APPENDIX C

INVENTORY OF DOCUMENTATION AND REFERENCE DOCUMENTS

Document List – MES Hawking Point Landfill

Not Dated	Geologic, Hydrologic & Soils Investigation
Not Dated	CHS Facility Permit for May 10, 1985 through May 9, 1988
Not Dated	Hazardous Waste Program CHS Permit
Not Dated	Figure 1 – Site Vicinity Map
Not Dated	Figure 2 – Site Layout Map
Not Dated	Site Map
January 1982	Operating Plan and Procedures
March 28, 1983	Report of Observations
August 1, 1983	Engineering Analyses and Design Documentation
March 1984	Environmental Hazard Assessment
June 27, 1985	Assessment of Continuing Releases
September 10, 1985	Aerial Photo Analysis
November 20, 1986	Newspaper Article regarding Allied Chemical
November 15, 1987	Reapplication for RCRA/CHS Facility Permit
April 1992	Permit Application for Contaminated Soil Storage Facility at Hawkins Point Hazardous Waste Landfill Area 6
May 1992	1989 Adjacent Land Use Map
November 1993	Permit Application for Soil and Wastewater Treatment Facilities at Hawkins Point Hazardous Waste Facility
August 4, 1994	Hawkins Point Hazardous Waste Landfill – Area 5 – Certificate of Closure
October 4, 1995	Controlled Hazardous Substances Permit
December 22, 1995	Hawkins Point Landfill – Chromium Contaminated Soil Treatment Unit – Description and Operations Manual

April 1998	Permit Application for Hazardous Waste Management Units at Hawkins Point Hazardous Waste Landfill Area 3, 5 and 6
February 5, 1999	Correspondence Regarding Leachate UST Closures
February 22, 2000	Hawkins Point Hazardous Waste Landfill – Permit Renewal Addendum #2
January 21, 2004	Correspondence Regarding Discontinuation of NPDES Permit
January 28, 2004	Correspondence Regarding NOI to Register for General Discharge Permit for Storm Water
April 13, 2004	Seep Evaluation and Recommendation Report – Hawkins Point Hazardous Waste Landfill – Baltimore, Maryland
August 2, 2006	Permit Application for Hazardous Waste Management Units at Hawkins Point Hazardous Waste Landfill Areas 3, 5, and 6
September 2006	RCRA Operation and Maintenance Inspection
May 19, 2008	Revisions to RCRA Hazardous Waste Permit Application for Hawkins Point Landfill
April 2009	RCRA Operation and Maintenance Inspection
May 7, 2009	Correspondence Regarding NOV-09-017
August 5, 2009	Correspondence Containing Groundwater Monitoring Report
2009	Groundwater Contour Map
February 2010	Fourth Quarter Groundwater Monitoring Report
March 19, 2010	SWM Retrofit Proposal

Not Dated

Geologic, Hydrologic & Soils Investigation

Geologic, Hydrologic & Soils Investigation

SECTION I

General Background:

The Atlantic Coastal Plain Province is underlain by a wedge-shaped mass of unconsolidated sedimentary despoits that overlie older consolidated crystalline rocks of Precambrian or Early Cambrian age. The Curtis Bay area lies within the upper Coastal Plain near the Fall Line that separates the Piedmont Province from the Coastal Plain. The unconsolidated sediments consist of stratified layers of sand, gravel, silt and clay. These sediments have been transported by wind, water and gravity. The Geologic Map of Maryland (1968) indicates that the upper Coastal Plain area consists of the youngest Patapsco and Raritan Formations, the intermediate Arundel Clay and the oldest Patuxent Formation, all of the lower Cretaceous Potomac Group. These Cretaceous sediments provide the parent material for the soils in the area.

According to the U.S.G.S. Geology Map of Baltimore County and Baltimore City (1976), the surface materials at the project site are part of the clay facies of the undifferentiated Patapsco and Raritan Formations. It is typically multicolored kaolinitic clay with varying amounts of sand and silt interbeds throughout. The thickness of the clay ranges from 1-1/2 to 165 feet thick. Below the clay is a sand facies which consists of well-sorted, fine to medium grained quartz sand with local areas of abundant quartz gravel. The sand and gravel strata constitute the major water-bearing layers that provide water to Annapolis, Glen Burnie and Bowie. The sand facies range from 1-1/2 to 100 feet thick.

Below the Patapsco and Raritan Formations is the Arundel Clay. This unit is a dark gray to maroon clay found only in the Baltimore-Washington area. Thickness ranges from zero to 100 feet. Below the Arundel is the Patuxent Formation, another important aquifer in the Coastal Plain. It consists of light gray to light brown clayey sands and gravels, and ranges in thickness from zero to 250 feet.

Groundwater at the site is a complex system which includes perched water as well as groundwater table conditions.[1] Water elevations range from 34 feet above sea level to 24 feet below sea level, due to the perched water conditions.

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[1]Personal communication with Frederick K. Mack, U.S.G.S., August, 1978.

SECTION II

Soils

The area surrounding Curtis Bay is part of the Christiana-Sunnyside-Sassafras soil association. The Christiana soils are deep, well-drained, highly clayey soils formed in the upper Coastal Plain. They developed in thick beds of very old red clays with some very thin mantles of silty and sandy materials. Because of the high plasticity, these soils are subject to earth slides and cave-ins when disturbed by building and highway construction.

Based on the available soils, geologic and hydrologic literature on the area near Thoms Cove, a subsurface exploration was completed to more accurately identify the extent of the clay and the locations of the silt and sand interbeds. Laboratory tests were performed to determine physical properties of the sediments.

SECTION III

Boring Data

Boring information from several subsurface investigations was used to evaluate the entire property as well as the extent and depth of chrome ore in Site 1. The following chart includes all soil borings evaluated for this project:

Date	# of Borings	Boring Nos.	Performed by	Performed for
Sept., 1981	19	B8 - B26	Hardin Assoc.	HLA
May, 1981	7	B1 - B7	Atec Assoc.	HLA
July, Aug., 1978	11	SB1 - SB5, B7A, B11A, B16A B24A, B31A,B32A	State Highway Admin.	Md. Port Admin.
Oct., 1977	30	B1 - B30	Water Resources Admin.	Md. Port Admin.

Based on the most recent soil exploration performed by Hardin Associates, the soil type encountered in almost all of the borings was a reddish brown to multicolored hard clay with trace amounts of silt and/or fine sand. The clay occurred consistently to the bottom of the test holes which indicates that the site is underlain by a thick horizon of clay. Other soil types include layers of silty sand, sand, silt and clayey silt. Colors vary from white and gray to tan and brown. An occassional thin seam of sand and gravel occurs. Five of the borings encountered chrome, they are: B7, B8, B9, B11, and B11A - which helped to delineate the location of the fill.

Based on the 1981 boring data and the data obtained from previous subsurface work, twelve (12) geologic sections were developed (A-A through

L - L). The sections are shown on the boring location map included in the Appendix of this report. Also, the various contour and isopach maps have been drawn to show the water levels and the extent of the sand lenses which occur on the site.

In general, the data indicates an extensive and continuous clay layer beneath the site with interfingering sand and silt layers. The sand layers and lenses are thicker on the north and west sides of the property and appear to thin or "pinch-out" towards the north and east sides. As the sand layers pinch into thin seams, the clay horizon becomes massive. Since the site has been used for the past decades, the soils have been disturbed and the surface material in areas is fill. The fill seems to consist mostly of clay transferred from neighboring areas, as it resembles the hard clay found at depth in the borings.

Several of the more recent borings encountered chrome ore. The 1977 and 1978 borings were concentrated in the area of Site 1, so the majority of those borings show the depths of the ore. Since 1978, additional fill material has been placed in this area; therefore, the surface elevations noted on the boring logs are not accurate. The geologic sections show the actual depth of sampling and the distribution of the different stratigraphic units.

The existence of faults, fracture systems, solution cavities, and similar geologic features was evaluated, and none were detected. Faults are difficult to determine in Coastal Plain sediments, and none are mapped in Anne Arundel County or Baltimore City and County. Similarly, fracture systems are difficult to recognize in plastic sediments such as clays; also, the destructive action of the boring process prevents recognition of fractures

in sediments brought to the surface by spoon or tube sampling methods. Solution cavities are not expected in the clays because of plasticity and lack of soluble minerals. Solution cavities in the sand, if present, are not important, because the fill design will minimize the potential for transmission of potential pollution.

SECTION IV

Sediment Analysis

To determine the physical characteristics of the soil, representative split spoon samples were tested in the laboratory. The tests included a visual classification including soil type, color and density, also the grain size distribution, natural moisture content, Atterberg Limits, Cation Exchange Capacity and permeability. The laboratory test results are included with this report.

The grain size distributions of selected samples are representative of the soils which are or will be providing containment and/or buffering capacity for fill material. The distributions indicate that more fines (clay and silt size particles) are present than is shown by the visual classification. The fine-grained soils that were tested are more than 90% fines with traces of sand. Clayey sediments predominate the area. The Plasticity Indices indicate moderately to highly plastic soils as was expected from the soil survey.

The Cation Exchange Capacity (CEC) was determined for six (6) representative samples. These range from 10 to 49 MEQ per 100 grams with an average CEC of 26 MEQ.

Four (4) permeability tests were completed: two on undisturbed, shelby tube samples, and two on remolded samples compacted to 90% of the maximum dry density. The permeability values were low within a 10^{-8} to 10^{-9} cm/sec. range.

SECTION V

Groundwater

As previously mentioned, the data obtained from the borings and monitoring wells indicate the existence of perched water and a ground water table condition within the site. Since the water level readings range from 34 feet above sea level to 24 feet below sea level, the data is not consistent enough to compile meaningful water table contours.

One reason for the inconsistent water data is that the complex facies change throughout the stratigraphic column. The interfingering sand and silty sand layers are being recharged by a source outside the property. The sand layers carry the water until it reaches an impervious zone such as clay. The water then becomes perched in that area. The true water table is located approximately several feet below sea level. The geologic cross-sections indicate where water was encountered in the monitoring wells.

SECTION VI

Production Well Data[2]

An evaluation was made of production wells located in the Patuxent and Patapsco Formations where production exceeds 10,000 gallons per day (.01 mgd), and especially with high production wells where production exceeds 1,000,000 gallons per day (1.0 mgd). The well locations and production data were obtained from the U.S. Geological Survey, the Maryland Water Resources Administration, and various technical data files and reports. The wells are shown on Exhibit 1 and Exhibit 2.[3,4]

The wells producing from the Patuxent Formation are considered unaffected by the fill location, because of the natural barrier of the overlying Arundel Clay as shown on Exhibit 3. The Arundel Clay is at least 100 feet thick below the site and is very extensively developed throughout northern Anne Arundel County, Baltimore City, and Coastal Plain areas of Baltimore County.[5]

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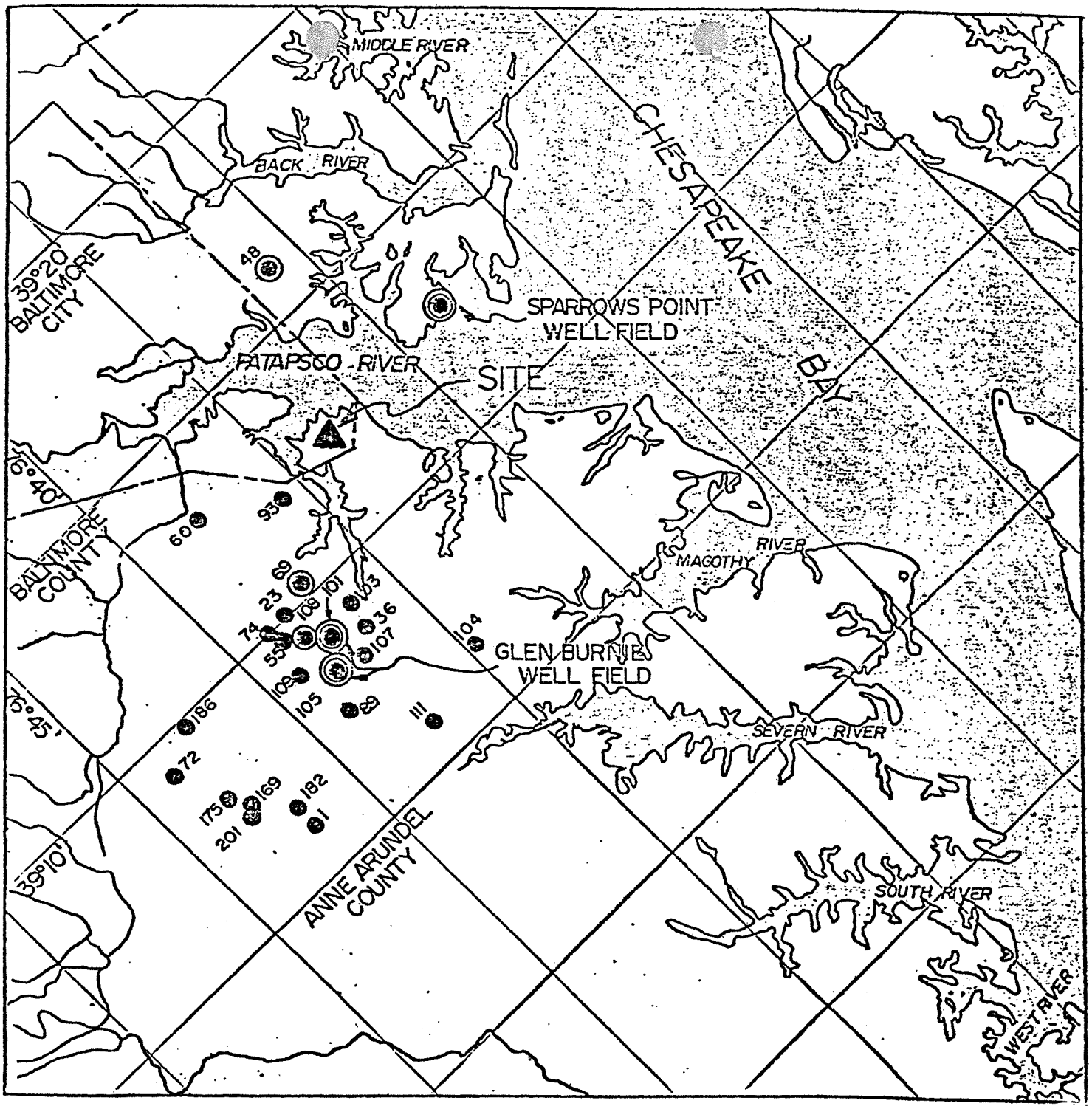
[2]Harrington, Lacey and Associates, Quarantine Road Secure Landfill - Part I: Secure Landfill Operating Plan and Procedures, (August 1980) pp. II-9 through II-11.

[3]Lucas, Richard, C., Anne Arundel County Groundwater Information: Selected Well Records, Chemical-Quality Data, Pumpage, Appropriation Data, and Selected Well Logs: Water Resources Basic Data Report No. 8, Maryland Geological Survey (Baltimore: 1976), 149 pp.

[4]Laughlin, Charles P., Records of Wells and Springs in Baltimore County, Maryland: Water Resources Basic Data Report No. 1, Maryland Geological Survey, (Baltimore: 1966), 403 pp.

[5]Bennett, Robert R. And Rex R. Meyer, 1952, Geology and Ground-Water Resources of the Baltimore Area, Maryland Geological Survey, Bulletin A, Baltimore, Maryland, 559 pp.



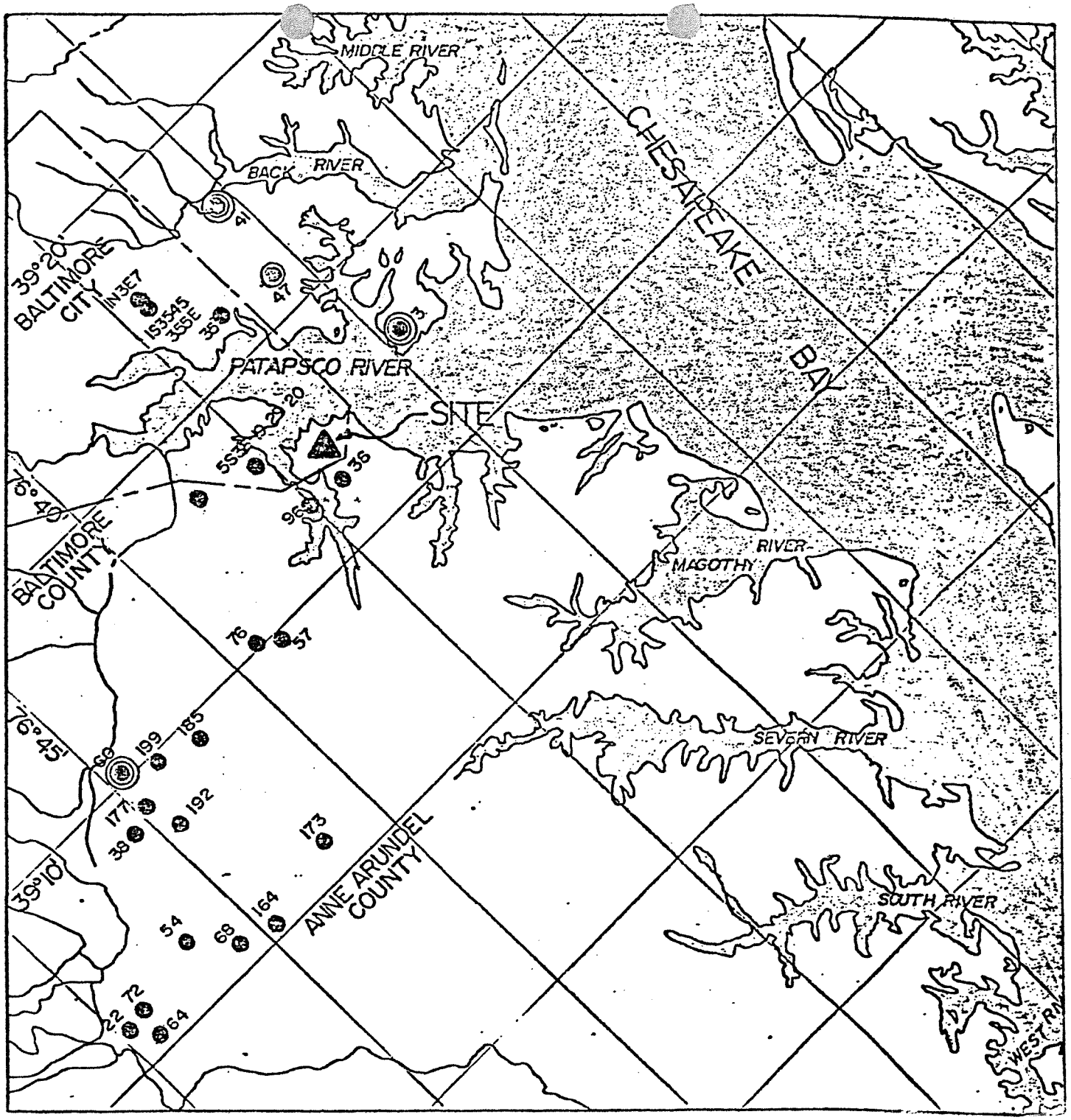
LEGEND

- WELLS PRODUCING ≥ 1.0 MGD.
- WELLS PRODUCING ≥ 0.1 MGD. ≤ 1.0 MGD.
- WELLS PRODUCING > 1.0 MGD.

PATAPSCO AQUIFER WELLS

Exhibit 1 Scale: 1" = 1/4 mi.

Harrington, Lacey & Associates
Engineers



LEGEND

- WELLS PRODUCING ≥ 1.0 MGD.
- WELLS PRODUCING ≥ 0.1 MGD ≤ 1.0 MGD.
- WELLS PRODUCING > 1.0 MGD.

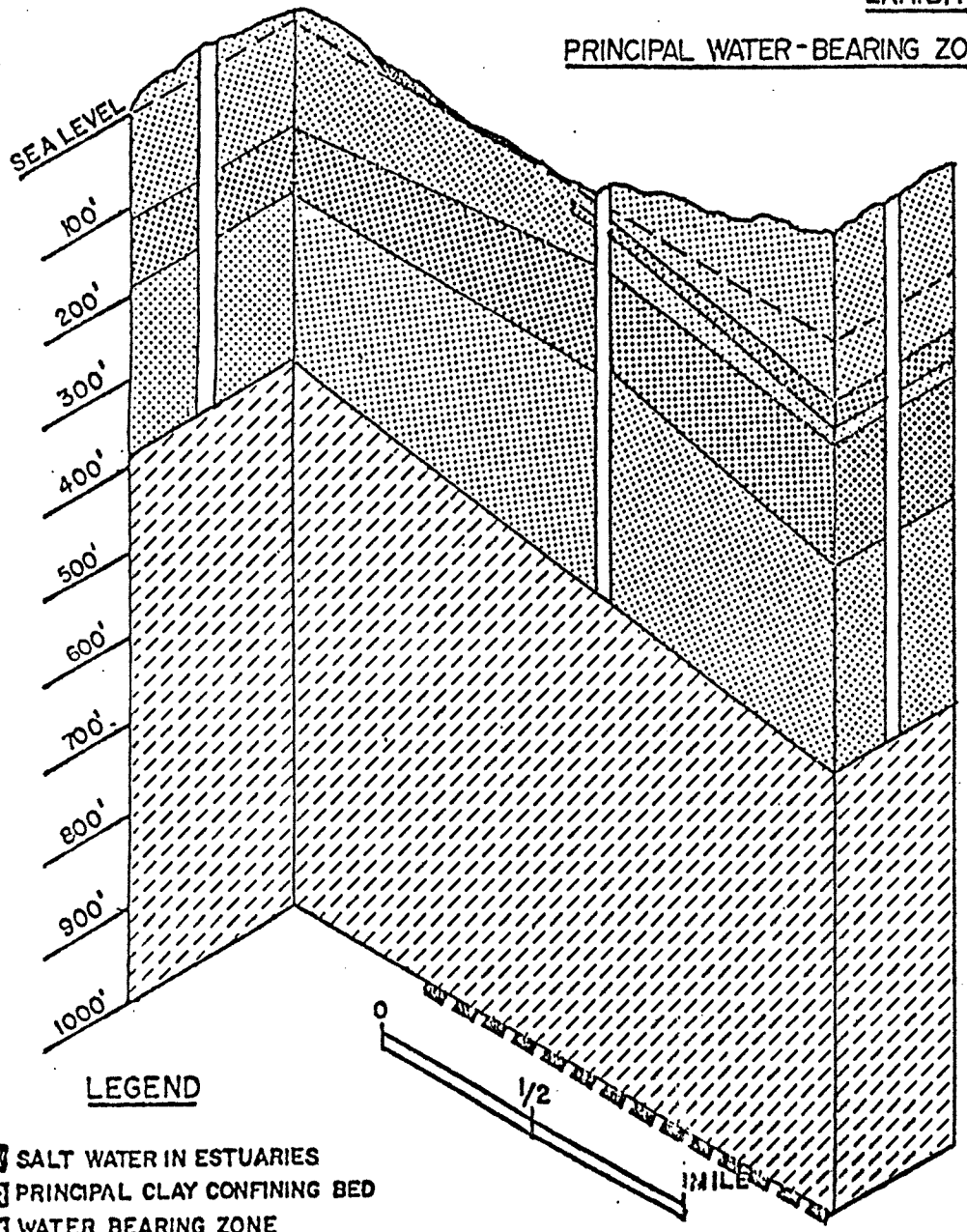
PATUXENT AQUIFER WELLS

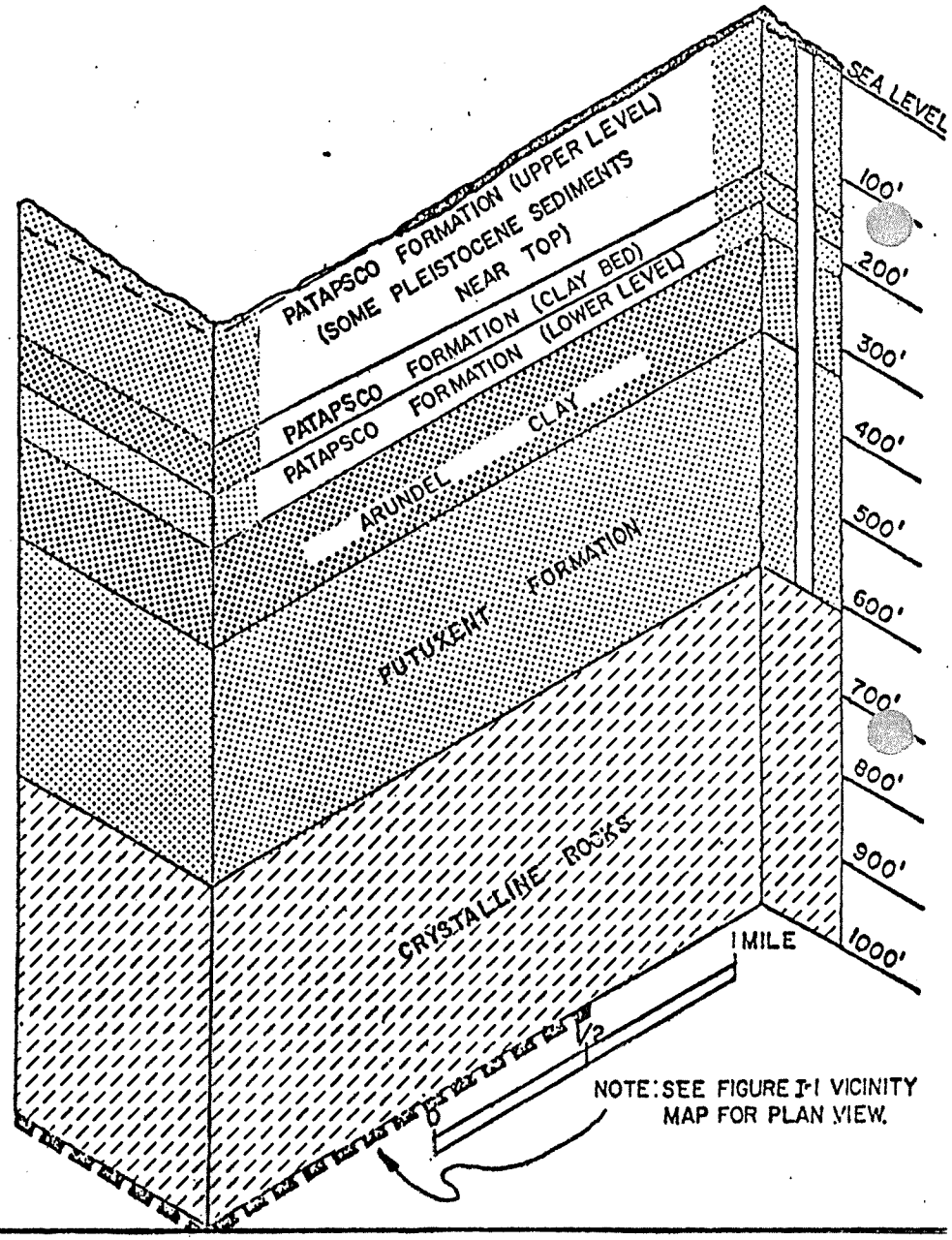
Exhibit 2 Scale: 1" = 1/4 mi

Harrington, Lacey & Associates
Engineers

EXHIBIT 3

PRINCIPAL WATER-BEARING ZONES AND CONFINING BEDS





NOTE: SEE FIGURE I-1 VICINITY MAP FOR PLAN VIEW.

LEGEND

- SALT WATER IN ESTUARIES
- PRINCIPAL CLAY CONFINING BED
- WATER BEARING ZONE
- CRYSTALLINE ROCKS

SOURCE: GEOLOGY AND GROUNDWATER RESOURCES OF THE BALTIMORE AREA.
BY ROBERT R. BENNETT AND REX R. MEYERS
MARYLAND GEOLOGICAL SURVEY,
BULLETIN A, 1952.

The Patapsco and Raritan Formations occurring above the Arundel Clay, and within which the fill is developed, have at least 19 wells within 10 miles of the site producing from 0.01 mgd to 0.1 mgd, 3 wells producing 0.1 mgd to 1.0 mgd, and 2 well fields producing above 1.0 mgd. The two well fields are the Sparrows Point field in Baltimore County and the Glen Burnie field in northern Anne Arundel County (Exhibit 1); respectively, these are approximately 4 and 6 miles from the fill site. There are no additional high capacity wells (1.0 mgd or above) closer to the site.

Only the wells having production above 1.0 mgd were evaluated as being potentially affected or affecting the groundwater movement in an immediately adjacent to the proposed Quarantine Road Secure Landfill. On that basis, the hydrologic conditions of these wells in the Patapsco Formation were investigated in two areas: the Glen Burnie well field, and the Sparrows Point well field. This is because the 19 wells producing below 0.1 mgd will have an approximate total average use of 1.0 mgd. Three other wells that average a total use of approximately 1.5 mgd are in the range of 0.1 mgd to 1.0 mgd. A total production of all the 19 wells is well below the daily average production of the Glen Burnie field alone.

The Glen Burnie field had an actual use of 7.5 mgd between January 1, 1978 and July 1, 1978, with a maximum use of 9.5 mgd on June 25, 1978. The Sparrows Point field used approximately 1.0 mgd during 1977 (the records do not indicate whether these values are average or maximum).

According to a representative of the U.S. Geological Survey, two wells at Sparrows Point are screened in the Patapsco at 206 - 222 feet and 283 - 304 feet. The drawdown on these observation wells is minimal; thus, this well field will not affect or be affected by the fill.[6]

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[6]Personal communication with Miss Claire Richardson, Geologist, U.S. Geological Survey in Baltimore, Maryland, September, 1978.

There is no recent information or usable observation wells maintained by the Maryland Geological Survey or the U.S. Geological Survey to determine the hydrologic characteristics of the Glen Burnie well field on surrounding wells, especially those between the field and the fill. However, the potential for affecting the Glen Burnie well field will be minimal because of a clay horizon that is separated from the lower aquifers by a natural clay barrier.

SECTION VII

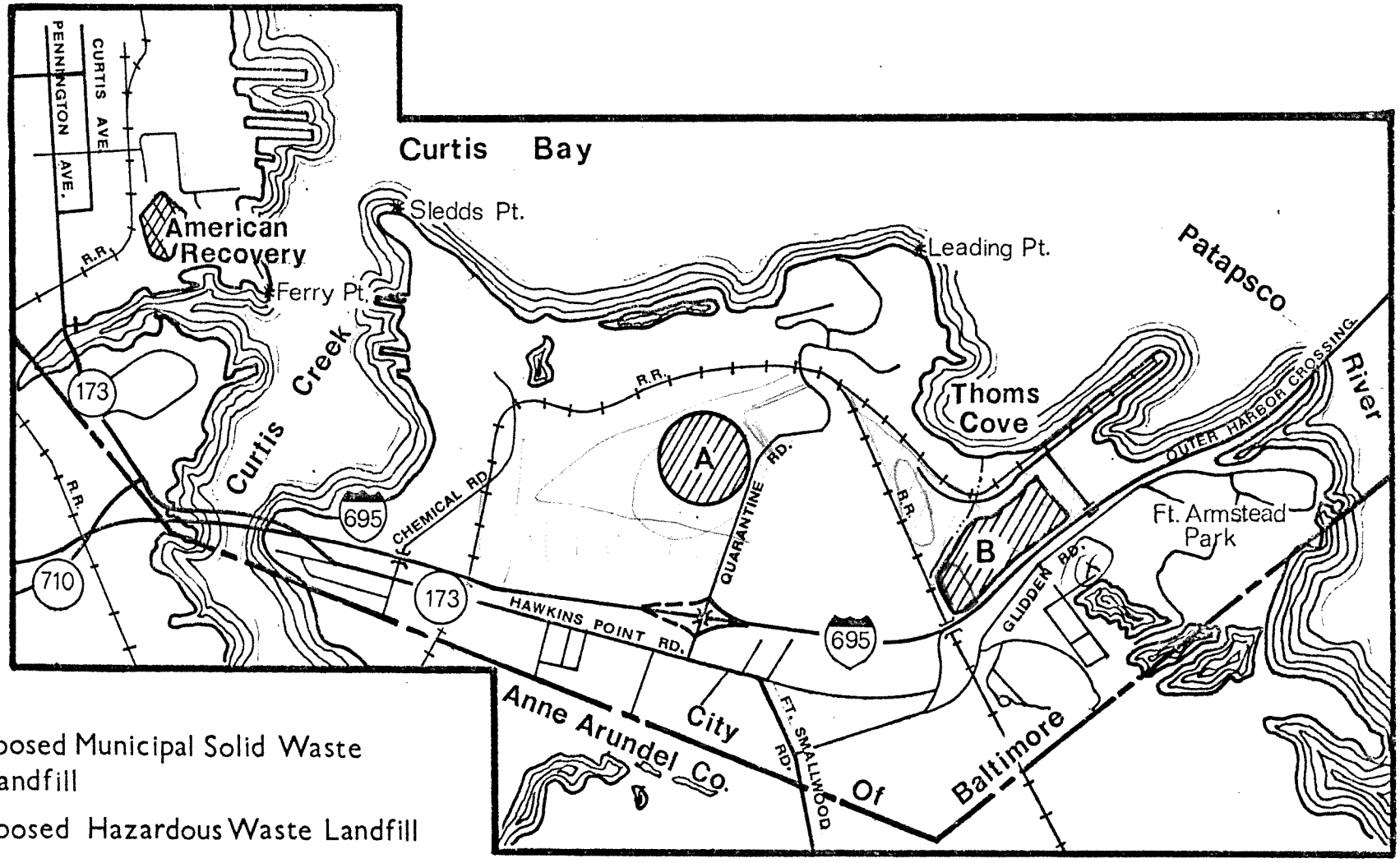
Conclusions

The subsurface investigation and evaluation has provided a better understanding of the geologic and hydrologic conditions in the vicinity of the project site. In general, the underlying sediments consist of clays with interbedded silts and sands. The sand layers are thickest on the north side of the property and "pinch-out" towards the east and south. The existing low permeability clay is extensive and can serve as an effective barrier against the downward movement of leachate and its constituents. The sand and silt layers are expected to be encountered during excavation. The greatest concern is with the sand layers that appear to be continuous in the southern part of the site. The potential for lateral transmission of water must be evaluated. If necessary, clay may be transferred from one part of the site to critical areas so that the clay can be placed in a controlled manner to produce an effective barrier.

In general, the sediments have a high clay content which will retard the movement of water, yet allow for lateral movement toward the leachate collection system. The potential for public health hazards related to ground water and domestic water supply will be minimized because the immediate surrounding area is served by a central water supply system.

The evaluation of existing production well records indicates that the potential for impacting wells within the area is minimal because of the protection offered by the underlying Arundel Clay formation and the location of the fill within clay and clayey sediments. Also, the information contained in the State's files and published reports indicates that the drawdown from the production well in the site vicinity will not affect the proposed fill.

The required monitoring of the groundwater wells will detect problems that arise relating to the movement of potential pollutants away from the site.



A Proposed Municipal Solid Waste Landfill

B Proposed Hazardous Waste Landfill

N

0 1000' 2000' 4000'

VICINITY MAP

HARRINGTON, LACEY & ASSOCIATES, INC.

SHEET No. 1 OF 1

BY RJH SUBJECT Ground Water Elevations - MES Hawkins Pt.

DATE 10/12/81

W.O. No. 7468-1

BORING No.		SURFACE Elevatn	BORING DEPTH	G.W. Depth	B.H. Bottom Elev.	G.W. Elevatn			
8		32.6	40	16.1	-7.4	16.5			
9		40.6	50	30.2	-9.4	10.4			
10		36.9	40	DRY	-3.1	DRY			
11		38.5	54	30.9	-15.5	7.6			
11A		23.6	40	20.2	-16.4	3.4			
12		54.34	60	40.9	[illegible]	13.44			
13		30.1	40	14.5	[illegible]	15.6			
14		15.7	40	12.1	-24.3	3.6			
15		21.9	40	14.0	[illegible]	7.9			
16	16A/22.6	21.9	40	DRY	[illegible]	DRY			
17		16.6	40	23.9	-23.4	-7.3			
18		19.4	40	32.1	-20.6	-12.7			
19	19A/22.6	19.7	40	DRY	[illegible]	DRY			
20		21.6	40	BKFL	[illegible]	BKFL			
20A		20.6	40	15.2	[illegible]	5.4			
21		16.2	40	DRY	-23.8	DRY			
22		40.8	40	34	[illegible]	6.8			
23		39.9	40	34.25	[illegible]	5.65			
24		36.3	40	26.7	[illegible]	9.6			
25		38.0	41	38	[illegible]	0			
26		44.1	40	9.8	[illegible]	34.3			

SOIL BORING PROFILES

Date	# of Borings	Boring Nos.	Performed by	Performed for
Sept., 1981	19 ◓	B8 - B26	Hardin Assoc.	HLA
May, 1981	7 ◑	B1 - B7	Atec Assoc.	HLA
July, Aug., 1978	11 ⊞	SB1 - SB5, B7A, B11A, B16A B24A, B31A, B32A	State Highway Admin.	Md. Port Admin.
Oct., 1977	30 ⬓	B1 - B30	Water Resources Admin.	Md. Port Admin.

▽ Indicates water level in borehole

(32.6) Indicates ground surface elevation

SOIL TYPE

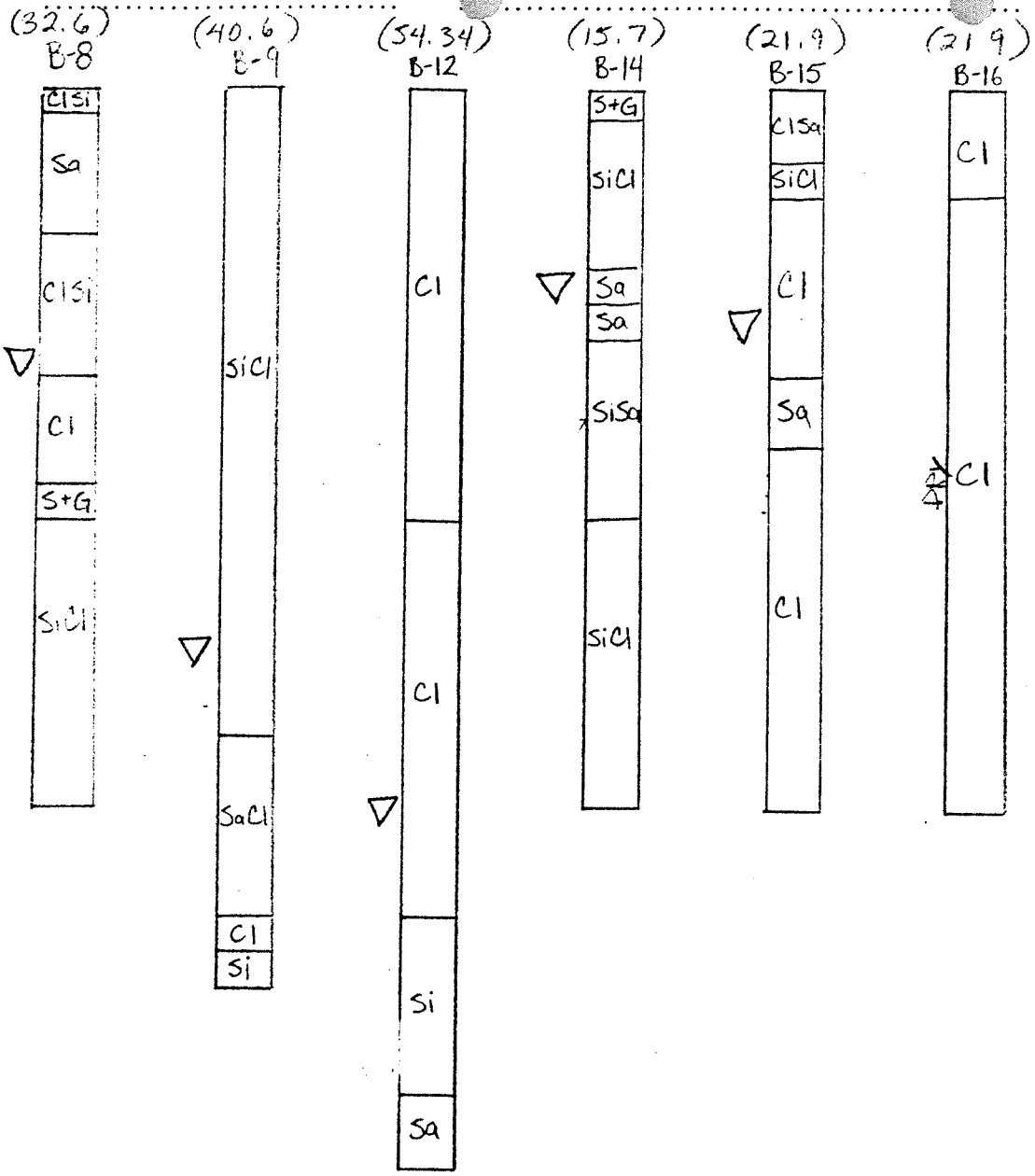
Cl - Clay
Sa - Sand
Si - Silt
S+G - Sand + Gravel
MK - Swamp Muck

or combinations:

SaCl - Sandy Clay
ClSi - Clayey Silt

BY ..... DATE ..... SUBJECT ..... SHEET NO. ..... OF ..... 10 .....

CHKD. By ..... DATE ..... Sept. 1981 – Hardin Assoc. JOB NO. .....



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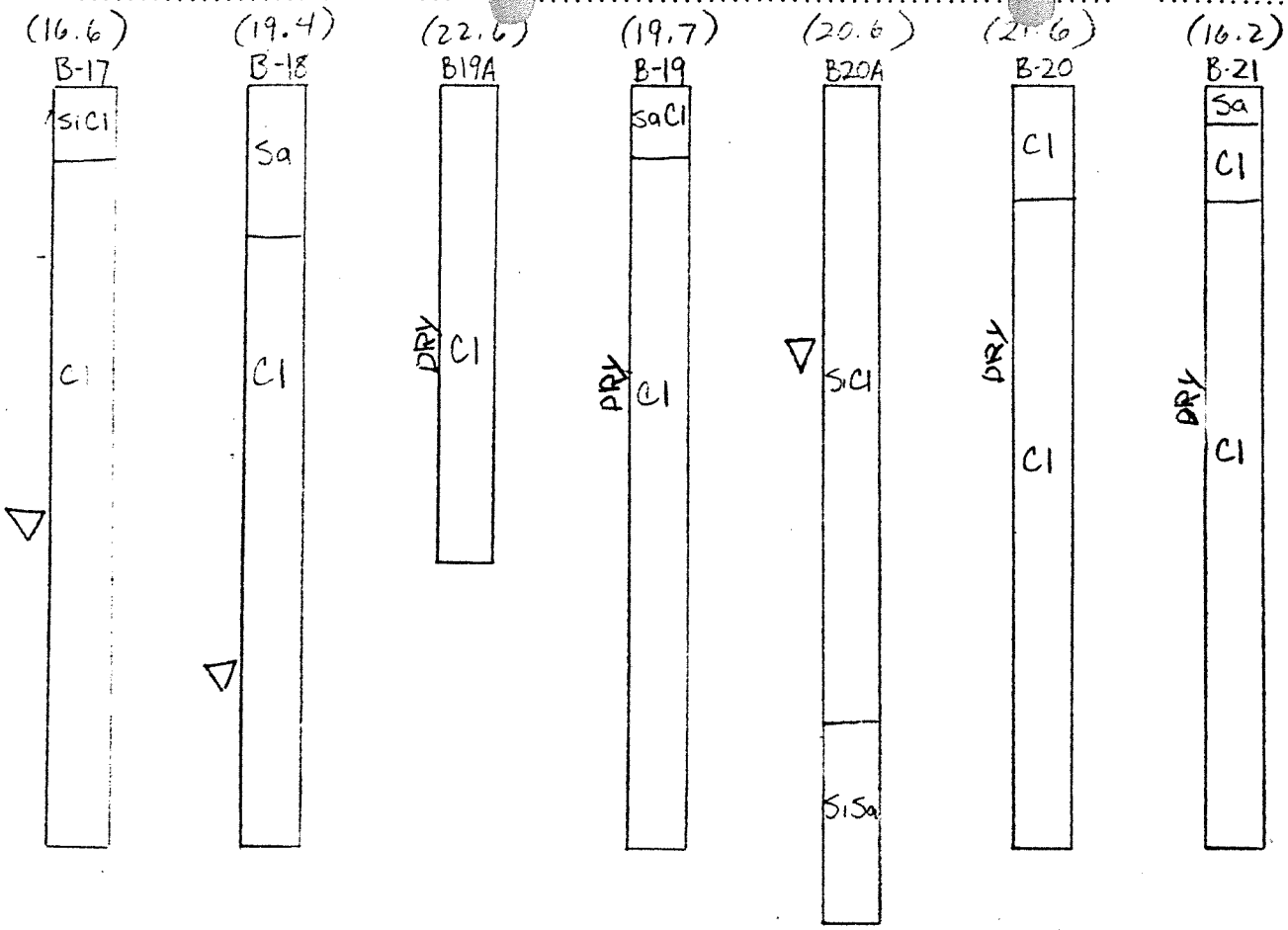

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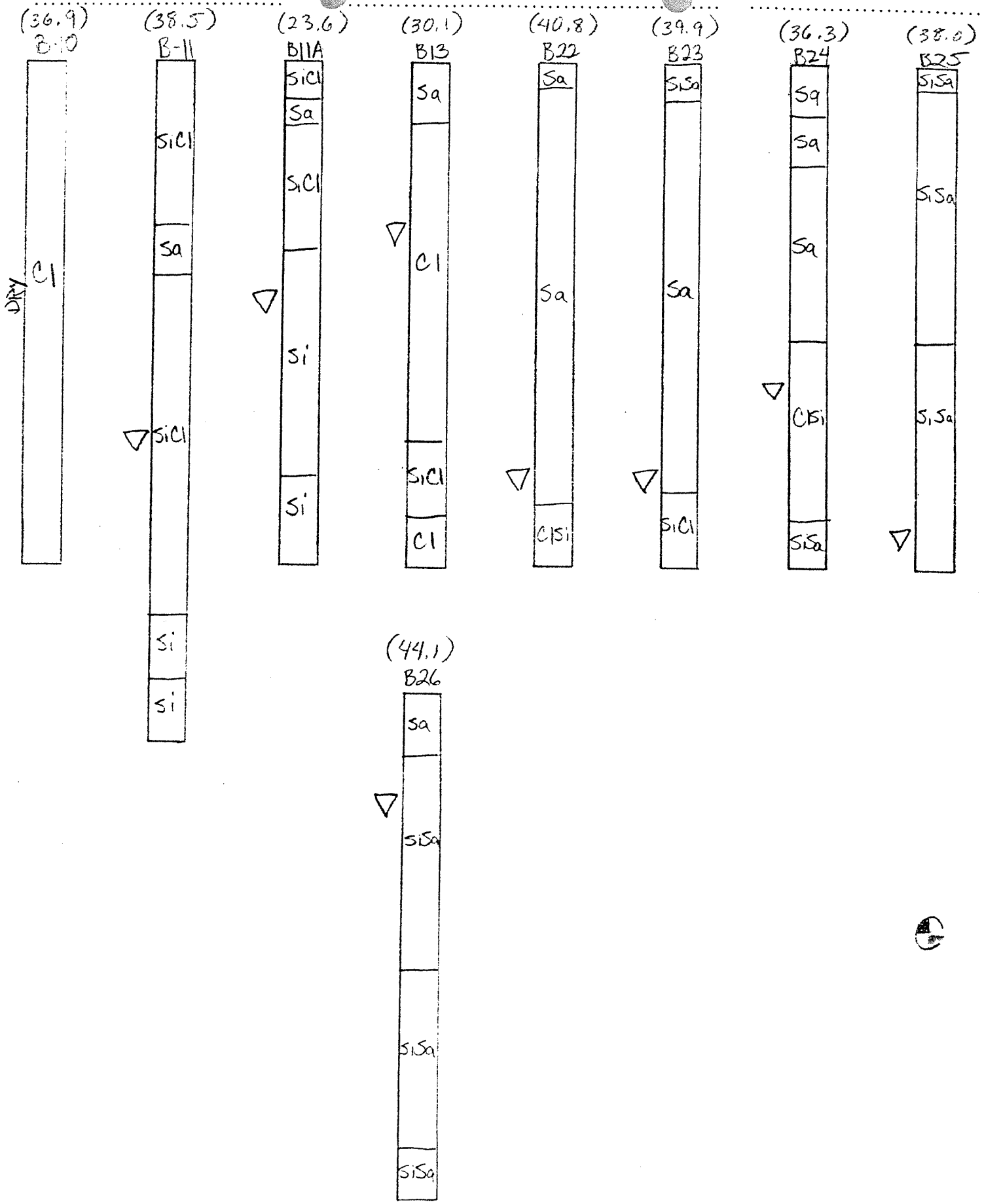

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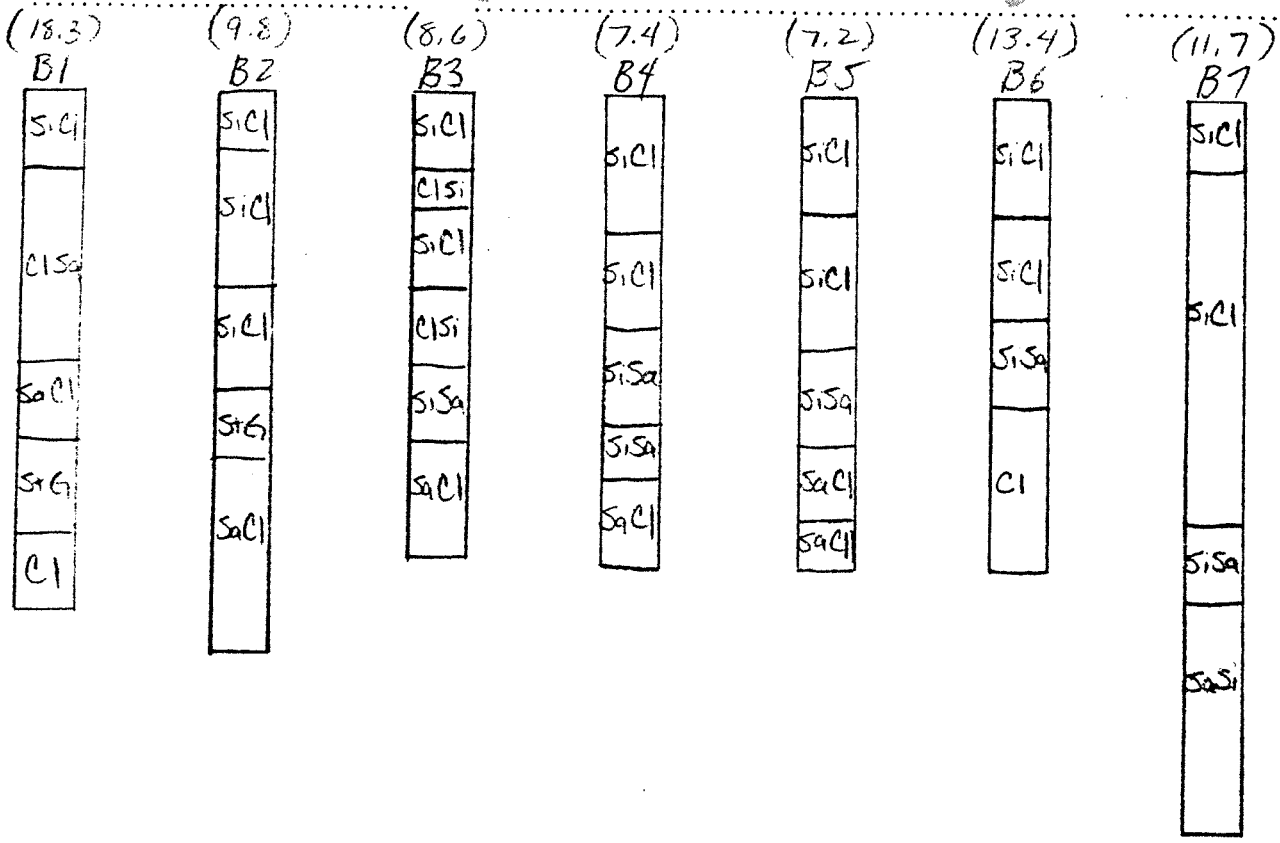

BY ..... DATE ..... SUBJECT MED HAWKINS POINT ..... SHEET NO. 5 OF 10

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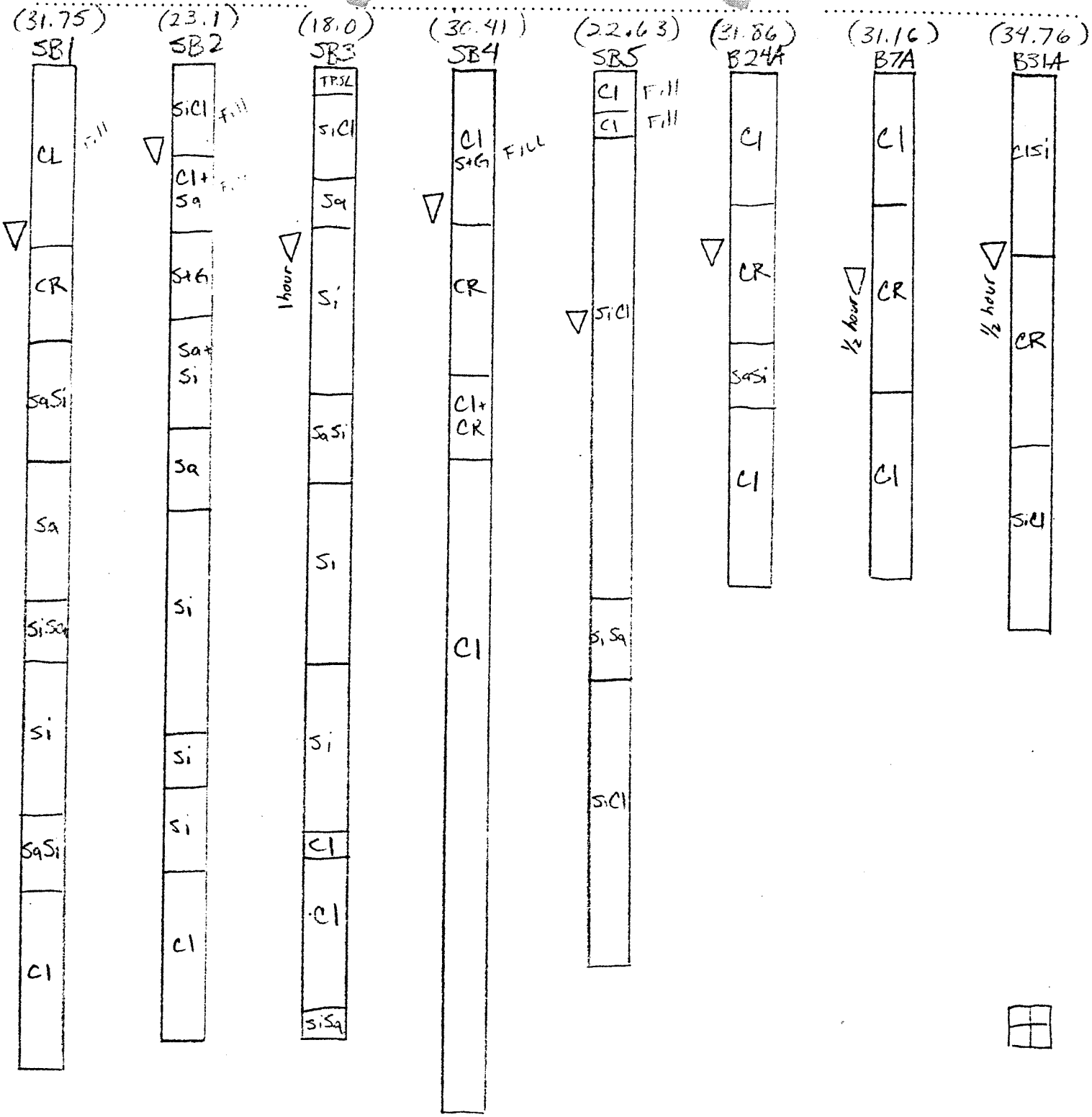

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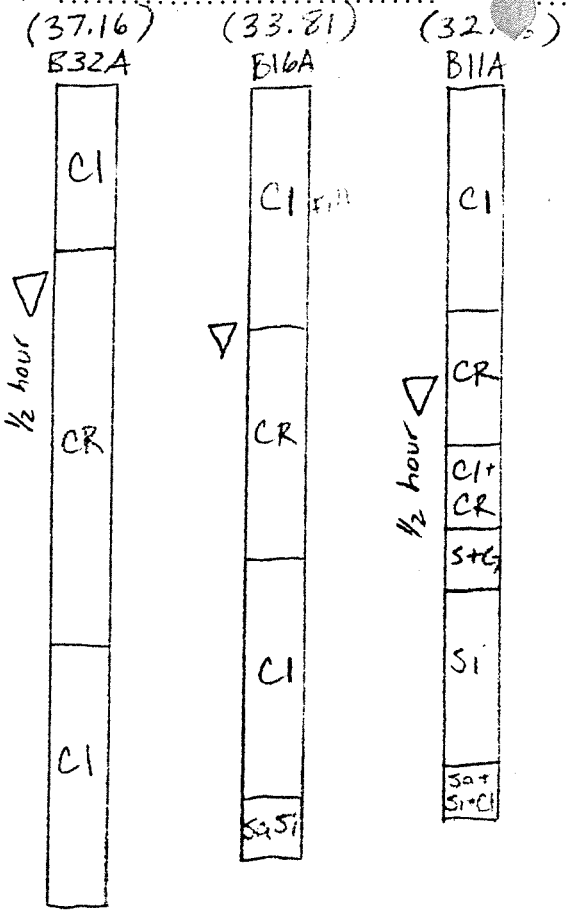

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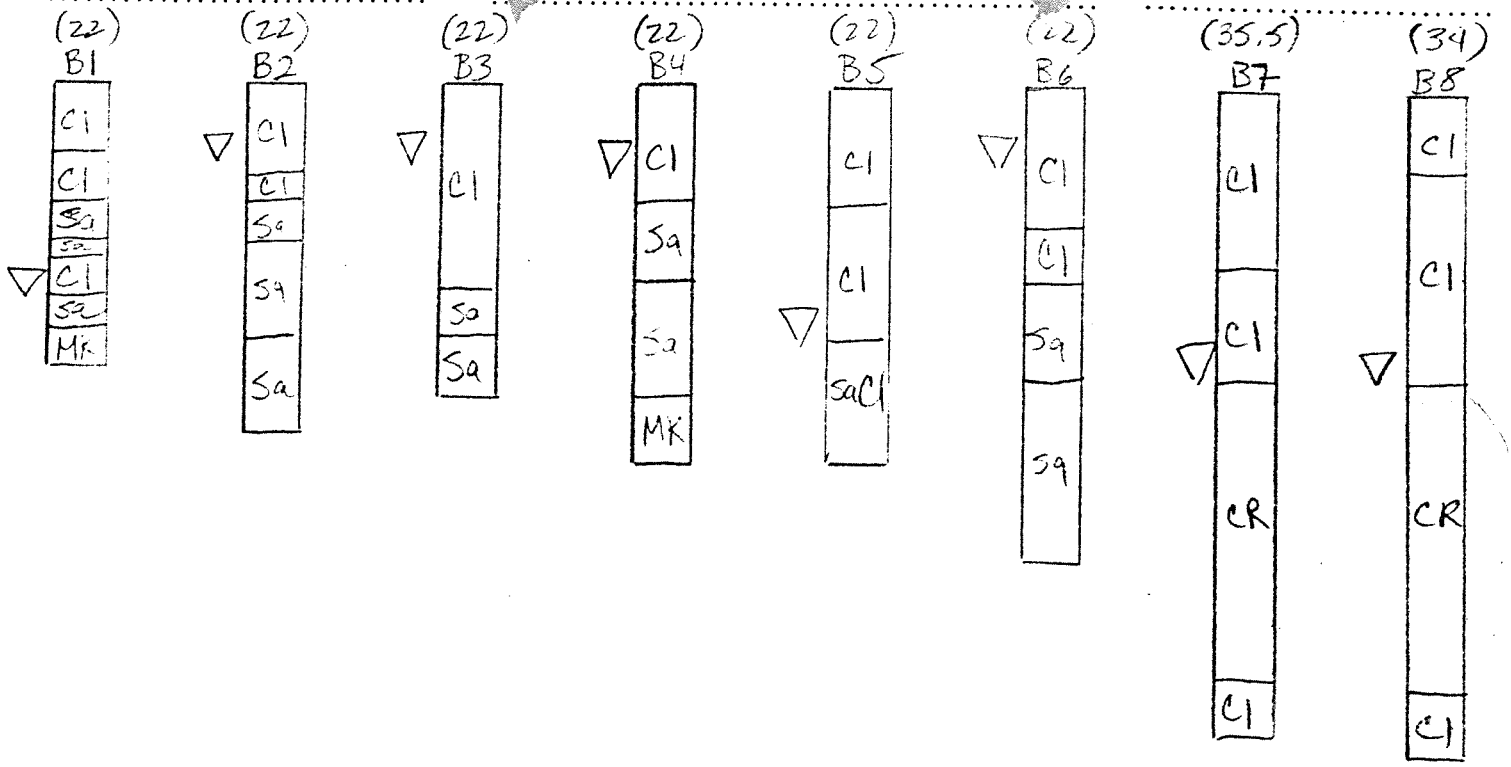
CHKD. By ..... DATE ..... Oct. 1977 - Water Res. Adm.

SHEET NO. 1 OF 10

JOB NO. .....



Not Dated

CHS Facility Permit for May 10, 1985 through May 9, 1988

State of Maryland

OFFICE OF ENVIRONMENTAL PROGRAMS
DEPARTMENT OF HEALTH AND MENTAL HYGIENE

201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201 • AREA CODE 301 • 383-

TTY FOR DEAF: Balto. Area 383-7555
D.C. Metro 565-0451

Adele Wilzack, R.N., M.S., Secretary

William M. Eichbaum, Assistant Secretary

CONTROLLED HAZARDOUS SUBSTANCES FACILITY PERMIT

Permit Number: A-264

Effective Date May 10, 1985

Expiration Date May 9, 1988

Pursuant to the Provisions of Health-Environmental Article, Section 7-232, Annotated Code of Maryland and regulations promulgated thereunder, the Office of Environmental Programs, Waste Management Administration, hereinafter referred to as "WMA" hereby authorizes

974-3276

Maryland Environmental Service
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

to operate a Controlled Hazardous Substances disposal facility

located at 5501 Quarantine Road
Baltimore, MD 21226

in accordance with the following special and general conditions including the attached map made a part hereof, and the provisions of COMAR 10.51. Applicable regulations are those which are in effect on the date of issuance of this permit.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated August 14, 1983 as modified by subsequent amendments dated January 31, 1984, August 1, 1984, September 10, 1984, October 16, 1984, November 2, 1984, December 18, 1984, and January 2, 1985 (hereafter referred to as the application) is accurate and that the facility will be constructed and/or operated as specified in the application. Any inaccuracies found in this information may be grounds for the termination or modification of this permit (see COMAR 10.51.07.02 J) and potential enforcement action. The Permittee must inform the WMA of any deviation from or changes in the information in the application which would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

Not Dated

Hazardous Waste Program CHS Permit

Maryland Department of the Environment

Hazardous Waste Program

Controlled Hazardous Substances Permit

MDE

CHS PERMIT A-264

(EPA ID No. MDD000731356)

Permittee:	**Maryland Environmental Service** **Hawkins Point Landfill** **5501 Quarantine Road** **Baltimore, MD 21226**

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Hazardous Waste Program

Controlled Hazardous Substances Permit Number A-264

Maryland Environmental Service
Hawkins Point Landfill
5501 Quarantine Road
Baltimore, Maryland 21226

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ATTACHMENTS

1. Waste Analysis Plan
2. Security Plan
3. Inspection Schedule
4. Personnel Training Outline
5. Contingency Plan
6. Closure Plan
7. Post-Closure Plan
8. Ground Water Monitoring Plan

9. Health and Safety Plan

10. Plans and Specifications of the Waste Water Treatment Facility

11. Waste Water Treatment Facility Operations Manual

12. Facility Description

13. Permit Application Part A

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Hazardous Waste Program

Controlled Hazardous Substances Permit Number A-264

Maryland Environmental Service
Hawkins Point Landfill
5501 Quarantine Road
Baltimore, Maryland 21226

OVERVIEW

This permit is a renewal of a Controlled Hazardous Substances (CHS) permit previously issued to Maryland Environmental Service (MES) on October 15, 1995 and modified on December 24, 1998. The facility, Hawkins Point Landfill, is located at 5501 Quarantine Road, Baltimore, MD 21226. MES is permitted to conduct the following operations in accordance with the requirements of the Code of Maryland Regulations Title 26, Subtitle 13:

- Area 5 Landfill: Authorized for post-closure care only.

- Waste Water Treatment Unit: Authorized only for the storage and treatment of waste water generated at the Hawkins Point Landfill (EPA ID No. MDD 000731356), Dundalk Marine Terminal (EPA ID No. MDD 030324073) and Honeywell Intl. Inc. (formerly known as Allied Signal's Baltimore Works Site, EPA ID No. MDD 069396711).

Maryland Environmental Services has provided secure conditions meeting statutory and regulatory requirements concerning hazardous waste management. Maryland Environmental Service has also demonstrated that it has in place required personnel training programs and contingency plans as well as appropriate safeguards and security measures to meet the regulatory requirements.

CONTROLLED HAZARDOUS SUBSTANCES FACILITY PERMIT

Permit Number: **A-264**

Effective Date: **January 28, 2002**

Expiration Date: **January 27, 2007**

Pursuant to the Provisions of Environment Article, §7-232, Annotated Code of Maryland and regulations promulgated thereunder, the Maryland Department of the Environment, Waste Management Administration, hereinafter referred to as "WAS" hereby authorizes

Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, Maryland 21401

(hereinafter "MES") to operate a controlled hazardous substances (CHS) treatment and storage facility and to maintain an inactive CHS land disposal facility known as the Hawkins Point Landfill, EPA Identification No. MDD000731356 and located at 5501 Quarantine Road, Baltimore, Maryland 21226 (76^0 32' 58" West Longitude and 39^0 12' 29" North Latitude[1]), in accordance with the following standard, general and special conditions including the attachments to this permit made a part hereof, and the provisions of the Code of Maryland Regulations, Title 26, Department of the Environment, Subtitle 13, Disposal of Controlled Hazardous Substances, hereinafter referred to as COMAR 26.13.

This permit is based on the assumption that the information submitted in the permit renewal application received by the Department on April 30, 1998 and as modified by subsequent amendments dated May 20, 1999, February 23, 2000 and December 12, 2001 (hereafter referred to as the application) is accurate and that the facility will be operated as specified in the application. Any inaccuracies found in this information may be grounds for modification or termination of this permit (COMAR 26.13.07.11 & .12) and potential enforcement action. MES shall inform the WAS of any deviation from or changes in the information submitted in the application which would affect MES' ability to comply with the applicable regulations or permit conditions.

[1] These coordinates mark the center of the site.

PART I - STANDARD CONDITIONS

I.A. EFFECT OF PERMIT

MES is allowed to manage hazardous waste in accordance with the conditions of this permit. Any management of hazardous waste not authorized in this permit is prohibited except as otherwise authorized by COMAR 26.13. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 7003 of RCRA (42 USC §6973), Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC §9606(a) commonly known as CERCLA), or any other law governing protection of public health or the environment.

I.B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in COMAR 26.13.07.11 and .12. The filing of a request for a permit modification, revocation and re-issuance, or termination or the notification of planned changes or anticipated noncompliance on the part of MES, does not stay the applicability or enforceability of any permit conditions.

I.C. SEVERABILITY

The provisions of this permit are severable; and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I.D. DEFINITIONS

For the purpose of this permit, terms used herein shall have the same meaning as those in COMAR 26.13 unless this permit specifically states otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the general scientific or industrial meaning of the term.

I.E. SIGNATORY REQUIREMENTS

All reports or other information requested by the WAS shall be signed and certified as required by COMAR 26.13.07.03.

I.F. DOCUMENTS TO BE MAINTAINED AT THE FACILITY SITE

MES shall maintain at the facility, until closure is completed and certified by an independent registered professional engineer, the following documents and amendments, revisions, and modifications to these documents:

1. Waste analysis plan required by COMAR 26.13.05.02 D and this permit. (Permit Attachment 1)

2. Inspection schedules and logs required by COMAR 26.13.05.02 F (2) and (4) and this permit. (Permit Attachment 2)

3. Personnel training documents and records required by COMAR 26.13.05.02 G (4) and (5) and this permit. (Permit Attachment 3)

4. Contingency Plan required by COMAR 26.13.05.04 and this permit. (Permit Attachment 4)

5. Operating record required by COMAR 26.13.05.05 D and this permit. (Permit Attachment 2)

6. Closure Plan required by COMAR 26.13.05.07 and this permit. (Permit Attachment 6)

7. Post-Closure Plan required by COMAR 26.13.05.07 and this permit (Permit Attachment 6)

8. A copy of this permit and its attachments.

9. A copy of COMAR 26.13 and its updates.

10. All other documents required by subsequent parts of this permit.

I.G. DUTIES AND REQUIREMENTS

1. Duty to Comply. MES shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any other permit noncompliance constitutes a violation of COMAR and is grounds for enforcement action, permit termination, revocation and re-issuance, modifications, or denial of a permit renewal application. (COMAR 26.13.07.04 B)

2. Duty to Reapply. If MES wishes to continue an activity regulated by this permit after the expiration date of the permit, MES shall submit a complete application for a new permit at least 180 days before this permit expires. (COMAR 26.13.07.04 C)

3. Permit Expiration. This permit and all conditions therein will remain in effect beyond the permit's expiration date if the MES has submitted a timely complete application and, through no fault of the MES, the WAS has not issued a new permit. (State Government Article, §10-226(b))

4. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for MES in an enforcement action to argue that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (COMAR 26.13.07.04 D)

5. Duty to Mitigate. MES shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit. (COMAR 26.13.07.04 E)

6. Proper Operation and Maintenance. MES shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by MES to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facility or similar systems to maintain compliance with the conditions of this permit. (COMAR 26.13.07.04 F)

7. Duty to Provide Information. MES shall furnish to the WAS, within a reasonable time, any relevant information which the WAS may request to determine whether cause exists for modifying, revoking or re-issuing, or terminating this permit, or to determine compliance with this permit. MES shall also furnish to the WAS, upon request, copies of records required to be kept by this permit. (COMAR 26.13.07.04 I)

8. Inspection and Entry. MES shall allow the WAS, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

   a. Enter at reasonable times upon MES's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

   c. Inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor substances or parameters at any location, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by COMAR 26.13.07.04 J.

9. Monitoring and Records.

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from COMAR 26.13.02.20 or an equivalent method approved by the WAS. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846, 3rd ed.), Standard Methods of Waste Water Analysis (19th ed.; 1995) or an equivalent method as specified in the attached Waste Analysis Plan.

b. MES shall retain records of all monitoring information, including all maintenance records and copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, and record. These periods may be extended by request of the WAS at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

c. Records of monitoring information shall specify:

i. The dates, exact place, and times of sampling or measurements;
ii. The individuals who performed the sampling or measurements;
iii. The dates analyses were performed;
iv. The individuals who performed the analyses;
v. The analytical techniques or methods used; and
vi. The results of such analyses (COMAR 26.13.07.04 K)

10. Reporting Planned Changes. MES shall give notice to the WAS as soon as possible of any planned physical alterations or additions to the permitted facility or any planned alterations to the permitted activity. This notice must include a description of all incidents of noncompliance reasonably expected to result from the proposed changes. (COMAR 26.13.07.04 M (1))

11. Transfer of Permit. This permit may be transferred to a new owner or operator only if it is modified or revoked and re-issued pursuant to COMAR 26.13.07.10. Before transferring ownership or operation of the facility during its operating life, MES shall notify the new owner or operator in writing of the requirements of COMAR 26.13 and provide the new owner with a copy of this permit. (COMAR 26.13.07.04 M(3))

12. Notification

a. MES shall report to the WAS any noncompliance, which may endanger health or the environment, orally within 24 hours and in writing within 5 days from the time MES becomes aware of the circumstances. (COMAR 26.13.07.04 M(6))

b. Oral and written reports required by Permit Condition I.G.12.a above shall include the following:

1. Information concerning release of any hazardous waste that may endanger a public drinking water supply source;

2. Any information of a release or discharge of hazardous waste, or of a fire or explosion at the facility which could threaten human health or the environment outside the facility, with the description of the occurrence and its cause including:

i. The name, address, and telephone number of the owner or operator;
ii. The name, address, and telephone number of facility;
iii. The date, time, and type of incident (for example, a release or fire);
iv. The names and quantities of material(s) involved;
v. The extent of injuries, if any;
vi. The assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and
vii. The estimated quantity and disposition of recovered material that resulted from the incident. (COMAR 26.13.07.15 D)

c. In addition to the information required by Permit Condition I.G.12.b above, MES shall include in the written report of noncompliance:

1. A description of the noncompliance and its cause;

2. The period of noncompliance, including exact dates and times, and if the noncompliance has been corrected or the anticipated time it is expected to continue; and

3. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. (COMAR 26.13.07.04 M(6))

d. MES may submit the report required by Permit Condition I.G.12.b within 15 days of becoming aware of the circumstances requiring notification, if the WAS approves the later deadline. (COMAR 26.13.07.15 D (2)(g))

e. If MES determines that the facility has had a release, fire or explosion which could threaten human health, or the environment, outside the facility, or, if the release exceeds the Reportable Quantities set forth in 40 CFR 302. MES shall immediately notify:

1. The local designated on-scene coordinator, if any ;
2. The National Response Center at (800) 424-8802;
3. The WAS Hazardous Waste Enforcement Division at (410) 631-3400;
4. The MDE Emergency Response Division at (410) 333-2950 during working hours, or (410) 974-3551 during non-working hours;
5. The local Fire Department, Fire Prevention Bureau , by dialing 911 or calling (410) 396-3100;
6. The Baltimore City Southwest Police Station by dialing 911 or calling (410) 368-6222;
7. Other appropriate local authorities if the facility's Emergency Coordinator determines that evacuation of local areas may be advisable. (COMAR 26.13.05.04 G (4))

f. In the oral notification report required by Permit Condition I.G.12.e above, MES shall include:

1. Name and telephone number of reporter;
2. Name and address of the facility;
3. Time and type of incident (release, fire or explosion);
4. Name and quantity of materials involved, to the extent known;
5. The extent of injuries, if any; and
6. The possible hazards to human health, or the environment, outside the facility. (COMAR 26.13.05.04 G (4)(b))

g. If an incident occurs which requires MES to implement the Emergency Procedures/ Contingency Plan of Permit Attachment 4, MES shall make a written submission to the WAS within 15 days of the incident (COMAR 26.13.05.04 G(10)). This submission shall include the information items (i) through (vii) listed under Permit Condition I.G.12.b (2) above.

13. Other Non-compliance. MES shall report other instances of non-compliance not otherwise required to be reported above at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition I.G.12.(COMAR 26.13.07.04 M(8))

14. Other Information. Whenever MES becomes aware that MES failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the WAS, MES shall promptly submit such facts or information to the WAS and state the reason for the omission or inaccuracy. (COMAR 26.13.07.04 M(8))

I.H. CERTIFICATION OF CONSTRUCTION OR MODIFICATION

MES may not manage hazardous waste at a new facility or a modified portion of the facility until:

1. MES has submitted to the WAS, by certified mail or hand delivery, a letter signed by MES, and a registered professional engineer stating that the facility has been constructed or modified in compliance with the permit; and

2. Either:

   a. The WAS has inspected the modified or newly constructed facility and finds it is in compliance with the conditions of this permit; or

   b. Within fifteen (15) days of the date of the submission of the letter required by Permit Condition I.H.1, MES has not received notice from the WAS of the WAS's intent to conduct the inspection described in Permit Condition I.H.2.a. (COMAR 26.13.07.15 C)

I.I. PERMIT FEE

Payment of the permit fee for this facility is a prerequisite to issuing this permit. Failure to pay the permit fee in a timely manner constitutes grounds for permit revocation. As specified in COMAR 26.13.07.21 the permit fee is based on the size of the facility, nature and quantity of CHS, and the anticipated costs of regulatory activities such as permit preparation, inspections, monitoring, and program development. During the existence of this permit, the permit fee is $44,472.45 per year, in addition to the cost of public notices.

I.J. COMPLIANCE SCHEDULES

Reports of compliance or non-compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule. (COMAR 26.13.07.07 D)

PART II - GENERAL FACILITY CONDITIONS

II.A. DESIGN AND OPERATION OF FACILITY

MES shall maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste constituents to air, soil, surface water or groundwater which could threaten human health or the environment.

II.B. GENERAL WASTE ANALYSIS

MES shall follow the procedures described in the attached Waste Analysis Plan, Permit Attachment 1. MES shall verify its waste analysis as part of its quality assurance program, in accordance with current EPA practices (Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, 3rd ed.) or equivalent methods approved by the WAS; and at a minimum, maintain proper functional instruments, use approved sampling and analytical methods, verify the validity of sampling and analytical procedures, and perform correct calculations.

II.C. SECURITY

MES shall comply with the security provisions of COMAR 26.13.05.02 E.

II.D. GENERAL INSPECTION REQUIREMENTS

MES shall follow the inspection schedules in Permit Attachment 3. MES shall remedy any deterioration or malfunction discovered by an inspection as required by COMAR 26.13.05.02 F (3). Records of inspections shall be kept as required by COMAR 26.13.05.02 F (4).

II.E. PERSONNEL TRAINING

MES shall conduct personnel training as required by COMAR 26.13.05.02 G. The training program shall follow the attached Training Plan, Permit Attachment 4. MES shall maintain documents and records as required by COMAR 26.13.05.02 G (4) and (5).

II.F. PREPAREDNESS AND PREVENTION

1. Required Equipment. At a minimum, MES shall equip the facility with the equipment set forth in the Permit Contingency Plan, Permit Attachment 5, as required by COMAR 26.13.05.03.

2. Testing and Maintenance of Equipment. MES shall test and maintain the equipment specified in the previous permit condition and in Permit Attachment 2, as necessary, to assure its proper operation in time of an emergency.

3. Access to Communications or Alarm Systems. MES shall maintain access to the communications or alarm system as required by COMAR 26.13.05.03 E.

4. Required Aisle Space. At a minimum, MES shall maintain aisle space as required by COMAR 26.13.05.02 I.

5. Arrangements with Local Authorities. MES shall maintain arrangements with local authorities as required by COMAR 26.13.05.03 H. If local officials refuse to enter into or renew existing preparedness and prevention arrangements with MES, MES must document this refusal in the operating record and immediately notify the WAS in writing of the refusal.

II.G. CONTINGENCY PLAN

1. Implementation of Plan. MES shall immediately carry out the provisions of the Contingency Plan, Permit Attachment 5, and follow the emergency procedures described by COMAR 26.13.05.04 G whenever there is an imminent or actual fire, explosion, or release of hazardous waste or constituents which threatens or could threaten human health or the environment. (COMAR 26.13.05.04 B (2))

2. Amendments to Plan. MES shall review and immediately amend, if necessary, the Contingency Plan as required by COMAR 26.13.05.04 E.

3. Copies of Plan. MES shall comply with the requirements of COMAR 26.13.05.04 D.

4. Emergency Coordinator. MES shall comply with requirements of COMAR 26.13.05.04 F.

II.H. RECORDKEEPING AND REPORTING

1. Operating Record. MES shall maintain a written operating record at the facility in accordance with COMAR 26.13.05.05 D.

2. Periodic Reporting. MES shall comply with all applicable periodic reporting requirements of COMAR 26.13.05.05 F.

II.I. CLOSURE REQUIREMENTS

1. Performance Standard. MES shall close the facility as required by COMAR 26.13.05.07, and in accordance with the Closure Plan, Permit Attachment 6.

2. Amendments to Closure Plan. MES shall amend the Closure Plan in accordance with COMAR 26.13.05.07 C whenever necessary.

3. Notification of Closure. MES shall notify the WAS at least 45 days prior to the date MES expects to begin closure.

4. Time Allowed for Closure. After receiving the final volume of hazardous waste, MES shall remove from the site all hazardous waste and shall complete closure activities in accordance with the schedules specified in the Closure Plan, Permit Attachment 6. MES shall implement the post-closure requirements of Permit Condition II.J, below, as amended if necessary, for any waste that remain on site after completion of closure.

5. Disposal or Decontamination of Equipment. MES shall decontaminate and/or dispose of all facility equipment as required by COMAR 26.13.05.07 E and the Closure Plan, Permit Attachment 6.

6. Certification of Closure. MES shall certify that the facility has been closed in accordance with the specifications in the Closure Plan and required by COMAR 26.13.05.07 F.

II.J. POST-CLOSURE REQUIREMENTS

1. Post-Closure care Period. MES began post-closure care for the landfill after completion of closure of the unit and shall continue for 30 years after that date. Post-closure care shall be in accordance with COMAR 26.13.05.07 and the Post-Closure Plan, Permit Attachment 7.

2. Post-Closure Security. MES shall maintain security at the facility during the post-closure care period in accordance with the Post-Closure Plan, Permit Attachment 7, and COMAR 26.13.05.07 G (3).

3. Amendments to Post-Closure Plan. MES shall amend the Post-Closure Plan, Permit Attachment 7, accordance with COMAR 26.13.05.07 H(4), whenever necessary.

4. Post-Closure Notices:

   a. Within 60 days of the effective date of this permit, MES shall:

      i. Record a notation on the deed to the facility property, or on some other instrument which is normally examined during title search, in accordance with COMAR 26.13.05.07I(2)(a).

      ii. Submit a certification that a notation, in accordance with Permit Condition II.J.4.a.i, above, has been recorded, including a copy of the document in which the notation has been placed.

   b. MES shall request and obtain a permit modification prior to post-closure removal of hazardous wastes, hazardous waste residues, liners, or contaminated soils, in accordance with COMAR 26.13.05.07 I(3).

5. Certification of Completion of Post-Closure Care. MES shall certify that the post-closure care period was performed in accordance with the specifications in the Post-Closure Plan, Permit Attachment 7, as required by COMAR 26.13.05.07 J.

II.K. GENERAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTES

MES shall comply with the requirements of COMAR 26.13.05.02 H.

II.L. MANIFEST SYSTEM

MES shall comply with the manifest requirements of COMAR 26.13.05.05 B, C, & G.

II.M. FLOODPLAIN STANDARD

MES shall comply with the requirements of COMAR 26.13.05.02-1 B.

II.N. WASTE MINIMIZATION/SOURCE REDUCTION

MES shall develop and conduct a Waste Minimization/Source Reduction Program. At a minimum the program should evaluate the waste minimization/source reduction potential for all hazardous waste streams on a yearly basis. MES shall report waste reduction efforts in the facility biennial report.

PART III – POST-CLOSURE CARE

III.A. GENERAL DESCRIPTION

Area 5 of the Hawkins Point Landfill is a closed land disposal unit that is currently undergoing post-closure care. The landfill was used solely for the disposal of chrome ore tailings and chromium contaminated debris generated from Allied Signal's Baltimore Works Plant. The waste designated hazardous for Toxicity (D007) and Corrosivity (D002). The amount of waste contained in Area 5 landfill is estimated at 451,450 tons disposed of in 11 cells. Tabulated below is the amount of leachate generated during the last few years:

Year	Leachate (gallons)
1995	243,648
1996	235,257
1997	213,105
1998	280,686
1999	258,903
2000	336,955
Up to June 2001	178,489

Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

III.B. UNIT IDENTIFICATION

MES shall provide post-closure care for the following hazardous waste management units, subject to the terms and conditions of this permit, and described as follows:

Type of Facility	Designation and Number of Units	Maximum Waste Inventory	Description of Wastes Contained	Hazardous Waste No.
Landfill	Area 5, Cells 1-11	451,450 tons	Chrome ore tailings	D007, D002

III.C. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

1. MES shall conduct post-closure care for each of the hazardous waste management units listed in Permit Condition III.B, above, that began after completion of closure of the unit and shall continue for 30 years after that date. The 30-year post-closure care period may be shortened upon application by MES, demonstrating that the facility is secure, and approval by the WAS. The period may be extended by the WAS if the WAS finds this is necessary to protect human health and the environment.

2. MES shall maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of COMAR 26.13.05.06 -.06-7 during the post-closure period.

3. MES shall comply with the requirements for landfills, as follows:

   a. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap, as necessary, to correct the effects of settling, subsidence, erosion, and other events;

   b. Continue to operate the leachate collection and removal system until leachate is no longer detected;

   c. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of COMAR 26.13.05.06 -06-7

   d. Prevent run-on and run-off from eroding or otherwise damaging the final cover;

   e. Protect and maintain surveyed benchmarks used in complying with the surveying and record keeping requirements of COMAR 26.13.05.14 I.

   f. Maintain a vegetative cover sufficient to minimize the effects of erosion on the final cover; and

   g. Prevent the growth of vegetation with deeply penetrating root systems that may compromise the integrity of the cap. MES shall mow the vegetative cover during the growing season and/or remove the plants in a timely manner.

4. MES shall comply with all security requirements, as specified in Permit Attachment 2, Security Plan.

5. MES shall not allow any use of the units designated in Permit Condition III.B which will disturb the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems during the post-closure care period.

6. MES shall implement the Post-Closure Plan, Permit Attachment 7. All post-closure care activities must be conducted in accordance with the provisions of the Post-Closure Plan.

III.D. INSPECTIONS

MES shall inspect the components, structures, and equipment at the site in accordance with the Inspection Schedule, Permit Attachment 3.

III.E. NOTICES AND CERTIFICATION

1. If MES or any subsequent owner or operator of the land upon which the hazardous waste disposal unit is located wishes to remove the hazardous wastes and hazardous waste residues, the liner, if any, or contaminated soils, then the owner/operator shall request a modification to this post closure permit in accordance with the applicable requirements in COMAR 26.13.07 (Permits for CHS Facilities). MES or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of COMAR 26.13.05.07 G (4) (Post-Closure Care and Use of Property).

2. No later than 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, MES shall submit to the WAS, by registered mail, a certification that the post-closure care for the hazardous waste disposal unit was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by MES and an independent, registered professional engineer. Documentation supporting the independent, registered professional engineer's certification must be furnished to the WAS upon request.

III.F. POST-CLOSURE PERMIT MODIFICATIONS

1. Before making any modifications to the approved Post-Closure Plan, MES shall request a permit modification to authorize the change. This request shall be in accordance with applicable requirements of COMAR 26.13.07 and shall include a copy of the proposed amended Post-Closure Plan for approval by the WAS.

2. MES shall request a permit modification whenever changes in operating plans or facility design affect the approved Post-Closure Plan, there is a change in the expected year of final closure, or other events occur during the active life of the facility that affect the approved Post-Closure Plan.

3. MES shall submit a written request for a permit modification at least 60 days prior to the proposed change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the Post-Closure Plan. (COMAR 26.13.05.07 H (4))

III.G. COMPLIANCE SCHDULE

Within 45 days of the effective date of this permit, MES shall inspect, and conduct any required repairs or replacements of, the chain-link fence and the gates described in Permit Attachment 2, Security Plan, to assure the status and integrity of the fence and gates as described in the Permit Attachment. MES shall report the results to the WAS.

PART IV – GROUNDWATER DETECTION MONITORING

IV.A. GENERAL PROVISIONS

Area 5 of the Hawkins Point Landfill is currently monitored for releases from the waste management units with two sets of groundwater monitoring wells. Each set consists of one background and two compliance point wells as specified in Permit Condition IV.B, below. MES shall monitor these wells to determine the groundwater quality of the uppermost aquifer underlying the waste management area in accordance with the requirements of Permit Conditions IV.B - IV.E.

IV.B. WELL LOCATIONS AND SPECIFICATIONS

1. MES shall maintain the groundwater monitoring system consisting of the wells specified below:

Well Set	Well No.	Well Function	Total Depth (ft)	Screened Interval (ft)
1	2B-1	Upgradient (Background)	45	35 – 45
	2D–2	Downgradient (Compliance)	36	26 – 36
	2F	Downgradient (Compliance)	30	20 – 30
2	2H	Upgradient (Background)	30	20 – 30
	2E	Downgradient (Compliance)	39	29 – 39
	2G	Downgradient (Compliance)	35	25 – 35

Well 2B-1 is located on the southwestern boundary of Area 5. Wells 2D and 2F are located on the eastern and northern boundary of Area 5, respectively. In the second set, well 2H is designated as the upgradient monitoring well for the area west of Area 5 known as the "Trough Area". Wells 2G and 2E are located on the eastern boundary of Area 5. The well locations are shown on the map (Figure 10.3) included in Permit Attachment 8.

2. MES shall maintain the monitoring wells identified in Permit Condition IV.B.1, in accordance with the detailed plans and specifications presented in Permit Attachment 8.

3. MES shall redevelop any one of the monitoring wells listed in Permit Condition IV.B.1 whenever 20 % of the screened interval of the well is silted or when the well does not recharge within 24 hours of bailing.

IV.C. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS

1. MES shall monitor the wells described in Permit Condition IV.B.1 for the following indicator parameters and constituents:

Parameter	Constituent
pH	Total Organic Carbon
Specific Conductivity	Total Organic Halogens
	Chromium
	Hexavalent Chromium
	Chloride
	Iron
	Manganese
	Phenols
	Sodium
	Sulfate

2. MES shall also monitor the wells for Barium only for the purpose of trend analysis.

IV.D. SAMPLING AND ANALYSIS PROCEDURES

MES shall conduct the following actions in accordance with the procedures specified in Permit Attachment 8, when obtaining and analyzing samples from the groundwater monitoring wells described in Permit Condition IV.B:

1. Collect a sequence of at least four samples from each well at an interval that assures an independent sample. MES shall assure that the sampling method used maintains integrity of the sample. Specifically, MES shall make sure that the sampling process described in Attachment 8, Section 10.1.13, does not affect volatile organic constituents of the sample, or use an alternative protective procedure.

2. Preserve integrity of the collected samples during storage and shipment before analysis.

3. Conduct sample analysis.

4. Track and control the process of sampling, shipment and analysis by using the chain-of-custody procedures.

IV.E. GROUNDWATER SURFACE ELEVATION

MES shall determine the elevation of the groundwater surface at each well each time the groundwater is sampled, in accordance with Permit Condition IV.G.2.

IV.F. STATISTICAL PROCEDURES

When evaluating the monitoring results in accordance with Permit Condition IV.G, MES shall use the following procedures:

1. A Parametric Analysis of Variance (ANOVA) shall be used to statistically evaluate the monitoring results, provided the following conditions are met:

   a. The number of data points below the Practical Quantification Limit (PQL) for a particular parameter or constituent, as defined in Permit Attachment 8, is less than or equal to fifteen (15) percent of the total number of data points to be evaluated;

   b. The distribution of the data, as defined by the Shapiro-Wilk Test, is normal; and

   c. The variances between the wells, as defined by Levene's Test, is equal.

   In conducting ANOVA, the data points below the PQL shall be replaced by one half (1/2) of their respective PQL.

2. If the conditions in Permit Condition IV.F.1 are not met, MES shall use a non-parametric Analysis of Variance to statistically evaluate the monitoring results.

3. MES shall determine the background groundwater quality for a monitoring parameter or constituent based on data from the current sampling event and the previous three quarterly sampling events of the background upgradient well.

4. MES shall conduct the statistical procedures described in Permit Conditions IV.F.1, 2 & 3 and in Permit Attachment 8 in accordance with the procedures set forth in the U.S. EPA Office of Solid Waste Guidance Document "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities", April 1989, and the "Addendum to Interim Final Guidance", July 1992.

5. MES may use an alternative statistical method than the method described under Permit Conditions IV.F.1 through 4, above, provided that:

   a. The new method meets the requirements of COMAR 26.13.05.06-3, and

b. MES proposes the method, together with the reason for change, to the WAS for review and approval before it is used.

IV.G. MONITORING PROGRAM AND DATA EVALUATION

1. MES shall collect, preserve, and analyze samples pursuant to Permit Condition IV.D.

2. MES shall determine groundwater quality at each monitoring well at the compliance point quarterly during the post-closure care period. MES shall express the groundwater quality at each monitoring well in a form necessary for the determination of statistically significant increases (i.e., means and variances).

3. MES shall determine the groundwater flow rate and direction in the uppermost aquifer at least annually.

4. MES shall determine whether there is a statistically significant increase over the background value for each parameter or constituent identified in Permit Condition IV.C each time groundwater quality is determined at the compliance point wells. In determining whether such an increase has occurred, MES shall compare the groundwater quality at each monitoring well specified in Permit Condition IV.B.1 with the background, in accordance with the statistical procedures specified in Permit Condition IV.F.

5. MES shall perform the evaluations described in Permit Condition IV.G.4 within 30 days after completion of sampling and analysis.

IV.H. RECORD KEEPING AND REPORTING

1. MES shall enter all monitoring, testing, and analytical data obtained in accordance with Permit Condition IV.G in the operating record. MES shall include in the data all computations, calculated means, variances, Shapiro-Wilk Test results, Levene's test results and parametric and non-parametric Analysis of Variance results.

2. MES shall submit the analytical results required by Permit Conditions IV.G.2 and IV.G.3 and the results of the initial statistical analyses required by Permit Condition IV.G.4, in accordance with the following schedule:

Samples Collected During	Results Due to WAS by
March	May 10
June	August 10
September	November 10
December	February 10

3. If MES determines, pursuant to Permit Condition IV.G, that there is a statistically significant increase above the background values for any of the parameters or constituents specified in Permit Condition IV.C, MES shall:

    a. Notify the WAS in writing within seven days. The notification must indicate what parameters or constituents have shown statistically significant increases.

    b. Immediately sample the groundwater in all wells and determine the concentration of all constituents identified in Appendix IX of 40 CFR 264.

    c. Establish the background values for each appendix IX constituent found in the groundwater.

    d. Within 90 days, submit to the WAS an application for a permit modification to establish a compliance monitoring program. The application must include the following information:

        i. An identification of the concentration of each Appendix IX constituent found in the groundwater at each monitoring well at the compliance point.

        ii. Any proposed changes to the groundwater monitoring system at the facility necessary to meet the requirements of compliance monitoring as described in COMAR 26.13.05.06-5

        iii. Any proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in COMAR 26.13.05.06-5.

        iv. For each hazardous constituent found at the compliance point, a proposed concentration limit, or notice of intent to seek an alternate concentration limit for a hazardous constituent.

    e. Submit a corrective action feasibility plan to the WAS within 180 days.

4. If MES determines, pursuant to Permit Condition IV.G, that there is a statistically significant increase above the background values for the parameters or constituents specified in Permit Condition IV.C, MES may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In such cases, MES shall:

    a. Notify the WAS in writing within seven (7) days that MES intends to make a demonstration.

b. Within 90 days, submit a report to the WAS which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation, or from natural variation in the groundwater.

c. Within 90 days, submit to the WAS an application for a permit modification to make any appropriate changes to the detection monitoring program at the facility.

d. Continue to monitor in accordance with the detection monitoring program at the facility.

IV.I. ASSURANCE OF COMPLIANCE

MES shall assure the WAS that necessary groundwater monitoring and corrective action measures are taken during the term of the permit to achieve compliance with the groundwater protection standard under COMAR 26.13.05.06-1 A.

IV.J. REQUEST FOR PERMIT MODIFICATION

If MES or the WAS determines that the detection monitoring program no longer satisfies the requirements of the regulations, MES shall, within 90 days of the determination, submit an application for a permit modification to make any appropriate changes to the program which will satisfy the regulations.

IV.K. COMPLIANCE SCHEDULE

Within 30 days of the effective date of this permit MES shall revise the current Groundwater and Surface Water Monitoring Program, included in Attachment 8 of the permit, to implement the following modifications to the program:

1. In Section 10.1.18, Sample Transportation, clarify that if a target parameter or constituent is detected in excess of the Maximum Contaminant Level in a trip blank, the corresponding current result for that parameter or constituent of the sample will be discarded, and the sampling and analysis for the parameter or constituent will be repeated.

2. In Section 10.2, General Groundwater and Surface Water Monitoring, clarify that barium is the only monitored constituent which is not a target constituent for achieving groundwater performance standard, while pH remains as a monitored parameter that is also required to achieve its background value in order to meet the performance standard.

PART V – STORAGE AND TREATMENT IN TANKS

V.A. GENERAL PROVISIONS

1. Pending final approval by the WAS, MES is permitted to design and construct a wastewater treatment system for the storage and treatment of chromium contaminated liquids. The system shall include an appropriate number of holding and treatment tanks and auxiliary equipment, and shall employ a treatment process, to be determined and justified based on the best available technology, specific considerations of the site, and characteristics of the wastes to be treated.

2. The treatment system shall provide for holding of a maximum of 20,000 gallons, and for treatment of a maximum of 7,000 gallons per day, of chromium contaminated liquids.

3. The system will be located in the eastern part of the Hawkins Point Landfill property, near the leachate storage and transfer area, as shown in Figure 3.5 included in Permit Attachment 14, Facility Description.

4. The treatment equipment will be enclosed within the aboveground, self-supporting, leak-proof structure that has been constructed in the area described above. The influent and effluent tanks shall be aboveground with appropriate secondary containment systems. The treatment tanks shall also have appropriate secondary containment.

5. MES shall comply with COMAR 26.13.05.10-3 with regards to the design and installation of all parts of the wastewater treatment system.

6. The treated leachate may not have more than 1 ppm of total chromium and 0.1 ppm of hexavalent chromium before being discharged.

V.B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

1. MES may use the tank system to be designed and constructed in accordance with Permit Condition V.A, above, to store and treat landfill leachate and wastewaters that are hazardous only due characteristics of corrosivity (D002) and chromium toxicity (D007).

2. The generation sources of the waste identified in Permit Condition V.B.1 shall be limited to:

    a. Leachate from Area 2/3 and Area 5 and wash water generated at the Hawkins Point Landfill (EPA ID No. MDD 000731356);

    b. Groundwater generated by the pump and treat system at the Dundalk Marine Terminal (EPA ID No. MDD 030324073); and

c. Groundwater extracted from Honeywell Site in Baltimore (former Allied Signal Baltimore Works Site; EPA ID No. MDD 069396711).

3. MES is prohibited from storing or treating hazardous waste that is not identified in Permit Conditions V.B.1-V.B.2, except as otherwise authorized by COMAR 26.13.

V.C. SECONDARY CONTAINMENT

MES shall design, construct, and operate a secondary containment system for each tank system, in accordance with the detailed design plans, calculations and descriptions to be submitted to and approved by the WAS and to be contained in Permit Attachment 12, Plans and Specifications of the Waste Water Treatment Facility. The secondary containment system for tanks that are not indoors shall also meet the requirements for a 25-year 24-hour storm event. (COMAR 26.13.05.10-4)

V.D. OPERATING REQUIREMENTS

1. MES shall not place hazardous wastes or treatment reagents in the tank systems if they could cause a tank, its ancillary equipment, or a containment system to rupture, corrode, leak, or otherwise fail. (COMAR 26.13.05.10 C(1))

2. MES shall prevent spills and overflows from the tanks or containment systems using the methods to be submitted to and approved by the WAS and to be included in Permit Attachment 12, Plans and Specifications of the Wastewater Treatment Facility, and Permit Attachment 13, Waste water Treatment Facility Operations Manual.

3. MES shall operate the storage and treatment tanks, and treatment equipment in accordance with Permit Attachment 13, Wastewater Treatment Facility Operations Manual to be submitted to and approved by the WAS.

V.E RESPONSE TO LEAKS OR SPILLS

In the event of a leak or spill from a tank system or a secondary containment system, or if a system becomes unfit for continued use, MES shall remove the system from service immediately and complete the following actions: (COMAR 26.13.05.10-6)

1. Stop the flow of hazardous waste into the system and inspect the system to determine the cause of the release.

2. Remove waste from the system within 24 hours of the detection of the leak to prevent further release and to allow inspection and repair of the system. If MES finds that it will be impossible to meet this time period, MES shall notify the WAS and demonstrate that a longer time period is required. If the collected waste is a hazardous waste, it must be managed in accordance with all applicable requirements of COMAR 26.13.

3. Contain visible releases to the environment. MES shall immediately conduct a visual inspection of all releases to the environment and based on that inspection:

   a. Prevent further migration of the leak or spill to soils or surface water; and
   b. Remove and properly dispose of any visible contamination of the soil or surface water.

4. Close the system in accordance to the Permit Attachment 6, Closure Plan, unless the following actions are taken:

   a. For a release caused by a spill that has not damaged the integrity of the system, MES shall remove the released waste and make any necessary repairs to fully restore the integrity of the system before returning the tank system to service.

   b. For a release caused by a leak from the primary tank system to the secondary containment system, MES shall repair the primary system prior to returning it to service.

   c. For a release to the environment caused by a leak from a component of the tank system that is below ground, is not readily available for visual inspection, or does not have secondary containment, MES shall provide this component with secondary containment that meets the requirements of COMAR 26.13.05.10-4 before the component is returned to service.

   d. For a release to the environment caused by a leak from the aboveground portion of the tank system that does not have secondary containment, and can be visually inspected, MES shall repair the tank system before the component can be returned to service.

   e. MES shall make sure that any components of a tank system replaced to eliminate a leak satisfy all applicable requirements in COMAR 26.13.05.10-3 and .10-4.

5. For all major repairs to eliminate leaks to restore the integrity if the tank system, MES must obtain a certification by an independent, qualified, registered professional engineer that the repaired system is capable of handling hazardous wastes without release for the intended life of the system before returning the system to service. Some examples of major repairs are installation of an internal liner, repair of a ruptured tank, or repair or replacement of a secondary containment system, and submit the certification as required by Permit Condition V.G.3.

V.F. INSPECTION SCHEDULES AND PROCEDURES

1. MES shall inspect the tank systems, in accordance with the Inspection Schedule, Permit Attachment 3, and shall complete the items in Permit Conditions V.F.2 and V.F.3 as part of those inspections.

2. MES shall inspect overfill controls, in accordance with the schedule to be submitted to and approved by the WAS and to be contained in Permit Attachment 3, Inspection Schedule. (COMAR 26.13.05.10 D(1))

3. MES shall inspect the following components of the tank systems once each operating day: (COMAR 26.13.05.10 D(2))

   a. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges) to ensure that the tank system is being operated according to its design;

   b. The tank system to detect corrosion or releases of waste; and

   c. Construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system, to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation).

4. MES shall assess the condition of the tank systems, in accordance with the schedule and procedures to be submitted to and approved by the WAS and to be described in Permit Attachment 3, Inspection Schedule. (COMAR 26.13.05.10 D)

5. MES shall document compliance with Permit Conditions V.F.2, V.F.3, and V.F.4 and place this documentation in the operating record for the facility. (COMAR 26.13.05.10 D(5))

6. MES shall develop and implement a tank system inspection plan for all waste water treatment tank systems that satisfies the requirements of COMAR 26.13.05.10 D.

7. MES shall ensure that all tanks maintain sufficient structural integrity to contain the wastes they are used to manage.

8. MES shall conduct a periodic assessment of the tank systems which satisfies the following requirements:

   a. The tank assessment shall determine whether cracks, leaks, corrosion, erosion or other problems may prevent compliance with Permit Condition V.F.7;

   b. The periodic assessment shall be conducted at least once every two years;

   c. No more than 25 months shall elapse between assessments;

   d. The tank assessment shall be conducted sometime during February of each odd-numbered year, unless an alternate schedule is approved by the WAS;

e. A report of the results from each tank system assessment shall be compiled and maintained as part of the facility operating record for at least three years; and

f. The tank assessment shall be made available to the WAS on request.

V.G. RECORD KEEPING AND REPORTING

1. MES shall report to the WAS, within 24 hours of detection, when a leak or spill occurs from the tank system or secondary containment system to the environment. (COMAR 26.13.05.10-6 A(6)) A leak or spill of one pound or less of solid waste, that is immediately contained and cleaned up, need not be reported.

2. Within 30 days of detecting a release to the environment from the tank system or secondary containment system, MES shall report the following information to the WAS: (COMAR 26.13.05.10-6 A(6)(b))

   a. Likely route of migration of the release;

   b. Characteristics of the surrounding area, including soil type and composition, geology, hydrogeology, and climate;

   c Results of any monitoring or sampling conducted in connection with the release. If MES finds it will be impossible to meet this time period, MES should provide the WAS with a schedule of when the results will be available. This schedule must be provided before the required 30-day submittal period expires;

   d. Proximity of downgradient drinking water, surface water, and populated areas; and

   e. Description of response actions taken or planned.

3. MES shall submit to the WAS all certifications required under Permit Condition V.E.5 not later than five days before returning the tank system to use. (COMAR 26.13.05.10-6 A(9))

4. MES shall obtain, and keep on file at the facility, the written statements by those persons required to certify the design and installation of the tank system. (COMAR 26.13.05.10-3 B(11))

5. MES shall submit annually to the WAS:

   a. The amount of waste accepted by MES during the previous year for storage in tanks, the amount of waste currently in storage in tanks, and the amount of waste treated by MES in tanks during the previous year;

b. The results of all detailed physical and chemical waste analyses conducted on waste sources;

c. The results of the monthly and annual waste analyses conducted on representative samples of the wastewater.

V.H. CLOSURE AND POST-CLOSURE CARE

1. At closure of the tank systems, MES shall follow the procedures in Permit Attachment 6. (COMAR 26.13.05.10-7 A)

2. At closure MES shall submit to the WAS for review and approval a comprehensive closure plan detailing closure procedures designed to achieve closure performance standards list of target constituents that the samples taken for verifying effectiveness of the decontamination must be analyzed for.

3. If MES can not successfully demonstrate that all contaminated soils and groundwater can be practically removed or decontaminated, in accordance with the Closure Plan, then MES shall close the tank systems and, within 90 days, submit a Post-Closure Plan to the WAS for review and approval, to perform post-closure care. (COMAR 26.13.05.07 H and 10-7 C)

V.I. SPECIAL TANK PROVISIONS FOR IGNITABLE OR REACTIVE WASTES

1. MES shall not place ignitable or reactive waste in the tank systems or in the secondary containment systems, unless one of the three conditions specified in COMAR 26.13.05.10-1 A(1)(a)-(c) are met.

2. MES shall comply with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjoining property line that can be build upon, as required in Tables 2-1 through 2-6 of the National Fire Protection Association's "Flammable and Combustible Liquids Code"/ (1990) (COMAR 26.13.05.10-1 A(2))

V.J. SPECIAL TANK PROVISIONS FOR INCOMPATIBLE WASTES

1. MES may not place incompatible wastes, or incompatible wastes and materials, in the same tank system or the same secondary containment system, unless the conditions specified in COMAR 26.13.05.10-1 B are met.

2. MES may not place hazardous waste in a tank system that has not been decontaminated and that previously held an incompatible waste or material, unless the requirements of Permit Condition V.J.1 are met.

V.K. COMPLIANCE SCHEDULE

1. MES shall submit to the WAS for review and approval a report which describes the design and operating procedures of tanks and tank systems that constitute the wastewater treatment system described in Permit condition V.A and demonstrates compliance with the requirements of all of COMAR 26.13.05.10 - .10-7. The report shall include:

   a. References to design standards or other available information used (or to be used) in the design and construction of the tank systems.

   b. A description of design specifications including identification of construction materials and lining materials (including pertinent characteristics such as corrosion or erosion resistance.)

   c. Dimensions, capacity, and shell thickness of tank systems.

   d. A diagram of piping, instrumentation, and process flow for each tank system.

   e. Description of feed systems, safety cutoff, bypass systems, and pressure controls (for example, vents.)

   f. A written assessment that is reviewed and certified by an independent, qualified, registered professional engineer as to the structural integrity and suitability for handling hazardous waste of each tank system, that complies with the requirements of COMAR 26.13.05.10-3. The assessment shall include the following information:

      i. Design standard or standards according to which the tank system and ancillary equipment will be constructed;

      ii. Hazardous characteristics of the waste or wastes to be managed;

      iii. For tank systems and components in which the external shell of a metal tank or any external metal component of the tank system will be in contact with the soil or with water, a determination by a corrosion expert of:

         a. Factors affecting the potential for corrosion, including but not limited to soil moisture content, pH, soil sulfides level, soil resistivity, structure to soil potential, influence of nearby underground metal structures such as piping, existence of stray electric current, existing corrosion protection measures such as coating or cathodic protection; and

         b. The type and degree of external corrosion protection that is needed to ensure the integrity of the system during the use of the system or

component, consisting of corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic, corrosion-resistant coating such as epoxy or fiberglass, with cathodic protection such as impressed current or sacrificial anodes, or electrical isolation devices such as insulating joints or flanges; and

iv. Design considerations to ensure that tank:

a. Foundations will maintain the load of full tank;

b. Systems will be anchored to prevent flotation or dislodging where the tank system is placed in a saturated zone; and

c. Systems will withstand the effects of frost heave.

g. A description of materials and equipment used to provide external corrosion protection, as required under COMAR 26.13.05.10-3 B (2) (c) (ii).

h. A detailed description of how MES will install the tank systems in compliance with the following requirements:

i. Ensure that proper handling procedures are adhered to in order to prevent damage to the systems during installation;

ii. Before covering, enclosing, or placing a tank system or component in use, have the system inspected by an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or components, for the presence of any of the following items: weld brakes, punctures, scrapes of protective coatings, cracks, corrosion, and other structural damage or inadequate construction or installation;

iii. Remedy all discrepancies detected in the inspection outlined in Permit Condition V.K.1.h.ii before the tank systems is covered, closed, or placed in use;

iv. Use backfill material that is a noncorrosive, porous, homogeneous substance for tank systems or components that are placed underground and that are backfilled, and install the backfill material so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported;

v. Test all tanks and ancillary equipment for tightness before covering, enclosing, or placing in use;

vi. Perform all repairs necessary to remedy any leaks in the tank systems before covering, enclosing, or placing the systems into use; and

vii. Ensure that ancillary equipment is supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

i. Detailed plans and descriptions of how the secondary containment system for each tank system is or will be designed, constructed, and operated to meet the requirements of COMAR 26.13.05.10-4 A-F.

j. A description of controls and practices to prevent spills and overflows, including:

i. Controls to prevent overfilling, such as level sensing devices, high level alarms, automatic feed cut-off, or by-pass to a standby tank;

ii. For uncovered tanks, maintenance of sufficient freeboard to prevent overtopping by wave or wind action or by precipitation; and

iii. Spill prevention controls, such as check valves or dry disconnect couplings.

k. As part of the Inspection Schedule, Permit Attachment 3, procedures for inspecting overfill controls, monitoring and leak detection equipment, level of waste of the tank systems, and construction materials of the area immediately surrounding, the tank systems, and cathodic protection systems.

l. As part of the Inspection Schedule, Permit Attachment 3, a schedule and procedures for assessing the condition of the tank systems that comply with COMAR 26.13.05.10 D (4), including procedures for emptying the tanks and an explanation of proposed assessment frequencies.

m. A description of the treatment process controls, emission controls, and safety or emergency procedures that are necessary to protect human health and the environment from toxic or otherwise harmful fumes, mists, or gasses resulting from:

i. Volatilization of wastes stored or treated in the tanks;

ii. Chemical reactions in the tanks, either routine or resulting from process upsets; or

iii. Physical agitation or other forms of treatment conducted in the tank.

n. An Operations Manual detailing how the treatment tanks and system, influent and effluent storage tanks, and process control and monitoring equipment will be operated.

2. MES is prohibited from constructing or operating the tanks and tank systems identified in Permit Conditions V.B.1 and V.B.2 until the WAS approves the report identified in Permit Condition V.K.1.

3. MES shall submit as-built plans and specifications of the waste water treatment and storage tanks, structures, secondary containment systems and ancillary equipment to the WAS before storing or treating hazardous waste or accepting hazardous waste for storage or treatment.

PART VI
PERMIT ATTACHMENTS

Permit Attachments, numbered 1 through 13, include sections, appendices and attachments of the MES permit application that carry their own number or letter designations. Permit Attachments are enforceable parts of this permit. However, if there is a discrepancy between a permit condition and contents of a permit attachment, the permit condition will prevail. Each permit attachment includes a title page that also shows the number of pages in that attachment.

Permit Attachment Number & Title		No. of Pages	Application Pages & Attachment Numbers
1.	Waste Analysis Plan	14	Appendix 4, p. 1-8 Attachment A
2.	Security Plan	1	Appendix 5, p. 1
3.	Inspection Schedule	11	Appendix 5, p. 2-6 including Table 5.1 in 6 pages
4.	Personnel Training Outline	13	Appendix 7, p. 1-13
5.	Contingency Plan	18	Appendix 6, p. 1-16 and Figures 6.1, 6.2
6.	Closure Plan	5	Appendix 11, p. 1-4 and Figure 11.1
7.	Post-Closure Plan	7	Appendix 11, p. 4-9 Table 11.1
8.	Groundwater Monitoring Plan	39	Appendix 10, p. 1-32 Figures 10.1 - 10-7
9.	Health and Safety Plan	50	Appendix 8, p. 1-2, Appendix 9, p.1-32, Figures 9.1- 9.4, Tables 9.1 and 11 pages of Material Safety Data Sheets
10.	Plans and Specifications of the Waste Water Treatment Facility		Information to be submitted.
11.	Waste Water Treatment Facility Operations Manual		Information to be submitted.

Permit Attachment Number & Title		No. of Pages	Application Pages & Attachment Numbers
12.	Facility Description	23	Appendix 3, p.1-10 Figures 3.1, 3.2, 3.4, 3.5 Pictures 1-9
13.	Permit Application Part A	9	

Richard W. Collins, Director
Waste Management Administration

1/25/02
Date Signed

Permit Number: A-264

Attachment 1

WASTE ANALYSIS PLAN

(There are 14 pages in this attachment)

4.0 WASTE ANALYSIS PLAN

4.1 GENERAL

Areas 2, 3 and 5 contain previously disposed chrome ore tailings and chromium contaminated soil and debris generated by Allied Signal, Inc. Area 5 contains construction debris and chromium ore tailings from the old Allied production facility in the Baltimore Inner Harbor. Areas 2 & 3 contain chromium ore tailings purchased by MPA from Allied Signal. At the time of purchase state environmental laws restricted MPA from using the tailings as indiscriminate fill and MPA was required to store the tailings in clay lined cells at Hawkins Point.

The major components of the chrome ore tailings are shown on Table 4.1. The debris which was generated during the dismantling of the Baltimore Works plant consisted of concrete, brick, asbestos, structural beams, gunnite, tile, floor slab, refractory and other miscellaneous materials. The debris and the chrome ore tailings are considered a hazardous waste by characteristic under Federal and State of Maryland regulations because the material exhibits the characteristic of corrosivity (D002) and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit for chromium (D007.) This material exhibits no other characteristics of hazardous waste. The leachate generated from the percolation of groundwater and precipitation through the cells is also a hazardous waste by characteristics of TCLP toxicity for chromium and corrosivity. Laboratory analyses of the leachate collected from January 1996 – December 1997 is included in Appendix B.

**********Change made to underground tank reference **********

The chromium contaminated leachate is collected by the leachate collection system. Presently, leachate collected by this system is transferred to a 20,000 gallon above ground leachate holding tank in the leachate holding and transfer area. A certified hazardous waste hauler transports this material to Envirite's York, Pa. treatment, storage, and disposal (TSD) facility. The MPA cells in Areas 2 and 3 have a similar leachate collection system. Both systems are closed with known sources of contamination. It is not anticipated that the composition of either of the leachate waste streams will differ greatly over time. Therefore, a composite leachate sample will be collected and analyzed annually for informational purposes.

The leachate generated in each of the two systems will be sampled by Maryland Environmental Service (MES) from the 20,000 gallon holding tank by directly collecting a sample from the leachate discharge point. The following parameters will be analyzed using the appropriate EPA testing methods and procedures:

A. Total Chromium	7190, 7191, 6020
B. Hexavalent Chromium	7196

C. pH	9040B
D. Sulfate	9056
E. Sodium	7770, 6020
F. Chloride	9056
G. Iron	7380, 6020
H. Manganese	7450, 6020
I. Barium	7080A, 7081, 6020
J. Conductivity	EPA 120.1
K. Solids (Dissolved)	EPA 160.1
L. Solids (Suspended)	EPA 160.2
M. Total Organic Carbon	EPA 415.1

The rationale for analyzing items A. through M. is to provide background information on leachate characteristics when used to compare to existing groundwater conditions and to detect possible infiltration of precipitation or ground water into the system. Items L. and M. are analyzed to demonstrate that the liquid is a wastewater by definition as listed in 40 CFR 268.2.

MES will notify the Maryland Department of the Environment (MDE) of the scheduled sampling events and a laboratory data report will be submitted to the MDE within 90 days of the sampling event.

Waste Characterization of Buried Material

Wastewater received from the Dundalk Marine Terminal or AlliedSignal's Baltimore Works will also be hazardous by characteristic for corrosivity (D002) and leachable chromium (D007).

Chromium contaminated soils are periodically excavated at the Dundalk Marine Terminal as a result of utility repair and maintenance activities, and port improvement projects. The chromium contaminated soils have been determined to be a hazardous waste under Federal laws and State of Maryland regulations. The composition of the excavated contaminated material at the DMT varies. The contaminated materials at the DMT include sand, small stones, rocks, soil, clay and chrome ore tailings. Table 4.1 displays the major components of chrome ore tailings. The concentration of chromium contamination varies in contaminated material from the Terminal due to the location in which the material originated and the type of material. Past TCLP analysis of excavated soil have ranged from 5.0 to 60.0 mg/l.

The pH values of the excavated contaminated material at the DMT vary and may sometimes reach 12. However, the material is not ignitable, reactive and incompatible with other material.

********* Reference to soil from Patapsco WWTP removed**********

In addition, intermixed with the Terminal material are "rock-like cemented soil and chrome ore tailings conglomerates" which apparently are an accretion of chrome ore tailings in a soil matrix which may be formed when moisture causes lime to bleed from the tailings cementing the mixture together as it dries. These "rock-like" materials vary in size from approximately 1 to 18 inches. A one gram sample was removed from one rock-like specimen. Table 4.2 shows the results of an analysis performed for the material.

**********Soil Treatment Facility section deleted**********

4.2 WASTEWATER TREATMENT FACILITY

********** Removed reference to pump and treat WWTP **********

Construction of the on-site wastewater treatment unit has been postponed. Maryland Environmental Service will continue to haul the leachate offsite, in the future, we may reevaluate the economic viability of a wastewater treatment plant. In the event of designing a WWTP, the effluent shall be in accordance with the NPDES permit (91-DP-2229) for outfall 006.

4.2.1Influent Characteristics

The influent will include leachate collected from the Area 5 landfill, the MPA cells in Areas 2 and 3, wash water generated during decontamination procedures, groundwater extracted from the former site of AlliedSignal's Baltimore Works facility, and other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area. The influent will generally have a pH greater than 12.5 and high concentrations in both total and hexavalent chromium (total chromium ranges from 100 to 2,000 mg/l, hexavalent chromium ranges from 100 to 2,000 mg/l). The wastewater flow is to be handled in the 7,000 gallons per day wastewater treatment system.

4.2.2 Waste Acceptance Procedures

Wastewater that will be accepted from off-site sources will be a chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area. Waste liquids should be similar in composition to the on-site leachate. Prior to acceptance of waste water from a new off-site source, or if MES has reason to believe that the characteristics of the off-site waste has changed, the waste stream shall be analyzed prior to treatment for priority pollutants including organic compounds as listed in Attachment A. Additional sampling and analysis of the 13 parameters as listed on pages 4-1 and 4-2 (Items A thru M) plus specific gravity and viscosity will be performed monthly during the acceptance of the off-site source to confirm waste characteristics.

Increased frequency of analysis of additional parameters may be performed at the discretion of MES.

1. Shipment Inspection

Any hazardous waste liquid received for treatment will be sampled prior to unloading at the site. The sample will be removed directly from the tanker truck and will be analyzed for pH using a pH meter and chromium using the Quick Qualitative Chrome Test to ensure that it matches the waste designated on the accompanying manifest.

Each waste shipment will be accompanied by a manifest, developed by the transporter, containing the following standard information (40 CFR 262.21):

- Document number
- Generator name, mailing address, telephone numbers, EPA identification number
- Transporter name and EPA identification number
- Designated disposal facility name, address and EPA identification number
- Waste description (49 CFR 12)
- Total quantity of waste as loaded on the transport vehicle
- Certification of manifest information of the generator

The transporter should submit the manifest to the Site Superintendent on a regular basis. The transporter should also submit a Shipment receipt Record including the date of transmittal, the number of shipments, and total gallons of waste transported.

2. Waste Acceptance Review:

The waste will not be accepted for disposal if any of the following conditions exist:

- The presence of chrome is not detected through either visual inspection or testing.

- Significant errors or omissions are evident in the manifest, labeling, placarding or other documentation accompanying the shipment.

The Site superintendent will contact the transporter to resolve any discrepancy. All discrepancies found will be noted on the manifest. Any manifest discrepancies unresolved after 15 days must be reported to the Maryland Department of the Environment (MDE).

At the unloading point of the treatment facility, the manifest will be signed and dated by a qualified MES personnel, with one copy retained in the file, a copy retained by the transporter, and one copy submitted to the MDE on a weekly basis.

4.2.3 Effluent Analysis Plan

The wastewater treatment system will operate under a National Pollutant Discharge Elimination System (NPDES) permit a copy which is included in Appendix H. Table 4.3 depicts the parameters to be used for the effluent analysis, types of data to be reported and the sampling methods to be used.

All procedures used in the effluent analysis shall be in accordance with the following methods:

- EPA-600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- SW-846,"Test Methods for Evaluating Solid Waste, 1986

TABLE 4.1
MAJOR COMPONENTS OF CHROME ORE TAILINGS

Constituent	Average Percent By Dry Weight
Calcium Oxide	38.8
Ferric Oxide	23.5
Aluminum Oxide	15.5
Magnesium Oxide	9.8
Total Chromium	4.8
Silicon Mono-Oxides	3.2
Sodium Peroxide	2.0
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.2
Vanadium	0.2
Titanium	0.2
Manganese	0.2
Non-hazardous undefined	0.4
	100.0

TABLE 4-2
ANALYSIS OF ONE GRAM SAMPLE OF ROCK-LIKE SECIMEN

Constituent	Concentration (ppm)
Iron	70,945.37
Aluminum	42,807.33
Magnesium	35,192.86
Chromium	17,080.58
Calcium	15,898.45
Sodium	2,115.65
Vanadium	797.30
Manganese	751.43
Sulfur	669.12
Nickel	366.52
Antimony	288.05
Zinc	285.67
Cobalt	122.99
Phosphorus	31.53
Silicon	19.54
Arsenic	9.23
Tin	7.96
Selenium	6.16
Cadmium	4.39
Copper	3.01

TABLE 4.3
EFFLUENT ANALYSIS SCHEDULE FOR WASTEWATER TREATMENT FACILITY AT HAWKINS POINT

Parameter	Value	Sampling Method
Total Suspended Solids	Qtr. Ave./Daily Max.	24-hr Composite
Total Chromium	Daily Ave./Daily Max.	"
Hexavalent Chromium	Daily Ave./Daily Max.	"
Copper	Monitoring w/o limits	"
Nickel	Monitoring w/o limits	"
Lead	removed	
Zinc	Monitoring w/o limits	"
Chlorine (total residual)	Daily Ave./Daily Max.	Grab
pH	Daily Ave./Daily Max.	Grab

MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER MANAGEMENT ADMINISTRATION
TOXIC SUBSTANCE ANALYTICAL PROTOCOL

PARAMETER	MINIMUM PRACTICAL DETECTION LEVEL[3] (ug/L)	STANDARD METHOD[1,2] #
METALS/INORGANICS[4]		
Al	5	304 (GFAA)
Sb	10	304 (GFAA)
As	2	303E (HGAA)
Be	5	200.7 (ICP)[5]
Cd	0.5	304 (GFAA)
Cr	5	304 (GFAA)
Cr-6 (dissolved)	10	303B (CHAA)
Cu	2	304 (GFAA)
CN (amenable)	10	412F (ADAC)
Pb	5	304 (GFAA)
Hg	0.5	303F (CVAAM)
Ni	5	304 (GFAA)
Se	2	303e (HGAA)
Ag	1	304 (GFAA)
Tl	5	304 (GFAA)
Zn	5	304 (GFAA)

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1 Other methods achieving a detection level at least as sensitive as the one listed here are acceptable, provided they have been approved for the analyte in question, in 40 CFR, part 136.

2 Less sensitive screening methods can be used. However, if the pollutant is not detected, more sensitive methods must be employed.

3 If proper methodology is used as specified above and interferences decrease sensitivity, documentation must be provided.

4 Performance of the methods identified below must be preceded by acid digestion procedure.

5 ICP: method referenced in Appendix C, CFR 40, part 136.

PARAMETER	PRACTICAL DETECTION LEVEL[1] (ug/L)	METHOD #
PESTICIDES		
Aldrin	0.05	608 (GC)
Alpha-BHC	0.05	608 (GC)
Beta-BHC	0.05	608 (GC)
delta-BHC	0.05	608 (GC)
Lindane/g-BHC	0.05	608 (GC)
Chlordane (sum of cis & trans)	0.5	608 (GC)
4,4' -DDD	0.1	608 (GC)
4,4' -DDE	0.1	608 (GC)
4,4' -DDT	0.1	608 (GC)
Dieldrin	0.1	608 (GC)
a-Endosulfan	0.1	608 (GC)
b-Endosulfan	0.1	608 (GC)
Endosulfan SO4	0.1	608 (GC)
Endrin	0.1	608 (GC)
Endrin Aldehyde	0.1	608 (GC)
Heptachlor	0.05	608 (GC)
Heptachlor Epox	0.05	608 (GC)
Toxaphene	1.0	608 (GC)
PCB/AROCHLORs		
PCB1016	0.5	608 (GC)
PCB1221	0.5	608 (GC)
PCB1232	0.5	608 (GC)
PCB1242	0.5	608 (GC)
PCB1248	0.5	608 (GC)
PCB1254	1.0	608 (GC)
PCB1260	1.0	608 (GC)

PARAMETER	MINIMUM PRACTICAL DETECTION LEVEL[1] (ug/L)	EPA METHOD[1,2,3] #
VOLATILES		
Acrolein	5	603 (GC)
Acrylonitrile	5	603 (GC)
Benzene	5	624/1624 (GC-MS)
Bromoform (Tribromomethane)	5	624/1624 (GC-MS)
Carbon Tetrachloride	5	624/1624 (GC-MS)
Chlorobenzene	5	624/1624 (GC-MS)
Chlorodibromomethane	5	624/1624 (GC-MS)
Chloroethane	10	624/1624 (GC-MS)
Chloroform (Trichloromethane)	5	624/1624 (GC-MS)
DCA, 1,1-	5	624/1624 (GC-MS)
DCA, 1,2-	5	624/1624 (GC-MS)
DCE, 1,1-	5	624/1624 (GC-MS)
DCE, 1,2-	5	624/1624 (GC-MS)
Dichlorobromomethane	5	624/1624 (GC-MS)
Dichloropropane, 1,2-	5	624/1624 (GC-MS)
Dichloropropene, 1,3- (cis)	5	624/1624 (GC-MS)
Dichloropropene, 1,3- (trans)	5	624/1624 (GC-MS)
Ether, 2-Chloroethyl Vinyl	10	624/1624 (GC-MS)
Ethylbenzene	5	624/1624 (GC-MS)
Methyl Bromide (Bromomethane)	10	624/1624 (GC-MS)
Methyl Chloride (chloromethane)	10	624/1624 (GC-MS)
Methylene Chloride (dichloromethane)	5	624/1624 (GC-MS)
TeCE	5	624/1624 (GC-MS)
TCA, 1,1,1-	5	624/1624 (GC-MS)
TCA, 1,1,2-	5	624/1624 (GC-MS)
TCE	5	624/1624 (GC-MS)

PARAMETER	MINIMUM PRACTICAL DETECTION LEVEL (ug/L)	EPA METHOD #
VOLATILES (cont.)		
TeCA, 1,1,2,2-	5	624/1624 (GC-MS)
Toluene	5	624/1624 (GC-MS)
Vinyl Chloride	10	624/1624 (GC-MS)
SEMIVOLATILES		
Acenapthene	10	625/1625 (GC-MS)
Acenapthylene	10	625/1625 (GC-MS)
Anthracene	10	625/1625 (GC-MS)
Benzidine	10	605 followed by 625/1625 (HPLC/GC-MS)
Benzidine, 3,3-Dichloro-	20	625/1625 (GC-MS)
Benzofluoranthene, 3,4- (=b)	10	625/1625 (GC-MS)
Bis(2-Chloroethoxy) Methane	10	625/1625 (GC-MS)
B(a)P	10	625/1625 (GC-MS)
B(a)P	10	625/1625 (GC-MS)
B(g,h,i) Perylene	10	625/1625 (GC-MS)
B(k) Fluoranthene (=11,12)	10	625/1625 (GC-MS)
Chloronapthalene, 2-	10	625/1625 (GC-MS)
Chrysene	10	625/1625 (GC-MS)
DCB, 1,2-	10	625/1625 (GC-MS)
DCB, 1,3-	10	625/1625 (GC-MS)
DCB, 1,4-	10	625/1625 (GC-MS)
Dibenzo(a,h) Anthracene	10	625/1625 (GC-MS)
Diphenylhydrazine, 1,2-	10	625/1625 (GC-MS)
Ether, 4-Bromophenyl Phenyl	10	625/1625 (GC-MS)
Ether, 4-Chlorophenyl Phenyl	10	625/1625 (GC-MS)
Ether, Bis(2-Chloroethyl)		

PARAMETER	MINIMUM PRACTICAL DETECTION LEVEL[1] (ug/L)	EPA METHOD[1,2,3] #
SEMIVOLATILES (cont.)		
Ether, Bis(2-chloroisopropyl)	10	625/1625 (GC-MS)
Fluoranthene	10	625/1625 (GC-MS)
Fluorene	10	625/1625 (GC-MS)
HCB	10	625/1625 (GC-MS)
HCBD	10	625/1625 (GC-MS)
Hexachlorobutadiene	10	625/1625 (GC-MS)
Hexachlorocyclopentadiene	10	625/1625 (GC-MS)
Indeno(1,2,3-c,d) Pyrene	10	625/1625 (GC-MS)
Isophorone	10	625/1625 (GC-MS)
Napthalene	10	625/1625 (GC-MS)
Nitrobenzene	10	625/1625 (GC-MS)
N-Nitrosodimethylamine	10	625/1625 (GC-MS)
N-Nitrosodiphenylamine	10	625/1625 (GC-MS)
N-Nitrosodi-N-Propylamine	10	625/1625 (GC-MS)
Phenanthrene	10	625/1625 (GC-MS)
Phenol	10	625/1625 (GC-MS)
Phenol, 2,4,6-Trichloro-	10	625/1625 (GC-MS)
Phenol, 2,4-Dichloro-	10	625/1625 (GC-MS)
Phenol, 2,4-Dimethyl-	50	625/1625 (GC-MS)
Phenol, 2,4-Dinitro-	10	625/1625 (GC-MS)
Phenol, 2-Chloro-	10	625/1625 (GC-MS)
Phenol, 2-Nitro-		

PARAMETER	MINIMUM PRACTICAL DETECTION LEVEL (UG/L)	EPA METHOD
SEMIVOLATILES (cont.)		
Phenol, 4,6-Dinitro-2-Methyl	50	625/1625 (GC-MS)
Phenol, 4-Chloro-3-Methyl-	10	625/1625 (GC-MS)
Phenol, 4-Nitro-	50	625/1625 (GC-MS)
Phenol, Pentachloro-	50	625/1625 (GC-MS)
Phthalate, Butyl Benzyl	10	625/1625 (GC-MS)
Phthalate, DEH (bis-2-ethylhexyl)	10	625/1625 (GC-MS)
Phthalate, Dibutyl	10	625/1625 (GC-MS)
Phthalate, Diethyl	10	625/1625 (GC-MS)
Phthalate, Dimethyl	10	625/1625 (GC-MS)
Phthalate, Dioctyl	10	625/1625 (GC-MS)
Pyrene	10	625/1625 (GC-MS)
TCB, 1,2,4-	10	625/1625 (GC-MS)
Toluene, 2,4-Dinitro-	10	625/1625 (GC-MS)
Toluene, 2,6-Dinitro	10	625/1625 (GC-MS)

GFAA = Graphite Furnace Atomic Absorption

HGAA = Hydride Atomic Absorption

CVAAM = Cold Vapor Atomic Absorption

ICP = Inductively Coupled Plasma

ADAC = After Distillation Amenable to Chlorination (colorimetric or electrode)

CEAA = Chelation, Extraction Atomic Absorption

GC = Gas Chromatography

MS = Mass Spectrometry

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Attachment 2

SECURITY PLAN

(There is 1 page in this attachment)

5.0 PROCEDURES TO PREVENT HAZARDS

5.1 SECURITY

5.1.1 Surveillance

Site security during normal working hours is provided by on-site operating staff. During all non-working hours, site security is provided by the guard service at the U.S. Gypsum plant at the only vehicular access point to the facility. A barrier and gate prevents unauthorized vehicular access. The guard's duties are as follows:

1. Prohibit unauthorized entrance into the facility during non-operating hours.

2. Provide the Site superintendent with written documentation identifying any vehicles attempting to enter the facility during non-operating hours.

3. Alert the emergency coordinator of any problems or unusual conditions encountered at the site during non-operating hours.

5.1.2 Entry Control

The active portion of the facility is completely enclosed by fencing, including a 6-foot high chain-link fence with a barbed wire top, 3-strand barbed wire fence and a total of 2 access gates. The entrance road access gate will be open and controlled by the facility operator during operating hours, and will be locked during non-operating hours. The guard at the U.S. Gypsum plant will prevent unauthorized entry during non-operating hours.

5.1.3 Warning Signs

Warning signs are posted at each gate stating: "Danger - Unauthorized Personnel Keep Out." The message will be stated in English, with bold printed 4-inch high letters, making the sign easily legible at a distance of 25 feet. Additional signs will be attached to the perimeter chain-link fence facing outward at a lateral spacing of approximately 400 feet.

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Attachment 3

INSPECTION SCHEDULE

(There are 11 pages in this attachment)

5.2 INSPECTION SCHEDULE

5.2.1 General Inspection Requirements

During the post-closure period of the Area 5 Landfill, site inspections will be performed quarterly for the first two years and continue semiannually for the remainder of the post-closure period. Regular inspection of the Wastewater Treatment Facility will be conducted to identify potential problems with structural deterioration, equipment malfunctions, operator errors, and possible discharges that could cause, or lead to, the release of hazardous waste contaminants that would adversely affect the environment or threaten human health. Any problems or facility failures should be corrected or repaired immediately.

These inspections will be performed on a routine basis by facility operating personnel under the direction of the Site Superintendent. Records of each inspection will be retained for a minimum of 3 years.

********** Soil Treatment Facility statement removed **********

During the post-closure period of the Area 5 facility, there will not be at any time unattended any exposed hazardous material which could cause harm or injury to unknowing or unauthorized persons or livestock which may enter the facility. The only active portion of the Hawkins Point facility is the leachate collection system which is fully enclosed thereby preventing possible physical contact or disturbance by unknowing or unauthorized persons or livestock which may enter the facility.

5.2.2 Inspection Procedures

Inspection will be conducted utilizing the items listed on the Inspection Logs presented in Table 5.1 as a guide. The following logs sheets will be used, as indicated in Table 5.1:

1. Facility Components
2. Safety and Emergency Equipment
3. Miscellaneous Equipment and Supplies
4. Security Devices

Table 5.1 contains a list of items to be inspected, a description of typical problems which may be observed, and the recommended frequency of inspection for each item. Information to be entered on the Inspection Logs includes the inspector's name and title, date and time of inspection, item inspected, frequency of

TABLE 5.1: INSPECTION LOG
FACILITY COMPONENTS

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Wastewater Treatment Building	Cracks, deterioration, spills	Daily			
Influent Storage Tank and Containment Area	Cracks, ponded water. deterioration	Daily			
Drainage Ditches	Erosion, clogging, inadequate protective vegetation	Weekly & after storm events			
Entrance Road	Cracks or deterioration	Weekly			
Fire Hydrants	Leakage, valves	Monthly			
Sump	Standing	Monthly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

TABLE 5.1: INSPECTION LOG

FACILITY COMPONENTS

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Cover Material of Area 5	Uneven settlement, seeps, erosion, inadequate drainage or vegetation	Quarterly			
Leachate Collection System	Breaks, leaks or clogs, deterioration, cracks or spalling of manholes	Monthly			
MPA Cells in Areas 2/3	Uneven settlement, seeps, erosion, inadequate drainage or vegetation	Quarterly			
Sewage Holding Tanks	Full, Leaks	Monthly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

TABLE 5.1: INSPECTION LOG

FACILITY COMPONENTS

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Permanent Survey Benchmarks	Dislocation, damage	Quarterly			
Truck Wash Area	Blockage, cracks, spalling and deterioration in pavement, corrosion of roof structure, damage of waste oil interceptor, deterioration of grating	Monthly			
Groundwater Interceptor System	Deterioration or damage to manholes	Monthly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

TABLE 5.1: INSPECTION LOG
SAFETY AND EMERGENCY EQUIPMENT

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Water Pump	Power, Clogging	Monthly			
Generators	Fuel Supply, Spark Plugs. Oil	As Used			
Road Cones	Out of Stock	Monthly			
Caution Flag Rope	Out of Stock	Monthly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

TABLE 5.1: INSPECTION LOG
MISCELLANEOUS EQUIPMENT AND SUPPLIES

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Shovels	Broken, Waste Buildup, Out of Stock	Weekly			
Brooms	Broken, Waste Buildup, Out of Stock	Weekly			
Drum Dolly	Out of Stock	Monthly			
Large, Heavy Duty Plastic Bags	Out of Stock	Monthly			
Gasoline Containers	Out of Stock	Monthly			
Groundwater Monitoring Wells	Contamination, Loose or Missing Cover	Quarterly			
Surface Water	Contamination	Monthly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

TABLE 5.1: INSPECTION LOG
SECURITY DEVICES

ITEM	TYPES OF PROBLEMS	FREQUENCY OF INSPECTIONS	STATUS*	OBSERVATIONS	DATE AND NATURE OF REPAIRS/REMEDIAL ACTION
Facility Fence	Corrosion, Damage to Chain-Link Fence or Barbed Wire	Monthly			
Gates and Locks	Corrosion, Damage	Monthly			
Warning Signs	Damaged	Weekly			
Locks on Groundwater Monitoring Wells	Corrosion, Broken	Quarterly			

*A - Acceptable; U - Unacceptable

Inspector _____

Title _____

Date & Time _____

inspection, status of the item, observations, and the date and nature of repairs and remedial action. The inspector will be required to indicate on the Inspection Logs whether the condition of each inspected item is acceptable or unacceptable. If the status of any item proves unacceptable, it will be reported immediately to the Site Superintendent for prompt initiation of repairs an/or remedial action procedures.

5.2.3 Remedial Action

The need for routine and preventive maintenance will be determined by the inspection procedures and recorded on the Inspection Logs. Any required maintenance will be initiated in order to preclude irreparable damage. If a hazardous situation is imminent, or has occurred, remedial action procedures will be followed in accordance with the contingency Plan (See Section 8.0). The emergency coordinator will be contacted and measures taken to contain or eliminate the hazard, and subsequently to decontaminate any affected areas.

5.3 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

5.3.1 Unloading Operations

**********SOIL TREATMENT FACILITY statement removed**********

**********underground tank reference changed**********

There will be unloading and transfer operations required in the handling of the leachate. The leachate will be transferred from the above ground holding tank to tank trucks via vacuum pumps provided on the trucks. This operation takes place in the leachate holding and transfer area which includes a concrete curb around three sides of a sloped spill pad area with grates which drain into a containment area. The liquid that spills in this area is pumped directly into the tankers via vacuum pumps.

Any spills during the loading or unloading procedures should be well contained. However, in the event a spill occurs in which hazardous liquids may leave the spill pad areas, sandbags and industrial absorbent products are maintained on site at all times. The only sides of the spill pads without a protective curb are enclosed by an area covered with asphalt. Any spill would be contained and captured immediately to prevent any possible hazard to the environment. Sufficient water and an eye wash station is available in the leachate holding and loading area for clean-up operations and for personnel safety.

5.3.2 Surface Water Runoff Control

**********SOIL TREATMENT FACILITY & WWTP statement removed**********

The site is generally sloped so that surface runoff and precipitation falling outside of the facilities will be directed to the perimeter ditches and drainage channels. There will not be any contaminated surface water runoff generated in the leachate holding and transfer area because the area is cleaned after each transfer operation.

5.3.3 Groundwater Quality Protection

**********SOIL TREATMENT FACILITY & WWTP statement removed**********

Ground water and surface water contamination due to the presence of the Area 5 landfill is prevented by the clay liner, leachate collection system, clay berms, and the final composite closure cap. During the post-closure period MES will continue to monitor the ground water as required by the sites current RCRA Permit and the surface water as required by the sites current National Discharge Elimination Permit. The above ground leachate holding tank and the leachate collection system will be inspected sometime during February of each odd numbered year, as specified within the March 2000 permit modification.

5.3.4 Equipment Failure and Power Outages

Generators will be used as power sources for electric-powered equipment in case of power failure. When equipment failure is investigated, repairs or replacement of the equipment will be made in a timely basis.

5.3.5 Prevention of Exposure to Personnel

To prevent hazardous exposure to personnel and to prevent other facility related accidents, the MES has incorporated training and safety programs for all employees at Hawkins Point. The training program is outlined in Section 7.0 of this application and the Health and Safety Program is outlined in Section 9.0. The Health and Safety Program lists the possible hazards associated with the waste material at Hawkins Point and the appropriate personnel protective equipment (PPE) required by the facility and MES. All PPE is maintained on site at all times located in the storage area. Eye wash stations are located in all areas of hazardous material handling. MES will maintain an up-dated list of PPE and other emergency equipment, as well as manufacturer's names, addresses and telephone numbers.

5.3.6 Communications

**********Point of contact information changed**********

Cellular and landline phone system are provided on site which permit communication between on-site stations and outside locations. Telephones are located in the Office and with the staff. A list of emergency telephone numbers will be displayed at each location including the following:

LOCATION	PHONE NUMBERS
Site Superintendent	443-871-7198
Police Department	911
Fire Department	911
Ambulance	911
Hospital (South Md. General, Baltimore City)	410-225-8000
MDE Spill Response	410-333-2950
MDE Spill Response (after hours)	410-974-3551
National Response Center	800-424-8802

A compressed air horn will be provided at the office area as a backup system for alerting personnel at the facility. In an emergency situation, the horn will be used to alert personnel across the entire site to the hazard through a system of coded horn blasts. The coding system will be as follows:

- Continuous, long blast: EVACUATE
- Repeated, short blasts: SPILL or FIRE

All site personnel will be instructed during the Training Program of the proper response to these alarms.

5.3.7 Extinguishers. Spill Control and Decontamination Equipment

Portable fire extinguishers are located in every location where a fire hazard may occur. They are located in the storage shed, the leachate loading area, lunchroom, locker room and office. Hoses for hook up at fire hydrant and yard hydrants are also available on-site at all times.

Spill control equipment (i.e., industrial absorbents, sand bags, etc.) is located in the storage shed and is available at all times. During facility

inspections, an inventory is performed to determine if the supply is low. Supplies are ordered before the inventory is too low.

Water is the essential necessity to decontamination. There is adequate volume and pressure to supply water with enough strength to decontaminate equipment, clean-up any possible spill or put out fires. All water used to decontaminate equipment or personnel is considered a hazardous waste and is collected and handled as leachate. Decontamination equipment is also inventoried during facility inspections and supplies are ordered regularly. Eye wash stations are located in the storage shed, the leachate holding and transfer area and the lunch and office trailers. Truck wash pads, located near the leachate holding and transfer area can be used to decontaminate equipment and personnel. Showers are available in the locker rooms.

5.3.8 Availability, Testing and Maintenance of Equipment

All facility communications, fire protection, spill control, water supply, decontamination and other emergency and hazard prevention equipment, where required, shall remain available at all times to employees and be tested and maintained as necessary to assure its proper operation in time of emergency.

5.3.9 Prevent Releases to the Atmosphere

**********SOIL TREATMENT FACILITY & WWTP statement removed**********

No subsurface gas generation is expected to occur in the landfill Cells of Area 5. The only waste received in the cells is chromium and/or asbestos contaminated, which is not reactive, ignitable or volatile.

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Attachment 4

PERSONNEL TRAINING OUTLINE

(There are 13 pages in this attachment)

7.O TRAINING PROGRAM

7.1 JOB TITLES AND DUTIES

The organization of supervisory personnel responsible for operations at the facility is graphically depicted on Figure 7.1. Job positions are described and the duties, qualifications and responsibilities of each position are outlined in Section 7.5. Environmental monitoring personnel, facility inspectors and operators who are assigned to the Hawkins Point facility to perform jobs as required or needed will be trained and qualified according to the facility training program.

7.2 OUTLINE OF TRAINING PROGRAM

In order to provide the full range of training necessary for employees to safely perform their duties at the Hawkins Point HWL, the training program includes classroom as well as on-the-job training. On-the-job training is conducted as the opportunities for the instruction arise and is conducted by the employee's immediate supervisor or the Site Supervisor. A list of the instructional items covered in the on-the-job training phase of the program is included in the job description summaries in Section 7.5.

For the classroom instruction, all facility employees are required to attend a 40 hour hazardous waste operator certification course and all supervisors are required to attend an 8 hour hazardous waste supervisor course both of which fulfill the OSHA 29 CFR 1910.120 training requirement. Each employee is required to maintain this certification by attending an 8 hour refresher course annually.

In addition to the OSHA hazardous waste operators training, each employee is required to become familiar with the Health and Safety Plan for Hawkins Point (See Section 9.0) and attend site safety training classes conducted by the MES Safety Division.

7.3 TRAINING CONTENT, FREQUENCY AND TECHNIQUES

The initial MES site safety training of employees involves an intensive lecture and discussion presentation of the full content of the training material. The annual review course will follow a less formal approach and will primarily re-emphasize the information necessary for worker safety under normal and emergency conditions. Operational improvements developed during the ensuing year of experience will be presented at the annual training review courses. The following material is included in MES site safety training:

Confined space entry
Standard first aid
Hazard communications standard
Material handling
Personnel protection equipment
Lifting Safely
Hazardous Materials
Employee safety standard
Fire extinguishers & fire safety
Electrical hazards
Adult CPR
Ventilation
Respiratory protection
Machinery hazards
Housekeeping
Car emergency repair
Power tools

7.4 IMPLEMENTATION SCHEDULE

All current employees have completed the classroom training program. New employees and employees assigned to new positions requiring additional training must receive this training within six months of assignment. New and reassigned employees will not be permitted to work unsupervised until after the completion of training. All training records will be maintained at the MES headquarters by the Site Supervisor for a minimum of three years.

In order to guarantee that such employee receives the required annual review training, the Site Supervisor will establish a specific time of year for this purpose.

7.5 JOB DESCRIPTION SUMMARIES

7.5.1 Site Supervisor

Job Description:

1. Serve as the MES agent of responsibility of site.

2. Create a standard of excellence and professionalism at site.

3. Provide for the training of all facility personnel.

4. Ensure the health and safety of all facility personnel.

5. Direct any reasonable action necessary to protect the environment.

Responsibilities: Responsible for all operations and action of personnel at the facility including:

a. Recordkeeping

b. Maintenance, inventory and operation of equipment.

c. Upkeep and maintenance of grounds at and surrounding the facility.

d. Public relations at the facility, which includes conducting tours and providing information to citizens groups and organizations as needed.

e. Facilitate coordination and communication between design engineers, technicians and regulators.

f. Facilitate coordination and communication between MES headquarters and Hawkins Point.

g. Conduct and review regular and thorough site inspections.

h. Implement the provisions of the Health and Safety Plan, the Contingency Plan, the Post-Closure Plan. Update and revise the plans as needed to improve the facility.

Qualifications:

Education Requirement: Graduation from High School

Experience Requirement: Three years experience in hazardous waste management activities.

Training:

1. 40 Hour Health and Safety Training for Hazardous Waste and Emergency Response satisfying OSHA 29 CFR 1910.120.

2. Annual 8 Hour Refresher Training satisfying OSHA 29 CFR 1910.120.

3. 8 Hour Supervisor Training satisfying OSHA 29 CFR 1910.120.

4. Office Procedures:

   General
   Personnel Management
   Budget Management
   Purchasing/ Inventory
   MES Site Safety Classes
   Hazardous Waste Manifest System
   Records

5. Operations Procedures:

Facility Operation/Control
Security
Leachate Management
Facility Inspection
Contingency Plan Implementation
Decontamination

6. Maintenance Procedures:

General Maintenance
Sedimentation and Erosion Control
Leachate Collection System

7. Equipment Operation and Maintenance Procedures:

Decontamination/Truck Wash Equipment
Leachate Handling Equipment
Facility Support Equipment
Safety Equipment
Spill Control Equipment
Heavy Equipment

8. Environmental Protection Program:

Ground/Surface Water Monitoring
Contamination Control

7.5.2 Environmental Sampler

Job Description:

The environmental samplers must be able to sample surface and ground water according with Section 10.0, inspect and evaluate the monitoring wells and outfalls as required and record and report all findings to the Site Supervisor.

Responsibilities:

a. Sampling required outfalls, wells and leachate. Recording all data.

b. Conduct all required well inspections.

c. Comply with the provisions of the Health and Safety Plan, the Contingency Plan, the Post-Closure Plan.

Qualifications:

Education Requirement: Graduation from High School

Experience Requirement: One years experience in hazardous waste management activities.

Training:

1. 40 Hour Health and Safety Training for Hazardous Waste and Emergency Response satisfying OSHA 29 CFR 1910.120.

2. Annual 8 Hour Refresher Training satisfying OSHA 29 CFR 1910.120.

3. Office Procedures:

   General
   Inventory
   MES Site Safety Classes
   Records

4. Operations Procedures:

   Security
   Well sampling
   Outfall sampling
   Sampling Equipment inspection
   Contingency Plan Implementation
   Decontamination

5. Maintenance Procedures:

   Sampling Equipment Maintenance

6. Environmental Protection Program:

   Ground/Surface Water Monitoring
   Contamination Control

7.5.3 Facility Inspector

Job Description:

The facility inspector must be able to inspect and evaluate the entire facility for any discrepancies, or inadequacies. All findings shall be recorded and reported to the Site Supervisor.

Responsibilities:

a. Recordkeeping and Inventory.

b. Conduct all required facility inspections.

c. Comply with the provisions of the Health and Safety Plan, the Contingency Plan, the Post-Closure Plan.

Qualifications:

Education Requirement: Graduation from High School

Experience Requirement: Three years experience in hazardous waste management activities.

Training:

1. 40 Hour Health and Safety Training for Hazardous Waste and Emergency Response satisfying OSHA 29 CFR 1910.120.

2. Annual 8 Hour Refresher Training satisfying OSHA 29 CFR 1910.120.

3. Office Procedures:

   General
   Inventory
   MES Site Safety Classes
   Records

4. Operations Procedures:

   Facility Operation/Control
   Security
   Facility Inspection
   Contingency Plan Implementation
   Decontamination

5. Maintenance Procedures:

General Maintenance
Sedimentation and Erosion Control
Leachate Collection System

6. Environmental Protection Program:

Ground/Surface Water Monitoring
Contamination Control

7.5.4 Operator

Job Description:

Operators must be able to operate all equipment at the facility to handle leachate collection and other required tasks. Operators must comply with Health and Safety Plan.

Responsibilities:

a. Maintenance, inventory and operation of equipment assigned.

b. Upkeep and maintenance of grounds at and surrounding the facility.

c. Follow the Health and Safety Plan, the Contingency Plan, the Post-Closure Plan as directed.

Qualifications:

Education Requirement: None

Experience Requirement: Must have ability to operate heavy equipment. A minimum of two years of experience would be required. Experience with hazardous waste operation is preferable.

Physical Requirement: Good physical condition; must be able to properly wear a respirator.

Training:

1. 40 Hour Health and Safety Training for Hazardous Waste and Emergency Response satisfying OSHA 29 CFR 1910.120.

2. Annual 8 Hour Refresher Training satisfying OSHA 29 CFR 1910.120.

3. Office Procedures:

   General
   MES Site Safety Classes
   Hazardous Waste Manifest System

4. Operations Procedures:

   Facility Operation/Control
   Security
   Leachate Management
   Contingency Plan
   Decontamination

5. Maintenance Procedures:

   General Maintenance
   Sedimentation and Erosion Control
   Leachate Collection System
   Roadways

6. Equipment Operation and Maintenance Procedures:

   Decontamination/Truck Wash Equipment
   Leachate Handling Equipment
   Facility Support Equipment
   Safety Equipment
   Spill Control Equipment
   Heavy Equipment

7. Environmental Protection Program:

   Contamination Control

HAWKINS POINT HAZARDOUS WASTE FACILITY TRAINING PROGRAM

BASIC TRAINING PROGRAM (Page 1 of 2)

Topic	Key Points
History of Environmental Law	Provides an overview of the progress of government toward the control of hazardous waste
	Summarizes the effect of each Law
RCRA - The Law	Describes the purpose, function and two primary subtitles of the law
	Provides a summarized presentation of the prior sections of Subtitle C
RCRA - The Regulations	Outlines the history and future of the regulations
	Describes the objective of the regulations
RCRA and Hawkins Point	Explains the RCRA regulations as they apply to Hawkins Point
Facility Standards	Lists and explains the facility requirements of operation under the RCRA regulations
Waste Receipt Procedures	Defines the on-site process for receiving waste step-by-step including record forms
	Defines the duties of each job position
Safety Procedures	Outlines general personal and operational safety rules
	Defines the characteristics and hazards of the types of wastes to be disposed

BASIC TRAINING PROGRAM (Page 2 of 2)

Topic	Key Points
Health & Safety Plan	Review and sign acknowledgment sheet
Contingency Plan/Evacuation Plan	Explains the plan contents
	Defines the plan requirements
	Details evacuation routes
	Implementation
	Use of local response units
Transportation/Manifest	Description and listing of regulatory authorities and Acts
	Summary of emergency response requirements
	Details shipping system
	Includes examples of required documentation and information
	Step-by-step outline of the manifest system
Emergency Response	Describes equipment and its use for emergency procedures
	Includes a discussion of the available emergency equipment and its use
	Procedures to respond to spills or fires
Personnel Safety Equipment	Instructs function of crew facilities, use of "clean room" and "dirty room"
	Daily personnel protective equipment procedures
	Personnel safety equipment

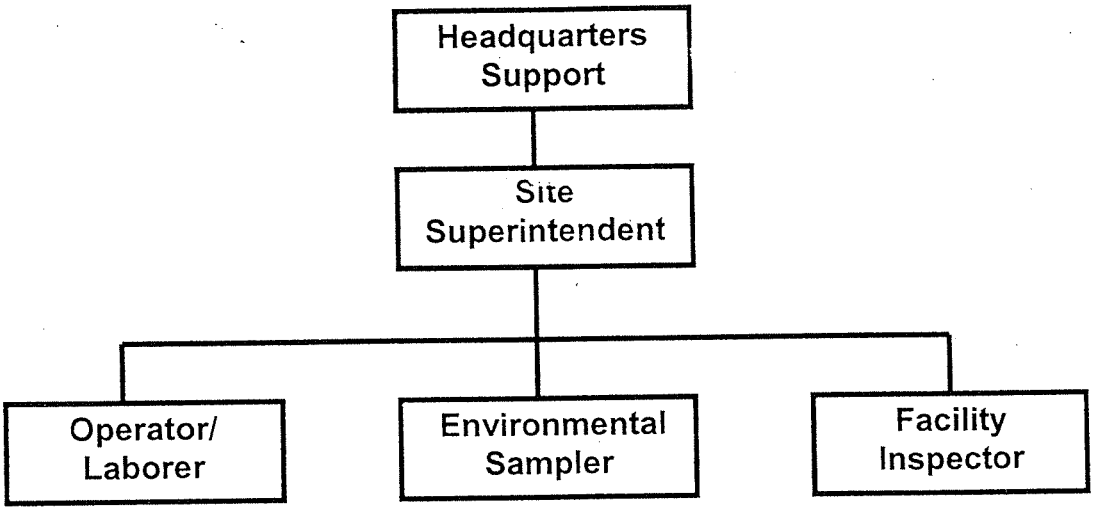
INTERMEDIATE TRAINING PROGRAM (Page 1 of 1)

Topic	Key Points
Treatment/Storage Techniques	Describe leachate collection system
	Describe treatment process equipment and its use
	Review unloading from storage tank
	Review hazards of treatment chemicals
	Review site NPDES Permit and conditions
Inspection Techniques	RCRA requirements
	Inspection techniques
	Review of inspection forms
	Discussion of remedial action procedures
Contingency Plan	Detailed presentation on specific employee tasks
Decontamination	Procedures for personnel
	Procedures for equipment
	Disposal of decontaminated residue and materials

ADVANCED TRAINING PROGRAM (Page 1 of 1)

Topic	Key Points
Monitoring	Waste screening process
	Waste receiving quality control process
	Groundwater, surface water and treatment plant monitoring
Emergency Equipment	Use
	Inspection
	Maintenance
Inspection Techniques	Maintaining an adequate program
	Explanation of the inspection procedures
	Review of forms
Handling/Storage Techniques	Traffic flow and control
	Loading off-site transport vehicles
Contingency and Health & Safety Plans	Details of plans
	Discussion of plans

FIGURE 7.1
ORGANIZATION CHART



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Attachment 5

CONTINGENCY PLAN

(There are 18 pages in this attachment)

6.0 CONTINGENCY PLAN

6.1 GENERAL

The Contingency Plan presented herein applies to the entire Hawkins Point Hazardous Waste Landfill site and serves to minimize the effects of an emergency or stress situation which could result in the uncontrolled discharge of hazardous waste into the environment or pose a hazard to human health or life. The Contingency Plan requires that in the event of a fire, explosion or release of hazardous wastes, facility personnel undertake specific emergency procedures developed in the plan. The responsibility for ensuring that the plan is implemented lies with the designated emergency coordinator.

Amendments, distribution and document control procedures for the Contingency Plan will be the responsibility of the Site Supervisor. One copy of the Contingency Plan will be provided to each of the organizations, companies, or agencies that have agreed to provide assistance in an emergency situation. A copy of this Contingency Plan is kept in the office trailer at the facility. Duplicate copies are retained by the Site Supervisor, the MES Safety Officer, the Environmental Monitoring Group and all offsite, on-call emergency personnel.

6.2 EMERGENCY COORDINATOR

6.2.1 Emergency Coordination

During Operating Hours, the Site Supervisor will serve as the emergency coordinator during facility operating hours and will have the authority to designate an acting emergency coordinator to serve in his absence. The following persons will be the designated emergency coordinators:

**********Point of contact changes**********

Primary Emergency Coordinator

Name: Russell Downs

Address: 390 West Court
Glen Burnie, Maryland 21061

Telephone: (410) 355-3898 (Office)
(410) 760-3583 (Home)
(443) 871-7198 (Mobile)

Emergency Coordinator #2

Name: Tarsem Thohan

Address: 9010 Hedgerow Way
Baltimore, Maryland 21236

Telephone: (410) 974-7254 (Office)
(410) 256-8450 (Home)
(443) 871-7208 (Mobile)

Emergency Coordinator #3

Name: David Ferguson

Address: 5711 Franklin St
Baltimore, Maryland 21225

Telephone: (410) 974-7295 (Office)
(410) 636-2246 (Home)
(443) 871-7210 (Mobile)

The name of the emergency coordinator on-site will be posted at all times on the emergency coordination bulletin board located in the office trailer. The bulletin board will be changed as necessary to indicate the currently designated emergency coordinator. The designated emergency coordinator will not leave the site without designating a replacement coordinator and posting the name on the bulletin board.

During non-operating hours, an emergency coordinator and an equipment operator will be on call during all non-operating hours; these individuals will be available to respond during all on-call times. Their names and telephone numbers will be posted in the office trailer. On-call persons are provided with a mobile phone which will be carried at all times while on call.

6.2.2 Limit of Authority

The emergency coordinator will be authorized to expend, using emergency procurement procedures, the resources necessary to prevent or mitigate fires, spills, explosions or other incidents or conditions that may threaten life, property or the environment.

6.3 EMERGENCY PERSONNEL

The emergency procedures outlined in this Contingency Plan are to be implemented in the event of a fire, spill, explosion or other incident that threatens life, property or the environment. The personnel responsible for responding in an emergency, and their roles are as follows:

1. Site Personnel. All personnel on site shall be trained to respond to emergencies, and represent the first line of defense in an emergency situation. Often, the manner of the initial response to an incident determines the severity of the incident. In the case of an emergency at the site, employees will immediately:

   - Notify the Site Supervisor and Designated Emergency Coordinator.

   - Take the requisite action to cease activities that are contributing or could contribute to the incident.

   - Contain the emergency incident as the situation dictates.

2. On-Site Emergency Coordinator. The On-Site Emergency Coordinator will take action to mitigate the incident, evaluate the situation and call for assistance if needed. The Coordinator, as with other site personnel, has been trained to respond to emergency situations at the site. In the event of an emergency incident, the Coordinator will immediately:

   - Evacuate the area except for emergency personnel.

   - Notify the Site Supervisor.

   - Direct the personnel involved in performing emergency functions until the arrival of the Site Supervisor.

6.4 IMPLEMENTATION

The decision to implement the Contingency Plan depends upon whether or not the impending or actual incident could threaten human health or the environment. The purpose of this section is to provide guidance to the emergency coordinator in making this decision by providing decision-making criteria. The Contingency Plan will be implemented in the following situations:

1. Fire and/or Explosion;

a. The fire causes the release of toxic fumes.

b. The fire could possibly spread to off-site areas.

c. The fire spreads and could possibly ignite materials at other locations on-site and could cause heat induced explosions.

d. The use of water or water and chemical fire suppressant could result in contaminated run-off.

e. An imminent danger of an explosion and the associated safety hazards of flying fragments or shock waves exist.

f. An imminent danger exists that an explosion could ignite other hazardous wastes at the facility.

g. An imminent danger exists that an explosion could result in the release of toxic materials.

2. Spills or Material Release:

a. The spill could result in the release of flammable liquids or vapors causing a fire or gas explosion hazard.

b. The spill could cause the release of toxic liquids or fumes.

c. The spill can be contained on-site, but the potential exists for ground water contamination.

d. The spill cannot be contained on-site, resulting in off-site soil contamination and/or ground or surface water contamination.

6.5 EMERGENCY RESPONSE PROCEDURES

6.5.1 Emergency Coordinator

Whenever there is an imminent or actual emergency situation, the emergency coordinator must immediately perform the following duties:

1. Activate the internal facility alarms and communications systems (air horn and/or radios), where applicable, to notify all personnel on-site.

2. Consult a list of all employees with home telephone numbers for quick notification of any off-duty employees who may be needed in the event of an emergency situation.

3. Notify the applicable state or local agencies with designated response roles, if their assistance is needed.

Other actions to be taken, not in priority order, are:

1. Notify the Site Supervisor.

2. Identify any materials and/or wastes released by fire or explosion.

3. Assess possible direct and indirect hazards to human health or the environment from release materials.

4. Notify the fire department in case of fire or explosion.

5. Notify the City and State police departments if evacuation of local areas may be advisable.

6. Notify the City Health Department and the Maryland Department of the Environment (MDE) in the event of a spill which could have a potential adverse effect on air, surface water or ground water quality (generally, any spill over 55 gallons), as well as in the event of a fire and/or explosion.

7. Notify the National Response Center in the event of a spill greater than 1,000 gallons or if evacuation is required.

8. Arrange for proper storage, treatment and/or disposal of recovered waste.

9. Submit "post-incident" reports, if required.

Whenever there is a release, fire, or explosion, the Emergency Coordinator must immediately identify the character, exact source, amount, and material and the location of its release or by a review of facility records, or if necessary, by chemical analysis. Concurrently, the Emergency Coordinator must assess possible hazards to human health or the environment that may result from the release, fire or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions.)

If personnel sustain injuries, the emergency coordinator must determine the number of persons injured, the seriousness of the injuries, and whether immediate evacuation of the injured is possible.

If the emergency coordinator determines that the facility has had a release, fire, or explosion which could threaten human health or the environment, or, if the release is of a quantity which would exceed the Reportable Quantities listed in 40 CFR 302, as promulgated effective July 1, 1990, these findings must be reported as follows:

1. If the assessment indicates that the evacuation of local areas may be advisable, the City and State police departments, the MDE and the City Health Department must be immediately notified. The emergency coordinator must be available to assist appropriate officials in deciding whether local areas should be evacuated.

2. The Emergency Coordinator must immediately notify either the government official designated as the on-scene coordinator for the area, or the National Response Center at 1-800-424-8802. This report must include:

   - Name and telephone number of reporter.
   - Name and address of the Hawkins Point Hazardous Waste Landfill.
   - Time and type of incident; e.g., release, fire.
   - Name, type and quantity of material(s) involved, to the extent known.
   - The extent of injuries, if any.
   - The possible hazards to human health, or the environment.

During an emergency, the Emergency Coordinator must take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous wastes at the facility. These measures must include, where applicable, a cessation of activities and operations, collecting and containing released waste, and removing or isolating containers.

6.5.2 Specific Emergency Actions

6.5.2.1. General. To respond to specific emergencies, the Hawkins Point HWL has adopted a series of Emergency Procedures; these procedures include the following:

- Spill procedure: on-site: liquids
- Spill procedure: on-site: solids
- Spill response procedure: off-site
- Spill response procedure: underground
- Fire procedures

- Explosion procedures

These procedures are outlined in the subsequent sections.

6.5.2.2 Spill Procedure: On-site: Liquids

1. Upon discovery, report to Emergency Coordinator.

2. The Emergency Coordinator will decide whether to implement the spill contingency plan; if so, sound alarm - short, repeated blasts, and if applicable, contact oncall emergency personnel.

3. Personnel will report to the facility control compound.

4. Upon the direction of the Emergency Coordinator, personnel will:

   a. Stop the leak or spill using earth, sand bags, heavy equipment, berms, absorbent, etc.

   b. Check the extent of the spill.

   c. Construct dikes, if necessary, or absorb with speed-i-dry.

   d. Place contaminated soil and absorbents in proper storage containers to be transported to an appropriate TSD facility by a certified hazardous waste hauler.

   e. Test area for contamination.

   f. Replace, repair and/or clean spill equipment.

   *******Specific contingency plan added for caustic and sulfuric spills*******

5. Specific Contingency Plan for Caustic and Sulfuric Spills

   Hazards: 66 Degree Sulfuric Acid

   Objective: Transfer chemicals from container larger than 55 gallons to 55-gallon container. All personnel involved with transfer of this chemical will review the MSDS sheet before starting the job.

   Equipment:

   Transfer pumps: the existing compatible chemical pumps will be used to transfer acid from the bulk storage tanks to 55-gallon drums. Tubing will be PVC.

Drum Pumps: the drum pump, if used, will be an FTI, Kynar PVDF pump with 1" ID PVC tubing.

55-gallon Drums: only 55 gallon drums known to have been previously used and marked for sulfuric acid will be used.

Personnel:

All workers who handle hazardous material will be 40-hour Hazwoper certified. The crew responsible for chemical transport is not permanently stationed at the facility where the transfer takes place. The following people will be on site during chemical transfer.

Emergency Coordinator: Site Supervisor permanently assigned the facility – will direct the clean up operations.
Crew Supervisor: The field supervisor will be at ESS level or higher.
Laborers: At least two laborers will be present during chemical transfer.

PPE: Refer to MSDS Sheet

All personnel will use the following PPE during chemical transfer. Be sure transfer hose is secure before starting chemical pump.

Tyvek QC
Safety goggles
Full face shield
Chemical resistant apron
Chemically resistant gloves taped at the wrist with glove inserts.

Spill Contingency and Clean up: Refer to MSDS Sheet

Sufficient sand, dry lime or soda ash and clean up equipment will be available on site before chemical transfer begins. Spills will be cleaned up immediately. The spill will be covered with sand, dry lime or soda ash. Do not put water directly onto leak, spill area or inside container. All clean-up solids and liquids shall be treated as hazardous material, stored in appropriate containers and disposed of at an appropriate TSD facility by a certified hazardous waste hauler.

Hazards: 50% Sodium Hydroxide (Caustic Soda)

Objective: Transfer chemicals from container larger than 55 gallons to 55-gallon container. All personnel involved with transfer of this chemical will review the MSDS sheet before starting the job.

Equipment:

Transfer pumps: the existing compatible chemical pumps will be used to transfer Caustic from the bulk storage tanks to 55-gallon drums. Tubing will be PVC.

Drum Pumps: the drum pump, if used, will be an FTI, polypropylene pump with 1" ID PVC tubing.

55-gallon Drums: only 55 gallon drums known to have been previously used and marked for caustic soda will be used.

Personnel:

All workers who handle hazardous material will be 40-hour Hazwoper certified. The crew responsible for chemical transport is not permanently stationed at the facility where the transfer takes place. The following people will be on site during chemical transfer.

Emergency Coordinator: Site Supervisor permanently assigned the facility – will direct the clean up operations.

Crew Supervisor: The field supervisor will be at ESS level or higher.
Laborers: At least two laborers will be present during chemical transfer.

PPE: Refer to MSDS Sheet

All personnel will use the following PPE during chemical transfer. Be sure transfer hose is secure before starting chemical pump

Tyvek QC
Safety goggles
Full face shield
Chemical resistant apron
Chemically resistant gloves taped at the wrist with glove inserts.

Spill Contingency and Clean up:

Sufficient clean up material and equipment will be available on site before chemical transfer begins.

Spills will be cleaned up immediately. Dry material can be shoveled up; liquid material can be removed with a vacuum. Neutralize remaining traces with any dilute inorganic acid (hydrochloric, sulfuric, or acetic). Flush spill area with water followed by a liberal covering of sodium carbonate. All clean-up solids and liquids shall be treated as hazardous material, stored in appropriate containers and disposed of at an appropriate TSD facility by a certified hazardous waste hauler.

6.5.2.3 Spill Procedure: On-Site: Solids.

1. Upon discovery of large spill, notify the emergency coordinator.

2. The emergency coordinator will decide whether to implement the contingency plan; if so, sound the alarm -short, repeated blasts, and if applicable, contact oncall emergency personnel.

3. Personnel will report to the facility control compound.

4. Upon the direction of the emergency coordinator, personnel will:

   a. Check the extent of the spill.

   b. In the event of rain or solids contacting water, follow spill procedures for liquids.

   c. Remove spilled waste and contaminated soil and place in proper storage containers to be transported to an appropriate TSD facility by a certified hazardous waste hauler.

   d. Test area for contamination.

6.5.2.4 Spill Response Procedure: Off-site.

1. Respond to off-site spills only at the direction of the TSD facility/hauler and the agreement of the Emergency Coordinator.

2. Upon receipt of a call, the Emergency Coordinator will determine the advisability of sounding the alarm; if so, sound the alarm - short, repeated blasts, and if applicable, contact on-call emergency personnel.

3. Personnel will report to the facility control compound.

4. Under the direction of the Emergency Coordinator, personnel will gather spill response equipment and move to the spill scene.

6.5.2.5 Spill Response Procedure: Underground. This procedure covers the release of liquids from the leachate collection system, leachate holding tanks, or from any cell. Actual decisions and directions would be provided by qualified technical and regulatory experts not available on-site; however, in general, when leaks are discovered, designated personnel will:

1. Determine the source of the leak and stop it.

2. Determine the extent of migration.

3. Determine ground water flows.

4. Provide remedial measures.

6.5.2.6 Fire Procedures.

1. Upon discovery, notify emergency coordinator.

2. The Emergency Coordinator will decide whether to implement the contingency plan; if so, sound the alarm -short, repeated blasts, and if applicable, contact oncall emergency personnel, and notify the fire department.

3. All personnel not actively involved in fighting the fire will move to the rally points indicated on Figure 6.2 and remain until accounted for and instructions are received from the Emergency Coordinator.

4. All injured persons should be removed immediately from the facility for treatment.

5. Personnel at the scene will attempt to extinguish the fire with the nearest fire extinguishers.

6. For fires where fire extinguishers are inadequate or unavailable, personnel will attempt to smother with dirt or a fire blanket.

7. For fires in other areas, extinguish by whatever means possible; for example, using hydrant and water hose.

8. Fuel fires can be extinguished using earth or foam-type fire extinguishers.

9. Fires in wood chips can be extinguished using water or earth.

6.5.2.7 Explosion Procedures.

1. Immediately notify the Emergency Coordinator.

2. All injured persons should be removed immediately from the facility.

3. The Emergency Coordinator will notify the fire department and decide whether to implement the contingency plan; if so, sound the alarm - long continuous blast for site evacuation.

4. Personnel will not re-enter the facility until investigators from the fire department determine the cause of the explosion and provide clearances to return to the area.

6.5.3 Clean-up Activities

During clean-up activities, personnel will:

1. Ascertain that all unnecessary persons are removed from the hazard area.

2. Utilize protective clothing and equipment.

3. If flammable waste is involved, remove all ignition sources and use protective clothing in conducting containment and clean-up measures.

4. Remove all surrounding materials that could be especially reactive with materials in waste.

5. Use absorbent pads, brooms, earth, sandbags, sand and other inert materials to contain, divert and clean up a spill if it has not been contained by a dike or sump.

6. Properly dispose of all spent containment and clean-up materials.

7. Properly dispose of all contaminated soil at an appropriate TSD facility.

8. If a spill should occur that requires clean-up activities beyond the capabilities of facility personnel, engage the services of a reputable spill removal contractor.

6.5.4 Post-Incident Actions

Immediately after an emergency, the Emergency Coordinator must provide for treatment, storage, or disposal of all recovered wastes, contaminated soil or surface water, or any other material that results from a release, fire or explosion at the facility.

The Emergency Coordinator must ensure that two conditions exist in the affected area of the facility:

1. More waste that may be incompatible with the released material is not treated, stored, or disposed until cleanup activities are completed.

2. All emergency equipment listed in the Contingency Plan is cleaned and fit for its intended use before operations are resumed.

The emergency coordinator or the site supervisor must investigate the facility for any damage that may have been caused to any of the containment systems, and conduct the appropriate repairs.

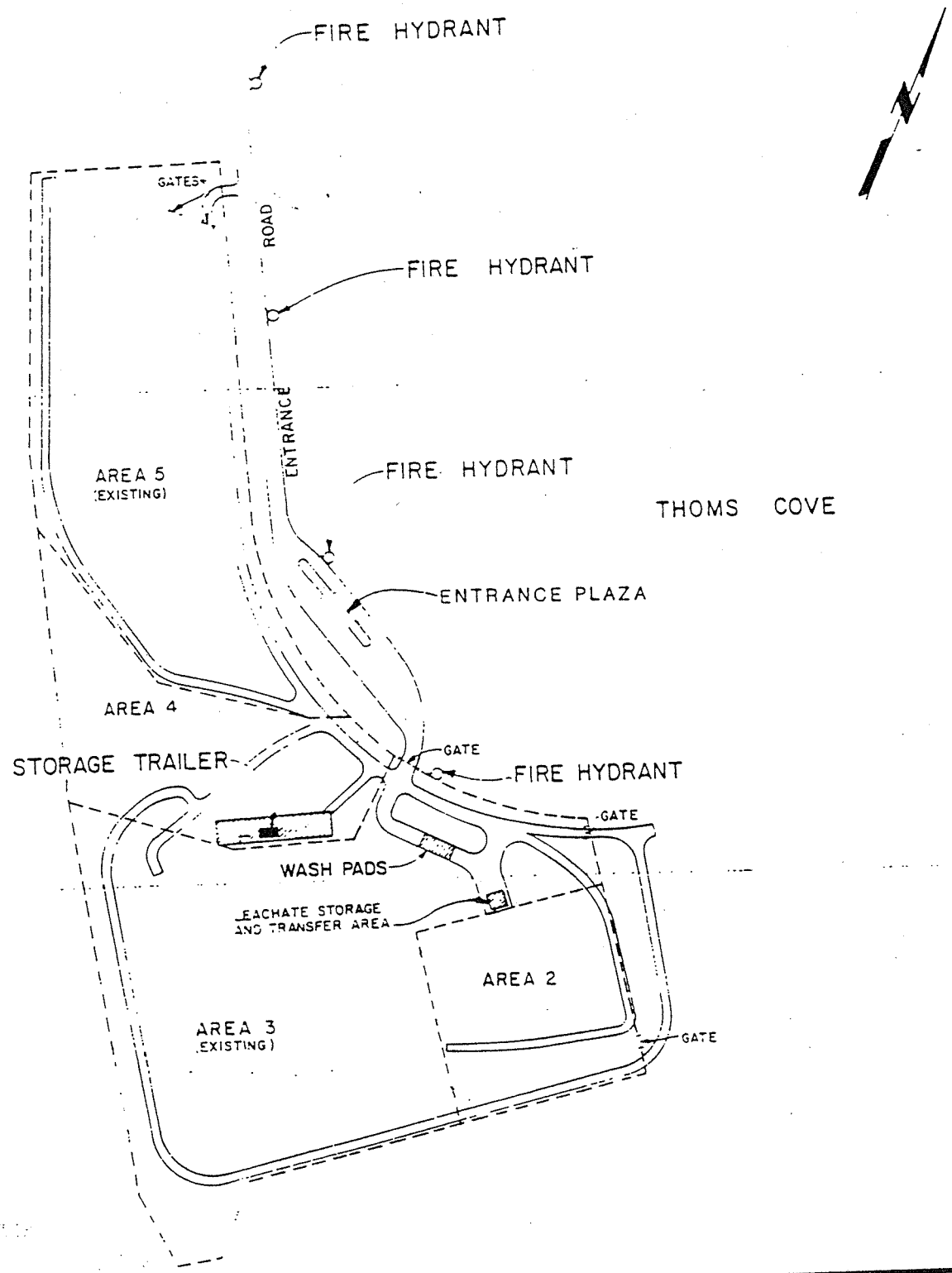
6.6 EMERGENCY EQUIPMENT

Figure 6.1 shows the location of fire hydrants and the storage trailer where all emergency materials, including speed-i-dry industrial absorbent, generator, electric pump, diesel pump, hoses, pipe stoppers, absorbents pads and sand bags. ABC-15 pound fire extinguishers used to fight all types of fires are located in the office and storage trailers and the leachate storage and transfer area. ABC-5 pound fire extinguishers are located in every vehicle and heavy equipment. ABC-20 pound fire extinguishers used to fight flammable liquid and gas and electrical fires are located in the storage trailer. For additional equipment needs or assistance, a list of equipment suppliers is located on the emergency coordination bulletin board.

6.7 COORDINATION AGREEMENTS

Agreements have been made between the MES and the Baltimore City police and fire departments, hospitals and emergency response teams to assist in emergency situations. Each of the following agencies have been contacted and provided with a copy of this Contingency Plan:

Baltimore City Police	911
Southern District	(410) 396-2525
Maryland State Police	(410) 761-5130
Baltimore City Fire Department	911
6 Battalion: Hazardous Materials Task Force	(410) 396-5781
Ambulance	911
Baltimore City, MD General Hospital	(410) 225-8000



EMERGENCY EQUIPMENT LOCATOR MAP

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 6.1

Toll Bridge Authority	(410) 288-8400
MDE Hazardous Waste Enforcement	(410) 631-3400 (days) (410) 974-3551 (nights & weekends)
MDE Emergency Response Program	(410) 333-2950 (office) (410) 974-3551 (24 hour response)

The departments listed above are the primary emergency authorities to be contacted in the event of an emergency. In addition, the police are available for traffic and crowd control as well as security services. These forces will assist the facility security personnel on an as needed basis. The fire department will be the primary emergency authority and will respond to facility fires, rescue efforts and other emergency incidents.

The National Response Center as listed below does not have a copy of the facility contingency plan, but is available for oil and chemical spill emergencies.

National Response Center 1-800-424-8802

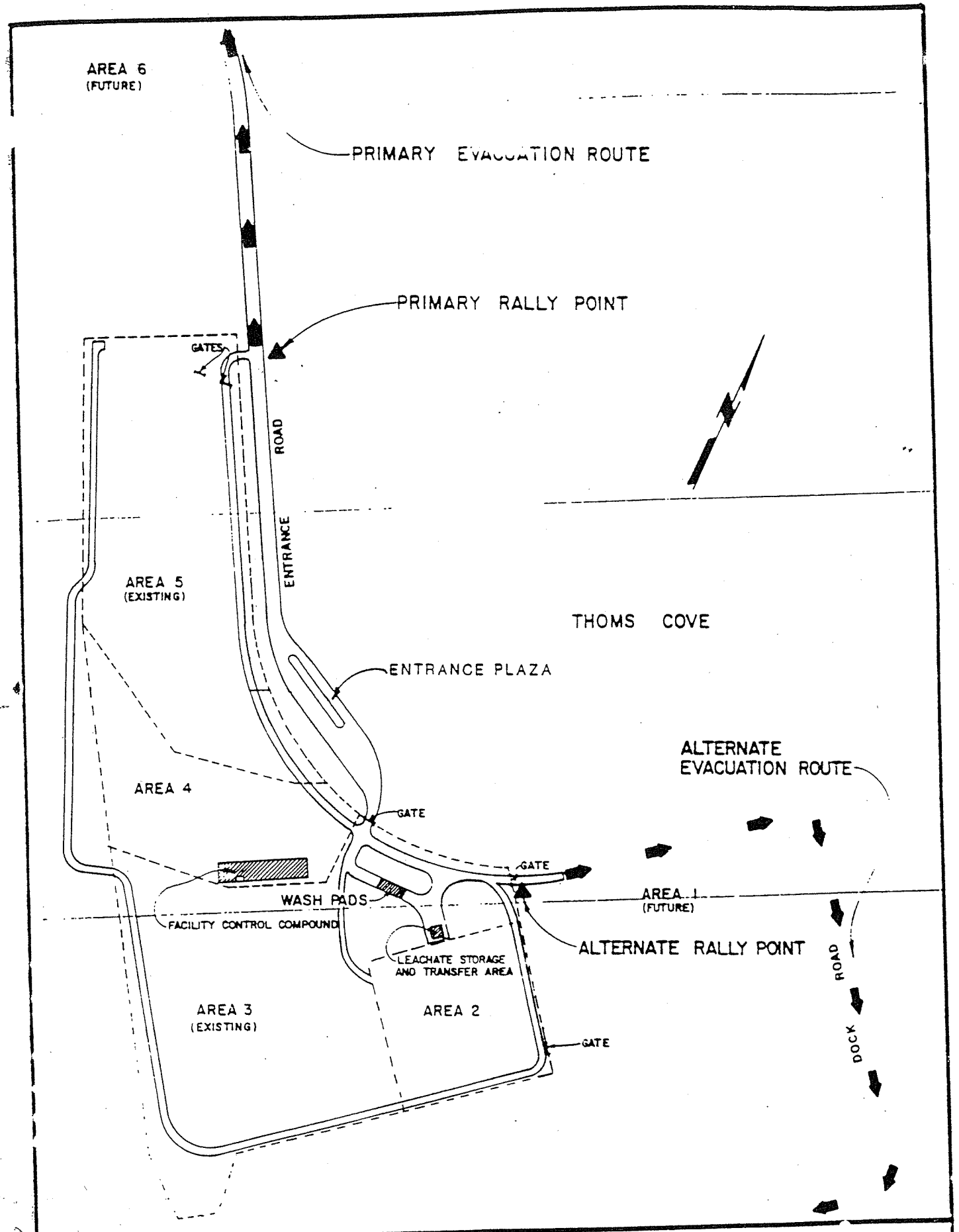
6.8 EVACUATION PLAN

The evacuation plan will be instituted in the event that the emergency coordinator determines that an actual or impending event poses a threat to human health or has a potential for severe environmental degradation. The evacuation plan will be implemented through the following procedures:

1. Sound the alarm - continuous, long blasts.
2. Notify personnel by 2-way radio.
3. Notify City and State police, and the Toll Bridge Authority.
4. Notify adjacent facilities, if applicable.

When the alarm sounds, each person will attempt to ensure that other workers in the area are informed. Personnel will proceed immediately to the primary rally point on the entrance road near the north side of Area 5, then exit via the entrance road. If the primary rally point is inaccessible, personnel are to proceed to the alternate rally point at the Dock Road gate, then exit by way of Dock Road. Refer to Figure 6.2 for the locations of the rally points and evacuation routes.

All employees will gather at the designated rally point where the senior facility personnel at each point will account for all personnel. The Emergency Coordinator will account for all personnel and visitors on the site sign-in log. Radio communication between points will be used to determine if all personnel have been evacuated.



RALLY POINTS AND EVACUATION ROUTES

MARYLAND ENVIRONMENTAL SERVICE

Hawkins Point Hazardous Waste Landfill

Figure 6.2

6.9 REQUIRED REPORTS

The Site Supervisor must provide written notification to the EPA Regional Administrator, and appropriate local authorities that the facility is clean and able to resume operations before activities in the affected area(s) of the facility commence.

The Site Supervisor must note in the operating record the time, date, and details of any incident that requires implementing the contingency plan. Within 15 days after the incident, a written report of the incident must be submitted to the Secretary of the MDE and the EPA Regional Administrator. The report must include:

1. Name, address and telephone number of the Maryland Environmental Service.

2. Name, address and telephone number of the Hawkins Point Hazardous Waste Landfill.

3. Date, time and type of incident; e.g., explosion, fire, spill.

4. Name, type and quantity of materials involved.

5. The extent of injuries, if any.

6. An assessment of the actual or potential hazards to human health or the environment, where applicable.

7. Estimated quantity and disposition of recovered materials that resulted from the incident.

6.10 AMENDMENTS TO THE PLAN

This plan will be revised and immediately amended, if necessary, whenever:

1. Applicable regulations are revised.

2. The plan fails in an emergency.

3. The facility changes operation, maintenance or other circumstances in a way that substantially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes in the responses necessary in an emergency.

4. The list of emergency coordinators changes.

5. The list of emergency equipment changes.

This review and amendment task is the responsibility of the Site Supervisor. For changes to items 4 or 5 above, defined as "minor modifications", notification to the EPA Regional Administrator and the Secretary of the MDE is required. All other changes must be processed as a RCRA permit modification as prescribed in 40 CFR 270. The Site Supervisor will ensure that all facility personnel are made aware of emergency procedures and amendments. To insure all copies of the contingency plan are updated as appropriate, the Site Supervisor will maintain a list of all contingency plan holders and locations. Any modification to the plan, will require the Site Supervisor to update all existing copies.

Permit Number: A-264

Attachment 6

CLOSURE PLAN

(There are 5 pages in this attachment)

11.0 CLOSURE, POST-CLOSURE, AND FINANCIAL ASSURANCE

11.1 CLOSURE PLAN

11.1.1 General

**********SOIL TREATMENT FACILITY statement removed**********

This closure plan addresses the final closure of the Wastewater Treatment Facility located at Hawkins Point Hazardous Waste Facility, in the event that one is constructed. The Area 5 landfill was closed in 1994 and is currently in post-closure monitoring. The Hawkins Point Hazardous Waste Facility is owned by the Maryland Port Administration (MPA) and operated by Maryland Environment Service (MES). The purpose of the closure plan is to ensure that an owner of a facility has considered and prepared for all necessary conditions to close that facility. This document will ensure that adequate preparation has been made for closure of the Wastewater Treatment Facilities at Hawkins Point Hazardous Waster Facility.

This closure plan covers the period beginning with final acceptance and treatment of the chromium contaminated wastewater, through the time that all requirements of the closure plan are certified as complete by a registered professional engineer.

Other areas of the property which will be affected during the closure and post closure activities are Areas 2, 3, and 4. Area 3 and some parts of Area 2 contain previously closed chrome ore tailing cells constructed by the MPA which are currently monitored and dewatered by the MES. These cells will continue to be monitored and dewatered during the closure and post closure period. In Area 3, Cell 40 was used previously to dispose controlled hazardous waste and has since been returned to an "unused" condition after all waste material was removed and transported to Fondessy, Ohio for disposal. Area 4 is a support area which includes an office trailer and equipment storage.

A complete listing of the names and addresses of personnel and regulatory agencies who receive a copy of the closure plan will be maintained by the Site Supervisor. Copies of the Closure Plan are retained on file by MDE, by the Site Supervisor at the Hawkins Point office trailer, and at MES Headquarters. Information concerning changes or modifications to the plan will be distributed to the listed parties by the Site Supervisor. Storage and updating of the Hawkins Point facility copy will be maintained by the individual listed in Section 11.2.4, Contact for Post Closure.

11.1.2 Closure Performance Standard

This closure plan was developed to ensure that the Wastewater Treatment Facility at the Hawkins Point Hazardous Waste Facility will be closed in a manner that will minimize the need for further maintenance, and will control, minimize, or

eliminate threats to human health and the environment, from the post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated precipitation, or waste decomposition products to the ground or surface waters, or to the atmosphere.

These performance standards are met through the proper design and construction of the treatment facilities, appropriate operations of the treatment processes, and proper implementation of the closure plan. The post-closure plan will ensure that all further maintenance and monitoring of the facility will be conducted for a minimum period of 30 years after closure.

11.1.3 Closure Procedures

**********SOIL TREATMENT FACILITY statement removed**********

The closure activities of the Wastewater Treatment Facility will be initiated upon the closure of the leachate sources including the Area 5 landfill, the MPA cells in Areas 2 and 3, the DMT, groundwater extracted from the former site of AlliedSignal's Baltimore Works facility, and other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area. All chromium contaminated materials on site will be treated to achieve non-hazardous condition in compliance with the Federal and State regulations.

The treatment buildings, including the foundation, and the equipment will be decontaminated by a certified contractor. All persons performing decontamination activities shall be trained and be equipped with proper Personal Protective Equipment. All mobile equipment will be removed from the site after being decontaminated. It is planned that the decontaminated treatment buildings will remain on the site after closure.

After proper removal and disposal of contaminated material and treatment chemicals, the water treatment units shall be decontaminated by steam cleaning and power washing equipment by a qualified contractor. All appropriate health and safety procedures to protect on-site contractor personnel and the surrounding environment will be implemented.

All contaminated washwater generated from decontaminated activities will be transported by a certified hazardous waste hauler to designated locations for treatment.

11.1.4 Safety

All personnel participating in the closure activities should follow the health and safety procedures as outlined in this application.

11.1.5 Decontamination and Clean-up Procedures

**********SOIL TREATMENT FACILITY statement removed**********

Prior to the closure of the Wastewater Treatment Facilities, soil will be sampled from the hail road, leachate holding and transfer area, truck wash pad area and any other suspected areas for analysis to ensure that contaminated material is not present. Diphenyl carbazide will be used as a quick qualitative field method of determining if soil is contaminated. Contaminated soil will be excavated and transported to a permitted treatment and disposal facility. All applicable state, federal, and local regulations regarding handling and transportation of hazardous waste will be followed.

Following the termination of clean-up operations, equipment used to handle hazardous materials will be thoroughly steam-cleaned in the wash pad area. All rinse water will be handled as leachate and will be transported off-site for treatment.

All equipment and buildings will be decontaminated until the rinse water from the facility, after testing does not indicate harmful concentrations of hazardous constituents are present. Diphenyl carbazide shall be used to test the facility equipment and the interior surface areas of the buildings. All wash water shall be collected and handled as hazardous waste with proper treatment and disposal. A certified contract laboratory service shall sample areas in and surrounding the treatment units for constituents indicative of facility activities. If a surface soil is found to be contaminated with harmful concentrations of constituents, additional sampling will be performed to define the extent of contamination. All contaminated material shall be treated or disposed of in accordance with applicable state and federal regulations.

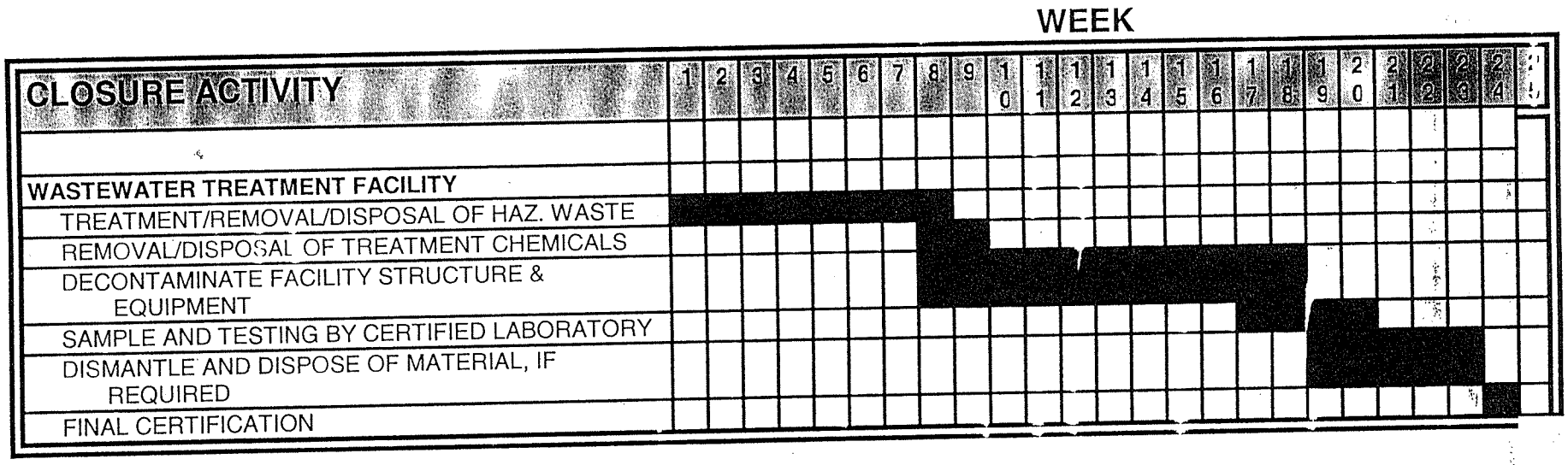
Proper operating procedures during closure will minimize the degree of decontamination and clean-up required. During and following closure operations, the facility will be inspected routinely for contaminated areas. If contaminated soil is discovered, the soil material will be transported off-site for treatment.

11.1.6 Schedule for Closure

The closure of the Wastewater Treatment Facility is anticipated to be completed within 90 days of receiving the final shipment of waste. The Maryland Environmental service (MES) will notify the Maryland Department of the Environment (MDE) in writing 45 days before the date on which MES expects to begin closure of the facility. Final closure will be supervised and certified complete by an independent registered professional engineer, in addition to certification of completion by the MES.

Figure 11.1 provides a schedule of closure activities for the Wastewater Treatment Facilities.

FIGURE 11.1
HAWKINS POINT HAZARDOUS WASTE FACILITY CLOSURE SCHEDULE



11.1.7 Certification of Closure Notice to Local Land Authority and Notice in Deed

Within 60 days of completion of closure plan, the MES will submit to the Hazardous and Solid Waste Management Administration of the Maryland Department of the Environment, by registered mail, certification by both MES and an independent registered engineer that the Wastewater Treatment Facility has been closed in accordance with the specifications of the approved closure plan.

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Attachment 7

POST-CLOSURE PLAN

(There are 7 pages in this attachment)

11.2 POST-CLOSURE PLAN

11.2.1 General

Post-Closure care of this facility will be performed for a minimum period of 30 years after the date of completing the closure and will consist of groundwater monitoring; monitoring and maintenance of Area 5 and all hazardous waste systems (i.e. leachate holding tanks) including routine inspections; leachate collection and treatment; site security; and staffing of responsible contact personnel to address problems or questions throughout the post-closure period.

The Maryland Environmental Service (MES) will maintain adequate staff to administer activities during the post closure care period. This staff will be responsible for post closure site inspections, leachate collection and treatment, surveillance of the environmental monitoring areas, maintenance and monitoring of the leachate collection systems, and storage and updating of the Hawkins Point Facility post-closure plans. A complete listing of the names and addresses of personnel and regulatory agencies who receive a copy of the closure plan will be maintained by the Site Supervisor. Copies of the Post-Closure Plan will be maintained at the Hawkins Point facility, at MES headquarters, by the Site Supervisor, by MDE, and by the Environmental Monitoring Group. Information concerning changes or modifications to the plan will be distributed to the listed parties by the Site Supervisor.

11.2.2 Post-Closure Environmental Monitoring Activities

Following the closure of the Area 5 facility, a post-closure environmental monitoring program will continue for a minimum period of thirty years with sampling and analyses performed on a quarterly basis. The environmental monitoring program is divided into three sections. The first and second sections address the monitoring of the ground water surrounding the Area 5 landfill and the closed MPA cells in Areas 2 and 3 respectively. The third section addresses the monitoring of the surface water within the Hawkins Point facility as regulated by the current National Pollution Discharge Elimination System (NPDES) permit. The environmental monitoring program is described in detail in Section 10.0.

**********SOIL TREATMENT FACILITY statements removed**********

The Wastewater Treatment Facility is exempt from post-closure groundwater monitoring requirements under COMAR 26.13.05.06A(7) based on the fact that all waste residues, contaminated containment system components, and contaminated subsoils are removed or decontaminated at closure. Additional design features which further justify an exemption from post-closure groundwater monitoring include:

- The wastewater treatment buildings are engineered structures and are leak-proof and totally enclosed buildings.
- The wastewater treatment facility is operated to exclude precipitation, run-on, and run-off.
- There will be continuing inspection and maintenance of the buildings during the active lives of the facilities and closure and post-closure care periods to prevent threats to human health and the environment.

Groundwater monitoring will continue during the 30 year post-closure period of the Area 5 Landfill.

11.2.3 Maintenance and Security of Facility

Monitoring and maintenance of the closed facility will be performed by the MES who will insure that all post-closure requirements are met. The following activities will be included in the post-closure care program:

A. The leachate collection system will be operated until all leachate is removed. The leachate will be handled as a hazardous waste and will be treated and disposed of as prescribed by law and regulation.

B. Drainage structures will be inspected and maintained to ensure proper drainage and prevent sedimentation and erosion.

C. Security fencing and warning signs will be maintained.

D. The final cover on Area 5 will be inspected and maintained to deter the effects of settling, subsidence, and erosion.

E. Ground water and surface water monitoring and analysis will be performed routinely as specified in 11.2.2.

To ensure that the above activities are fulfilled, scheduled site monitoring inspections will be performed. The site inspections will be performed by a qualified individual who is familiar with the facility and assigned to inspect the items and systems noted above. The regulatory agencies will be notified of each inspection to allow for representation. The inspection findings will be recorded on a Post-Closure

Inspection Log. Post-Closure Inspection Logs will be maintained on file and available for review at the MES headquarters. The following lists the items and possible problems to look for which will be inspected at a minimum during scheduled post-closure inspections:

A. Cover Material of Area 5: Uneven settlement, subsidence, seeps, erosion, inadequate drainage or vegetation.

B. Drainage Swales: Bank erosion, clogging, obstructions, excessive silting, loose rip-rap, inadequate vegetation.

C. Leachate Collection System: Breaks, leaks or clogs, deterioration, cracks or spelling of manholes.

D. Leachate Holding and Transfer Area: Deterioration of access manholes, corrosion of blockage of grating, cracks in spill pad, damaged pumps, damaged or non-waterproof electric boxes, corrosion or damage of roof structure.

E. Truck Wash Area: cracks, spelling and deterioration in pavement, corrosion, blockage, deterioration of grating, corrosion of roof structure, deterioration or damage of waste oil interceptor, damage to manholes.

F. Septic Tanks: damage or deterioration to exterior pipes.

G. All NPDES sampling points: contamination, damage, inaccessibility

H. All Ground Water Monitoring Wells and locks: corrosion, damage, inaccessibility.

I. Security Fencing, Gates, Locks, and Warning Signs: damage, corrosion, or missing.

J. Ground Water Interceptor System: Deterioration or damage to manholes

K. Access, Entrance and Haul Roads: Deterioration, rutting, erosion, cracks, loss of aggregate, contamination.

L. Permanent Survey Benchmarks: Dislocation, damage

M. Sediment Ponds: Erosion, cracks, passage of sediment, deterioration, height of sediment, inadequate vegetation.

N. Area 5: Signs of contamination escape

O. MPA Cells in Areas 2 and 3: Signs of contamination escape, uneven settlement

P. Trailer and Equipment Storage Area: Locks on Storage Structures, all pumps, hoses, additional equipment and supplies are present, inadequate water and electric.

Q. Yard and Fire Hydrants: leakage, hydrant fails to drain after valve is closed, freezing of nozzle caps.

The inspections detailed above in items A-Q will be performed at least quarterly for the first 2 years and then decrease to semi-annual and continue for the next 28 years at a minimum. Any unacceptable conditions discovered during the scheduled post-closure inspections will be corrected as expeditiously as possible. Leachate collection activities will be performed on an as need basis which may or may not be more frequent than the scheduled post-closure inspections. The interior of the leachate holding tank will be cleaned, visually inspected and leak tested during February of each odd numbered year, as specified within the March 2000 permit modification. The leachate collection system will be visually inspected bi-annually, and cleaned when necessary to maintain system collection efficiency.

The following safety supplies and equipment will be on site at all times and will be inventoried accounted for during each facility inspection:

Industrial Absorbent
Speed-I-dry
First Aid Equipment and Supplies
Fire Extinguishers
Impermeable Protective Gloves
Foot Coverings or Rubber Boots
Flashlight with Batteries
Portable Pumps
Eyewash Stations
Goggles and Safety Glasses
Safety Shields
Pipe Plugs
Sandbags
Hand soap
Fire Blankets
Hard Hats
Tyveck Coveralls
Protective Rain Gear
Shovels
Emergency Showers
Respirators and Cartridges
Ear Protectors
Air Horn

11.2.4 Contact for Post-Closure Care

The following individual is designated to be the required contact person regarding post-closure care:

NAME:	Mr. William E. Chicca
ADDRESS:	13,713 Stoner Drive Silver Spring, MD 20904
TELEPHONE:	(410) 974-7295 (office) (301) 384-4459 (home)

11.3 NOTICE IN DEED AND NOTICE TO LOCAL LAND AUTHORITY

Within 60 days of certification of closure of Area 5, the MES shall record a notation on the deed to the facility property that will notify any potential purchaser of the property the following:

A. The property has been used to manage hazardous wastes,
B. The facility has been cleaned and decontaminated
C. A plat and records indicating the type, location and quantity of hazardous wastes handled within the facility have been filed with the City of Baltimore, Zoning Enforcement Division, and with the Maryland Department of the Environment.

11.4 CLOSURE AND POST-CLOSURE COST ESTIMATE

**********Post closure care costs updated**********

The closure cost of a potential future Wastewater Treatment Facility is estimated at $95,400 including administration and contingencies. Activities required to close the facilities will include facility decontamination, equipment decontamination, and disposal/treatment of washwater. The estimate is prepared using December 2001 dollars. MES will adjust the closure cost estimate for inflation annually each July. The inflation factor to be used will be the Department of Commerce, Annual Implicit Price Deflator for Gross National Product. A breakdown of the closure cost is presented in Table 11.1. The probable post closure care cost for the Wastewater Treatment Facility included with the landfill post closure cost. Activities during the post-closure period include facility inspection, boundary maintenance and security measures. A breakdown of post-closure cost is provided in Table 11.1.

The estimated cost in 2001 dollars for the 30 year period of post closure care of Areas 2,3, and 5 as described in Section 11.2 is approximately $12,672,000. (This cost is actually the figure for the remaining 23 years of the 30 year post-closure care period). A cost breakdown of these estimates are provided in Table 11.1.

11.5 FINANCIAL ASSURANCE MECHANISM FOR CLOSURE AND POST-CLOSURE

The Hawkins Point Hazardous Waste Facility is owned and operated by an agency of the State of Maryland. In accordance with 49 CFR 264.140c of the federal regulations, states and the federal government are exempt from the requirements of Subpart H, Financial Requirements. The Maryland Environmental Service is an Agency of the state of Maryland and is therefore exempt from this requirement. While being exempt from these requirements, the state of Maryland is fully aware of

**********Table Changes**********

TABLE 11.1
AREA 5 HAWKINS POINT HAZARDOUS WASTE LANDFILL
POST-CLOSURE CARE COST

CLOSURE of WWTP	UNIT	UNIT COST	QUANTITY	COST
I. Labor/Clerical Cost	LS	$ 32,400	1	$32,400
II. Removal, Transport, and Disposal Cost	LS	$ 12,300	1	$12,300
III. Site Remediation Cost	LS	$ 50,700	1	$50,700
Sub total of Closure				$95,400
23 YEAR POST-CLOSURE of Land fill				
Monitoring Maintenance	LS	$ 25,000	1	$25,000
Environmental Monitoring	YR	$ 70,000	23	$1,610,000
Facility Inspection	YR	$ 3,000	23	$69,000
Erosion Repair	YR	$ 2,000	23	$46,000
Boundary Maintenance	YR	$ 1,500	23	$34,500
Routine Maintenance	YR	$ 194,415	23	$4,471,500
Security Measures	YR	$ 2,000	23	$46,000
Leachate Treatment	GAL	$ 0.30	13,800,000	$4,140,000
Facility Permit Fee		$ 46,000	23	$1,058,000
Subtotal				$11,520,000
Contingency (add 10%)				$1,152,000
Closure & Post Closure Care Costs				$12,672,000

the importance of financial assurances for closure and post-closure activities at a facility of this type, and will make adequate preparations to insure that financial needs during closure and post-closure will be met.

11.6 LIABILITY INSURANCE REQUIREMENTS

The Hawkins Point Hazardous Waste Facility is owned and operated by an agency of the State of Maryland. In accordance with 49 CFR 264.140c of the federal regulations, states and the federal government are exempt from the requirements of Subpart H, Financial Requirements. The Maryland Environmental Service is an Agency of the state of Maryland and is therefore exempt from this requirement. While being exempt from these requirements, the state of Maryland is fully aware of the importance of liability insurance for a facility of this type, and will make adequate preparations for insuring the facility.

Permit Number: A-264

Attachment 8

GROUNDWATER MONITORING

(There are 39 pages in this attachment)

10.0 GROUNDWATER AND SURFACE WATER MONITORING PROGRAM

10.1 GENERAL SAMPLING AND ANALYSES PROTOCOL

The Maryland Environmental Service continues to be the consultant carrying out the groundwater and surface water monitoring plan.

10.1.1 Laboratory Capabilities

Any laboratory contracted to carry out the sampling and analysis will be a full-service wet chemistry, organic and metals analysis laboratory; equipped with all of the basic and specialized equipment required to perform analyses as required by the EPA and Maryland Department of the Environment. The laboratory should conduct its operations in such a way as to provide reliable information. The contracted laboratory may use a subcontractor for certain analyses. Currently, the contracted laboratory is:

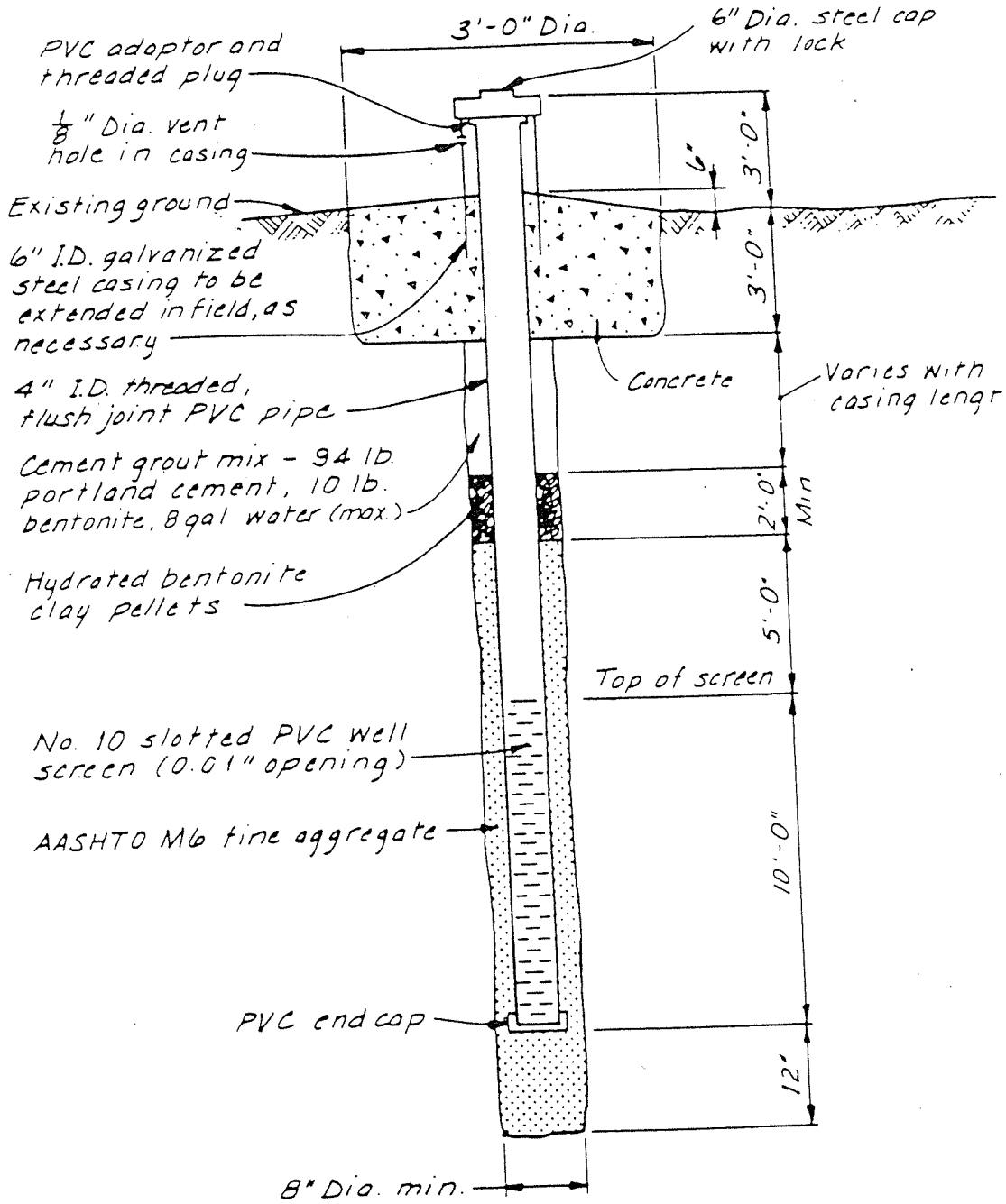
Atlantic Coast Laboratories, Inc.
(Artesian Laboratories)
630 Churchmans Road
Newark, Delaware 19702

10.1.2 Laboratory Certification

The contracted and/or Subcontracted Laboratories must have a Maryland Department of Health and Mental Hygiene Certification for drinking water analysis.

10.1.3 Well Installation And Maintenance

All monitoring wells are cased in a manner that the integrity of the well bore hole is maintained. Each well is provided with casings and locking caps for security. Each well is set in concrete. The casings are screened and packed at a minimum of ten feet with sand. The space between the bore hole and well casing above the sampling depth has been sealed with hydrated bentonite clay pellets (bentonite plug). Above the bentonite plug is a mixture of ten percent bentonite clay by weight and ninety percent cement. The depth of this mixture varies with the length of the casing. The installation of all wells are in accordance with 40 CFR Part 264.98. Figure 10.1 is a general diagram of the well installation used. Each monitoring well will be thoroughly inspected and repaired as necessary during each sampling period. The protective standpipe, locking cap mechanism and well pipe will be inspected for damage. If damaged, the standpipe will be re-aligned and re-grouted or replaced. The well pipe will be inspected for vertical alignment and replaced if misalignment is sufficiently severe to inhibit proper sampling. The actual well installation reports are located in Appendix A.



GROUND-WATER MONITORING WELL

MARYLAND ENVIRONMENTAL

Hawkins Point Hazardous Waste Landfill

FIGURE 10.1

10.1.4 Well Evacuation Procedures

Before monitoring wells are purged, the water elevation is measured, by taking the known elevation at the top of the well casing and subtracting the depth of water plunked. After measuring the elevation of water, the depth to the bottom of the well is measured. The volume of water standing in the well is calculated using a conversion factor that converts the depth of water in a 4 inch diameter well into gallons. This volume (standing depth) is multiplied by three to determine total volume of water to be purged from the well.

The time required to purge this volume is determined using a 2.5 gallon bucket and a stop watch. The time required to fill the bucket is determined using the stop watch. This time is divided by the 2.5 gallon volume of the bucket to get gallons per second. This is multiplied by 60 seconds per minute to determine the pump rate in gallons per minute. Then the number of gallons is divided by the pump rate to determine the number of minutes required to purge three volumes from the well.

10.1.5 Measurement of Standing Water in Well

Water elevation is measured using a weighted tape measure which is marked to 0.1 foot. Water elevation is measured each time samples are collected. Depth to water and depth to the bottom of the casing is measured and recorded. Each well shall have a permanent reference point from which the initial measurement is taken.

The weighted tape measure shall be rinsed with deionized water before using in another well to avoid cross contamination between wells.

The measurement of the standing water will continue to be measured during each sampling event.

10.1.6 Determination of Volume to be Purged

The volume of three times the water in the casing shall be calculated per well. This is the volume of water which will be purged from each well. If the well purges to dryness before three volumes is obtained, this purged volume is sufficient.

Calculations: Conversion from depth to volume for a 4" well - 0.65 gallons/foot

A. Depth to Bottom - Depth to Water = Depth of Standing Water, in feet

B. Depth of Standing Water X 0.65 gallon/feet = Gallons of Standing Water

C. Gallons of Standing Water X 3 = Total Volume to be Purged

10.1.7 Determination of Time Required to Purge

The time required to purge three times the volume of water in the casing shall be calculated. This time must be calculated for each well because of the different well depths, which changes the amount of time required for the pump to lift the required volume of water.

The following are steps used to determine this time:

A. Measure Time to Fill a 2.5 gallon bucket, in seconds

B. Divide this time by 2.5 to get gallons/second

C. Gallons/second X Total Volume to be Purged = Total Time to Purge 3 volumes.

10.1.8 Purging Procedure

Each well is purged using a designated submersible well pump powered by a portable air compressor. The submersible well pumps are either stainless steel or Teflon sample pumps (each pump will contain a Teflon bladder). The type of tubing used with the pumps per well is polyethylene bonded twin tubing. A pump controller is used to regulate the compressed air needed to operate the air driven purge and sample pumps.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Once the air compressor is started, the air driven pump pumps groundwater through the uptake side of the twin tubing into 55 gallon polyethylene drums.

10.1.9 Handling Procedures for Purged Groundwater

During post-closure, all groundwater will be purged directly into polyethylene drums and disposed of in the leachate holding tanks and will be handled in the same manner as the leachate.

10.1.10 Safety

Occupational Safety and Health Administration's (OSHA) Forty-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response is required of all personnel prior to groundwater monitoring of this site.

10.1.11 Determination of Rate and Direction of Groundwater Flow in Uppermost Aquifer

Rate and direction of groundwater flow shall be determined using measured water elevations, adjusted to mean sea level. The direction of flow shall be determined by comparing the height of groundwater (water elevation) in each well. Water elevations, groundwater contours and hydraulic gradient shall be used to calculate seepage velocity using Darcy's Equation. The seepage velocity shall be calculated annually. The frequency of determining the rate and direction of groundwater flow in the uppermost aquifer is also annually. Groundwater flow shall be measured quarterly to establish seasonal and temporal variations in flow velocity and direction.

10.1.12 Quarterly Preparation of Groundwater Contours

Groundwater contours shall be prepared quarterly and shall be compared to previous contours to detect changes. Tracking the changes in the quarterly contours shall determine if these changes are seasonal or spatial variations or if they are the result of groundwater contamination.

10.1.13 Sample Withdrawal Techniques

Sample withdrawal shall be accomplished with equipment and procedures selected to yield representative samples for all monitoring parameters.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Upon starting the air compressor, groundwater will be pumped through the uptake side of the twin tubing into the appropriate sample bottle.

10.1.14 No Field Filtration of Samples

Samples shall not be field filtered prior to delivery to the laboratory as per 40 CFR Part 264.97.

10.1.15 Sampling Equipment and Materials

During the Post-closure period each well will continue to have a designated pump assigned to it. Depending on the pH of the groundwater in that well, the pump will be either a Teflon or stainless steel submersible pump. As stated by the Environmental Protection Agency (EPA), a pH < 5.0 or > 10.0 should not, but could possibly cause leaching of the stainless steel; therefore, all of the permitted wells, including wells 2E and 2H have designated Teflon submersible pumps. The following is a list of the remainder of the materials and equipment needed to purge and sample this site: portable air compressor, pump controllers, nylon rope, bonded twin tubing and plastic drums.

As previously stated each well pump and pump tubing is designated and will remain in that well for the life of the pump and/or pump tubing. Although the portable air compressor and pump controllers will be used to purge and sample all the wells, only the designated pump tubing will come in contact with any potentially contaminated groundwater. Therefore, decontamination is not necessary. All sampling equipment will be inspected during each quarterly sampling event and will be repaired and/or replaced on an as needed basis if found defective.

10.1.16 Sample Handling and Preservation Techniques

Sample preservation shall be according to 40 CFR Part 136 and SW-846, as shown on the following table. All samples shall be stored at 4°C after collection. The preservation of the parameters as listed in 40 CFR 264.93 and 264.98 (a) are as follows:

Metals		Container Preservation
1	Antimony	Plastic pH<2 w/ HNO_3
2	Arsenic	"
3	Barium	"
4	Beryllium	"
5	Cadmium	"
6	Chromium	"
7	Cobalt	"
8	Copper	"
9	Lead	"
10	Nickel	"
11	Selenium	"
12	Silver	"
13	Thallium	"
14	Vanadium	"
15	Zinc	"

EPA-Organic Constituents		Container Preservation
16	Acetone	Glass 4°C for all organic compounds
17	Acrylonitrile	"
18	Benzene	"
19	Bromochloromethane	"
20	Bromodichloromethane	"
21	Bromoform: Tribromomethane	"

CONTINUED,

EPA-Organic Constituents		Container Preservation
22	Carbon disulfide	Glass 4°C for all organic compounds
23	Carbon tetrachloride	"
24	Chlorobenzene	"
25	Chloroethane: Ethyl chloride	"
26	Chloroform: Trichloromethane	"
27	Dibromochloromethane: Chlorodibromomethane	"
28	1,2-Dibromo-3-chloropropane: DBCP	"
29	1,2-Dibromomethane: Ethylene dibromide, EDB	"
30	1,2-Dichlorobenzene: 1,2-Dichlorobenzene	"
31	p-Dichlorobenzene: 1,4-Dichlorobenzene	"
32	trans-1,4-Dichloro-2-butane	"
33	1,1-Dichloroethane: Ethylene chloride	"
34	1,2-Dichloromethane: Ethylene dichloride	"
35	1,1-Dichloroethylene: 1,1-Dichloroethene: Vinylethylene Chloride	
36	cis-1,2-Dichloroethylene: cis-1,2-Dichloroethene"	
37	trans-1,2-Dichloroethyelene: trans-1,2-Dichloroethene	"
38	1,2-Dichloropropane	"
39	cis-1,3-Dichloropropane	"
40	trans-1,2-Dichloropropene	"
41	Ethylbenzene	"
42	2-Hexanone: Methyl butyl ketone	"
43	Methyl bromide: Bromomethane	"
44	Methyl chloride: Chloromethane	"
45	Methylene bromide: Dibromomethane	"
46	Methylene chloride: Dichloromethane	"
47	Methyl ethyl ketone: MEK: 2-Butanone	"
48	Methyl iodide: Iodomethane	"
49	4-Methyl-2-pentanone: Methyl isobutyl ketone	"
50	Styrene	"
51	1,1,1,2-Tetrachloroethane	"
52	1,1,2,2-Tetrachloroethylene:	"
53	Tetrachloroethylene: Tetrachloroethene: Perchloroethylene	
54	Toluene	"
55	1,1,1-Trichloroethane: Methylchloroform	"
56	1,1,2-Trichloroethane	"
57	Trichloroethylene: Trichloroethene	"
58	Trichlorofluoromethane: CFC-11	"
59	1,2,3-Trichloropropane	"
60	Vinyl acetate	"
61	Vinyl chloride	"
62	Xylenes	"

CONTINUED,

MDE-Other Constituents		Container Preservation
63	Alkalinity	P 4°C
64	Ammonia Nitrogen	P pH<2 H_2SO_4
65	Bicarbonates (by titration)	P 4°C
66	Biochemical Oxygen Demand	P 4°C
67	Calcium (by atomic absorption)	P pH<2 HNO_3
68	Chemical Oxygen Demand	P pH<2 H_2SO_4
69	Chloride	P 4°C
70	Cyanide (Total)	pH>12 NaOH, Ascorbic Acid
71	Hardness	P pH<2 HNO_3 or H_2SO_4
72	Iron	"
73	Magnesium	"
74	Mercury	P 4°C
75	Nitrate Nitrogen	P 4°C
76	pH	None, field test
76	Potassium	P pH<2 HNO_3
77	Sodium	P pH<2 HNO_3
78	Solids (dissolved)	P 4°C
79	Sulfate	P 4°C
80	Total Organic Carbon	P pH<2 H_2SO_4
81	Temperature	None, field test
82	Conductivity	None, field test
83	Acrolein	G 4°C for all organic compounds
84	4-Bromofluorobenzene	"
85	2-Chloroethyl vinyl ether	"
86	Chloromethane	"
87	Dichlorodifluoromethane	"
88	1,2 Dichloroethane	"
89	trans-1,2-Dichloroethane	"
90	cis-1,3-Dichloropropylene	"
91	trans-1,3-Dichloropropylene	"
92	1,4-Difluorobenzene	"
93	Ethanol	"
94	Ethyl methacrylate	"
95	Iodomethane	"

P - HDPE, High density polyethylene
G - Glass bottle with a Teflon lid

10.1.17 Sample Delivery to Laboratory

Samples shall be picked up by the contracted laboratory at MES headquarters or directly from the facility, unless sampling is being performed by the contracted laboratory in which case the samples will be taken directly from the site with the control of the sample delivery being the responsibility of the contracted laboratory. The samples shall be transported in such a manner that they meet all holding times and preservation requirements as per the methodologies detailed in SW-846.

a. Sample Labels

To prevent sample misidentification, the sampler shall affix a label to each sample container (bottle). Sample labels shall be sufficiently durable to remain legible even when wet. Sample labels shall contain, at a minimum, the following information:

- Sample identification number;
- Name and signature of collector;
- Date and time of collection;
- Place of collection; and
- Parameters requested (if space permits).

The samples shall be labeled by recording the above information directly on the sample containers. The descriptive information for the samples (referenced to the identification number) must be recorded in two places. One copy shall be kept in a separate file or logbook, and a second copy shall be shipped with the samples to the laboratory.

10.1.18 Chain of Custody Control

The tracing of sample possession shall be accomplished by use of a chain-of-custody record as described in Chapter One of SW-846. A chain of custody form shall be completed for all sample bottles which uniquely identifies each sample, the sample collection point, the person(s) performing the sample collection, time and date of sample collection and the analyses to be performed including the methodologies and detection limits. The chain of custody shall be signed whenever the sample changes hands and shall show that all required preservations were maintained and the samples at the time of delivery were chilled to $4^{\circ}C$. The contract laboratory must furnish a chain of custody for any samples they collect which includes all of the above. A chain-of-custody form shall be completed and shall accompany every sample shipment. The chain-of-custody shall contain enough copies so that each person possessing the shipment receives his/her own copy. At a minimum, the chain-of-custody shall contain the following information:

MARYLAND ENVIRONMENTAL SERVICE
SAMPLE CHAIN OF CUSTODY

PROJECT #: 32-0815
SAMPLE PURPOSE: QUARTERLY WELLS

PROJECT NAME: HAWKINS POINT
FORM: HPQTWELS, REV 12/18/92

SAMPLE NUMBER	SAMPLE LOCATION	DATE	TIME	SAMPLE TYPE	ANALYSIS REQUIRED	# OF CONT.
CHILLED TO 4 DEG C ? ___ YES ___ NO					TOTAL # CONTAINERS	

RELINQUISHED BY: ACCEPTED BY:
DATE: TIME: DATE: TIME:

RELINQUISHED BY: ACCEPTED BY:
DATE: TIME: DATE: TIME:

ANALYSIS: 1 UNPRES. LITER for CHLORIDE (EPA# 325.3), SULFATE (EPA#375.3) Cr+6(EPA# 218.4)
1 500 ML HNO3 for BARIUM (EPA# 200.7), TOTAL CHROMIUM (EPA# 218.2), IRON (EPA# 200.7), MANGANESE (EPA# 200.7), AND SODIUM (EPA# 273.1)
1 250 ML UNPRES. AMBER for TOXICITY (EPA# 9020)

FIELD PARAMETERS: pH (EPA# 150.1), SPECIFIC CONDUCTANCE (EPA# 120.1), AND TEMPERATURE

- Sample number;
- Signature of collector;
- Date and time of collection;
- Sample type (e.g., ground water, soil, surface water, etc.);
- Identification of sampling point (e.g. well number, outfall location);
- Number of containers;
- Analyses requested;
- Preservatives used;
- Signature of persons involved in the chain of possession;
- Inclusive dates and times of possession;
- Internal temperature of shipping/transportation container when samples were sealed into the container for shipping/transporting;
- Internal temperature of container when opened at the laboratory; and
- Remarks section to identify potential hazards or to relay other information to the laboratory.

Sample Transportation

Samples should be transported to the receiving lab in clean coolers and in vehicles free of cigarette smoke and cross contamination from other sites. A trip blank will be used, which measures potential contamination from bottles, preservatives, sample handling and transportation procedures. Detection of target analytes in trip blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, sample transportation and laboratory practices. Detection of target analytes in the trip blank greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and/or re-sampling shall occur.

Detection of target analytes in the trip blank greater than an order of magnitude of the detection limit (in the absence of a MCL) or the field results for that parameter shall invalidate the results and re-sampling shall occur.

10.1.19 Sample Collection Quality Assurance and Quality Control

Sample collection and preservation shall be performed by the contract laboratory for the regulated wells. [reference to sedimentation pond samples removed]. All other monitoring wells will be sampled by MES and analyzed by the contract laboratory.

Sample collection quality control shall be accomplished with a trip blank, a field blank and duplicate samples. One trip blank and one field blank shall be prepared each sample day. One duplicate for every 10 samples shall be collected and analyzed. The trip blank measures potential contamination from bottles, preservative and sample handling procedures.

The field blank establishes quality control for sample collection techniques. The duplicate establishes quality control for sample collection techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Detection of target analytes in field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. The concentrations of any contaminants found in field blanks should not be used to correct data. The contaminant concentration (target analytes) in these blanks should be documented. If the concentrations are more than an order of magnitude greater than the field sample results, this shall invalidate the results and re-sampling [word: payment removed] shall occur. Detection of target analytes in trip and field blanks greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-sampling shall occur.

Field Logbooks

When a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample collection, rather than a change in the ground-water quality, are responsible. Therefore, examination of the field logbook is critical in this process. A field log should be kept each time monitoring activities are conducted in the field. The field logbook should document the following:

- Sample location identification;
- Presence of debris and/or solids;
- Sample withdrawal procedure and equipment;
- Date and time of collection;
- Monitoring Well sampling sequence;
- Types of sample bottles used and sample identification number;
- Preservatives used;
- Parameters requested for analysis;
- Field observations of sampling event;
- Name of collector;
- Weather Conditions, including air temperature; and
- Internal temperature of field and shipping containers.

10.1.20 Laboratory Analytical Techniques

This section includes RCRA SW-846 analytical methods, quality assurance, and quality control procedures, for solid waste and wastewater. Where maximum contaminant level's (MCL's) have been finalized or where Primary or Secondary Drinking Water Standards exist, the analytical method used shall provide the detection limit required to determine compliance with the MCL or Standard.

10.1.21 Analytical Procedures

All Volatile Organic Compounds shall be analyzed using SW-846 Method 8240. All analytical procedures shall be methods approved or referenced in SW-846. The RCRA SW-846 method for the remainder of the parameters are listed as follows:

Metals	Method Number
Antimony	7040, 6020
Arsenic	7060A, 7061A, 6020
Barium	7080A, 6020
Beryllium	7090, 7091, 6020
Cadmium	7130, 7131A, 6020
Chromium	7190, 7191, 6020
Cobalt	7200, 7201, 6020
Copper	7210, 7211, 6020
Iron	7380, 6020
Lead	7421, 6020
Magnesium	7450, 6020
Nickel	7520, 6020
Selenium	7740, 7741A, 7742, 6020
Silver	7761, 6020
Thallium	7841, 6020
Vanadium	7910, 7911
Zinc	7950, 7951, 6020

Other Parameters

Alkalinity	EPA 310.1
Ammonia Nitrogen	EPA 350.1 or 350.2
Bicarbonates (by titration)	EPA 310.1
Biochemical Oxygen Demand	EPA 405.1
Calcium	7140, 6020
Chemical Oxygen Demand	EPA 410.4 or 410.1,2.3
Chloride	9056
Cyanide (Total)	9012A

CONTINUED,

Metals	Method Number
Hardness	EPA 130.2
Mercury	7470
Nitrate Nitrogen	EPA 352.1
pH	9040B
Potassium	7610, 6020
Sodium	7770, 6020
Solids (dissolved)	EPA 160.1
Sulfate	9056
Total Organic Carbon	9060
Temperature	EPA 170.1
Conductivity	EPA 120.1
Total Organic Halogens	9020B, 9022

10.1.22 Quality Assurance and Quality Control

Laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the SDWA, 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be available for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis. The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

The type, purpose, and frequency of QC samples to be analyzed in the laboratory and the acceptance criteria is specified below. Additional information has been detailed in the specific plans and include the applicability of the QC sample to the analytical process, the statistical treatment of the data, and the responsibility of laboratory staff and management in generating and using the data. The laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be made available by the laboratory for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis.

The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

Cases when a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample analyses, rather than a change in the water quality, are responsible. The laboratory duplicate establishes quality control for sample preparation and analytical techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Laboratory Blanks document contamination resulting from the analytical process. Detection of target analytes in laboratory blanks shall trigger investigation of potential sources of contamination in reagents, preservatives, sample preparation techniques, and laboratory practices.

A method blank will only be acceptable for use with the accompanying samples, when the concentration in the blank of any analyte of concern is not higher than the highest of either:

(1) The method detection limit, or
(2) Five percent (5%) of the regulatory limit for that analyte, or
(3) Five percent (5%) of the measured concentration in the sample.
(4) ½ of MDE's PQL

In addition to the above, detection of target analytes in laboratory blanks (method blanks) greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-analyzing shall occur. Detection of target analytes in laboratory blanks equal to or greater than an order of magnitude of higher than the method detection limit for that parameter shall invalidate the results and re-analyses shall occur. The concentrations of any contaminants found in blank samples should not be used to correct the data.

Equipment and Instrumentation

Equipment and instrumentation should meet the requirements and specifications of the specific test methods and other procedures as specified in the SW-846 and this permit. The laboratory should maintain an equipment/instrument description list that includes the manufacturer, model number, year of purchase, accessories, and any modifications, updates, or upgrades that have been made.

Corrective Action

All laboratory control samples, matrix spike, surrogate spike and matrix duplicate samples must be within the acceptable range given in the specific EPA method used. In the event that the percent recovery is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as follows:

1. Submit in writing to MES the procedures describing how to identify and correct deficiencies in the analytical process.

2. These procedures must include specific steps to take in correcting deficiencies such as preparation of new standards and reagents, re-calibration and re-standardization of equipment, re-analysis of samples, or additional training of laboratory personnel in methods and procedures.
3. The procedures should specify that each corrective action has been documented with a description of the deficiency and the corrective action taken, and must include the person(s) responsible for implementing the corrective action.

Data Reduction and Validation

All data for this facility will be reviewed by the MES contract manager prior to being entered into the existing databases. The trip blanks, field blanks, duplicates, and surrogate spikes (volatile organic compounds only) will be reviewed for the presence of targeted compounds. As stated above, detection of target analytes in trip and field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. Upon verification from laboratory and/or corrective actions taken by the laboratory, MES will implement the procedures as described. In the event that the percent recovery for the surrogate spike is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as described in above sections, Quality Assurance and Quality Control & Corrective Action.

Before data is validated and entered into the database, MES' reporting staff will compute and interpret the results from all QC samples to verify that the analytical results are reported correctly. In addition, precision and bias, including evaluations of reagent, equipment rinsate, trip blanks, calibration standards, control samples, duplicate and matrix spike samples, and surrogate recovery, will routinely be monitored by periodically requesting daily QC/QA runs. The sole purpose of these procedures is to assure that the contracted laboratory has in place and is implementing corrective actions when necessary before submitting data to MES.

10.2 GENERAL GROUNDWATER AND SURFACE WATER MONITORING

The post-closure environmental monitoring program will continue for a period of thirty years with sampling and analyses of the indicator and groundwater quality parameters performed on a quarterly basis. Although barium and pH have been removed from the list of indicator parameters, they will continue to be monitored on a quarterly basis. All other parameters, (those characterizing the suitability of the ground water as a drinking water supply as listed in Section 10.1.21) will be analyzed annually. This additional monitoring as stated in COMAR 26.13.05.06J, shall determine whether additional hazardous constituents are present in the uppermost aquifer.

10.2.1 Indicator and Groundwater Quality Parameters

The preservation of the quarterly indicator and groundwater quality parameters as listed in 40 CFR Part 264.93 and 264.98(a) are as follows:

EPA/MDE Site Specific	Container Preservation
1 Chromium	P pH<2 HNO_3
2 Hexavalent Chromium	P 4°C

EPA General Constituents	Container Preservation
3 Chloride	P 4°C
4 Iron	P pH<2 HNO_3
5 Manganese	" "
6 Phenols	A/G H_3PO_4 & $CuSO_4$
7 Sodium	P pH<2 HNO_3
8 Sulfate	P 4°C

EPA General Constituents	Container Preservation
9 Specific Conductivity	None, field test
10 Total Organic Carbon	A/G Unpreserved
11 Total Organic Halogens	A/G Unpreserved

Note: P - HDPE, High density polyethylene A/G - Amber Glass bottle with a Teflon lid

10.2.2 Analytical Procedures for Indicator and Groundwater Quality Parameters

Parameter	Method Number
Chromium	7190, 7191, 6020
Hexavalent Chromium	7196
Chloride	9056
Iron	7421, 6020
Manganese	7450, 6020
Phenols	8040
Sodium	7770, 6020
Sulfate	9056
Specific Conductivity	120.1
Total Organic Carbon	9060
Total Organic Halogen	9020B, 9022

10.2.3 Type, Quantities, Concentrations Expected in Wastes

During post-closure, the indicator parameter of specific conductivity, and the waste constituent parameter of total chromium, will continue to be utilized as the basis for the detection monitoring for the Area 5 facility. Monitoring and analysis of these parameters provides the data base necessary to determine if any leakage from the Area 5 regulated unit occurs.

As outlined in Appendix B, entitled "Soils and Chrome Ore Tailings Chemical Analyses: Laboratory Reports", the content of chromium in the waste material was significantly greater than any other hazardous constituent, and thus should continue to be a representative indicator parameter of any heavy metal migrating from the cells containing chromium ore tailings. Barium will no longer be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the Hawkins Point facility. Barium would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells indicate that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. Barium will however continue to be monitored on a quarterly basis.

All other parameters listed in section 10.2.2 will continue to be utilized in establishing groundwater quality and as additional indicators of groundwater contamination.

10.2.4 Identification of Uppermost Aquifer

As outlined in the November 1992 Slug test, performed by Black & Veatch (See Appendix F), the upper aquifer under-lying Area 5 is an unconfined aquifer composed of post-cretaceous sediments and the upper member of the cretaceous deposits known as the Patapsco Formation. The base of this aquifer rests on the top of approximately 100 feet of Arundel Clay.

The Patapsco Formation consists of interbeded, banded silts and clays with clayey sands. Water-bearing sands of the Patapsco aquifer occur as irregularly bounded sheets to isolated ribbons, separated by layered silts and clays. Arundel Formation underlying the Patapsco Formation primarily consists of silts and clays. This layer has a low hydraulic conductivity and forms a no flow boundary under the Patapsco Aquifer.

10.2.5 Mobility And Stability In The Unsaturated Zone

The mobility and stability of Area 5 leachate depends on the physical and chemical behavior of each constituent as well as the different properties of the soils (those soils associate with the Patapsco Formation). Each constituent has a different solubility, adsorption, and migration rate that varies with soil pH, temperature and saturation. These factors alone have made, and will continue to make, determining the mobility and stability of the constituents of the leachate from Area 5 complex; therefore only general statements about mobility and stability will be made.

Heavy metal cations such as chromium, much like the chlorides and sulfates anions, are not highly responsive to attenuation in the saturated or unsaturated zone. In a high pH environment many metallic ions precipitate out of solution as insoluble oxides, hydroxides, phosphates, and sulfides. However, with a drop in pH and reducing soil conditions, these same insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium may adsorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Trivalent chromium is typically slowly mobile in aerobic, unsaturated conditions (Reports indicate increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxyl oxide contents). Hexavalent chromium usually does not precipitate in significant amounts; however it's mobility does increases between pH levels of 7 and 8.

Since attenuation properties depend on both the nature of the waste and the subsurface environment one can conservatively assume, over the active life of the facility, the non-reactive components of the leachate have traveled through the groundwater at a rate equal to the seepage velocity of Area 5. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may or may not

cause some components to travel faster than, or in different directions from, the flow of groundwater. In addition the density differences in some ions (chrome in particular) may cause some leachate components to sink rather than flow with the advective forces, or may slow down their migration rate.

Again, one may conservatively assume that during the closure and post-closure period, the stabilization and migration of the constituents of the leachate from Area 5 will continue in the same manner as described above.

The actual monitoring protocol is divided into three sub- sections. The first section addresses the monitoring of the groundwater surrounding Area 5 including Sedimentation Pond No 1 (stormwater runoff from Area 5). The second section addresses the monitoring of the observation wells surrounding the old MPA cell. The third section addresses the monitoring of the surface water outfalls throughout the facility.

10.3 GROUNDWATER MONITORING OF AREA 5

The effectiveness of the leachate collection system will be determined by statistically evaluating the groundwater in the upper most aquifer surrounding Area 5 and by monitoring the surface water of Sedimentation Pond No. 1, for the indicator parameters. The indicator parameters are outlined in section 10.2.2, as being characteristic of the leachate and/or contaminated groundwater from Area 5.

10.3.1 Proposed Monitoring Of Regulated Wells

It is proposed that monitoring for Area 5 continue to be performed as two different statistical evaluations to match the two different hydrogeologic formations that have been identified. This will continue to more accurately represent the groundwater quality of and around Area 5 by allowing an accurate evaluation of potential contamination caused by Area 5 in the one formation, while evaluating the degree of off-site contamination in the other formation (Trough Area).

In the first evaluation, monitoring Well 2B-1 shall continue to be designated as the up-gradient well for Area 5, with monitoring Wells 2D and 2F remaining the down-gradient wells. In this evaluation, Well 2G would no longer be used in the statistical analyses of this portion of Area 5.

In the second evaluation, monitoring well 2H shall continue to be designated as the up-gradient monitoring well for the area west of Area 5 known as the "Trough Area". Wells 2E and 2G would be the down-gradient monitoring wells for this evaluation.

Well 2A will continue to be monitored in quadruplicate for possible future use. All data received from quadruplicate monitoring will be compiled into a data base for possible future use.

Barium and pH will be monitoring quarterly along with the indicator parameters, but will not be included in the quarterly statistical analysis. The barium and pH data will be used to run quarterly trends analyses.

10.3.2 Justification for Proposed Monitoring

This proposal is requested because Wells 2G, 2E and 2H are not in the same hydrogeologic formation as the other three compliance wells. Monitoring of these wells continue to reveal the presence of contaminants which are not characteristic of the chromium ore tailing disposed of in the Area 5 facility, indicating that this well is contaminated from a source other than Area 5.

In 1985, a hydrogeologic assessment of the site by Black and Veatch identified a "trough" of less dense post-Cretaceous age sediments running across the southern end of Area 5 which allows groundwater to move more rapidly down-gradient across the southern end of Area 5 toward Wells 2G and 2E. Well 2H lies within the trough as it enters the property and is up-gradient from Wells 2G and 2E.

MES has tabulated pH data from December 1993 to present for monitoring wells 2B, 2D, 2F, 2E, 2G and 2H, the wells in question. Historically, the pH coming on-site through the up-gradient wells 2B & 2H are consistently less than the pH in the down-gradient wells 2D, 2F, 2E & 2G. This pH data was graphed; as shown, the pH of wells 2H and 2D are consistently lower then the pH of wells 2D & 2F; 2G & 2H, respectively.

The methods of statistical analyses used are the Parametric and Non-Parametric Analysis of Variance (ANOVA). These analyses are used to determine if there is a difference between the up-gradient well mean and the two down-gradient well means at a given point in time. These methods, like other methods, assume that a significant increase in the tested parameter indicates that the numbers down-gradient are higher than the numbers up-gradient. However, this is not the case at Hawkins Point with respect to pH. At the Hawkins Point facility, the quality of water coming on-site, through the Trough Area as well as beneath Area 5, has been shown through years of testing to be deteriorated due to high concentrations of Chloride, Iron, Manganese, Sodium, Sulfate, Barium, and low pH (the pH averages 3.4 for well 2H and 3.5 for well 2D since December 1993).

Prior to 1993, pH was not statistically analyzed at the site. The original permit did not require such testing. MES began statistically analyzing pH at the site in 1993. Inclusion of pH as an indicator parameter at the site became effective after renewal of CHA Permit A-264, which was issued on October 15, 1995. Since 1993, each quarterly analysis has determined that statistically significant increases in pH has occurred in down-gradient wells 2D, 2F, 2E and 2G intermittently. MES has consistently responded that pH differences are indicative of off-site contamination.

This off-site contamination is causing a false positive in the statistical analyses, erroneously indicating an increase in pH in down-gradient wells

MES' response to this observation has consistently been that pH differences are indicative of off-site contamination moving onto the Hawkins Point property. This off-site contamination is causing a false positive in the statistical analysis, erroneously indicating an increase in pH in down-gradient wells when in fact the pH of the up-gradient well has consistently been well below that of the down-gradient wells.

MES continues to believe that pH in the down-gradient wells are not increasing and that the statistically significant increase in pH is a false positive because the ground water coming on-site (through up-gradient wells 2H and 2B) has an extremely low pH which at times does decrease. The former landfills immediately up-gradient of Hawkins Point are positioned as potential cause of the decreased pH of the ground water entering the site and result in a false positive for a statistically significant increase in pH in the wells down-gradient to 2H and 2B. MES believes that the data clearly supports the position that the regulated unit in Area 5 is not the cause of this statistical increase.

Barium will not be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the facility and therefore would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells are normally less than 100 ppb, indicating that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. The maximum contaminant limit of barium in drinking water is 2000 ppb.

10.3.3 Designated Wells

Area 5 will be monitored by three groundwater monitoring wells 2B (upgradient), 2D, and 2F (points of compliance) which will continue to be statistically evaluated on a quarterly basis. Groundwater monitoring wells 2A, 2B, 2D, 2F, 2E, 2G and 2H will continue to be designated as regulated wells for the facility. The installation, location and depths of these wells are also in accordance with 40 CFR Part 264.97.

10.3.4 Background and Regulated Wells

In the first evaluation Monitoring Well 2B continues to be designated as the background well as defined in 40 CFR Part 264.97, it represents the quality of background water that has not been affected by leakage from Area 5. Down-gradient monitoring wells 2D and 2F will continue to represent the quality of groundwater passing through Area 5.

In the second evaluation, Monitoring Well 2H continues to be designated as the background well for the area west of Area 5 known as the "trough area". As defined in

40 CFR Part 264.97, background quality may be based on sampling of wells that are not up-gradient from the waste management area when: sampling at other wells will provide an indication of back-ground groundwater quality that is as representative or more representative than that provided by the up-gradient wells. Wells 2E and 2G will continue to be designated as the down-gradient monitoring wells for the Trough Area.

10.3.5 Use of Well Data

Historical data from the up-gradient wells will continue to be used to establish background data for the statistical evaluations. The historical data from the remainder of the compliance wells listed in this section has been compiled into a groundwater data base and will continue to be used to determine seasonal trends, potential contamination and/or any other possible future uses. The four quarterly replicates from each down-gradient well shall be compared to the combined pool of current and historical replicates from the background well. This historical data used shall not exceed two years.

The amount of historical replicates to be used shall be specified in the permit. In addition, the historical replicates from the background well shall not be averaged prior to use in the ANOVA procedure. The total sample size is twenty-four (24) data points:

- Up-gradient (Background) data consist of four (4) data points from the current quarterly monitoring and the data points from the three most previous quarterly monitoring events

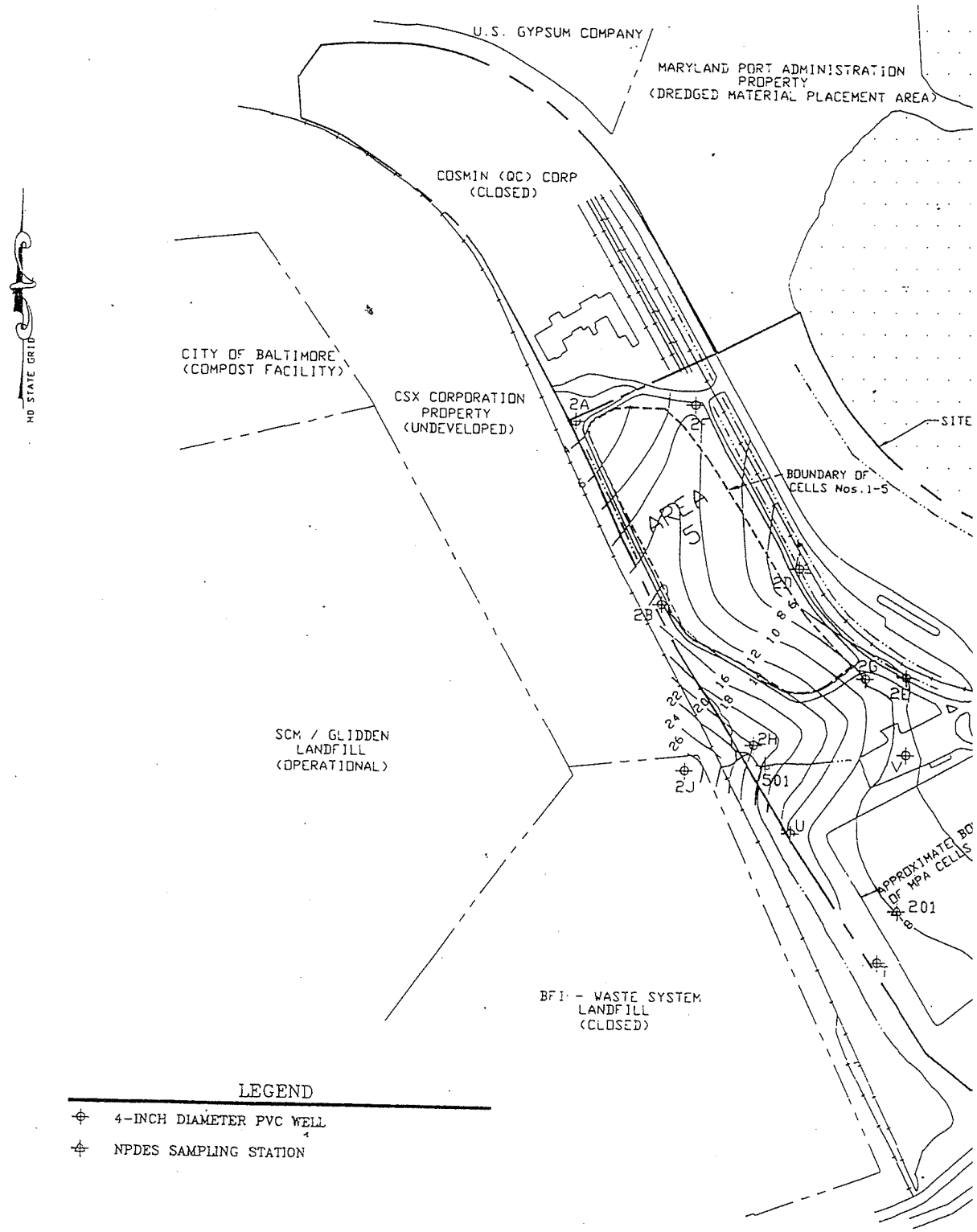
- Down-gradient data consist of four (4) data point from the current quarterly monitoring of each of the two down-gradient wells.

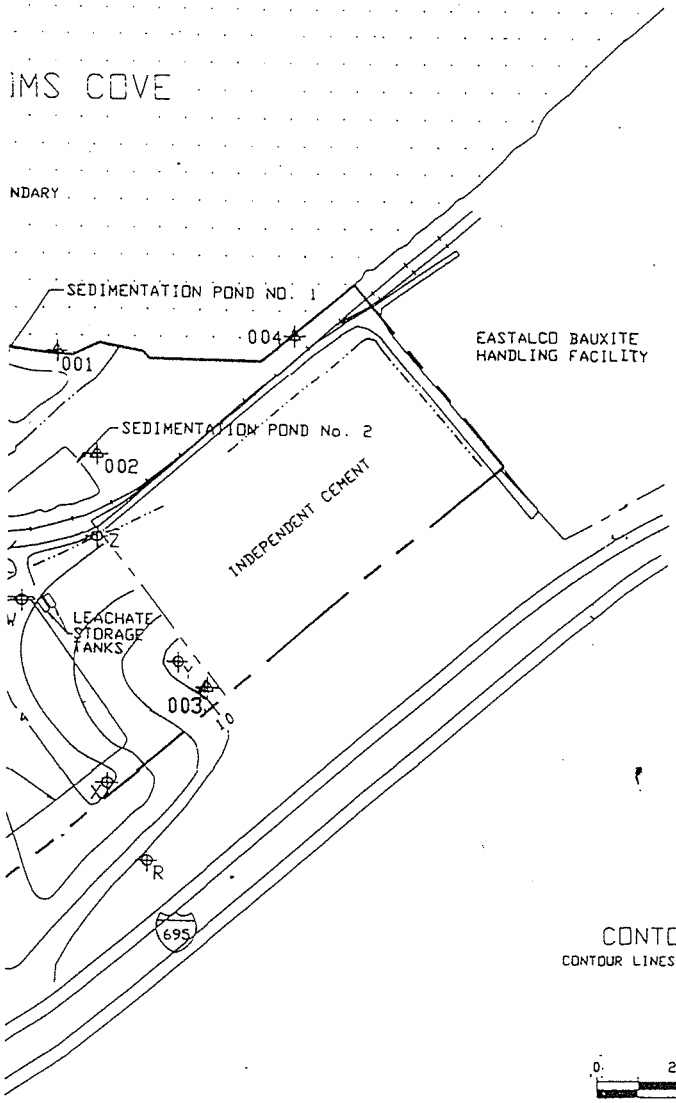
10.3.5.1 Historical Data Spreadsheets

In addition to statistical evaluations, the data collected from the quarterly groundwater monitoring will continue to be compiled into a groundwater database for that particular well. This will be used to help determine seasonal trends if necessary. Appendix C contains historical groundwater monitoring data from 1994-1998.

10.3.5.2 Comparison of Each Constituent in the Compliance Wells to the Background Wells.

Once the quarterly analyses are completed, each constituent is compared to the same constituent in the background data. A quarterly statistical evaluation per constituent is performed following the procedures outlined in section 10.4.


U.S. GYPSUM COMPANY
MARYLAND PORT ADMINISTRATION PROPERTY (DREDGED MATERIAL PLACEMENT AREA)
COSMIN (QC) CORP (CLOSED)
MD STATE GRID
CITY OF BALTIMORE (COMPOST FACILITY)
CSX CORPORATION PROPERTY (UNDEVELOPED)
SITE
BOUNDARY OF CELLS Nos.1-5
AREA 5
2A
2B
2C
2D
2E
2F
2H
2J
501
201
SCM / GLIDDEN LANDFILL (OPERATIONAL)
BFI - WASTE SYSTEM LANDFILL (CLOSED)
LEGEND
4-INCH DIAMETER PVC WELL
NPDES SAMPLING STATION



CONTOUR INTERVAL 2 ft

CONTOUR LINES REFLECT FEET ABOVE MEAN SEA LEVEL

MARCH 1992

GRAPHIC SCALE

(IN FEET)

0 200 400 800

FIGURE 10.3

'LAND
RONMENTAL
ICE

HAWKINS POINT HAZARDOUS WASTE LANDFILL
GROUND WATER CONTOURS
OBSERVATION WELLS AND NPDES STATIONS

10.4 STATISTICAL EVALUATION

This section contains procedures for performing a comparison of up-gradient and down-gradient groundwater analytical results to determine whether contamination has occurred. The procedures include:

10.4.1 A Proposed Statistical Method That Complies With 40CFR PART 264.97.

The proposed method of statistical analysis is the Parametric Analysis of Variance (ANOVA), an EPA approved statistical method under 40CFR PART 258.53(h) and (i). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Using ANOVA followed by a pos hoc comparison determines if an actual difference in groundwater quality exists for a given sampling period among a group of wells. For Area 5 wells, this analysis will determine if there is a difference between the background well mean and the two down-gradient well means at a given point in time for each monitoring parameter. The parametric ANOVA assumes that the data are normally distributed and have equal variances.
Two tests will determine if the data follow those assumptions. If not, the data will be statistically evaluated using a non-parametric ANOVA.

10.4.2 Evaluation of Non-Detected Parameters

If less than fifteen percent (15%) of the data points are below the laboratory detection limit, each data point that is below detection will be replaced by one half of its Practical Quantification Limit (PQL/2). All data shall then be evaluated by the parametric ANOVA.

However, if greater than fifteen (15%) of the data points are below the laboratory detection limit, a non-parametric ANOVA method shall be used to statistically evaluate the data. In the non-parametric ANOVA, all data points are ordered and replaced by their numeric rank. Those data points below detection are tied and equal to the average of the ranks as if they were slightly different.

10.4.3 Normal and Log-Normal Distribution

The EPA has reversed its previous guidance on the distribution of groundwater data according to the "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Draft, Addendum to Interim Final Guidance", dated July 1992. The EPA has indicated that ground water concentration data usually follow a log-normal distribution as opposed to a normal distribution. Therefore, all data points shall be logged prior to checking the distribution.

The Shapiro-Wilk Test shall be used to determine whether the data points follow the log-normal distribution. If the test statistic is greater than a critical value, the

data are log-normal, however, if the test rejects the logged-data, the data shall be unlogged and retested for a normal distribution.

10.4.4 Equality of Variances

To determine if the different wells have similar variances, The Levine Test shall be used. In this analysis, each data point is replaced by the absolute value of its respective residual:

$$z_{ij} = x_{ij}^{3} - x_{i}^{3}$$

10.4.5 ANOVA Procedures

1. Arrange the data (or the natural log of data) in a table using the number of wells and the number of replicates,

Well No.	R1	R2	R3	R4	
1	1	2	3	4	BACKGR. CURRENT
2	1	2	3	4	BACKGR. PREQRT
3	1	2	3	4	BACKGR. PREQRT
4	1	2	3	4	BACKGR. PREQRT
5	1	2	3	4	DOWNGR. CURRENT
6	1	2	3	4	DOWNGR. CURRENT

2. Record the number of observations n,
   n = (#wells) * (# replicates)
   here n = 6 X 4 = 24

3. Sum the readings (replicates) per well, from i to m number of wells

$$S\ X_i = (R1_i+R2_i+R3_i+R4_i)$$

4. Calculate the mean (average) of the replicates per well, $X_i..X_m$, where m is the total number of wells.

$\bar{X} = S\ X_i /N$, where N is the number of readings per well.

5. Expand the table to include the sum of each well and the well mean. (See Figure 10.4)

6. Add all the sums together to get the sum of sums (SSUM) and take the average of all the means to get the mean of means (MMEAN). Numerically the,

2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

STATISTICAL ANALYSIS FOR HAWKINS POINT HAZARDOUS WASTE LANDFILL
ANALYSIS OF VARIANCE (ANOVA) REPORT DATE: 15-Jun-92
MARCH 1992 TOTAL BARIUM DATA FROM THE CONTRACT LABORATORY (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4
BACKGR 2H	50.0	50.0	90.0	600.0 *
2H	40.0	40.0	40.0	40.0
2E	230.0	230.0	240.0	220.0
2G	20.0	20.0	20.0	20.0

*MATRIX INTERFEREN
CONTRACT LABORAT

NATURAL LOG OF TOTAL BARIUM (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4	SUM_X	MEAN	BACKGR ME
BACKGR 2H	3.912	3.912	4.500	6.397	18.72	4.68	4.68
2H	3.689	3.689	3.689	3.689	14.76	3.69	
2E	5.438	5.438	5.481	5.394	21.75	5.44	
2G	2.996	2.996	2.996	2.996	11.98	3.00	
READINGS (N)							

****SQUARE OF SAMPLE CONCENTRATION DATA********

					SUM OF SUMS	MEAN OF MEANS
BACKGR 2H	15.30	15.30	20.25	40.92	67.21	4.20
2H	13.61	13.61	13.61	13.61		
2E	29.57	29.57	30.04	29.09		
2G	8.97	8.97	8.97	8.97		

****SUM OF SQUARES SCRATCH-PAD****

WELL NO.	SUM_X	SUM(_X_SQR)	READINGS (N)	(SUM_X)^2	(SUM_X)^2/n	MEAN
BACKGR 2H	18.72	91.78	4	350.47	87.62	4.68
2H	14.76	54.43	4	217.73	54.43	3.69
2E	21.75	118.27	4	473.08	118.27	5.44
2G	11.98	35.90	4	143.59	35.90	3.00

****(ONE WAY) ANALYSIS OF VARIANCE TABLE****

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	ESTIMATE OF STD	CALCULATED F RATIO	TABLED F RATIO
BETWEEN WELLS	13.90	3	4.63	13.349	3.49
SAMP. ERROR	4.16	12	0.347		
TOTAL	18.06	15			

IF THE CALCULATED F RATIO IS GREATER THEN (>) THE TABLED F RATIO, THEN pos hoc COMPARISONS ARE NECESSARY.

BACKGROUND DATA FOR WELL 2H CONSIST OF DATA FROM 1988-1991.

$$SSUM = (S\ X_i + S\ X_j + \ldots S\ X_m) \text{ and the,}$$

$$MMEAN = (\bar{X}_i + \bar{X}_j + \ldots \bar{X}_m)/m \text{ (\# of wells)}$$

7. Square the Sum of each well and arrange in a table along with the SSUM and MMEAN, SUMSQ

$$SUMSQ = (S\ X_i)^2$$

8. Calculate the sum of squares between the wells, SS_{well}

$$SS_{well} = [(S\ X_i)^2 + (S\ X_j)^2 + \ldots (S\ X_m)^2] - 1/N^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with m number of wells-1 being the degree of freedom for between wells.

9. Calculate the corrected total sum of squares, SS_{total}

$$SS_{total} = (R1_i^2 + R2_i^2 + \ldots + R3_j^2 + R4_j^2 + \ldots$$

$$R4_m^2) - 1/n^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with n number of readings-1 being the degree of freedom for between observations.

10. Find the error within the wells, SS_{error}

$SS_{error} = SS_{total} - SS_{well}$, with n(# of observations)-m(# of wells) being the degree of freedom for the error.

11. Arrange the calculations in a table using the number of wells by the calculations. (See Figure 10.4)

12. Calculate the mean squares between the wells and within the wells MSBW and MSWW.

$$MSBW = SS_{well}/m\text{-}1 \text{ and } MSWW = SS_{error}/n\text{-}1$$

13. Now divide MSBW by MSWW to obtain the calculated F statistic, F_{cal}.

14. Using Table 1, of Appendix D, m-1 degrees of freedom, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated F can be found, F_{tab}.

15. Using the above calculations the one-way ANOVA table should be set up as shown in the attached example (Figure 10.4).

16. If and only if the calculated F ratio exceeds the tabulated F ratio should pos hoc comparisons be made, otherwise can conclude that there is no significant statistical difference (well means are the same) among the wells at the given time period.

10.4.6 Procedures For pos hoc Comparison

1. To compute the pos hoc comparisons (Bonferroni t-statistics), let M=the # of compliance wells, which will also be the number of comparisons to be made.

2. Sum the total number of observations in the background well nb.

3. From ANOVA worksheet list the average

concentration of the background well, $\overline{X}b$.

4. Calculate the difference between the average concentration of each compliance well and the average of the background well.

$$DIFF=\overline{X}i-\overline{X}b.$$

5. Calculate the standard error of each difference (SE), however, if the number of observations is the same for all the compliance wells then the standard error for each well will be equal.

$$SE = [MSWW*(1/nb+1/M)^{1/2}]$$

6. Using Table 2 (Bonferroni's t Table) of Appendix D, # of compliance wells M, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated Critical t value can be found, crit. t.

Crit.t value obtained from Table 2, Appendix D

7. Multiply the Critical t value by the Standard error to obtain the D quantities for each well, once again if the number of observations is the same for all the compliance wells then the D quantity for each compliance well is equal.
D = Crit. t * SE

8. Compare the difference $\overline{X}i$ - $\overline{X}b$ to the value D, if the difference exceeds the D value, conclude that compliance well has significantly higher concentrations than the average background wells. Otherwise conclude that the well is not contaminated. This must be performed per compliance well.

9. Finally, calculate the residuals $R1_i$, which are the differences between each observation and its predicted value (in this case, the mean of that particular well X_i). The residuals can be used to check for departures from normality.

$$R1_i = X1_i - \overline{X}_i$$

10. Using the above calculations for pos hoc comparisons, set up table along with an interpretation of the data and calculations as shown in the attached example (See Figure 10.5).

Appendix E is a working example of the ANOVA statistical analysis using actual data from a groundwater monitoring event of both Area 5 and the Trough Area.

10.4.7 Non-Parametric ANOVA

The non-parametric ANOVA procedure shall be used when: 1) the data does not follow a normal or log-normal distribution, 2) the data has unequal variances between wells, or 3) greater than fifteen percent (15%) of the data points are below laboratory detection. Under this procedure, the Kruskal-Wallis Test is used to determine if there is a statistically significant increase among the wells.

10.4.7.1 Kruskal-Wallis Procedures

The procedures for the Kruskal-Wallis Test is as follows:

1) Rank all observations (N) from least to greatest,

2) Calculate the sum of the ranks of observations in each well (RK_i) and the average of the ranks for each well.

3) Calculate H,

$$H = [\ 12/N(N+1)*S\ R_i^2/N_i\ ]-3(N+1)$$

where N, is the number of data points for each well.

4) If there are ties among the ranks, then the adjusted Kruskal-Wasllis statistics must be calculated as follows:

$$H' = H/1 - (\sum_{i=1}^{g} t_i^3 - t_i / N^3 - N)$$

where, g is the number of groups of distinct tied observations and t_i is the number of observations in the tied group i.

a:\2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

DEGF. = DEGREES OF FREEDOM
M = # OF COMPLIANCE WELLS (ALSO # OF COMPARISONS TO BE MADE)
nb = TOTAL # OF SAMPLES IN BACKGROUND WELLS
Xb= AVERAGE CONCENTRATION OF BACKGROUND WELLS

DEGF=	12
M=	3
nb=	4
Xb=	4.68

The difference between the mean of the five compliance wells and the mean of the background well.

meanXi - meanXb = difference

2H=	-0.99
2E=	0.76
2G=	-1.68

SE = STANDARD ERROR OF EACH DIFFERENCE.
Since the # of observations is the same for all compliance wells, the standard errors for the four differences will be equal.
Di = COMPUTE THE QUANTITIES Di FOR EACH DIFFERENCE
Once again since the # of observations are the same, D1=D2=D3...
CRT. t = CRITICAL t, CONSTANT FROM TABLE 2
D = SE*CRT. t

SE=	0.450
CRT. t=	2.45
D=	1.102

Since calculate F was > tabled F the Bonferroni multiple comparisons procedure was used to determine for which wells there was statistically significant evidence of contamination.

Of the three comparisons, none exceeded the critical value D, it can be concluded that there was no statistical difference among the camparisons.

COMPUTING THE RESIDUALS USING ln DATA

WELL NO.	RPL 1	RPL 2	RPL 3	RPL 4
2H=	0.00	0.00	0.00	0.00
2E=	0.00	0.00	0.04	-0.04
2G=	0.00	0.00	0.00	0.00

5) If H or H' is less than the tabulated chi-squared value with (k-q) degrees of freedom, where k is the number of groups, then one can conclude that there is no significant statistical increase (no contamination present). However, if H or H' is greater, then one must proceed with step 6.

6) Compute the critical difference C_i, for each well:

$$C_i=Z_{(a/(k-1))}* ÖN(N+1)/12*(1/n_b+1/n_i)$$

where n_b, is the number of data points in the background well, here n_b=16, and $Z_{(a/(k-1))}$ is the upper (a/(k1)) percentile from the standard normal distribution.

7) Compute the differences between each down-gradient well's average among the ranks and the background (up-gradient) well rank average. If this value for any well exceed C_i, then one can conclude that there is a significant statistical increase and therefore evidence of contamination in that particular well.

10.4.8 Statistically Significant Evidence of Contamination

Within one month after receiving the analytical results from the last replica taken for that quarter, it will be determined whether there is a statistically significant increase in contaminates per detection monitoring point using the procedures outlined in Sections 10.4.1-10.4.7.

If it is determined that there is statistically significant evidence of contamination for chemical parameters or hazardous constituents as specified in 40 CFR Part 264.98, then the following procedures will be followed:

1. The Regional Administrator (EPA) and the Regulatory Agency (MDE) will receive written notification within seven days. This notification will specify which chemical parameters or hazardous constituents have shown statistically significant evidence of contamination.

2. All monitoring wells shall immediately be sampled to determine the presence and concentration of any constituents listed in Appendix IX of 40 CFR Part 264.

3. Should any of the constituents listed in Appendix IX of CFR Part 264 be found present, then that well will be re-sampled and analyzed within one month of receiving the initial analytical results. Both sets of results will be submitted to MDE within a timely manner of receiving the second results.

4. Should the results from the second set of analyses confirm the finding of the first set of analyses, then the results of both sets of analyses along with an application for permit modification to establish a compliance monitoring

program will be submitted to MDE. The submission of this finding shall occur within ninety days of receiving the second set of analytical results. The permit modification application shall follow the guidelines outlined in 40 CFR Part 264.98

10.5 DETERMINING THE SAMPLING INTERVAL

In no instance are any of the sampling events allowed to exceed ninety calendar days from the initiation of sampling. To determine the sampling interval, hydrogeologic conditions of the regulated unit were evaluated to determine the groundwater flow velocity. Using the calculated seepage velocity, the sampling interval is generated.

10.5.1 Hydrogeologic Conditions

Slug tests were performed on the existing and proposed compliance wells by Black and Veatch in November 1992. A copy of the report can be found in appendix F.

The data from this report was used to estimate the minimum time interval between sampling per event that would allow four independent samples per well of the groundwater surrounding both Area 5 and the Trough Area.

The following calculations were used to determine the minimum time required to obtain an independent sample from each compliance well:

Vh=(Kh)(i)/Ne, where

Vh = Horizontal component of the average linear velocity, (seepage velocity)

Kh = Horizontal hydraulic conductivity,

Ne = Effective porosity and

i = Hydraulic gradient.

D = Well Diameter

D/Vh = minimum time required for an independent sample of groundwater to pass through the diameter of the well.

These calculations are based on Darcy's Equation, and follow the guidelines given in the EPA document, "Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities", April 1989.

10.5.2 Estimated Seepage Velocity and Time Required to Pass Through a Four-Inch Well Diameter

According to the Slug Test Report referenced above, the estimated seepage velocity was calculated as 0.014 feet/day (0.168 inches/day) for Area 5 and 0.136 ft/day (1.632 inches/day) for the Trough Area. Therefore the average minimum time required for an independent sample of groundwater to pass through the four inch diameter well is as follows:

Minimal time required for Area 5 is D/Vh = (4 inches/0.168 inches/day) = 23.8 days

Minimal time required for Trough Area is D/Vh=(4 inches/1.632 inches/day) = 2.5 days

10.6 SAMPLING INTERVAL

Based on the information from Section 10.5.2 and to assure that all samples are taken within the ninety (90) day window (21 days between replicates), the suggested sampling interval for Area 5 is once every 21 days. The suggested sampling interval for the Trough Area is once every 3 days (3 days between replicates until all four replicates are taken). Procedures for the suggested sampling interval are outlined below. Each sampling interval assures that the replicates are taken far enough apart in time to prevent any type of auto correlation.

10.6.1 Sampling Interval Procedures

On Day One of the sampling event purge each well following the procedures outlined in Sections 10.1.5 through 10.1.11. All field information including depth to water, volume of water purged, date, time and samplers initials shall be documented in a field notebook.

On Day Two, sample each of the wells using the sampling procedures outlined in sections 10.1.14 through 10.1.16. All field information such as pH readings, specific conductivity readings, temperature, date/time and sampler initials shall be recorded in a field notebook. This set of samples will be the first replicate.

Twenty-one days (three for the Trough Area) after the wells were initially sampled, sample each again (without purging). This set of samples will be the second replicate.

Twenty-one days (three for the Trough Area) after the second replicate, sample each of wells (without purging). This set of samples will be the third replicate.

Finally twenty-one days (three for the Trough Area) after the third replicate, sample each of the wells again (without purging). This set of samples will be the

fourth and final replicate of the sampling event. Below are examples of the proposed sampling Intervals:

Sampling Interval For Area 5

Date	Replicate No.
June 1	Purge Only
June 2	1
June 23	2
July 13	3
August 3	4

Sampling Interval For Trough Area

Date	Replicate No.
June 1	Purge Only
June 2	1
June 5	2
June 8	3
June 11	4

10.6.2 Sampling Frequency

The sampling frequency shall remain quarterly for at least 30 years, with yearly analysis being performed on those parameters outlined in section 10.1.16.

10.7 PROPOSED METHOD FOR DATA ORGANIZATION AND PRESENTATION

10.7.1 Data Organization

Upon receiving the data from the contract laboratory, it will be checked against the chain of custody. This will assure the samples were analyzed for the proper group of parameters. The blanks, Trip Blanks, Duplicates and when applicable surrogates will be reviewed. Data will then be entered into a groundwater computer database. The first spreadsheet will consist of data for all wells sampled during that particular sampling event. The second spreadsheet will consist of all data from historical and current sampling events per well. e.g., if there are six wells then, there will be six different spreadsheets (Shown in Figures 10.6 and 10.7). The four independent samples (replicates) will be used to establish a statistical profile of the groundwater surrounding Area 5 and the trough Area for that given time as shown in Figures 10.4 and 10.5.

Indicator parameters are those parameters that are characteristic of landfill leachate and could indicate leakage from the landfill. Each indicator parameter will be statistically evaluated according to procedures outlined Section 10.4.

HAWKINS POINT GROUNDWATER QUALITY MONITORING

DATE 03/11/92

SAMPLING POINT	UNITS	2A REP 1	2A REP 2	2A REP 3	2A REP 4	2A AVERAGE	2B1 REP 1	2B1 REP 2	2B1 REP 3	2B1 REP 4	2B1 AVERAGE	2D2 REP 1	2D2 REP 2	2D2 REP 3	2D2 REP 4	2D2 AVERAGE	2E REP 1	2E REP 2	2E REP 3	2E REP 4	2E AVERAG
PH	UNITS	4.7	4.6	4.7	4.7	4.7	4.5	4.5	4.5	4.5	4.5	5.9	5.8	5.8	5.8	5.8	4.7	4.7	4.7	4.7	4
SP CONC.	UMHOS/CM	100	100	100	100	100	2500	2350	2500	2500	2463	520	520	520	520	520	10320	9030	10320	10320	99
TOX	MG/L	0.012	0.013	0.025	0.010 L	0.015	0.010	0.056	0.013	0.011	0.023	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.030	0.010 L	0.018	0.0
CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.01	0.01 L	0.01 L	0.01	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.155	0.155	0.160	0.155	0.1
HEX CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.
CHLORIDE	MG/L	8	7	7	7	7	34	33	34	33	34	20	20	20	20	20	350	360	350	350	3
SULFATE	MG/L	31	29	29	30	29.8	3400	3300	3200	3300	3300	250	250	250	250	250	19000	19000	19000	19000	19
BARIUM	MG/L	0.16	0.19	0.17	0.17	0.17	0.05 L	0.05 L	0.05 L	0.05 L	0.05 L	0.16	0.16	0.16	0.17	0.16	0.23	0.23	0.24	0.22	0.
IRON	MG/L	1.30	1.40	1.40	1.40	1.38	1100.0	1100.0	1100.0	1000.0	1075.0	13.00	13.00	13.00	13.00	13.00	6900	7000	6900	6900	6
MANGANESE	MG/L	0.07	0.06	0.06	0.06	0.06	28.0	28.0	28.0	28.0	28.0	0.81	0.81	0.83	0.80	0.81	270	270	270	270	
SODIUM	MG/L	5.3	5.3	5.2	5.2	5.25	21.0	11.0	21.0	21.0	18.5	10.00	11.00	11.00	11.00	10.75	310	310	310	310	
DEPTH TO WATER	FEET	41.4					27.8					23.2					18.2				
DATUM		84.5					47					37.5					42.2				

44.48

HAWKINS POINT HAZARDOUS WASTE LANDFILL
EPA Identification No. MDD 00 073 1356

GROUND WATER MONITORING WELL 2A
Permit No. BC 81-0102

TOP OF STEEL CASING ELEVATION + 44.48
BOTTOM OF SCREEN ELEVATION - 21.7

STANDARD/UNITS		DET.LIMIT	3/23/89	6/22/89	9/28/89	12/21/89	3/22/90	6/21/90	9/20/90	12/06/90	03/21/91	06/20/91	09/19/91	12/12/91	03/11/92	06/19/92
WATER ELEVATION (MSL DATUM)			1.98	1.78	2.98	2.18	2.48	3.28	3.48	2.78	3.58	3.38	3.08	2.68	3.08	1.96
BARIUM	1.0 mg/l	0.010	0.050 L	0.06	0.09	0.05 L	0.05 L	0.11	0.05 L	0.05 L	0.05 L	0.07	0.05 L	0.050 L	0.017	0.060
CHROMIUM(TOTAL)	.05 mg/l	0.001	0.004	0.005 L	0.005 L	0.01 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.003	0.005 L	0.010 L	0.005 L
CHLORIDE	250 mg/l	0.100	10.0	10	7	10	8	10	7	8	8	9	8	6	7	8.000
IRON	0.3 mg/l	0.001	1.70	3.50	0.16	0.02 L	0.24	0.50	0.30	0.48	0.73	0.49	4.75	1.28	1.38	4.700
MANGANESE	0.05 mg/l	0.001	0.05	0.09	0.03	0.05 L	0.06	0.09	0.06	0.06	0.06	2.1	0.19	0.04	0.06	0.180
SODIUM	20.0 mg/l	0.100	3.4	5.3	5.0	5.4	4.85	7.15	5.73	4.85	5.45	6.85	4.63	4.630	5.250	4.980
SULFATE	250 mg/l	0.10	25	38	25	43	56	34	23	41	35	41.3	1475	11.50	29.80	8.80
pH	6.5-8.5 units	0.1	4.93	4.8	4.3	4.8	4.8	5.3	4.5	4.8	6.5	4.9	4.4	4.1	4.7	4.1
SPEC. CONDUCT	umhos/cm	1	1428	158	57	80	90	97	71	69	130	74	103	50	100	78
TOX	mg/l	0.01	0.010 L	0.02	0.02	0.04	0.04	0.1	0.0225	0.01 L	0.28	0.01 L	0.011	0.03	0.02	0.06
CHROMIUM (HEX)	0.05 mg/l	0.010	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.010 L	0.010 L

NOTE: BOL-Below Detection Limit
NOTE: An "L" indicates a less than value
NOTE: IN SEPT AND DEC OF 1990, THE CONTRACT LABORATORY EXPERIENCED MATRIX INTERFERENCES AND ONLY REPORTED ONE OR TWO VALUES FOR EACH OF THE TOX SAMPLE SETS.

2S

Other parameters outlined in Section 10.1.16 will be monitored annually but will not be statistically evaluated unless there is a specific reason for concern, or specific guidance from the regulatory agency (Maryland Department of the Environment (MDE)). There will be no statistical evaluation of the Volatile Organic Compounds (VOC's). Instead, the procedures outlined in Section 10.7.2 shall be followed for reporting VOC concentrations to MDE.

10.7.2 Reporting the Presence of Volatile Organic Compounds (VOC)

If any of the organic compounds described in Section 10.1.16 are present, a report shall be submitted to MDE following the procedures described below:

1. Each VOC that is present will be compared to the Maximum Contaminant Level (MCL) for that compound, as listed in the EPA document titled "Drinking Water Regulations and Health Advisories", April 1992. (see Appendix G.) The MCL is the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

2. If any VOC is present, but is less than the MCL for that compound, then a letter and a copy of the data report will be submitted to MDE within one month of receiving the data. The well will continue to be closely monitored for VOC levels (VOC's will be monitored semi-annually as opposed to annually for that year).

3. If the concentration of any VOC is greater than the listed MCL for that compound, the monitoring well will be immediately re-sampled, using the procedures in Section 10.1.21. A letter and the data reports from both sampling events will be submitted to MDE within one month of receiving the second data report.

10.7.3 Schedule For The Submission Of Data Collected

All data collected for the previous quarter shall be submitted to MDE one month after receiving data from contract laboratory.

10.7.4 Quarterly Data Submission Package

A copy of the data as received from the contract laboratory, individual well spreadsheets, statistical evaluations for sampling event and a summary or interpretation of the data will be submitted to MDE one month after receiving the final data report from laboratory. A copy of this data package will also be filed on site.

10.7.5 Submission of Letters Documenting Presence of VOC's or Exceedance of VOC MCL's

Within one month of receiving the yearly data analyses from the contract laboratory, if any volatile organic compounds are present, a letter stating such shall be submitted to MDE.

If a VOC MCL is exceeded, a letter and data report will be sent to MDE within one month of receiving the data report from the second sampling event.

10.8 SURFACE WATER MONITORING

During post-closure all surface water monitoring will continue to be performed in accordance with the National Pollution Discharge Elimination System (NPDES) permit. A NPDES permit renewal was submitted to the regulatory agency (MDE) in July of 1990. Monitoring will be performed in accordance with the new permit when received. A copy of the permit renewal application is enclosed in Appendix H.

Permit Number: A-264

Attachment 9

HEALTH AND SAFETY PLAN

(There are 50 pages in this attachment)

8.0 SAFETY PROGRAM

8.1 GENERAL

The purpose of an effective safety program is to prevent accidents. The program itself need not be elaborate nor do people need to be safety experts to start and sustain a successful safety program. To be successful, the program must involve each employee on a personal level. The program must also have the support of management through:

- Making safe work practices mandatory.
- Correcting hazardous conditions immediately.
- Providing adequate safety equipment.
- Providing support for safety training and planning.
- Training each employee thoroughly in the proper and safe operation of each item of equipment before permitting the employee to assume responsibility for its operation an/or maintenance.
- Developing an adequate emergency response plan (See Section 6.0)

All personnel should promote safety by continuously analyzing jobs, work areas, and procedures from a safety standpoint so that potentially hazardous actions or conditions are recognized. When a hazard is noted, immediate steps should be taken to eliminate it by corrective action. If the hazard cannot be corrected, proper warning signs should be posted, safety devices should be installed, and safety procedures should be established to counteract the hazard. The periodic safety inspections by the MES Safety Officer will be conducted to identify correctable hazards that may not be apparent to regular employees.

8.2 SAFETY TRAINING

Safety training sessions will be regularly conducted to ensure that all operating personnel are familiar with the safety procedures and use of safety equipment as required by the Occupational safety and Health Act (OSHA). An emergency directory as presented in Section 5.3.6, with appropriate names and telephone numbers of persons and agencies to be contacted in case of emergency should be posted at prominent and secure locations.

Safeguards should be provided on equipment to reduce the possibility of injury to employees. All operating equipment will be provided with enclosed protective cabs to protect the operator from accidents, weather, and flying debris.

Normal safety precautions will be observed while operating or working around heavy equipment.

All personnel should be aware of the dangers associated with construction and heavy equipment operation, particularly while the unloading of hazardous wastes is in progress. Differing flows and directions of traffic and operational equipment, and the angle of operation of equipment pose dangers to those working in the vicinity of the unloading. Employees will be equipped with high-visibility headgear, gloves, and safety shoes, at a minimum; goggles, respirators, and reflective vests are also available and will be mandated as conditions dictate.

8.3 SALVAGE AND SCAVENGING

Access to the Facilities will be strictly controlled and limited to MES Facility employees, contractors handling the waste, authorized MPA and environmental regulatory personnel. Scavenging and salvaging materials at the facility will not be permitted, except at the direction of the MES for the recovery of materials for recycling.

8.4 FIRE PROTECTION

The chromium contaminated soils are an essentially non-combustible material. Therefore, fire hazards are not anticipated. Fire extinguishers will, however, be carried on all equipment working in or near the facility to control accidental, or possible equipment fires. Any fires which may develop within the facility that cannot be extinguished using the portable fire extinguisher mounted on the operating equipment will be smothered using earth stockpiled near the facility.

8.5 EMERGENCY RESPONSE

The safety of all individuals involved in the operation and maintenance of the facility depends on an ability to quickly identify and react properly to an emergency situation. In addition to the safety elements discussed previously, it is important to know the basic actions to take should an emergency arise, such as accidental injury, poisoning or fire.

Should an emergency arise, the proper emergency response authority should be notified; i.e. emergency coordinator, police department, fire department, ambulance service, etc. After the proper authorities have been contacted, the individual handling the emergency should notify the Site Supervisor. A detailed written report should be prepared describing the events surrounding such an occurrence. Every accident should be investigated, whether or not injuries occurred. The results of the investigation should be used to prevent a recurrence of the accident.

9.0 HEALTH AND SAFETY PLAN

9.1 INTRODUCTION

The Hawkins Point Hazardous Waste Facility is a secure hazardous waste landfill in Baltimore, Maryland permitted by the Maryland Department of the Environment and operated by the Maryland Environmental Service (MES). The Facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southeastern corner of Baltimore City (See Figure 9.1).

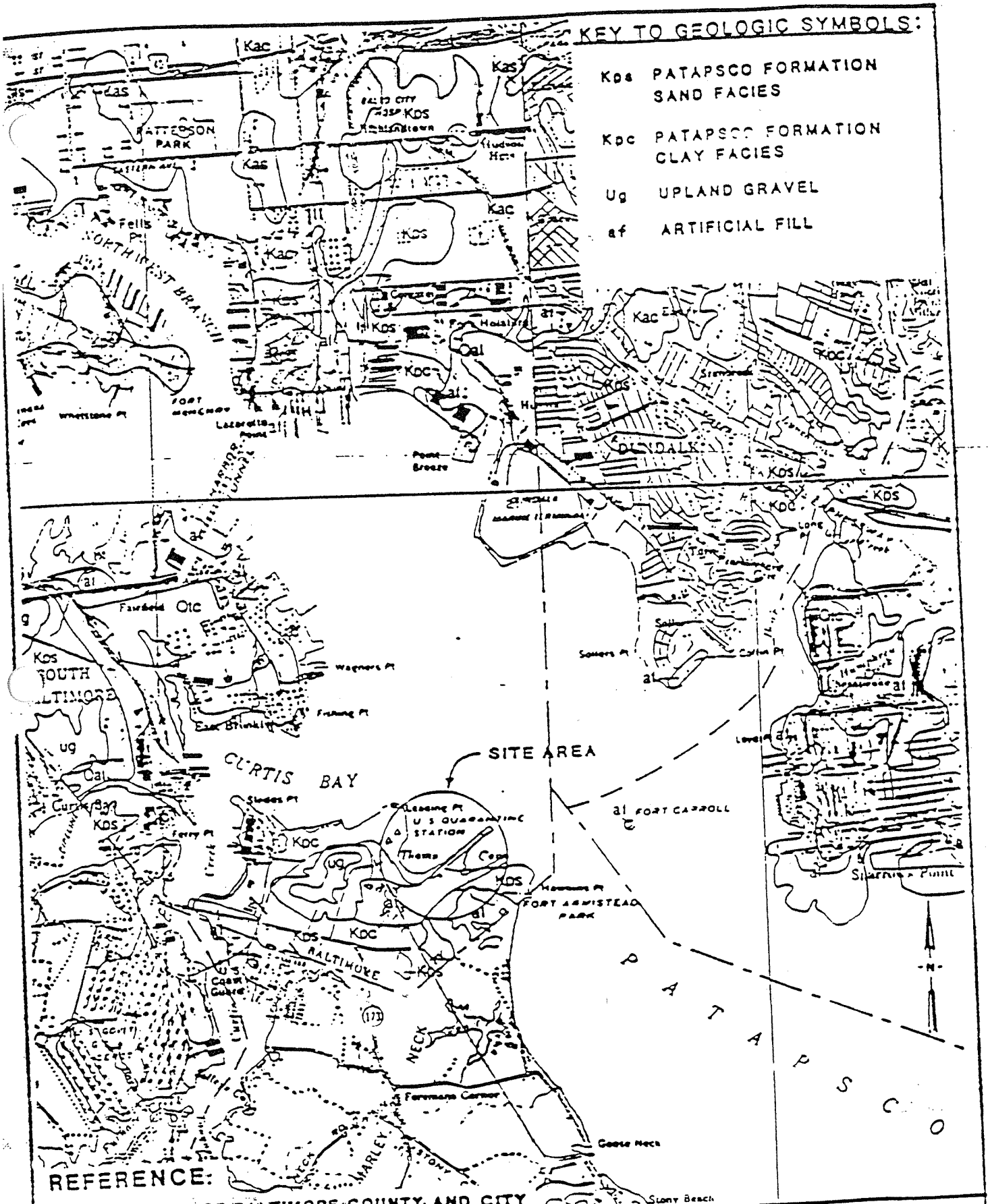
The purpose of this plan is to advise personnel of the presence of hazardous materials at this facility and to provide methods whereby operations by personnel can be conducted in a manner that protects public health and the environment. Although adverse health effects are not expected in this particular operation, failure to use proper safeguards and/or work practices when in direct contact with chromium bearing leachate can result in skin and mucus membrane irritation. Lung cancer has been associated with airborne concentrations of certain chromate dusts, exclusively in an industrial setting.

9.2 BACKGROUND

Before closure, Area 5 of the Hawkins Point facility received chrome ore tailings and chromium contaminated debris from the dismantling of the former AlliedSignal plant in Baltimore, Maryland. Some chromium chemicals are believed to cause cancer when inhaled by humans. Under the current federal and state testing criteria, the chromium ore tailings and contaminated debris is classified as a characteristic hazardous waste. The leachate which is generated within the landfill from percolating rainfall is collected by the leachate collection system. The chromium bearing leachate is a hazardous waste with a pH as high as 13. Therefore, all personnel of the Wastewater Treatment Facility shall conduct operations in accordance with the following requirements and procedures.

9.2.1 Training Requirements

All personnel who will be engaged in activities within the Facility must complete the 40 hour hazardous waste training course or if previously trained, an appropriate 8 hour refresher course. The training must comply with OSHA Regulations 29 CFR 1910.120. Certification must be maintained by all employees working on the site. At least one person with valid current 8 hour supervisory training certification shall be on the site at all times when work is in progress. Certifications will be maintained on-site.



REGIONAL GEOLOGIC MAP

Figure 9.1

MES

HAWKINS POINT LANDFILL

9.2.2 Pre-Entry Briefings

All personnel working in chromium contaminated areas will be briefed by the Site Supervisor, prior to initiating work, to explain the hazard of chromium. These hazards include:

a. Inhaling chromium dust or aerosols which causes irritation in the breathing passages and is a suspected carcinogen.

b. Contacting chromium bearing leachate or contaminated material containing chromium with the skin may cause irritation or chrome sores it left in prolonged contact with the skin.

All employees will be required to review this Health and Safety Plan and sign a certification of understanding (section 9.11.1)

9.2.3 Medical Surveillance Requirements

All personnel working in chromium contaminated areas will have completed a comprehensive medical surveillance examination within the 12 month period prior to beginning the work. The examination must comply with OSHA Regulations 29 CFR 1910.120. The certification will be signed by a medical doctor and will specify any work limitations and whether respiratory protective equipment can be worn while the individual is working.

9.2.4 Pre-Entry Medial Surveillance

All personnel working in chromium contaminated areas will be examined by the Site Supervisor or a designated safety officer to ensure that any cuts or open wounds are adequately covered to avoid possible development of chrome sores. Any individual that has a deep cut or wound which cannot be properly covered, such as sutures, will not be allowed to work in chromium contaminated areas.

9.2.5 Record Keeping

All records required by this Health and Safety Plan are to be kept on file at Hawkins Point and maintained by MES. The records are as follows:

a. *Training* Certificate For the 40 Hour OSHA Training Course

b. Annual 8 Hour Refresher *Training* Certificate, As Appropriate

c. 8 Hour Supervisor *Training* Certificate, As Appropriate

d. Medical Surveillance Training Certificate, As Appropriate

e. Respirator Fit Test Records

f. Incident Reports Involving Employees

Medical records, all exposure monitoring results, any PPE maintenance records, attendance, accident reports, spill reports, and any other records specific to Health and Safety will also be maintained by MES for MES staff.

9.2.6 Hazard Evaluation

a. Chemical Hazards - See Table 9.1 for key chemical compounds of concern.

b. Physical Hazards - Heat stress/cold exposure Increased noise levels General hazards connected with heavy machinery operations

c. Hazards Posed by Site Activities - Increased airborne particulate containing chromium and asbestos resulting from construction and operation activities.

9.3 HAZARD COMMUNICATIONS RULE

The Hazard Communications Rule, COMAR 09.12.22 and 29 CFR 1910.1200 require a written hazard communication program and training on its contents for all exposed employees. These regulations require review of the following items which will be discussed prior to employees initial entrance briefing:

9.3.1 Specific Requirements of the Law and Regulation
9.3.2 Nature of all Hazardous Substances in the Work place
9.3.3 Protection From Hazards
9.3.4 Access to information through MSDS and Labels included in Appendix A.
9.3.5 Employees rights under the law

A Materials Safety Data Sheet (MSDS) is required for all hazardous materials encountered on site (section 9.11.2) MSDS's for the hazardous materials existing on-site will be kept in a designated file by MES available for employee review.

All containers of hazardous materials on-site must be labeled in accordance with OSHA Regulations. No employee is permitted to remove or deface any label on any container. If labels are inadvertently removed, an appropriate hazard warning as to the identity of the contents will be affixed to the container.

TABLE 9.1 KEY CHEMICAL COMPOUNDS

Compound	PEL or TLV as a TWA	Action Level	Physical Characteristics	Route of Exposure	Symptoms of Exposure	Target Organs
Chromium (VI) Compounds as Cr	0.05 mg Cr/m^3*	0.025 mg/m^3	Appearance and odor vary depending upon compound	Inhalation	Cancer and/or Nasal Perforation	Respiratory System
Chromite Ore Processing (Chromate) as Cr	0.05 mg Cr/m^3* 0.1 mg Cr/m^3**	0.025 mg/m^3	Appearance and odor vary depending upon compound Typically Chromates are yellow-green	Inhalation	Cancer and/or Nasal Perforation	Respiratory System
Chromium Metal Chromium (II) and Chromium (III) Compounds as Cr	0.5 mg Cr/m^3*,**	0.25 mg/m^3	Appearance and odor depending upon compound	Inhalation	Cancer and/or Nasal Perforation	Respiratory System
Asbestos	0.2 fibers/cm^3 longer than 5 µm with a length-to-diameter ratio of at least 3 *,**	0.1 fiber/cm^3	Fine slender, flaxy fibers	Inhalation Ingestion	Interstitial Fibrosis and Restricted Pulmonary Functions	Lungs

NOTES: * TLV, Threshold Limit Value (ACGIH Standard)
** PEL, Permissible Exposure Limit (OSHA Standard as found in 29 CGR 1910, Subpart Z)
TWA 8 hour Time-Weighted Average
Taken From: Threshold Limit Values and biological Exposure Indices for 1992-1993, published by the American Conference of Governmental Industrial Hygienist, Cincinnati, Ohio.

9.4 OPERATION AREA DESIGNATION

The Operation Areas will be clearly designated by placing weighted barricades connected with brightly colored plastic tape around the area. All unauthorized vehicles and personnel will be directed away from this area. MES will have radio communication or equivalent at the site. This communication system will be maintained throughout the Operation Period.

9.5 INITIAL SAFETY PROCEDURES

Before work begins, all site personnel will:

1. Locate the nearest available telephone to the work site. Telephones are provided in the trailer.

2. Check the posted emergency telephone numbers and the route to the Hospital (See Table 9.2 and Figure 9.2).

3. Confirm there is at least one vehicle for emergency use.

4. Check emergency equipment.

5. Locate the nearest available fire hydrant to the work site (See Figure 9.3).

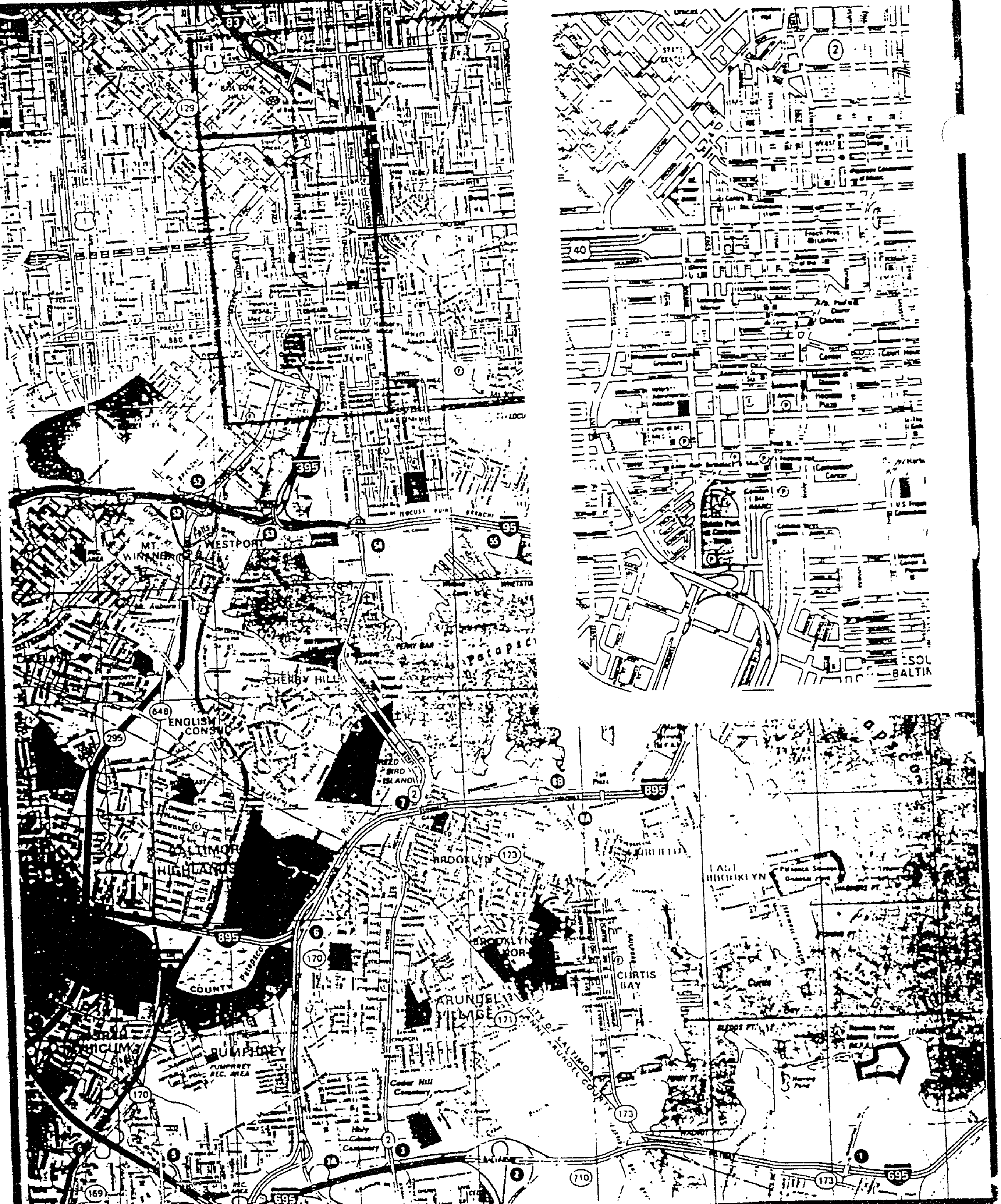
6. Confirm accessibility of the evacuation routes (See Figure 9.4).

9.6 WORK ZONES IDENTIFIED

In order to identify work areas where various levels of Personal Protective Equipment (PPE) are required, the on-site areas will be divided into four zones. All employees must comply with the standard safety practices and PPE requirements for each zone upon entering the Operation Area. Tables 9.3 and 9.4 list the PPE required for each level defined in the zones.

9.6.1 Exclusion Zone

An Exclusion Zone is defined as any work area that handles and treats the chromium contaminated material. Workers doing any type of work in this area will be required to wear Level C protection. Table 9.3 has a listing of Level C requirements. Employees must comply with COMAR 09.12.35, Confined Space Regulations. In addition to all federal and state regulations regarding confined space entry, the Employees must also follow the attached, Confined Space Entry Safety Procedure (section 9.11.5).

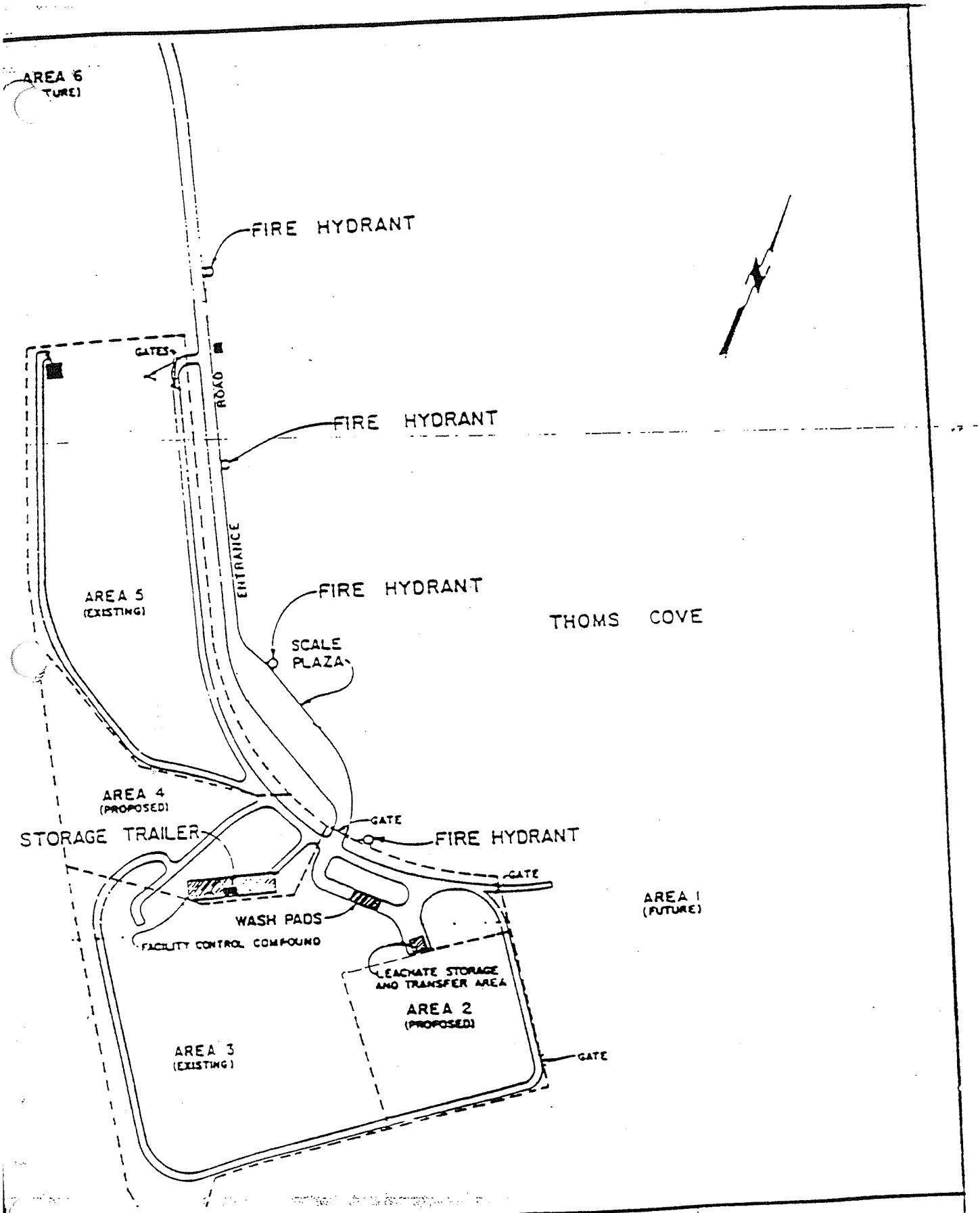


HOSPITAL ROUTE

FIGURE 9.2

MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT LANDFILL



FIRE HYDRANT LOCATIONS

Figure 9.3

MES

HAWKINS POINT LANDFILL

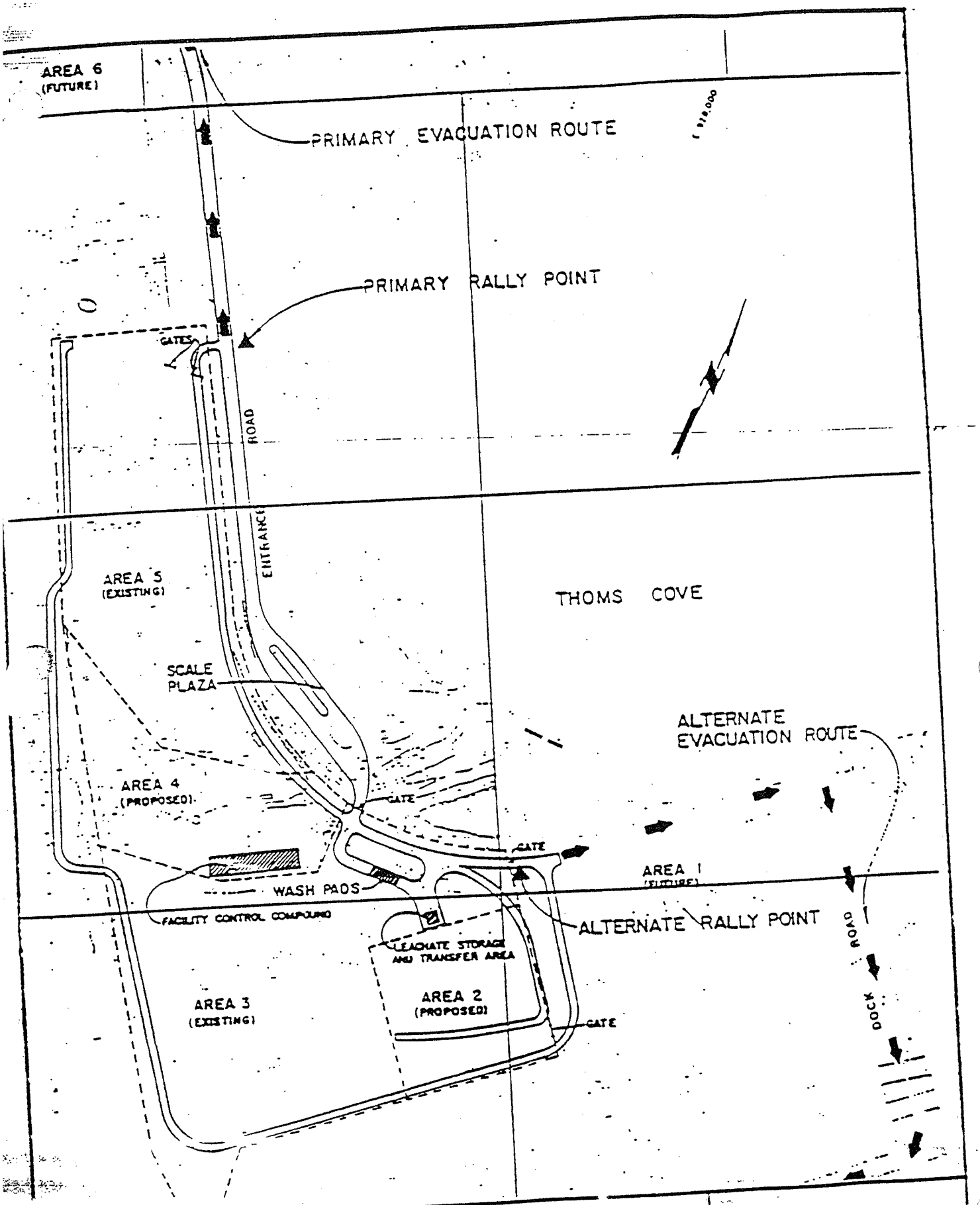


Figure 9.4

EVACUATION ROUTES

MES

HAWKINS POINT LANDFILL

TABLE 9.2

**********Point of contact change**********

Emergency Contacts

Primary Emergency Contact

Name: Russell Downs
Address: 390 West Court
Glen Burnie, Maryland 21061
Telephone: (410) 355-3898 (Office)
(410) 760-3583 (Home)
(443) 871-7198 (Cell)

Emergency Contact #2

Name: Tarsem Thohan
Address: 9010 Hedgerow Way
Baltimore, Maryland 21236
Telephone: (410) 974-7254 (Office)
(410) 256-8450 (Home)
(443) 871-7208 (Cell)

Emergency Contact #3

Name: David Ferguson
Address: 5711 Franklin Street
Baltimore, Maryland 21225
Telephone: (410) 974-7254 (Office)
(410) 636-2246 (Home)
(443) 871-7210 (Cell)

Local Emergency Contacts

Ambulance	911
Hospital	
Harbor Hospital	410-347-3200
Emergency Room	410-347-3510
Police	
Glen Burnie Barracks	410-761-5130
Baltimore City Headquarters	911
Fire Department (Balto. City HQ)	911
National Response Center	800-424-8802

9.6.2 Contamination Reduction Zone

The Contamination Reduction Zone will comprise an area immediately adjacent to any Exclusion Zone. Weighted trash cans will be placed inside this area to discard contaminated PPE. Boot wash tubs and rinsing stations will be located in the Contamination Reduction Zone to clean PPE when necessary. Once employees have discarded contaminated outer PPE, they will be required to remain in level D PPE prior to entering the Support Zone.

On-site shower and locker facilities are to be provided. Eating, drinking and smoking are not to be permitted in the locker rooms. A lunch room is available for use. Before an employee may leave the site, They must shower to reduce any possibility of taking contaminated material off-site.

9.6.3 Support Zone

The Support Zone will include the surrounding area which contains the office trailer and shower facility and all areas used for staging operations for the work area. This will include material storage, equipment storage, and supplies. It is recommended that Level D protection be worn by employees working inside the support zone. Table 9.4 has a listing of level D requirements.

9.7 WORK LIMITATIONS

A. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated, which includes the Exclusion and Contamination Reduction Zones.

B. Hands and face must be thoroughly washed upon leaving the Support Zone and before eating, drinking, or any other activity in the Support Zone.

C. Whenever decontamination procedures for outer garments are in effect, good personal hygiene will be used as soon as possible after the protective garment is removed, i.e. washing hands and showering.

D. No facial hair which interferes with the effectiveness of a respirator will be permitted on personnel required or potentially required to wear respiratory protection equipment. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator.

E. Contact with potentially contaminated surfaces will be avoided whenever possible. One should not walk through puddles, mud, or other discolored

surfaces or kneel on the ground. One should not lean, sit, or place equipment on drums, containers, vehicles, or the ground which may potentially be contaminated.

F. Medicine and alcohol can potentiate the effect from exposure to certain compounds. It will be the responsibility of the Site Supervisor to note any individual who is using prescribed medication and recommend modifications in an employee's work schedule, if needed, due to the use of medication.

G. The Site Supervisor must not allow personnel on-site while under the influence of alcohol or other drugs. Entry on-site while under the influence of alcohol or other drugs will be grounds for immediate dismissal.

H. Personnel and equipment in the work areas will be minimal, but sufficient for effective site operations.

I. Work areas for various operational activities will be established.

J. Procedures for leaving the work area will be planned and implemented prior to going to the site. Work areas and decontamination procedures will be established on the basis of prevailing site conditions.

K. Respirators will be issued by the Site Supervisor for the exclusive use of each worker where practical. The wearer will be responsible for cleaning his/her own respirator using respirator cleaning solution or cleaning solution as per manufacturer's recommendations whenever the respirator is removed from the face, and for a more thorough cleaning and inspection weekly. A log will be established by the employees to record weekly inspection events. This log shall be kept on file at the work site.

L. Safety gloves and boots will be taped to the disposable suits as necessary.

M. All unsafe equipment left unattended will be identified by a "Danger, Do Not Operate" tag.

N. No contact lenses will be worn in work areas.

O. Cartridges for air-purifying respirators will be changed regularly or whenever the user experiences excessive breathing resistance.

P. Use the "Buddy" system (pairs) in the Exclusion Zone. Buddies will use prearranged hand signals or other means of emergency signals for communication in case of communication breakdown. Visual contact between "Pairs" on-site and team members remaining nearby will be maintained in order to assist in case of emergencies.

Q. All activities will cease during major precipitation events, during periods of strong gusty winds, or during other severe weather events. Whenever an electrical storm approaches the work area, personnel will be evacuated from locations that are lightning hazards.

R. All employees will be directed to notify the most readily accessible supervisor of any unsafe condition, practice, or circumstance associated with or resulting from site activities.

S. Identification of emergency medical assistance will be made prior to work operations. The location, telephone number, and transportation capabilities of the nearest emergency medical facilities will be posted.

9.8 DECONTAMINATION PROCEDURES

9.8.1 For Personnel

All employees will be required to follow the decontamination procedures when leaving the work area. In an emergency, other provisions may be made by the Site Supervisor or designated Emergency Coordinator. The decontamination supplies and equipment will be maintained by the Site Supervisor within the Contamination Reduction Zone/Zones. Showers are provided in the locker room for additional prevention of migration of site materials outside the regulated area. The decontamination procedure assumes the contaminating substances are particulate matter and soils containing heavy metals and leachate. The decontamination procedure will be modified if the type of contaminating substance or its hazard potential are altered.

The personal decontamination station will be set up after the Hot Line, or the division between the Exclusion Zone and the Contamination Reduction Zone, has been established and consists of the following:

Station 1: Segregated Equipment Drop. Deposit equipment used on site (tools, sampling devices and containers, etc.) on plastic liners.

Station 2: Tape Removal. Remove tape around boots and gloves and deposit in a container with plastic liner.

Station 3: Outer Glove Removal. Remove outer gloves and deposit in container with plastic liner.

Station 4: Suit Removal. With assistance of helper, remove suit. Deposit in container with plastic liner.

Station 5: Rubber/Safety Boot Wash. Wash safety boots with scrub brush and tap water (use decontamination soap such as alconox if necessary).

Station 6: Rubber/Safety Boot Rinse. Rinse off decon solution using water. Repeat as many times as necessary.

Station 7: Inner Glove Wash.* Wash with tap water (use a decontamination soap such as Alconox if necessary).

Station 8: Inner Glove Rinse.* Rinse with water. Repeat as many times as necessary.

Station 9: Air Purifying Respirator Remove air purifying (APR) or SCBA Clean the interior and exterior of the APR with decontamination towelettes. Deposit the APR in a clean plastic bag to be thoroughly decontaminated following field activities. Avoid touching face with fingers.

Station 10: Inner glove Removal. Remove inner gloves and deposit in container with liner.

* Optional Stations depending upon the extent of contamination accumulated during the specific activity.

9.8.2 Equipment Decontamination

It is imperative that all equipment used on-site be thoroughly decontaminated before being allowed to leave the work area. Special attention will be paid to the treads, tracks or crevices and interior surfaces.

An intermediate decontamination station will be established to wash off treads, tracks, and excessive soil and debris if any equipment must exit the exclusion zone. Following the intermediate decontamination, the equipment will be required to proceed to the decontamination station located at the truck wash pad for further decontamination. No equipment will be allowed to leave the site prior to inspection.

9.9 DISPOSAL PROCEDURES

These disposal procedures are to be followed to dispose of used PPE and wastewater generated by work in Exclusion Area.

9.9.1 Contaminated Personal Protective Equipment

All Personal Protective Equipment (PPE) which cannot be decontaminated, such as tyveks, gloves, boot covers, and respirator cartridges, will be placed in plastic bag lined trash cans located within the Contamination Reduction Zone. All materials placed in these plastic bags will be approved for disposal by the Site Supervisor. The trash cans will be sufficiently weighted to insure that they will not spill or fall over.

********reference to onsite treatment removed*********

9.9.2 Contaminated Wastewater

All contaminated wastewater collected at the decontamination stations, during cleaning operations or any other source will be collected and transferred into the on-site existing holding/storage tank. Liquid material will then be transported by a certified hazardous waste hauler to an off-site permitted facility for treatment.

9.9.3 Contaminated Soil

In the event that a spill or leak occurs and contaminated soil is generated, all potentially contaminated soil shall be tested using the quick qualitative testing method included in this Plan. All material found to show evidence of contamination shall be collected and contained in a labeled container suitable to hold hazardous waste. The drum(s) will then be transported by a certified hazardous waste hauler to an off-site permitted treatment/disposal facility.

9.10 SAFETY EQUIPMENT

At a minimum, the following safety items shall be maintained and made available at the designated locations:

ITEM	QUANTITY	LOCATION
First Aid Kit	1	Office Trailer Contamination Reduction Zone
Eye Wash Bottle	2	Office Trailer

ITEM	QUANTITY	LOCATION
Eye Wash Bottle	2	Contamination Reduction Zone
Clean Water Supply		Wash Facility Support Zone

9.11 ADDITIONAL ATTACHMENTS

9.11.1 ACKNOWLEDGEMENT SHEET

All personnel working at the Hawkins Point Hazardous Waste Landfill shall sign this sheet acknowledging that they have read the Health and Safety Plan. This sheet shall become part of the project file.

By my signature, I acknowledge that I have read, understood, and will abide by the Health and Safety Plan while working at the Hawkins Point facility.

PRINT NAME	SIGNATURE	DATE

9.11.2 MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheet
OSHA's Hazard Communication
Standard 29 CFR 1910.120

MARYLAND ENVIRONMENTAL SERVICE

SODIUM CHROMATE/BICHROMATE

Section I - General Information

Identity
Chromium Leachate

Generator's Name Maryland Environmental Service	Emergency Telephone Number 1-800-669-7080
Address Hawkins Point Landfill 5501 Quarantine Road Baltimore, Maryland 21226	Telephone Number For Info. (410) 974-7295 Date Prepared February, 1992

Section II - Hazardous Ingredients/Identity Information

Formula CAS No., Molecular Weight, Chemical Formula: N/A
Permissible Concentrations: Air
TLV = 0.05 mg/m
OSHA TWA = 0.1 mg/m^3 (as CrO_3) (Ceiling)

Section III - Physical/Chemical Characteristics

Boiling Point 106 - 110°C	Specific Gravity (H_2O = 1) 1.50 -1.55	
Vapor Pressure (mm Hg) Negligible	Melting Point N/A	
Vapor Density (Air = 1) N/A	Evaporation Rate N/A	pH - as high as 13 as low as 6
Appearance and Odor Odorless, Yellowish-green liquid	Solubility in Water Complete	

Section IV - Fire and Explosion Hazard Data

Flash Point N/A	Flammable Limits N/A	LEL N/A	UEL N/A

Extinguishing Media
N/A

Special Fire Fighting Procedures
If involved in a fire, water runoff may contain hexavalent chromium and should be prevented from entering sewers or waterways. Use NIOSH approved respirator protective gloves clothing and rubber boots.

Unusual Fire and Explosion Hazardous
NONE

Section V - Reactivity Data

Stability	Conditions to avoid
Stable	N/A

Incompatibility (Materials to avoid)
NONE

Hazardous Decomposition or Byproducts
NONE

Hazardous Polymenzation	Conditions to avoid
Will Not Occur	N/A

Section VI - Health Hazard Data

Inhalation
Inhalation of mists can cause ulceration and perforation of the nasal septum, as well as irritation and ulceration of the respiratory system. Overexposure to hexavalent chromium may cause risk of lung cancer

Skin
Can cause irritation. Contact with breaks in the skin can cause "chrome sores" (skin ulcers). Bichromates and chromates are skin sensitizers. Skin absorption has been reported

Ingestion
Can be harmful or fatal. Toxic effects may not appear right away. Systemic poisons: chromates and bichromates are primarily toxic to the kidneys, liver and gastro-intestinal tract.

Eyes
Can cause severe irritation and conjunctivitis.

Section VII - Precautions For Safe Handling and Use

Steps To Be Taken In Case Material Is Spilled
Immediately contain material and prevent from entering sewers or waterways with use of berms and or absorbent materials. Clean up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors. If material is spilled on soil or other porous material, the soil must be immediately dug up and place in a properly labeled sealed container and sent by a certified hauler to a certified treatment facility. Any equipment or supplies used to clean up the spill can be thoroughly decontaminated immediately, the equipment or supplies will considered a contaminated waste and must be treated as such. In case of a spill notify the National Response Center at 1-800-424-8802. Ensure compliance with local, state and federal regulations

Precautions To Be Taken In Handling And Storage
Keep in a tightly closed container, stored in a cool, dry ventilated area. Protect against physical damage. Wear special protective equipment for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not ear, drink or smoke in workplace.

Section VIII - Control Measures

Respiratory Protection

Where required, use a NIOSH approved, high-efficiency mist respirator. For some exposures, a NIOSH approved, self-contained breathing apparatus or air-supplied respirator may be necessary.

Ventilation

Sufficient to reduce chromium concentration in air below current permissible TLV/TWA levels.

Hands, Arms and Body

Wear impervious boots and gloves, and long-sleeve shirt and trousers for routine washwater handling. Head and neck should be covered. For increased protection, wear impervious jacket and trousers. Take hot shower after work, using plenty of soap.

Eye Protection

Face shield or eye glasses suggested. No contacts.

Section IX - Emergency/First Aid

Skin

Wash with plenty of soap and water without delay. Continue showering for at least 15 minutes.

Eyes

Immediately flush with plenty of water continuing for at least 15 minutes and get medical attention.

Inhalation

Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Ingestion

If conscious, immediately have victim drink water, then induce vomiting, followed by more water.

Additional First Aid

In all cases, call a physician.

Section X - Additional Information

For Manufacturing use only. Not for consumption. Absorption through broken, burned, or intact skin, may cause systemic poisoning affecting kidney and liver functions, which can be fatal. Chronic exposure can also cause such poisoning. Recent studies indicate a significant risk of lung cancer among long-term employees of the chromate-producing industry. Furthermore, on the basis of tests with laboratory animals, investigative results suggest that all chromium (VI) compounds be treated as suspect carcinogens which may pose a lung cancer-risk through overexposure. Good practice dictates precautions to minimize worker exposure via skin contact and the escape of dust or mist into the air. Caution should also be observed in operations where this chemical is mixed with other chemicals. Certain chemical mixtures may cause potentially carcinogenic insoluble hexavalent chromium compounds. Hexavalent chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster.

Mallinckrodt

Material Safety Data

Emergency Phone Number: 314-987-5001

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361

CHROMIUM TRIOXIDE SOLUTION

PRODUCT IDENTIFICATION:

Synonyms: Chromium trioxide / phosphoric acid solution

Formula CAS No.: Not applicable to mixtures.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Hazardous Ingredients:
CAS #: 1333-82-0 Chromium Trioxide (less than 1%)
7664-38-2 Phosphoric Acid (less than 3%)

PRECAUTIONARY MEASURES

DANGER! MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. HEXAVALENT CHROMIUM COMPOUNDS POSE A POSSIBLE CANCER HAZARD BASED ON TEST WITH LABORATORY ANIMALS. EXPOSURE MAY CREATE A CANCER RISK. MAY CAUSE SEVERE IRRITATION TO SKIN, EYES, RESPIRATORY TRACT, AND GASTROINTESTINAL TRACT. MAY CAUSE LIVER AND KIDNEY DAMAGE.

Do not get in eyes, on skin, or on clothing.
Do not breathe mist/vapor.
Store in a tightly closed container.
Use with adequate ventilation.
Remove and wash contaminated clothing promptly.
Wash thoroughly after handling.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, induce vomiting immediately by giving two glasses of water, or milk if available and sticking finger down throat. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Corrosive Material

SECTION 1 Physical Data

Appearance: Red liquid.

Odor: Odorless.

Solubility: Soluble in water.

Boiling Point: No information found.

Melting Point: No information found.

Specific Gravity: No information found.

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Although a potent oxidizer and fire hazard in higher concentrations, the chromium trioxide component is not expected be a fire hazard in this dilute solution.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Chromium Trioxide decomposes at high temperatures to form oxygen and the less hazardous trivalent chromium oxide (Cr^{3+}). Phosphoric acid can produce toxic fumes of phosphorous oxides.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Chromium Trioxide in higher concentrations or as a dry solid is incompatible with any combustible, organic or other readily oxidizable material (paper, wood, sulfur, aluminum or plastics).
Phosphoric Acid in higher concentrations is incompatible with strong caustics, metals, sulfides, and sulfites. A strong mineral acid, contact with water can cause liberation of much heat and violent spattering.

SECTION 4 Leak/Spill Disposal Information

Isolate or enclose the area of the leak or spill. Clean-up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors. Neutralize with alkaline material, pick up with absorbent material (sand, earth, vermiculite) and dispose in a RCRA-approved waste facility. Reportable Quantity (RQ) (CWA/CERCLA): 1000 lbs. Chromium Trioxide
5000 lbs. Phosphoric Acid

Ensure compliance with local, state and federal regulations.

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Material Safety Data

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CHROMIUM SULFATE

PRODUCT IDENTIFICATION:

nony n Chromium MS; sulfuric acid, chromium (3+) salts 2), hydrate, chromium (III) sulfate (2:3), hydrate

rmula CAS No. 15244-38-9 (Hydrated)

TSCA CAS No.: 10101-53-8 (Anhydrous)

olecular Weight: Not applicable.

emical Formula: $Cr_2(SO_4)_3 \cdot xH_2O$

zardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES BURNS.

not get in eyes, on skin, or on clothing.
id breathing dust.
p container closed.
with adequate ventilation.
sh thoroughly after handling.

EMERGENCY/FIRST AID

allowed, induce vomiting immediately by giving two glasses of ter, or milk if available and sticking finger down throat. Never anything by mouth to an unconscious person. If inhaled, ove to fresh air. If not breathing, give artificial piration. If breathing is difficult, give oxygen. In case of tact, immediately flush skin or eyes with plenty of water for at t 15 minutes. In all cases call a physician.
E SECTION 5.

DOT Hazard Class: ORM-E

SECTION 1 Physical Data

Appearance: Violet or green crystals.

Odor: Odorless.

Solubility: 84-120 g/100 g water @ 20°C (68°F)

Boiling Point: Decomposes at red heat.

Melting Point: Loses water @ 90°C (194°F)

Specific Gravity: 1.7

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not considered to be a fire hazard.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Oxides of sulfur and the contained metal.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
No incompatibility data found.

SECTION 4 Leak/Spill Disposal Information

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from dust.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust.

Disposal: Whatever cannot be saved for reclamation may be disposed in a RCRA approved hazardous waste facility. Do not flush to the sewer.

Reportable Quantity (RQ)(CWA/CERCLA) : 1000 lbs.

Ensure compliance with local, state and federal regulations.

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Material Safety Data

Emergency Phone Number: 314-982-5000

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CHROMIUM POTASSIUM SULFATE

PRODUCT IDENTIFICATION:

ynonyms: Chrome alum dodecahydrate; sulfuric acid, chromium 3+) potassium salt (2:1:1) dodecahydrate

ormula CAS No.: 7788-99-0

TSCA CAS No.: 10141-00-1

Molecular Weight: 499.48

hemical Formula: $CrK(SO_4)_2\ 12H_2O$

Hazardous Ingredients: Not applicable.

PRECAUTIONARY MEASURES

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION.

Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

EMERGENCY/FIRST AID

If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: **Not Regulated**

SECTION 1 Physical Data

Appearance: Red-violet granules.

Odor: Odorless.

Solubility: 19.6g/100g water @ 20°C (68°F).

Boiling Point: Decomposes

Melting Point: Loses water @ 89°C (192°F) Loses all water @ 400°C

Specific Gravity: 1.83

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not considered to be a fire hazard.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
Use protective clothing and breathing equipment appropriate for the surrounding fire.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Aqueous solution slowly becomes green on heating and recovers reddish-violet colors on cooling.

Hazardous Decomposition Products:
No hazardous decomposition products.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
Aluminum and magnesium.

SECTION 4 Leak/Spill Disposal Information

Ventilate area of leak or spill. Clean-up personnel may require respiratory protection from dust.

Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

Disposal: Whatever cannot be saved for reclamation may be delivered to an approved waste disposal facility.

Ensure compliance with local, state and federal regulations.

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Material Safety Data

Emergency Phone Number: 314-982-5000

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CHROMIUM NITRATE

PRODUCT IDENTIFICATION:

ynonyms: Nitric acid, chromium (3+) salt, nonahydrate (1:3:9); chromium (3+) nitrate nonahydrate, chromium trinitrate nonahydrate

ormula CAS No.: 7789-02-8 (Hydrated)

TSCA CAS No.: 13548-38-4 (Anhydrous)

olecular Weight: 400.21

hemical Formula: $Cr(NO_3)_3 \cdot 9H_2O$

azardous Ingredients: None.

PRECAUTIONARY MEASURES

ANGER! STRONG OXIDIZER. CONTACT WITH THER MATERIAL MAY CAUSE FIRE.
RMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION.

ep from contact with clothing and other combustible terials.
not store near combustible materials.
re in a tightly closed container.
move and wash contaminated clothing promptly.
sh thoroughly after handling.
oid breathing dust.
e with adequate ventilation.
oid contact with eyes, skin and clothing.

MERGENCY/FIRST AID

swallowed, induce vomiting immediately by giving two glasses of ter and sticking finger down throat. Never give anything by uth to an unconscious person. If inhaled, remove to fresh air. not breathing, give artificial respiration. If breathing is ficult, give oxygen. In case of contact, immediately flush skin eyes with plenty of water for at least 15 minutes. In all cases l a physician.
ll SECTION 5.

OT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Purple crystals.

Odor: Odorless.

Solubility: Soluble in water

Boiling Point: Decomposes < 100°C (212°F)

Melting Point: 60°C (140°F)

Specific Gravity: 119

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

Explosion:
Contact with oxidizable substances may cause extremely violent combustion.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Aqueous solution slowly becomes green on heating and recovers reddish-violet colors on cooling.

Hazardous Decomposition Products:
Emits toxic fumes of nitric oxides when heated to decomposition.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
Oxidizable materials, platinum plus bromide trifluoride.

SECTION 4 Leak/Spill Disposal Information

Ventilate area of leak or spill. Clean-up personnel may require respiratory protection from dust.

Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

Disposal: Whatever cannot be saved for reclamation may be delivered to an approved waste disposal facility.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 1 Other: Oxidizer

Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

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CHROMIUM METALLO-ORGANIC STANDARD

PRODUCT IDENTIFICATION:

nonyms: Chromium Metallo-Organic StandARd (1000 ppm)

rmula CAS No.: Not applicable to mixtures.

olecular Weight: Not applicable.

hemical Formula: Not applicable.

Hazardous Ingredients:
CAS#: 1330-20-7 Xylene
68002-97-1 Neodol 91-6
149-57-5 2-Ethyl Hexanoic Acid
7440-47-3 Chromium (ca. 0.1%)

PRECAUTIONARY MEASURES

WARNING! FLAMMABLE! MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION. AFFECTS CENTRAL NERVOUS SYSTEM. CONTAINS CHROMIUM. EXPOSURE MAY CREATE A CANCER RISK.

Keep away from heat, sparks and flame.
Keep container closed.
Use with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Avoid breathing vapor.
Wash thoroughly after handling.

EMERGENCY/FIRST AID

Aspiration hazard.
If swallowed, get immediate medical attention. Vomiting may occur spontaneously, but DO NOT INDUCE! If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Flammable Liquid

SECTION 1 Physical Data

Appearance: Clear, reddish-purple liquid.

Odor: Characteristic, solvent ethereal odor.

Solubility: Insoluble in water.

Boiling Point: No information found.

Melting Point: No information found.

Density: No information found.

Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Flammable. Flashpoint: 26.2°C (79°F)(TCC)(Minimum)
Autoignition: ca. 463.8°C (867°F).
Flammable limits in air, volume % (1.0-7.0).

Explosion:
Explosive vapor-air mixtures may be formed.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Involvement in fire causes formation of carbon monoxide, other organic components and possibly metal fumes.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
Strong oxidizers, sources of heat and ignition.

SECTION 4 Leak/Spill Disposal Information

Handling equipment must be grounded to prevent sparking. Contain and recover spills when possible. Ventilate area of leak or spill. Remove all sources of ignition. Clean-up personnel require protective clothing and respiratory protection from vapors. Contain and recover liquid when possible. Collect as hazardous waste and atomize in a suitable RCRA approved combustion chamber, or absorb with vermiculite, dry sand, earth or similar material for disposal as hazardous waste in a RCRA approved facility. Do not flush to sewer! Reportable Quantity (RQ)(CWA/CERCLA): 1000 lbs. Xylene

Ensure compliance with local, state and federal regulations.

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Material Safety Data

:mergency Phone Number: 314-982-5000

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:HROMIUM CHLORIDE

RODUCT IDENTIFICATION:

monyms: Chromium (III) chloride, hexahydrate (1:3:6); hromic chloride hexahydrate; Chromium trichloride hexahydrate

ormula CAS No.: 10060-12-5 (Hydrated)

SCA CAS No.: 10025-73-7 (Anhydrous)

lecular Weight: 266.48

:mical Formula: $CrCl_3.6H_2O$

azardous Ingredients: None.

RECAUTIONARY MEASURES

NGER: CAUSES BURNS. HARMFUL IF ALLOWED OR INHALED.

not get in eyes, on skin, or on clothing.
id breathing dust.
p container closed.
with adequate ventilation.
sh thoroughly after handling.

MERGENCY/FIRST AID

vallowed, induce vomiting immediately by giving two glasses of er and sticking finger down throat. Never give anything by uth to an unconscious person. If inhaled, remove to fresh air. ot breathing, give artificial respiration. If breathing is icult, give oxygen. In case of contact, immediately flush skin yes with plenty of water for at least 15 minutes. In all cases a physician.
d SECTION 5.

YT Hazard Class: Not Regulated

SECTION 1 Physical Data

Appearance: Greenish-black or violet crystals.

Odor: Odorless.

Solubility: Soluble in water.

Boiling Point: Dissociates above 1300°C (2372°F)

Melting Point: 1152°C (2106°F)

Specific Gravity: 1.85

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not considered to be a fire hazard.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Emits toxic fumes of chlorine when heated to decomposition.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
Lithium and nitrogen.

SECTION 4 Leak/Spill Disposal Information

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from dust.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust.

Disposal: Whatever cannot be saved for reclamation may be disposed in a RCRA approved hazardous waste facility.

Ensure compliance with local, state and federal regulations.

Mallinckrodt

Material Safety Data

Emergency Phone Number: 314-982-5000

Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361

CHROMIUM TRIOXIDE

PRODUCT IDENTIFICATION:

Synonyms: Chromium (VI) oxide (1:3); chromic acid, solid; chromic anhydride

Formula CAS No.: 1333-82-0

Molecular Weight: 99.99

Chemical Formula: CrO_3

Hazardous Ingredients: Not Applicable.

PRECAUTIONARY MEASURES

DANGER! POWERFUL OXIDIZER. CAUSES SEVERE BURNS. MAY CAUSE DELAYED BURNS OR EXTERNAL ULCERS. CONTACT WITH OTHER MATERIAL MAY CAUSE A FIRE. MAY BE FATAL IF SWALLOWED. HEXAVALENT CHROMIUM COMPOUNDS POSE A POSSIBLE CANCER HAZARD BASED ON TEST WITH LABORATORY ANIMALS. EXPOSURE MAY CREATE A CANCER RISK.

Do not get in eyes, on skin, or on clothing.
Do not breathe dust or mist from solutions.
Store in a tightly closed container.
Use with adequate ventilation.
Remove and wash contaminated clothing promptly.
Wash thoroughly after handling.
Do not store near combustible materials.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, induce vomiting immediately by giving two glasses of water, or milk if available and sticking finger down throat. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.
SEE SECTION 5.

DOT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Dark red deliquescent solid.

Odor: Odorless.

Solubility: 63g/100g water @ 20°C (68°F)

Boiling Point: Decomposes on melting

Melting Point: 197°C (387°F)

Specific Gravity: 2.7

Vapor Density (Air = 1): No information found.

Vapor Pressure (mm Hg): No information found.

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Will ignite on contact with acetic acid and alcohol. Releases oxygen upon decomposition, increasing the fire hazard.

Explosion:
Contact with oxidizable substances may cause extremely violent combustion. Containers may explode if involved in a fire.

Fire Extinguishing Media:
Use water, however, the decomposing material will form a hot viscous foam and caution should be exercized against the possiblity of a steam explosion.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Decomposes at high temperatures to form oxygen and the less hazardous trivalent chromium oxide (Cr_2O_3).

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Any combustible, organic or other readily oxidizable material (paper, wood, sulfur, aluminum or plastics). Arsenic, ammonia gas, hydrogen sulfide, phosphorus potassium, sodium and selenium will produce incandescence.

SECTION 4 Leak/Spill Disposal Information

Ventilate area of leak or spill. Clean-up personnel require protective clothing and respiratory protection from dust.

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust.

Disposal: Whatever cannot be saved for reclamation may be disposed in a RCRA approved hazardous waste facility. Reportable Quantity (RQ) (CWA/CERCLA): 1000 lbs.

Ensure compliance with local, state and federal regulations.

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 1 Other: Oxidizer

Mallinckrodt

Material Safety Data

Emergency Phone Number: 314-982-5000

Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

Mallinckrodt makes no representations, or warranties, either express or implied, of merchantability, fitness for a particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, Mallinckrodt will not be responsible for damages resulting from use of or reliance upon this information.

Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361

CHROMIUM ATOMIC ABSORPTION STANDARD

PRODUCT IDENTIFICATION:

Synonyms: Chromium AA Standard; Chromium Atomic Absorption StandARd (1000 ppm)

Formula CAS No.: Not applicable to mixtures.

Molecular Weight: Not applicable to mixtures

Chemical Formula: Not applicable. (ca. 99% water)

Hazardous Ingredients:
CAS#: 7789-00-6 Potassium chromate (less than 1%)

PRECAUTIONARY MEASURES

WARNING! CONTAINS HEXAVALENT CHROMIUM. EXPOSURE MAY CREATE A CANCER RISK.
MAY BE HARMFUL IF SWALLOWED.

Do not get in eyes, on skin, or on clothing.
Avoid breathing mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

EMERGENCY/FIRST AID

If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Never give anything by mouth to an unconscious person.
SEE SECTION 5.

DOT Hazard Class: Not Regulated

SECTION 1 Physical Data

Appearance: Clear, yellow solution.

Odor: Odorless.

Solubility: Infinite in water.

Boiling Point: ca. 100°C (212°F)

Melting Point: ca. 0°C (32°F)

Specific Gravity: ca. 1.0

Vapor Density (Air = 1): Essentially the same as water

Vapor Pressure (mm Hg): Essentially the same as water.

Evaporation Rate: Essentially the same as water.

SECTION 2 Fire and Explosion Information

Fire:
Not considered to be a fire hazard.

Explosion:
Not considered to be an explosion hazard.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Emits oxides of chromium when heated to decomposition.

Hazardous Polymerization:
This substance does not polymerize.

Incompatibilities:
No incompatibility data found.

SECTION 4 Leak/Spill Disposal Information

Absorb liquid spills with a dry absorbent. Containerize unusable material for disposal in an approved waste facility. Do not discharge to sewers or waterways.

Ensure compliance with local, state and federal regulations.

9.11.3 PERSONAL PROTECTIVE EQUIPMENT

TABLE 9.3

LEVEL B PERS0NAL PROTECTIVE EQUIPMENT

1. Hard Hat With Chin Strap
2. Rubber/Safety Boots (steel toes and shanks recommended)
3. Splash Guard Suit With hood (made of material to resist corrosive material)
4. Supplied Air Respirator
5. Small Back-up SCBA
6. Neoprene Gloves with Surgical Inner Gloves

LEVEL C PERS0NAL PROTECTIVE EQUIPMENT

1. Hard Hat
2. Safety Boots (steel toes and shanks recommended)
3. Disposable Boot Covers
4. Tyvek Suits - to be worn over the coveralls or outer work clothes
5. Full-Face Air Purifying Respirator (APR) or Half-Face APR with Safety Glasses or Goggles.
6. HEPA Filter Cartridges - to be changed at least daily regardless of the amount of time spent in operation.
7. Neoprene Gloves with surgical inner gloves if handling soil and/or waste within the exclusion zone, and during decontamination which would involve water rinsing.
8. Leather Gloves with surgical inner gloves may be worn by equipment operators as long as they do not directly handle soils and/or wastes.

Inner Gloves shall be taped to the Tyvek Suits at the ankles and wrists with duct tape.

TABLE 9.4

LEVEL C MODIFIED PERS0NAL PROTECTIVE EQUIPMENT

1. Hard Hat

2. Safety Boots (steel toes and shanks recommended)

3. Tyvek Suits - to be worn over the coveralls or outer work clothes

4. Neoprene Gloves with surgical inner gloves if handling hazardous material within the exclusion zone, and during decontamination which would involve water rinsing.

5. Leather Gloves with surgical inner gloves may be worn by equipment operators as long as they do not directly handle hazardous materials.

Inner gloves and safety boots shall be taped to the Tyvek Suits at the ankles and wrists with duct tape.

LEVEL D PERS0NAL PROTECTIVE EQUIPMENT

1. Hard Hat

2. Safety Glasses or Goggles

3. Safety Boots (steel toes and shanks recommended)

4. Coveralls or outer work clothes - which are required to stay on-site at the end of each work day.

5. Gloves - leather or cloth outer gloves (impervious plastic surgical inner gloves recommended beneath the outer gloves if handling soil).

9.11.4 QUICK QUALITATIVE CHROME TEST

A diphenyl-carbizide solution will turn purple in the presence of chromium.

Making the Diphenyl-Carbizide Solution

1. Add 0.10 grams of Diphenyl-carbizide to 50 mls. Ethanol.

2. Mix for 30 minutes.

3. Add acid solution (180 mls. distilled water plus 20 mls. concentrated Sulfuric Acid).

4. Mix for 15 minutes.

5. Transfer to sealed glass storage bottle, label and date bottle and keep refrigerated. Solution is good for one month.

Testing Soil for Chromium

Approximately 2 tablespoons of the soil are deposited in a 1 pint bottle that has been previously rinsed with tap water. Approximately 1/2 cup of tap water is added to the soil. The water-solid mixture in thoroughly mixed for several minutes, and the solid is allowed to settle until a clear water layer is visible. Add 5 drops of diphenyl-carbizide solution to the water layer. The appearance of a light to dark purple color confirms the presence of chromium.

Testing Water for Chromium

Add five drops of the diphenylcarbazide solution to the water. The appearance of a light to dark purple color confirms the presence of chromium. This test can be done by collecting a sample in a glass bottle or adding the solution directly to standing water in the field.

Log of Solution Mix

A log shall be maintained specifying:

1. Date of preparation

2. Name of person preparing solution

3. Expiration date of solution

9.11.5 CONFINED-SPACE ENTRY SAFETY PROCEDURE

1.0 PURPOSE

The purpose of this procedure is to prevent serious accidents which could result from entry into confined spaces, such as above ground tanks, at the Hawkins Point Landfill.

For the purposes of this procedure, a confined space shall be considered as any space, open or closed, in which toxic gases or flammable vapors might accumulate or where an oxygen deficiency may occur. Examples of such spaces include all tanks, tank trucks, vats, bins, hoppers, kilos, boilers and similar vessels as well as pits, sewers, manholes, trenches, etc., which may contain toxic, flammable or oxygen deficient atmospheres or which are five feet (5 ft.) or more in depth or height.

2.0 SCOPE

At least two workers are required to enter a confined space area. One worker must remain outside of the space and maintain voice/visual contact with the worker inside the tank at all times. Additional personnel may be required depending upon the task to be performed. For example, if an employee must be lowered into a tank, two men may be required.

3.0 EQUIPMENT NEEDED

Below is a list of equipment that may be required. Not all equipment will be needed in all situations.

- LEL/02 Meter
- Safety line and harness
- Two-way radio or alarm
- Ventilation fan and hose
- Personal protective equipment, respirators, chemical protective suits gloves, boots, eye protection, tripod or winch system
- Ladders
- Lighting equipment
- Confined Space Entry Permit (valid for one shift onlv)
- Other

4.0 CONFINED SPACE ENTRY PERMIT

No employee is to enter a confined space unless a Confined Space Entry Permit has been obtained. It is the responsibility of the project supervisor to issue this permit. Confined Space Entry Permit shall be signed by the supervisor and

foreman and explained to each employee working in the confined-space area; their signatures will indicate the understanding of the rules outlined in the permit.

The confined-space permit will be valid for a Single work shift only. On projects requiring more than a single work shift, a new permit shall be completed at the start of each shift. The permit shall be displayed at the specific work site.

At the conclusion of the project, the confined-space work permit(s) shall be placed in the job file by the Site Safety Coordinator.

It is the responsibility of the project supervisor to see that workers comply with all safety practices of the confined-space permit.

5.0 OPERATING PROCEDURES

The project supervisor and/or crew foreman is responsible for evaluating general safety hazards including permits, locking out of equipment, adequate lighting, tools, etc.

5.1 Each confined space shall be tested for combustible vapors oxygen level, and toxicity. When levels of combustible vapors exceed 10 percent of the lower explosive limit (LEL), all sources of ignition shall be removed. Entry shall not be made until the space is flushed or purged below the 10 percent LEL level.

5.2 Each confined space must be tested for oxygen content prior to entry. The minimal acceptable percent of oxygen is 19.5 percent. If this level cannot be met, a supplied-air respirator must be used.

5.3 Each confined space must be tested for toxic vapors. Chemical protective equipment must be worn if a skin contact problem exists. These tests should be conducted by Site Health and Safety officer using Draeger tubes, Monitox units, or other monitors

5.4 Welding and/or cutting in a confined space shall require the use of a hot work permit, Procedure Code HOOP. Cutting gas cylinders and welding machines will not be taken into confined spaces.

5.5 Before work is started in a confined space, all product lines and electrical lines shall be locked and tagged. NOTE: At the Hawkins Point Landfill, no active electrical lines or product lines should exist. All electrical circuits must be checked with a tic tracer to verify that they are disconnected.

5.6 A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space.

5.7 All employees entering a confined space shall wear an approved safety harness to which a lifeline may be attached in the event of an emergency. When confined space is entered through a manhole or is deeper than the employee's shoulders, an approved life line should be attached.

5.8 Rescue equipment must be at the project site prior to commencing work. Rescue equipment will include extra rope, safety harnesses, stretchers, and an emergency Self-Contained Breathing Apparatus (SCBA). No one should enter a confined space until adequate safety equipment is present to remove an unconscious person.

5.9 Employees entering a confined space must be under the constant surveillance of a safety observer. It is the safety observer's responsibility to follow this procedure:

- A valid confined-space-entry permit must be at the site.
- Rescue equipment must be available at the site.
- The safety observer must know the location of the nearest telephone and emergency numbers, safety shower, and fire extinguishers.
- When welding or cutting is done in a confined space, the safety observer must know how to shut down the equipment.
- The safety observer must remain in constant contact with the employees in the confined space. The observer is not to leave his/her assigned station except to report an emergency.
- UNDER NO CIRCUMSTANCES SHALL THE SAFETY OBSERVER ENTER THE CONFINED SPACE. If an emergency occurs, the safety observer shall sound an alarm or notify the site supervisor immediately using a two way radio, giving clear information as to the location of the emergency. Be sure that the location is repeated to ensure that the rescue team or help will be able to locate you.
- Be sure that you know the exact location at which you are working, e.g., building number, floor and kiln or tank number if applicable so that you can describe your location in the event of an emergency.

Return all permits to the supervisor at the end of each shift. The supervisor shall be responsible to check that all personnel are accounted for and that all permits have been returned.

REFERENCES:

1. NIOSH, Working in Confined Spaces U.S. Department of Health, Education, and Welfare, 1979.

9.11.6 FALL PROTECTION AND SAFETY HARNESSES

1.0 PURPOSE

To prevent personal injuries due to falls when employees work in areas where fall hazards cannot be eliminated by reasonable means due to the location or nature of the work area, safety harnesses or other appropriate devices shall be implemented.

2.0 SCOPE

Only the personnel necessary for completing the primary task are needed to comply with the fall protection and safety harness procedures.

3.0 NECESSARY EQUIPMENT

- Approved safety harnesses
- Approved safety belts or wristlets
- Energy-adsorbing tail lines
- Hoisting or arresting tripods
- Means of attaching lines to "secure points

4.0 OPERATING PROCEDURE

Before any employee attempts to work in an area where a high risk of falls exists, they must equip themselves with suitable fall-arresting equipment.

4.1 Any employee working in an elevated workstation will wear a safety harness or belt and an energy adsorbing tail line.

4.2 The fall protection equipment shall be properly fitted and shall not restrict the movements of the worker. Full safety harnesses are required for any work performed over twenty-five feet in elevation. Safety belts will be used between fifteen feet and twenty-five feet in elevation. Safety belts or wristlets will be used below grade.

4.3 Tail lines or lanyards of the shortest workable length must be attached to a secure point in the vicinity of the work area. The line shall be long enough not to restrict the worker's movement, but short enough to prevent tripping over the line and falls beyond the worker's extended reach for self rescue; in any case, not over 6 feet.

4.4 Where safety belts and safety lines are not practical, when working on a roof bracket platform at the center of a large roof, for example; catch platforms, temporary floors or safety nets shall be used when working

more than 20 feet above the ground and the roof has a slope of greater than 3 inches in 12 inches.

4.5 Where welding or cutting takes place in confined spaces, falls are possible below grade, or the chance of asphyxiation exists; means shall be provided for quickly removing workers in case of emergency. When safety belts and lifelines are used for this purpose, they shall be attached to the worker's body so that the body cannot be jammed in a small exit opening. This can usually be accomplished with wristlet harnesses and manually operated hoisting equipment above grade.

REFERENCES:

1. OSHA, 29 CFR 1926.104 to .105 "Safety Belts, Lifelines, and Lanyards" and "Safety Nets", Construction Standards.

9.11.7 MOTOR VEHICLES AND MECHANIZED EQUIPMENT OPERATING PROCEDURES

1.0 PURPOSE

Safe working conditions for all employees involved in the transport of materials onsite at the Hawkins Point Landfill.

2.0 SCOPE

Personnel fully qualified to operate heavy equipment and assisting personnel are the only individuals necessary for the completion of these tasks.

3.0 EQUIPMENT NEEDED

Safety equipment to be worn by equipment operators and assisting personnel-will include:

- Safety boots
- Hearing protection (if necessary)
- Safety hard hats
- Work gloves
- Tyvek disposable suits
- Respiratory protection (if necessary)

4.0 OPERATING PROCEDURES

These procedures must be followed to ensure the safety of operators and assistants:

4.1 Vehicles in use must be inspected at the beginning of each work shift for defects or technical problems.

4.2 All vehicles must have a service brake system capable of stopping and holding the equipment fully loaded, in addition to emergency and parking brakes.

4.3 All vehicles will be equipped with at least two headlights and taillights in operable condition.

4.4 All cracked and/or broken windshields must be replaced.

4.5 All vehicles must be equipped with an audible warning device in operable condition.

4.6 Equipment that is loaded by means of cranes, power shovels, or similar equipment, must have a cab shield.

4.7 Tools and materials will be secured during transport.

4.8 Operating levers controlling hoisting or dumping devices must be equipped with a latch device to prevent accidental starting or tripping of the mechanism.

REFERENCES:

1. OSHA, 29 CFR 1926.600 to .602, "Motor Vehicles, Mechanized Equipment, and Marine Operations", Construction Standards.

9.11.8 SAFE STORAGE, HANDLING, AND USE OF COMPRESSED GASES

1.0 PURPOSE

The safe storage, handling, and use of compressed gas cylinders and compressed gases at the Hawkins Point Landfill.

2.0 SCOPE

The personnel necessary for completing the primary task are the only ones needed to comply with the compressed gas storage, handling, and use procedure.

3.0 NECESSARY EQUIPMENT

- Chains and hooks to secure stored cylinders.
- Rubber tired cylinder hand truck, with chain to secure cylinders
- Hook wrench for valve protection caps and valve handwheels. Combination wrench for operating stem-type valves.
- Hoisting cage for cylinders with securing chains and safety ropes.

4.0 OPERATING PROCEDURES

4.1 Cylinders shall be stored in cool, dry, well ventilated, and fire resistant places. They should also be stored away from sources of heat and the extremes of weather, dampness, and the direct rays of the sun.

4.2 Never store empty and full cylinders together. Preferably full cylinders of flammable gases, oxidizers, corrosive gases, etc., should be stored in their own separate, labeled, walled sections.

4.3 Cylinders shall not be moved without the valve tightly closed, and the valve protection cap in place. When moving, never drop cylinders, or permit them to strike each other violently. Avoid dragging, rolling, or sliding the cylinders, even for a short distance. They should be moved using a suitable hand truck.

4.4 The valve protection cap shall be left in place until the cylinder has been secured upright in its location of expected use. After the valve cap is removed, the flow control regulator shall be installed immediately; in order that dust, dirt, or insects do not enter the cylinder valve.

4.5 When returning empty cylinders, leave some positive pressure in the cylinder, and close the valve securely. Mark or label the cylinder

4.6 When using compressed gases, follow the following general precautions:

a. Close the main cylinder valves when not in use.

b. A flow or pressure regulating valve should be in the line, located at the cylinder.

c. Use oldest cylinders first. Three months is a reasonable time for cylinder storage.

d. Always use gases in areas with adequate ventilation.

e. Use cylinders away from heavily occupied areas, or pipe low pressure gases into the building.

f. Always read all data sheets and label information associated with the gases you are using.

9. Compressed gases or compressed air shall not be used to removed dust or dirt from uniforms or, boots, or personal protective equipment.

h. Compressed air for cleaning purposes shall not exceed 30 psi with the nozzle obstructed or dead-ended. Effective chip guarding and personal protective equipment shall be used for this operation.

i. Cylinders shall not be placed where they could become part of the patch of an electrical circuit.

j. Cylinders shall never be refilled onsite. Always return ' them to the supplier for refilling.

REFERENCES:

1. OSHA, 29 CFR 1910 Subpart M, "Compressed Gas and Compressed Air Equipment".

2. OSHA, 29 CFR 1910.101 to 1910.252.

3. OSHA, 29 CFR 1926.302 to 1910.350.

4. Compressed Gas Association Pamphlet UP-1-(yr.).

9.11.9 HAND AND POWER TOOL PROCEDURES

1.0 PURPOSE

Safe working conditions will be instituted for employees that need to utilize hand and power tools onsite at the Hawkins Point Landfill.

2.0 SCOPE

Only the personnel fully qualified to operate hand and power tools and assisting personnel are needed for completion of the task(s).

3.0 NECESSARY EQUIPMENT

Safety equipment to be worn by equipment operators and assisting personnel will include:

- Safety boots
- Safety hard hats
- Tyvek disposable suits
- Hearing protection (if necessary)
- Work gloves (if necessary)
- Respiratory protection (if necessary)

4.0 OPERATING PROCEDURES

These operating procedures and other applicable regulations shall be instituted to ensure the safety of construction employees and other site personnel.

4.1 HAND TOOLS

4.1.1 Chisels, wedges and other impact tools shall be kept free of mushroomed or rounded heads.

4.1.2 Wooden-handed tools must be kept free of splinters or cracks and must be kept tight in the tool.

4.2 POWER-OPERATED HAND TOOLS

4.2.1 Electric cords and hoses used for hoisting or lowering tools will not be permitted.

4.2.2 Compressed air used for cleaning purposes shall not exceed 30 psi with the nozzle obstructed. Effective chip guarding and personal protective equipment shall be used for this operation.

4.2.3 All pneumatic nailers, staples, and other similar equipment, which incorporates automatic fastener feed, and operates at more than 100 psi,

will have a safety device on the muzzle to prevent the ejection of fastness, unless the muzzle is in contact with the work surface.

4.2.4 All hoses with an inner diameter greater than 1/2-inch shall have a safety device at the source of supply in order to reduce pressure in the hose in case of failure.

4.2.5 All fuel powered tools shall cease operation while being serviced, refueled, or maintained.

4.2.6 The fluid used in hydraulic powered tools shall be fire-resistant fluid which must retain its characteristics at the most extreme temperatures to which it will be exposed. The fluid is regulated under Schedule 30 of the U.S. Bureau of Mines, Department of the Interior.

REFERENCES:

1. OSHA, 29 CFR 1926.300 to .302, "Hand Tools and Power Operated Hand Tools", Construction Standards.

9.11.10 SIGNS, SIGNALS, AND BARRICADES

1.0 PURPOSE

Signs, signals and barricades will be placed in areas where potential hazards may exist; therefore, aiding in the overall safe working conditions at the Hawkins Point Landfill.

2.0 SCOPE

Signs, signals, and barricades will be placed in areas where potential hazards, stockpiled soil, trenches, excavations or other uses arise.

3.0 NECESSARY EQUIPMENT

Safety equipment to be worn by all personnel working within the confines of the Hawkins Point facility (This list does not address all PPE for each level of protection, it is just an overview.):

- Safety boots
- Safety hard hats
- Tyvek Disposable suits
- Hearing protection (if necessary)
- Work gloves (if necessary)
- Respiratory protection (if necessary)

4.0 OPERATING PROCEDURES

4.1 Danger signs shall have red as the predominating color for the upper panel; black outlined borders; and a white lower panel for additional information.

4.2 Caution signs shall have yellow as the predominating color; black borders and upper panel; yellow lower panel is for additional wording.

4.3 Exit signs shall have red letters not less than 6 inches high on a white background. The thickness of each letter shall be at least 3/4-inch in width.

4.4 Accident prevention tags shall be used as means of warning employees of an existing hazard.

4.5 Flagmen or other traffic controls will be implemented in providing the necessary protection on or adjacent to a highway or street.

REFERENCES:

1. OSHA, 29 CFR 1926.200 to 203, "Signaling and Barricades", Construction Standards.

Permit Number: A-264

Attachment 10

PLANS AND SPECIFICATIONS OF THE WASTE WATER TREATMENT FACILITY

(There are 0 pages in this attachment)

MES will submit information required for this permit attachment in accordance with the Compliance Schedule specified in Permit Condition V.K. of the permit.

Permit Number: A-264

Attachment 11

WASTE WATER TREATMENT FACILITY OPERATIONS MANUAL

(There are 0 pages in this attachment)

MES will submit information required for this permit attachment in accordance with the Compliance Schedule specified in Permit Condition V.K. of the permit.

Permit Number: A-264

Attachment 12

FACILITY DESCRIPTION

(There are 23 pages in this attachment)

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill is a secure hazardous waste facility in Maryland, permitted by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southwestern corner of Baltimore City (see Figure 3.1).

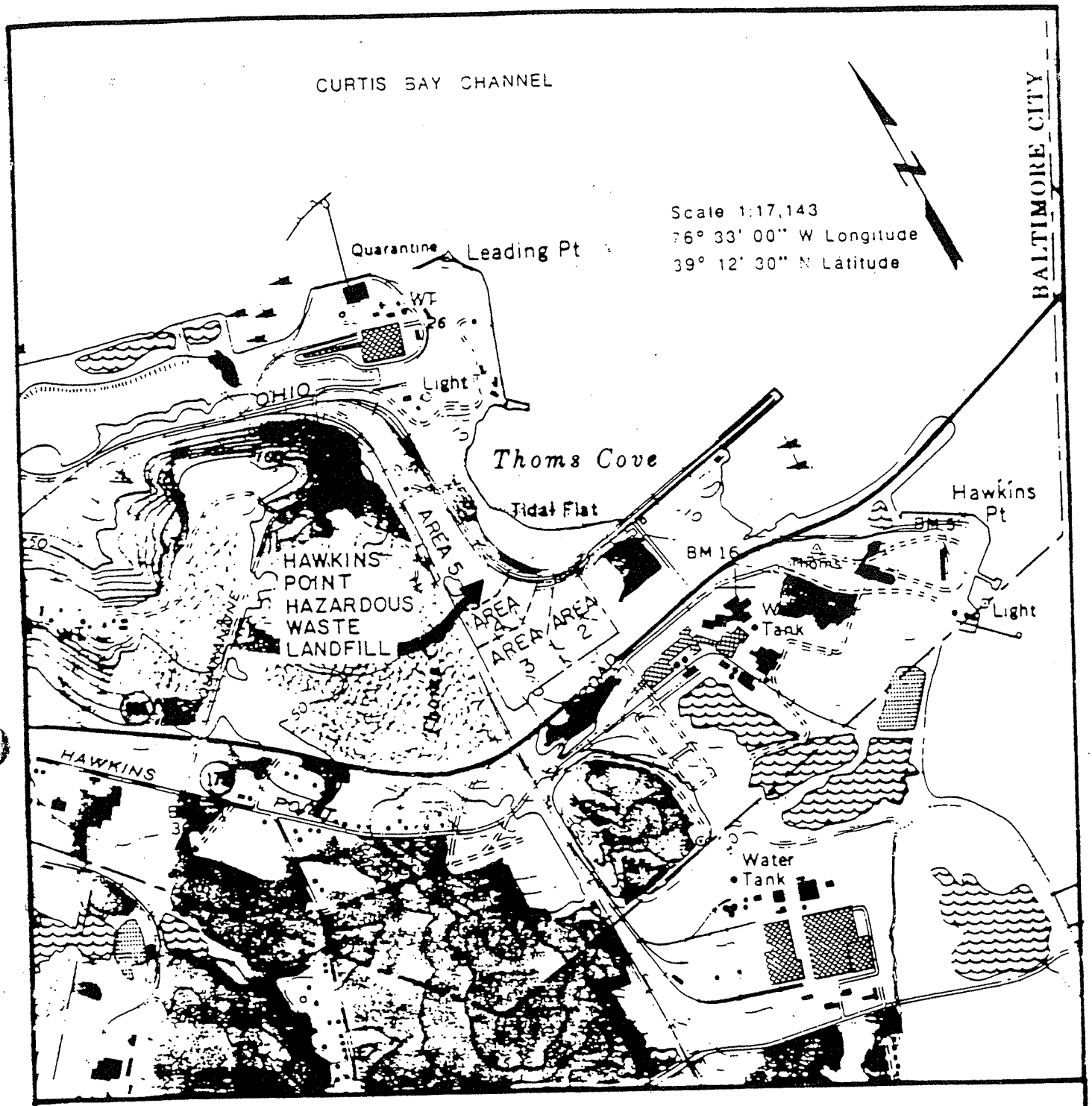
The Hawkins Point property, owned by the Maryland Port Administration (MPA), an agency of the State of Maryland, encompasses approximately 67 acres and is divided into six areas (See figure 3.2). Areas 1 and 6 are presently outside of the fenced area of the Hawkins Point facility. Area 1 is currently leased for use to EASTALCO Aluminum Co. Area 6 was previously leased to the Cosmin Corporation and is not currently being used.

Area 5, currently in post-closure care, was dedicated to the sole use of AlliedSignal, Inc. for the disposal of chromium contaminated waste. In January of 1983, MES began accepting chrome ore tailings from the Baltimore works facility owned by AlliedSignal. In 1985, the Baltimore Works facility closed. As part of closure, portions of the Baltimore Works facility were dismantled and handled as hazardous waste. The chromium contaminated debris which consisted of structural beams and concrete, brick, asbestos, soil (up until May 8, 1990) and other additional chromium contaminated debris was disposed in Area 5 until the ultimate capacity was reached in 1993. An estimated 451,450 tons of hazardous waste is disposed in Area 5. Presently, the only waste handling from Area 5 is the leachate generated within the capped landfill. In 1998, 280,686 gallons of leachate were generated, in 1999, 258,903 gallons were generated and in 2000 336,955 gallons were generated.

Areas 2 and 3 contain closed chrome ore tailing cells constructed by the MPA and monitored and dewatered by the MES. The tailings are also from the former Baltimore Works plant. These cells continue to be monitored and maintained in the dewatered condition. Leachate generated from these cells was 277,217 gallons in 1998, 297,525 gallons in 1999 and 336,955 gallons in 2000.

**********statement regarding Leachate Plant Start-up Removed **********

During January of 1983, Cell 40 in Area 3 was opened to accept controlled hazardous waste. The cell was operated by MES for approximately eleven months and due to economic reasons was then closed. All waste material was removed and transported to Fondessy, Ohio for disposal and the cell was returned to an "unused" condition. The 80 mil HDPE liner is still in place in the cell and acts as an impervious cap over the underlying old chrome cells in the area. Ponded rain water is periodically pumped out of the cell into the site surface drainage system and is



LEGEND

- Surface water
- Facility boundaries
- Area boundaries
- Direction of surface water flow

Notes:

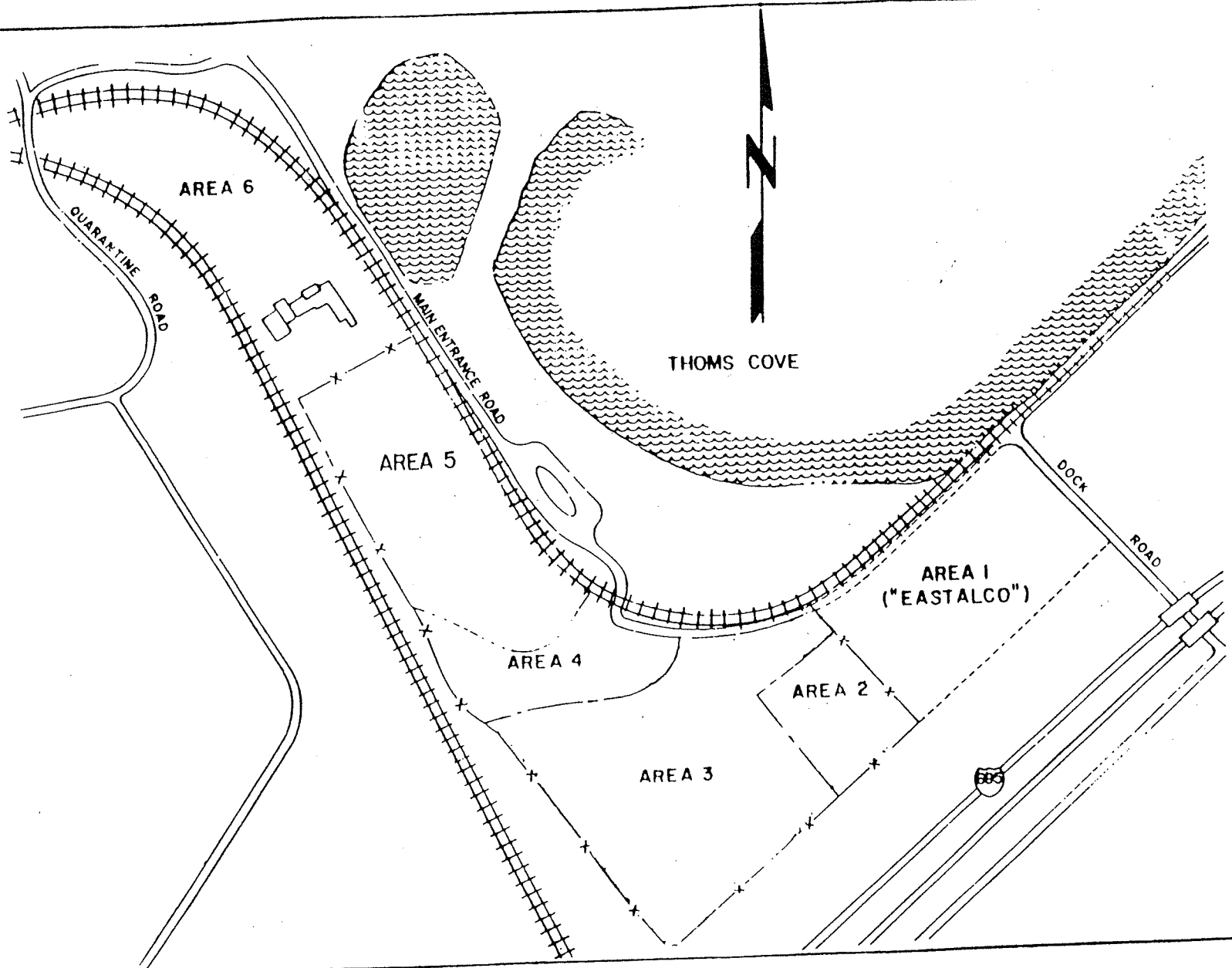
1. Contour interval is 10 feet.
2. Mean range of tide is approximately 1.1 feet.

AREA TOPOGRAPHIC MAP

MARYLAND

Hawkins Point Hazardous Waste Landfill

Figure 3.1



AREA LOCATOR MAP

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.2

discharge after flowing through Sediment Pond #2. Discharge from Sediment Pond #2 is monitored under the site's NPDES Permit. In the future MES may pursue filling in Cell 40, in order to reduce the ponding in that area. MES will consult MDE and perform an evaluation of the area will be performed prior to filling Cell 40.

Area 4 has previously been used for experimenting with chrome ore tailings fixation. However, little actual data is available regarding the dates of the filling or the characteristics of the wastes received. A "paint sludge" is believed to also have been deposited in this area. The deposit was discovered by MES personnel and reported to the Maryland Department of Health and Mental hygiene in 1982.

3.2 SITE DEVELOPMENT

To date, 4 construction contracts have been completed for facilities to serve all areas of the Hawkins Point HWL site. These include:

A. "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).

- Groundwater interceptor bordering the western and southern edge of Area 3.
- Sedimentation Ponds No. 1 and 2.
- Drainage ditches and culverts tributary to the sedimentation ponds.

B. "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982)

- Leachate storage and transfer area.
- Leachate collection system for chrome ore tailings underlying Area 3 and Area 5.
- Electrical service improvements.

C. "Contract 3: CHS Landfill Expansion" (November 5, 1982)

- Entrance road.
- Scale plaza.
- Truck-wash pads.
- Sanitary sewerage holding systems.
- Drainage improvements.

- Security fencing.
- Cell No. 40 earthen berms, liner system, and leachate collection system.

D. "Contract 4 – Leachate storage tanks" Feburary 1999contract ID No. 97-03-44R

- Abandoned two 30,000 gallon underground leachate storage tanks and replaced with one 20,000 gallon above ground storage tank,

MES is also in the process of contracting future improvements in the leachate collection lines and will also install an additional manhole (MH) between MH 220 and MH 221 in order to clean out leachate collection lines.

Capping of Area 5 was performed under MES construction contract ID No. 93-03-140 "Area 5 Final Cap Construction - Hawkins Point Hazardous Waste Landfill" (July 1993). Area 5 was certified closed by an independent Professional Engineer on July 22, 1994. A copy of the Certification is included in Appendix I.

**********Statement concerning WWTP deleted**********

3.3 PERMITS

The Hawkins Point HWL currently operates under EPA Final RCRA Permit Number MDD 000731356, and State of Maryland Controlled Hazardous Substances Facility Permit Number A-264, effective October 15, 1995, with an expiration date of October 14, 1998. This document is intended as an application to renew CHS Permit A-264.

**********Statement concerning soil treatment facility removed**********

The original Controlled Hazardous Substances Facility Permit Number A-264, which became effective November 30, 1982, authorized the disposal of specified general hazardous wastes in Cell No. 40 of Area 3. A RCRA Part B permit application for the expansion of Area 3 with Cell No. 41 through 49 was submitted to the EPA on August 1, 1983, while the facility operated under interim status. After cessation of active operations the interim status of Area 3 expired on November 8, 1985.

Various other permits are required and have been issued for environmental and support features of the site. Disposal permits from the City of Baltimore, Department of Health have been issued (Permit No. 65, February 1, 1981 to January 31 1982; Permit No. 74, February 1, 1982 to January 31, 1983) and renewed as necessary. A sediment control permit, WRA No. 82SF0441, was

issued on February 18, 1982 by the State Water Resources Administration (WRA). A National Pollutant Discharge Elimination System (NPDES) permit for the facility (State Permit No. 85-DP-2229, NPDES Permit No. ND 0061417) was originally issued on May 1, 1986 and reissued on April 1, 1997. A copy of this permit is included in Appendix H. This permit includes effluent limits for the discharge of an effluent stream from the proposed leachate treatment system. A Waste Water Discharge Permit application (Identification No. 1-08955) was submitted to the City of Baltimore on March 18, 1992. A permit is not applicable for this facility and will not be issued because there is no discharge into the City sewer system. The application will be retained in City files for information only.

3.4 TOPOGRAPHIC MAP

3.4.1. Figure 3.3 depicts a topographic map outlining the existing general site plan and the development of the area surrounding the site. The topographic map was derived from aerial photography obtained on April 1, 1983.

The following details are required under COMAR 26.13.07.02D(6) to be described and depicted on the topographic map in Figure 3.3 to aid in the permit application review.

a. Intake and Discharge Structures. There are no intake structures for this facility. There are two existing discharge structures labeled as Sediment Pond 1 and 2. The sediment ponds collect surface water run-off from the facility and then discharge into Thoms Cove. An NPDES permit regulates these discharges. A potential third discharge is that of the leachate treatment plant effluent pipe. This discharge will also be regulated under the sites NPDES permit.

**********Statement concerning soil treatment facility removed.**********

b. Hazardous Waste Treatment, Storage, or Disposal Facilities. Each of the disposal areas, Area 5, Cell 40 and the MPA cells in Area 3 are shown on the map. Cell 40 is no longer a disposal site. Two 30,000 gallon underground leachate holding tanks are shown on the map. These two tanks have been abandoned and removed in accordance with MDE regulations and replaced with an above ground 20,000 gallon tank as part of the leachate treatment facility This tank is permitted to store leachate. The hazardous waste leachate treatment and storage facilities are depicted on the map.

c. Wells Where Fluids Are Injected Underground. There are no wells at this facility where fluids from the facility are injected underground.

d. Wells, Springs, and Other Surface Water Bodies Within 1/2 Mile of the Facility Boundary. All existing facility wells and surface water bodies are designated on the map. A listing of wells registered in public records was requested from the Maryland Department of the Environment. These wells are also shown on the topographic map on Figure 3.3.

3.4.2. The following details are required under COMAR 26.13.07.02D(35) to be described and depicted on a topographic map as shown on Figure 3.3 to aid in the permit application review.

a. Map Scale and Date. Please note that the referenced topographic map was derived from aerial photography obtained on April 1, 1983 and has a scale of 1 inch equal to 200 feet, and a contour interval of 2 feet.

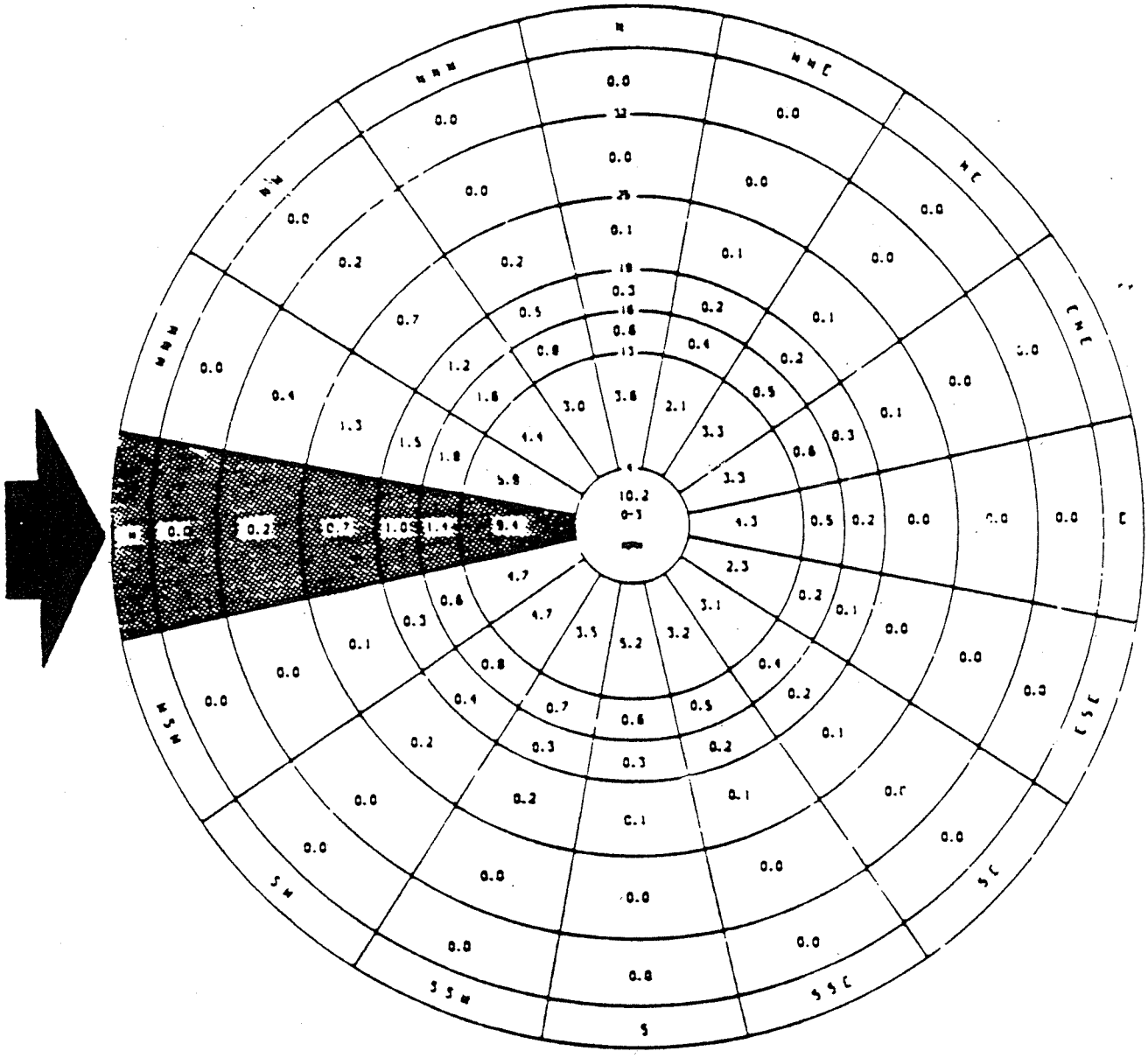
b. 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone X, areas determined to be outside of 500 year floodplain, by the Federal Emergency Management Agency (FEMA).

c. Surface Waters. Surface water streams in the Hawkins Point Area generally flow easterly, and discharge into Thoms Cove on the western bank of the Patapsco River. Surface water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area; the directions of these flows are indicated on the topographic map.

d. Land Uses. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped land and park land does exist as indicated. No residential land uses occur within 1,000 feet of the property boundary.

e. Wind Rose. Figure 3.4 depicts the annual wind rose of meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between O and 3 miles per hour.

**********Statement deleted concerning Soil treatment**********



WIND ROSE FOR BALTIMORE, MARYLAND

MARYLAND ENVIRONMENTAL SERVICE

Hawkins Point Hazardous Waste Landfill

Figure 3.4

g. Facility Boundary. The facility boundaries encompass Areas 2,3,4,5 and 6. These five areas are formerly or presently in use with the exception of area 6 which was never used as a hazardous waste treatment, storage or disposal area.

h. Access Control. The main entrance road will convey traffic to and from the facility; this road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1 and at the northern end of Area 5. A 6-foot high chain-link security fence with a barbed-wire top, 3-strand barbed wire fence and a total of 5 access gates surrounds the facility as shown in Figure 3.3.

i. Injection and Withdrawal Wells. There are no injection or withdrawal wells associated with this facility.

**********Statement regarding start up of WWTP removed **********

j. Building, Treatment, Storage, or Disposal Operations, or Other Structures. Existing structures within the facility include a leachate loading facility, having a corrugated metal roof shelter located in the leachate loading and transfer area; and a truck wash facility, which has a corrugated metal roof shelter located in the truck wash pad area. A trailer on site serves as an office, crew quarters and safety station. An above ground leachate storage tank and a metal building that was the proposed location of the leachate treatment system building are also located on site.

k. Barriers for Drainage or Flood Control. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into three categories:

1. Storm water that has the potential of being contaminated by contact with hazardous waste is directed to the leachate collection system and holding tanks for transfer to permitted treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of facility is conveyed to one of two sedimentation ponds or a perimeter drainage swale before discharging into Thoms Cove. Discharges from the site are covered by a National Pollutant Discharge Elimination System (NPDES) permit approved by the Maryland Department of the Environment.

**********Statement changed concerning tanks and wwtp**********

I. Location of Operational Units Within the Hazardous Waste Management Facility Site, Where Hazardous Waste is Treated, Stored or Disposed. Closure of Area 5 is complete. Hazardous waste treatment facilities may in the future be constructed to treat the chromium leachate. Two 30,000 gallon underground leachate holding tanks were abandoned and a new 20,000 gallon above ground storage tank has been installed. Areas where hazardous waste has been disposed of during prior years is delineated on Figure 3.3. The now nonexistent leachate holding lagoons and the IU conversion systems stabilization demonstration area are two such areas. Leachate from the two previous areas of disposal (Areas 3 and 5) will continue to be collected and transferred from the above ground storage tank at the leachate loading area.

3.5 TRAFFIC PATTERNS

3.5.1. Traffic Characterization and Routing

The on-site traffic flow pattern is presented in figure 3.5. All traffic including facility employees and visitors, will enter the Wastewater Treatment Facility from Quarantine Road onto the dual lane, 2 directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

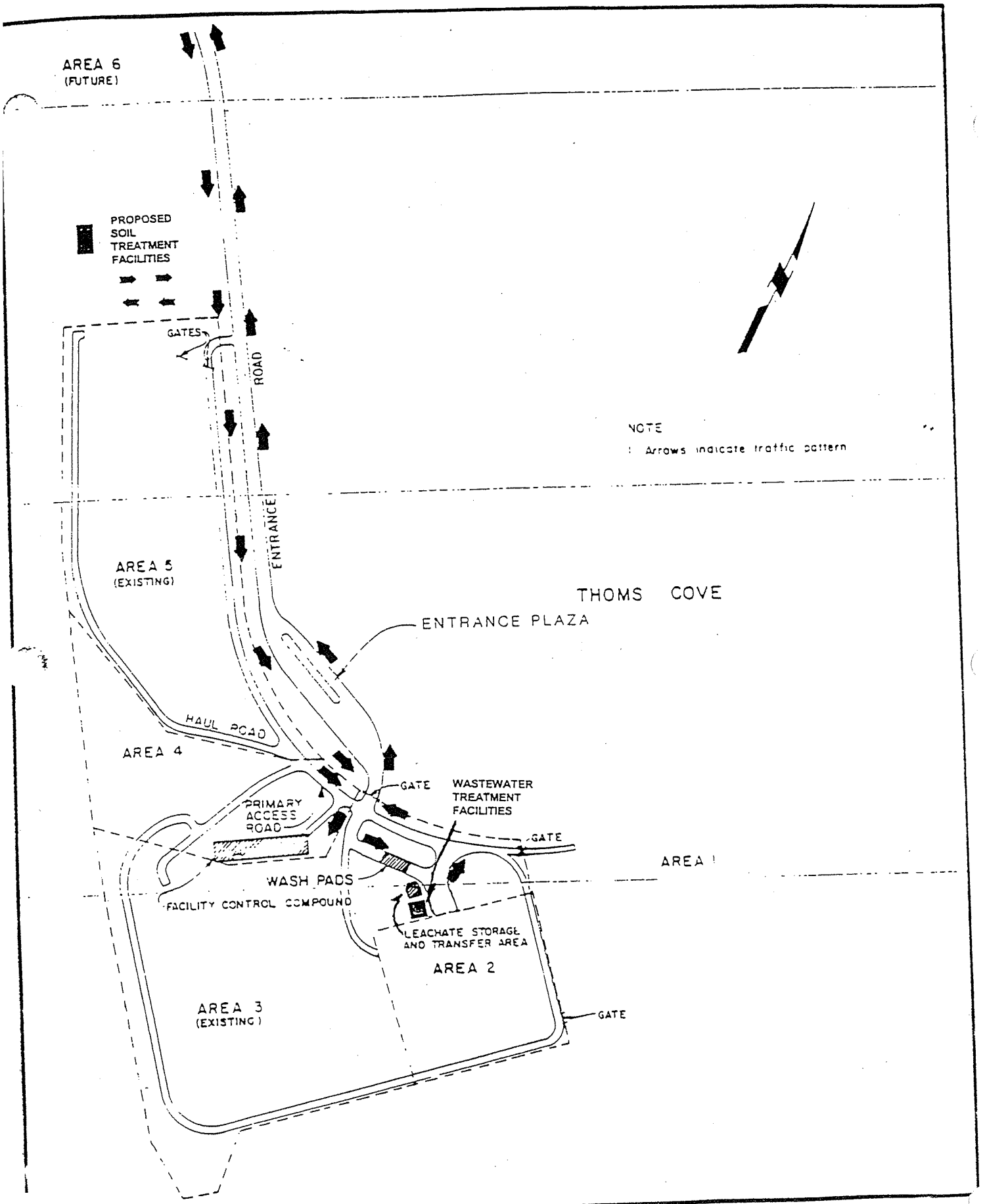
All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the unloading areas, will be directed to the truck wash pads of the Hawkins Point Facility.

All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

Quarantine Road accesses the U.S. Gypsum Company Plant and the BFI, SCM and Hawkins Point HWL. The traffic imposed on this road is minimal, consisting primarily of waste hauling vehicles, tractor-trailers, and employee passenger vehicles. The road is designed for the H-S 20 ton truck, highway bridge loading of the AASHTO Standard Specifications for Highway Bridges.

3.5.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminate soil and waste materials are removed from the exterior of the vehicle either by use of a potable water hose, power washer unit or by brushing. Vehicle surfaces to be checked include the wheel axle assembles, rear bumper, rear of the



ON-SITE TRAFFIC ROUTING: AREA 5

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.5

dump bed and tailgate assemble. All contaminated wash water will flow to a separate oil interceptor and then to the leachate storage area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank would be checked daily when the wash rack is used and the tank emptied as necessary. The portable steam cleaner should be serviced in accordance with the manufacture's instructions.

3.6 ADDITIONAL BACKGROUND INFORMATION

3.6.1. NAICS Code:

924110: Administration of Air and Water Resource and Solid Waste Management Programs

3.6.2. Geographic Location of Facility:

Latitude: 39 12'30" N Longitude: 76 33'00" W

3.6.3. Operator:

Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, Maryland 21401
(410) 974-7254
Operator status: Agency of the State of Maryland

3.6.4. Owner:

Maryland Port Administration
World Trade Center
Baltimore, Maryland 21202-3041
(410) 333-4500
Owner status: Agency of the State of Maryland

3.6.5. Political Jurisdiction of Facility:

District 47 of Baltimore City

3.6.6. Photographs of the facility:

a. Existing Structures and Areas

- Truck wash facility on Picture 7
- Leachate loading area on Picture 9

- Sediment pond no. 1 on Picture 2
- Sediment pond no. 2 on Picture 3
- Area 6 on picture 1

b. Existing treatment, storage and disposal areas (tank information added)

- Disposal Area 5 on Picture 4
- MPA disposal cells underlying Cell No. 40 on Picture 5
- 20,000 gallon storage tank on Picture 8

b. Future treatment, storage and disposal areas

**********Soil Treatment Facility statement removed**********

- Wastewater treatment plant building on Picture 6

3.6.7 Indian Lands

This facility is not on Indian Lands.

3.6.8 Faults

According to the Map of Young Faults in the United States, published by the United States Geological Survey (USGS) in 1977, there are no known fault displacements within the last 15 million years in Maryland or Delaware. The nearest mapped fault of any age is inferred to be approximately 6 miles to the northwest of the site.

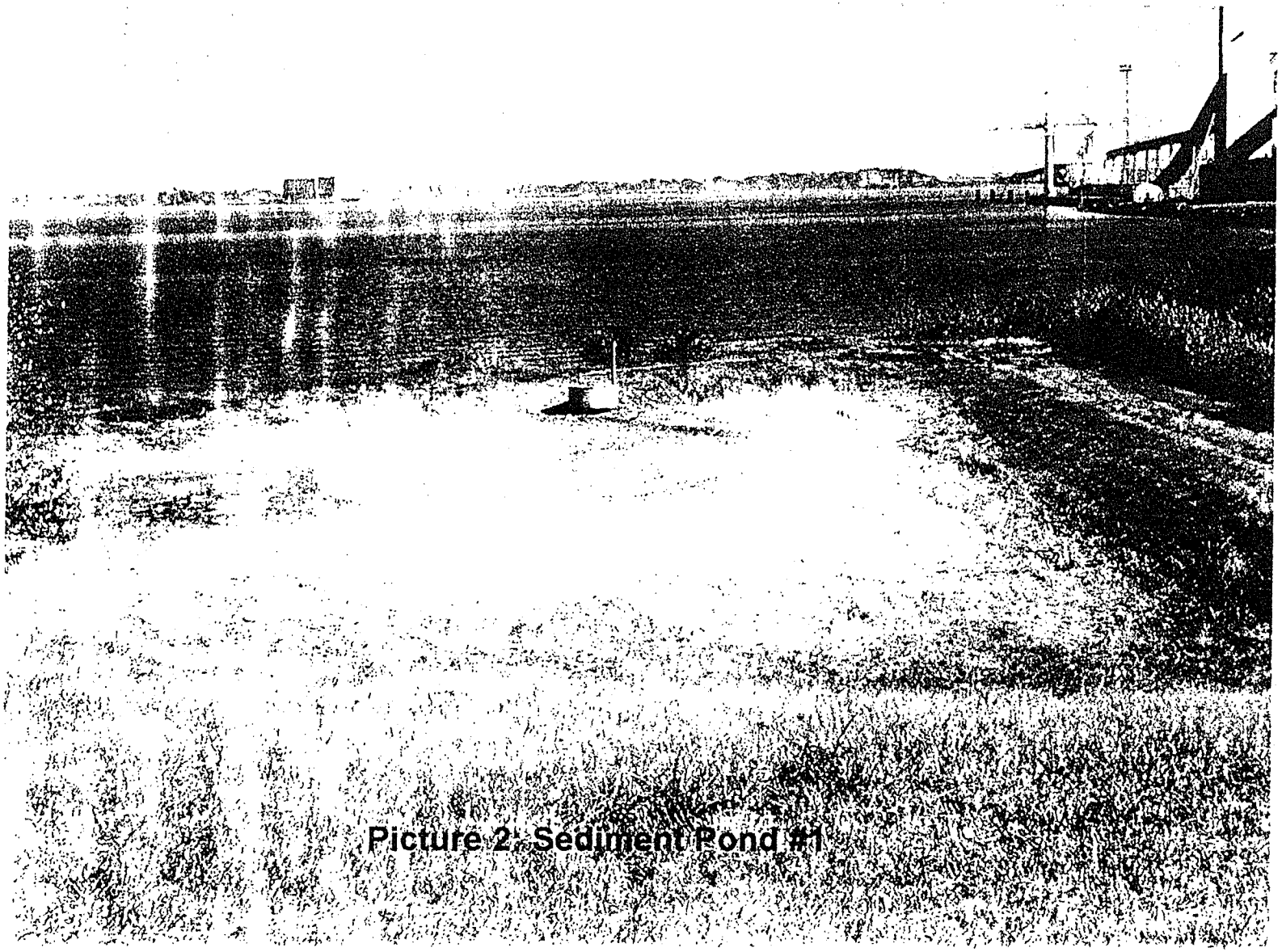
3.7 FEDERAL COMPLIANCE

The facility is in compliance with the applicable Federal laws listed in 40 CFR 270.3 as follows:

3.7.1 Wild and Scenic Rivers Act

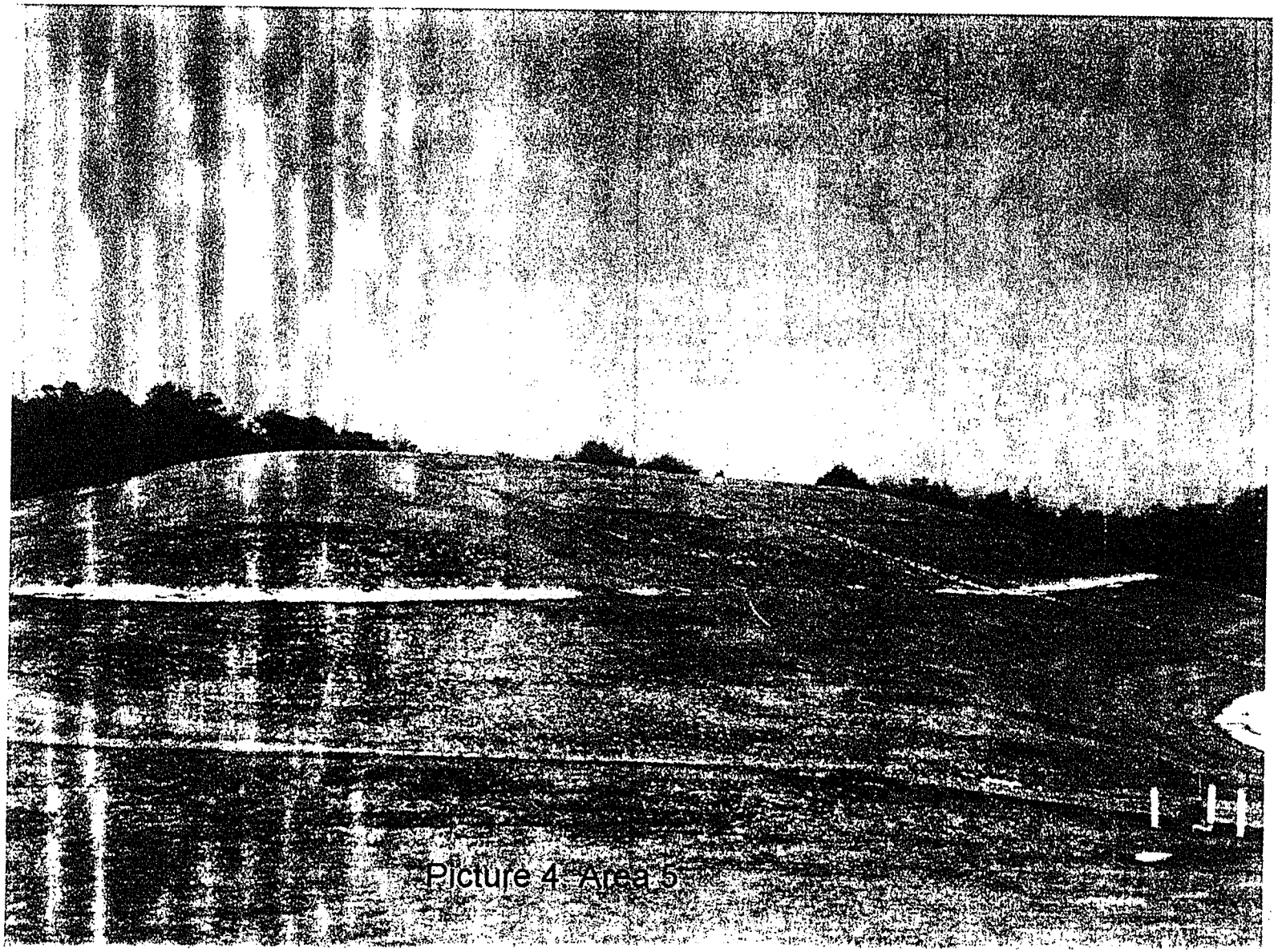
Section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established. This facility is not a water resources project, and is therefore in compliance. In addition, the only river in the nearby vicinity of the Hawkins Point facility is the Patapsco River, which is not a national wild and scenic river.

Picture 1: Area 6



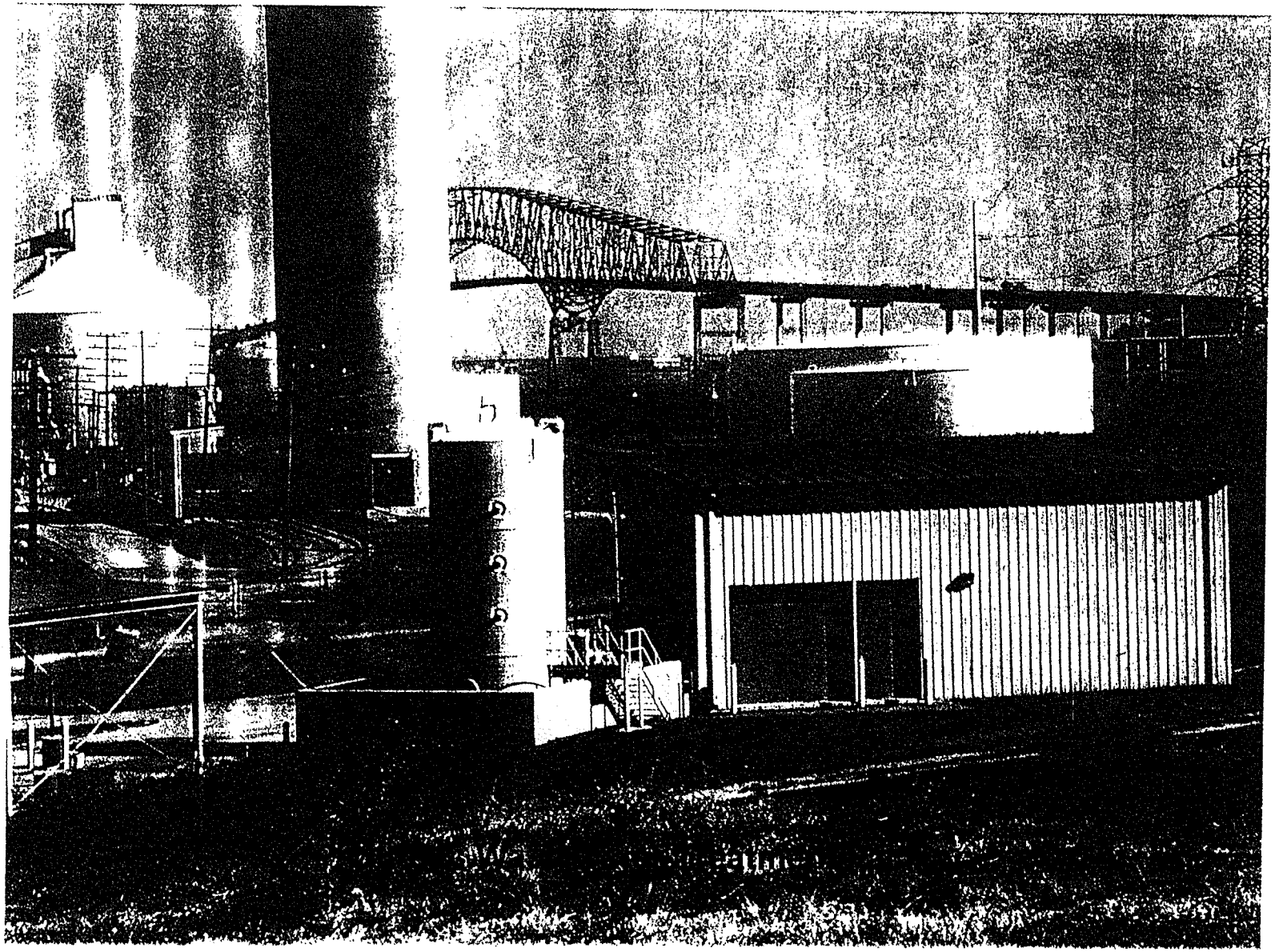
Picture 2: Sediment Pond #1

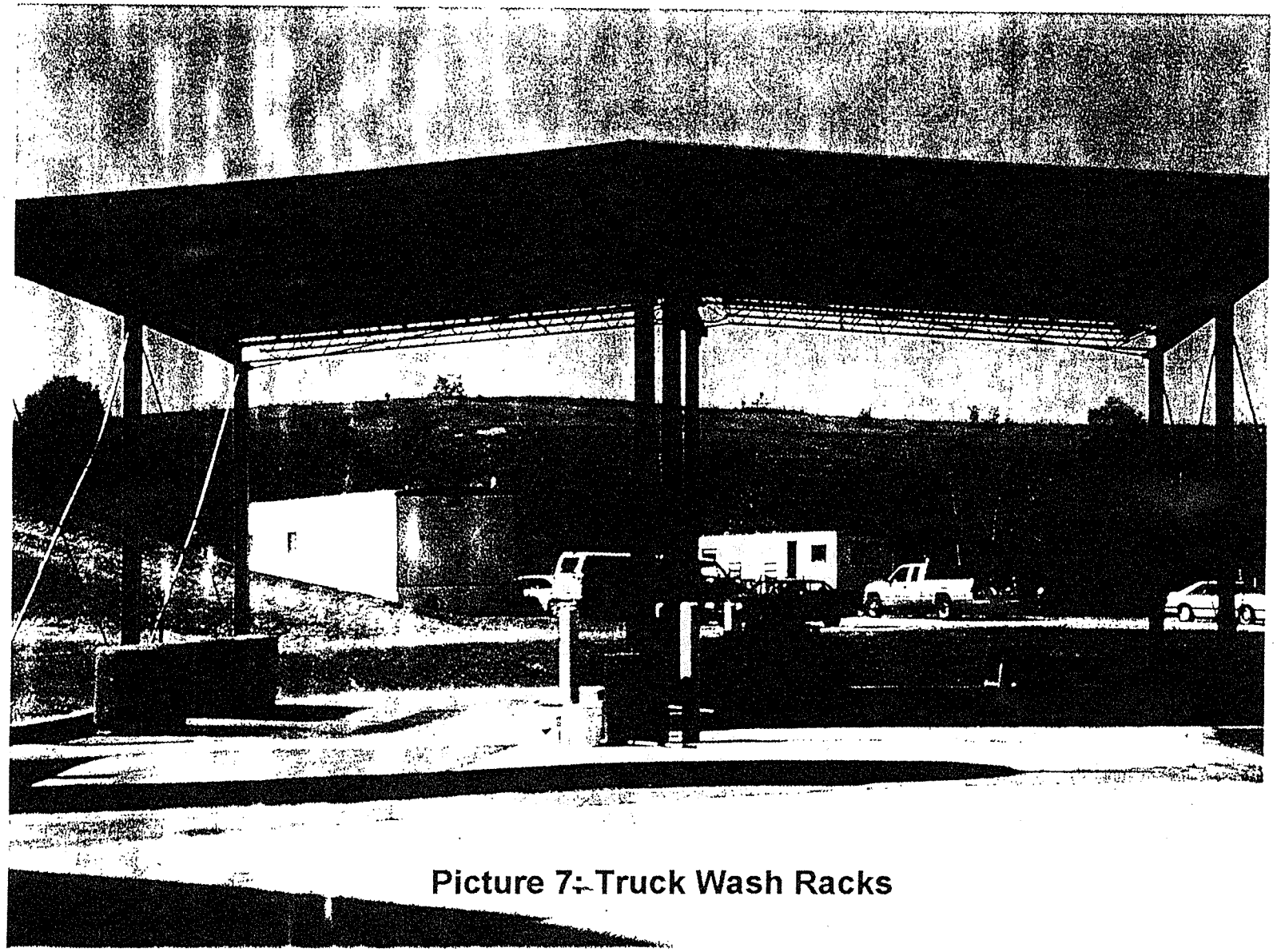
Picture 3: Sediment Pond #2



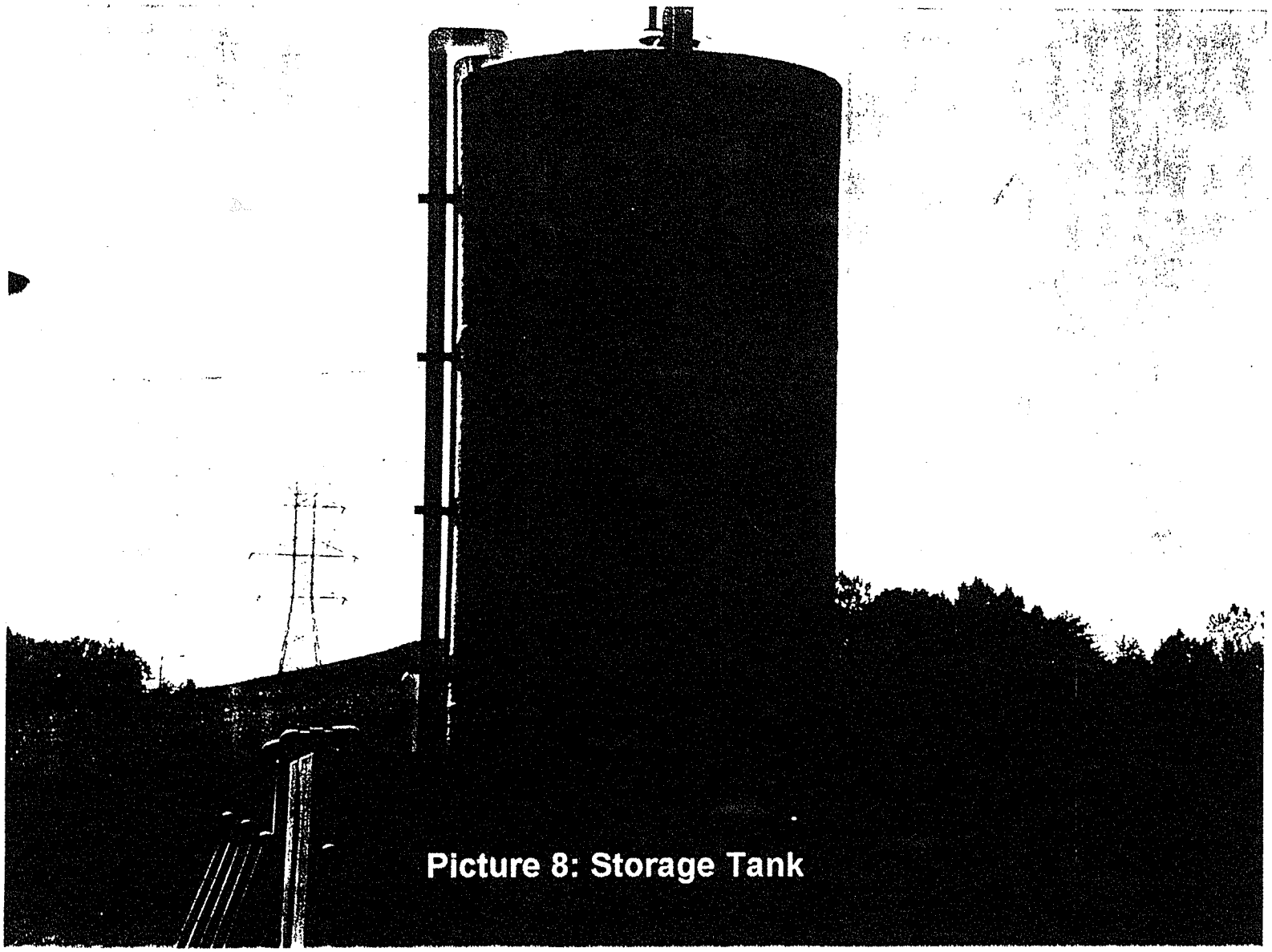
Picture 4 Area 5

Picture 5: Cell 40





Picture 7: Truck Wash Racks



Picture 8: Storage Tank

Picture 9: Leachate Loading Area

3.7.2 Natural Historic Preservation Act of 1966

Section 106 of the Act, and implementing regulations (36 CFR 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. Since there are no licensed activities and properties listed or eligible for listing in the Register near the facility, it is in compliance with the Act.

3.7.3 Endangered Species Act

Section 7 of the Act and implementing regulations (50 CFR 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior of Commerce, that any action authorized by the USEPA is not likely to jeopardize the continued existence of any endangered or threatened species, or adversely or threatened species in the area, the facility is in compliance with the Act.

3.7.4 Coastal Zone Management Act

Section 307(c) of the Act, and implementing regulations (15 CFR 930) prohibit the USEPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management Program, and the State or its designated agency concurs with the certification (or the Secretary of Commerce override the State's non-concurrence). This facility is located in a riverine area, not a coastal zone, and therefore is in compliance with the Act.

3.7.5 Fish and Wildlife Coordination Act

The Act requires that the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve those resources. The facility does not impound, divert, or control or modify any body of water, and therefore is in compliance with the act.

Permit Number: A-264

Attachment 13

PERMIT APPLICATION PART A

(There are 9 pages in this attachment)

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved, OMB No. 2050-0034 Expires 10/31/02
GSA No. 0248-EPA-OT

For EPA Regional Use Only	EPA United States Environmental Protection Agency Washington, DC 20460 **Hazardous Waste Permit Application Part A** *(Read the Instructions before starting)*	
Date Received Month Day Year		

I. Facility's EPA ID Number *(Mark 'X' in the appropriate box)*

[ ] A. First Part A Submission	[X] B. Revised Part A Submission (Amendment # 1)
C. Facility's EPA ID Number: MDD000731356	D. Secondary ID Number *(If applicable)*

II. Name of Facility

HAWKINS POINT HAZARDOUS WASTE LANDFILL

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street: 5501 QUARANTINE ROAD

Street *(Continued)*:

City or Town	State	Zip Code
BALTIMORE	MD	21226 –

County Code *(If known)*	County Name

B. Land Type (Enter code)	C. Geographic Location LATITUDE (Degrees, minutes, & seconds)	LONGITUDE (Degrees, minutes & seconds)	D. Facility Existence Date Month	Day	Year
	39 12 30N	076 33 00W	8	5	1980

IV. Facility Mailing Address

Street or P.O. Box: MES 2011 COMMERCE PARK DRIVE

City or Town	State	Zip Code
ANNAPOLIS	MD	21401 –

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(Last)*	*(First)*
FERGUSON	DAVID
Job Title	**Phone Number** *(Area Code and Number)*
CHIEF, WASTE REMEDIATION	410-974-7254

VI. Facility Contact Address *(See instructions)*

A. Contact Address Location	Mailing	Other	B. Street or P.O. Box
	X		

City or Town	State	Zip Code
		–

DEC 13

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved, OMB No. 2050-0034 Expires 10/31/02
GSA No. 0248-EPA-OT

EPA ID Number *(Enter from page 1)*	Secondary ID Number *(Enter from page 1)*
MDD000731356	

VII. Operator Information *(See instructions)*

A. Name of Operator: MARYLAND ENVIRONMENTAL SERVICE

Street or P.O. Box: 2011 COMMERCE PARK DRIVE

City or Town	State	ZIP Code
ANNAPOLIS	MD	21401 –

Phone Number *(Area Code and Number)*	B. Operator Type	C. Change of Operator Indicator	Date Changed Month	Day	Year
410-974-7254	S	Yes [ ] No [X]			

VIII. Facility Owner *(See instructions)*

A. Name of Facility's Legal Owner: MARYLAND ENVIRONMENTAL SERVICE

Street or P.O. Box: 2011 COMMERCE PARK DRIVE

City or Town	State	ZIP Code
ANNAPOLIS	MD	21401 –

Phone Number *(Area Code and Number)*	B. Owner Type	C. Change of Owner Indicator	Date Changed Month	Day	Year
410-974-7254	S	Yes [ ] No [X]			

IX. NAICS Codes *(In order of significance; start in left box)*

First	Second	Third	Fourth
924110			
(Description) ADMIN. OF AIR & WATER RESOURCE & SOLID WASTE MGMT. PROGRAMS	*(Description)*	*(Description)*	*(Description)*

X. Other Environmental Permits *(See instructions)*

A. Permit Type *(Enter code)*	B. Permit Number	C. Description
N	MD0061417	STORMWATER, LEACHATE TREATMENT
F	A264	MD CHS PERMIT

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved, OMB No. 2050-0034 Expires 10/31/02
GSA No. 0248-EPA-OT

EPA ID Number *(Enter from page 1)*	Secondary ID Number *(Enter from page 1)*
MDD000731356	

XI. Nature of Business *(Provide a brief description)*

THE HAWKINS POINT HAZARDOUS WASTE LANDFILL IS A CLOSED CHROME ORE TAILINGS DISPOSAL FACILITY. LEACHATE IS STILL GENERATED AND WILL BE HAULED OFF-SITE.

XII. Process Codes and Design Capacities

A. PROCESS CODE - *Enter the code from the list of process codes below that best describes each process to be used at the facility. Thirteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in item XIII.*

B. PROCESS DESIGN CAPACITY - *For each code entered in column A, enter the capacity of the process.*
1. AMOUNT - *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.*
2. UNIT OF MEASURE - *For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.*

C. PROCESS TOTAL NUMBER OF UNITS - *Enter the total number of units used with the corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage:	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment:	
T01	Tank Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, Or Refining Furnace	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour: Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Hour; Liters Per Hour; or Million Btu Per Hour
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR §260.10	
T94	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X):	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G	Short Tons Per Hour	D	Cubic Yards	Y
Gallons Per Hour	E	Metric Tons Per Hour	W	Cubic Meters	C
Gallons Per Day	U	Short Tons Per Day	N	Acres	B
Liters	L	Metric Tons Per Day	S	Acre-feet	A
Liters Per Hour	H	Pounds Per Hour	J	Hectares	Q
Liters Per Day	V	Kilograms Per Hour	R	Hectare-meter	F
		Million Btu Per Hour	X	Btu Per Hour	I

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Form Approved, OMB No. 2050-0034 Expires 10/31/02
GSA No. 0248-EPA-OT

EPA ID Number *(Enter from page 1)*: D D 0 0 0 7 3 1 3 5 6

Secondary ID Number *(Enter from page 1)*:

XII. Process Codes and Design Capabilities *(Continued)*

EXAMPLE FOR COMPLETING ITEM XII (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	B. 2. Unit Of Measure (Enter code)	C. Process Total Number Of Units	For Official Use Only
X 1	S 0 2	533.788	G	001	
1	T 0 1	7.000	U	001	
2	S 0 2	20.000	G	001	
3	D 8 0	.190	A	001	
4		.			
5		.			
6		.			
7		.			
8		.			
9		.			
10		.			
11		.			
12		.			
13		.			

NOTE: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in item XIII.

XIII. Other Processes *(Follow instructions from item XII for D99, S99, T04 and X99 process codes)*

Line Number (Enter #s in seq w/XII)	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	B. 2. Unit Of Measure (Enter code)	C. Process Total Number Of Units	D. Description Of Process
X 1	T 0 4	.			In-situ Vitrification
1		.			
2		.			
3		.			
4		.			

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

EPA ID Number *(Enter from page 1)*: M D D 0 0 0 7 3 1 3 5 6

Secondary ID Number *(Enter from page 1)*:

XIV. Description of Hazardous Wastes

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C UNIT OF MEASURE - *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/ or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of item XIV-D(1).*
3. *Use additional sheet, enter line number from previous sheet, and enter additional code(s) in item XIV-E.*

2. PROCESS DESCRIPTION: *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.*
3. *Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number	A. EPA HAZARD WASTE NO. (Enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (Enter code)	D. PROCESS (1) PROCESS CODES (Enter)	D. PROCESS (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
X 1	K 0 5 4	900	P	T 0 3 D 8 0	
X 2	D 0 0 2	400	P	T 0 3 D 8 0	
X 3	D 0 0 1	100	P	T 0 3 D 8 0	
X 4	D 0 0 2				Included With Above

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GSA No. 0248-EPA-OT

EPA ID Number *(Enter from page 1)*: M D D 0 0 0 7 3 1 3 5 6

Secondary ID Number *(Enter from page 1)*:

XIV. Description of Hazardous Wastes *(Continued; use additional sheets as necessary)*

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D007	3500	T	T01	CHROME LEACHATE
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

EPA I.D. Number (Enter from page 1)	Secondary ID Number (Enter from page 1)
D D 0 0 0 7 3 1 3 5 6	

XV. Map

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (See instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

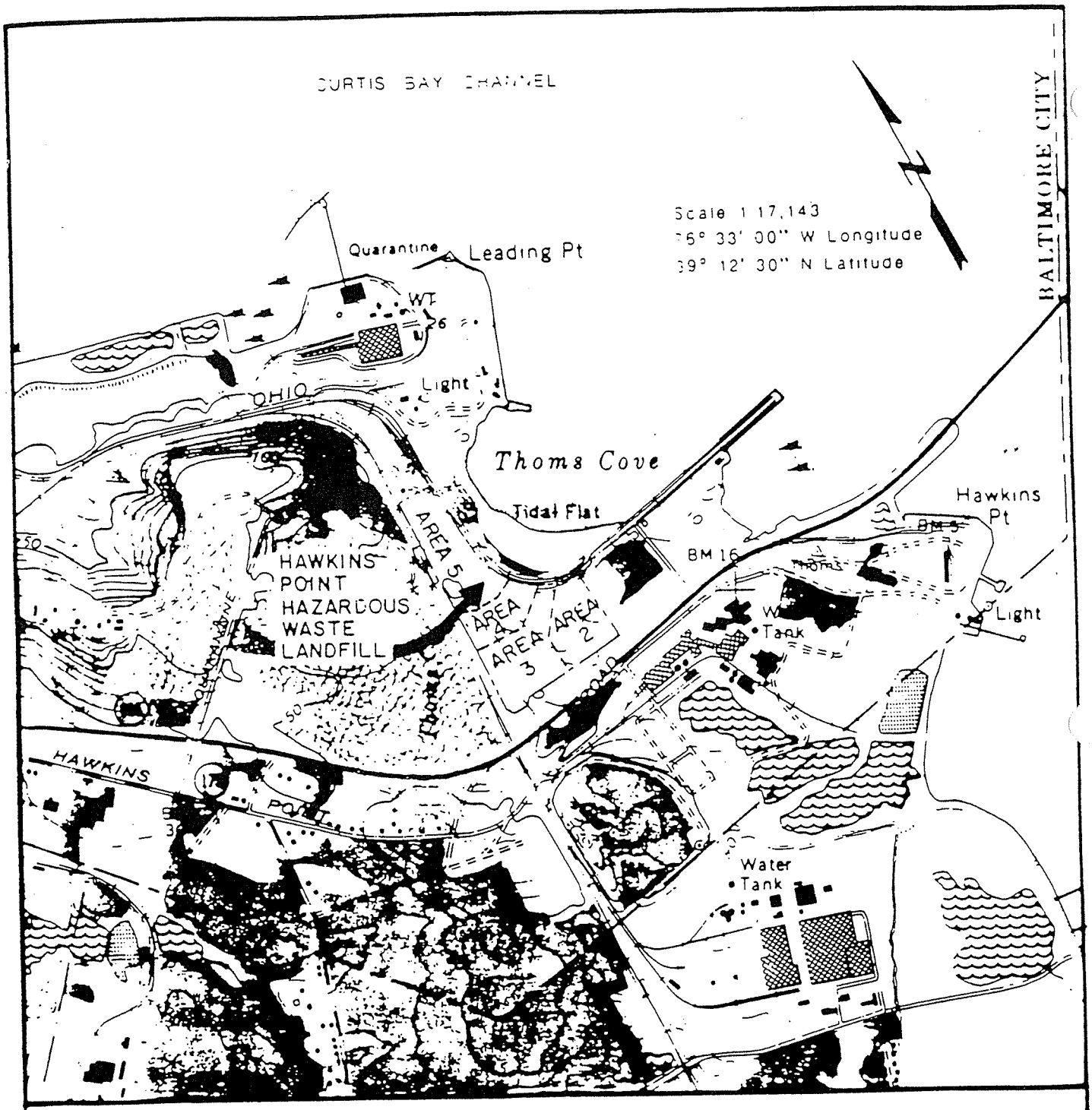
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner Signature	Date Signed 5/18/99
Name and Official Title (Type or print) DIRECTOR, MES	
Owner Signature	Date Signed
Name and Official Title (Type or print)	
Operator Signature	Date Signed 5/18/99
Name and Official Title (Type or print) JAMES W PECK, DIRECTOR	
Operator Signature	Date Signed
Name and Official Title (Type or print)	

XIX. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. (Refer to instructions for more information)

Notes



LEGEND

- Surface water
- Facility boundaries
- Area boundaries
- Direction of surface water flow

Notes:

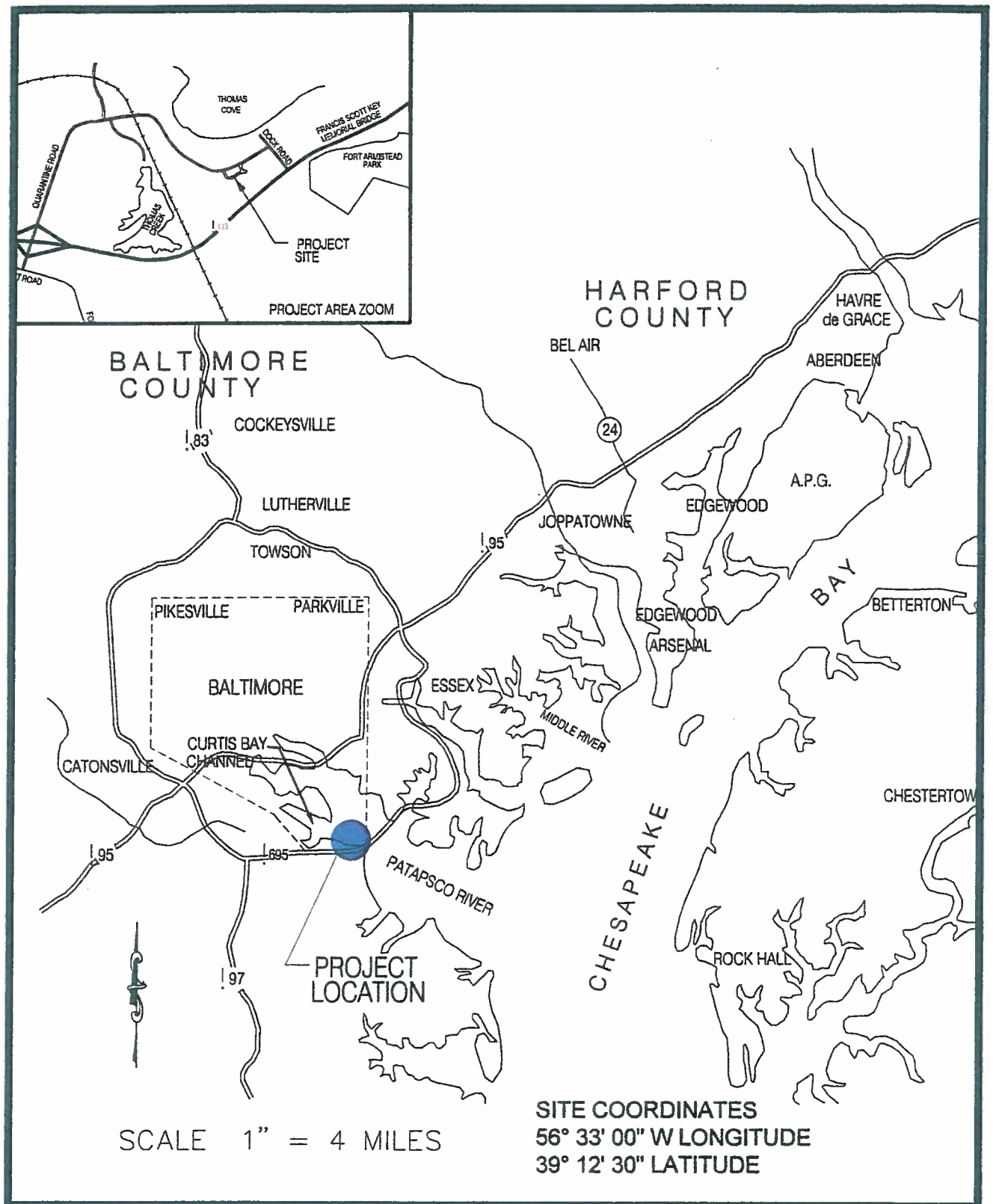
1. Contour interval is 10 feet.
2. Mean range of tide is approximately 1.1 feet.

AREA TOPOGRAPHIC MAP

BECK & VEATCH	Hawkins Point Hazardous Waste Landfill	figure 2-1

Not Dated

Figure 1 – Site Vicinity Map

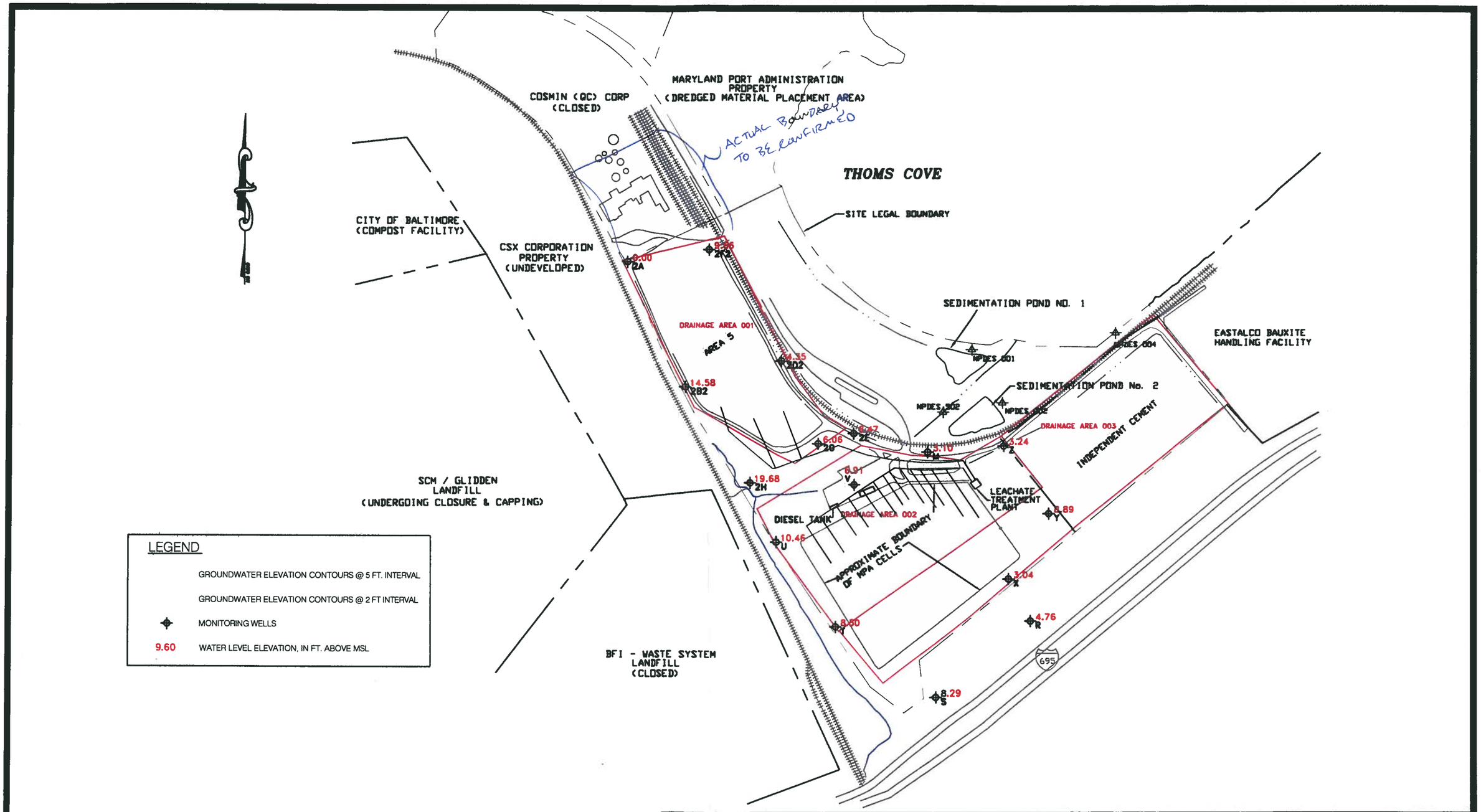


MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT HAZARDOUS WASTE FACILITY
VICINITY MAP
FIGURE 1

Not Dated

Figure 2 – Site Layout Map



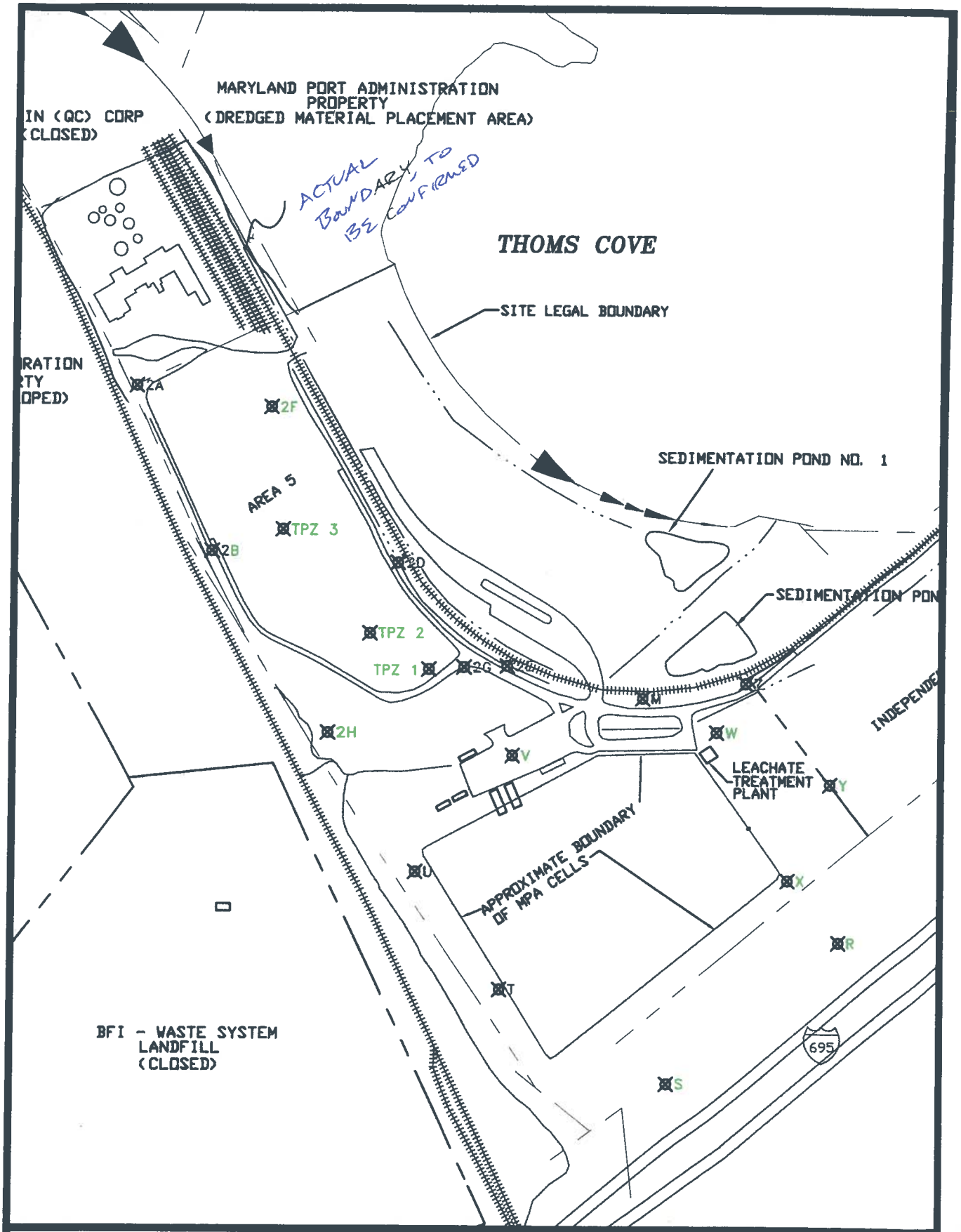
MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT HAZARDOUS WASTE FACILITY
SITE MAP
FIGURE 2

PATH

Not Dated

Site Map



MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT
SITE MAP

C:\HM\MC\DRWG\040783.DWG

January 1982

Operating Plan and Procedures

EPA

MARYLAND ENVIRONMENTAL SERVICE

DEPARTMENT OF NATURAL RESOURCES

HAWKINS POINT DHS DISPOSAL FACILITY

OPERATING PLAN & PROCEDURES

PART I - GEOLOGIC AND HYDROLOGIC INVESTIGATION LANDFILL DESIGN CRITERIA

PART 2 - DESIGN AND OPERATION

January, 1982

HARRINGTON, LACEY & ASSOCIATES, INC.

MARYLAND ENVIRONMENTAL SERVICE

Department of Natural Resources

HAWKINS POINT

DHS DISPOSAL FACILITY

Operating Plan & Procedures

Part 1 - Geologic and Hydrologic Investigation
Landfill Design Criteria

Part 2 - Design and Operation

February, 1982

Revised

HARRINGTON, LACEY & ASSOCIATES, INC.

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CHAPTER I

INTRODUCTION

Background

The proposed Hawkins Point DHS Landfill site is located in the Curtis Bay industrial area adjacent to Thoms Cove near the southern Baltimore City limits at the Francis Scott Key Bridge. The property is owned by the Maryland Port Authority (MPA) and has a total area of approximately 125 acres. Only about 55 acres of the property is to be utilized in this facility. A portion of the site (approximately 10 acres) is presently being used as a permitted chrome ore disposal facility which is operated by the Maryland Environmental Service (MES) for Allied Chemical Corporation. The site also contains a closed chrome ore disposal area on about 13 acres.

Recognizing the continuing need for safe hazardous waste disposal facilities, MES proposes to design, construct, and operate this designated hazardous substances (DHS) landfill to serve the State of Maryland. The State Hazardous Waste Facilities Siting Board has been seeking acceptable sites in Maryland, preferably near Baltimore, where most of the State's hazardous waste is generated, to establish safe disposal facilities. Since the one remaining hazardous waste landfill in the State is due to cease operations in May, 1981, the development of an alternative site is imperative to maintain continuity of disposal for industries in the State.

The proposed Hawkins Point landfill design concept involves the separation of the site into two disposal areas, one of which will be used only for general solid hazardous waste, and the other exclusively for Allied Chemical chrome ore waste. Since both wastes are classified as designated

hazardous substances, the disposal site will require a State DHS permit. Only solid wastes generated within the State of Maryland are to be accepted at this facility; no liquid waste will be accepted.

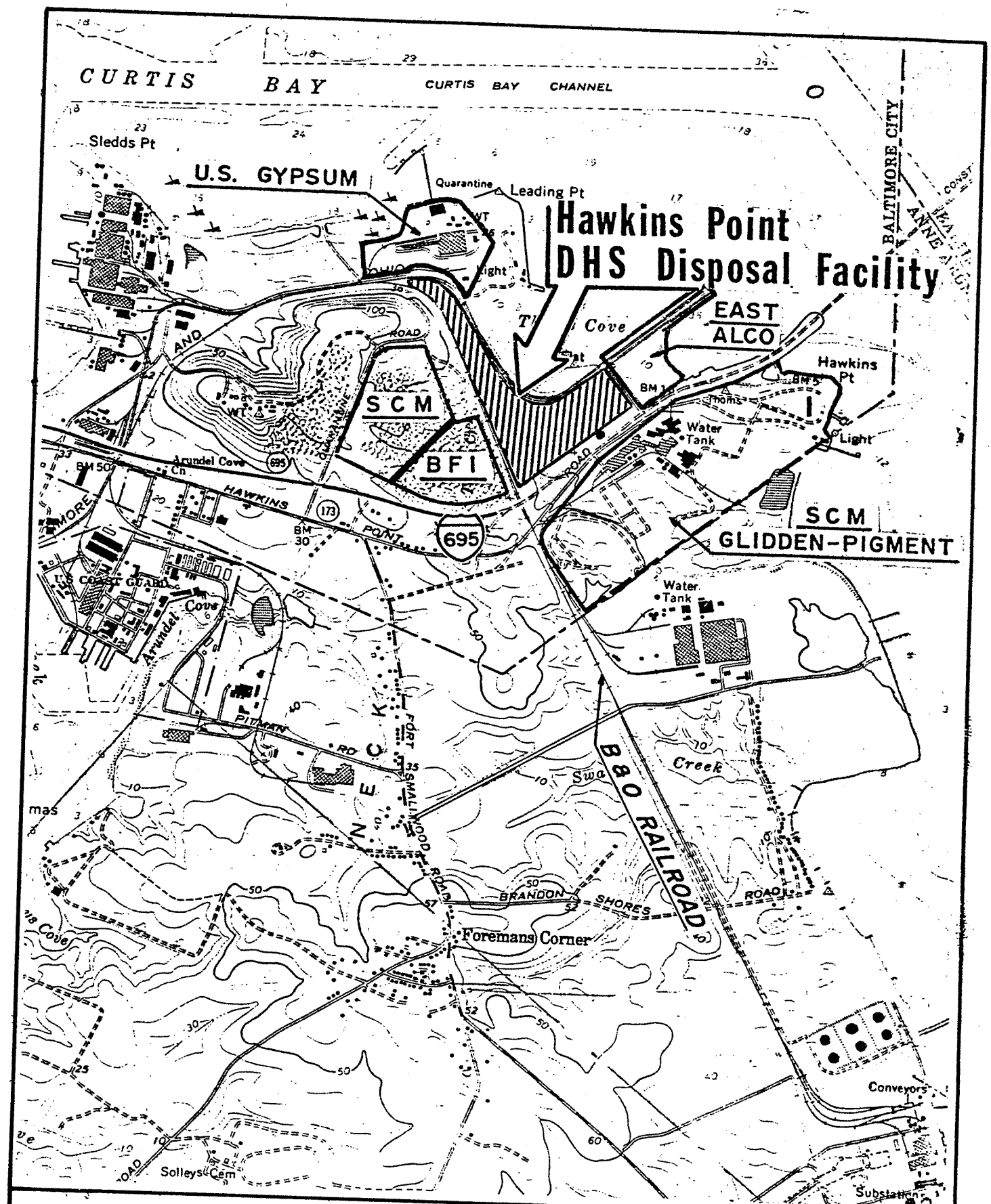
The site has been evaluated and the disposal facility designed in accordance with all current regulations and procedures for DHS solid waste fills.

Site

The proposed disposal site consists of about 35 acres of land owned by MPA.

This land is located near Thoms Cove north of the I-695 Outer Harbor Crossing. It is bounded on the east by Cove Road and on the west by the B & O Railroad. The U.S. Gypsum Co. Plant is located north of the site, the SCM-Glidden Pigments plant across I-695 to the south, an Eastalco Bauxite handling facility and pier to the east, and two adjacent existing landfills across the B & O Railroad to the west. An additional 10± acres will be used east of the Cove Road B & O Railroad spur adjacent to Thoms Cove Road for entrance roads and facilities to the disposal site. The Vicinity Map indicates these surrounding land uses and the boundaries of the proposed project. (See Figure I).

As previously mentioned, a permitted chrome ore disposal facility is presently being operated on about 10 acres of the site by MES exclusively for Allied Chemical Corporation. An existing, closed chrome disposal area is located on about 13 acres of the property southeast of the existing facility and adjacent to I-695 and the B & O Railroad. Approximately 2 acres north of the operating chrome site are utilized by the Cosmin Corporation for an industrial warehouse/handling facility.



HAWKINS POINT DHS DISPOSAL FACILITY

1" = 2000'

FIGURE I

VICINITY MAP

N

Land Use and Zoning

The subject property and surrounding lands are zoned for heavy industrial use, designation M-3 which allows landfills as a conditional use. The relatively undeveloped community of Hawkins Point, approximately 2000 feet southwest of the site between I-695 and Hawkins Point Road is zoned B-1 and B-2 Business District (See Figure I).

As discussed in the site description, two large industrial plants exist adjacent to the site; U.S. Gypsum Co. to the north and SCM-Glidden Pigments to the south, and two landfills to the west across the B & O Railroad owned by Browning-Ferris Industries and SCM Corporation.

The general area is served by the Baltimore City water system and BG&E electric service. According to Water Resources Administration records, several industrial wells also exist in the general vicinity of the fill.

Topography and Drainage

The topography of the site is a result of natural and artificial processes. Elevations range between a high of 46 feet above sea level north of Cosmin to a low of 10 feet above sea level, west of Eastalco. The portion of land to be used for the entrance facilities is adjacent to Thoms Cove and ranges in elevation from elevation 30 to sea level. The site typically slopes towards Thoms Cove.

The site topography used for the detailed design was based on aerial overflights in February and October, 1981 by Harford Aerial Surveys and was prepared by photogrammetric techniques at a scale of 1" = 100' with a 2-foot contour interval.

Onsite surface runoff travels south and west from the extremities of the site to a stream flowing easterly and located about 1500 feet north of I-695. This stream predominantly carries drainage from the adjacent landfills west of the B & O Railroad which enters the site through three culverts under the railroad. The total drainage area to the stream is approximately 180 acres. This stream crosses under Cove Road through a 54 inch concrete pipe and continues traveling over land approximately 500 feet before discharging into Thoms Cove.

Diversion berms, ditches, and sediment control devices constructed as part of the existing chrome ore disposal facility control runoff from that site and allow only uncontaminated surface waters to exit the area.

Interim DHS Fill Extension

Because the final DHS regulations are still being developed by EPA, only the portion of the site that meets the EPA interpretation as an allowable interim extension of a temporarily permitted DHS landfill can be considered for permit application at this time. Consequently, this permit application package is being submitted to include only the vertical extension of the presently permitted Site 2, for chrome ore waste, and a single lateral area extension of previously filled Site 1, for selected general solid designated hazardous substances.

Even though the requested permit, covered by this submission, is limited to the interim extension, the sub-surface investigation, structural integrity of the underlying soils, maximum fill potential, proposed operating procedures and other similar considerations have been developed for the entire property to assist in the required evaluation of the requested interim extension to the existing DHS fill.

Previously Performed Site Corrective Work

As indicated hereinbefore, portions of the site have been previously filled with chrome ore waste (Site 1) and a portion of the site (Site 2) continues to operate under an active permit for the disposal of additional quantities of chrome ore waste. Two contracts are either being bid or being prepared for bid, to modify specific aspects of the previously performed DHS fill construction, to meet the requirements of an order from the State Department of Health and Mental Hygiene.

Contract 1 includes surface water drainage modifications necessary to facilitate site drainage to minimize the quantity of rainfall which may ultimately infiltrate the filled waste and become leachate. The site drainage modification contract includes the sediment and erosion control provisions necessary to protect adjacent surface water courses during construction of Contract 1, Contract 2 and any access road modifications contemplated to relocate the major point of egress to the site. Contract 1 also includes a ground water interceptor on three sides of Site 1 to meet the previously established design concept used on the permitted Site 2 and to minimize the potential for leachate created by ground water intrusion.

Contract 2 includes the installation of an underfill leachate collection system for the previously filled portion of Site 1 and as a modification to the previously provided leachate collection system for the presently operating Site 2. The leachate collection system to be installed under Contract 2 also includes collecting sumps, on-site leachate storage and a truck loading station to transfer the collected leachate from storage to off-site treatment and disposal.

Because the work included under Contracts 1 and 2 are in response to the above mentioned order from the State, this work is proceeding and is scheduled for completion prior to final action on the request for permit extension. The surface water control modification will not be impacted by the requested interim landfill extension. The leachate collection system being installed under Contract 2, will serve the requested vertical fill extension on the presently permitted Site 2. In the event that the Site 1 extension is permitted for the requested interim period, the leachate system will be extended to include this adjacent area, as indicated on the attached permit application drawings.

While the required modifications included under Contracts 1 and 2 are required by the State order and are not necessarily a part of this permit application, the contract drawings are attached to this submission in order to facilitate the permit application review process. The attached contract drawings indicate the actual condition of the site, prior to the performance of any work required to accommodate the requested interim permit extension.

CHAPTER II

GEOLOGIC, HYDROLOGIC, AND SOILS EXPLORATION

GEOLOGY

GENERAL:

The Curtis Bay area lies within the upper Coastal Plain near the fall line which is the boundary that separates the Piedmont Province from the Coastal Province. The Atlantic Coastal Plain Province is underlain by a wedge-shaped mass of unconsolidated sedimentary deposits that overlie older consolidated crystalline rocks of Precambrian or Early Cambrian age.[1] The altitude of the bedrock surface is shown in Figure 1.

The unconsolidated sediments consist of stratified layers of sand, gravel, silt and clay, transported by wind and water. The sediments dip to the southeast, forming a wedgelike body having a maximum thickness in Baltimore County of about 800 feet. The upper Coastal Plain region consists of the youngest Patapsco and Raritan Formation, the intermediate Arundel Clay and the oldest Patuxent Formation, all of the lower Cretaceous Potomac Group [2]. These Cretaceous sediments provide the parent material for the soils in the area. A geologic cross section is shown in Figure 2.

The Patuxent Formation crops out in an irregular belt along the edge of the Coastal Plain in Baltimore County, northwest of the site. The formation is of continental origin and consists of a series of irregular and lenticular beds of brown, tan and white gravel, sand, sandy clay, and clay, and thin indurated sandstone layers. The sands and gravels commonly show crossbeddings; the Patuxent formation thickens rapidly to the southeast where it is a good aquifer. The upper boundary of the Patuxent formation of the site is approximately at elevation -350 ft.[3].

The Arundel Clay, which overlies the Patuxent formation, crops out along the Fall Line in an irregular belt half a mile to 3 miles wide, extending northeastward across Baltimore County and to the vicinity of Bush River in Hartford County. This formation dips about 40 feet to the mile to the southeast and ranges in thickness from about 25 feet near the outcrop to 200 feet down dip. This formation consists of a tough red to gray clay which locally contains small concretionary masses of "ironstone." The Arundel Clay is more than 100 feet thick below the site and acts as a continual layer or aquiclude permitting the development of artesian pressure in the underlying Patuxent formation[3]. The approximate altitude of the top of the Arundel Clay is shown in Figure 3.

The Patapsco formation which lies unconformally upon the Arundel Clay is lithologically similar to the Patuxent formation. The sediments, also of continental origin, are composed essentially of red, brown, white, or gray gravel, sand, sandy clay, and clay. The formation ranges in thickness from about 300 feet where fully developed in southeastern Baltimore County to only a few feet on hills northwest of the major belt of outcrop[3].

Geology and Soils of the Site

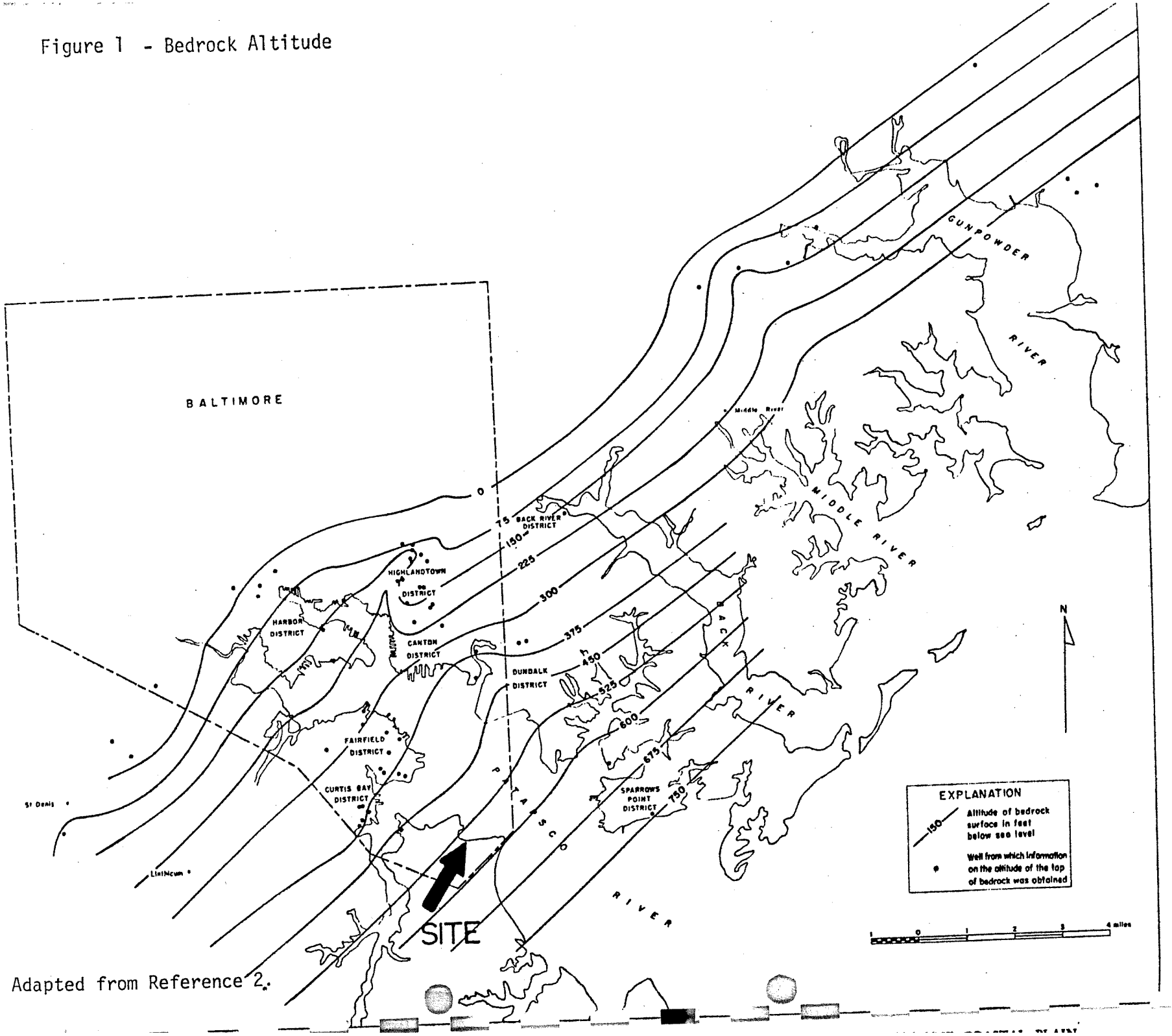
The surface materials at the project site are part of the clay facies of the undifferentiated Patapsco and Raritan formations[3]. It is typically multicolored kaolinitic clay with varying amounts of sand and silt interbeds throughout. The thickness of the clay at the site ranges from trace amounts at the north end to 100 feet at the south end. Below the clay is a sand facies which consists of well sorted, fine to medium grained quartz sand with local areas of abundent quartz gravel. The sand and gravel strata (Patapsco formation)

constitutes a major water bearing formation that provides water to Annapolis, Glen Burnie and Bowie. The thickness of this sand and gravel strata is estimated to be 100 feet at the proposed site.

The soils in the area surrounding Curtis Bay are part of the Christiana-Sunnyside-Sassafras Soil Association. The soils of this group are deep, highly clayey soils formed in the upper Coastal Plain. These soils developed in thick beds of very old red clays and contain some thin mantles of silty and sandy materials. An extensive subsurface exploration was undertaken to identify the extent of the clay and the locations of the silt and sand interbeds. A detailed description of the soils in the area is given in Chapter II, Subsurface Conditions.

In general, the soil type encountered in almost all of the borings was a reddish brown to multicolored hard clay with varying amounts of silt and/or fine sand ranging in thickness from zero to a few feet. The clay layer is extensive and continuous beneath the site with interfingering sand and silt layers. The silt and/or sand seams do not exhibit any discernable pattern and appear to occur in a random fashion throughout the site. The sand layers and lenses are thicker on the north and west sides of the site and appear to thin or "pinch out" toward the east side. Where the sand layers pinch into thin seams, the clay horizon becomes more massive. Since the site has been used for waste disposal for the past decades, the surface soils have been disturbed and the surface material in some areas is believed to be clay transferred from adjacent areas.

Figure 1 - Bedrock Altitude



Adapted from Reference 2.

GROUNDWATER HYDROLOGY

GENERAL:

Approximately 65 borings were drilled at the site. Of these about 30 were completed as piezometers. The data obtained from all the borings indicate a complex stratigraphic column with interfingering of sand and/or silty sand seams imbedded in the predominantly clay strata.

A piezometer is an open pipe with a screen attached to its lower end thus permitting water to enter the pipe and rise to a level known as the static water level (SWL). When the screen is installed in a permeable formation such as sand the response of a piezometer is generally rapid and equilibrium conditions, i.e., water level in the pipe corresponding to water level in the formation, is established in a short time. The less permeable the screened zone is, the longer the time required for equilibrium.

During drilling, ground water encountered may be perched, unconfined (water table) or artesian (confined). A perched water table occurs when downward movement of water due to precipitation is restricted by a layer of relatively low permeability. The water will then "pond" on the restricting layer and form perched ground water or perched water table. If there are no restricting layers such as clay on top of the natually occuring ground water, infiltration is not restricted and the ground water level is free to rise and fall in response to recharge or discharge. Such a formation is known as a unconfined aquifer and the water table is the plane where ground water pressure is equal to atmospheric pressure. The water table height corresponds to the equilibrium water level in a piezometer penetrating the formation.

A confined strata or formation is a layer of water bearing material that is sandwiched between two layers of much less pervious materials like a sandy layer between two clay layers. Confined strata are normally completely filled with groundwater and do not have a free water table. The pressure condition in an confined layer is characterized by the piezometric surface which is the level the ground water will rise to in a piezometer that penetrates the confining layer and is screened in the pervious layer. All three types of ground water occur at the site resulting in a complex ground water regime.

Site Groundwater Regime

Drilling operation started in late September, 1981 and continued through January, 1982. The piezometers installed in September (HB8 - HB26) were sealed with bentonite from 0.0' to 3.0' and screened from 33.0' - 40.0'. Water level data obtained during the first few days after completing the installation of the piezometers indicated that equilibrium conditions were achieved in the majority of the piezometers after a relatively short period of time.

During the week of October 18 and November 1, 1981, considerable precipitation was recorded. Water levels recorded on 11/5 and 11/20 showed that the water level in most of the piezometers fluctuated over a range of a few inches to a few feet. Following an analysis of the data it was concluded that although all of the wells were grouted at the upper three feet, surface water was entering the piezometers and contributing to the large fluctuations noted. Because the surface seal (grout) was believed to be intact, the water was probably entering the piezometers via shallow sand seams or lenses that were below the grouted zone. These sand seams are recharged at or near ground surface and because of their relatively high permeability act as a water conduit, thereby admitting large quantities of water to the piezometers.

The resulting water level recorded in such piezometers did not reflect the true water table level or piezometric surface

In order to obtain a "true" piezometric surface it was decided to regroute all of the HB8 - HB26 series to a deeper level; except well HB-8, the piezometers were sand packed from 33.0 - 40.0', and grouted from 33.0 to the surface. The screened portion extended from 35.0' to 40.0 as originally constructed. After regrouting was completed, each piezometer was evacuated or pumped and water level recording was resumed. At the present time, the piezometers record the water table elevation as piezometric surface encountered in the nongrouted zone only.

The groundwater data presented in Table 1 reflects the above conditions. For example, well HB 17 was regrouted and pumped on December 14, 1981 and true piezometric level was not established in this well until the beginning of January. Similar conditions existed in wells HB 15, 22, and 24.

Along the boundary between land and the Patapsco River, the water table level, if present, should be at or slightly higher than the level of the water in the River. Assuming the river water surface elevation at Mean Sea Level (MSL) implies that the water table level at the land-river interface is at approximately MSL. Water levels in a number of borings near the shore line (HB-14, 17, 20A, 24) are either below MSL or slightly above (the reasons for water levels below MSL are discussed in a subsequent section). Highest water levels were recorded along the southwestern boundary of the site (HB-8, 9, 12) and the southeastern boundary (HB-10, 12, 13). Therefore, based on water level data, the ground water, if present, is moving in a northerly direction toward the Patapsco River.

As was previously stated, the borings at the site show evidence of perched water table, unconfined water table, and confined strata. Perched water tables were encountered in borings HB-17, 22, 23, 24, and 25. For each case, water was encountered at a higher elevation than the equilibrium level. Water table conditions were encountered in boring HB-8, 11A and 63.

TABLE 1

GROUND WATER LEVELS

Well #	Surface Elev.	Encountered G.W. Elev.	Ground Water Elevation Date 10-4	11-5	1-13	1-21	1/29	2/9
8	33.0	15.0	16.9	14.9	10.0	12.6	13.5	14.4
9	40.6	4.6	10.5	10.1	11.5	11.4	11.3	11.9
10	36.9	D	D	8.7	9.0	9.7	10	10.3
11	38.5	-9	7.6	-	-	-	-	-
11A	23.6	7.6	3.5	-	-	-	-	-
12	54.3	-1.7	13.4	11.1	-	-	-	-
13	30.1	-3.9	15.5	14.9	15.7	15.6	15.4	15.4
14	15.7	-3.8	3.6	3.6	2.7	3.6	4.4	4.6
15	21.9	D	7.9	6.9	14.3	15.1	15.1	14.8
16	21.9	D	D	D	-2.9	-0.9	0.8	3.1
17	16.6	13.6	-7.3	-12.8	6.7	6.8	6.9	6.9
18	19.4	D	-12.7	1.4	2.0	2.6	2.6	2.9
19	19.7	D	D	D	-9.4	-7.6	-6.0	-4.1
20A	11.8	-24.7	-3.3	-3.2	Mud	-2.0	-1.9	-1.7
21	24.0	D	D	D	-4.8	9.8	9.5	9.5
22	40.8	31.8	6.8	2.7	D	1.9	1.8	2.5
23	39.9	28.9	5.7	4.8	4.9	5.1	4.9	5.7
24	36.3	29.3	9.9	9.9	4.2	4.5	4.5	4.8
25	38.0	36.5	28.1	28.2	28.4	28.4	28.2	29.2
26	44.1	33.1	6.1	20.7(?)	8.7	Mud	Mud	Mud

TABLE 1

GROUND WATER LEVELS

Well #	Surface Elev.	Encountered G.W. Elev.	Ground Water Elevation Date 10-4	11-5	1-13	1-21	1/29	2/9
44	22.7	D				13.9	13.2	12.7
46	18.3	D				D	D	D
63	22.0	7.0				-	5.0	5.3
64	23.7	-23.3				2.4	3.0	3.2
65	20.2	-46.8				9.3	9.0	9.1
66	26.6	-26.4				4.9	5.2	5.5
67	32.3	-69.7				-0.5	-0.3	0.2

Notes

1. Piezometers 11 & 11A were accidently destroyed after 1-4-81.
2. D = Dry
3. " - " is level below MSL.
4. Piezometer 12 was accidentally destroyed after 11-5.

In these borings, the water level at equilibrium was approximately that which was encountered during drilling. Almost all of the other borings i.e. HB-9, 10, 11, 12-21, 44, 46, 63-67 record piezometric levels. In each case, the hole was dry or water was encountered at substantially lower elevations than those recorded at the present time (Jan. 1982). Careful analysis of each boring log indicates that one or more seams of sandy silt or lenses of more permeable material were encountered and the water level in the piezometer reflects the pressure the water in the more permeable zone is subjected to. Sand lenses or more permeable zones present in the screened area for selected wells are given in Table 2.

TABLE 2

LOCATION OF SAND OR SILT LENSES IN SELECTED WELLS

Well #	Depth of Lens, tt
9	40 - 46
15	34 - 35.5
16	34 - 37
17	32 - 34
19	34 - 35.5
21	32 - 34 (Probable)
22	30 - 35
65	67 - 71

For example, note that borings HB-17 and HB-46 are adjacent to each other; both were drilled to a depth of 40 feet. The water elevation in boring 17 is 6.9 (2/9) feet while boring 46 is dry. The logs of these two borings are similar but a close examination of the soil samples from boring 17 show

narrow or thin seams of silty clay that is more permeable than the surrounding clay, which contains water under pressure. The water level in boring 17 reflects the pressure the ground water is subjected to at these more pervious seams. No silt seams were encountered in boring 46, and therefore, boring 46 is dry. Similar conditions were encountered with other borings. Although the sand seams are more permeable than the surrounding clay, its permeability is often only one or two orders of magnitude higher than the clay. Therefore, water from such a layer does not move rapidly into the piezometer, and the time required to reach equilibrium may be from a few days to a few weeks. Most of the borings which intersect a more permeable formation show a slow steady rise in the water level but in some cases equilibrium conditions have not yet been reached. Such is the case in piezometers HB-10, 14, 16, 19 and 66.

If the hydraulic head in a slightly pervious sand seam or lens is greater than that of the surrounding media, water will migrate due to the head differential or gradient. However, if the surrounding media is clay of very low permeability, the rate of migration of water will be very small.

For example, under a gradient of unity the movement of water in clay having a permeability of 10^{-8} cm/sec is approximately 3 cm in 10 years. Therefore it is possible that after long periods of time, water would migrate vertically upward and saturate the clay layers overlying the sand seams. However, because of the nature of clays, this ground water is not "free" and does not readily move to open holes. The pressure in an open hole or boring is atmospheric and movement of water from the surrounding

medium to the boring can take place only if the water pressure in the surrounding medium is greater than atmospheric. The water pressure in clays which are close to saturation is less than zero and only when these clays are completely saturated is the pressure greater than zero. Only then can movement take place; its rate controlled by the permeability of the clay and the hydraulic gradient.

Ground water data obtained suggest that "free" water table is encountered in only a few cases; most of the borings indicate that ground water is moving vertically upward from more pervious sand seams and/or sand lenses, the aerial extent of these sand seams is unknown as are their recharge zones. Because of the irregular nature of these sand seams, and the unknown rates of flow through them, the proposed design includes an intercepting drain to collect and divert ground water moving toward the waste disposal cells. Groundwater elevations in the piezometers installed at the site are given in Table 1.

A generalized ground water map is shown in the attached set of plans. It should be noted that this ground water map combines water table levels and piezometric surfaces and in view of the above discussion, does not reflect, in each case, the actual water level recorded. The map does represent what is believed to be the piezometric/water table condition at equilibrium. Water level monitoring will continue and adjustments to the above map will be made if warranted.

Intercepting Drain

An incercepting drain is proposed along the northwest and southwest boundary of the site. The purpose of this drain is to intercept and divert any ground water from moving into the waste cells. The drain invert is 4

feet below the bottom of the cell, extends to the ground surface and filled with gravel. The proposed design of the drain is shown in the Surface Water Correction Contract, Plan Sheets 2 & 3 of 6, and Profile Sheet 6 of 6. The interceptor is shown as existing on the drawings as it will be constructed prior to the commencement date of this submittal. It is recognized that sand seams or lenses which may be present in the unscreened zone (grouted portion of a piezometer) are not presently monitored, i.e., the piezometric or water table level of such stratas are not recorded. Such sand seams may be present at any proposed cell site and located either above the invert of the proposed intercepting drain or below it.The flow in any such seams which takes place above the invert of the drain will be intercepted by the drain. Therefore, precise information as the ground water regime in these strata is not required.

Ground water flow in seams located below the intercepting drain invert will not be intercepted by the drain. However, if such flow is under artesian conditions, it may, with time, move vertically up through the surrounding clay layer. Any flow into the vicinity of the drain will be intercepted by it. Flow that reaches the invert of a given cell will be diverted into the leachate collection system proposed for each cell. During excavation of each cell any sand seams encountered will be sealed.

Production Well Data

An evaluation was made of production wells located in the Patuxent and Patapsco formations where production exceeds 10,000 gallons per day (.01 mgd), and especially with high production wells where production exceeds 1,000,000 gallons per day (1.0 mgd). The well locations and production data were obtained from the U.S. Geological Survey, the Maryland Water Resources Administration, Anne Arundel County Department of Public Works, and various technical data files and reports. The wells are shown on Exhibit 1 and Exhibit 2.[A,B,C] in Appendix C.

The Patapsco and Raritan formations occurring above the Arundel Clay have at least 19 wells within 10 miles of the site producing from 0.01 mgd to 0.1 mgd, 3 wells producing 0.1 mgd to 1.0 mgd, and 2 well fields producing above 1.0 mgd. The two well fields are the Sparrows Point field in Baltimore County and the Glen Burnie field in northern Anne Arundel County (Exhibit 1); these are approximately 4 and 6 miles from the fill site, respectively. No additional high capacity wells (1.0 mgd or above) have been identified closer to the site.

Only the wells having production above 1.0 mgd were evaluated as being potentially affected or affecting the groundwater movement in an area immediately adjacent to the proposed Hawkins Point DHS Disposal Facility.

[A] Harrington, Lacey and Associates, Quarantine Road Secure Landfill - Part I: Secure Landfill Operating Plan and Procedures, (August, 1980), pp. II-9 through II-11.

[B] Lucas, Richard, C., Anne Arundel County Groundwater Information: Selected Well Records, Chemical-Quality Data, Pumpage, Appropriation Data, and Selected Well Logs: Water Resources Basic Data Report No. 8, Maryland Geological Survey (Baltimore: 1976), 149 pp.

[C] Laughlin, Charles P., Records of Wells and Springs in Baltimore County, Maryland: Water Resources Basic Data Report No. 1, Maryland Geological Survey, (Baltimore: 1966), 403 pp.

On that basis, only the Glen Burnie and Sparrows Point well fields have been investigated. The remaining wells identified produce an approximate total of only 3.0 mgd with average individual production of less than 0.1 mgd. The total production of these wells is less than 30% of the Glen Burnie well field alone.

The Glen Burnie well fields had an actual production rate ranging between 10 and 12 mgd in the first two weeks of January, 1982.[D] The Sparrows Point field produced approximately 1.0 mgd in 1977; more recent production figures have not yet been located.

Two wells in the Sparrows Point field are screened in the Patapsco at 206 - 222 feet and 283 - 304 feet.[E]

Pollution Potential

The major aquifers underlying the site are the Patapsco and the Patuxent. The Patuxent formation is overlain by the Arundel Clay Strata, estimated to be about 100 feet thick. Above the Arundel clay lies the Patapsco aquifer. The clay layer at the site which lies above the Patapsco is massive and extends to some 100 feet (boring HB-67). Within this layer, sand or silty sand seams are present where the pressure of the water is greater than atmospheric (confined stratas). Thus, inflow in this clay layer is limited and is due to infiltration from precipitation and outflow from the sand seams.

[D] Source - Anne Arundel County Department of Public Works, Bureau of Utility Operations - Water Division, January, 1982.

[E] Personal communication with Miss Claire Richardson, Geologist, U.S. Geological Survey in Baltimore, Maryland, September, 1978. Reverified, January, 1982.

Due to the presence of pressures greater than zero in the sand seams, the infiltration from such seams into the clay layer although small, is larger than the vertical downward infiltration from precipitation. Because the sand seams are under positive pressure, it is unlikely that any pollutant can enter such seams, since the gradient is away from the seam toward the clay. Therefore, any contaminant that does not move into the leachate collection system, will remain in the clay layer and eventually move toward the Patapsco River, or toward the drain interceptor. Likelihood of contamination of existing ground water supplies is extremely remote.

REFERENCES

1. Geologic Map of Maryland, 1968.

2. Bennet, Robert R., and Rex R. Meyer, Geology and Groundwater Resources of the Baltimore Area, Maryland Geological Survey, Bulletin 4, 1952.

3. Dingman, B.J., and M.D. Ferguson, The Water Resources of Baltimore and Hartford Counties, Maryland Geological Survey, Bulletin 17, 1956.

SUBSURFACE CONDITIONS

GENERAL

A field and laboratory exploration program has been conducted to determine existing soil and groundwater conditions at the Hawkins Point DHS Disposal Facility, and to provide geotechnical input into the design of that facility. A location plan of the test borings which have been completed and of the observation wells which have been installed are shown on sheet 10 of 22. Logs are presented in Appendix A of this report.

The emphasis of this report has been focused principally on two areas of the Hawkins Point DHS Facility, referred to as the proposed Site 2 and Cell 4, shown on sheet 2 of 22 . Five (5) generalized subsurface profiles showing the approximate depth and distribution of soil strata as well as the elevations at which water was encountered in the respective boreholes drilled in the vicinity of the proposed Site 2 are presented on sheet 17 of 22. Four (4) generalized subsurface profiles showing soil strata and groundwater encountered in the vicinity of the proposed Cell 4 are presented on sheets 17 & 17A of 22. Presented below are brief descriptions of the conditions encountered at each of the proposed cells.

Site 2

Nine (9) Standard Penetration Test (SPT) borings have been drilled in the vicinity of Site 2. Those borings, shown on sheets 17 & 17A, were drilled to depths varying from approximately 30 feet to 65 feet. Each of the borings encountered three general soil strata. Typically, SPT samples were obtained at 2.5 foot intervals for the depth of those borings to enable better

definition of the strata and groundwater conditions at the respective borings. A groundwater observation well was also installed in the completed borehole of HB-63. No laboratory tests were conducted on the samples retrieved from the Site 2 area.

Stratum 1 - Below existing grades, sands, containing varying quantities of gravel and traces to layers of silt and/or sandy clay were the initial strata encountered. The thickness of this stratum varied from 5 to 20 feet along the west side of the site, 3 to 8 feet atop the existing wastes in the central disturbed areas of the site, and 8 to 14 feet along the east side of the site. SPT 'N' values also varied across the site ranging from 3 to 14 blows per foot in the west, 10 to 20 blows per foot in the east, and from 4 to greater than 100 blows per foot in the central Site 2 areas.

Stratum 2 - The second strata encountered consisted primarily of sandy to clayey silts. Traces of organics and shells were also logged in this stratum. Stratum 2 averaged 12 feet in thickness in the western borings and 24 feet in thickness in the eastern borings, and varied from approximately 5 to 15 feet beneath the existing chrome waste that were encountered in borings HB-52 and HB-54. SPT 'N' values typically varied from 5 to 15 blows per foot within this stratum. Notably, however, SPT 'N' values varying from 20 to 40 blows per foot were recorded at borings HB-58 and HB-59 drilled along the western limits of Site 2. Also, unconformably, a strata or pocket of medium stiff to stiff red silty clay was encountered in borings HB-61 and HB-62.

Chrome wastes having SPT 'N' values which typically varied from 20 blows per foot to greater than 50 blows per few inch penetration were encountered

beneath and above the Stratum 1 and 2 soils at borings HB-52 and HB-54 respectively.

Stratum 3 - The basement strata encountered in all of the test borings in the Site 2 area was a sand which contained layers and/or innter stratas of clay and silt. The interface of this stratum with the overlying stratum 2 soils, as shown on the two east-west subsurface profiles through the site, appeared to slope towards Thoms Cove at 1:10 (vertical:horizontal) or flatter.

SPT 'N' values averaged 3 to 10 blows per foot in the southern areas of Site 2 within upper 25 to 35 feet of Stratum 3. In the remaining Site 2 areas explored, 'N' values typically ranged from 10 blows per foot to greater than 50 blows per few inches penetration and generally increased with depth.

Cell 4

Seventeen (17) Standard Penetration Test (SPT) borings have been drilled within the immediate vicinity of the proposed Cell 4. Close interval SPT samples were obtained from most of the borings drilled in proximity of the cell, particularly through existing fills, disturbed soils and alluval deposits. Undisturbed Shelby tube samples were retrieved from offset borings drilled adjacent to borings HB-71 and HB-73. Groundwater observation wells were also installed in four of the completed boreholes in the vicinity of Cell 4 designated HB-14, HB-16, HB-44 and HB-66. As previously stated, logs describing the soil and groundwater conditions encountered in the borings are presented in Appendix A and four (4) generalized subsurface profiles showing conditions in the vicinity of the proposed Cell 4 are presented on sheets 17 & 17A of 22. Table 1 presents a summary of the laboratory test results which have been conducted on samples retrieved from

the borings drilled in proximity to the proposed Cell 4. Table 2 summarizes the strength test results obtained.

Although the actual subsurface conditions encountered in proximity to the proposed Cell 4 are quite variable and complex, geotechnically, we have identified the two basic soil strata shown on the 'Generalized Subsurface Profiles'.

Stratum 1 - Beneath existing site grades to elevations varying from +24 near boring HB-66 to elevation -26 at boring HB-42, fills, disturbed soils and/or alluvial soils were encountered. The nature of those soils varied from sands to silts to clays within small vertical and horizontal distances and contained varying percentages of organics, randomly. The general index tests of moisture determination, grain size analysis and Atterberg limit testing were performed on representative samples retrieved from the surfical strata of fill and alluvail soils. Natural moisture contents determined varied from 11 to 57 percent, typically averaging 16 to 18 percent in the fills encountered above elevation +20 and 20 to 25 percent in the stratum 1 soils below elevation +20. The higher moisture contents determined were typically associated with soft organic layers in alluvial soils. The plastic (P.I) determined from the Atterberg limit tests performed on the fine grained stratum 1 soils varied from non-plastic to a P.I. of 32 but typically averaged 16, and classified as a CL or ML according to the Unified Soil Classification System. CH, MH and OH soils, however, were also identified within the designated stratum 1 soils. The results of grain size analysis performed on stratum 1 soils are included in the Appendix. Notably, a sample of chrome retrieved from boring HB-34 was tested and yielded the gradiation of a fine to coarse sand

containing a little fine gravel and a trace of silt. In-situ dry unit weights determined on all undisturbed Shelby tube samples retrieved are presented in Table 1 or Table 2.

Pocket Penetrometer Test and Pilcon Vane Shear Tests were performed on representative split spoon and Shelby tube cohesive samples retrieved from stratum 1 to determine an estimate of their confined compressive strength. The values determined varied from less than 0.25 tons per square foot (TSF) to greater than 4.5 TSF generally corresponding inversely with the moisture contents determined.

Additional strength tests, performed on undisturbed Shelby tube samples of stratum 1 clays and silts retrieved from borings HB-71A and HB-73A, included: Unconsolidated Undrained (UU) triaxial tests, Isotropically Consolidated Triaxial Compression test with pore pressure measurements (CTU), and Direct Shear test. Those results are summarized in Table 2 and data plots of their results are included in the Appendix.

Consolidation tests were conducted on undisturbed Shelby tube samples of clayey silt retrieved from stratum 1 in borings HB-71A and HB-73A. The stress history of those samples as well as their consolidation characteristics, are indicated on the time-deflection curve and strain-pressure data sheets included in this Chapter.

Stratum 2 - Beneath the stratum 1 soils, mottled red to gray silty clays containing layers, seams and/or pockets of yellow to brown sands and silts were encountered and represent the second general soil stratum encountered in the proposed Cell 4 area. This stratum was rather well defined at each boring,

typically being identified by its color and by a noticable increase in recorded SPT 'N' values. 'N' values averaged greater than 30 blows per foot within this stratum, however, they ranged from 2 blows per foot to greater than 50 blows per few inch penetration. Moisture contents determined on representative samples retrieved from stratum 2 ranged from 12% to 33%. Liquid limits varied from 26% to 34% and plastic limits varied from 10% to 35% on the fine grained samples tested from that stratum. According to the Unified Soil Classification System, they typically classify as a CL although some ML, MH and CH soils were identified. Representative gradiation curves of the granular soils encountered within the stratum are included in the Appendix. Unconfined compressive strengths, estimated from Pocket Penetrometer Tests performed on split spoon samples, typically varied from 2.0 TSF to greater than 4.5 TSF for the cohesive samples tested from stratum 2.

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

DHS DISPOSAL FACILITY

HAWKINS POINT, BALTIMORE, MARYLAND

HA81150

BORING AND SAMPLE NO.	DEPTH (FEET)	POCKET PENETROMETER (TSF)	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	GRAIN SIZE
HB-34, S-3	9.5-11.0	>4.5	13.5		18	
HB-34, S-4	14.5-16.0	>4.5				
HB-34, S-6	19.5-21.5		18.5			*
HB-34, S-7B	22.0-24.0	3.5 to 4.0	19.5	37	21	
HB-34, S-9	27.0-29.0	4.0				
HB-34, S-10	29.5-31.0	4.0	16.5	46	24	
HB-39, S-5	10.0-12.0	1.0	23.0	64	36	
HB-39, S-6	12.5-14.5	3.0	26.5	63	24	
HB-39, S-7	15.0-17.0	1.5	33.0			
HB-39, S-8	17.5-19.0	4.0	23.0			
HB-39, S-10	25.0-26.5	>4.5	16.0			
HB-39, S-12	35.0-36.5	>4.5	12.0	36	10	
HB-41, S-3	5.0- 6.5	>4.5	13.5	41	22	
HB-41, S-8	16.5-18.0		18.5			
HB-41, S-13	40.0-41.5		25.5			*
HB-42, S-4	15.0-16.5		11.5			*
HB-42, S-8	35.0-36.5	<0.25	57.0	56	24	
HB-42, S-10	38.0-40.0	<0.25	53.0	59	40	

*SEE TEST CURVES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

DHS DISPOSAL FACILITY

HAWKINS POINT, BALTIMORE, MARYLAND

HA81150

BORING AND SAMPLE NO.	DEPTH (FEET)	POCKET PENETROMETER (TSF)	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	GRAIN SIZE
HB-42, S-12	42.0-44.0	<0.25	49.0			
HB-42, S-15	48.0-50.0	<0.25	23.5	26	21	*
HB-42, S-19	56.0-58.0	2.0	20.0	34	16	
HB-42, S-21	60.0-62.0		17.0			*
HB-42, S-23	64.0-66.0	>4.5	15.0	35	12	
HB-42, S-25	68.0-70.0		12.0			*
HB-44, S-3	5.0- 7.0	>4.5	17.0	NP	NP	
HB-44, S-5	10.0-12.0	0.75 to 1.25	21.0	32	21	
HB-44, S-7	15.0-17.0	0.25	23.0			
HB-44, S-9	20.0-21.5		20.0	32	25	*
HB-44, S-10	22.5-24.0	1.0	21.5	35	27	
HB-44, S-12	27.5-29.0	2.0	25.5	35	29	
HB-44, S-14	32.5-34.0	>4.5	15.5	32	27	
HB-44, S-16	37.0-38.5		15.0	26	22	*
HB-45, S-2	2.5- 4.5		21.5			
HB-45, S-4	7.5- 9.5	>4.5	19.5	46	20	
HB-45, S-6	12.5-14.0	>4.5	15.5	42	25	
HB-45, S-7	15.0-16.5	>4.5	14.5			
HB-45, S-8	17.5-19.0	>4.5	21.0	55	34	
HB-45, S-11	25.0-26.5	>4.5	14.5	36	10	

*SEE TEST CURVES

Sheet 2 of 2

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

DHS DISPOSAL FACILITY

HAWKINS POINT, BALTIMORE, MARYLAND

HA81150

BORING AND SAMPLE NO.	DEPTH (FEET)	POCKET PENETROMETER (TSF)	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	IN-SITU DRY UNIT WEIGHT (
HB-71A, Tube 1	5.5- 6.0	1.25	18.5	28	11	110.5
	6.0- 6.5	1.0	20.0			108.5
	6.5- 7.0	1.0	15.0			121.5
HB-71A, Tube 2	10.5-11.0	2.75	16.0	27	14	
	11.0-11.5	2.5	19.5			
HB-71A, Tube 3	15.5-16.0	2.0	16.5	29	13	111.0
	16.0-16.5	2.25	17.5			112.0
	16.5-17.0	2.25	16.3			114.5
HB-71A, Tube 4	21.0-21.5	0.25	17.0	23	9	112.0
HB-71A, Tube 5	26.0-26.5	1.75	16.5	26	11	113.5
	26.5-27.0	3.5	17.0			111.5
HB-71A, Tube 6	31.0-31.5	2.25	17.0	24	19	110.5
	31.5-32.0	2.25	18.5			107.5
HB-71A, Tube 7	35.0-37.0		16.5	32	20	

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

DHS DISPOSAL FACILITY

HAWKINS POINT, BALTIMORE, MARYLAND

HA81150

BORING AND SAMPLE NO.	DEPTH (FEET)	POCKET PENETROMETER (TSF)	PILCON VANE SHEAR (TSF)	NATURAL WATER CONTENT	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	IN-SITU (PCF)	CONSOLIDATION	TRIAXIAL
HB-71A, Tube 8	45.0-47.0			36.0	75	43			*
HB-71A, Tube 9	50.0-52.0		0.65	46.5	65	38		▲	*
HB-73A, Tube 1	11.0-11.5	1.5		23.0	38	20	107.0		
	11.5-12.0						100.5		
HB-73A, Tube 2	15.5-16.0	2.0		22.0	35	20	105.0		
	16.0-16.5	2.5		21.5			106.0		
	16.5-17.0	1.5		21.5			105.5		
HB-73A, Tube 3	20.0-22.0			44.5	52	34			*
HB-73A, Tube 4	25.0-27.0			24.5			101.2		
HB-73A, Tube 5	30.0-32.0			59.5	69	37		▲	*
HB-73A, Tube 6	35.0-37.0			60.0	76	40			*

▲ SEE TEST CURVES

* SEE TABLE 2 and TEST CURVES

TABLE 2

SUMMARY OF STRENGTH TEST RESULTS

DBB DISPOSAL FACILITY

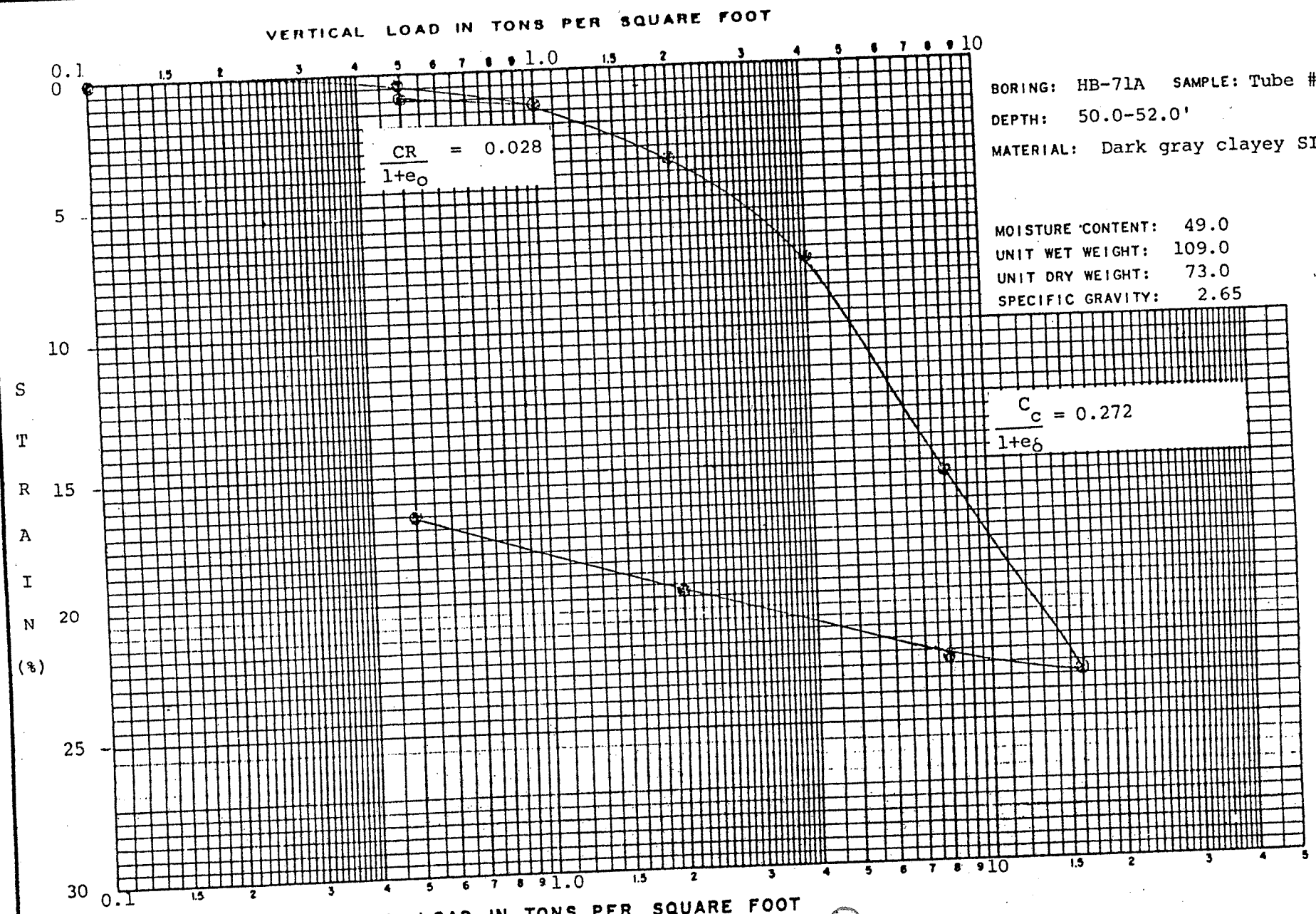
HAWKINS POINT, BALTIMORE, MARYLAND

HA81150

BORING AND SAMPLE NO.	DEPTH (FEET)	TYPE OF TEST	NATURAL WATER CONTENT (%)	IN-SITU	TOTAL STRESS ANALYSIS Ø	TOTAL STRESS ANALYSIS C_{ksf}	MARYLAND STRESS Ø	EFFECTIVE ANALYSIS C'_{ksf}
HB-71A, Tube 8	45.0-47.0	Triaxial Compression (UU)	64.0	60	0	1.0	--	--
HB-71A, Tube 9	50.0-52.0	Direct Shear	46.5	77	29.0	0.45	--	--
HB-73A, Tube 3	20.0-22.0	Direct Shear	59.0	66	25.5	0.14	--	--
HB-73A, Tube 3	20.0-22.0	Triaxial Compression (UU)	74.0	54	0	0.72	--	--
HB-73A, Tube 5	30.0-32.0	Triaxial Compression ($\overline{CIU}$)	45.0	73	14.0	0.45	26	0.40
HB-73A, Tube 6	35.0-37.0	Triaxial Compression (UU)	55.0	65	0	0.72	--	--

CONSOLIDATION TEST

PREPARED BY:	DATE:	CHECKED BY:	DATE:		JOB NO.:
HKA-I	2/1982	HAI	2/11/82	DHS Disposal Facility Hawkins Point Baltimore, Maryland	HA81150

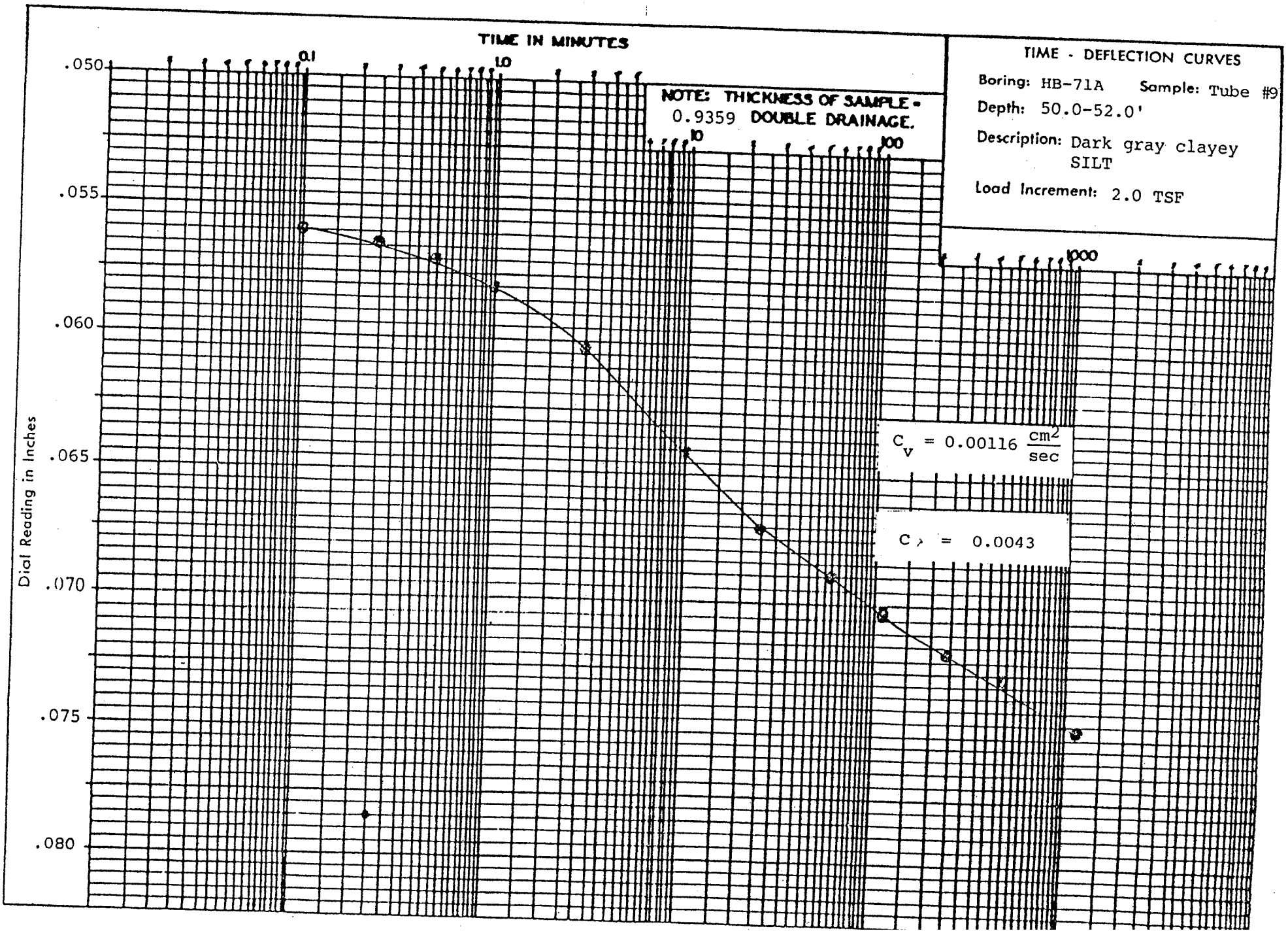


Prepared By RAW Date 2/9/82 Project HA81150

Checked By JBC Date 2/10/82

DHS Disposal Facility
Hawkins Point
Baltimore, Maryland

HARDIN ASSOCIATES, INC.
Consulting Engineers



TIME - DEFLECTION CURVES

Boring: HB-71A Sample: Tube #9

Depth: 50.0-52.0'

Description: Dark gray clayey SILT

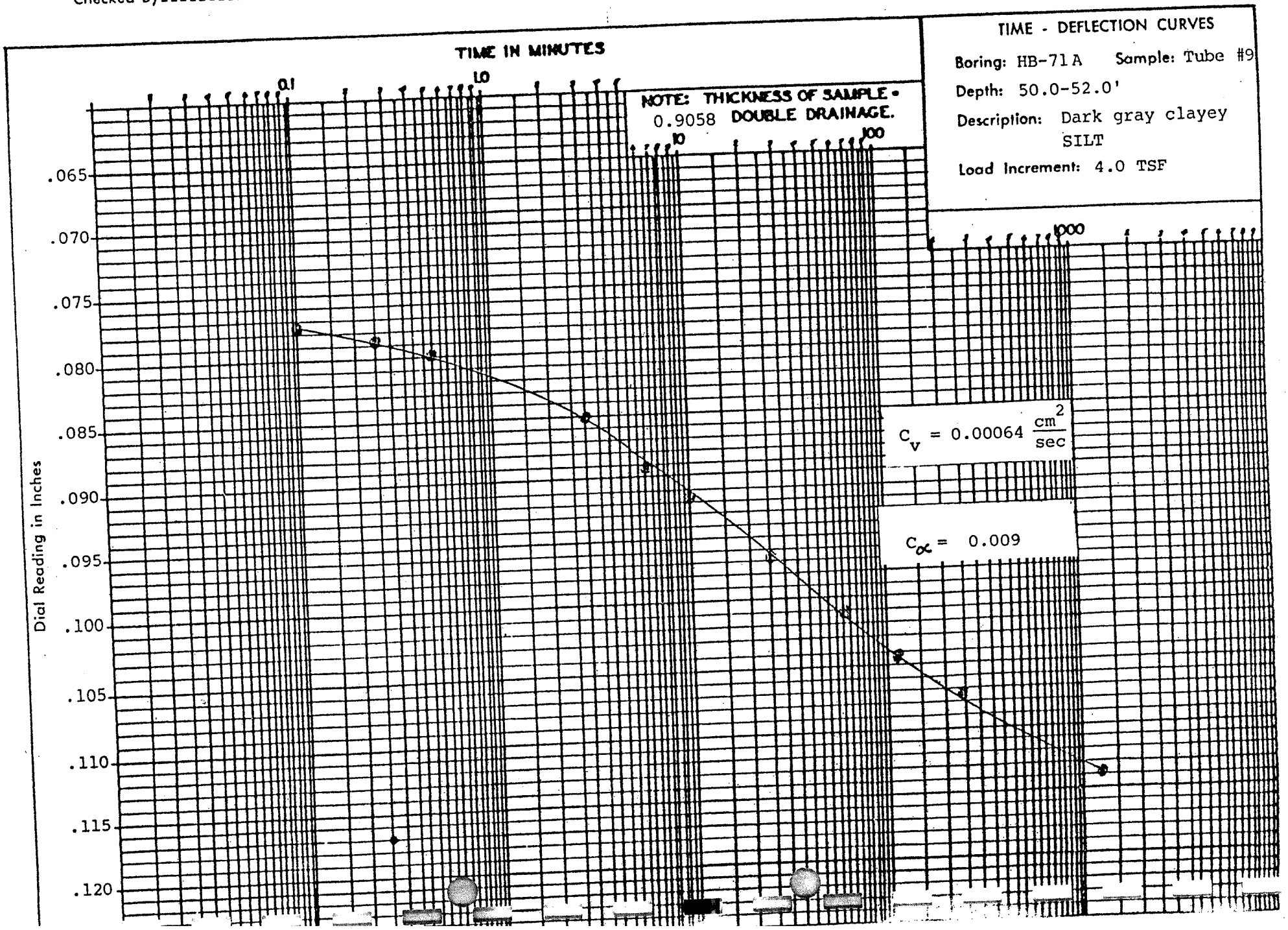
Load Increment: 2.0 TSF

Prepared By RAW Date 2/9/82 Project HA81150

Checked By JBC Date 2/10/82

DHS Disposal Facility
Hawkins Point
Baltimore, Maryland

HARDIN ASSOCIATES, INC.
Consulting Engineers



CONSOLIDATION TEST

PREPARED BY:	DATE:	CHECKED BY:	DATE:		JOB NO.:
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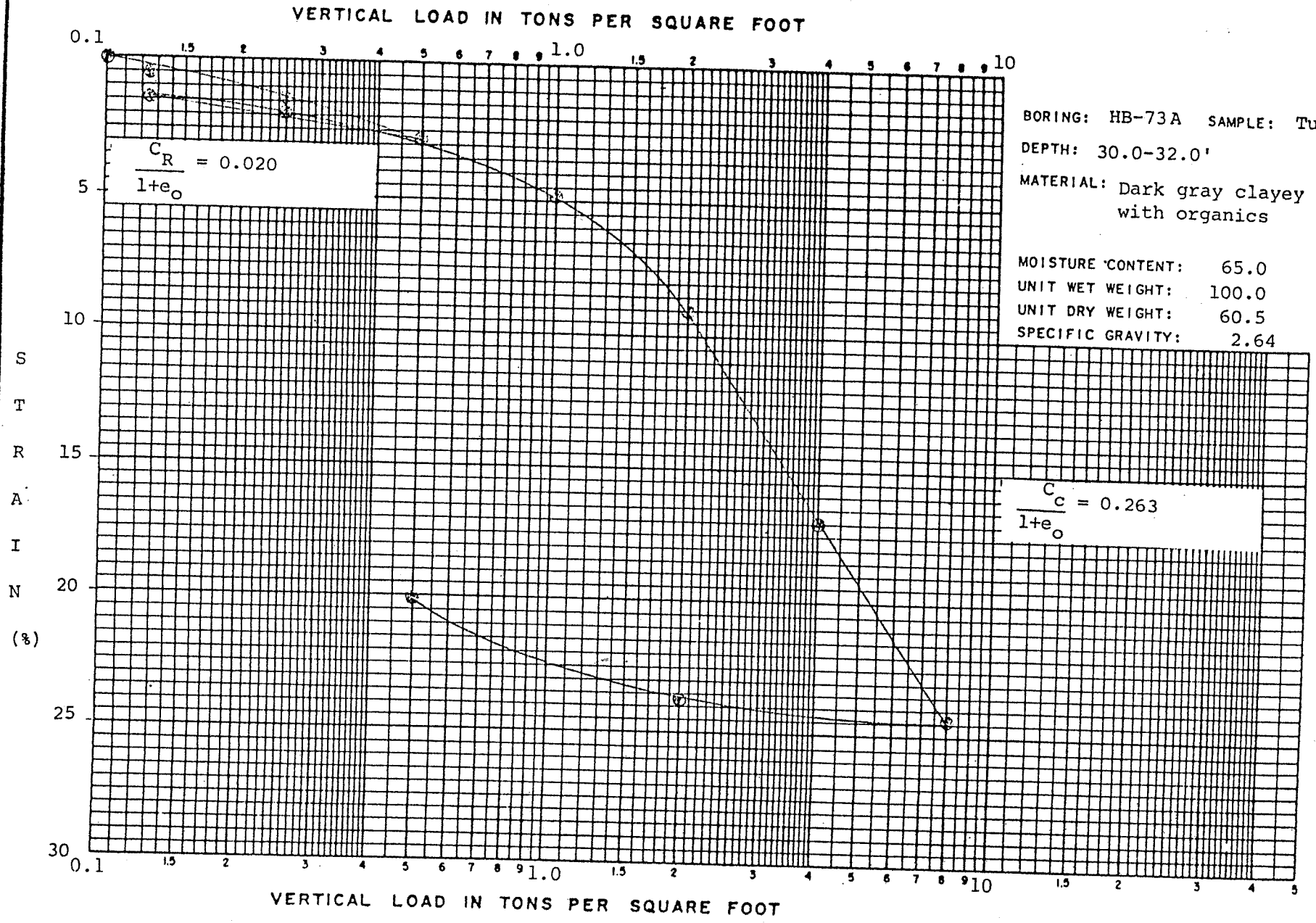


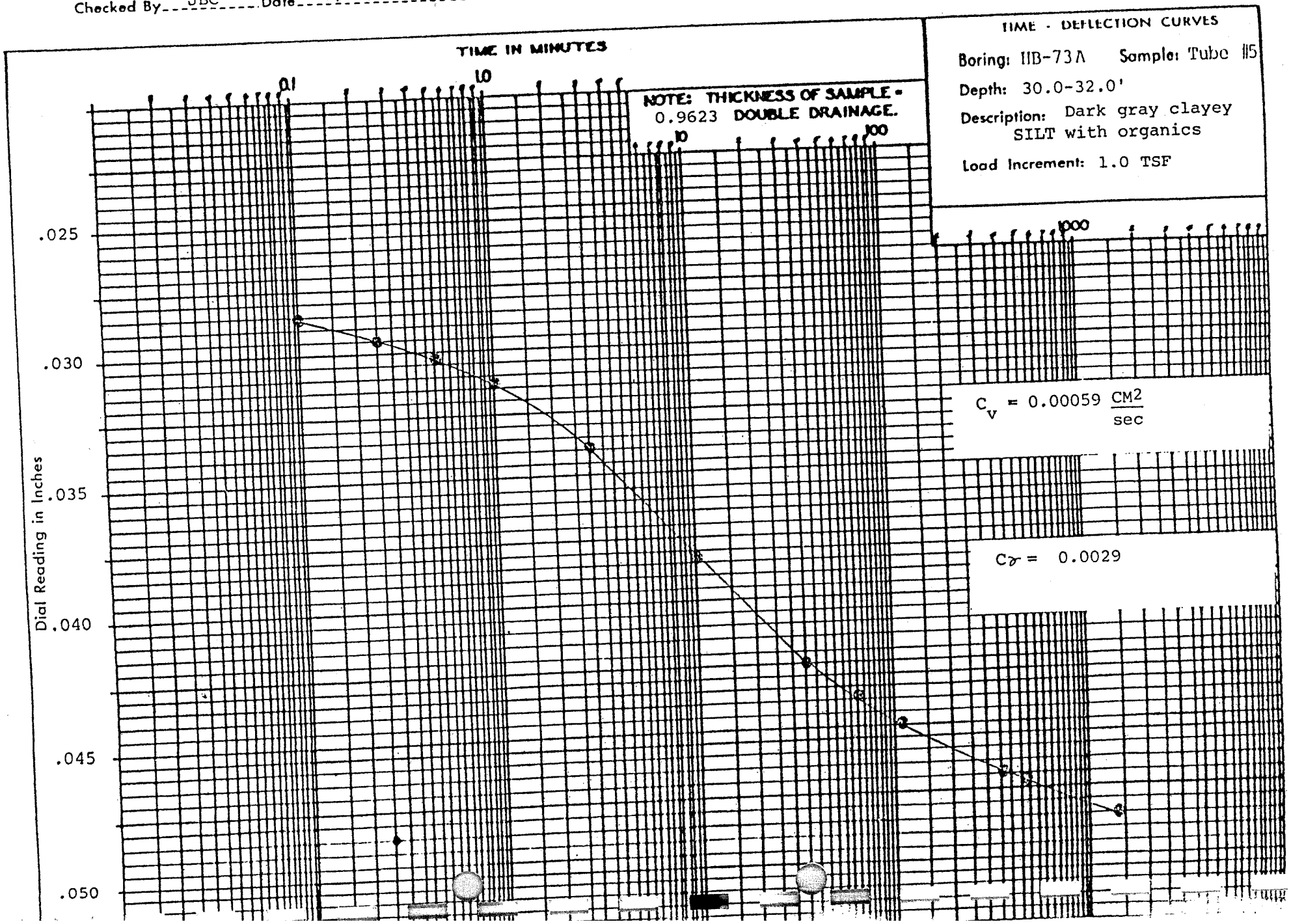
HARDIN ASSOCIATES, INC. — CONSULTING ENGINEERS — BALTIMORE, MARYLAND

Prepared By RAW Date 2/9/82 Project HA81150

Checked By JBC Date 2/10/82

DHS Disposal Facility
Hawkins Point
Baltimore, Maryland

HARDIN ASSOCIATES, INC.
Consulting Engineers

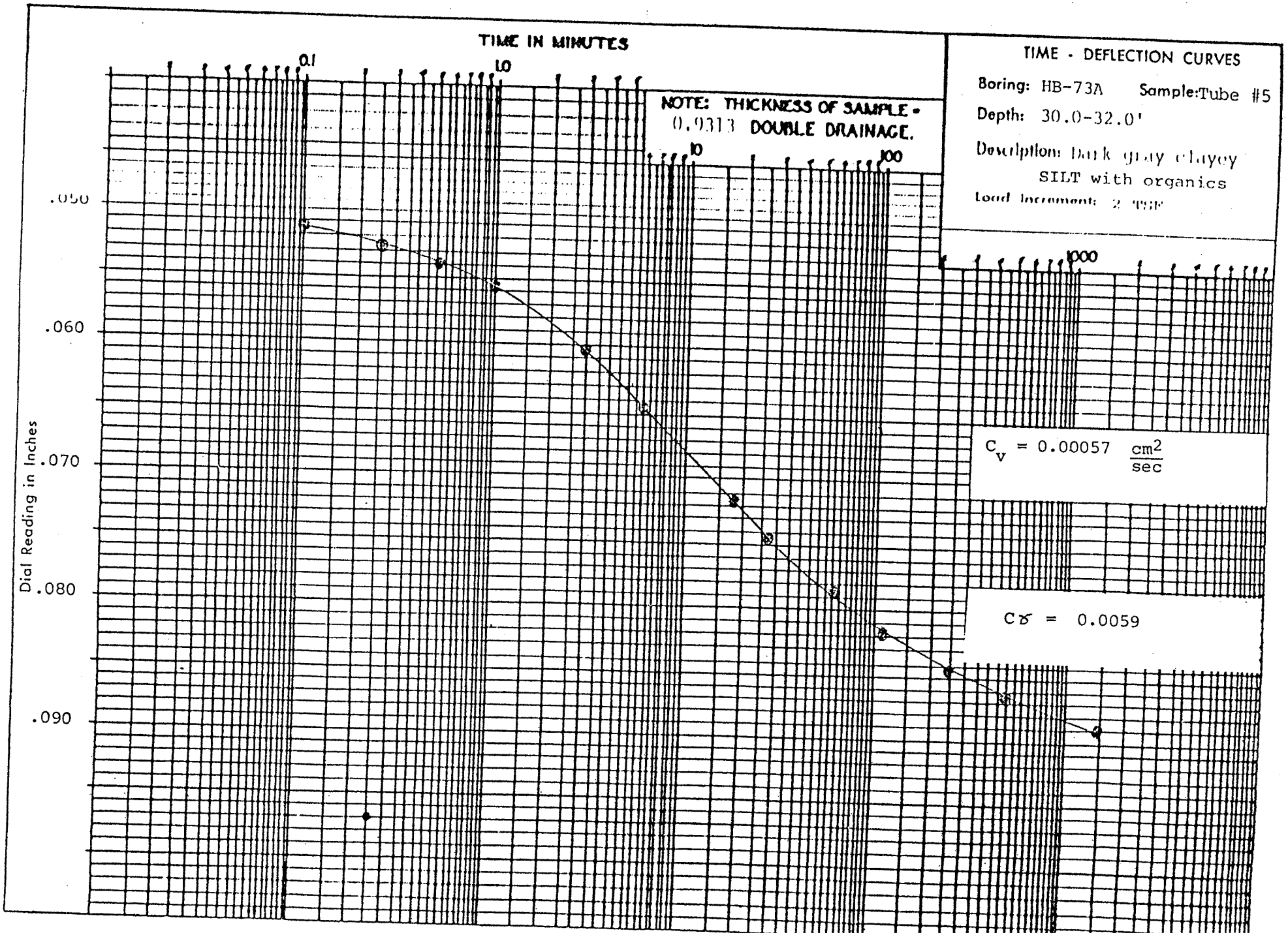


Prepared By RAW Date 2/9/82 Project HA81150

Checked By JBC Date 2/10/82

DHS Disposal Facility
Hawkins Point
Baltimore, Maryland

HARDIN ASSOCIATES, INC.
Consulting Engineers



TRIAXIAL COMPRESSION TEST

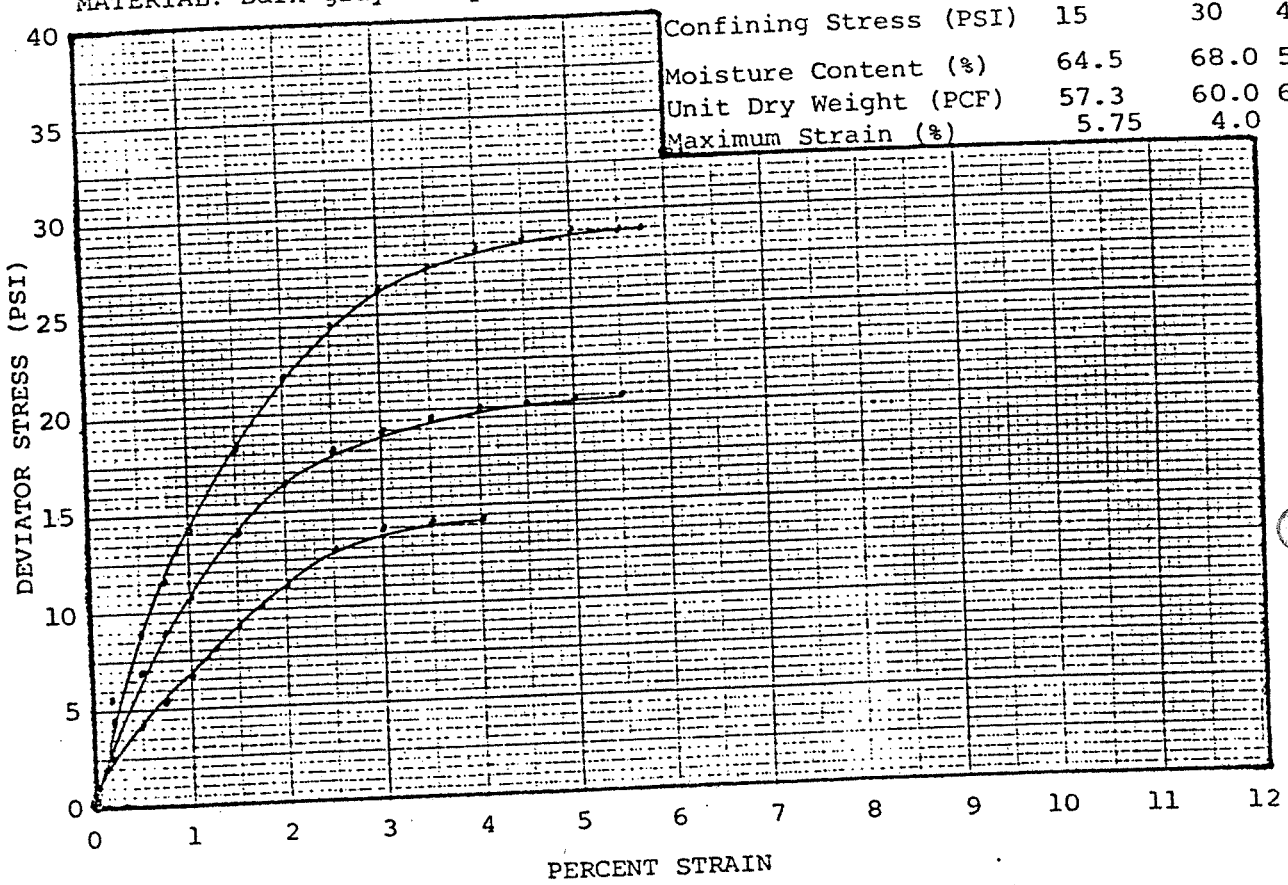
TEST SOURCE LOCATION: HB-71A

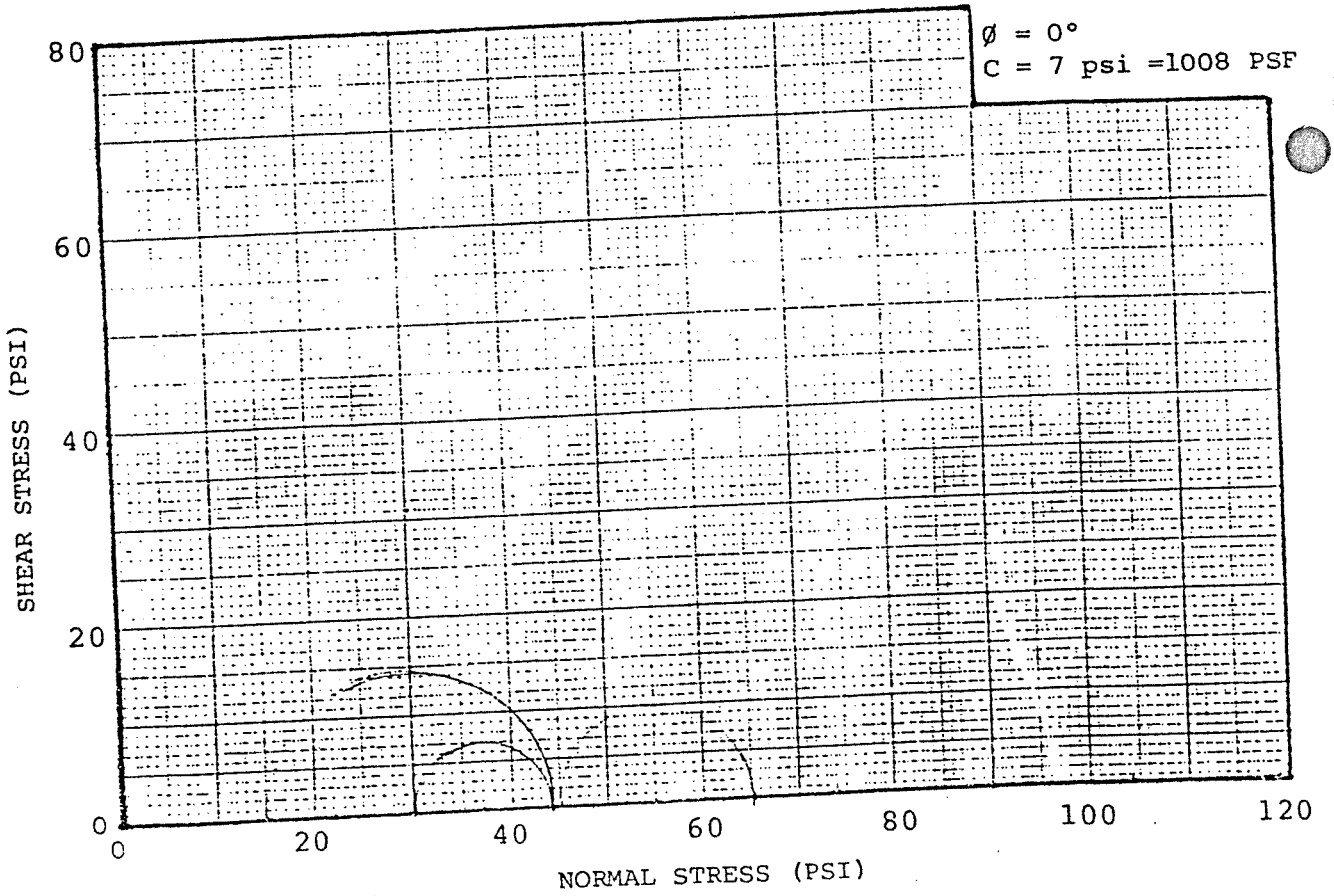
DEPTH: 45.0-47.0 feet

UU Test

MATERIAL: Dark gray silty CLAY with organics

Confining Stress (PSI)	15	30	45
Moisture Content (%)	64.5	68.0	59.4
Unit Dry Weight (PCF)	57.3	60.0	63.1
Maximum Strain (%)	5.75	4.0	5.5





JOB NUMBER: HA81150

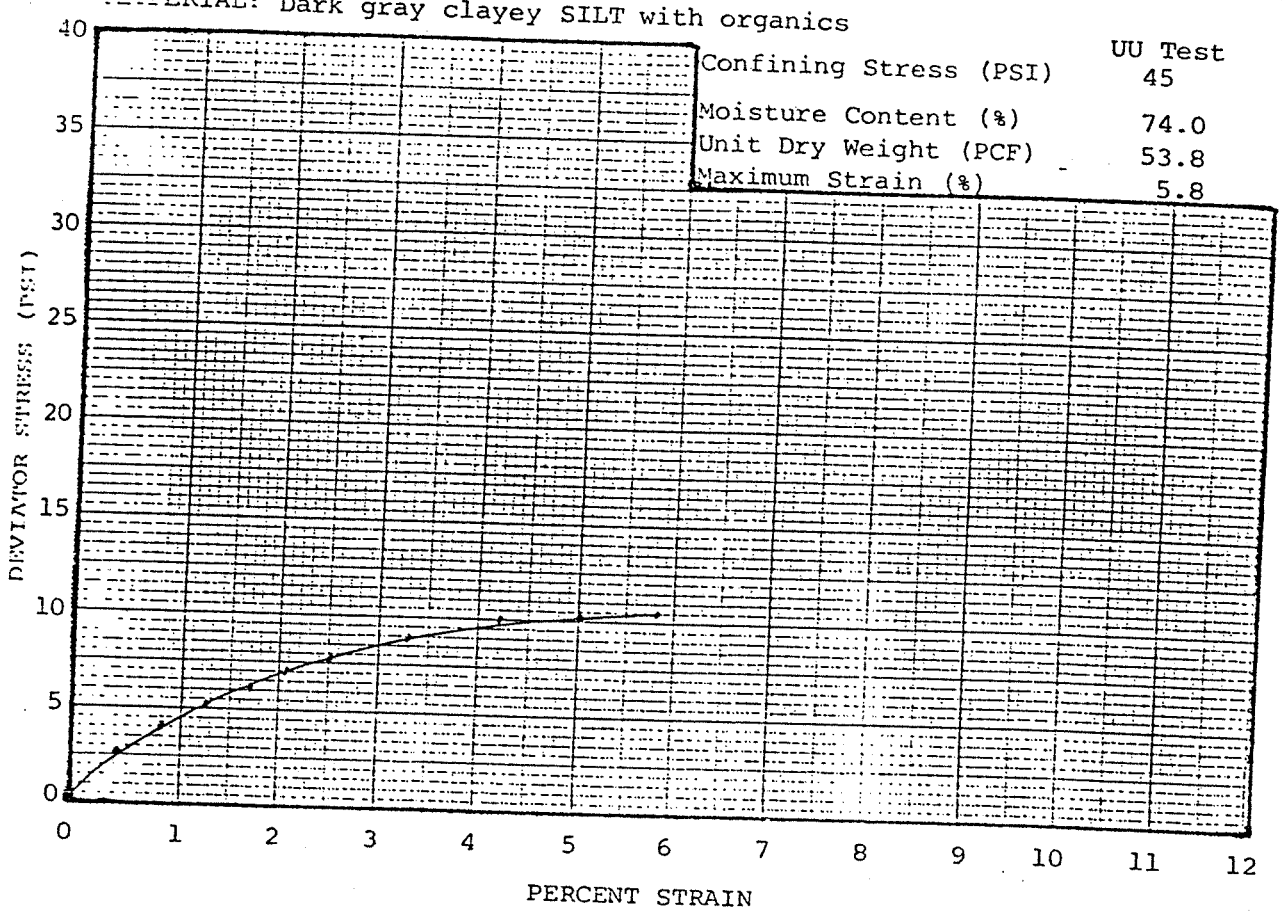
TRIAXIAL COMPRESSION TEST

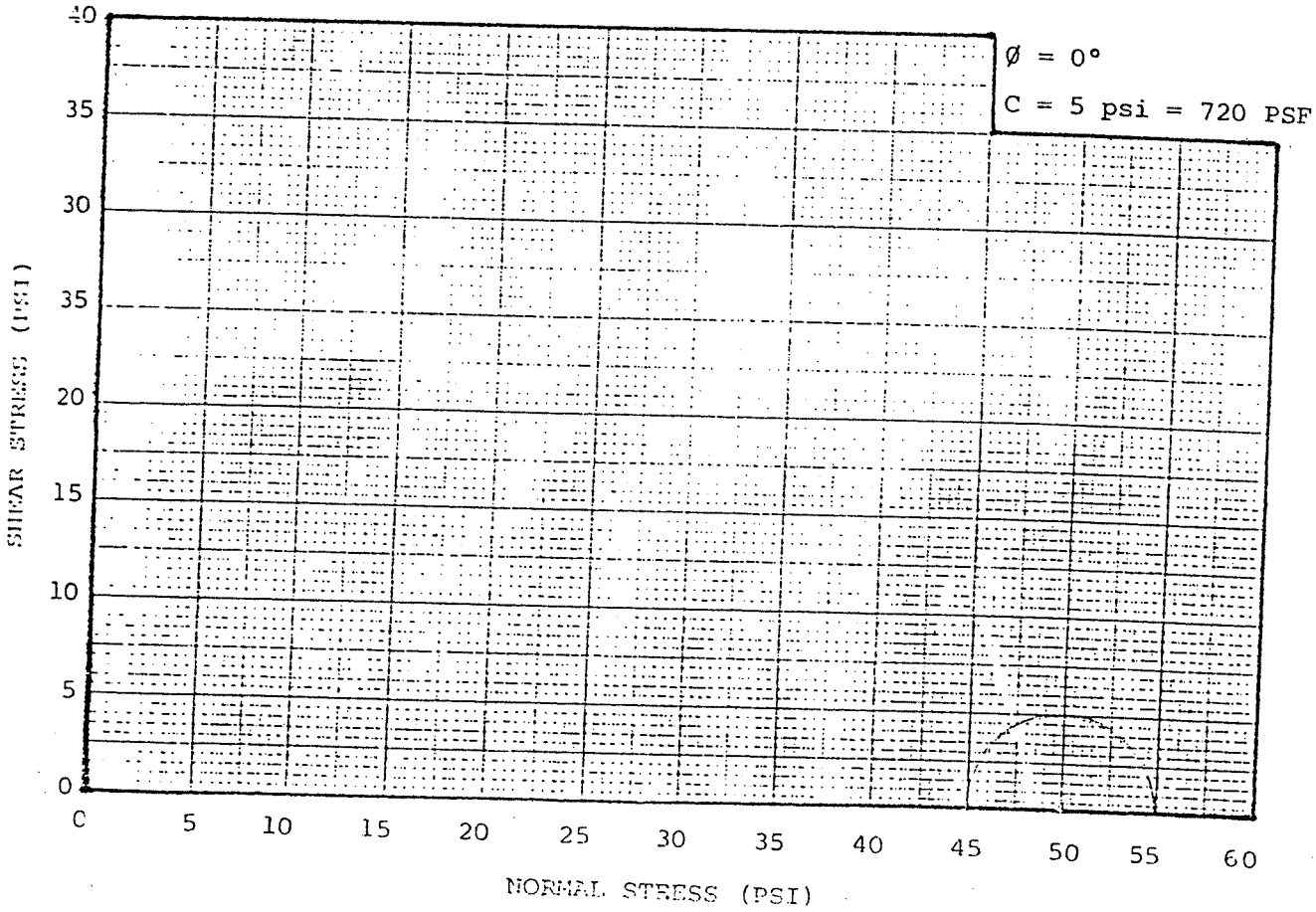
TEST SOURCE LOCATION: HB-73A

DEPTH: 20.0-22.0 feet

MATERIAL: Dark gray clayey SILT with organics

	UU Test
Confining Stress (PSI)	45
Moisture Content (%)	74.0
Unit Dry Weight (PCF)	53.8
Maximum Strain (%)	5.8





JOB NUMBER: HA81150

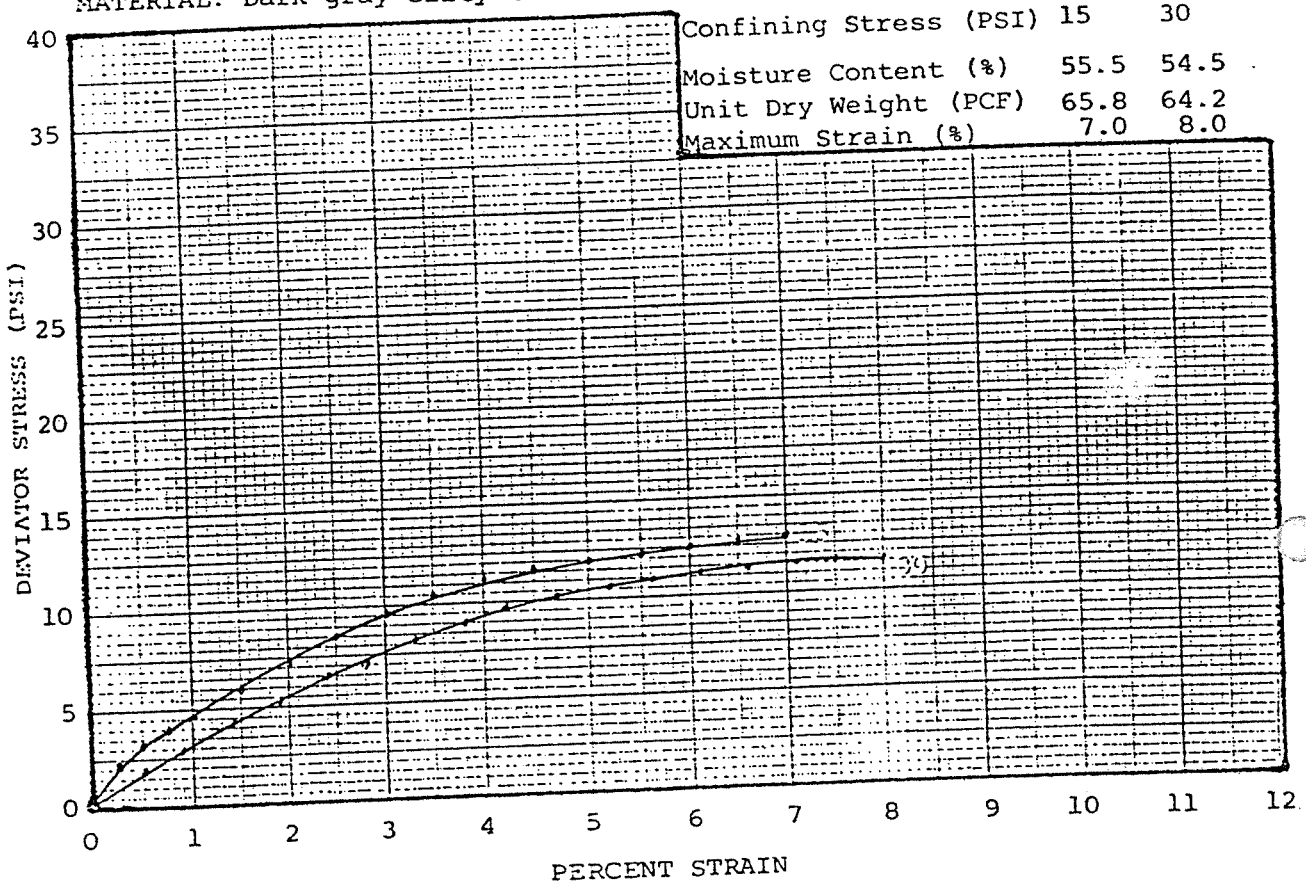
TRIAXIAL COMPRESSION TEST

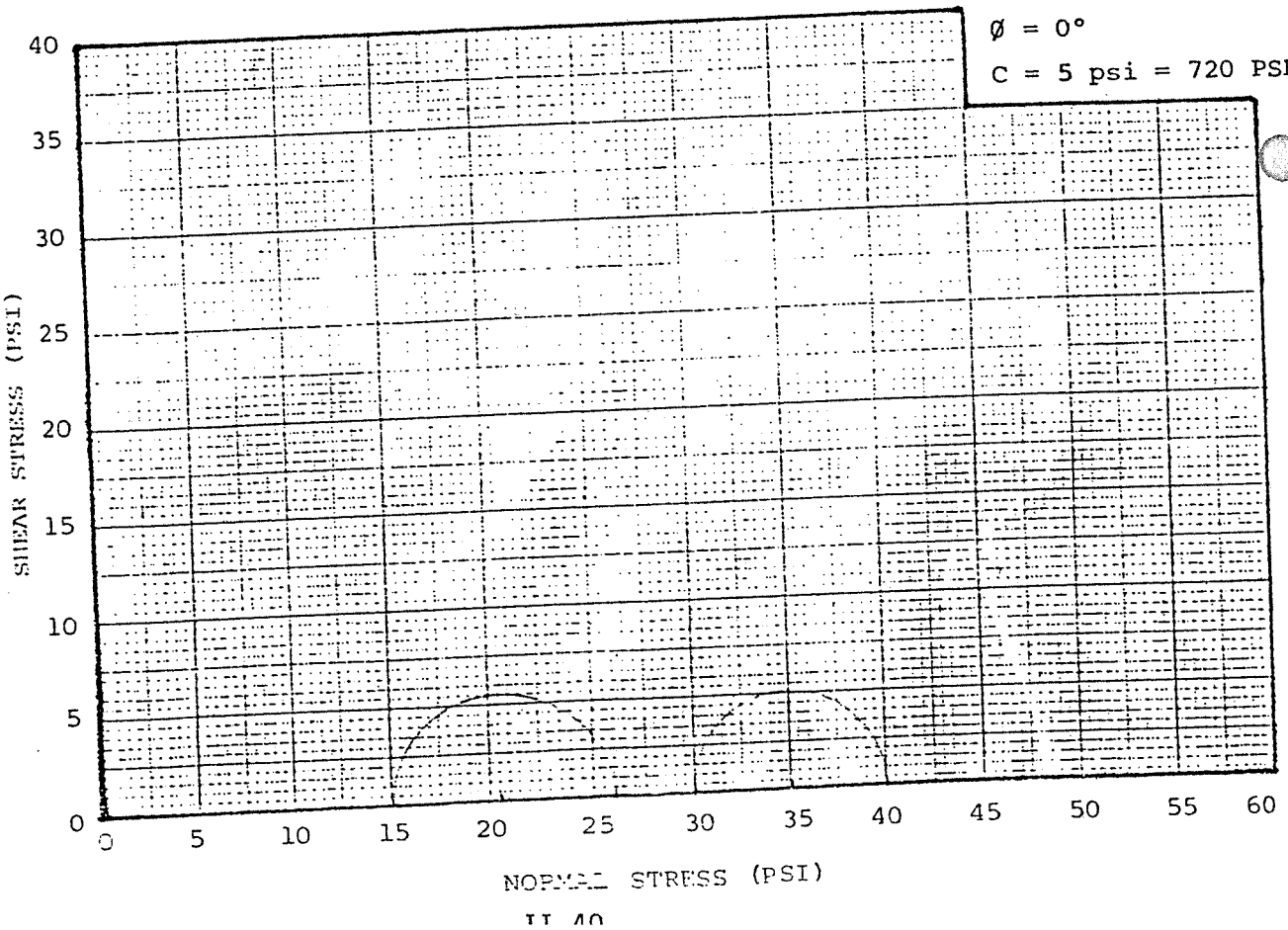
TEST SOURCE LOCATION: HB-73A

DEPTH: 35.0-37.0 feet

MATERIAL: Dark gray silty CLAY with organics

	UU TEST	
Confining Stress (PSI)	15	30
Moisture Content (%)	55.5	54.5
Unit Dry Weight (PCF)	65.8	64.2
Maximum Strain (%)	7.0	8.0





JOB NUMBER: HA81150

TRIAXIAL COMPRESSION TEST

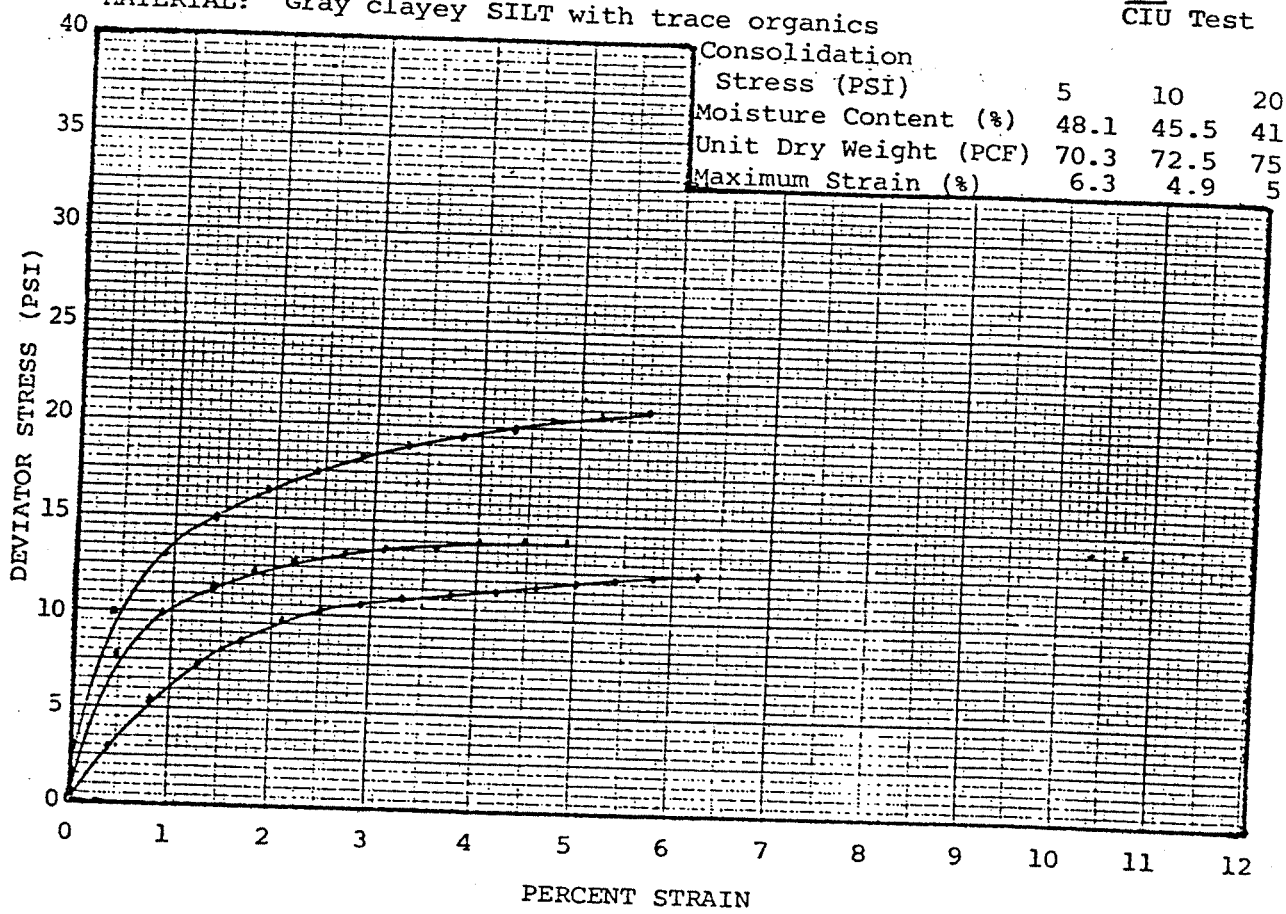
TEST SOURCE LOCATION: HB-73A

DEPTH: 30.0-32.0 feet

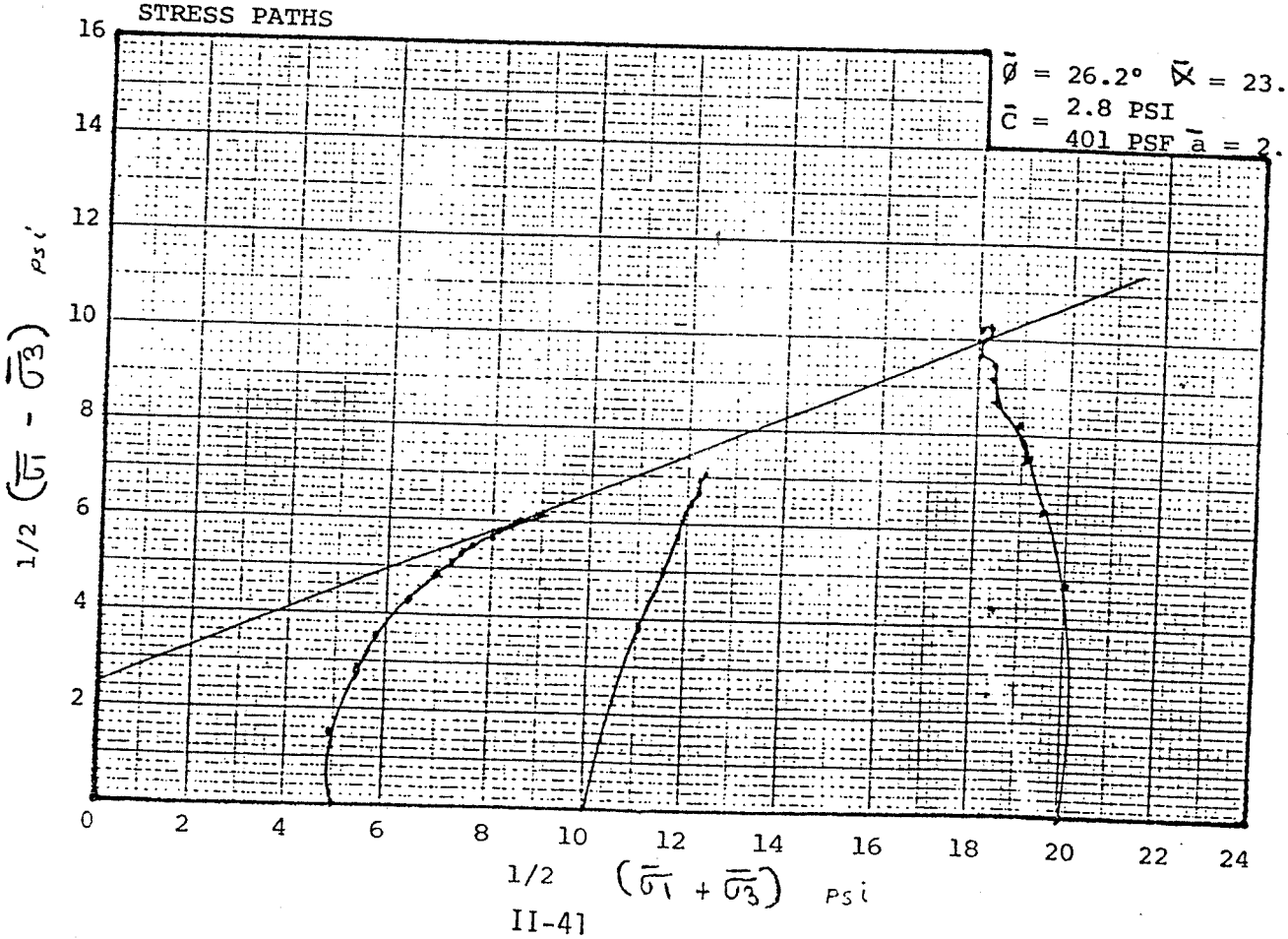
MATERIAL: Gray clayey SILT with trace organics

$\overline{CIU}$ Test

Consolidation Stress (PSI)	5	10	20
Moisture Content (%)	48.1	45.5	41.8
Unit Dry Weight (PCF)	70.3	72.5	75.7
Maximum Strain (%)	6.3	4.9	5.7



STRESS PATHS



JOB NUMBER: HA81150

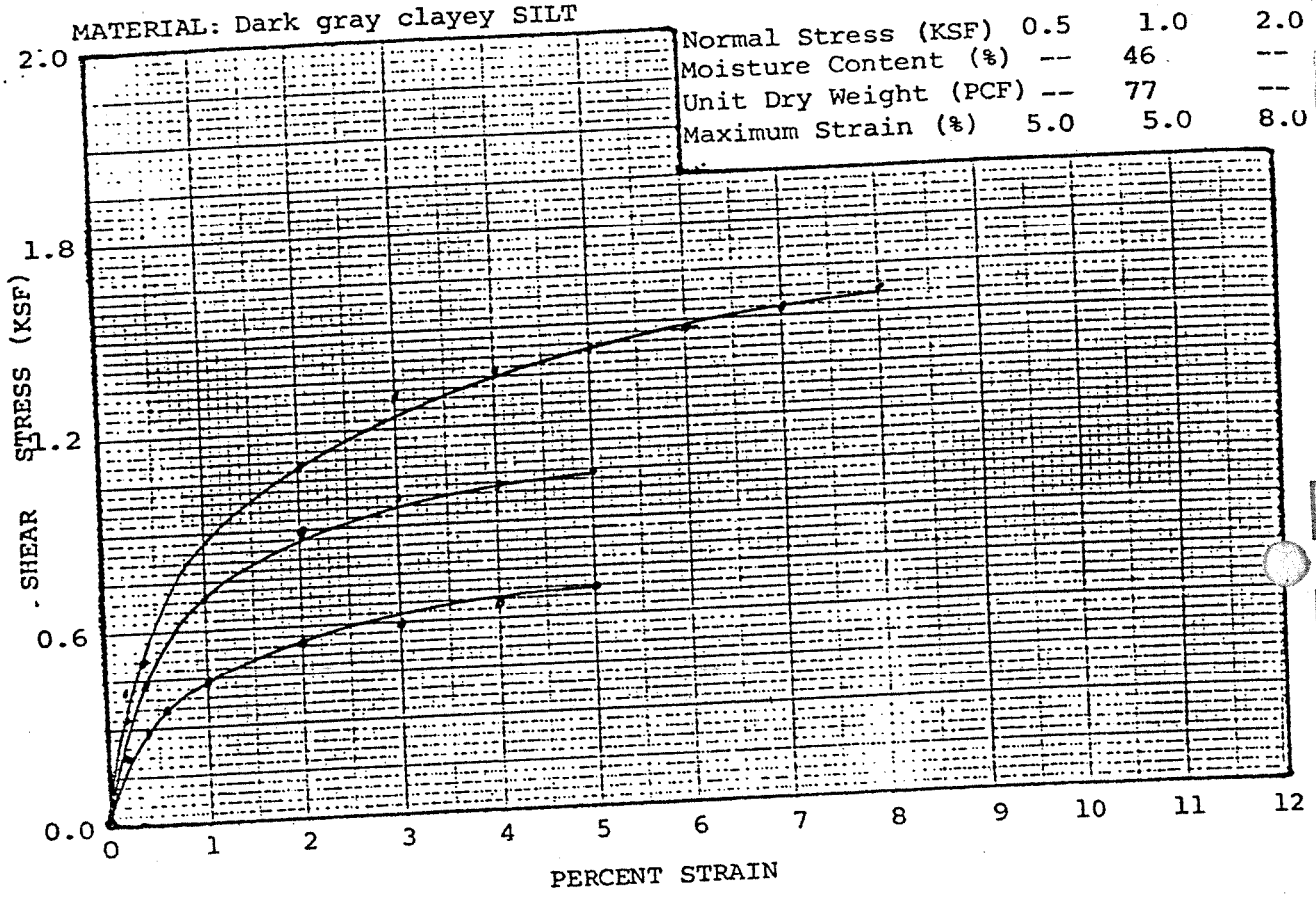
DIRECT SHEAR TEST

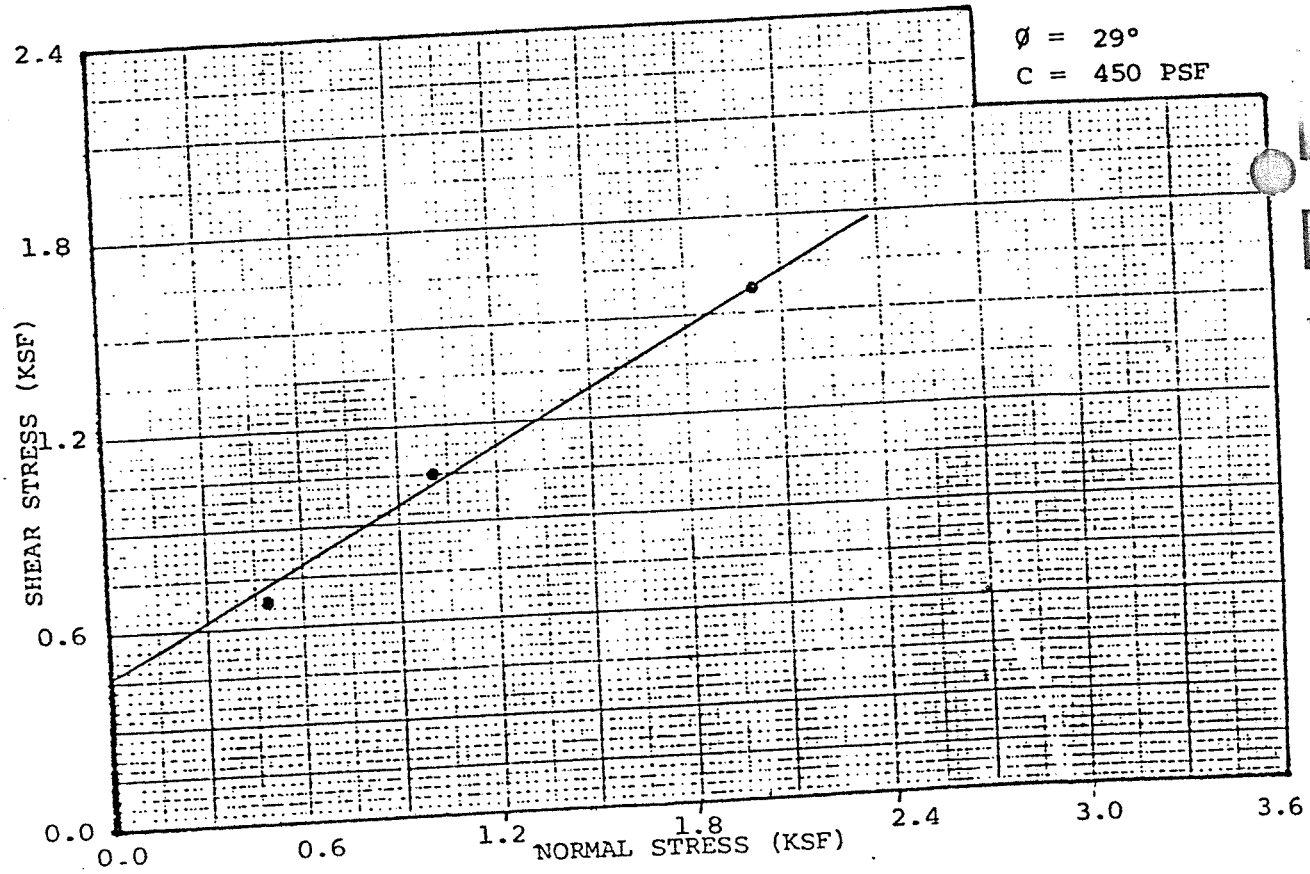
DEPTH: 50.0-52.0 feet

TEST SOURCE LOCATION: HB-71A

MATERIAL: Dark gray clayey SILT

Normal Stress (KSF)	0.5	1.0	2.0
Moisture Content (%)	--	46	--
Unit Dry Weight (PCF)	--	77	--
Maximum Strain (%)	5.0	5.0	8.0





JOB NUMBER: 11A81150

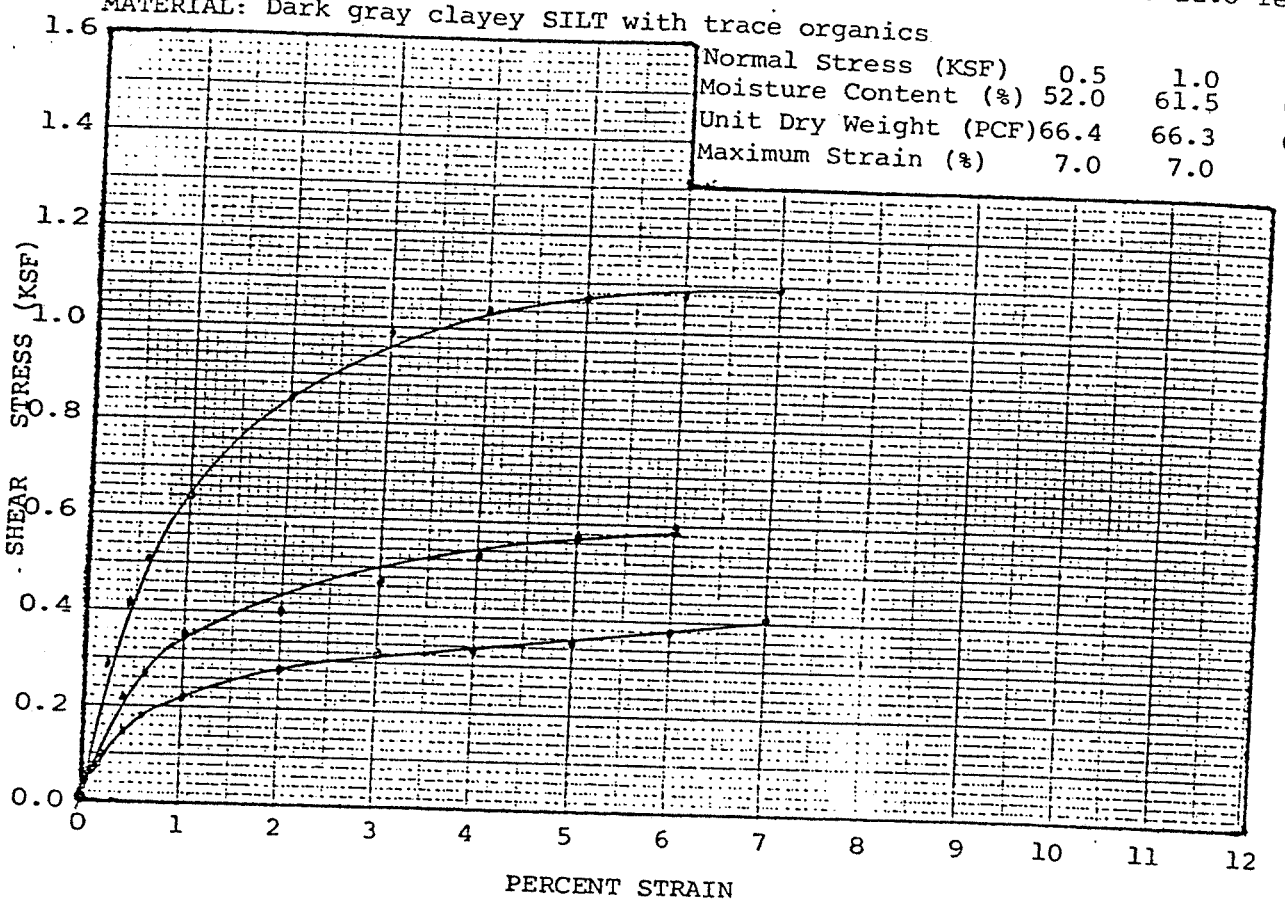
DIRECT SHEAR TEST

TEST SOURCE LOCATION: HB-73A

DEPTH: 20.0-22.0 feet

MATERIAL: Dark gray clayey SILT with trace organics

Normal Stress (KSF)	0.5	1.0	2.
Moisture Content (%)	52.0	61.5	63.
Unit Dry Weight (PCF)	66.4	66.3	64.
Maximum Strain (%)	7.0	7.0	7.



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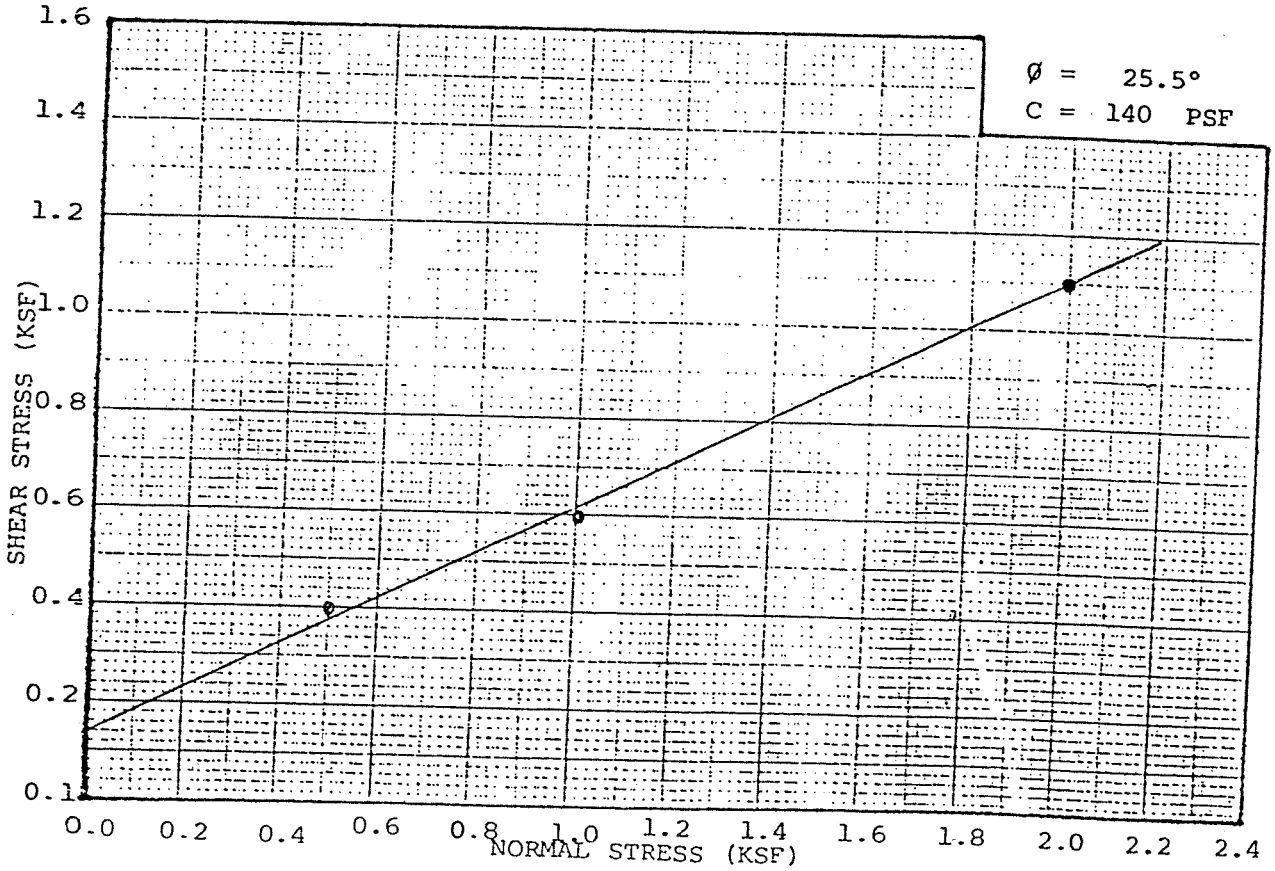

GEOTECHNICAL ANALYSIS

GENERAL

The geotechnical analysis for the proposed Site 2 and Cell 4 have been based on the subsurface conditions and laboratory test results described in the 'Subsurface Condition' section of this report. At this writing, interim plans call for a second lift of DHS waste to be placed atop a cover layer on Site 2 from approximately elevation +28 to +48. It is understood that the first lift placed on Site 2 was primarily chrome. Based on borings HB-52 and HB-54, the bottom of those wastes is near elevation +5. Based on those borings, conservative design parameters have been assumed for the waste in that cell. The underlying soils beneath and adjacent to that cell have been assumed to be comparable or better in strength and consolidation characteristics to those encountered in the borings drilled in and the laboratory tests conducted on samples retained from the Cell 4 area.

With respect to the proposed Cell 4, it is understood that the existing stockpile of materials overlying that cell area will be removed, and excavations to elevations varying from approximately +9 at the northwest corner of the proposed cell to near elevation +22 at its southeast corner will be made to accommodate the DHS wastes. It is further understood that a minimum 3 foot thick liner of relatively impervious clay will be placed on the floor and walls of the then completed excavation, and a leachate collection system will then be installed. Notably, any wet pervious materials encountered at the base of the excavation are to be drained to an interceptor system prior to

placing the clay liner and leachate collection system. The interim plans then call for DHS waste to be placed up to an elevation of approximately +15.

Both DHS cells are proposed to have finished exterior slopes of 4:1 (horizontal:vertical). Interim exterior as well as all interior dividers between cells will have a maximum slope of 2:1. The excavated slopes for the below grade portion of Cell 4 will also be 2:1. Typical sections through each of the cells are shown on sheets 17 & 17A of 22, and the interim grading plan for both cells are shown on sheets 17 & 17A of 22. A discussion of our conclusions regarding slope stability and settlement for the proposed interim plans are presented separately for the respective cells. Cell 4 will be discussed first since the laboratory data base for one analysis originates from the results obtained from that area.

Cell 4

Settlement - The impact of the proposed Cell 4 development scheme from a settlement viewpoint, can best be put into perspective by reviewing the generalized subsurface profiles shown on sheet 17 & 17A of 22. As indicated, the top of the proposed first lift will be approximately 8 to 16 feet above existing site grades. Additionally, the existing stockpile overlying the proposed Cell 4 area, towers almost 25 feet above the surrounding site grades, and we understand that stockpile has been standing in-place over five (5) years. By inspection, therefore, we expect the base of the Cell 4 excavation will swell slightly as a result of the proposed overburden excavation and we anticipate that only a fraction of the actual swelling will recompress as the first lift is placed in Cell 4. The greatest swelling

and the largest future settlements which may be associated with the final grading plan can be expected to occur in the northern and eastern areas of Cell 4 where the fills, disturbed soils and alluvial soils which comprise stratum 1 are expected to be encountered at the base of the cell.

Based on the consolidation test results presented in the Appendix, we estimate that in the northern and eastern areas of Cell 4 where the subsurface conditions are as indicated in borings HB-71 and HB-73, the base of the excavation could heave (swell) in the range of 2.5 to 5.0 inches depending in large measures on the thickness of overburden being removed and the time the excavation is left open. Based on the assumption that backfilling will be in progress within 5 months of commencing the excavations, we anticipate that actual heaves beneath the cell should vary from 1.0 to 2.5 inches in the northern and eastern areas. In contrast, in the southern and western areas of Cell 4 where the very stiff to hard silty clays of stratum 2 will be encountered at the base of the cell, we anticipate that any heaves occuring in those areas a result of the excavation will occur almost instantaneously as the loads are removed, and will be negligible.

Upon backfilling of the Cell 4 excavation, we estimate that if the northern and eastern areas of the cell were allowed to fully heave, maximum recompression settlements varying from 1.8 to 2.6 inches could occur. Based on the coefficients of consolidation determined, heaves and/or settlement could occur for a period ranging from 1.0 to 5.0 years. We anticipate, however, that considering the sand seams, pockets and layers encountered in our explorations beneath Cell 4 within stratum 1, 90 percent of all consolidation should be complete within two years.

Slope Stability - A review of the existing topographic conditions and the generalized subsurface profiles of the Cell 4 area is appropriate prior to evaluating the proposed interim Cell 4 development scheme. Notably, the existing stockpile currently has slopes averaging 2:1 and steeper in areas where the proposed Cell 4 will have temporary and/or internal slopes of 2:1, and exterior slopes of 4:1. From a foundation stability standpoint, it is concluded that in the absence of any dynamic forces, the lowest factor of safety of the foundation soils in the Cell 4 area under their existing loading condition probably existed immediately upon completion of the stockpile. Since no distress, slope of foundation failures have been observed to-date within the stockpile area, we conclude that the factor of safety against a foundation related slope stability failure is greater than 10, for the existing embankment loading condition. Considering the proposed finished grading for the interim development scheme for Cell 4, the stability fo Cell 4 against slope failures becomes academic and obviously much greater than unity.

With regards to the stability of the proposed Cell 4 excavation, Sheet 17 presents the results of a simplified bishop analysis of that excavation using the soil parameters and thicknesses shown. That analysis indicated the safety factor against a rotational failure of the excavation exceeds 2.0.

The near presence of groundwater as well as intermittent soft organic layers within the exposed stratum 1 soil below the base of the proposed excavations in the northern areas of Cell 4, however, may influence initial operations such as compaction of the clay liner on the floor of the cell. We recommend that pending conditions actually exposed at the base of the Cell 4

excavation, provisions should be available to overexcavate a maximum of 3 feet of any exposed deleterious materials below the base of the clay liner. We recommend that a granular soil free of fines be used to replace any over-excavated soils. Utilization of granular soils should provide an adequate base upon which the clay liner can be properly compacted. The numerical analysis is included in Appendix B.

Site 2

Settlement - In our analysis of settlement of the proposed development of Site 2, we have used the data presented on the generalized profile shown on sheets 17 & 17A of 22 . We understand that the development of this site includes increasing the elevation to 48. The material is understood to be chrome tailings which in-place will have a unit weight of 120 PCF. Consolidation tests were not performed on any samples from Site 2. The consolidation data used in this analysis was obtained on a sample from boring HB-73A. A compression of standard penetration resistance obtained in test boring on Site 2 with those obtained in HB-73A show that the analysis will be conservative since in all cases the compressibility of Site 2 soils are less than the test soil.

Based on the consolidation test from HB-73A and the greatest thickness of compressible material encountered in Site 2 (25 feet in HB-61), we have estimated a maximum settlement equal to 20 inches. For the more typical thickness of compressible material under the center of the proposed cell, 6 to 12 feet in HB-52, HB-54 and HB-56, the estimated maximum settlement is in the range of 6 inches to 12 inches.

It is our opinion that the use of laboratory data from HB-73 results in an over estimate of the settlement in Site 2 by a factor of at least 2. Out best estimate of the settlement in Site 2 is then in the range of 3 to 6 inches. From consideration of a maximum estimated settlement of 6 inches in a 12 foot thick layer. we compute 0.5 inches/ft of compressible material. From the generalized profile for Site 2, we estimate that the slope of the compressible layers is typically 10 horizontal to 1 vertical. From this consideration the slope of the liner after settlement would be 5 inches/ 100 feet or about 0.4 percent. Deflections of this magnitude are not expected to cause distress in properly installed liners.

Slope Stability - The stability of the proposed Site 2 will largely be a function of the strength parameters of the chrome wastes. Based on the assumption that the chrome will behave as a fine sand, we have conservatively estimated that in-place, the chrome will have a minimum angle of intermal friction of 30° and a cohesion of zero. On that basis, the minimum factor of safety against a slope failure within the waste materials will be 1.2 for any temporary exterior and/or interior 2:1 (horizontal:vertical) slopes and 2.3 for exterior 4:1 slopes.

To further analyze the embankment as well as the foundation stability of the interim development scheme, an analysis was made using Control Data Corporation (CDC) Slope II computer program. A simplified bishop analysis was made of a 2:1 (horizontal:vertical) slope comprised of wastes having an angle of internal friction of 25°. Strength parameters for the stratum 1 soils beneath and adjacent to the cells wastes were initially based on the

minimum UU test results determined lab testing of samples retrieved from the Cell 4 area, and were subsequently based on the total stress parameters determined from the CTU tests which were also conducted on samples retrieved from the Cell 4 area. The results of those analysis are presented on Sheet 17A of 22 and confirm that the critical factor of safety with respect to embankment stability will exist within the embankment section for low strength waste materials.

With particular attention to Site 2 and the chrome wastes which will be placed there, based on SPT 'N' values logged in the chrome wastes encountered in borings HB-52 and HB-54, it is reasonable to assume a higher angle of interior friction exists. Additionally, cohesive strength increases with time as a result of cementation can also be anticipated, thus the stability of embankments of chrome wastes can be expected to have substantially higher factors of safety against failure than indicated in the worst case analysis presented. The numerical analysis is included in Appendix B.

Clay Liner Integrity

The adequacy of the on-site clay as liner material will be dependent upon the actual characteristics of the leachate resulting from the filled material. While no quantity of leachate will exist from the general DHS accepted at the site until the site is operable, an analysis of the potential integrity of the clay as a liner material was performed by evaluating test results developed by research that offers applicability.

The evaluation is contained in Appendix I. It is further expected that site and leachate specific studies will be established as the fill progresses to further verify the results of the research reported to date.

CHAPTER III

DHS LANDFILL DESIGN RATIONALE

General:

A properly designed and operated DHS landfill provides an engineered method for the land disposal of solid wastes that minimizes the potential for impact on public health and environmental degradation. In general, the greatest potential for pollution from a DHS fill is the possible contact of the wastes or the by-products of decomposing wastes with ground or surface waters. Therefore, the landfill design must minimize the rate of leachate generation and avoid contact with uncontaminated waters.

When DHS wastes are disposed of in a landfill, depending on their physical and chemical stability and persistence in the environment, they may remain relatively unchanged or they may decompose to various constituents consistent with their chemical content. If all water could be excluded from the fill the movement of pollutants from the waste would be limited to diffusion (resulting in negligible quantities); however, when water is present, the waste or its by-products may leave by suspension or dissolution in much greater quantities. In order to control this latter method of pollutant movement, the quantity of water present in the fill must be reduced to the minimum possible amount. This is one of the primary goals of a DHS landfill design.

There are two main methods to effect the reduction of water in the fill. The first is to avoid the placement of fill in standing water. If the water is merely runoff ponded on the ground, it may be removed by pumping and diversion of surface water from the area. If the water is present as evidence of groundwater recharge, either the groundwater level

must be permanently lowered by the continual pumping of wells installed surrounding the area or earth fill must be placed in the area to raise the waste above the natural groundwater level. The second method is to minimize the quantity of infiltration of precipitation into the fill by maximizing runoff. Runoff maximization is accomplished by using the most impermeable material available as final cover for the fill and designing the slopes of the fill as steep as is practicable.

The other primary goal of a DHS landfill design is to control the movement of water which has infiltrated the fill (and become leachate) so as not to endanger the public health and safety of the surrounding area. This is most often done by utilizing clay as a liner for the disposal area since its permeability is usually much lower than other soils in the fill area. The clay liner, if its permeability is sufficiently low enough, will allow only a very small amount of leachate to exit the base of fill.

If the rate of infiltration into the fill is greater than the rate of exfiltration, leachate will begin to build up in the fill increasing the hydraulic gradient and forcing a greater quantity of leachate out of the fill. To control this problem, a system of underdrains may be placed beneath the waste to remove the leachate from the fill. Once collected, the leachate must be removed from the underdrain system and treated to remove the pollutants which are dissolved or suspended in it before it may be discharged again into the environment.

Potential for Leachate Generation:

This DHS landfill is designed to prevent the disposal of wastes in surface water or groundwater, and uses both an existing and constructed clay barrier between the base of the new fill and the potentiometric surface. An underdrain system is used to minimize the effects of the leachate

from the fill on the water table. As discussed previously, the amount of precipitation penetrating the fill is directly related to the quantity and rate of leachate generated. All new fill areas and additional fills on existing completed disposal areas will be provided with an underdrain system to collect leachate and convey it to a collection point from which it will be transported to offsite treatment.

The basic hydrological principle that exemplifies the relationship between precipitation, evapotranspiration, surface runoff, and infiltration is expressed by the formula:

Net Infiltration = Precipitation - (Runoff + Evapotranspiration)

In order to evaluate the above relationship for a normal fill operation within a specific localized area, the "water balance", as recommended by the U.S. Environmental Protection Agency, has been computed for the proposed Hawkins Point DHS Landfill.[5,6,7]

The water balance method is an engineering technique that takes the estimated precipitation and subtracts the theoretical amount lost due to surface runoff and evapotranspiration to obtain an estimated amount of net infiltration. The continuing addition of yearly infiltration quantities will eventually result in the fill reaching its field capacity, at which time the

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[5] Use of the Water Balance Method for Predicting Leachate Generation from Solid Waste Disposal Sites, by Dennis G. Fenn, Keith J. Hanley, Truett V. DeGeare, U.S. EPA, 1975.

[6] Thornthwaite, C.W. and J.R. Mather. The Water Balance, Centerton, N.J., 1955, 104 p. (Drexel Institute of Technology, Laboratory of Technology. Publications Climatology, V.8, No. 1).

[7] Thornthwaite, C.W. and J.R. Mather. Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance. Centerton, N.J., 1957, (Drexel Inst. of Tech., Lab. of Tech., Public in Climatology, V.10, No. 3)

leachate will migrate through the fill and a large portion will flow into the underdrain system. When field capacity is eventually reached, the amount of net infiltration will equal the amount of potential leachate that may be available for migration away from the fill.

The actual water balance computation, along with its supporting data is included in Appendix D of this report. The computation indicates that there will be no net infiltration after closure and stabilization of the fill.

Leachate Control:

The precipitation that infiltrates the top of the fill and percolates downward will eventually produce leachate. When leachate reaches the base of the fill, the majority of the leachate volume will tend to flow to the underlying leachate collection system.

In general, the permeability of the fill is greater than the permeability of the natural, in-place soils. The permeability of the general DHS fill is estimated to be approximately 10^{-4} cm/sec. Previous tests performed on the chrome ore waste indicate a permeability of 10^{-3} to 10^{-4} cm/sec. These permeabilities, in comparison with soils, are similar to sand mixtures. This permeability is considered normal for industrial wastes fills.

As an element of the subsurface exploration performed at this site, laboratory permeability tests were performed on four clay samples; two tests were performed on undisturbed Shelby tube samples and two on remolded bulk samples. The tests result in values within the 10^{-8} cm/sec. range which is typical for clay according to the Unifield Soil Classification System.

In order to minimize the amount of potential downward leachate percolation below the fill in the area of excavation in the original ground, a clay barrier having a permeability within the 10^{-8} cm./sec. range will be provided by either leaving the natural clay in place to provide a minimum depth of 3 feet below the underdrain collector pipe invert; or by placing the on-site excavated clay where required on the side slopes, or in the bottom of the excavation to seal the more permeable soils which may be encountered and to minimize potential pollutant migration away from the disposal site.

For design purposes, the permeability of the clay barrier is considered to be within the 10^{-8} cm./sec. range. Field testing during the initial and continuing site preparation phases of the operation will be required to confirm that the permeability of the clay barrier remains uniformly within this range.

A system of underdrains is proposed to intercept and divert leachate from the fill area to the leachate collection system. The underdrain system will be placed beneath the base of fill at the top of the clay barrier. The layout of the drain system is shown in the attached drawings. Design criteria for the underdrain system is given in Appendix D.

The purpose of the underdrain system is to collect and divert the leachate from the fill area to a central collection point from which it can be removed for treatment. The underdrain system will insure that water levels will be minimized within the fill. The selected drainage coefficient of 0.1 in./hr. will insure that the system will be able to handle infiltration from high intensity, short duration storms.

Groundwater Monitoring

The effectiveness of leachate containment will be continually evaluated by means of a groundwater monitoring program. The program will involve the establishment of a number of groundwater monitoring points whose locations and depths are sufficient to provide immediate detection of leachate migration from the fill.

The program will be in strict compliance with the requirements of the Annotated Code of Maryland (COMAR) Title 10, Subtitle 51, Disposal of Designated Hazardous Substances (Section 05.06, Groundwater Monitoring). A copy of the plan is included in this report as Appendix E.

In addition to the groundwater monitoring well testing, the ground water interceptor discharge will be monitored on the same frequency as the ground water monitoring wells. In the event the ground water interceptor discharge becomes contaminated, it will be directed into the leachate collection system for transport off the site for treatment and disposal.

March 28, 1983

Report of Observations

201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: CHS / Water Pollution Date 3/28/83

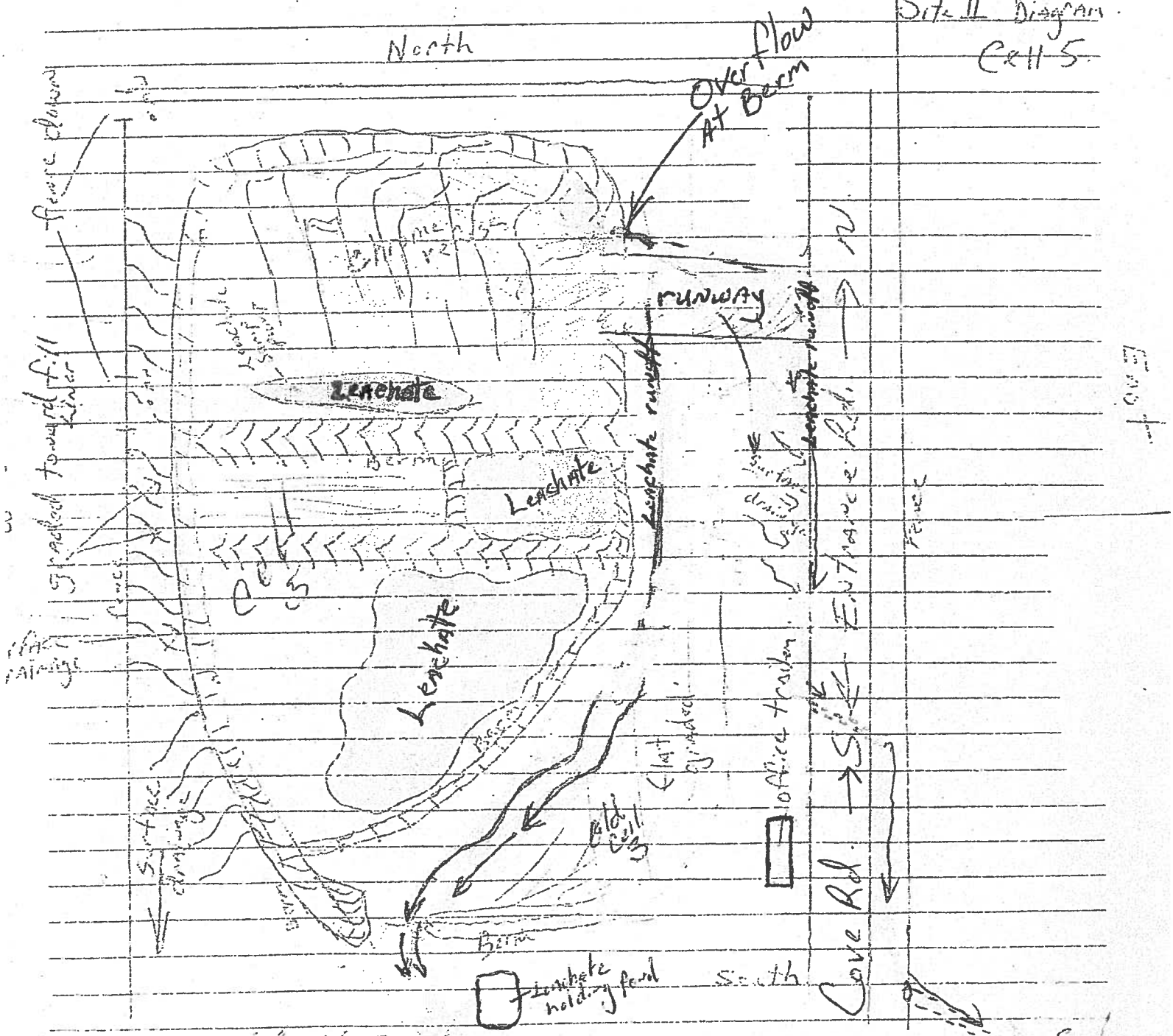
Facility Name: MES Hawkins Point Landfill.

Remarks:

Contacts: Lew Long MES; Ron Nelson - Site II Mgr.

Site II

Site II Diagram Cell 5



Observer: Bill Schmitt Person Interviewed:

DHMH 5579

August 1, 1983

Engineering Analyses and Design Documentation

ENGINEERING ANALYSES AND DESIGN DOCUMENTATION

Hawkins Point Hazardous Waste Landfill *1983*

Area 5

MDD 00 073 1356
"B3"

Black & Veatch

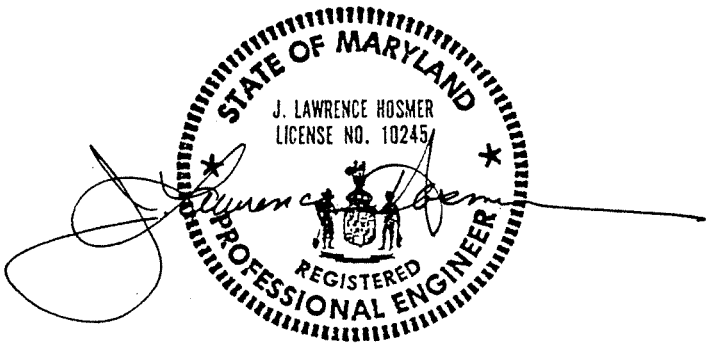
maryland
environmental

ENGINEERING ANALYSES AND DESIGN DOCUMENTATION
AREA 5

HAWKINS POINT HAZARDOUS WASTE LANDFILL
Baltimore, Maryland

for the:
MARYLAND ENVIRONMENTAL SERVICE
Annapolis, Maryland

1983



prepared by:
Black & Veatch, Engineers-Architects
Bethesda, Maryland

and

Woodward-Clyde Consultants
Rockville, Maryland

p.n. 10833

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EXECUTIVE SUMMARY

On the order of 425,000 tons of hazardous substances were generated in the State of Maryland in 1980; of this volume, approximately 350,000 tons, or 82 percent, is transported to off-site treatment or disposal facilities. This volume could increase in the future with the installation of wastewater pretreatment facilities, and with growth or broadening of the State manufacturing base, according to a study entitled "Hazardous Waste Quantities and Facilities Needs in Maryland", completed in August 1981 by Arthur D. Little, Inc. for the Maryland Hazardous Waste Facilities Siting Board. This study has been updated with a report on the "Generation and Disposition of Hazardous Wastes Manifested in Maryland 1981/1982," dated April, 1983. Providing in-state facilities to accommodate this waste stream has, as a result, been demonstrated to be integral to the continued growth of the economic base of the State. Also, the implementation of current or pending Industrial Pretreatment Programs, as mandated by the United States Environmental Protection Agency (EPA) under 40 CFR 403, will result in increased volumes of wastewater treatment sludges for disposal. Therefore, since no other public facility currently exists in the State for the disposal of hazardous substances, the need for hazardous waste management facilities within the State is clear.

While preferred management practices dictate the consideration of alternative technologies to traditional land disposal, such as waste recovery and exchange, physical/chemical treatment, or thermal destruction, the use of land disposal will realistically continue as an economically-viable solution in the near future. Even with the establishment of the Maryland Waste Exchange, a large proportion of Maryland-generated hazardous

waste facilities are also required as an ultimate solution for the non-processable fraction and process residues, as well as a secondary disposal method when other technologies fail. For these reasons, the State of Maryland recognizes the need for suitable land disposal facilities within the State to serve Maryland industry.

A second study was therefore commissioned and completed for the Maryland Environmental Service (MES) in 1982 to screen each County within the State for suitable locations for the development of a hazardous waste landfill. This study, entitled "Facility Site Inventory, Final Report", prepared by Booz-Allen & Hamilton, Inc., evaluated the potential locations of hazardous waste landfill sites in the State with respect to their technical competency and economic merit. A major factor in this siting study was the point of generation of the waste stream within the State. This consideration weighed heavily in the selection process, dictating a site which was within a reasonable distance of Baltimore, Maryland, the centroid for hazardous substance generation in the State. Indeed, the single largest generator of hazardous substances in the State, the Allied Chemical Company, Baltimore Works, accounts for approximately 35 percent of the total statewide waste stream. A result of this study was the identification of the Hawkins Point site in the extreme southeastern corner of the City of Baltimore as a hazardous waste landfill. This selection was enhanced by the facts that:

- The site had been previously utilized for a variety of waste disposal activities, including the current site for the disposal of the waste generated by the Allied Chemical Company, Baltimore Works.
- The site was in the ownership of various agencies of the State of Maryland.

- The area surrounding the site was primarily industrial in nature, including several active and closed industrial landfill operations.

In the interest of assuring that Maryland industry would be afforded in-state facilities to serve their disposal needs, the Hawkins Point site was designated for development as a general hazardous waste landfill. The site was deeded to the Maryland Environmental Service with the mandate that such a facility be developed and operated. While the Maryland Environmental Service began the detailed process of design, permitting and construction of the Hawkins Point facility, the only operational secure landfill in the State, the Solley Road Landfill owned and operated by Browning-Ferris Industries (BFI) in neighboring Anne Arundel County, was closed on December 31, 1982. This closure left Maryland without a public secure landfill facility to dispose of the States hazardous substances.

By the time the BFI Solley Road Landfill was closed, however, the Maryland Environmental Service had submitted, on August 5, 1980, a Resource Conservation and Recovery Act (RCRA) Part A permit application for a vertical and lateral expansion of the existing Allied Chemical disposal facilities at Hawkins Point. The Maryland Department of Health and Mental Hygiene (DHMH) issued Controlled Hazardous Substances (CHS) Facility Permit No. A264, dated November 30, 1982, to the Maryland Environmental Service for this expansion. The facility consisted of a vertical expansion of 4 cells (Cell Nos. 5 through 8) for the disposal of chrome ore tailings generated by Allied Chemical, and a separate cell (Cell No. 4) for the disposal of general hazardous waste generated by other Maryland industries. Both of these expansions were located over prior chrome ore tailings disposal areas utilized by Allied Chemical and/or the Maryland Port Administration. The vertical expansion facilities for the containment of chrome

ore tailings began operation in January 1983; the general hazardous waste facility began operation in July 1983.

In accordance with 40 CFR 270, the U.S. Environmental Protection Agency-Region III requested that the Maryland Environmental Service submit Part B of the RCRA permit application by August 1, 1983. This document, and the accompanying "Engineering Analyses and Design Documentation, Appendices", "Operation & Maintenance Manual, Area 2, 4, 5", and "Part B Permit Facility Design-Area 5: Site 2 Expansion", fulfill the requirements of that submittal. It should be noted that the Maryland Environmental Service has hereby attempted to fully satisfy the requirements of 40 CFR 270, and is anxious to cooperate with both the U.S. Environmental Protection Agency and the Maryland Department of Health and Mental Hygiene in meeting any further regulatory requirements. This will enable the future development of the Hawkins Point facility to proceed in an efficient manner. The heretofore efforts of the 2 regulatory agencies involved, the staffs of the Maryland Environmental Service and Allied Chemical Company, and the consulting engineers responsible for the preparation of this application have been guided by a desire to provide a hazardous waste management facility that protects the human and natural environment, offers effective and proper disposal facilities for Maryland industry, and satisfies all regulatory requirements. It is our opinion that the proposed Hawkins Point Hazardous Waste Landfill achieves these goals.

1.0 PERMIT APPLICATION CHECKLIST

In order to assist the reviewer of this document in locating specific regulation requirements under 40 CFR 264 and 40 CFR 270 governing the issuance of a Resource Conservation and Recovery Act (RCRA) permit, a permit application checklist follows which details each requirement and its location in these documents. It should be noted that this application is comprised of four components, entitled:

- "Engineering Analyses and Design Documentation, Area 5"
- "Engineering Analyses and Design Documentation, Appendices"
- "Operation & Maintenance Manual, Area 2, 4, 5"
- "Part B Permit Facility Design, Area 5: Site 2 Expansion."

Each of the above documents are referenced, as appropriate, in the checklist. The following abbreviations have been utilized:

Letter Prefix	Referenced Document
E	"Engineering Analyses and Design Documentation, Area 3" report.
F	Part A permit application form included in Section 2.0 of this report.
O	"Operation & Maintenance Manual, Area 2, 4, 5".
PD	"Part B Permit Facility Design, Area 5: Site 2 Expansion" Documents.

1.0 PERMIT APPLICATION CHECKLIST

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	264.13(c)	- Procedures to determine identity of each waste movement	NA
		- Procedures for collecting representative samples	NA
270.14(b)(4)		- Security description for active portion of facility	0-5.1
	264.14(a)	- Security procedures waiver justification	NA
		- Unknowing/unauthorized contact with waste not harmful	NA
		- Unknowing/unauthorized disturbance of waste or equipment cannot cause violation of Part 264	NA

Part 270	Part 264	Requirement	Location in Application
	264.14(b)	- Description of 24-hour surveillance system	0-5.1.1
		- Description of artificial or natural barriers	0-5.1.2
		- Description of controlled entry/ egress procedures	0-5.1.2
	264.14(c)	- Description of warning signs	
		- List of languages on signs	0-5.1.3
		- Statement of 25-foot legibility	0-5.1.3
		- Description of sign locations and numbers of signs	0-5.1.3
270.14(b)(5)		- General Inspection Schedule and Procedures Description	
	264.15(b)(1)	- Written schedule	0-5.2.2
	264.15(b)(2) and 265.15(d)	- Statement as to where, at facility, inspection schedule and records will be kept	0-5.2.1
	264.15(b)(1)	- Identification of equipment/process to be inspected	0-5.2.2
	264.15(b)(3)	- Identification of types of problems each equipment/process to be checked for	0-5.2.2
	264.15(b)(4)	- Frequency of inspections by equipment/ process	0-5.2.2
	264.15(c)	- Schedule of remedial action	0-5.2.3

Part 270	Part 264	Requirement	Location in Application
270.14(b)(5) and 270.21(d)(iv)	264.15(a) and 264.303	- Specific Inspection Requirements for Landfills	
		- Description of procedures for	
		- Inspection of liners/covers during and immediately after installation	0-5.2.2
		- Inspections weekly and after storms for	0-5.2.2
		- Operation of run-on/run-off controls	0-5.2.2
		- Liquids in leak detection systems	NA
		- Proper functioning of wind dispersal controls	0-10.2.2
		- Leachate in and proper operation of leachate collection/removal system	0-5.2.2, 6.3.3
270.14(b)(6)	Part 264 Subpart C	- Preparedness and Prevention Documentation	
		- Waiver(s) request and justification	NA
	264.32(a)	- Description of internal communications/alarm system(s)	0-5.3.6
	264.34(a)	- Documentation of personnel access to internal communication/alarm system(s)	0-5.3.6
	264.24(b)	- Description of external communications/alarm system(s)	0-5.3.6
	264.34(b)	- Documentation of personnel access to external communications/alarm system(s)	0-5.3.6

Part 270	Part 264	Requirement	Location in Application
	264.32(c)	- Description of fire control/ extinguishing, spill control and decontamination equipment	0-11.5
	264.32(d)	- Documentation of adequate water volume and pressure for above equipment	0-9.4
	264.33	- Documentation of equipment testing/maintenance schedule and procedures	0-5.2.2, 6.2.4
	264.35	- Documentation of adequate aisle space	NA
	264.37(also 264.52(c)	- Documentation and description of arrangements or attempts at arrangements with;	
		- Police department(s)	0-11.6
		- Fire department(s)	0-11.6
		- Hospitals	0-11.6
		- Local emergency response teams	0-11.6
		- State emergency response teams	0-11.6
		- Emergency response contractors	0-11.6
		- Equipment suppliers	0-5.3.5
	264.37(a)(2)	- Documentation of agreements designating primary emergency authority	0-11.6
270.14(b)(7)	Part 264 Subpart D	- Contingency Plan Documentation	
	264.51 and 264.52(a)	- Criteria for implementation of contingency plan	
	264.52(d)	- Emergency Coordinators Identification	
		- Names	0-11.2.1
		- Addresses	0-11.2.1

Part 270	Part 264	Requirement	Location in Application
		- Home/Work Phones	0-11.2.1
	264.55	- Documentation of Qualifications	0-8.1
		- Documentation of Authority	0-11.4.1
		- Description of notification procedure	0-11.4.1
	264.52(e)	- Emergency equipment location	0-11.5
		- Documentation of equipment	0-11.5
		- Physical description of equipment	0-11.5
		- Statement of equipment capabilities	0-11.5
	264.52(f)	- Evacuation Plan	
		- Criteria for implementation	0-11.7
		- Description of signal(s) to implement	0-11.7
		- Description of primary and alternate routes	0-11.7
	264.53	- Contingency Plan Copy Location	
		- Description of location of facility's copy of plan	0-11.1
		- Numbers of duplicate copies and their location	0-11.1
	264.54	- Contingency Plan Amendment	
		- Identification of person responsible and authorized to change/amend plan	0-11.9
		- Description of procedure to change/amend facility copy of plan	0-11.9
		- Description of procedure to insure update of all copies of plan	0-11.1

Part 270	Part 264	Requirement	Location in Application
	264.56	- Detailed Emergency Procedures	
		- Procedure for facility personnel notification	0-11.4
		- Procedure for state/local agency notification	0-11.4
		- Procedure for identification of character, source, amount, and areal extent of released materials	0-11.4.1
		- Procedure for assessment of environment/human health hazards	0-11.4.1
		- Identification of On-Scene Coordinator for geographic area	0-11.4.1
		- Description of specific responses and control procedures for	
		- Fire	0-11.4.2
		- Explosion	0-11.4.2
		- Spill	0-11.4.2
		- Description of process shutdown and monitoring procedures	0-11.4.1
		- Description of cleanup procedures and associated material treating, storing, disposal procedures	0-11.4.3
		- Description of emergency equipment cleaning and refitting procedures	0-11.4.4
		- Description of procedures to insure incompatible waste segregation during cleanup	0-11.4.4

Part 270	Part 264	Requirement	Location in Application
270.14(b)(8)		- Preventive Procedures, Structures, and Equipment Documentation, including descriptions of equipment/procedures to	
		- Prevent hazards during unloading operations	0-5.3.1
		- Prevent water supply contamination	0-5.3.2 , 5.3.3
		- Mitigate equipment failure and power outages	0-5.3.4
		- Prevent undue personnel exposure to wastes	0-5.3.5
270.14(b)(9)	264.17	- Prevention of Accidental Ignition or Reaction Documentation	
		- Description of separation and protection of ignitable, reactive, incompatible wastes	NA
		- Description of ignitable, reactive incompatible wastes handling procedures	NA
		- Description of number, location and type of warning/prohibition signs	NA
		- Documentation that procedures are adequate to prevent accidental ignitions or reactions	NA

Part 270	Part 264	Requirement	Location in Application
270.14(b)(9) and 270.21(f) and 270.21(g)	264.17(b) 264.312	- Specific Ignitable/Reactive Waste Requirements for Landfills if I/R Wastes Disposed	NA (See 0-4.2.1, 4.2.2
		- Procedures that render wastes nonreactive and nonignitable	NA
		- Procedures for preventing reactions	NA
		- Procedures for protecting wastes	NA
	264.313	- Procedures for insuring that incompatible wastes will not be disposed of in same landfill cell	NA
	264.316 (c)-(e)	- Procedures for identifying contents and insuring proper landfilling of incoming labpacks	NA
270.14(b)(10)		- Traffic Documentation	
		- Identification of:	
		- Waste movement routes	0-4.4.1
		- Number of movements by type vehicle	0-4.4.1
		- Quantity of waste moved per movement per vehicle	0-4.4.1
		- Traffic control signals and personnel	NA
		- Route surface composition and load bearing capacity	E-7.7
270.14(b)(11)		- Facility Location Documentation	
270.14(b)(11)(i) and (ii)		- Political jurisdiction identified facilities only	E-4.3.1
		- Comparison to Appendix VI of Part 264	E-4.3.1

Part 270	Part 264	Requirement	Location in Application
		- Documentation that faults with displacement in Holocene time are more than 3000 feet from facility	E-4.3.1
	264.18(a)	- Demonstration that no faults pass within 200 feet of unit sites	E-4.3.1
270.14(b)(11)(iii)-(v)	264.18(b)	- Documentation of facility location relative to 100-year flood plain level or wave action flooding	E-3.2
		- Documentation that facility can withstand the 100-year flood without washout of hazardous waste by:	E-3.2
		- Analysis of hydrodynamic hydrostatic forces resulting at site from 100-year flood, and	NA
		- Presentation operating units and flood protection devices design and how they will prevent washout, or	NA
		- Plan for removal of waste before washout including	NA
		- Timing of removal relative to flood levels	NA
		- Estimated time to remove all waste	NA
		- Location to which waste will be moved and proof of compliance with Parts 122 through 124 and 264 through 267 of the Chapter	NA
		- Detailed description of personnel equipment, and procedures for waste removal sufficient to insure availability in time for use	NA
		- Analysis of potential for discharge during waste movement	NA

Part 270	Part 264	Requirement	Location in Application
		- A plan documenting how and on what time schedule the facility will comply with S264.18(b) if not in compliance (existing facilities only).	NA
270.14(b) (12)	264.16	- Personnel Training Program Documentation	
		- Outline of introductory and continuing personnel training programs	0-8.2, 8.3
		- Identification and qualifications of program instructor	0-8.2
		- Brief description of how training program meets actual job tasks	0-8.2, 0-8.3
		- Description of procedures to ensure all appropriate personnel receive appropriate training and receive annual training review	0-8.4
		- Description of records to be kept their location, and procedures to ensure they are retained for proper length of time	0-8.2
270.14(b) (13)	264.112	- Closure Plan Documentation	
		- Description of partial and final closure procedures	E-8.1
		- Description of maximum unclosed portion during facility life	E-8.1.4
		- Estimate of maximum waste inventory in storage/treatment during facility life	E-8.1.6
	264.114	- Equipment decontamination procedure	E-8.1.7
		- Estimated year of closure	E-8.1.8
	254.113	- Description of closure schedule including	E-8.1.8
		- Total time to close	E-8.1.8

Part 270	Part 264	Requirement	Location in Application
270.14(b)(13)	264.113	- Trackable intervening closur activities	E-8.1.2
		- Location(s) and number of copies of closure plan	E-8.1.1
		- Identification of person responsible for storage and updating of facility copy of closure plan	E-8.2.4
		- Procedure for updating all other copies of closure plan	E-8.2.4
270.14(b)(13) and 270.21(e)	264.112 and 264.310(a)	- Specific Closure Plan Requirements for Landfills	
		- Detailed plans and an engineering report which describes the final cover components in detail	E-8.1.5
		- Documentation that the final cover will	
		- Provide long-term minimization of migration of liquids through closed landfill	E-8.1.5
		- Function with minimum maintenance	E-8.1.5
		- Promote drainage and minimize erosion/abrasion	E-8.1.5
		- Settle/subside without losing integrity	E-8.1.5
		- Be less permeable than bottom liners or subsoils	E-8.1.5
270.14(b)(13)	264.117 and 264.118	- Post-Closure Plan Documentation	
		- Description of ground-water monitoring activities and frequencies	E-8.2.2
		- Description of maintenance activies and frequencies for:	
		- Final containment structures	E-8.2.3

Part 270	Part 264	Requirement	Location in
		- Facility monitoring equipment	E-8.2.3
		- Location(s) and number of copies of post-closure plan	E-8.2.4
		- Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan prior to closure	E-8.2.4
		- Identification and location (address and phone number) of person responsible for storage and updating facility copy of post-closure plan during post-closure period	E-8.2.4
		- Procedure for updating all other copies of post-closure plan	E-8.2.4
270.14(b)(13) and 270.21(e)	264.118 and 264.310(b)	- Specific Post-Closure Plan Requirements for Landfills	
		- Procedures for maintenance and repair of final cover	E-8.2.3
		- Monitoring and maintenance procedures for leak detection system	NA
		- Procedure for leachate collection/removal system operation	E-8.2.3
		- Procedures to maintain and monitor ground-water monitoring system	E-8.2.2
		- Procedures for preventing final cap erosion due to run-on and run-off	E-8.2.3
		- Procedures for protection and maintenance of benchmarks	E-8.2.3
	264.310(c)	- Procedures to be undertaken if liquid is found in leak detection system	NA
270.14(b)(14)	264.210	- Documentation of Notice on Deed (existing facilities only)	E-8.3

Part 270	Part 264	Requirement	Location in Application
		- Statement that land used to manage wastes	E-8.3
		- Statement of restricted use per S284.117(c)	E-8.3
	264.119	- Documentation of type, location and quanity of wastes filed with local authority and EPA Regional Administrator	E-8.3
270.14(b) (15)	264.142	- Closure Cost Estimate	E-8.4
	264.143 and 264.146	- Documentation of a financial assurance mechanism for closure that is:	E-8.5
	264.151(a)	- Closure trust fund	NA
	264.151(b)	- Surety bond guaranteeing payment	NA
	264.151(c)	- Surety bond guaranteeing performance	NA
	264.151(d)	- Closure letter of credit	NA
	264.151(e)	- Closure Insurance	NA
	264.151(f) and (h)	- Financial test and corporate guarantee	NA
		- Multiple financial mechanism for one facility	NA
		- Single financial mechanism for facilities	NA
270.14(b) (16)	264.144	- Post-Closure Cost Estimate	E-8.6
	264.145d and 264.146	- Documentation of a financial assurance mechanism for post-clousre that is:	E-8.7
	264.151(a)	- Closure trust fund	NA
	264.151(b)	- Surety bond guaranteeing payment	NA
	264.151(c)	- Surety bond guaranteeing performance	NA
	264.151(d)	- Post-closure letter of credit	NA

Part 270	Part 264	Requirement	Location in Application
	264.151(e)	- Post-closure Insurance	NA
	264.151(f) and (h)	- Financial test and corporate guarantee	NA
		- Multiple financial mechanism for one facility	NA
		- Single financial mechanism for multiple facilities	NA
270.14(b) (17)	264.147	- Documentation of Insurance	E-8.8
		- Request for variance from insurance	NA
	264.151(i) and (j)	- Insurance for sudden/accidental occurrences	NA
		- Insurance for nonsudden/accidental occurrences	NA
	264.151(g)	- Financial test for liability coverage	NA
270.14(b) (18)	264.149	- Documentation of a State Required Financial Mechanism for Closure, Post-Closure, or Liability, including	NA
		- EPA I.D. number	NA
		- Facility name	NA
		- Facility address	NA
		- Amounts of liability coverage or funds assured	NA
	264.150	- Documentation of State Assumed Responsibility for Closure Post-Closure or Liability, including	NA
		- Letter from State describing State's responsibilities	NA
		- Facility EPA I.D. number	NA
		- Facility name	NA
		- Facility address	NA

Part 270	Part 264	Requirement	Location in Application
		- Amounts of liability coverage or funds assured	NA
270.14(b) (19)		- Topographic map showing a distance of 1000 feet around facility at a scale of not more than 1 inch equals 200 feet that clearly shows	PD-5C-2
		- Contours	PD-5C-2
		- Proper contour intervals	PD-5C-2
		- Map scale and date	PD-5C-2
		- 100-year flood plain area	PD-5C-2
		- Surface waters and intermittent streams	PD-5C-2
		- Surrounding land uses	PD-5C-2
122.25(a) (19)		- Wind rose	E-3.2
		- North orientation	PD-5C-2
		- Legal boundaries of facility site	PD-5C-2
		- Access control	PD-5C-2
		- Injection and withdrawal wells onsite and offsite	NA
		- Buildings and recreation areas	PD-5C-2
		- Run-off control systems	PD-5C-2
		- Access and internal roads	PD-5C-2
		- Storm, sanitary, and process sewerage systems	PD-5C-2
		- Loading and unloading areas	E-3.2
		- Fire control facilities	PD-5C-2
		- Barriers for drainage or flood control	PD-5C-2

Part 270	Part 264	Requirement	Location in Application
		- Location of past or present operational units and equipment cleanup areas	PD-5C-2
		Specific Requirements for Landfills	
270.21(a)		- List of hazardous wastes to be placed in each landfill call	0-4.2.1
270.21(b)	264.301(a)	- Detailed plans and an engineering report describing	
270.21(b)(1)	264.301(a)(1)	- Liner system construction (new only)	
		- Material of construction	E-7.4
		- Chemical properties	E-7.4.1
		- Physical strength	E-7.4.3
		- Thickness	E-7.4.1
		- Foundation design/intergrity	E-7.4.2
		- Area covered	E-7.4.1
		- Liner system integrity against (new only)	
		- Internal and external pressure gradients	E-7.4.3
		- Contact with waste/leachate	E-7.4.3
		- Climatic conditions	E-7.4.3
		- Installation stresses	E-7.4.3
		- Daily operational stresses	E-7.4.3
	264.301(a)	- Leachate collection and removal system to maintain less than one foot of leachate on liner including	E-7.4.2
		- Materials of construction	E-7.5
		- Chemical resistance to waste/ leachate	E-7.5.4
		- Sufficient strength to prevent collapse	E-7.5.4.3.4

Part 270	Part 264	Requirement	Location in Application
270.21(b)(1)		- Provisions to prevent clogging	E-7.5
	264.301(b)	- Liner system/leachate system exemption including	NA
		- Nature and quantity of wastes	NA
		- Alternative design and operation	NA
		- Landfill location description	NA
		- Hydrogeologic setting	NA
		- Attentuative capacity of materials between landfill and ground and surface waters	NA
270.21(b)(2)	264.301(c)	- System for control of run-on from peak discharge of a 25-year storm	E-7.6.2
270.21(b)(3)	264.301(d)	- System for control of run-off water volume from a 24-hour, 25-year storm	E-7.6.3
270.21(b)(4)	264.301(e)	- Procedures to manage collection and holding facilities associated with run-on and run-off control systems	0-6.2.5, 10.3.3
270.21(b)(5)	264.301(f)	- Wind dispersal control procedures	0-4.6, 10.2.1
270.21(c)	264.302(a)	- Documentation for Part 264 Subpart F exemption including	
		- Landfill and liners above seasonal high water table	NA
		- Two liners meeting requirements of 264.301(a)(1)	NA

Part 270	Part 264	RequirementApplication	Location in Application
		- Leak detection system between liners	NA
		- Leachate system meeting 264.301(a)(2) requirements	NA
270.21(h)	264.314	- Documentation of procedures/ equipment for landfilling liquid wastes	NA (0-4.2.1)
270.21(i)	264.315	- Documentation of procedures/ equipment for landfilling containers	NA (0-4.2.1)
270.14(c)	Part 264	Part B Protection of Ground-Water Information Requirements for Surface Impoundments, Waste Piles, Land Treatment Units and Landfills	
270.14(c)(1)		- Interim status period ground-water monitoring data summary	E-Appendix N&P
270.14(c)(2)		- Identification of uppermost and hydraulically interconnected aquifers under facility including	E-4.4.1
		- Water flow rate and direction	E-4.4.2, E-4.4.3
		- Bases for identification	E-4.5.1
270.14(c)(3) and 270.14(b)(19)		- Topographic map	PD-5C-2
		- Delineation of property boundary	PD-5C-2
	264.95(b)	- Delineation of waste management area	E-3.1
	264.95(a)	- Delineation of proposed point of compliance	PD-5C-4
		- Ground-water monitoring well locations	E-4.5.2.1
		- Location of aquifers	E-4.4.1
270.14(c)(4)(i) through (ii)		- Descriptions of existing contamination	E-6.3
		- Delineation of plume extent	NA

Part 270	Part 264	Requirement	Location in Application
		- Appendix VIII constitutents concentrations	NA
		- Concentrations throughout plume	NA
		- Maximum concentration in plume	NA
270.14(c)(5)	264.97	- Detailed plans and an engineering report of Ground-Water Monitoring Program	
	264.97(a)	- Description of wells	Appendix F&G
		- Number of wells	E-4.5.2.1
		- Locations	E-4.5.2.1
		- Depths	E-4.5.2.1
		- Assurance of unaffected background water measurement	E-4.6.2
		- Assurance of compliance point ground-water measurement	E-4.6.4
	264.97(c)	- Casing description	E-4.5.2.2
	264.97(d)	- Description of sampling/analysis procedures	
		- Sample collection methods	Appendix J
		- Sample preservation/shipment	Appendix J
		- Analytical procedures	Appendix J
		- Chain of custody control	Appendix J
	264.97(e)	- Documentation of proper and adequate analytical procedures	Appendix J
	264.97(f)	- Procedure for determination of ground-water elevation with	Appendix J
270.14(c)(6)	264.91(a)(4) and 264.98	- Description of Detection Monitoring Program Including	

Part 270	Part 264	Requirement	Location in Application
270.14(c)(6)(i)	264.93 and 264.98(a)	- List of indicator parameters waste constituents, reaction products to be monitored for, including	E-4.5.1
		- Type, quantities, concentrations expected in wastes	Appendix L, 0-4.2.1
		- Mobility, stability, persistence in unsaturated zone	E-4.4.5
		- Detectability in ground-water	Appendix R
270.14(c)(6)(ii) and (III)	264.98(a)(4) and (264.98(c)(1)	- Background ground-water concentrations values and coefficients of variation established by one of the following:	
	264.98(c)(3)	- Use of an appropriate ground-water monitoring systems; and	E-6.3.2
	264.97(g)(1)	- Quarterly sampling of gradient wells for one year; or	E-4.6.2
	264.97(g)(3)	- Quarterly sampling of other wells for one year, and	E-4.6.2
	264.97(g)(4)	- Data from a minimum of one sample/well and minimum of four samples per quarter, or	E-4.6.1
		- Presentation of procedures to calculate such values	NA
270.14(c)(6)(ii)	264.98(b)	- Description of an appropriate ground-water monitoring system to be installed at the compliance point	E-6.3.2
270.14(c)(6)(iv)	264.98(d)	- Procedures for collection semi-annual ground-water samples at the compliance point during	
		- Active life	E-Appendix R
		- Closure period	E-Appendix R

Part 270	Part 264	Requirement	Location in Application
		- Post-closure period	E-Appendix R
	264.98(e)	- Procedure for annual determination of uppermost aquifer flow rate and direction	E-4.6.5
	264.98(f) and 264.97 (d), (e)	- Documentation of sample collection and analysis procedures	E-Appendix J
	264.98(g)	- Procedure for determining a statistically significant increase for any monitored paramenter or constitutent by	
		- Comparing compliance point data to background data using the procedures in 264.97(h)(1) or (2), and	E-4.6.2
		- Providing an estimate of the completion necessary to obtain results	E-4.6.2
270.14(c)(6)	264.98(h)	- Procedures to be implemented if a statistically significant increase in any constitutent or parameter is identified at any compliance point monitoring well, including	
	264.98(h)(1)	- Written notification to	E-4.6.4
	264.98(h)(2)	- Sample collection and analysis methods of all Appendix VIII constituents at all monitoring wells	E-4.6.4
	264.98(h)(3)	- Method for establishing Appendix VIII constituent background values	E-4.6.2
	264.98(h)(4)	- Preparation of an application for permit modification to establish compliance monitoring	E-4.6.3

Part 270	Part 264	Requirement	Location in Application
270.14(c)(7)	264.91(a)(1) - and 264.99	Description of Compliance Monitoring Program, including	
		- Lists of wastes previously handled at facility	NA
		- Characterization of contaminated ground-water	NA
		- Hazardous constituents identified	NA
		- Hazardous constituents concentrations	NA
	264.99(b) -	Description of compliance monitoring system at the compliance point	NA
		- List of hazardous constituents to be compliance monitored	NA
	264.96 -	Proposed compliance period	NA
	264.99(d) -	Procedure for collection quarterly samples at compliance point during compliance period	NA
	264.99(c)(3) -	Procedures for establishing background concentration values for constituents that are based on one of the following:	
		- Use of an appropriate ground-water monitoring systems, and	NA
	264.97(g)	- Data that is available prior to permit issuance	NA
		- Data that accounts for measurement errors in sampling and analysis	NA
		- Data that accounts for seasonal ground-water quality fluctuations	NA
		- Data from a minimum of one sample per well and a minimum of four samples from monitoring system, each time system is sampled	NA

Part 270	Part 264	Requirement	Location in Application
270.14(c)(7)(iv)	264.92 and 264.99(1), (2)	- Proposed concentration limits for constituents with justification based on	
		- 264.94(a)(1) and 264.97(g)	NA
		- 264.94 (a)(2)	NA
		- 264.94(b) and 264.99(c)(1)	NA
	264.99(e)	- Procedure for annual determination of uppermost aquifer flow rate and direction	NA
	264.99(f)	- Procedures for annual testing of all compliance point wells for Appendix VIII constituents	NA
	264.99(g)	- Documentation of all sampling and analysis procedures	NA
	264.99(h)	- Procedures for determining a statistically significant increase for any monitored constituent by	NA
		- Comparing compliance point data to the concentration limit using the procedure in 264.97(h)(2)	NA
		- Providing an estimate of the time period after sampling completion necessary to obtain results	NA
	264.99(i)	- Procedures to be implemented if the ground-water protection standard is exceeded at any compliance point monitoring well, including	NA
	264.99(i)(1)	- Written notification to Regional Administrator	NA
		Part B Certification and Signatories	
270.11(d)		- Certification paragraph	NA
270.11(a)		- Appropriate signatory	NA

2.0 PART A PERMIT APPLICATION

In accordance with 40 CFR 270, a revised and updated Part A permit application follows for Area 5 of the Hawkins Point Hazardous Waste Landfill (HWL). This permit application, in combination with the parallel application for Area 3, supercedes the current Part A application which was initially filed with the United States Environmental Protection Agency (EPA) on August 5, 1980.

The EPA identification number for the Hawkins Point HWL is MDD000731-356, and includes both Area 5 and Area 3 of the facility. It should be understood that the current submission, however, includes only Area 5 development of the facility; a separate RCRA permit application, including a revised Part A permit application, discusses the Area 3 development.

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

(Area 5)

Form Approved OMB No. 158-R0175

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F M D D 0 0 0 7 3 1 3 5 6 D

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill—in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill—in area*(s)* below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold—faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	MARK 'X' NO	MARK 'X' FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP HAWKINS PT HAZARDOUS WASTE LNDFLL AREA 5

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*		
2 HENNESSEY L J PROJECT ENGNR	301	269	3666

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 MD ENVIR SERVICE 60 WEST ST

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 ANNAPOLIS	MD	21401

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 5501 QUARANTINE ROAD

B. COUNTY NAME

NA

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6 BALTIMORE	MD	21226	

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

(Area 5)

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

S													T/A	C
F	M	D	D	0	0	0	7	3	1	3	5	6		1

1 2 - 13 14 15

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS
23	24 - 29	

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 71 **1. EXISTING FACILITY** *(See instructions for definition of "existing" facility. Complete item below.)*

[ ] 71 **2. NEW FACILITY** *(Complete item below.)*

C	YR.	MO.	DAY
8	8 0	0 8	0 5
15	73 74	75 76	77 78

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* **OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED** *(use the boxes to the left)*

YR.	MO.	DAY
73 74	75 76	77 78

FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* **OPERATION BEGAN OR IS EXPECTED TO BEGIN**

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[X] 72 **1. FACILITY HAS INTERIM STATUS**

[ ] 72 **2. FACILITY HAS A RCRA PERMIT**

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code*(s)* in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below):* A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

S		T/A	C
C	DUP		1

1 2 - 13 14 15

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
	16 - 18	19 - 27	28	29 - 32
X-1	S 0 2	600	G	
X-2	T 0 3	20	E	
1	D 8 0	93.0	A	
2				
3				
4				

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
	16 - 18	19 - 27	28	29 - 32
5				
6				
7				
8				
9				
10				

CONTINUE ON REVERSE

Continued from page 2.

(Area 5)

NOTE. Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
S W M D D 0 0 0 7 3 1 3 5 6 T/A C 1	S W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

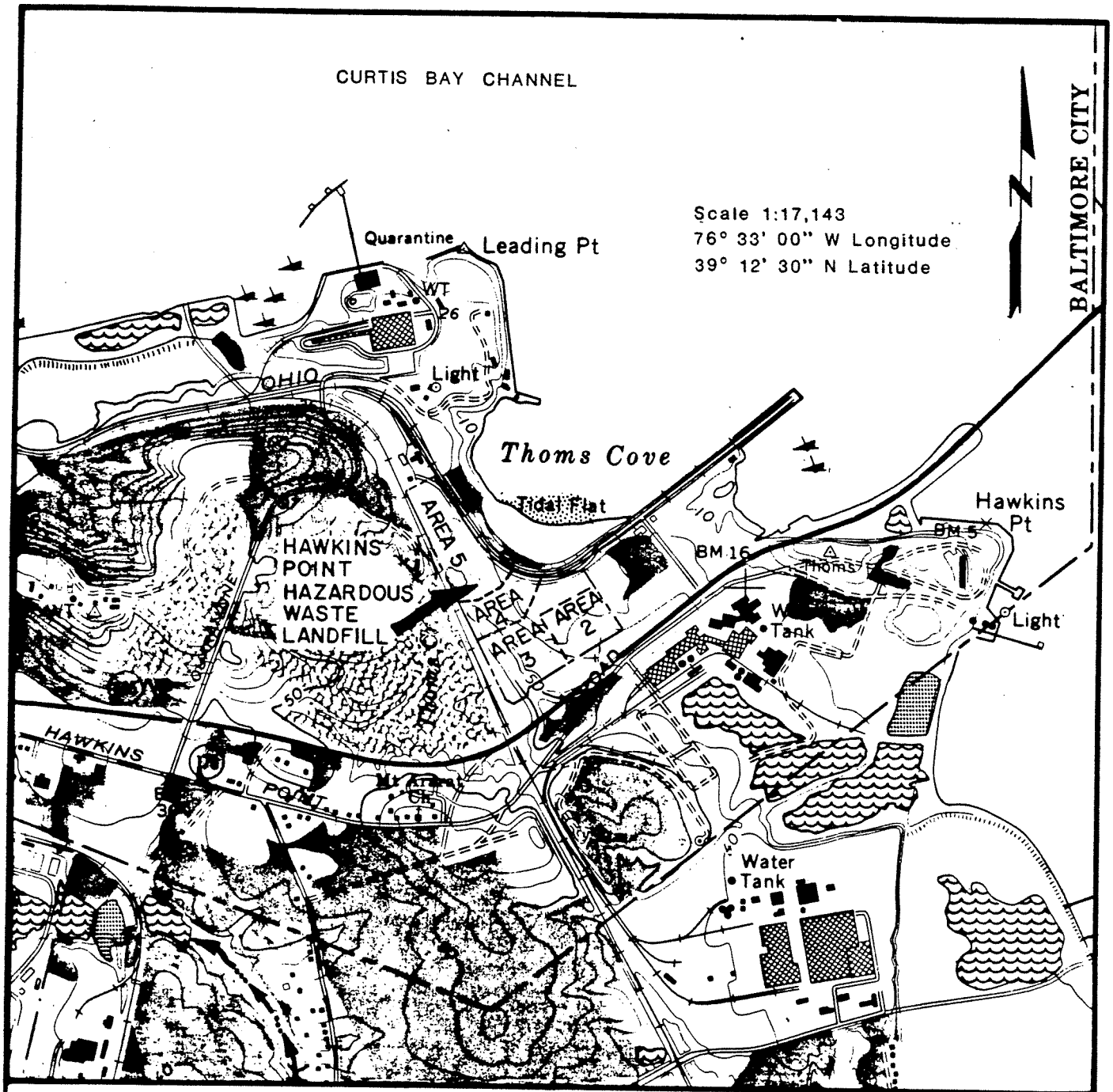
LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D007	100,000	T	D80	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

V. FACILITY DRAWING *(see page 4)*

See the attached Figure 2.1: Area Topographic Map, and Figure 2.2: Existing Facility Aerial Photograph. Also refer to the General Site Plan contained in the attached "Part B Permit Facility Design - Area 5: Site 2 Expansion". These drawings delineate property boundaries, areas of past, present and future disposal, and ancillary facilities on the site.



LEGEND

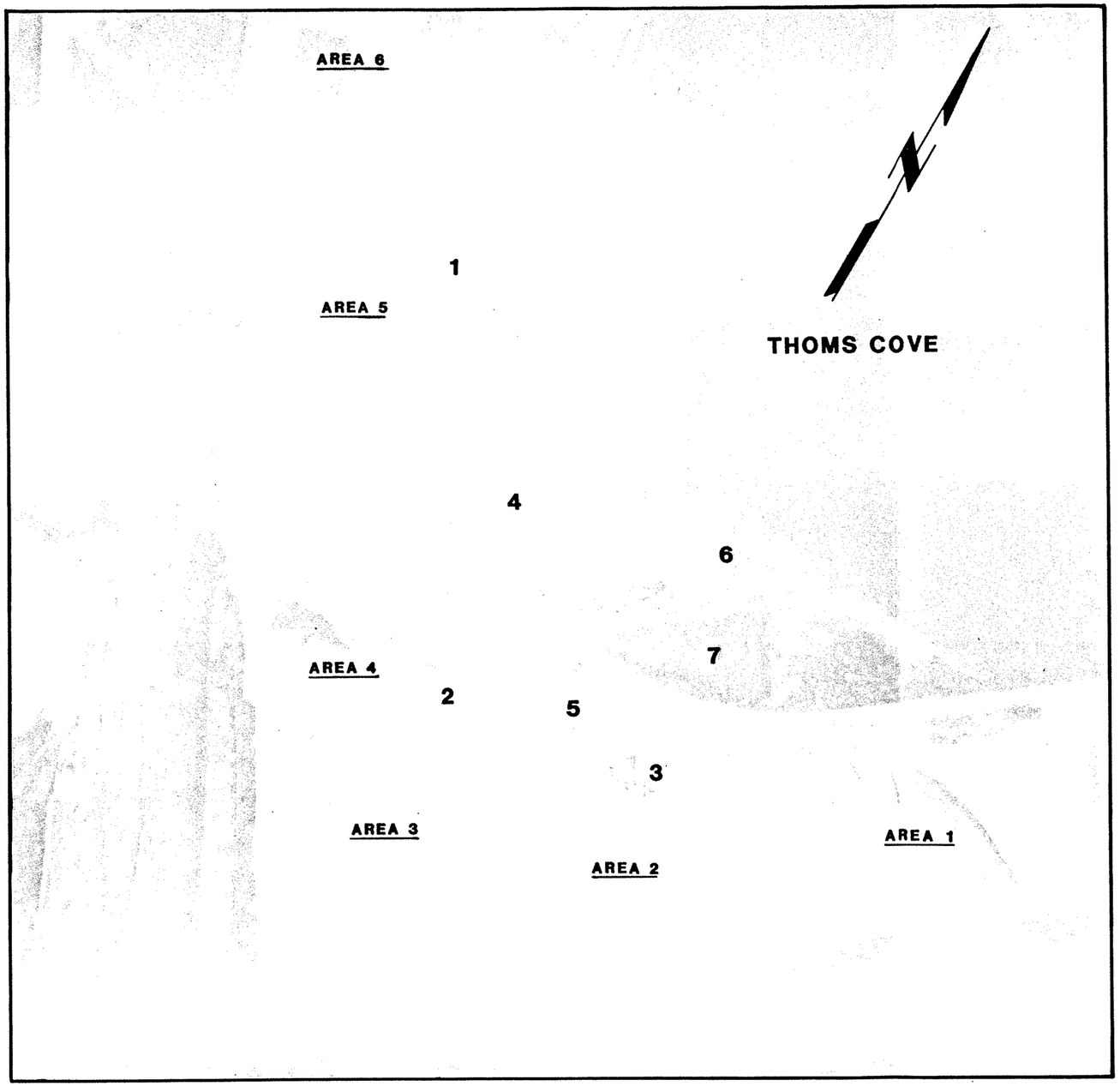
- Surface water
- Facility boundaries
- Area boundaries
- Direction of surface water flow

Notes:

1. Contour interval is 10 feet.
2. Mean range of tide is approximately 1.1 feet.

AREA TOPOGRAPHIC MAP

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 2.1



KEY

1 Entrance Road

2 Facility Control Compound

3 Leachate Storage and Transfer Area

4 Scale Plaza

5 Truck-Wash Pads

6 Sediment Pond No. 1

7 Sediment Pond No. 2

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	EXISTING FACILITY AERIAL PHOTOGRAPH	figure 2.2

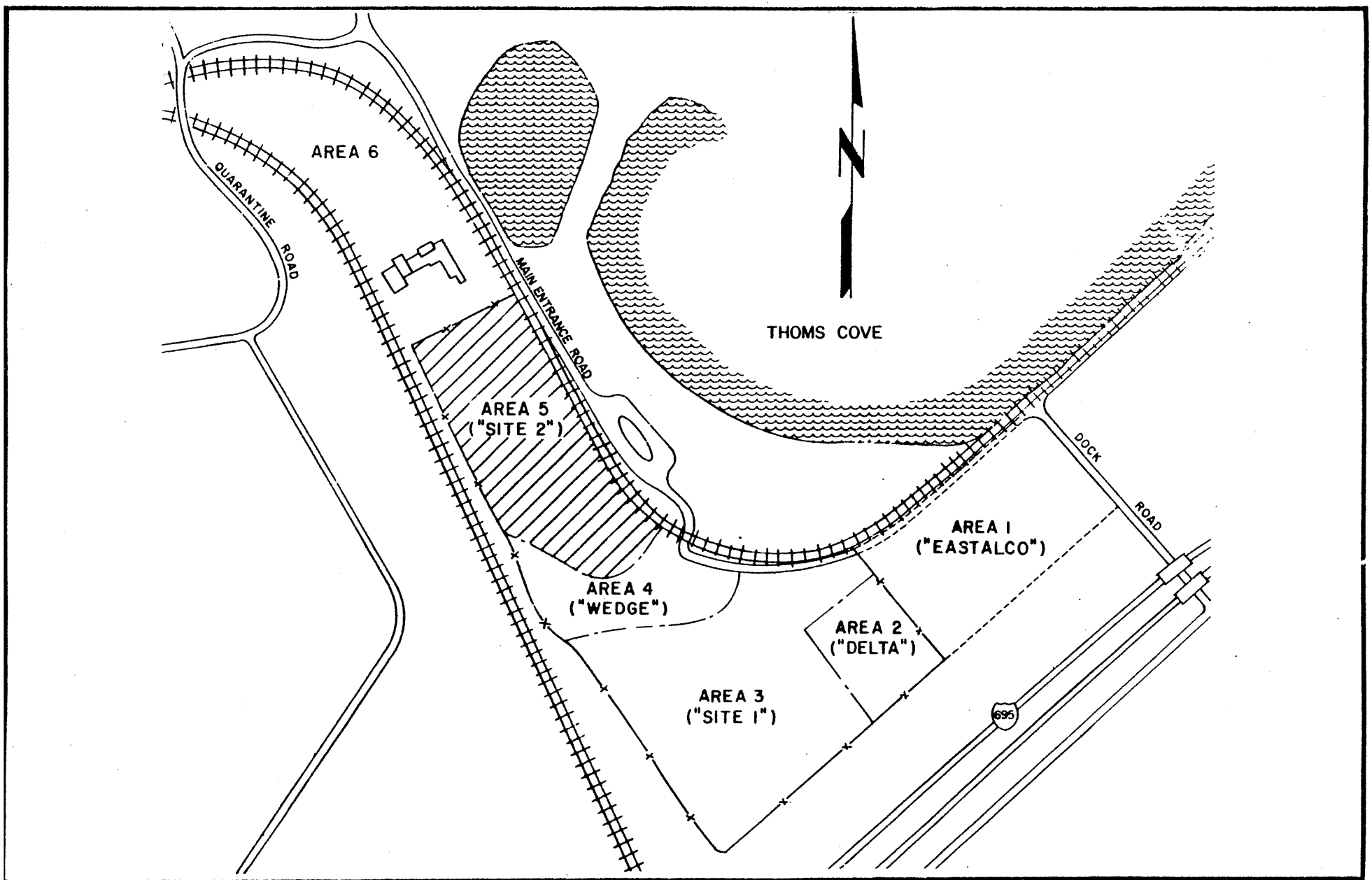
3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill is a secure hazardous waste landfill in Maryland permitted by the Maryland Department of Health and Mental Hygiene. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southeastern corner of Baltimore City (see Drawing No. PD-5C-1 of the "Part B Permit Facility Design" documents). Located on State of Maryland property, the facility is owned and operated by the Maryland Environmental Service, an agency of the State of Maryland.

The Hawkins Point site has several advantages in serving as a hazardous waste disposal area: 1) it is located within Baltimore City, the statewide centroid for hazardous waste production; 2) it is commensurate with existing land uses; 3) it is readily accessible from major transportation corridors; and 4) because of the industrial character of the area, community impacts are minimized.

Presently, the Hawkins Point site encompasses approximately 67 acres, including approximately 41 acres designated for the disposal and containment of hazardous wastes. The site is divided into 6 areas as indicated on Figure 3.1. Areas 1 and 6 are presently outside of the Hawkins Point facility; Areas 2 and 4 are within the facility and are proposed for future landfill development. Two areas have previously been used for the deposition of chrome ore tailings, in the general vicinities of Areas 3 and 5. These areas are currently being prepared for expansion, and are addressed in two simultaneous RCRA permit applications. This permit application concerns the existing and proposed development of Area 5.



AREA LOCATOR MAP

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 3.1

The development of Area 5, located in the northwestern section of the Hawkins Point HWL site, will provide for the disposal and containment of chrome ore tailings generated by the Allied Chemical Company. Area 5 construction to date has involved the removal of contaminated waters in previously disposed chrome ore tailings, prior to vertical expansion of the area. The control of surface waters, ground waters, leachate production and fugitive dust dispersion will be of prime importance during site development activities.

To date, three construction contracts have been completed for facilities to serve all areas of the Hawkins Point HWL site. These include:

- "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).
  - Ground-water interceptor bordering the western and southern edge of Area 3.
  - Sedimentation Pond Nos. 1 and 2.
  - Drainage ditches and culverts tributary to the sedimentation ponds.
- "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982).
  - Leachate storage and transfer area.
  - Leachate collection system for chrome ore tailings underlying Area 5.
  - Electrical service improvements.
- "Contract 3: CHS Landfill Expansion" (November 5, 1982).
  - Entrance road.
  - Scale plaza.
  - Truck wash pads.
  - Sanitary sewerage holding systems.
  - Drainage improvements.
  - Security fencing.
  - Cell No. 5 earthen berm and liner system.

Facilities are also provided at the Hawkins Point Hazardous Waste Landfill to furnish essential services ancillary to the landfill operation, and a suitable working environment for facility employees. The principal ancillary facilities are: 1) a scale plaza/office trailer; 2) a laboratory trailer; 3) a guardhouse; 4) a storage trailer; 5) a crew trailer; 6) a truck-wash area; and 7) a leachate storage and transfer area. Essential utility services are also provided, including electric, telephone, and water. Wastewater is disposed utilizing 2 on-site sanitary sewerage holding systems.

3.2 TOPOGRAPHIC MAP

Drawing No. PD-5C-2 of the "Part B Permit Facility Design, Area 5: Site 2 Expansion", drawings depicts a topographic map outlining the general site plan and the development of the area surrounding the site. The topographic map was derived from aerial photography obtained on April 1, 1983. 40 CFR 270.14(b)(19) requires the following details to be described and depicted on the topographic map to aid in the permit application review. The reviewer should note that the referenced topographic map has a scale of 1 inch equal to 200 feet, and a contour interval of 2 feet.

- Land Uses. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped land and parkland does exist as indicated. No residential land uses occur within 1,000 feet of the facility boundary.
- Facility Boundary. The facility boundaries encompass Areas 2, 3, 4, and 5. These four areas are presently in use or are designated for future use as operating hazardous waste landfills.
- 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation (el.) along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will

raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone C, areas of minimal flooding, by the Federal Emergency Management Agency (FEMA).

- Wind Rose. Figure 3.2 depicts the annual wind rose of meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located a distance of approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between 0 and 3 miles per hour (mph).

- Access Roads. The main entrance road will convey traffic to and from the facility; this road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1. Primary and secondary access roads, and haul roads will provide on-site access to Areas 2, 3, 4, and 5; additional information detailing the on-site access roads is presented in Section 7.7 of this report.

- Recreational Areas. No recreational areas occur within 1,000 feet of the property boundary.

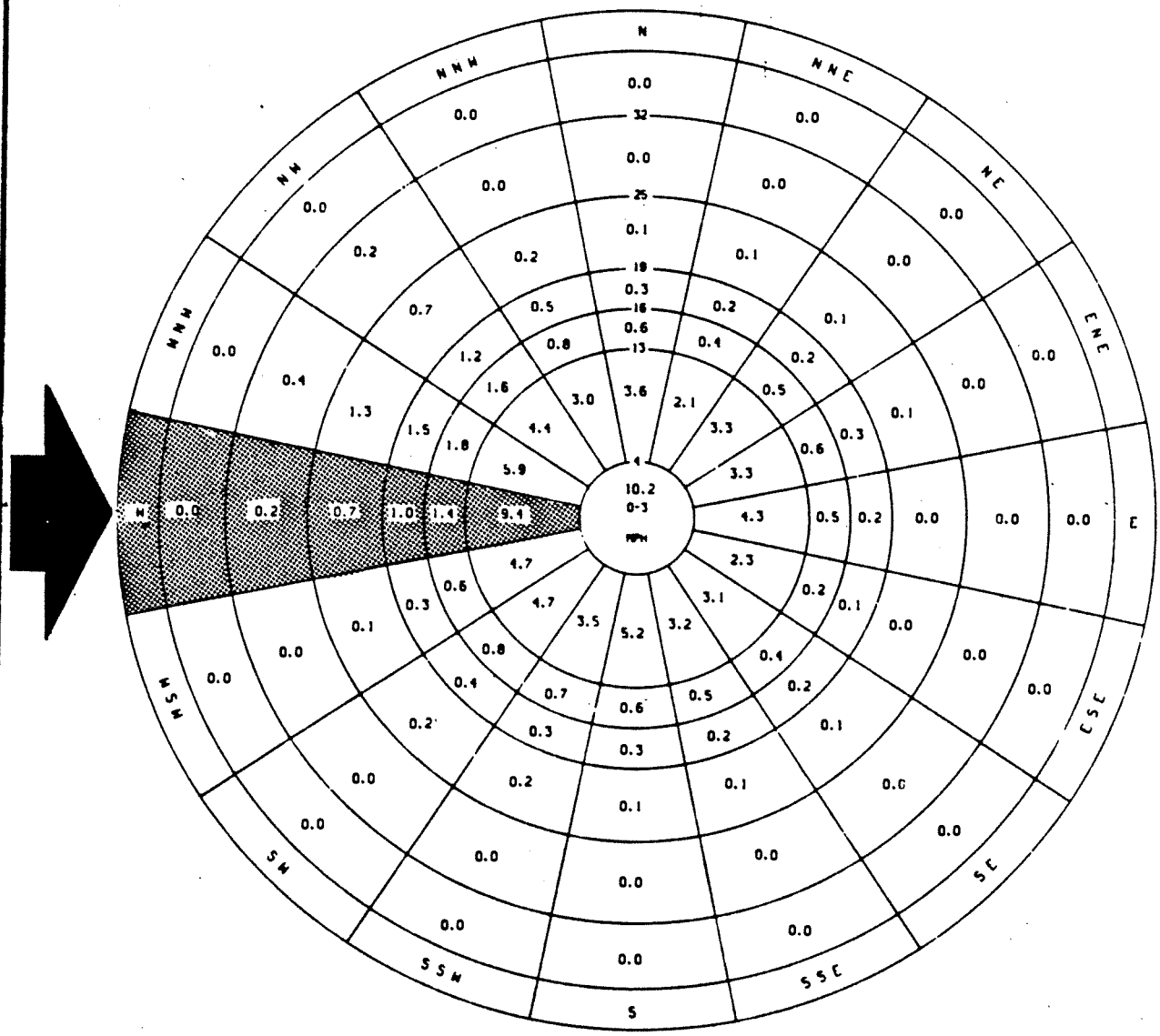
- Fire Control Facilities. Five fire hydrants serve the Hawkins Point facility along the main entrance road, as indicated on the topographic map.

- Surface Waters. Surface-water streams in the Hawkins Point area generally flow easterly, and discharge into Thoms Cove, on the western bank of the Patapsco River. Surface-water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area; the directions of these flows are indicated on the topographic map.

- Loading and Unloading Areas. Chrome ore tailings will be unloaded and disposed within an active cell of the Area 5 development. Leachate will be collected, temporarily stored and transferred to tank trucks at the leachate storage and transfer area for off-site treatment or reuse.

- Buildings and Structures. On-site facilities are currently under construction to serve the above operations. As of August 1, 1983, existing structures within the facility boundaries consisted of a corrugated metal roof shelter located in the leachate storage and transfer area, and a second structure in the area of the truck-wash pads. Facility control structures will consist of 6 trailers, as discussed in Section 7.8.

- Weigh Station and Clean-up Area. Trucks will be weighed at the Allied Chemical Company facility in Baltimore prior to transport At the site, trucks which require washing will utilize facilities located at the truck wash pad area.



WIND ROSE FOR BALTIMORE, MARYLAND

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 3. 2

- Sanitary and Storm Water Systems. Sanitary wastewater facilities consist of 2 sanitary sewerage holding systems located in the facility control compound area and the scale plaza. The systems are checked weekly and pumped out as necessary. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into 3 categories:

  1. Storm water that has been contaminated by waste is directed to the leachate collection system and holding tanks for transfer to suitable treatment facilities.

  2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

  3. Storm water which has come in contact with uncontaminated areas of the facility is conveyed to 1 of 2 sedimentation ponds before discharging into Thoms Cove.

4.0 GEOLOGIC AND HYDROGEOLOGIC DESCRIPTION

4.1 AREA 3 GEOLOGIC AND HYDROGEOLOGIC SUMMARY

Area 3 is underlain by post-Cretaceous age surficial sediments, Cretaceous age Coastal Plain deposits and pockets of more recently deposited fill comprised of randomly-placed natural soils and constructed chrome ore tailings cells. The Cretaceous age sediments of Area 3 are predominantly hard clays, although dense sands and silts also occur in these soils. Post-Cretaceous sediments occur in a trough inferred to be cut into the Cretaceous deposits along the northwestern edge of Area 3. The post-Cretaceous sediments in this trough consist of silts, sands, clays, and organic materials.

The near surface, unconfined aquifer underlying Area 3 consists of post-Cretaceous sediments and the upper member of the Cretaceous deposits known as the Patapsco Formation. The base of the aquifer rests unconformably on the top of approximately 100 feet of Arundel Clay, also Cretaceous in age. Beneath the Arundel, and hydraulically isolated from the near surface aquifer in the area of the site, lies the Patuxent Formation. This formation is also Cretaceous in age and comprises a deeper aquifer beneath the site.

Regional ground-water contours indicate flow generally in an eastern direction toward Thoms Cove, although local ground-water contours indicate a mound in the surface of the water table beneath Cell No. 40 in Area 3. This local mounding is interpreted to be the result of precipitation draining from the increased storage capacity of fill placed in the area, causing local flow to radiate away from the center of the pile. This effect is attenuated by the regional flow gradients moving onto the site from the west toward Thoms Cove, away from any current or potential areas of withdrawal from the aquifer.

refer to Dennis

A geotechnical evaluation of the Cretaceous and post-Cretaceous sediments in Area 3 concluded that the facility can be implemented utilizing conventional geotechnical construction techniques. Slope stability analyses, using various strength parameters for general hazardous waste process sludge, concluded that the facility will be stable in these soils. Settlements are expected to range from one to four feet, with differential settlements of approximately 2 feet in 100 feet. The Cretaceous and post-Cretaceous deposits appear capable of providing adequate structural support. In summary, the pro-

posed engineering and environmental design practices for the facility are considered to be sufficient to provide adequate support for the facility and to protect ground-water quality in the area.

4.2 REGIONAL GEOLOGY

4.2.1 General

The Hawkins Point Hazardous Waste Landfill site lies within the Coastal Plain Physiographic Province. The formations that comprise this Province consist of unconsolidated sediments that were deposited in a succession of fluvial (riverine), fluvio-marine (near-shore) and marine environments. This succession of depositional environments resulted from several transgressive-regressive cycles of the sea that occurred some 100 million years ago. A transgressive cycle occurs when there is an increase in sea level that involves encroachment of the sea onto land. Encroachment results in the progressive placement of non-marine (continental), fluvio-marine and marine sediments. The regressive cycle, conversely, occurs when there is a decrease in sea level. This results in an exposure of the former sea bottom. A layering of non-marine over fluvio-marine over marine sediments is the resulting classical sequence of deposition. The unconsolidated sediments of the Coastal Plain begin at the Fall Line and dip southeasterly at generally less than 1 degree to form a massive wedge of sediments which exceeds 8,500 feet in thickness along the Atlantic coast.

The geologic map of the area presents a succession of Coastal Plain outcrops of the Lower Cretaceous age sediments of the Potomac Group. The Potomac Group is comprised of the Patuxent (oldest), Arundel and Patapsco (youngest) Formations. These are all overconsolidated sedimentary soils of continental origin that were deposited during a transgressive cycle where there was a rise in sea level. The Potomac Group was derived from materials eroded by rivers from the Piedmont and upland areas to the west. Directly underlying the Potomac Group is crystalline bedrock, the eastern continuation of the basement complex that outcrops in the Piedmont Province. It is anticipated that crystalline bedrock underlying the region of the site is on the order of 550 feet below the ground surface.

4.2.2 Patuxent Formation

The Patuxent Formation, the basal or deepest member of the Potomac Group, was deposited in a fluvial (riverine) environment. The rivers which dissected broad plains near the coast deposited complex combinations of channel and point bar sands and gravels in the fast-moving river channels and silts and clays in the floodplain or overbank areas. The result of this type of deposition is that the materials often have significant lateral and vertical variability.

The Patuxent Formation increases in thickness toward the southeast from its outcrop area where it is exposed at the land surface along the Fall Line. It has been reported to be as much as 2,300 feet thick near Ocean City, Maryland, and continues thickening beyond the continental shelf. The Patuxent formation consists of irregularly stratified layers of moderately-sorted sands and gravels that can be relatively thick, irregularly bounded sheets of sands derived from channel and river bar origins, or relatively thin, isolated pods or ribbons of silt and/or clay associated with overbank deposits. The proportion of clay to sand increases to the southwest, toward Washington, D.C.

4.2.3 Arundel Formation

The Arundel Formation, which directly overlies the Patuxent Formation, was deposited in a massive floodplain overbank environment. Silts and clays are the major constituents of this formation, with minor occurences of sand beds. Thicknesses average about 100 feet. This less permeable formation is generally regarded as an aquiclude or barrier, separating the Patapsco and Patuxent aquifers.

4.2.4 Patapsco Formation

The Patapsco Formation, which outcrops on the site, was deposited in a fluvial environment, and its depositional chracteristics and variability are similar to those of the Patuxent Formation which was deposited in a similar environment. The Patapsco Formation increases in thickness moving from its outcrop area to the southeast where it is several thousand feet thick beneath Ocean City, Maryland. It consists of interbedded, banded silt

and clay with clayey sand. The clayey fraction of the formation increases to the southwest toward Washington, D.C. The sand facies, consisting of varying compositions of sands, silts and clays, of the approximately 300-foot thick Patapsco Formation in the vicinity of Baltimore at times exceed 50 feet in thickness.

4.3 SITE GEOLOGY

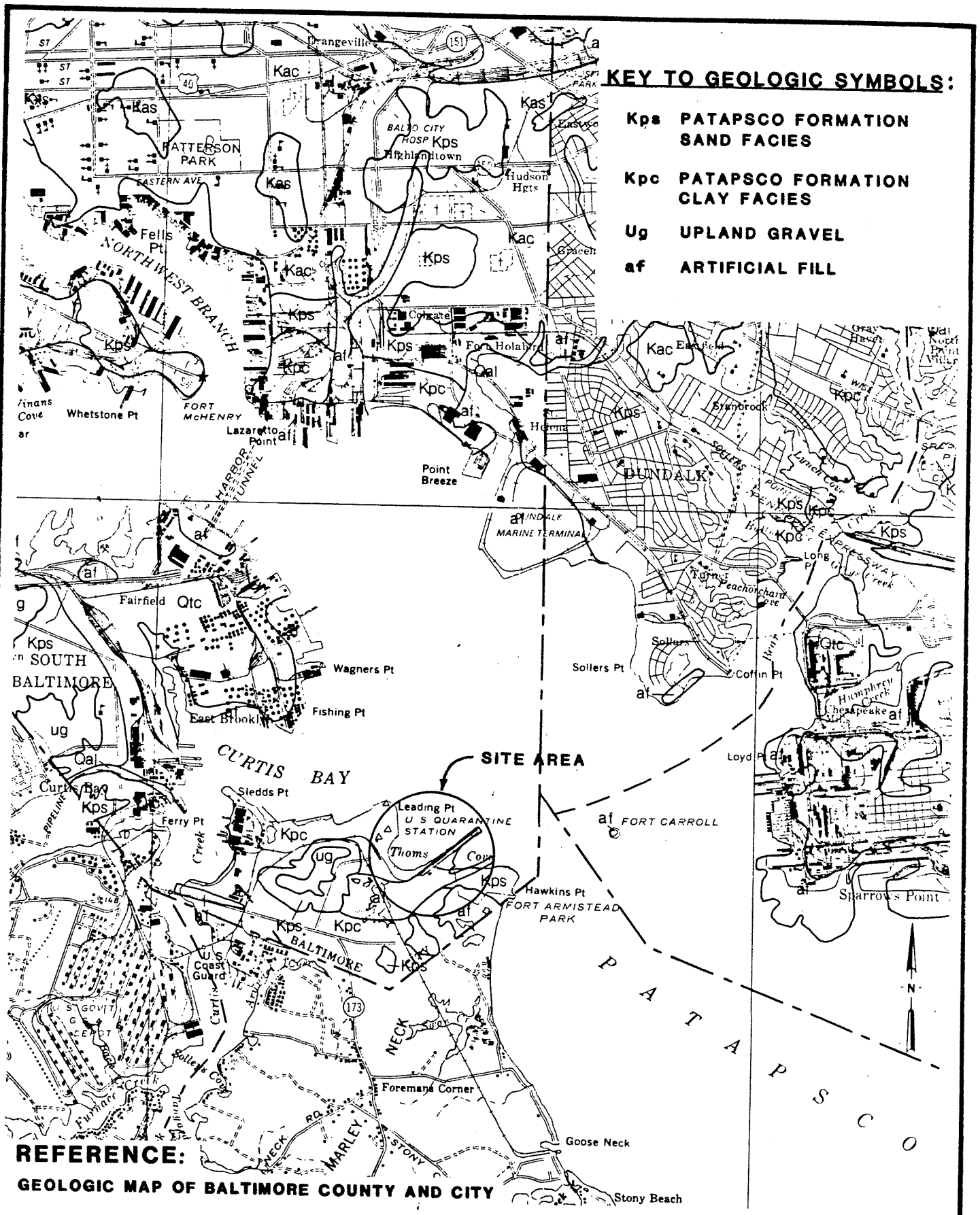
4.3.1 General

Geologic maps indicate that the Hawkins Point HWL site is underlain by clays, sands and fills. A general geologic map is included as Figure 4.1. The clays and sand facies (deposits) are mapped as Cretaceous in age and form part of the Patapsco Formation of the Potomac Group.

Figure 4.1 indicates that Patapsco clays occur predominantly in the southern sector of the site (Areas 2 and 3) and outside the site boundary of Area 5 toward the northwest. Patapsco sands occur near Area 5 to the west. A cap deposit of Upland Gravel (Quartenary Age) also exists to the west of Area 5. Much of the Patapsco Formation at the site is overlain by natural soil fills or chrome ore tailings' cells.

Per 40 CFR 264.18(a)(2)iii, the site is located in a political jurisdiction that is not listed in Appendix VI of that section. Appendix VI lists jurisdictions which have faults that have been active within Holocene time. Additionally, according to the Map of Young Faults in the United States, published by the United States Geological Survey (USGS) in 1977, there are no known fault displacements within the last 15 million years in Maryland or Delaware. The nearest mapped fault of any age is inferred to be approximately 6 miles to the northwest of the site.

As part of this study, a review of existing geologic literature was conducted. Officials within the Maryland Geologic Survey and the Maryland Department of Health and Mental Hygiene (DHMH) were consulted. During this review, historical records, including topographic and geologic maps were examined. Historic maps of the area indicate the existence of a lake associated with Thoms Creek to the west and southwest of Area 3. Figures 4.2, 4.3 and 4.4 depict the general location and configuration of the creek and lake during the past 45 years. Figure 4.2 indicates the general configuration of

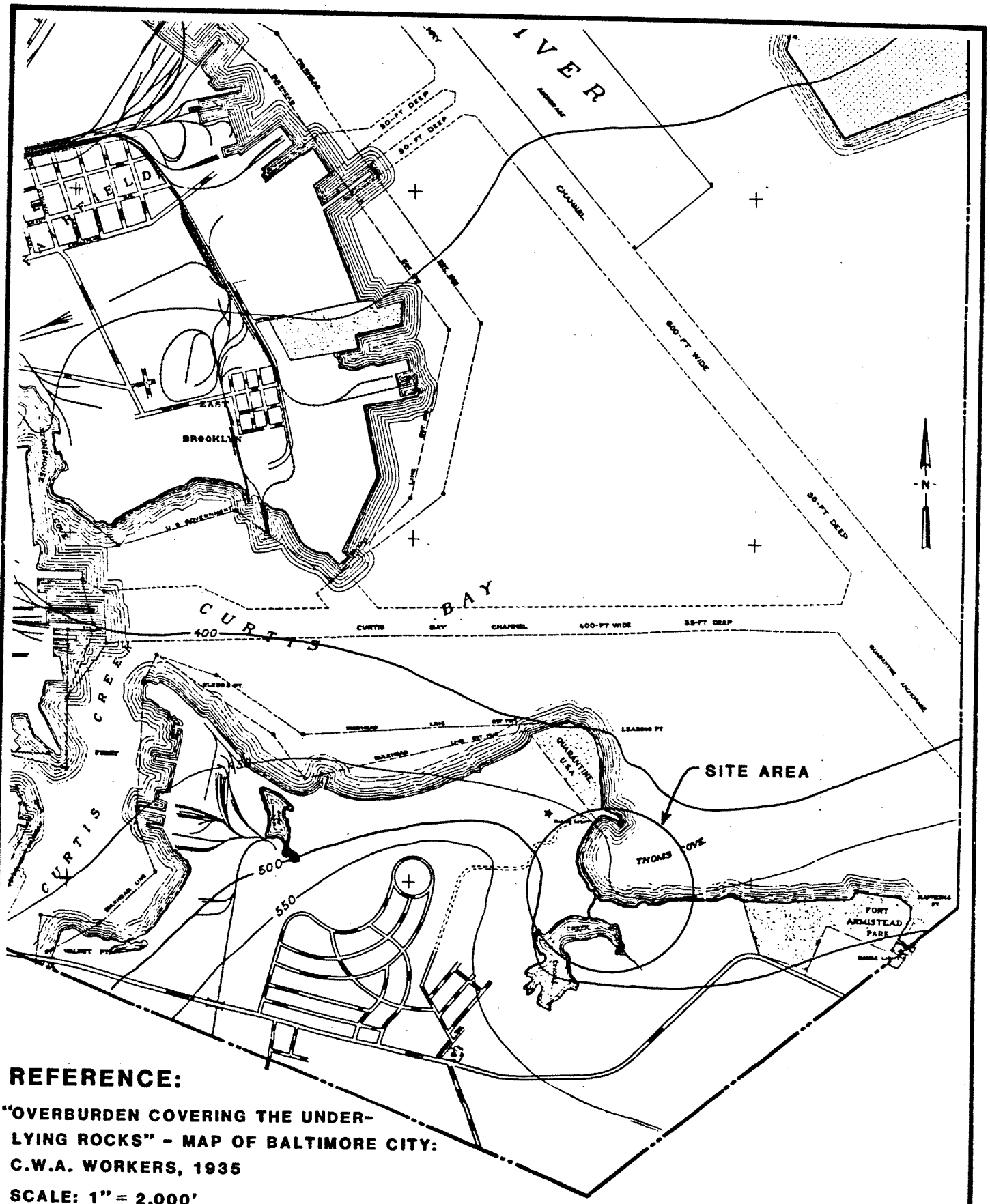


REFERENCE:

GEOLOGIC MAP OF BALTIMORE COUNTY AND CITY

REGIONAL GEOLOGIC MAP

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.1



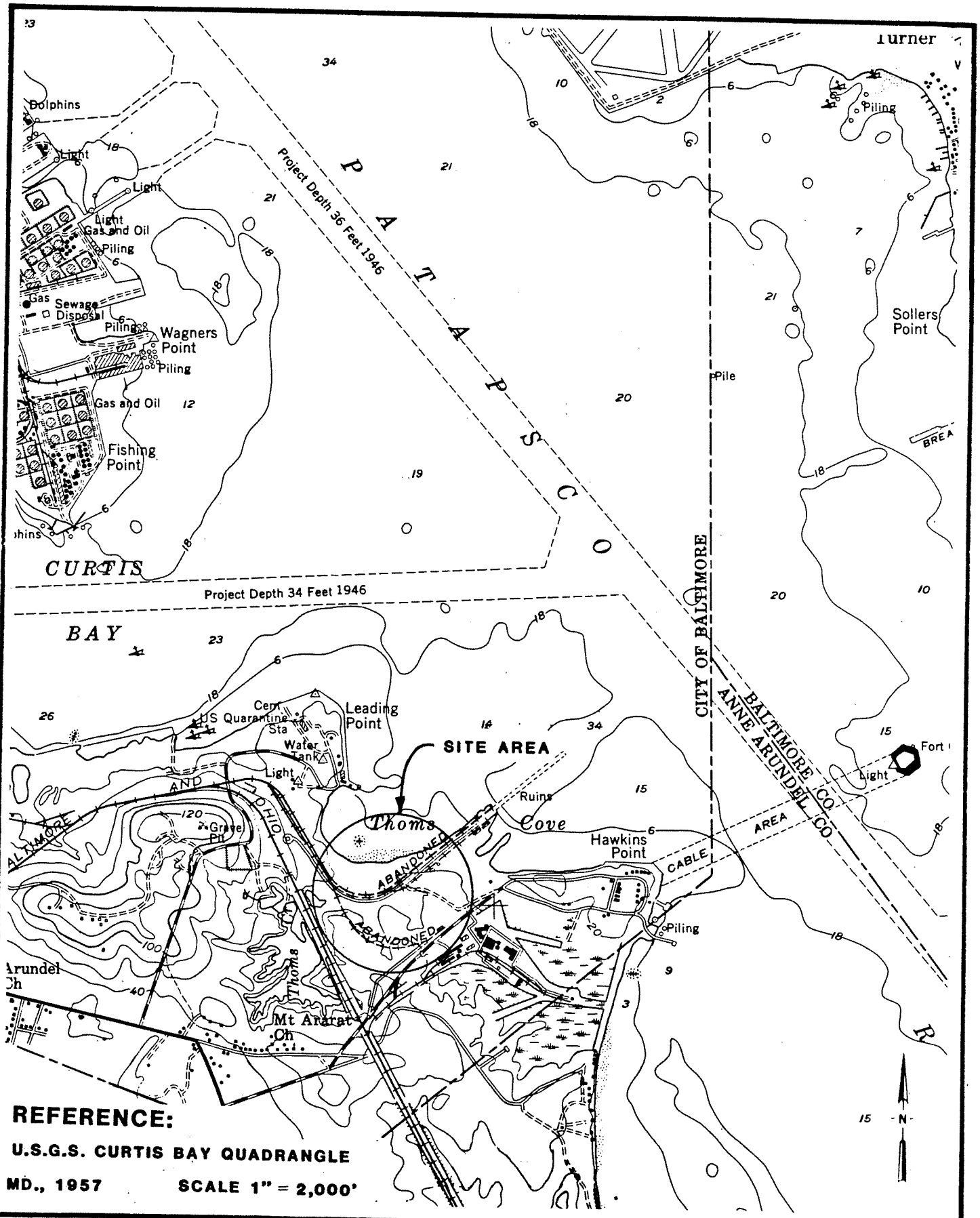
REFERENCE:

"OVERBURDEN COVERING THE UNDER-LYING ROCKS" - MAP OF BALTIMORE CITY: C.W.A. WORKERS, 1935

SCALE: 1" = 2,000'

EXTENT OF THOMS CREEK-1935

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.2



REFERENCE:

U.S.G.S. CURTIS BAY QUADRANGLE

MD., 1957 SCALE 1" = 2,000'

AREA TOPOGRAPHY-1957

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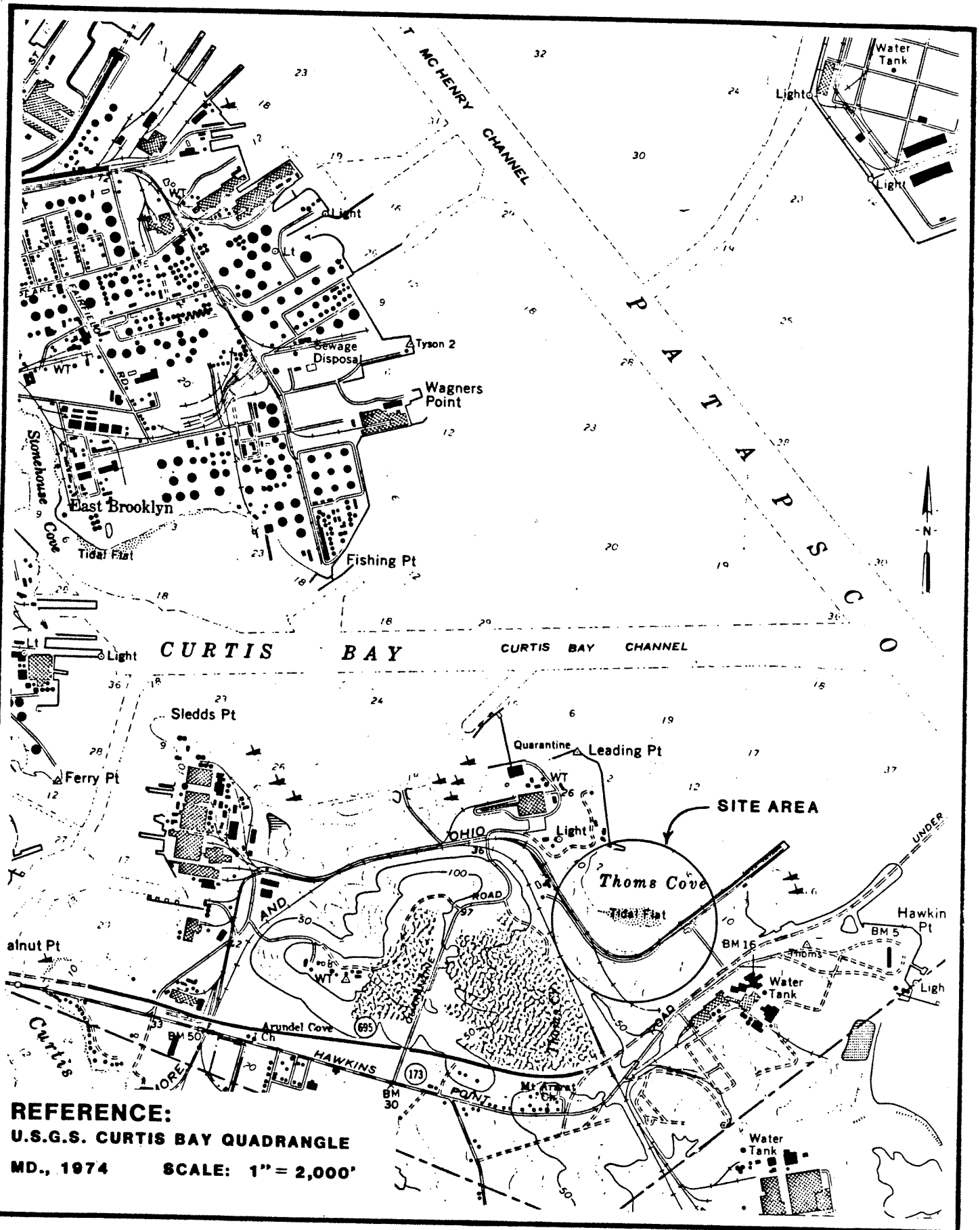
Hawkins Point Hazardous Waste Landfill

figure 4.3



REFERENCE:
U.S.G.S. CURTIS BAY QUADRANGLE
MD., 1974 SCALE: 1" = 2,000'

AREA TOPOGRAPHY-1974

Black & Veatch
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Hawkins Point Hazardous Waste Landfill

figure 4.4

Thoms Creek and the lake in 1935. Figure 4.3 is a copy of a USGS quadrangle map from 1957 which indicates the presence of Thoms Creek, the lake, and the low-lying marshy areas to the southeast of Area 3. Of significance from a hydrogeologic standpoint, the 1957 map indicates the general relationship of upland areas to the lake and marsh. The Thoms Creek Lake area is depicted on this map as topographically lower than the current Area 3. Thoms Creek (located northwest of Area 3) flows through the site from the west toward the northeast into Thoms Cove; other low-lying marshy areas existed to the southeast of the Area 3.

The 1974 USGS quadrangle map, Figure 4.4, depicts the configuration of the site similar to its present condition. The marshy areas and Thoms Creek Lake have been filled almost completely. Discussions with DHMH indicate that Thoms Creek Lake was filled and used in the past as a disposal facility accepting various unidentified waste products.

4.3.2 Site Investigations

Four separate subsurface investigations have been performed in Areas 1 through 6 since 1978. These were performed by:

- State Highway Administration, July, 1979.
- Atec Associates, May, 1981.
- Hardin Associates (for Harrington, Lacey & Associates, 1981 and 1982).
- Woodward-Clyde Consultants, April and May 1983.

In addition, a series of borings was performed in the area of Thoms Cove for Ewell, Bomhardt Associates in July 1973. A summary of all subsurface explorations conducted at the site is graphically depicted on Figure 4.5: Boring Location Plan.

One of the purposes of the 1983 field investigation was to provide a basis for evaluating and comparing the previous boring data. Based on this comparison it was determined that the 1983 boring data are in substantial agreement with the previous data. Consequently, the previous boring log data, along with the current data, were utilized to evaluate the site. Boring logs for all site investigations are included in Appendices A, B, C, D and E.

Map Compiled by Photogrammetric Methods from Aerial Photography Dated April 1, 1983.

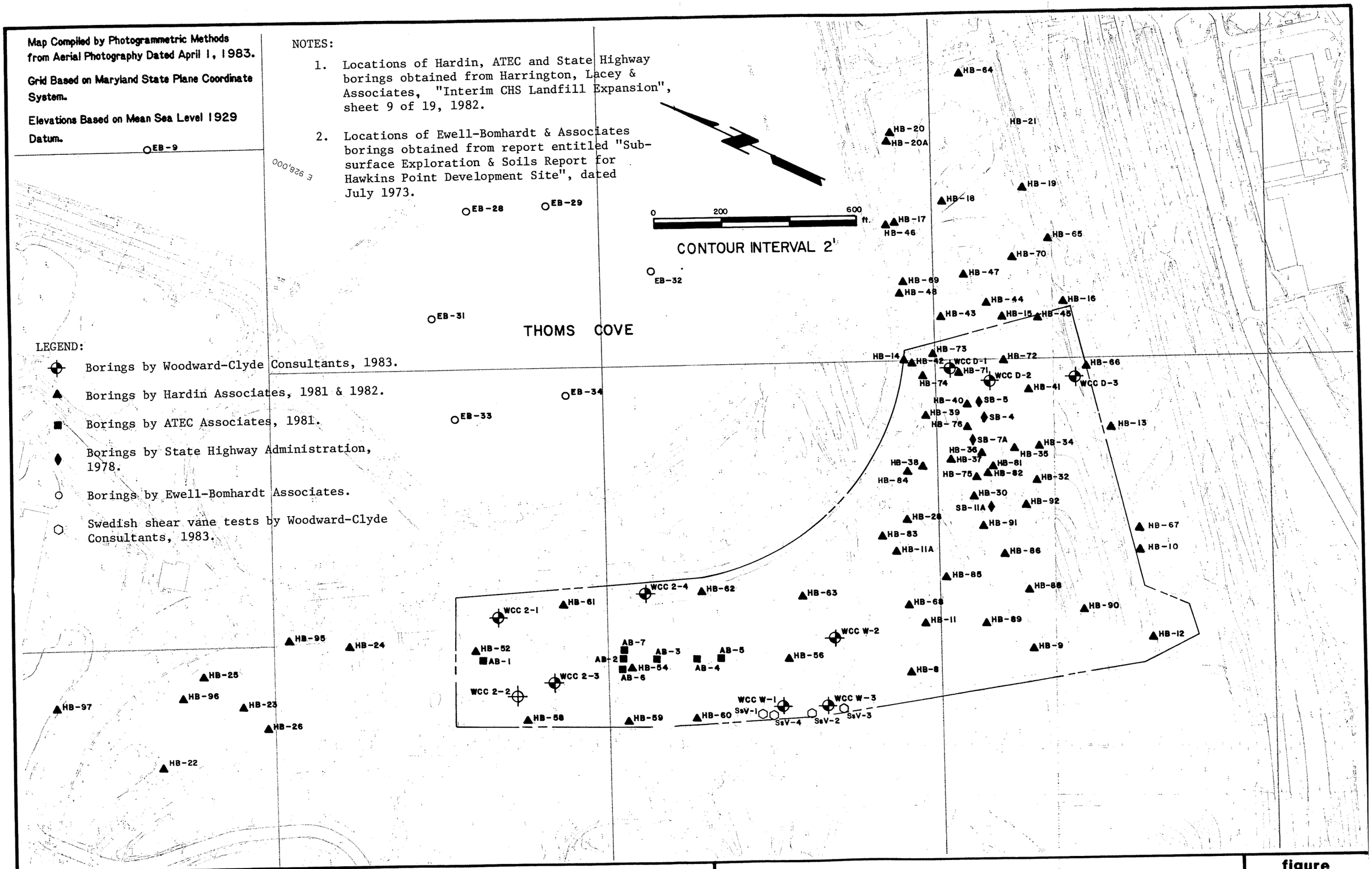
Grid Based on Maryland State Plane Coordinate System.

Elevations Based on Mean Sea Level 1929 Datum.

NOTES:

1. Locations of Hardin, ATEC and State Highway borings obtained from Harrington, Lacey & Associates, "Interim CHS Landfill Expansion", sheet 9 of 19, 1982.

2. Locations of Ewell-Bomhardt & Associates borings obtained from report entitled "Subsurface Exploration & Soils Report for Hawkins Point Development Site", dated July 1973.



LEGEND:

- Borings by Woodward-Clyde Consultants, 1983.
- Borings by Hardin Associates, 1981 & 1982.
- Borings by ATEC Associates, 1981.
- Borings by State Highway Administration, 1978.
- Borings by Ewell-Bomhardt Associates.
- Swedish shear vane tests by Woodward-Clyde Consultants, 1983.

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Hawkins Point Hazardous Waste Landfill

BORING LOCATION PLAN

figure 4.5

4.3.3 Geologic Interpretations

Due to the complex, three-dimensional variability of the deposition at the site, a three-dimensional geologic model (see Photograph No. 2-1) was constructed using all available subsurface boring data. This provided one basis for interpreting the site geology and hydrogeology. A horizontal scale of 1 inch equal to 50 feet, and a vertical scale of 1 inch equal to 4 feet was used. Each boring was represented as a vertical dowel rod using color-coded symbols for each soil material. The dowels were fixed at a lower point to a plywood base which represented elevation (el.) -60 feet mean sea level (msl).

A series of figures was compiled as a result of the model interpretations, included as Figures 4.6, 4.7, 4.8, and 4.9, discussed in detail below.

- Figure 4.6: Inferred Contours: Cretaceous Age Sediments Surface

  This figure indicates the inferred elevation contours of the top of Cretaceous age sediments beneath the site. The top of the Cretaceous was identified from Standard Penetration Test (SPT) blow counts (N) that were greater than or equal to 50 blows per foot (bpf). This criterion was used because Cretaceous age sediments associated with this site are overconsolidated. Similar materials in Maryland commonly exhibit blow counts in this range.

  These contours exhibit significant features in the surface of the Cretaceous sediments in both Areas 3 and 5. A large, deep trough of relatively less dense material exists beneath the site, trending from southwest to northeast along the northwest edge of Area 3. This trough corresponds well to the axis of Thoms Creek and the old Thoms Creek Lake. The figure also indicates that significant amounts of these less dense soils exist inland of the present shoreline and in a smaller trough trending northwest-southeast, northeast of Area 3 within Areas 1 and 2.

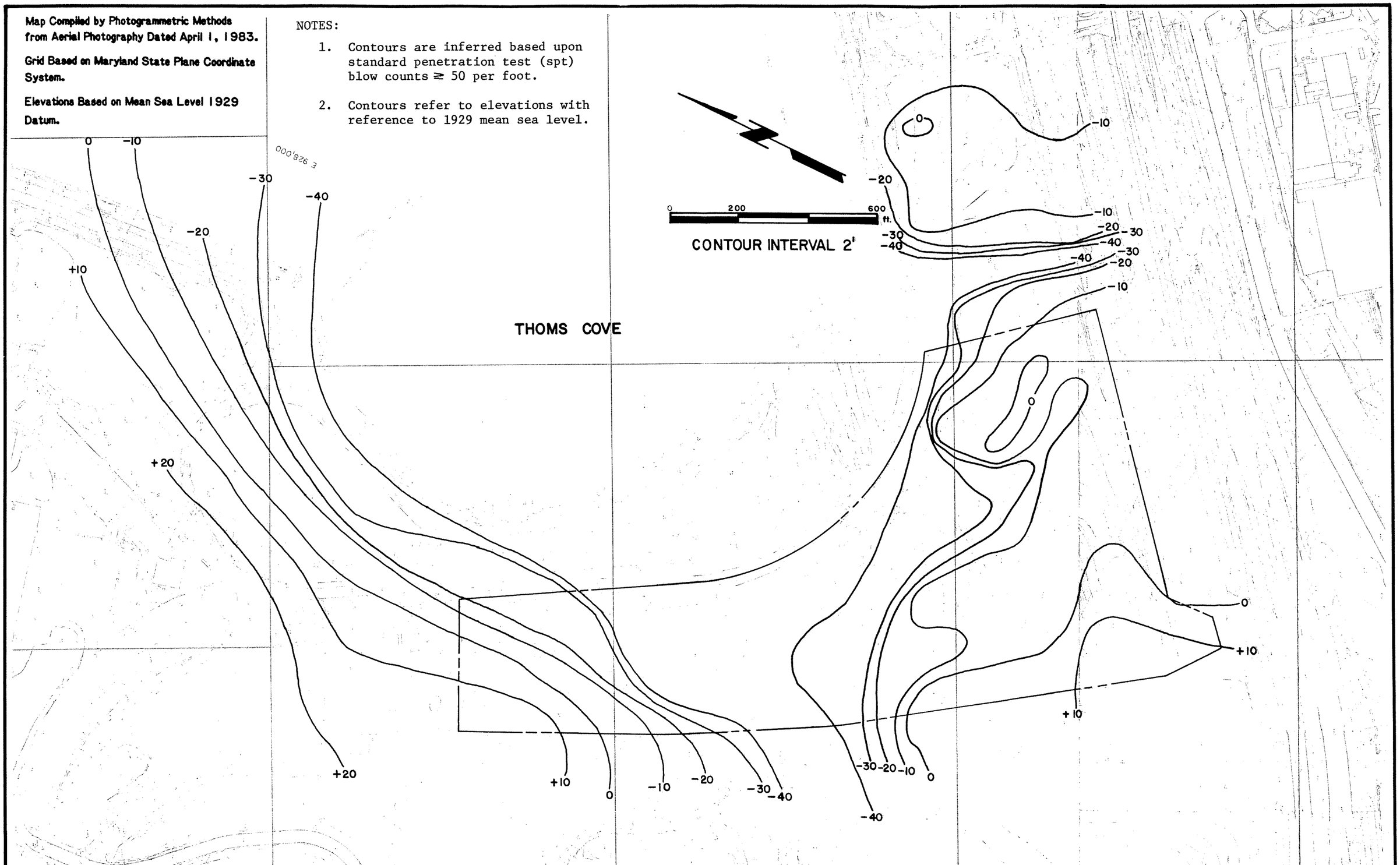
Map Compiled by Photogrammetric Methods from Aerial Photography Dated April 1, 1983.

Grid Based on Maryland State Plane Coordinate System.

Elevations Based on Mean Sea Level 1929 Datum.

NOTES:

1. Contours are inferred based upon standard penetration test (spt) blow counts ≥ 50 per foot.
2. Contours refer to elevations with reference to 1929 mean sea level.



Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	INFERRED CONTOURS: CRETACEOUS AGE SEDIMENTS SURFACE	figure 4.6

The contours confirm the 1957 topography that indicated that upland areas sloped toward the site from the west across Area 5 and from the south across Area 3, with Thoms Creek incising the upland areas. These results may be significant from a hydrogeologic standpoint since they infer potential historic flow directions associated with the troughs and Thoms Creek Lake.

Figures 4.7, 4.8 and 4.9 indicate the general distribution of sands, silts and clays across the site. The contours depict the relative percentage of materials encountered within each boring either as layers or a mixture with other sediments. The interpretation does not necessarily imply continuity of sediments or layers across the site, but rather the general amount of sands, silts and clays found in each area. These distribution maps are generally consistent with the geologic map of the site in that they exhibit the same distribution of materials in the subsurface sediments

o Figure 4.7: General Distribution, in Percent, of Silt-Sized Deposits

In Area 4 and the southeastern portion of Area 5, a trough, cut into the Cretaceous sediments, is inferred at significant depth. There is a significant silt content in the post-Cretaceous sediments filling this trough. This silt is interpreted to be the result of sedimentation associated with Thoms Creek, Thoms Creek Lake and Thoms Cove. Layers of silt occur on the order of 25 feet thick in Area 4. Typical riverine interbedded sands and clays are also present. Silt layers are generally on the order of 5 feet to 10 feet thick in Area 5 and less than 5 feet in Area 3. The presence of large percentages of silt east of Area 3 gives a further indication of a smaller northwest-southeast trending trough filled with post-Cretaceous sediments. Sediments containing organics (such as peat) were encountered in the W-series borings in the western portion of Area 4. The existence of organic soils further re-

inforces the theory that an infilled trough exists. Surficial fills were also encountered in this area of the site.

- Figure 4.8: General Distribution, in Percent, of Sand-Sized Deposits

Sands dominate the northwestern sector of the site (Area 5), which is consistent with geologic maps of the area. The dense sands are interpreted to be predominantly Cretaceous in age (Patapsco Formation) particularly toward the western boundary of Area 5. However, less dense sands with organic silts and clays occur along the entire eastern boundary of Area 5. These are interpreted to be more recent fluvial deposits (post-Cretaceous). Published references indicate that the sand facies of the Patapsco Formation may be as thick as 50 feet. This appears to be supported by sand thicknesses of 20 to 40 feet indicated in the borings in Areas 5 and 6. Figure 4.10 depicts the elevation contours of the top of the sand (both Cretaceous and post-Cretaceous). The contours exhibit the general trend of sand layers dipping toward the southeast from the northwestern sector of the site. The dip is consistent with the top of Cretaceous sediments depicted on Figure 4.6. Sand layers or lenses are generally thinner in Areas 2, 3 and 4. As described previously, the sands in Area 4 appear to be associated with post-Cretaceous deposition and infilling of the Thoms Creek area. Sand layers or lenses also occur in Areas 2 and 3 associated with the clay facies of the Patapsco Formation. Continuity of these layers or lenses is difficult to assess, although they may extend on the order of a several hundred feet laterally.

- Figure 4.9: General Distribution, in Percent, of Clay-Sized Deposits.

The general distribution of clay is consistent with published geologic data. The clay-dominated deposits are thickest in Areas 3

and 2 with total encountered thicknesses of approximately 20 to 30 feet. Most of the clays encountered in this sector are interpreted to be part of the clay facies of the Patapsco Formation. The figure is consistent with the 1957 topographic map which indicates an upland area in this sector of the site. It is also consistent with the inferred elevation of the top of Cretaceous sediments (Figure 4.6), since thicknesses generally decrease from south to northwest across Area 3 toward the trough. Clays encountered in Area 4 and in Area 5 along the northwestern to northeastern boundary of the site are predominantly soft, often dark, organic clays interpreted to be of post-Cretaceous fluvial origin.

Large quantities of fill have been placed in the site area. It is our understanding that these fill materials include: dredge spoil placed between Thoms Cove and the northern and eastern Area boundaries; chrome ore tailings cells of varying thickness (Areas 3 and 5); and reworked natural soils generally near the surface and/or associated with the construction of the facility. Further description of the fills are included in the following sections on geotechnical engineering conditions.

4.3.4 Site Geologic Summary

The Hawkins Point HWL site is underlain by fills, post-Cretaceous fluvial deposits and Cretaceous age sands, silts and clays. Sands predominate in Areas 5 and 6, silts in Area 4 and clays in Areas 3 and 2, although all three materials occur throughout. Owing to the geologic depostitional history, large variations in material are common across the site; pods, lenses, channels, and layers of all three materials are expected to occur.

4.4 REGIONAL HYDROGEOLOGY

4.4.1 General

The area of the Hawkins Point HWL site is underlain by two major water-bearing formations, the Patapsco and Patuxent Formations. These two formations are separated unconformally by the confining clays of the Arundel Formation. As with all of the sediments of the Coastal Plain Province, the

Patuxent and Patapsco dip gently, at approximately 1 degree, to the southeast to form thickening wedges of sediments which extend beyond the Continental Shelf. Both the Patapsco and Patuxent formations contain sand strata which act as water-bearing bodies of varying thicknesses and hydraulic conductivities. These sand strata are hydraulically interconnected within each formation to form the Patuxent and the Patapsco aquifers.

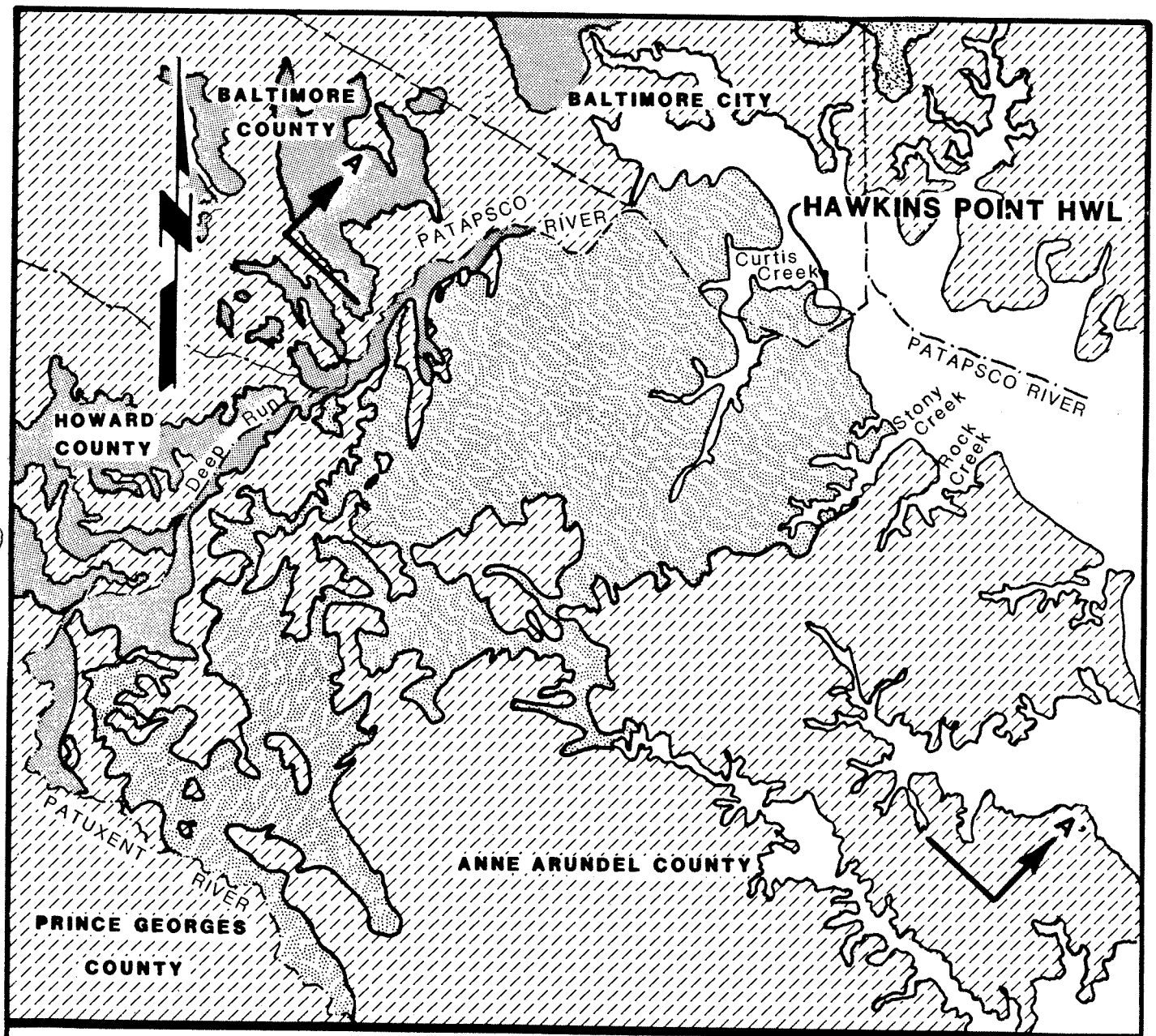
4.4.2. Patuxent Aquifer

The sands in the Patuxent occur as irregularly bounded sheets and isolated pods separated by clay and silt beds. As a result of these confining clays and silts, the Patuxent aquifer becomes artesian (confined) to the southeast. The water-bearing sand facies of the Patuxent generally exhibit more uniformity and lateral extent as it dips to the southeast. The Patuxent also tends to possess a higher percentage of sand in the Baltimore area than it does in more northerly or southerly localities.

The Patuxent Formation is used as a source for ground water for drinking and industrial purposes in Charles, Prince Georges, Anne Arundel, Baltimore, Harford and Cecil Counties in Maryland. In the counties to the south and east, the surface of the Patuxent Formation is too deep (approximate el. -1,000 feet) to be practically tapped. In locations where the Patuxent is easily tapped, it remains a significant source of potable ground-water supplies.

Transmissibility is the ability of an aquifer to transmit water under a given head and hydraulic gradient. It is dependent on the hydraulic conductivity and saturated thickness of the aquifer. It is a rough indication of the production one can expect from the aquifer. Reported transmissibility values for the Patuxent aquifer range from 1,000 gallons per day per foot (gpd /ft) to 80,000 gpd/ft, with the least productive sections occurring in Prince Georges and Charles Counties. The highest values of trasmissibility are reported in Baltimore, Anne Arundel and Harford Counties. The general flow direction in the Patuxent formation, is down dip, to the southeast from the area where it is exposed at the surface (see Figures 4.11 and 4.12).

The recharge area of the Patuxent aquifer generally occurs in its outcrop area approximately 5 miles northwest of the site. Where the Patuxent



LEGEND:

- PATAPSCO FORMATION, INCLUDING ARUNDEL FORMATION
- PATUXENT FORMATION
- UNDIFFERENTIATED FORMATIONS

NOTE:

FOR CROSS-SECTION, A-A' SEE FIG. NO. 4.11

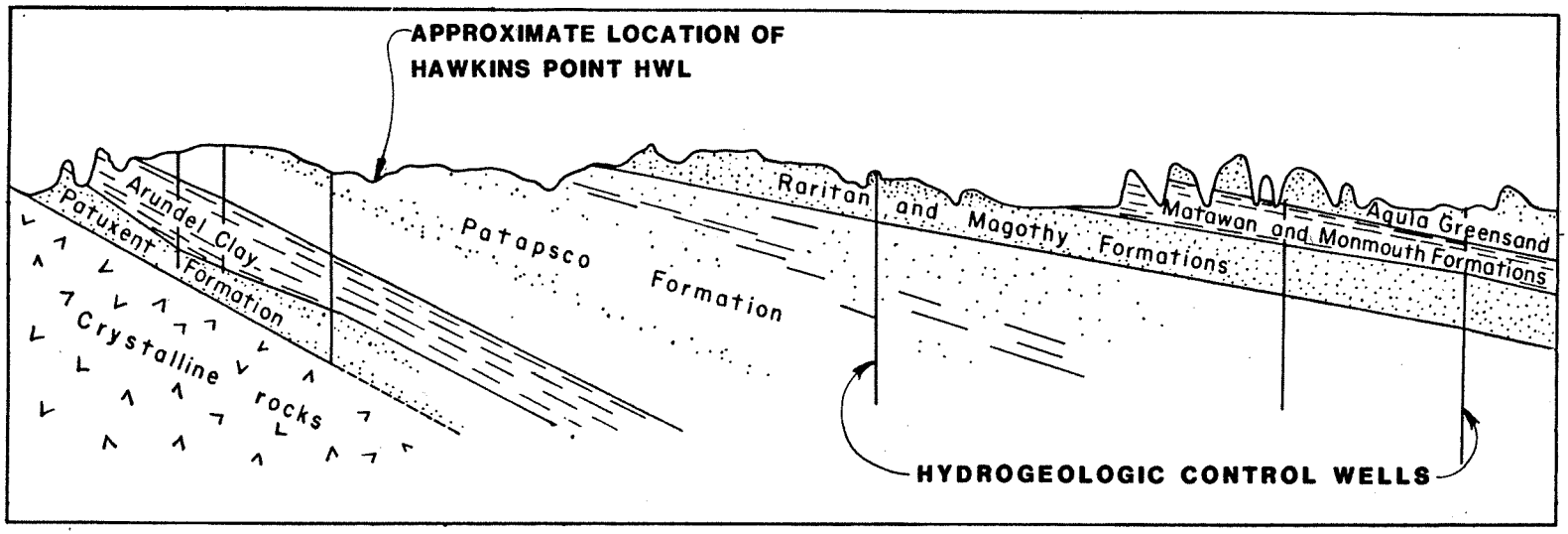
1 0 1 2 3 4 MILES

SCALE

REFERENCE: GROUND-WATER SUPPLIES IN ANNE ARUNDEL COUNTY, GEOLOGIC MAP OF BALTIMORE COUNTY AND CITY, GEOLOGIC MAP OF MARYLAND

GENERALIZED GEOLOGIC MAP INDICATING OUTCROPS OF PATAPSCO AND PATUXENT FORMATIONS

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.11



SECTION A-A' FROM FIGURE 4.11

REFERENCE: GROUND-WATER SUPPLIES IN ANNE ARUNDEL COUNTY

GENERALIZED GEOLOGIC CROSS-SECTION NEAR HAWKINS POINT HWL

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.12

dips below the Arundel clay, as it does at the site, the major portion of its recharge comes from surface infiltration in its outcrop area.

Three of the major users of the Patuxent within a 10 mile radius of the site are: the Glen Burnie Municipal System, Anne Arundel Department of Public Works at an average of 1.7 million gallons per day (mgd) in 1976; the Bethlehem Steel Corporation, Sparrows Point Plant at 3.6 mgd in 1980; and the Federal Yeast Corporation at 2.6 mgd in 1980. The major uses of the Patuxent ground water are for municipal drinking water and industrial cooling.

The ground water obtained from the Patuxent aquifer in the Baltimore area requires treatment to reduce its acidity and to remove iron before distribution for municipal use. The hardness, dissolved solids and chloride content generally are reported to be within Secondary Standards established by EPA in 1979. In the Baltimore industrial area, it is of good general quality although somewhat high in hardness.

4.4.3 Patapsco Aquifer

The water-bearing sands of the Patapsco aquifer occur as irregularly bounded sheets to isolated ribbons, separated by layered silts and clays, and compose approximately one-third of the total thickness of the formation in the Baltimore area. The sand strata are sometimes reported to exceed 50 feet in thickness. Several of the most productive aquifers in the Baltimore area are contained in this formation. Much of the formation exists under artesian conditions. In the outcrop area depicted on Figure 4.11, the aquifer is generally unconfined and receives recharge from the surface or through surface sediments. The outcrop area is a 6-mile wide belt trending northeast-southwest across the Baltimore area, including Hawkins Point. It covers 140 square miles in Maryland. The Hawkins Point site contributes a very small amount of recharge to the entire Patapsco aquifer, on a regional basis.

Reported transmissibility values for the Patapsco aquifer range from 1,200 gpd/ft to 50,000 gpd/ft with the higher values occurring in Baltimore and Anne Arundel County. At the Bethlehem Steel Corporation, Sparrows Point plant, the Patapsco Formation is no longer used to obtain ground water because it has high levels of chlorides, and the Patuxent is more productive and of better quality in the area.

The water quality of the Patapsco Formation in the Baltimore area is comparable to that of the Patuxent Formation. Around Sparrows Point, it has been found to have a high degree of hardness.

4.5 SITE HYDROGEOLOGY

4.5.1 General

The Hawkins Point site is underlain by several water-bearing bodies. Those at the surface consist of post-Cretaceous sands and silts described in the geologic sections of this report. Underlying these sediments, and near the surface in Areas 3 and 6, is the Patapsco aquifer. At the site this aquifer is generally unconfined (water table) and receives its recharge through the post-Cretaceous and upland sediments at the surface.

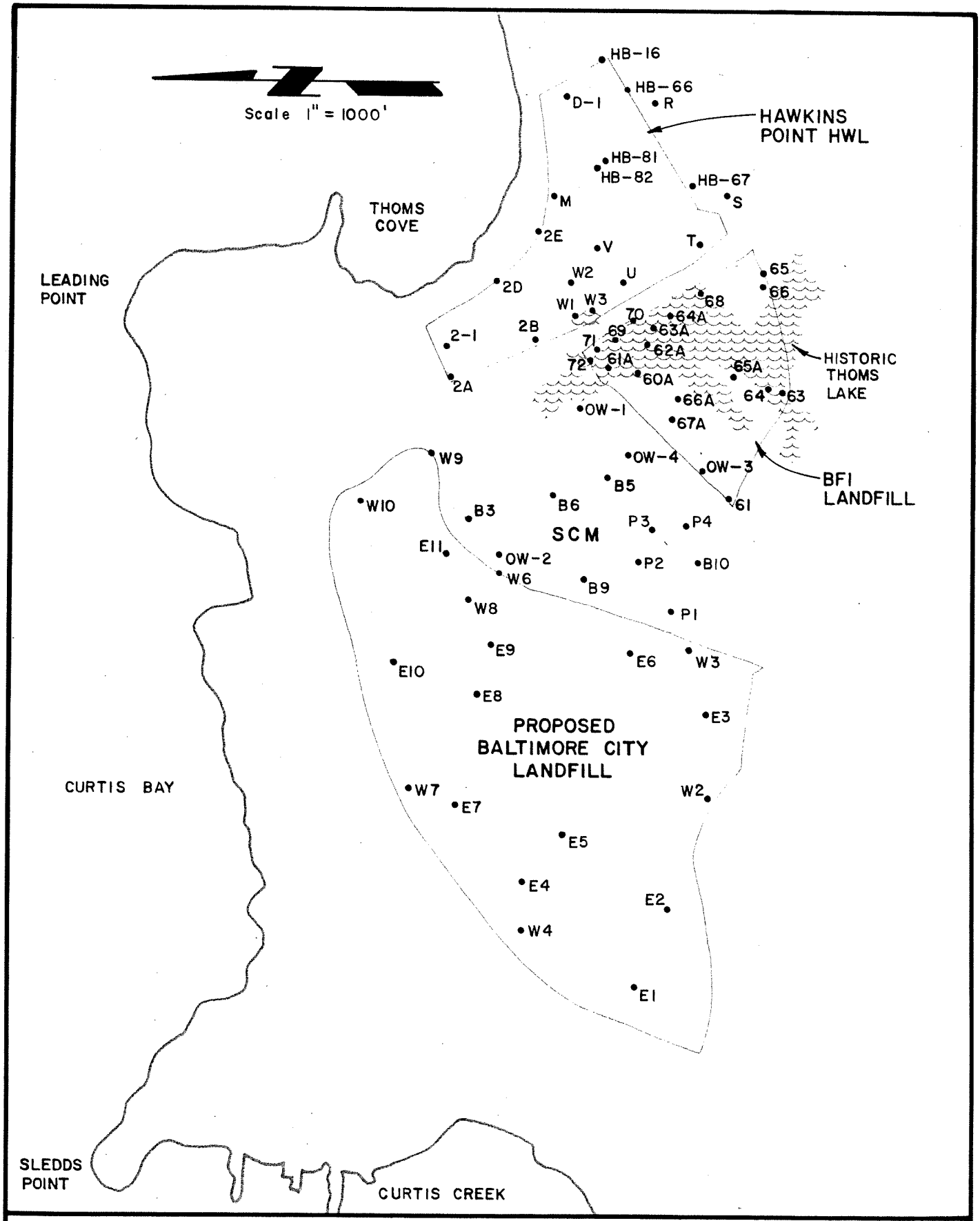
There may be small areas of perched and confined ground water within the surface and Cretaceous-age sediments due to the heterogeneity of the deposits, but these are likely to be limited in extent.

Site investigations and published literature indicate that the Patapsco aquifer is underlain by a continuous layer of Arundel clay, approximately 100 feet thick. The hydraulic conductivity of this clay (10^{6} to 10^{-8} cm/sec) is low enough to allow it to serve as a lower barrier to the downward flow of water or the migration of ions in the water to the underlying Patuxent aquifer.

Beneath the Arundel clay lies the Patuxent aquifer. It is assumed from the literature that under the site this aquifer is artesian, with a general flow direction to the southeast, although no site borings penetrated this formation.

As part of this investigation, a regional ground-water map was compiled. The contours represent the regional flow in the near surface aquifer, defined here as the hydraulically connected Patapsco and overlying post-Cretaceous sediments. Information used to compile the map was obtained from the following sources:

- City of Baltimore, Hawkins Point Sanitary Landfill Draft Geologic Report, May 4, 1983.
- Browning-Ferris Industries ground-water report by Environmental Resources Management, 1982.



NEAR SURFACE AQUIFER WELLS

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.13

- SCM-Quarantine Road Site Well logs performed for Geraghty & Miller by ATEC Associates, Incorporated, 11/81.
- Subsurface Information obtained for the Hawkins Point site during the course of this investigation.

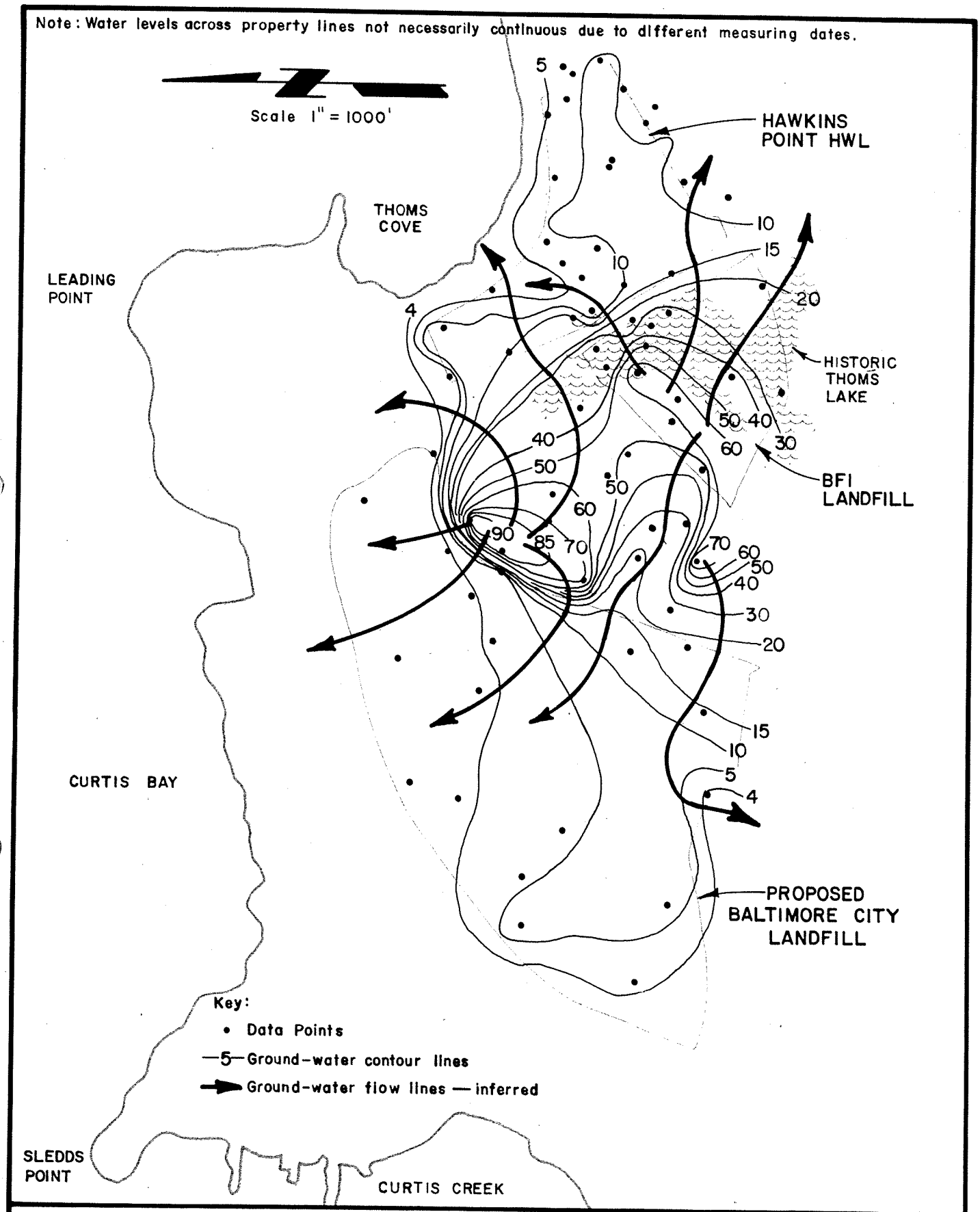
The control points used to compile the ground-water contour map and in the discussion of water-quality (in later sections) are indicated on Figure 4.13: Near Surface Aquifer Wells. This figure also shows the location of adjacent properties.

The ground-water elevations obtained from the above sources indicates general flow conditions for the region. Although measured during different seasons and years, a clear flow relationship is nevertheless evident in Figure 4.14: Regional Ground-water Elevation Contours. There appears to be an area of ground-water recharge west of historic Thoms Lake, causing flow across the BFI property and to the northeast across the Hawkins Point site in the vicinity of Thoms Creek. This recharge area also controls flow toward the west, across SCM property and onto the City of Baltimore property.

There appears to be another recharge area on the SCM property just east of Quarantine Road. Water level measurements indicate that elevations are significantly higher in this area causing flow to radiate away from this point. Since this is not the topographically highest point in the area, and there seems to be no present historic physical feature that might result in this type of flow configuration, this high may be viewed as perched water.

4.5.2 Site Investigation

4.5.2.1 Ground-water Monitoring Wells. Ground-water data were obtained from the existing observation wells and piezometers, and 5 newly-installed 2-inch diameter piezometers. The ten, 4-inch diameter monitoring wells for the detection monitoring program existed on the site prior to the initiation of this investigation. These wells are constructed of threaded, flush-joint polyvinyl chloride (PVC) pipe and are located as indicated on Figure 4.15. Copies of Well Completion Records for these wells are included as Appendix F. Additionally, ten 2-inch diameter piezometers existed on-site, installed by Hardin Associates during a previous investigation. As with all wells on site, Well Completion Records were submitted as required to the DHMH. Specifics regarding the construction of the wells installed by Hardin Associates



REGIONAL GROUND-WATER ELEVATION CONTOURS

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 4.14

are included with the associated boring logs as Appendix B. During the current investigation, 5 additional 2-inch inside diameter PVC piezometers were installed at the locations indicated in Figure 4.15. Well completion reports describing the detailed construction of these wells are included as Appendix G.

Data on all piezometers and wells utilized in this study are summarized in a Well Data Summary included as Table 4.1. This table includes the State well identification number, ground-surface elevation, elevation of screened intervals, ground-water elevations, soil materials encountered within the screened interval, and permeability data.

4.5.2.2 Well Construction Procedures. The 2-inch diameter wells installed in 1983 were constructed of flush-joint, threaded PVC. Slotted 0.015 inch screen sections varied from 5 to 10 feet in length. Elevations of the bottom of the screens ranged from approximately el. +6 feet to el. -38 feet. The annulus around each screen was packed with well-sorted, medium to coarse sand. A 3-foot thick bentonite seal was placed above the sand pack to seal the screened interval of the aquifer from surface water influence. The remaining annular space was grouted above the top of the seal by means of a tremie pipe using a 90 percent portland cement/10 percent bentonite mix to prevent vertical contamination along the outside of the casing. To provide security, a 4-foot long section of nominal 4-inch diameter steel casing with a hinged, locking cap was installed around the PVC riser and grouted in place. Tags imprinted with a well permit number, as required by the State of Maryland, were secured to the steel casings. A typical monitoring well installation is depicted on Drawing No. PD-3A-18 of the "Area 3: Site Expansion, Part B Permit Facility Design" documents.

It is understood that the existing 4-inch inside diameter PVC detection monitoring program wells were constructed in a manner similar to that of the 2-inch wells installed for this study. Screen lengths were generally on the order of 10 feet, with a 2-foot bentonite seal above the gravel packs that extend approximately 5 feet above the screened interval. The elevation of the bottom of the screens of these wells range from approximately el. -6 feet to el. -45 feet. The annular space above the gravel pack was grouted above

Table 4.1: Well Data Summary

TEST BORING OR WELL NO.	STATE ID NO.	GROUND SURFACE ELEVATION (MSL) (IN FEET)	WELL SCREEN INTERVAL		GROUND WATER		SOIL DESCRIPTION OF SCREEN INTERVAL	PERMEABILITY (cm/sec)	TEST METHOD	ANALYTICAL TECHNIQUE
			UPPER EL (FT.)	LOWER EL (FT.)	LEVEL	DATE				
2A	BC-81-0102	43.9	-10.1	-20.1	4.4	4-29	Clayey SAND	5.1×10^{-4}	Rising Head	Hvorslev
2B	BC-81-0098	41.4	4.4	-5.6	18.1	4-20	Sand CLAY & SAND	9.8×10^{-6}	Rising Head	Bouwer & Rice
2D	BC-81-0099	25.8	-8.2	-18.2	5.6	4-13	Silty CLAY & Clayey SAND	2.7×10^{-3}	Slug	C.B.P.
2E	BC-81-0103	24.8	-4.2	-14.2	7.1	4-29	CLAY & Silty SAND	5.5×10^{-0}	Slug	C.B.P.
M	BC-81-0104	21.9	-7.1	-17.1	5.6	4-18	CLAY with Sand Lenses	4.2×0^{-4}	Slug	C.B.P.
R	BC-81-0100	24.9	-35.1	-45.1	7.3	4-29	CLAY	5.4×10^{-6}	Rising Head	C.B.P.
S	BC-81-0101	36.7	-13.3	-23.3	9.5	4-29	Fine SAND	1.8×10^{-2}	Slug	Hvorslev
T	BC-81-0105	35.4	-5.6	-15.6	10.6	4-29	CLAY	6.7×10^{-3}	Slug	Hvorslev
U	BC-81-0106	32.9	-18.1	-28.1	9.8	4-29	Silty CLAY	4.9×10^{-4}	Rising Head	Hvorslev
V	BC-81-0097	26.7	-9.3	-19.3	8.9	4-20	CLAY	6.6×10^{-8}	Falling Head	Hvorslev
HB-10	BC-81-0039	36.9*	3.9	-3.1	12.3	4-29	Silty CLAY	1.8×10^{-7}	Rising Head	Hvorslev
HB-13	BC-81-0043	27.4	-5.6	-12.6	12.4	4-29	Silty CLAY	1.5×10^{-7}	Rising Head	C.B.P.
HB-14	BC-81-0044	17.2	-15.8	-22.8	4.6	4-29	Silty CLAY	2.4×10^{-6}	Slug	Hvorslev
HB-67	BC-81-0078	34.4	-63.6	-70.6	3.2	4-29	Silty fine SAND	6.0×10^{-4}	Slug	Hvorslev
HB-81	BC-81-0083	39.1	7.1	0.1	14.5	4-29	Clayey SAND	8.7×10^{-6}	Rising Head	Hvorslev
HB-82	BC-81-0084	39.9	5.9	-1.1	16.4	4-29	Clayey SAND	9.6×10^{-7}	Rising Head	Hvorslev
HB-15	BC-81-0045	24.8	-8.2	-15.2	12.0	4-20	Silty CLAY	1.0×10^{-7}	Rising Head	Hvorslev
HB-16	BC-81-0046	18.4	-14.6	-21.6	11.0	4-20	CLAY	2.4×10^{-8}	Rising Head	Hvorslev
HB-66	BC-81-0080	22.8	-27.2	-32.2	2.5	4-29	Silty fine SAND	5.6×10^{-5}	Slug	Bouwer & Rice

NOTES: * Symbol indicates that the elevation was obtained from site plans or boring logs by Harrington Lacey and Associates, 1982.

Table 4.1: Well Data Summary (Continued)

TEST BORING OR WELL NO.	STATE ID NO.	GROUND SURFACE ELEVATION (MSL) (IN FEET)	WELL SCREEN INTERVAL		GROUND WATER		SOIL DESCRIPTION OF SCREEN INTERVAL	PERMEABILITY (cm/sec)	TEST METHOD	ANALYTICAL TECHNIQUE
			UPPER EL (FT.)	LOWER EL (FT.)	LEVEL	DATE				
W-1	BC-81-0119	22.8	10.1	5.6	18.3	5-12	Clayey SILT and PEAT	5.3×10^{-6}	Rising Head	Hvorslev
W-2	BC-81-0121	19.5	-8.9	-18.4	5.0	5-11	SAND and SILT	4.4×10^{-2}	Slug	C.B.P.
W-3	BC-81-0122	19.3	-24.0	-38.5	5.6	5-25	Clayey SILT and SAND	8.4×10^{-5}	Rising Head	C.B.P.
D-1	BC-81-0124	21.1	-11.2	-20.7	6.2	5-11	Silty CLAY and SAND	3.4×10^{-6}	Rising Head	Bouwer & Rice
2-1	BC-81-0120	28.1	7.9	-1.7	10.8	5-11	SAND	1.0×10^{-6}	Rising Head	Hvorslev
HB-44	BC-81-0076	22.7*	-12.3	-17.3	10.0	4-29	Sandy SILT	2.4×10^{-7}	Rising Head	C.B.P.

NOTES: * Symbol indicates that the elevation was obtained from site plans or boring logs by Harrington Lacey and Associates, 1982.

the bentonite seal using a 90 percent portland cement/10 percent bentonite mix. Locking steel casings with screw caps were installed around the PVC riser and grouted in place. Tags with imprinted well permit numbers are secured to the steel casing.

4.5.2.3 Well Development Procedures. After installation, the 4-inch diameter wells were developed by the well driller. Each well was pumped for approximately a 2-hour period at rates ranging from 1 to 10 gallons per minute. Two-inch diameter piezometers used for water-quality testing were also developed during this study. As part of the development procedure, temperature and in-situ conductivity were monitored. In addition, a record was maintained of the appearance of the water removed. Water levels and pumping rates were also recorded. Copies of these well development records are included in Appendix H.

4.5.2.4 Ground-water Elevation Measurements. Elevations of the top of the protective casing for the detection monitoring program 4-inch wells were provided by Maryland Environmental Service (MES). Elevations for all 2-inch diameter piezometers were referenced from the 4-inch wells. Ground-water depths were measured from the top of the well casing to the static level of standing water in the wells prior to sampling. The measurements were made using a fiberglass surveying tape with a plumb weight attached to the end. Measurements were recorded to the nearest hundredth of one foot. The tape measuring device was rinsed with distilled, deionized water before measuring levels in each well to prevent cross-contamination.

4.5.2.5 Hydraulic Conductivity Tests. To estimate the hydraulic conductivity (permeability) of the strata screened by the monitoring wells, "slug" tests and/or rising head pump-out tests were performed on all wells indicated on Figure 4.15. The slug test measures the rate at which the water level in a well returns to its static level after a known volume (slug) is instantaneously introduced or removed. Because the volume of a slug is small, the test can be used to estimate the hydraulic conductivity of the strata only in the immediate vicinity of the well tested. Three different size slugs were

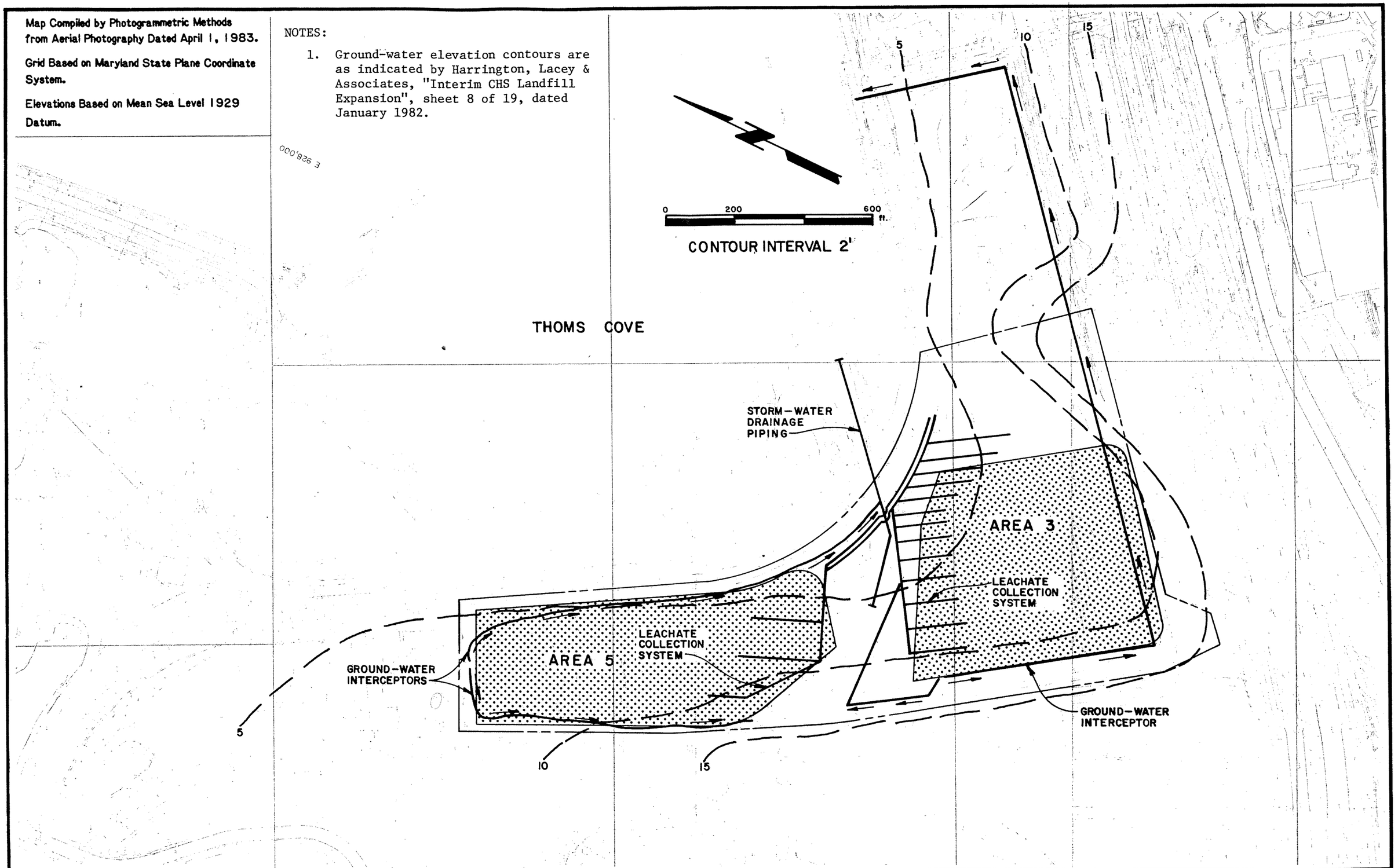
Map Compiled by Photogrammetric Methods from Aerial Photography Dated April 1, 1983.

Grid Based on Maryland State Plane Coordinate System.

Elevations Based on Mean Sea Level 1929 Datum.

NOTES:

1. Ground-water elevation contours are as indicated by Harrington, Lacey & Associates, "Interim CHS Landfill Expansion", sheet 8 of 19, dated January 1982.



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GROUND-WATER INTERCEPTOR AND LEACHATE COLLECTION SYSTEMS PLAN

figure 4.16

used in the slug tests. The slugs were 5-feet long, negatively bouyant sealed steel pipe with an outside diameter ranging from 1 inch to 2.5 inches with volumes ranging from 0.03 to 0.14 cubic feet. Rising head tests were performed by pumping or bailing the wells and monitoring the rate of ground-water recovery in the well.

The change in water head was monitored using a pressure transducer connected to a millivolt strip chart recorder. The hydraulic conductivity was calculated for the screened interval at each well according to prescribed methods.

4.5.3 Background Information

4.5.3.1 Previous Water Level Monitoring. As noted previously, Hardin Associates conducted a site investigation during 1981 and 1982 which included the installation of several 2-inch diameter piezometers uring the period from September 1981 through August 1982 ground-water levels were monitored on a periodic basis in many of these piezometers. These data are presented as Appendix I.

4.5.3.2 Previous Work. Based on the data from the monitoring wells, Harrington, Lacey & Associates developed a "...Piezometric Surface Contour Map" in January 1982. The contours have been reproduced on Figure 4.16. At that time ground-water flow was interpreted to be toward Thoms Cove with contour lines generally paralleling the outline of Thoms Cove. No aquifer testing was performed in this study and, therefore, no flow data are available.

The Harrington, Lacey & Associates report concluded that confined, unconfined, and perched ground-waters were in evidence on the site and that principal flow occurred within the sand "seams". It was determined that only minor flow occurred within the clays, which were inferred to be unsaturated.

4.5.3.3 Modifications of the Ground-water Flow Regime. Ground-water interceptors (GWI) previously installed at the site may influence the ground-water flow regime. Figure 4.16 indicates the location and configuration of the ground-water interceptors. The GWI invert for Area 5 (el. +16 feet to el. +25 feet) appears to be above the 1982 ground-water levels in several loca-

tions. The southwestern GWI adjacent to Area 3 has an invert (el. +19 feet to el. +17 feet) above the reported ground-water elevation. The southern GWI (el.+8 to el.+4) appears to have been placed at an elevation that would intercept the ground water.

4.5.4 Ground-water Assessment

4.5.4.1 Summary of Geologic Conditions Affecting Ground-water Flow. A complex stratigraphy typifies the Hawkins Point HWL site. The fluvial nature of deposition both in the Cretaceous and post-Cretaceous sediments has resulted in variegated layers and lenses of sands, silts and clays. These materials dominate the site in different areas. Historic data indicate significant pre-existing features which seem to influence the ground-water flow regime. In interpreting ground-water flow and direction, the following features were considered significant:

- Topographic and Hydrogeologic features:
  - Thoms Cove, north and east of the site.
  - Thoms Creek traversing the site from southwest to northeast.
  - Previous existing Thoms Creek Lake (and Thoms reek) to the southwest.
  - Existing upland area to the west.
  - Previous existing upland area to the south.
  - Previous existing marshy area to the southeast.
- Geologic features:
  - Dominance of sand to west (upland area) and beneath Areas 5 and 6.
  - Dominance of silt in the central sector of the site associated with post-Cretaceous alluvial sediments in a trough.
  - Probable silt trough to the east.
  - Dominance of clay associated with pre-existing upland area to south.
  - Depositional history of the in-situ soils.

Map Compiled by Photogrammetric Methods from Aerial Photography Dated April 1, 1983.

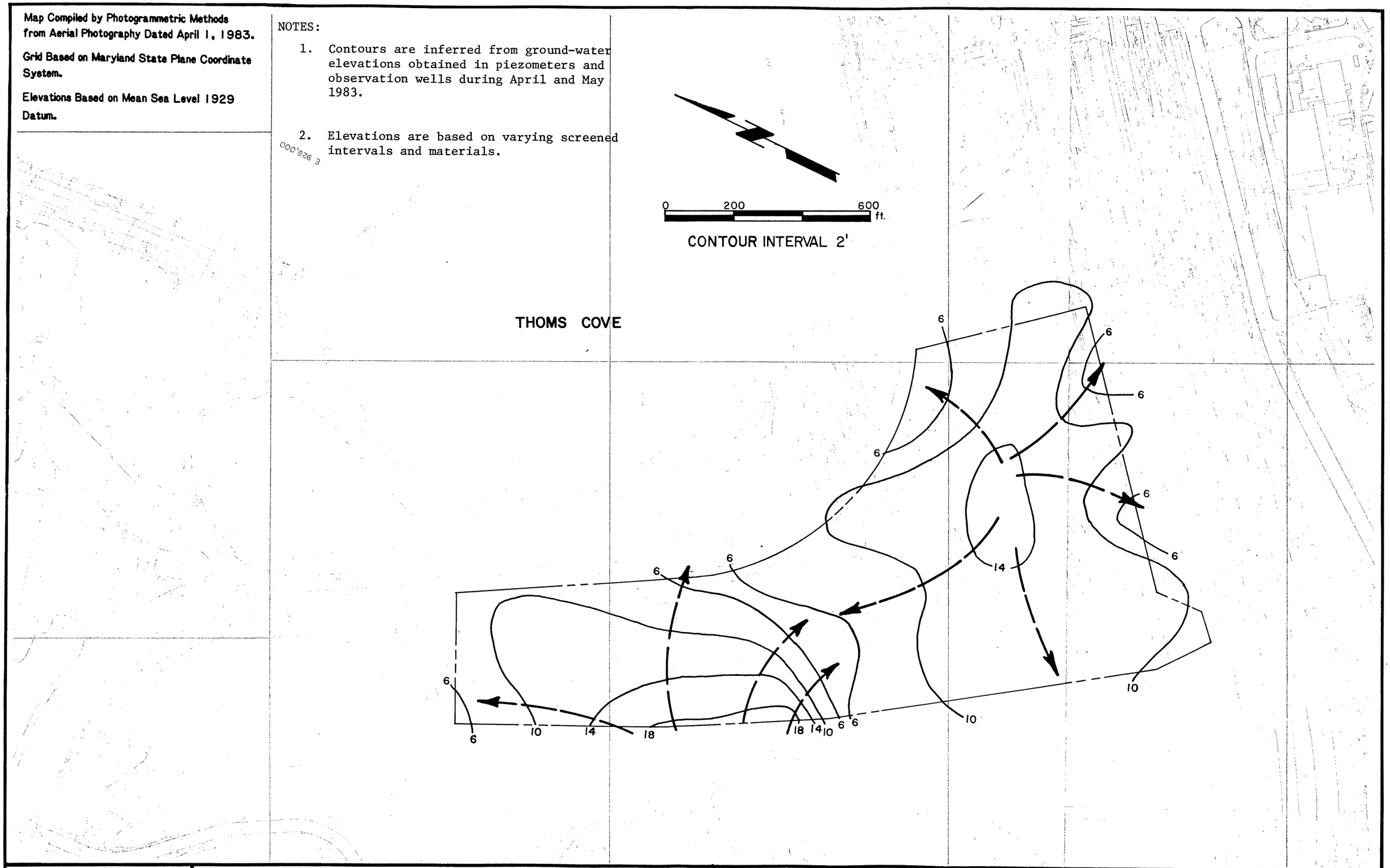
Grid Based on Maryland State Plane Coordinate System.

Elevations Based on Mean Sea Level 1929 Datum.

NOTES:

1. Contours are inferred from ground-water elevations obtained in piezometers and observation wells during April and May 1983.

2. Elevations are based on varying screened intervals and materials.



Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	GENERALIZED GROUND-WATER ELEVATION CONTOURS	figure 4.17

4.5.4.2 Ground-water Elevations. Based on measurements of ground-water levels in the on-site, monitoring wells and piezometers, a ground-water contour map was constructed (see Figure 4.17). Ground-water elevations used in plotting this map were measured in April and May 1983. Depths to ground water in the near surface aquifer (the Cretaceous and post-Cretaceous sediments) below ground surface ranged from 2.5 to 18.3 feet.

The most recent local ground-water contour map, based upon the current study, is generally consistent with historic and regional information. Local ground-water contours tend to converge near the present-day Thoms Creek, which serves as a possible discharge area (Areas 4 and 5). The interpreted local flow is toward the northeast-southwest trending trough of post-Cretaceous sediments previously identified. It appears that a local component of flow also exists to the southwest toward the infilled Thoms Creek Lake. This flow, however, may be reversed by the regional ground-water gradients back towards the Hawkins Point Site before actually reaching the former lake area. There is also a local component of flow toward Thoms Cove.

There are two areas of local ground-water highs on the site, along the western side of Area 5 and in the center of Area 3. The western side of Area 5 borders a topographic high consisting of Cretaceous sands overrun by upland gravels. Both local and regional flows are generally away from this high toward the east. The regional flow continues beneath Area 5 toward Thoms Cove; local flow is partially diverted by the GWI bordering the western edge of Area 5.

The second local ground-water high occurs in Area 3 beneath Cell No. 40. Just as natural topographic highs act as recharge areas raising the water table elevations beneath them, the chrome ore tailings cells tend to store water received from rainfall. As this extra water drains into the subsurface, it creates a local ground-water mound beneath it. Ground-water flow radiates out from the center of the mound in all directions. This mounding effect could locally override the regional flow directions toward Thoms Cove.

The entire western border of the site is bounded by other disposal facilities. Overlying the historic location of Thoms Creek Lake west of Areas 3 and 4 is a closed landfill which is maintained by BFI-Waste Systems (BFI). Adjacent to Area 5 on the west is a disposal site operated by SCM/

Glidden (SCM). Portions of both of these facilities are hydraulically upgradient of the Hawkins Point facility both regionally and locally, particularly once the leachate collection system is operational and the waste cells are lined, resulting in a reduction of ground-water mounding beneath Area 3 so that it no longer affects local flow directions. Thoms Creek flows through the site into Thoms Cove with flow originating west of the Hawkins Point site.

4.5.4.3 Ground-water Flow/Hydraulic Conductivities. The results of aquifer tests to assess hydraulic conductivities (permeability) are indicated in Table 4.1. Included in the table are descriptions of the materials encountered within the screened interval of the well. It should be noted that the descriptions provided for the detection monitoring wells are from drillers' logs, and several descriptions appear inconsistent with the permeability test results. These soil descriptions were, therefore, not used in the hydrogeologic interpretations.

Hydraulic conductivities ranged from 5.5 centimeters per second (cm/sec) in sand to 2.4×10^{-8} cm/sec in clay. Table 4.2 represents the typical range of relative permeabilities measured in these materials and Figure 4.18 shows their areal distribution.

Table 4.2: Summary of Hydraulic Conductivities

Material	Typical Range in Hydraulic Conductivities (cm/sec)
silty sand; sand	5.5 to 1.0×10^{-6}
clayey sand; clay and sand	2.7×10^{-3} to 9.6×10^{-7}
silt; clayey silt; sandy silt	8.4×10^{-5} to 2.4×10^{-7}
clay; silty clay	5.4×10^{-6} to 2.4×10^{-8}

Note: Wells T and U were logged by the well drillers as silts and clays in the screened intervals, however, the hydraulic conductivities were calulated to be 6.7×10^{-3} cm/sec, and 4.9×10^{-4} cm/sec respectively. These hydraulic conductivity values were not included in the above table.

Ground-water gradients were assessed by using 3-point solutions of ground-water elevations and by using the ground-water contour map. Gradients ranged from 0.002 feet/foot to 0.095 ft/ft with an average of 0.028 ft/ft. Most gradients were between 0.020 and 0.030 ft/ft.

Most of the flow toward Thoms Cove and Thoms Creek from both Areas 3 and 5 exhibits a gradient ranging from .020 to .030 ft/ft. The steepest interpreted gradient occurs near Thoms Creek near the southern end of Area 5. The flattest gradient occurs from Area 3 toward the southwest (BFI). This is interpreted to be the result of the ground-water mounding occurring in Area 3.

The velocity of ground-water can be estimated by using Darcy's seepage velocity equation:

$$V = \frac{Ki}{n}$$

Where:

V = seepage velocity (ft/day).
K = hydraulic conductivity (ft/day).
i = hydraulic gradient (ft/ft).
n = effective porosity.

Based on hydraulic conductivities derived from the field aquifer tests and using an assumed porosity of 0.3, the velocity of ground-water flow beneath the various areas of the site was estimated. Athough it is difficult to calculate specific values due to the complexity of the stratigraphy, generalizations can be made based on the hydraulic conductivities and gradients observed.

Sandy materials (silty sands) which predominate Area 5 have estimated velocities on the order of 4 to 5 feet/day, or less. However, the potential for greater velocities exists since a hydraulic conductivity of 5.5 cm/sec was observed in well 2E in the post-Cretaceous sediments. The trough of

post-Cretaceous fluvial sediments in the center of the site is estimated to have velocities on the order of 2 feet/day. This is based on the sand layers which occur in that area and the areal distribution of hydraulic conductivities. Velocities in the more massive, siltier materials may be on the order of 0.02 ft/day. Significantly, slower velocities would be associated with the Cretaceous clays at the southern, Area 3, sector of the site.

4.5.4.4 Ground-water Fluctuation. During the previous site investigation, periodic readings of water levels were obtained in the 2-inch diameter wells. The period covered was from September, 1981, through August, 1982. During the current study, readings were taken in the remaining 2-inch wells between April and May, 1983.

Most of the major fluctuations noted in the Harrington, Lacey & Associates report were attributed to construction activities such as excavation and filling operations and installation of the ground-water interceptor. The maximum fluctuations were on the order of 8 feet. A comparison of the recent readings to the 1981 and 1982 readings is presented in the Table 4.3. Typically, fluctuations are on the order of a few feet except for wells HB-15 and HB-16. Both these wells were discussed in the previous report as being influenced by construction activities during 1982.

Table 4.3: Comparison of Ground-water Elevations in 2-Inch Diameter Monitoring Wells

Well or Boring No.	Elevation[1] (ft) 11/5/81	Elevation[1] (ft) 2/2/82	Elevation[1] (ft) 8/2/82	Elevation[2] (ft) 4/83	Max. Change (ft)
HB-10	8.65	10.07	8.82	12.3	3.65
HB-13	15.08	15.27	14.77	15.1	0.50
HB-15	6.90	14.98	9.90	14.9	8.08
HB-16	Dry	1.65	13.32	14.5	12.85
HB-44	14.12 (1/8/82)	13.03	NR	10.0	4.12
HB-66	-	4.18	2.43	5.3	2.87
HB-67	-	4.27	6.50	5.9	1.63
HB-81					
HB-82					

[1] As reported by Harrington, Lacey & Associates, October, 1982.
[2] These elevations were corrected to reflect the original datum used in 1981. 1983 Topographical survey indicates changes from original data.

Rises in the ground-water levels between the previous ground-water contours and those constructed for this study are on the order of 5 to 8 feet in Area 5 and Area 3, respectively. Limited ground-water data from beneath Area 3 indicate that 7 feet of rise may have occurred beneath the site.

4.5.4.5 Ground-water Recharge. The major source of ground-water recharge appears to be the infiltration of precipitation through the post-Cretaceous sands and silts throughout the site and through the Cretaceous sediments to the west of Area 5. Recharge may be concentrated in the areas of ground-water highs (Area 3 and western Area 5.)

4.5.5 Flow Rate of Chemical Constituents

The migration of leachate components through a heterogeneous soil involves an extremely complex series of mechanisms. Leachate stabilization or migration depends upon not only the physical and chemical behavior of the leachate but also on numerous soil properties, such as texture, structure, mineralology, and density. Leachate components could be classified according to their ionic structure, i.e. heavy metals, salts or exchangeable bases, pathogens, organics, etc. Or they can be classified according to their reactive nature, i.e. more or less dense than water, organic or inorganic, reactive or inert, etc. Each component has a different solubility, affinity for adsorption, and migration rate. These also vary with soil pH, temperature, and saturation. In addition, the natural chemistry of the ground-water can affect the migration of contaminants. With these factors in mind, only general statements can be made about the migration of leachate components.

Generally, metallic ions can be adsorbed and exchanged on a clay compound, but this attenuation varies with the different metallic ions. Heavy metal anions such as chromium, much like chlorides and sulfates, are not highly responsive to attenuation in the saturated or unsaturated zone. In a

high pH environment many metallic ions precipitate out of solution as insoluble oxides, hydroxides, phosphates, and sulfides. With a drop in pH and reducing conditions in the soil, these insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium may adsorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Precipitation is generally more effective than adsorption. Trivalent chromium is typically only slowly mobile in aerobic, unsaturated conditions. Reports indicate that increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxy oxide contents. Hexavalent chromium usually does not precipitate in significant amounts, and its mobility increases between pH levels of 7 to 8.

Many variables are present in the chrome ore tailings underlying Areas 3 and 5 which may tend to enhance and/or attenuate the movement of chromium into the ground water. Because attenuation properties are variable both in the nature of the waste and the subsurface environment, it is difficult to predict the rate of flow. It can be conservatively assumed that non-reactive components travel through the ground water at a rate equal to the seepage velocity. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may cause components to travel faster than or in different directions from the flow of ground water. Density differences in some ions (chrome in particular) may cause leachate components to sink rather than flow with the advective forces, or may slow their migration rate.

With the addition of inorganic wastes into the Area 3 facility (primarily heavy metals) similar variables as those associated with the migration of chromium are expected to affect flow of any contaminant. Assuming that components of these wastes reach the ground water, an estimate of their flow rate can be assumed to be the same as that of the ground waters. However, additional characterization of the wastes and soils at the site is necessary before a better understanding of the stabilization processes that could affect migration rates can occur.

4.6 GROUND-WATER MONITORING PROGRAM

4.6.1 General

The locations of the 10 monitoring wells installed at the Hawkins Point HWL site, and their relationship to the waste management areas are indicated on Figure 4.19. These wells were installed at the direction of the DHMH as part of the Interim Expansion Permit requirements. Details regarding these wells are included in section 4.5.2. Currently samples are obtained and tested on a monthly basis. At present samples are analyzed for the following parameters:

- Parameters characterizing ground water as a drinking water supply:
  - Arsenic
  - Barium
  - Cadmium
  - Chromium
  - Fluoride
  - Lead
  - Mercury
  - Nitrate (as N)
  - Selenium
  - Silver
  - Endrin
  - Lindane
  - Methoxychlor
  - Toxaphene
  - 2, 4-D
  - 2, 4, 5 TP Silvex
  - Radium
  - Gross Alpha
  - Gross Beta
  - Turbidity
  - Coliform Bacteria

  not required

  Parameters establishing ground-water quality:
  - Chloride
  - Iron
  - Manganese
  - Phenols
  - Sodium
  - Sulfate
- Parameters used as indicators of ground-water contamination:
  - pH
  - Specific Conductance
  - Total Organic Carbon
  - Total Organic Halogen

Sample collection, shipment, analyses control are included in Appendix J. Field sampling is performed by MES operations personnel and analytical testing is performed by the University of Maryland. The results of sample analyses will be available as soon as practical after the sampling period, presently, a period less than 3 months.

Based upon the ground-water elevation contour maps constructed for this study, well (2-B) is located upgradient of the Areas 3 and 5. However, data are available on upgradient wells located on adjacent sites (see Section 6.3.3). Nine additional wells are, at present, all located hydraulically downgradient from the waste disposal areas. Figure 4.15 indicates the location of the detection monitoring program wells with respect to the waste disposal areas and the ground-water elevation contours. NO

Since numerous wells exist hydraulically upgradient of the Hawkins Point site, general background water quality for monitoring purposes could be established by sampling most upgradient wells, including those on SCM and BFI properties. Therefore, it is recommended that all wells that might indicate ground water quality upgradient of the Hawkins Point site remain functional for this purpose.

After the first year of sampling is completed, the following monitoring program is recommeded (as per Part 264.92 (a and b)).

On an annual basis in Areas 3 and 5 (as per 265.92 (d)(1)):
- Chloride
- Iron
- Manganese
- Phenols
- Sodium
- Sulfate

On a semi-annual basis in Areas 3 and 5 (as per 265.92 (d)(2)):
- pH
- Specific conductance
- TOC
- TOH
- Zinc
- Lead
- Nickel
- Chromium (hexavalent)
- Chromium (total
- Cadmium
- Copper

Mercury
Arsenic

4.6.2 Background Ground-water Data

As discussed in Section 6.3.1, the original monitoring wells for the facility were abandoned in 1983 at the direction of DHMH. Data results for these wells cover a period from July 1980 to July 1982, but are considered invalid due to questionable well installation techniques. The new detection monitoring wells were installed in late 1982 and early 1983; initial first sampling occurred in February 1983. Therefore, one year of water-quality data has not been collected as per Part 264.97(g)(1). Thus, statistically valid increases and general background variations have not yet been established. Continued monthly sampling will provide an increasing data base for establishing statistical changes in water quality, and it is recommended that during the first year of active life quarterly samples be taken for the parameters listed previously (as per 265.92 (c)).

Since additional background data to comply with Part 264.98 is available off-site, it is considered appropriate that the ongoing sampling of the upgradient well, in conjuction with upgradient data obtained at nearby facilities, be used to define background water-quality. Off-site data may be especially useful due to the potential for upgradient sources of contaminants.

4.6.3 Procedure for Determining Statistically Significant Increase in Monitored Parameters

Once background water-quality levels are established, the procedures outlined in 40 CFR 264.97(h) will be followed to determine statistically valid increases or decreases for monitored parameters between the compliance point and the background wells. As specified under Part 264.95(a) the Regional Administrator will specify the Point of Compliance in the facility permit. At present a total of nine wells are located downgradient of both Areas 3 and 5. The most likely wells to be included as compliance points appear to be Well 2D for Area 5 and Well M for Area 3 since they are closest to the limit of the waste management area (Figure 4.19).

4.6.4 Procedures to be Implemented if a Statistically Significant Increase in a Specified Contaminant Occurs at the Compliance Point

If a statistically significant increase over the specified limit established by the EPA Regional Administrator occurs at the compliance point, then procedures outlined under 40 CFR 264.98(h) will be followed.

4.6.5 Procedures for Annual Determination of Uppermost Aquifer Flow Rate and Direction

Ground-water elevations will be measured during each sampling event as outlined in the sampling procedures in Appendix J. These elevation records will be maintained and compared to previously compiled data to assess fluctuations and evaluate any potential gradient changes. On an annual basis hydraulic conductivities should be evaluated. This can be accomplished through the use of standard field techniques. The hydraulic conductivity results, along with gradients obtained from ground-water elevation data, can then be used to assess fluctuation in flow rates.

4.6.6 Procedures for Inspection and Maintenance of Ground-water Monitoring System

Periodic monitoring of the ground-water levels and quality will be accomplished according to the procedures and intervals outlined for the active life of the facility (see the Operation & Maintenance Manual). The ground-water monitoring activities and frequencies will be as cited under the post-closure plan.

Inspection of the monitoring wells during each sampling period would include a visual inspection of the protective standpipe, the locking cap mechanism and the well pipe. If the protective standpipe has been loosened or damaged, it should be either re-aligned and regrouted or replaced. The locking mechanism should be lubricated and kept in working order. To ensure proper sampling, the internal well pipe should be inspected and be replaced if found to be out of alignment.

Visual inspection should also be conducted of the well sampling apparatus, such as, tubing, etc., and replacements should be made if necessary. All wells should be properly purged as set forth in the sampling procedures (Appendix R).

5.0 GEOTECHNICAL EVALUATION

5.1 SITE INVESTIGATION

5.1.1 Subsurface Conditions

A total of 10 borings were drilled during the current investigation. The 10 auger borings were drilled to depths ranging from 6.0 to 61.5 feet below the existing ground surface. Borings were advanced using 8-inch outside diameter hollow stem augers. Soil samples were generally obtained at 2.5-foot intervals except in the intervals where a two-inch diameter well screen was to be located. In that case, continuous samples were obtained over the screened interval. Samples were taken using a 2-inch diameter split spoon sampler in accordance with American Society for Testing and Materials (ASTM) D-1586. All drilling and sampling operations were supervised by a qualified geologist, who maintained field logs of all borings. Final boring logs, along with other details of the field and laboratory investigation, are provided in Appendix A. A narrative summary of field activities for each boring is included with the logs.

The 1983 borings encountered fill in varying thicknesses, most commonly less than 10 feet. This fill consists primarily of stiff clay or medium dense sand. Blow counts (N) from Standard Penetration Testing (SPT) ranged from 6 to 32 blows per foot (bpf) in the sands, with an average of 15 bpf. In the clays, the blow counts ranged from 7 to 17 bpf, with an average of 11 bpf. Laboratory moisture contents in the clay materials ranged between 13 and 21 percent.

Beneath the fill, where it did not overlay chrome ore tailings, post-Cretaceous aged alluvial sediments were typically encountered. These sediments consist of alternating layers of sand, silts, clays and organics. The sands, silts and clays varied in density from very loose/soft to very dense/stiff. Blow counts in the sands ranged from weight-of-hammer (WOH) to 60 bpf with an average of 17 bpf. The silts and clays exhibited blow counts ranging from 2 to 22 bpf, with an average of 9 bpf. Moisture contents in the alluvium ranged from 13 to 23 percent. Organic silts and clays were encountered in thicknesses of less than 3 feet. Blow counts in the organic layers ranged from 2 bpf to 7 bpf, with an average of 4 bpf. Moisture contents ranged from 63 to 73 percent.

The chrome ore tailings encountered in several of the borings were generally very dense. Blow counts ranged from 13 bpf to 100 blows per inch, with an average of approximately 60 bpf. Laboratory moisture contents ranged from 13 to 23 percent. Auger drilling through this material was accomplished with some difficulty.

Cretaceous sediments were encountered in 2 of the borings at depths of 10 and 15 feet. Although Cretaceous sediments typically consist of hard silty clays or very dense sands, only the clays were encountered in the borings. SPT values in these natural soils ranged from 21 bpf to 96 bpf, with an average of 52 bpf. Laboratory moisture contents ranged from 11 to 18 percent. Auger drilling was accomplished with some difficulty through this material. Ground water was encountered in 7 of the 10 test borings.

The general characteristics of the fill, alluvium chrome ore tailings and natural Cretaceous deposits encountered in the 10 test borings were consistent with those reported in previous investigations.

5.1.2 Field Testing

5.1.2.1 General. The 10 borings were drilled by Hardin-Huber Associates of Pasadena, Maryland, using a truck-mounted Mobile B-61 drilling rig, between April 25, 1983, and May 13, 1983. Soil drilling involved hollow-stem augering with Standard Penetration Testing (SPT) in accordance with ASTM D-1586 test procedure.

Test borings that were drilled through known hazardous materials required special procedures. These included containment and disposal of auger cuttings, decontamination of the drilling rig and equipment, and, as with all borings, sealing of the auger borehole with a grout slurry. All soil samples were logged in the field by a geologist; representative samples were shipped to Woodward-Clyde Consultants in Rockville, Maryland, for further examination.

In 5 of the borings, 2-inch diameter PVC observation wells were installed for the purpose of water-quality sampling and ground-water monitoring (see Section 4). The methodology and results of the additional field testing are presented in the following subsections.

5.1.2.2 Swedish Vane Shear Tests. The Swedish Vane Shear is a portable mechanical apparatus operated by two individuals, and is designed for in-situ testing of relatively soft silts and clays. It provides a reliable means of determining the undrained shear strengths (Su) of soils which are not easily recoverable for testing in the laboratory. The vane shear can test soils with shear strengths of less than 4,800 pounds per square foot (psf).

The Swedish Vane Shear was used in 2 areas of the Hawkins Point HWL site to test soils that could not be easily recovered without disturbing the samples. In Area 4 it was used to test and define the region of silty "mud" deposited adjacent to the Chessie System railroad tracks by Thoms Creek. Four vane soundings were obtained along the banks of Thoms Creek (see Figure 4.5). The strength profiles of the soundings are presented in Table 5.1. The alluvial, silty muds were found to range from 1.5 to 4.0 feet in thickness and have an undrained shear strength of 200 to 500 psf.

Table 5.1: Swedish Vane Shear Tests Adjacent to Thoms Creek (Area 4)

Depth (ft)	Unconfined Shear Strength (psf)			
	SSV-1	SSV-2	SSV-3	SSV-4
1.6	660	670	410	-
3.2	290	200	390	1,280
4.9	320		-	1,440
6.5	770		2,430	430
8.2			840	500
9.8			1,180	1,260
11.4				1,600
13.1				2,690
14.8				3,890

The Vane Shear was also used adjacent to Boring D-1, in Area 2, to determine the strength properties of the soft, black organic silts encountered. A borehole was augered to a depth of 13 feet, the first vane sounding beginning at a depth of 14.8 feet. Samples obtained from Boring D-1 indicated that the organic silts were located from 23 feet to 26 feet. The Vane Shear

indicated that the organic silts at this depth exhibit undrained shear strengths of 1,900 to 2,370 psf, as indicated in Table 5.2.

Table 5.2: Swedish Vane Shear Tests Adjacent to Boring D-1 (Area 2)

Depth (ft)	Undrained Shear Strength (psf)
14.8	3,490
16.4	4,800+
18.0	3,700
19.7	2,760
21.3	2,760
23.0	1,930
24.6	2,370
25.9	4,800+

5.1.2.3 Cone Penetrometer Test. An in-situ static cone penetrometer test was conducted near Boring 2-4 in Area 5. This test provides an indication of the compressive strength and modulus for the soils penetrated. Cone resistance is sensed by a waterproof full-bridged strain gage load cell housed in a stainless steel casing. The cone is a standard 1.4 inch diameter (10 cm^2 base area), 60 degree cone. The 2,000- 5,000- 6,000- and 10,000 pound capacity load cells can be interchanged to accurately measure cone resistance for a wide range of conditions. The cone penetrometer attaches to a standard (EW-size) drill rod. Strain signals through a shielded electrical cable are recorded continuously in real-time as resistance on one channel of a two-channel strip chart recorder.

The test was conducted between depths 6.5 and 28.5 feet below the ground surface. Graphical results of the test are presented in Appendix A. Cone bearing strengths in the alluvial silts and clays that were penetrated ranged from 10 to 35 tons per square foot (tsf). Occasional layers, which may reflect iron-oxide cemented zones, were encountered with strength values of up to 278 tsf. 2

5.1.2.4 Pocket Penetrometer Tests. Pocket penetrometer tests were performed in the field on samples obtained from SPT sampling. The results of these tests are presented in Appendix A. The reliability of pocket penetrometer tests is limited and, therefore, the results were used only for a qualitative comparison of similar materials.

5.2 LABORATORY TESTING

Laboratory soil testing was integrated with the results of the field investigation to provide soil properties and parameters required to characterize each of the pertinent soil types encountered. Water quality tests were also performed as discussed in Section 6.0.

Routine soil tests ere in general accorance with ASTM and U.S. Army Corps of Engineers (USACE) testing procedures. These tests included moisture content (ASTM D-2216), liquid and plastic limits (ASTM D-423 and D-424), specific gravity (ASTM D-854) and in-situ densities (USACE EM-1110-2-1906). The results of these tests are presented on the boring logs. Test results for consolidation tests (ASTM D-2435) and particle size analyses (ASTM D-422) are presented graphically in Appendix A. Additional laboratory analyses performed during previous investigations are presented in Appendix K.

5.3 GEOTECHNICAL ENGINEERING ANALYSES

5.3.1 Slope Stability Analyses

5.3.1.1 General. Slope stability analyses were performed using the Woodward-Clyde Consultants micro-computer program "STABR". This program was developed by the Geotechnical Engineering Division of the University of California, Berkeley and employs the Modified Bishop Method. In the program, the slip circle having the minimum factor of safety is obtained by a systematic comparison of the stability of a number of possible circular failure surfaces.

Based on the boring information, laboratory testing, and experience with embankment design, engineering strength properties were assigned to the soils considered in the stability analyses. These properties are presented in Table 5.3.

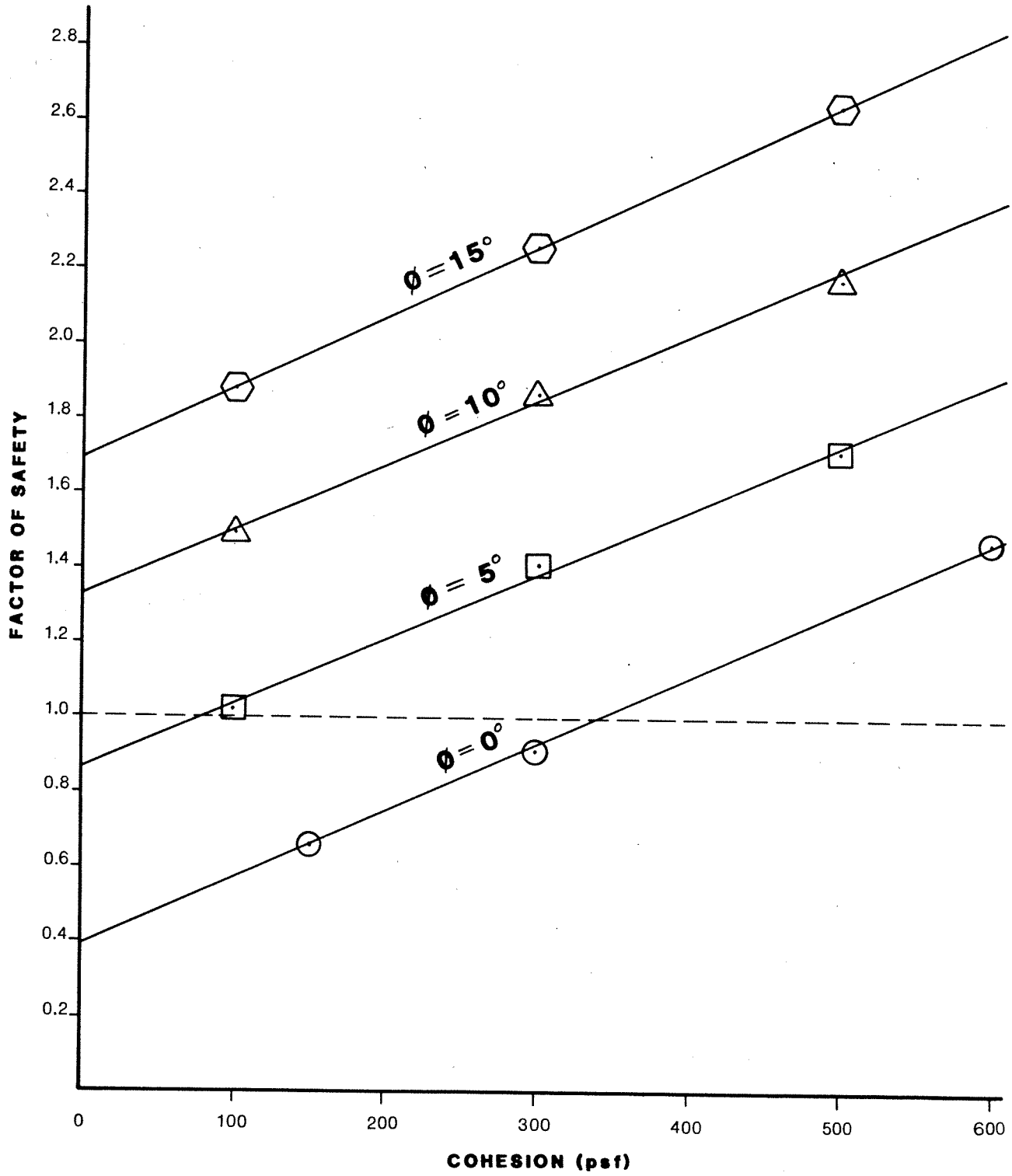
Table 5.3: Soil Properties for Stability Analyses

Soil Type	Cohesion (psf)	Friction Angle (degrees)	Total Unit Weight (pcf)
Earthen berms	1,000	24	110
Chrome ore tailings	3,000	36	120
Firm clayey silt/silty clay	450	29	100
Soft clayey silt	300	20	100
Organic silts	150	25	80
Cretaceous clay	3,000	24	120
Cretaceous sand	0	40	125
General hazardous waste	Varied	Varied	80

5.3.1.2 Area 3 Stability. A stability analyses was performed on a typical section of the Area 3 facility berm configuration that is proposed in this permit application. The exterior berm slopes were assumed to be 3:1 (horizontal:vertical) and the interior slopes were 2:1. Although the strength parameters for the general hazardous waste are not known at this time, a parametric study was used to assess the strength necessary to achieve stability. Figure 5.1 presents the combination of cohesive strength and friction angle required to achieve a given factor of safety.

Experience on a similar facility in the northeastern United States, however, indicates that the lowest strength values for a hazardous waste process sludge were on the order of 500 psf cohesion and 15 degrees friction angle. These values were obtained by periodic field sampling of the in-place sludge and subsequent laboratory testing. Cohesion values ranged from 500 to 800 psf and friction angle ranged from 15 to 20 degrees. The unit weight for this sludge was approximately 80 pcf with water contents on the order of 80 to 100 percent.

Based on cohesion of 500 psf, a friction angle of 15 degrees, and a unit weight of 80 pcf for the waste, the factor of safety against slope failure in Area 3 was computed to be in excess of 2.5. It is considered that an



COMPARISON OF FACTOR OF SAFETY TO STRENGTH OF WASTE

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 5.1

adequate factor of safety can be developed for the facility. Since the stability of the facility is dependent on the waste strength characteristics, it will be necessary to verify the strength of the waste through both generator supplied data and field testing.

I-1e(5) I-1e(6)

5.3.2 Settlement Analyses

5.3.2.1 General. Post-closure settlement is expected to occur primarily as the result of long-term consolidation of the foundation soils with relatively small compression of the chrome ore materials. The major source of foundation settlement is expected to be in the organic clayey silts that are present in varying thicknesses throughout portions of the site.

Consolidation tests were conducted on soil samples obtained from the organic silt layers. The results of these tests were combined with results of consolidation tests from previous site explorations to define the compressibility of the plastic in-situ soils. The compression properties of the sands were calculated using the equation presented by Schmertmann (1970), which correlates Standard Penetration Test results with compression moduli. For the hard Cretaceous clays, the results of Washington Metropolitan Area Transit Authority (WMATA) consolidation tests on similar materials were used.

5.3.2.2 Area 3 Settlement. Based on the soil profiles in the Area 3 expansion area, it is estimated that total foundation settlements under the proposed Area 3 facility could range from 1 to 4 feet, although the major portion of Area 3 is expected to experience less than 2 feet of total settlement. The presence of a thick stratum of soft clayey silts under the northeastern portion of Area 3 could cause settlements under that corner to approach 4 feet. Approximately 40 percent of the total settlement should occur rapidly as a result of the placement of waste. Since construction/filling operations will be conducted over a relatively long period of time, most of the consolidation should occur within 1 year after construction is completed.

Differential settlements for the major portion of the Area 3 facility are expected to be negligible. However, in the northeastern portion of the Area 3 facility, which will experience the greatest settlements, the differential settlements may be as great as 2 feet per 100-foot span. This differ-

ential is not expected to affect the integrity of the clay and synthetic liners, and is oriented such that any impact on the leachate collection system should act to increase the drainage gradients within the system underneath the northeastern area of the facility.

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p15

6.0 WATER-QUALITY EVALUATION

6.1 CHROME ORE TAILINGS CHARACTERISTICS

A quantitative and qualitative analysis was conducted on a representative sample of the existing chrome ore tailings currently disposed at the Hawkins Point HWL site. This sample also was assumed to approximate the characteristics of previous chrome ore tailings disposed at the site under the proposed expansion area. The sample was tested for EP Toxicity; the results of all analyses are presented as Appendix L. Of the 15 contaminants analyzed, only chromium was found in concentrations greater than the maximum concentration for the characteristic of EP Toxicity (40 CFR 261.24(b) Table 1). Two additional contaminants (barium and nickel) + pH were found to occur in concentrations greater than either the EPA Primary or Secondary Drinking Water Standards (see Table 6.1).

Table 6.1: Chrome Ore Tailings Contaminants

Contaminant	Concentration (ppm)
Barium	52.83
Total chromium	163.50
Hexavalent chromium	147.25
Nickel	0.85

The chrome pH waste is alkaline with a pH ranging from approximately 11 to 13.

6.2 GENERAL HAZARDOUS WASTE CHARACTERISTICS

The types of hazardous wastes which have been authorized for disposal in Area 3 of Hawkins Point HWL site are included as Appendix M. With some exceptions, only inorganic, non-liquid wastes which exhibit EP Toxicity (COMAR 10.51.02.13) characteristics, are authorized waste materials.

6.3 ASSESSMENT OF GROUND-WATER QUALITY

6.3.1 Abandoned Wells

In the spring of 1980, Maryland Environmental Service (MES) installed 5 monitoring wells in Area 5 (see Figure 4.19). The wells were sampled periodically to test for total and hexavalent chromium concentrations. The validity of the test results as representative of water quality beneath the site was questioned by DHMH when erratic levels of chromium concentrations were measured. A review of well construction records indicated that

unsound construction techniques may have been used to install these wells. The wells were subsequently abandoned by order of the DHMH in June 1982.

6.3.2 Monitoring Wells

After the abandonment of the 5 original wells, a new program monitoring the upper waters in the near-surface aquifer was initiated, utilizing the 10 monitoring wells indicated in Figure 4.15. Three sets of analytical data for samples from these wells have been obtained-to-date, between February and May, 1983. Complete results of these analyses are presented as Appendix N. The contaminants indicating significant concentrations when compared with EPA Primary and Secondary Drinking Water Standards are presented in Table 6.2. Absence of a value indicates compliance with criteria.

As may be noted in Table 6.2, concentrations of contaminants which are several orders-of-magnitude higher than the appropriate standard have been reported for manganese, sulfate, iron, nickel, sodium, and selenium. Additional ground-water samples from these wells are required for the data to be statistically significant. Until statistical significance is established, the information presented should be used only as a general indicator of quality.

6.3.3 Off-Site and Deep On-Site Wells

Off-site wells on the BFI-Waste Systems and SCM/Glidden properties are located adjacent to and hydraulically upgradient of the Hawkins Point HWL site as shown on Figure 4.13 and 4.14. Both the BFI and SCM sites are topographically higher than the Hawkins Point site, and may contribute to the near surface aquifer recharge at the Hawkins Point HWL site.

In the past, the BFI landfill has been used for the disposal of industrial and municipal waste, but no information relative to the quantities or types of disposed waste is currently available. General characterization only can be inferred from the quality of the ground water sampled.

The SCM landfill has been used for the disposal of various by-products of the SCM/Glidden industrial processes. The results of chemical analyses conducted on industrial wastes disposed of at this site are included in Appendix O.

Continuing water-quality analyses of ground water have been conducted in monitoring wells on both sites. The summary reports of all the analyses for the BFI and SCM facilities are presented as Appendix P. Locations of the BFI monitoring wells are indicated in Figures 4.13 and 6.1.

relevance

The mean values of contaminants which exhibit significant concentrations, when compared with EPA Primary and Secondary Drinking Water Standards, in the ground-waters underlying the BFI and SCM landfills are as presented in Table 6.3.

Table 6.3: Mean Concentrations of Selected Parameters in Off-Site Wells[1]

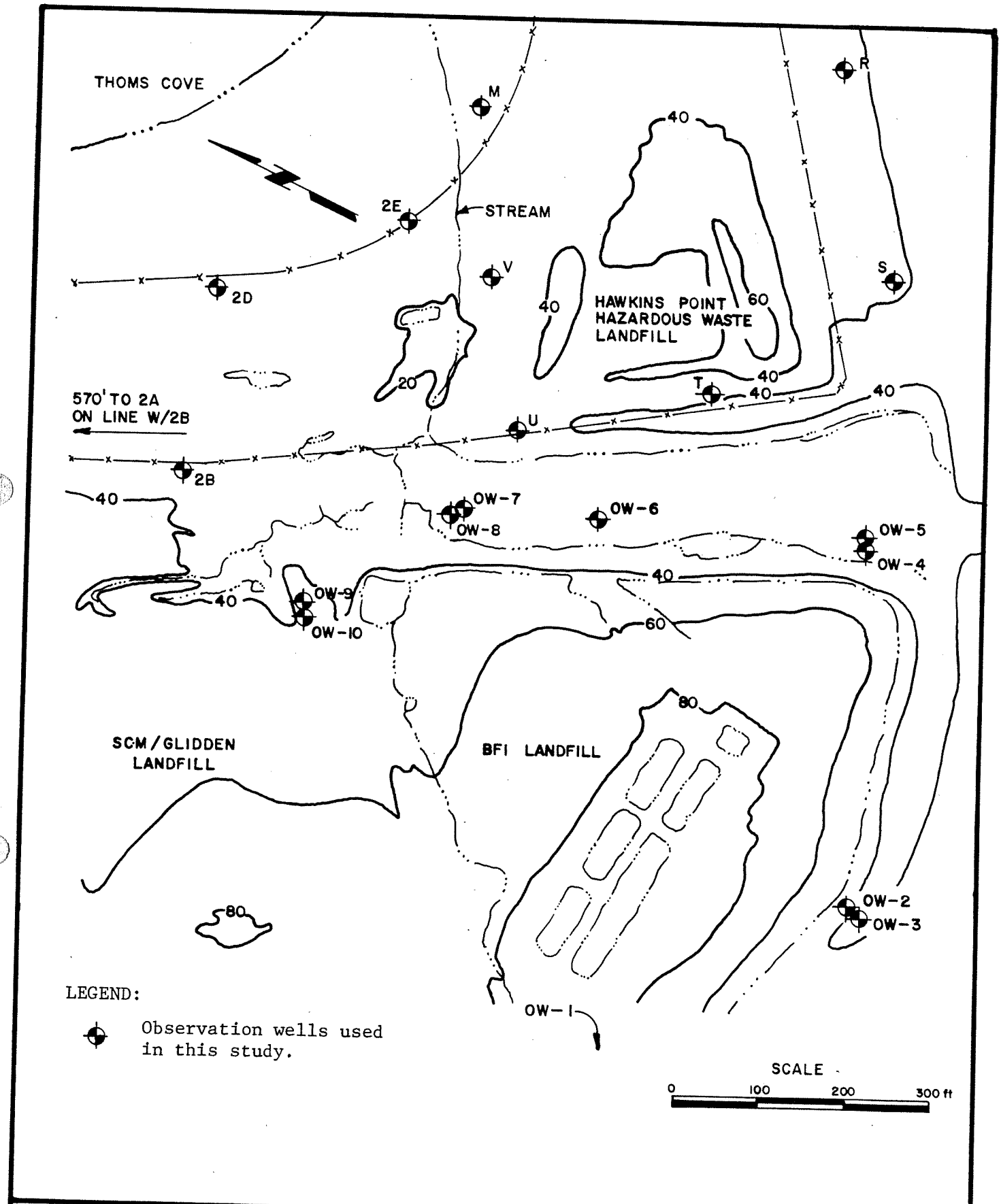
BFI LANDFILL
(1982)

Well No.	Ag (ppm)	Fe (ppm)	Cd (ppm)	SO_4 (ppm)	Mn (ppm)	Na (ppm)	Cr (ppm)	Hg (ppm)	As (ppm)	Pb (ppm)	Cl (ppm)
OW-1		7,067		16,407	180	300	3.4				449
OW-2	.140	65,367	.180	101,150	1.3	40	16.1	.032	.10		982
OW-3		1,208		5,700		900			.06	.052	5,380
OW-4		7									
OW-5		40									
OW-6		57				300					485
OW-7		722		9,485			0.12				
OW-8		328		113		240					784
OW-9		7,133		13,269	.085	520					814
OW-10		6,833		15,248	.100	430					406
Standard/ Criterion	.050	.03	.010	250	.050	20	.050	.002	.050	.050	250

SCM LANDFILL
(1982)

Well No.	Fe (ppm)	SO_4 (ppm)	Mn (ppm)	Na (ppm)	Cr (ppm)	Hg (ppm)
P-1	1,779	10,925	76.0	.143	5.01	.100
P-2	159	254	1.08	.072	.027	
P-3	1.5	284	3.08	.070	0.07	
P-4	277	426	14.40	.098	0.15	
Standard/ Criterion	0.3	250	.050	.020	.050	.002

1. As calculated based on data supplied by facility owners; absence of a value indicates compliance with criteria.



OBSERVATION WELL LOCATION PLAN

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 6.1

Table 6.2: CONTAMINANTS OF SIGNIFICANT CONCENTRATION

MAXIMUM/MEAN RECORDED VALUES[1]

Well No.	Se (ppm)	Cl (ppm)	pH[2] (ppm)	Fe (ppm)	Cd (ppm)	SO_4 (ppm)	Mn (ppm)	Ni (ppm)	Na (ppm)
2A	-	-	5.1/5.7	2.0/1.2	-	-	0.33/0.25	-	-
2B upgradient	.032/.024	-	4.8/5.0	42.3/37.8	.014/.012	1950/1337	13.7/11.5	-	38/32
2D	.037/.032	-	4.7/5.6	38.8/36.5	.028/.019	1720/973	12.7/10.6	-	34/24.7
2E	.093/.077	342/270	5.5/5.7	44.6/39.6	.023/.012	4800/3807	22.2/21.3	-	496/339
M	.311/.282	402/271	4.3/4.6	46.2/40.8	.035/.019	38,900/ 25,300	22.6/21.4	.05/.05	1330/1173
R	-	263/-	5.1/5.3	6.8/4.4	.017/-	-	0.45/0.34	.05/.05	52/33
T	.015/.012	-	5.5/5.5	0.6/0.36	.018/.011	4940/1651	0.89/0.85	.40/0.36	48/42
U	-	-	5.5/6.2	2.5/1.2	.024/.010	-	0.34/0.31	.05/.05	-
V	.012/-	498/358	5.5/5.8	25.4/23.1	-	-	1.30/1.07	.25/.26	126/119
GWI #2	.199/.190	-	4.9/5.2	27.2/23.1	.012/-	966/489	6.60/4.7	-	45/35
S	.016/.011	-	6.0/-	7.8/2.9	.019/.010	-	2.10/1.6	.650/.53	74/70
STANDARD/ CRITERION	.010	250	6.5/8.5	0.3	.010	250	0.05	.0134	20

1. Data from sampling events conducted on February 28, April 1 and May 13, 1983.
2. Lowest and mean value.
3. Absence of a value indicates the result was within criterion; results from additional scheduled sampling events will be required to establish statistical significance.

From the tables it may be noted that both the SCM and BFI sites exhibit manganese, sulfate, iron and chromium concentrations which are several orders-of-magnitude higher than the EPA Primary and Secondary Drinking Water Standards. Additionally, in November 1982 elevated levels of radioactivity were noted in Well No. P-1.

As part of this investigation, regional water quality data were obtained so that generalized isoconcentration maps could be constructed. In addition to the sources cited in Section 4.3.2 which were used to construct a ground-water elevation contour map, the following sources were used to assess regional ground-water quality:

- Water Resources Basic Data Report No. 8: Anne Arundel County Ground -Water Information - Selected Well Records, Chemical-Quality Data, Pumpage, Appropriation Data, and Selected Well Logs, by R.C. Lucas, 1976.

- Water Resources Basic-Data Report No. 10, Maryland Ground-Water Information: Chemical Quality Data, by R.S. Woll, 1978.

From the regional data it was found that the deeper waters of the near surface aquifer are generally of better overall quality than those in the upper portion of the aquifer. Information from an on-site production well, screened in the lower portion of the Patapsco, was also used (see Table 6.4). The on-site production well produced non-potable water for site operations, and is located at approximately coordinates N 501,260 and E 927,540, near the southeastern end of Area 5. The analyses of the water quality in the production well is good, generally reflecting the overall regional quality. This indicates that general contamination in the upper portion of the near-surface aquifer may not have mixed with the deeper waters of the same aquifer.

Well HB-67, located near the southern site boundary in Area 3 (see Figure 4.5), is a well in the Patapsco aquifer with a screen elevation at -68 feet (MSL). The well monitors waters deeper in the near-surface aquifer than the remaining on-site monitoring wells. Figures 4.13 and 6.2 through 6.4 indicate that this well displays water quality similar to the on-site production well, although HB-67 exhibits lower iron and chromium concentrations. This generally good water quality supports the proposal that the water quality in the near-surface aquifer generally improves with depth.

Information from the USGS indicates that an off-site production well in the Pataspco aquifer in the Glen Burnie area (approximately 6 miles southwest of the site) demonstrates good overall quality, with levels of iron .08 ppm,

Table 6.4 On-Site Production Well Water Quality

Parameter	Concentration (mg/l)	Parameter	Concentration (mg/l)
B	0.02	Temperature	14.5
Cl	10.0	Alkalinity	1.0
Specific Conductance	73.0 umhos	Sb	0.001
Cu	24.0	Se	0.001
Dissolved Solids	34.0	Mo	0.001
F	0.1	TOC	0.5
Hardness	3.0	P	0.02
I	0.01	Cr	0.012
Pb	0.005	Acidity	20.0
Mn	0.01	Ag	0.001
Ni	0.016	Fe	0.3
pH	4.2	Hg	0.0002
K	0.5	Cd	0.003
SO_4	13.0	Na	2.7

Source: STORET
Sampling Date: April 7, 1983
Well Location: N 501,260 and E 927,540

chromium 0.001 ppm (dissolved), sulfate 8.7 (dissolved), and specific conductance 120 umhos/cm.

Four parameters were selected as a basis of comparison between on-site and off-site water quality in the upper portion of the near-surface aquifer. Regional information indicates the following range of concentrations for the entire aquifer thickness:

Iron	500 - 700 ppm
Sulfate	7-70 ppm
Specific Conductance	27-500 umhos/cm

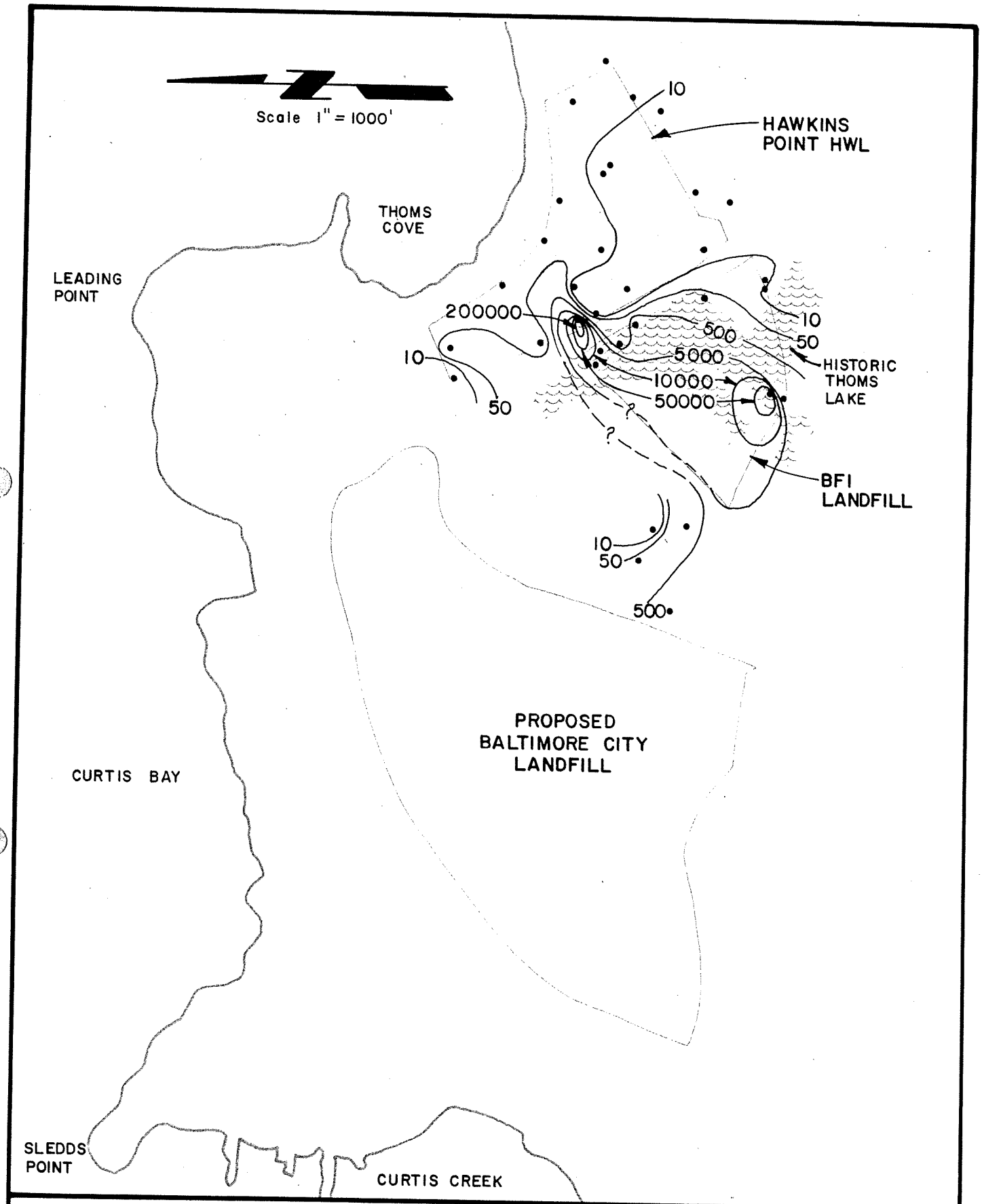
Regional pH ranged from 4.3 to 6.8, although this information was not used to construct an isoconcentration map.

Figure 6.2 shows the isoconcentration lines for iron. These values are the average for each well of several sampling events in 1982 and 1983. The highest concentrations appear to be centered in two areas, the southwest and northeastern parts of historical Thoms Lake. Concentrations generally decrease to less than 10 ppm both to the north and southeast.

Figure 6.3 shows similar isoconcentration lines for sulfate. It appears that there are three areas of high concentration, the same two areas as with iron and an additional area centering around Well M on the Hawkins Point HWL property. Once again, concentrations decrease to below 60 ppm to the southeast and to below 500 ppm to the west and northwest.

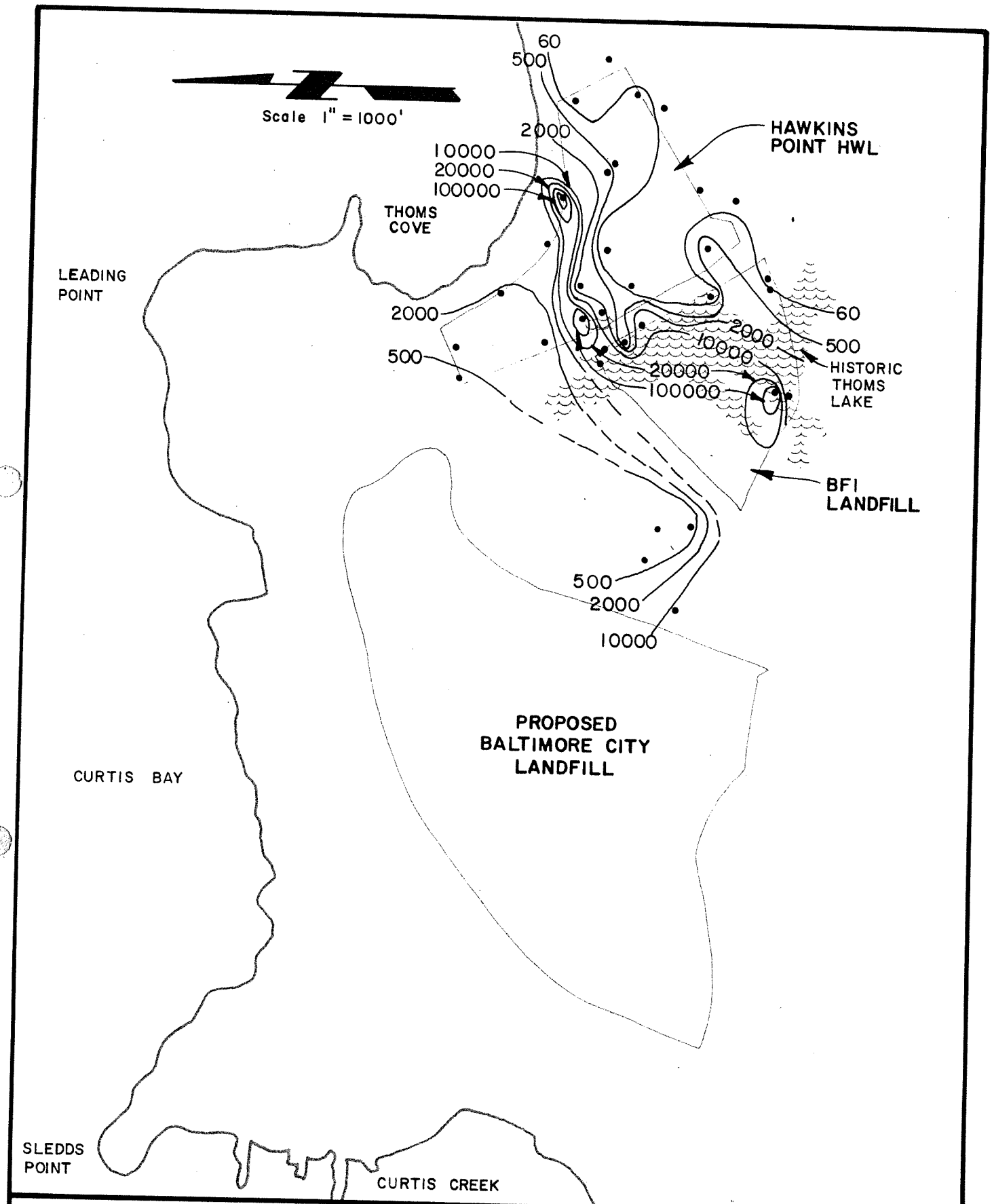
Figure 6.4 shows lines of equal specific conductance. High values are centered in the southwestern part of historical Thoms Lake and in an elongated area trending roughly east-west along the center of the Hawkins Point HWL site. Concentrations decrease to below 500 umhos/cm to the northwest and southeast.

There is a striking similarity between the configurations of Figure 6.2 through 6.4 for iron, sulfate, specific conductance. The most degraded near-surface ground water appears to occur in the upper portion of the aquifer along the line diagonally across Thoms Lake from the southwest to the northeast, along the alignment of the trough as identified in the geologic discussion. Figure 6.5 depicts the distribution of average total chromium concentrations. It is apparent from this distribution that high concentrations of total chromium have been measured in off-site as well as on-site wells. Chromium concentrations in the upper portion of the near surface aquifer at



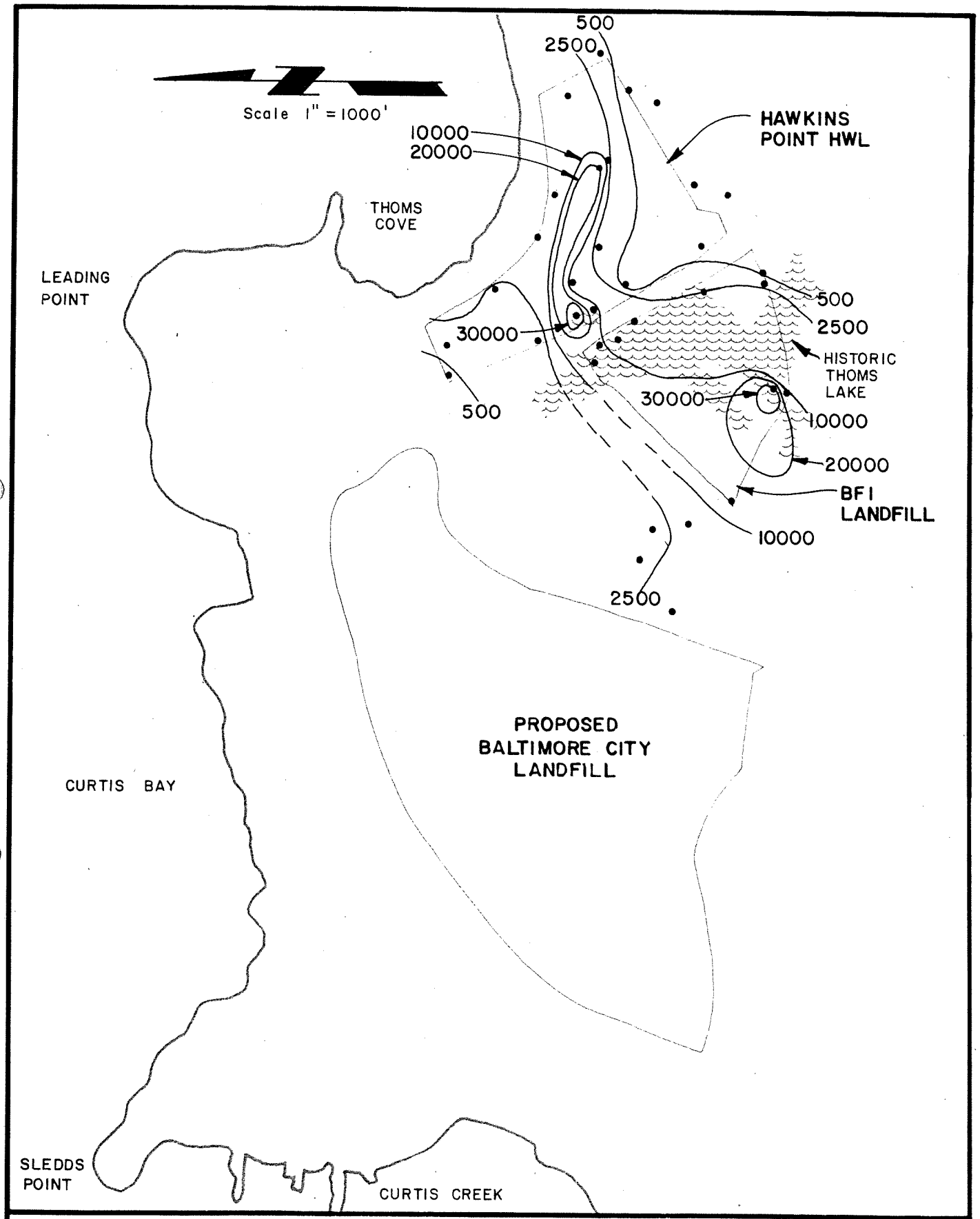
ISOCONCENTRATION LINES - IRON (MG/L)

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 6.2



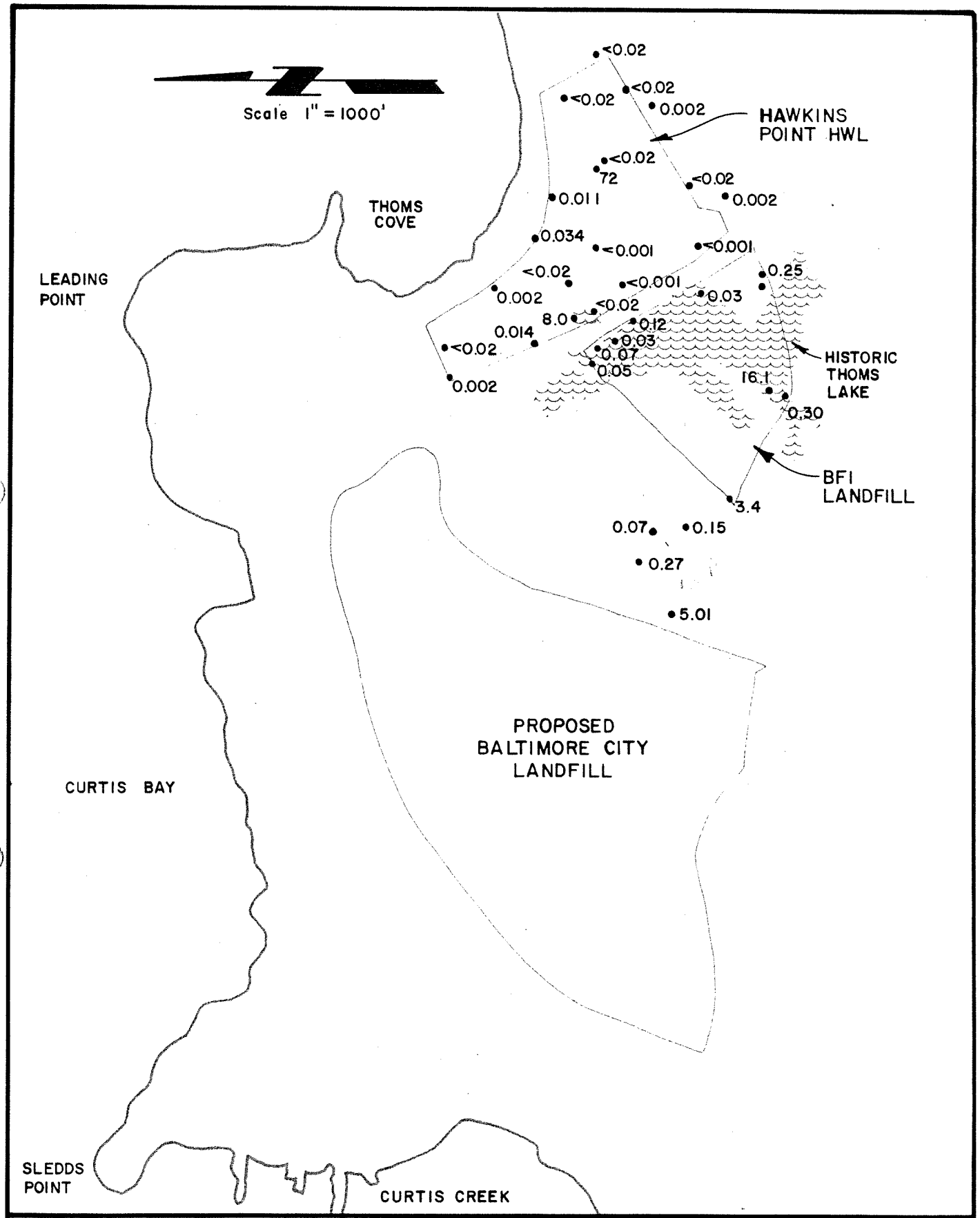
ISOCONCENTRATION LINES - SULFATE (MG/L)

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 6.3



LINES OF EQUAL SPECIFIC CONDUCTANCE (UMHOS/CM)

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 6.4



AVERAGE TOTAL CHROMIUM CONCENTRATIONS (MG/L)

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 6.5

the Hawkins Point HWL site are generally lower, however, than those measured in off-site wells immediately west (hydraulically upgradient) of the site. Figures 6.2 through 6.5 therefore reinforce the overall interpretation of the regional ground-water quality, namely:

- shallow ground water in the upgradient areas west of the Hawkins Point HWL is of poorer quality, generally, than that of the regional near-surface aquifer, and
- the water quality appears to be degraded prior to its movement onto the Hawkins Point HWL site.
- as a result of these external factors, the on-site water quality in the near-surface aquifer at the Hawkins Point HWL may have been further degraded.

6.3.4 Investigatory Wells

Samples for water-quality analyses were obtained from selected 2-inch diameter wells installed in the upper portion of the near-surface aquifer at the Hawkins Point HWL site in accordance with the sampling procedures outlined in Appendix Q. Laboratory analyses were performed by Measurement Sciences Corporation (MSC) in accordance with the procedures outlined in Appendix R. Results of the 2 sampling events are presented in Appendix S; Table 6.5 presents a summary of the maximum levels of contaminant concentration which exceed the respective EPA Primary or Secondary Drinking Water Standards. Absence of a value indicates compliance with criteria. As noted for the BFI and SCM data, elevated concentrations of iron, sulfate, manganese and sodium occur.

Recommendations regarding additional water-quality investigations are presented in Section 6.4.

6.4 SUPPLEMENTAL GROUND-WATER QUALITY ASSESSMENT

The following items will be considered in order to further evaluate the water quality beneath the site, provide additional background data, and assess the impact of the site on ground-water quality.

Table 6.5: Summary of Maximum Elevated Levels of Contaminants

2-inch Diameter Wells[1]

Well No.	As (mg/l)	Ba (mg/l)	Cd (mg/l)	Cr (mg/l)	F (mg/l)	Pb (mg/l)	Se (mg/l)	Ag (mg/l)	Cr^{+6} (mg/l)	Cl (mg/l)	Fe (mg/l)	Mn (mg/l)	Na (mg/l)	SO_4 (mg/l)	pH (units)	Gross Alpha (pCi/l)
WCC D-1										3100	47	0.5	1600			15±10
WCC 2-1		15								460	500	12	66	1,900	4.6	
WCC W-1	0.18	1.4	0.036	8.0	37	0.46	0.023			300	230,000	760	220	110,000	3.7	
WCC W-2						0.11				1000	18	1.8	800	1,300	8.0	18±10
WCC W-3	0.06			0.09						1500	4,300	130	800	10,000	6.3	22±10
HB-16											28	0.56	48			
HB-81	0.13			0.12		0.06					1.4		520	450	11.7	33±10
HB-82	0.44		0.011	80		0.084	0.038		100		42	1,000	3000	750	12.5	
STANDARD/ CRITERION	0.05	1.0	0.01	0.05	1.4-2.4	0.05	0.05			250	0.3	0.05	20	250	6.5/8.5	

1. Absence of a value indicates compliance with criteria

1. Conduct geophysical surveys (electromagnetic) to assess relative water quality, especially upgradient and deeper in the aquifer. Current water-quality data in W-series wells indicates elevated levels of contaminants possibly from upgradient sources.

2. Install three to five 2-inch diameter piezometers (monitoring wells) on the BFI and SCM sites near the Chessie System railroad to obtain water-quality samples and establish groundwater levels.

3. Regarding activities at off-site wells:
   a) Obtain piezometric levels from wells on the BFI, City of Baltimore, and SCM sites at the same time as those measured on the Hawkins Point HWL property.

   b) Perform analyses on water quality samples taken at the same time from on-site and selected off-site wells.

   c) Maintain all off-site monitoring wells at least until an acceptable background water quality baseline has been established.

4. Use the existing on-site production well as a water quality sampling point.

5. Maintain all 2-inch on-site wells outside the development area as monitoring wells and install protective casings and caps.

The following results could be developed from this program:

1. Refinement, as appropriate, of the ground-water contours across property lines of adjacent sites by obtaining water quality and level sampling data pursuant to the above work.

2. Assessment of potential contaminant plumes occurring upgradient, and extending onto the Hawkins Point HWL site with water quality data pursuant to the above work.

3. Development of reliable isoconcentration maps of contaminants, as appropriate, from data obtained during a common sampling event.

4. Establishment of background, upgradient water quality.

7.0 FACILITY DESIGN AND DEVELOPMENT

7.1 GENERAL

Area 3 of the Hawkins Point Hazardous Waste Landfill has been designed, and will be constructed to meet or exceed the requirements of the recently enacted RCRA regulations (40 CFR 264). During July 1983, the Maryland Environmental Service began screening prospective users and is accepting general hazardous wastes. The total waste volume delivered to Area 3 is expected to average approximately 40,000 tons per year.

The Area 3 facility will consist of 10 cells constructed in numerical order, designated Cell Nos. 40 through 49. The existing permitted facility in Area 3 consists of Cell No. 40; Cell Nos. 41 through 49 will comprise a lateral and vertical expansion of the area development. This facility overlies a previously operating chrome ore tailings disposal site. Earthen berms approximately 10 feet in height will be constructed from materials stockpiled on-site, or borrowed from off-site to form the perimeter berm of each cell. The complete bottom and inside slopes of the base cells (Nos. 40, 41 and 42) will be lined with a composite liner consisting of 2 feet of compacted clay forming a base for a 80-mil thick high density polyethylene (HDPE) synthetic membrane. This liner system will directly overlie a relatively impervious in-situ soil cover over the underlying chrome ore tailings. The synthetic membrane and clay base are designed to prevent the potential movement of contaminants from the cell and prevent ground-water contamination. The inside slopes of subsequent upper cells (Nos. 43 through 49) will be lined with a clay and a 40-mil thick HDPE liner system.

A leachate collection system will be installed above the synthetic membrane lining in each of the base cells. This system will be connected to the existing Area 3 leachate collection system. A layer of coarse sand/fine gravel will be placed over the synthetic membrane liner to effectively drain leachate into the leachate collection system.

calculations

A system of open conveyance ditches and culverts will be employed to convey run-on and runoff surface-water flows around the facility to Thoms Cove. These facilities have been designed to pass the 100-year, 24-hour recurrance interval storm event. All open channels are designed to safely convey storm flows with a minimum of 2 feet of freeboard.

On-site roadways will consist of a paved dual-lane, 2-directional entrance road, dual-lane, 2-directional primary access roads, and single-lane, 1-directional haul roads. The haul roads will be temporary facilities leading to the operational cells. In addition, a single-lane, 2-directional secondary access road will be constructed at closure for emergency access/egress. The entrance road will be constructed of bituminous concrete, all other on-site roads will be dense-graded aggregate.

Ancillary facilities at the Hawkins Point Hazardous Waste Landfill include a scale plaza, truck-wash pads, a leachate collection, storage and transfer area, a facility control compound and service utilities.

The following sections describe in detail each of the elements of the existing and proposed Area 3 site development.

7.2 PHASED CELL DEVELOPMENT

The development of the Area 3 expansion consists of 10 cells, designated Cell Nos. 40 through 49, as indicated on Drawing Nos. PD-3A-3 through

PD-3A-14 of the "Part B Permit Facility Design" documents. Cross-sections through these cells are depicted on Drawing Nos. PD-3A-16 and 17. The 10 cells will be filled in numerical order, 1 cell at a time. As each cell is being filled, construction of the subsequent cell will be accomplished before the capacity of the operational cell is reached. This procedure will permit continual operation and acceptance of waste throughout the facility's active life, with no delays due to construction or cell preparation.

The projected in-place volumes of waste disposed in each cell are presented in Table 7.1. The projected density of the in-place waste, based on the types of waste anticipated at this time, is 1.15 tons per cubic yard (t/cy), equal to 85 pounds per cubic foot.

Table 7.1: Projected Cell Volumes

Cell Number	Waste Volume (cu. yd.)
40	36,000
41	7,400
42	27,250
43	32,750
44	21,750
45	10,900
46	10,400
47	6,500
48	5,300
49	7,700
Total	165,950

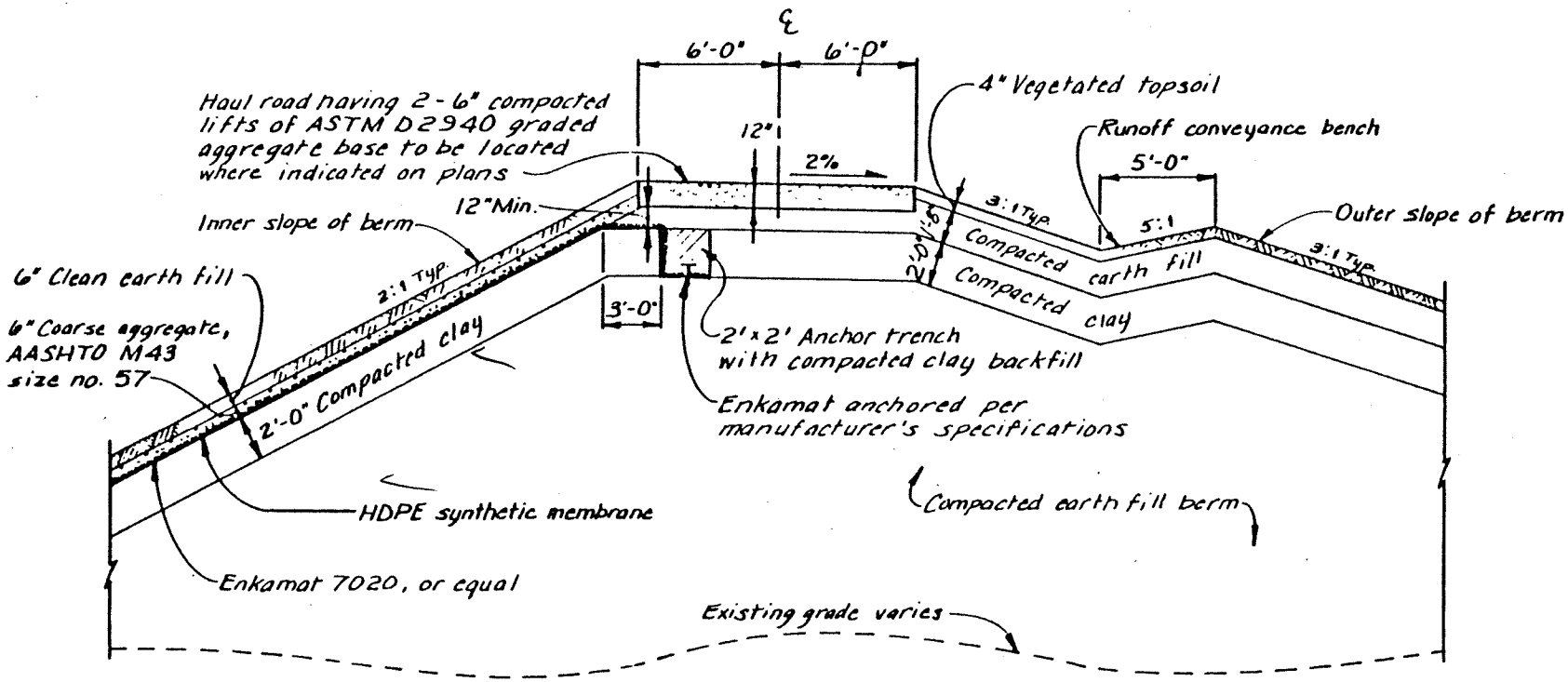
7.3 EARTHEN BERM CONSTRUCTION

Each cell of the Area 3 facility will be enclosed by earthen containment berms. Each berm will be approximately 10 feet in height and consist

of compacted soil fill materials. The outside slope of each berm will be constructed at a slope of three-horizontal to one-vertical (3:1) while the inner slopes will be 2:1. This configuration will maximize the contained waste volume of each cell, while maintaining slope stability (see Section 5.3.1). The inside slope of each cell will also have a composite clay and synthetic membrane liner system, as discussed in Section 7.4. A typical cross-section of the earthen berms is presented on Figure 7.1.

The soil proposed for use in berm construction will contain no large rocks, brush, stumps, logs, roots or other deleterious materials. It will be placed in thin horizontal lifts and compacted to 90 percent of the maximum dry density obtainable, in accordance with ASTM D-1557 (Method D) test procedures. During construction of the berms, field testing of the fills for in-place density will be performed by an independent geotechnical testing laboratory. Prior to placement of the fill, the proposed soil materials will be tested for classification and correlation purposes, and to determine material properties. These tests will determine in-situ moisture content, moisture-density relationships, and the particle-size distribution of the fill materials.

The inner slope of the berm will incorporate a 2-foot thick layer of compacted clay with a in-place hydraulic conductivity not exceeding 1.0×10^{-7} cm/sec. This layer will provide a sound foundation for the overlying synthetic membrane as well as serve as a secondary liner to prevent the migration of leachate. A high density polyethylene (HDPE) synthetic membrane will be placed over the clay layer to serve as the primary liner along the side slopes. To protect the synthetic membrane, the inside slope will be blanketed with a 12-inch thick protective bedding consisting



NOT TO SCALE

TYPICAL EARTH FILL BERM

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Hawkins Point Hazardous Waste Landfill

figure
7.1

of 6 inches of coarse aggregate and 6 inches of soil fill. The 6-inch aggregate layer will also serve as a drainage layer to convey leachate vertically along the side slope. An Enkamat soil stabilization matting will be placed directly on top of the synthetic membrane to hold the 12 inches of bedding in place.

With the exception of Cell Nos. 40 through 42, the outer slope of the berms will be covered with a 2-foot thick layer of compacted clay as the berm is constructed. This clay layer will serve as a protective cap, minimizing infiltration during operations, and functioning as part of the final cap of the entire Area 3 landfill at closure.

A 12-foot wide haul road will be constructed and maintained at the top of each berm. This haul road will consist of 12 inches of stabilized gravel to prevent rutting and erosion; maintenance of the haul roads during operations will assure that the facility is operational during inclement weather.

7.4 LINER SYSTEM

7.4.1 General

To protect the subsurface soils, ground- and surface-waters from any migration of waste and/or leachate from the Area 3 facility, a composite liner, as discussed previously, will be installed over the bottom of Cell Nos. 40, 41 and 42, and along the side slopes of each cell. This bottom liner system will consist of the following materials constructed on the existing prepared subgrade: 2 feet of compacted clay with an in-place hydraulic conductivity of less than 1.0×10^{-7} cm/sec, a high density polyethylene (HDPE) synthetic membrane, 1-foot thick drainage layer, and

a 1-foot thick protective blanket. The side-slopes of the base cells (Nos. 40, 41 and 42) will consist of a similar liner system with the exception that the drainage layer and protective blanket will be prepared in Cell No. 40 with 2 feet of clean earth fill materials, and Cell Nos. 41 and 42 with a 6-inch thick, clean earth fill blanket overlying a 6-inch thick drainage layer, as discussed previously. The side-slopes of Cell Nos. 43 through 49 will be provided with a similar liner system as the base cell slopes except that the HDPE membrane thickness will be 40 mil; this membrane, while not required, will inhibit the lateral migration of leachate. Typical liner details are presented on Figures 7.2 and 7.3.

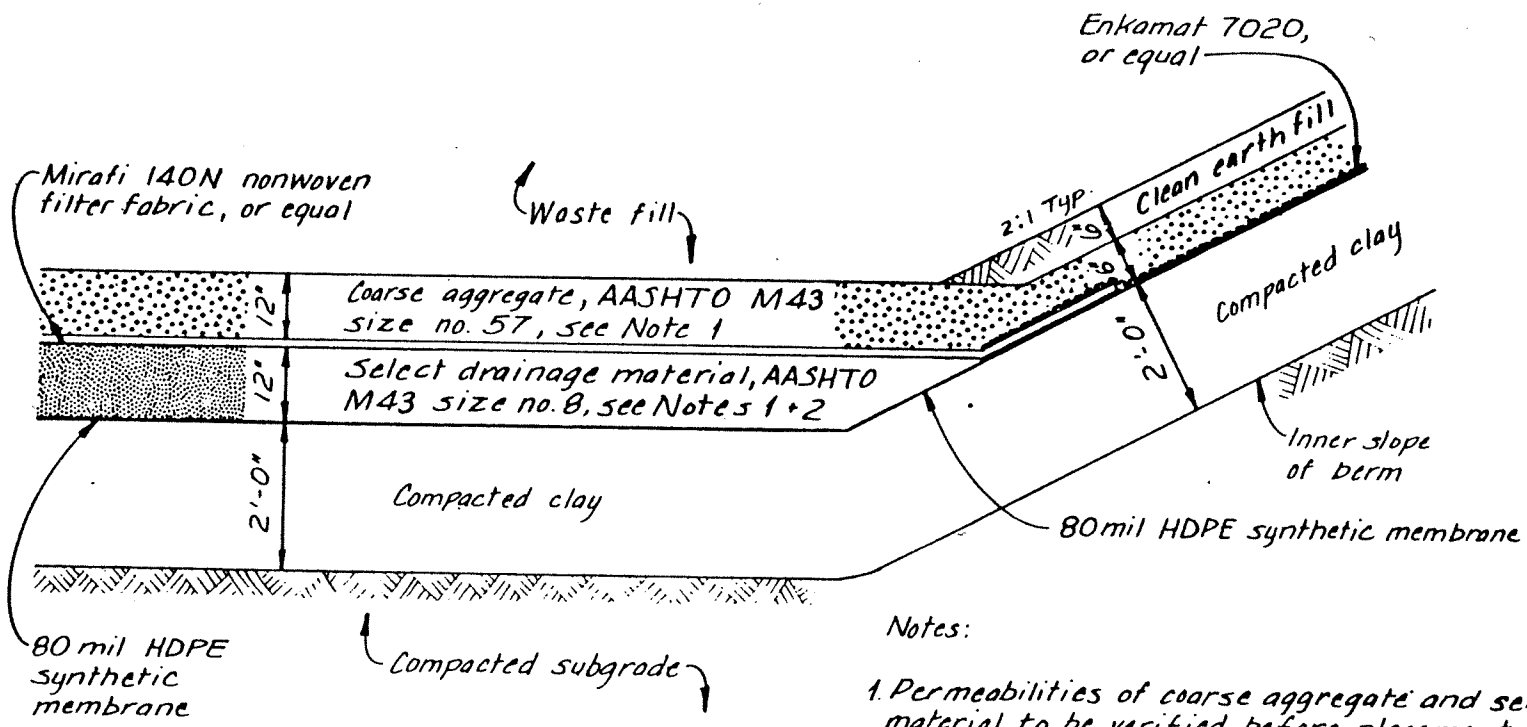
To insure that the components of the liner system will meet the performance goal of preventing wastes and/or leachate from passing through the liner during the life of the facility, the liner system was evaluated for the following:

- Liner foundation.
- Liner strength.
- Chemical characteristics and compatibility.

Information addressing these topics is presented in the following sections.

7.4.2 Liner Foundation

Geotechnical analyses of the subsurface conditions underlying Area 3 are discussed in detail in Section 5.0 of this report. Generally, the area is underlain by sands, stiff clays, and artifical fills. Beneath the fills and chrome ore tailings, alluvial sediments are typical. Based on the soil profiles apparent in Area 3, total settlements of 1 to 4 feet are



Notes:

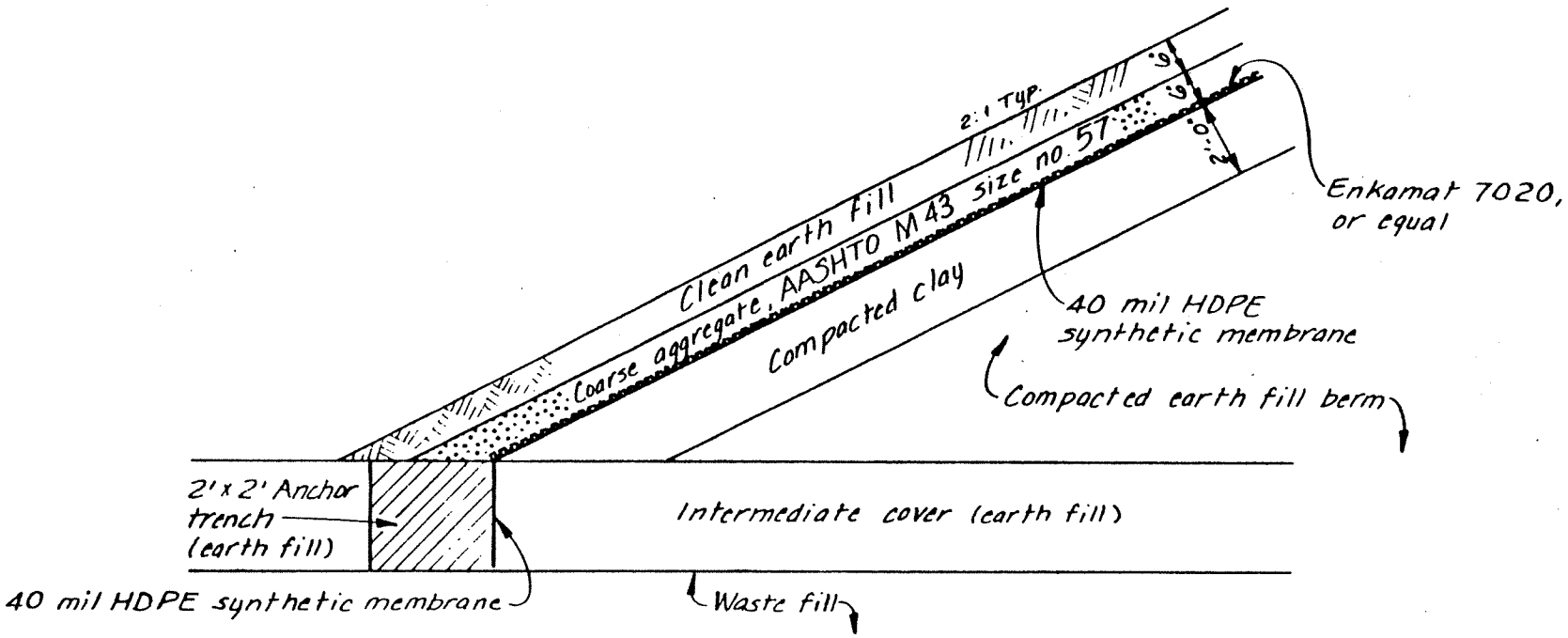
1. Permeabilities of coarse aggregate and select drainage material to be verified before placement.

2. Select drainage material to be clean aggregate having a permeability of $k \geq 1 \times 10^{-2}$ cm/sec.

NOT TO SCALE

TYPICAL LINER (CELL NOS. 40 - 42)

Black & Veatch Engineers - Architects	**Hawkins Point Hazardous Waste Landfill**	figure 7.2



NOT TO SCALE

TYPICAL LINER (CELL NOS. 43 - 49)

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 7.3

estimated. Differential settlements, however, are expected to be negligible and will not affect the integrity of the composite clay and synthetic membrane liner.

Construction and placement of the liner system will proceed as follows:

1. The subgrade will be cleared and grubbed of any vegetation.
2. The subbase of the cells will be graded to the design contours (see the "Part B Permit Facility Design" documents).
3. The subbase will be proof rolled to identify any locally weak foundation areas.
4. The subbase will be compacted and bonded with the first lift of the clay base layer.

The clay base layer will serve as a secondary liner to the synthetic membrane above, and will provide a sound foundation for the placement of the synthetic membrane. Clay materials will be placed in horizontal lifts not to exceed 8 inches in uncompacted thickness, and will be compacted to a minimum density of 90 percent of the maximum dry density obtainable. In-place clays will be field tested to demonstrate a hydraulic conductivity (permeability) of less than 1.0×10^{-7} cm/sec. A procedure for in-place permeability testing of the clay base is included in Appendix T. The synthetic membrane will then be placed over the clay base layer. Quality control measures and installation specifications for the synthetic membrane are presented in Appendix U.

7.4.3 Liner Strength

The synthetic membrane, as the primary liner, must be sufficiently strong to withstand the stresses caused by installation, hydrostatic

pressure, strength losses due to temperature variations, foundation settlement, and construction and operational loadings. HDPE is semi-flexible, extremely tough and offers excellent puncture resistance. HDPE exhibits generally higher physical strength characteristics than other materials, and retains these strength characteristics longer. In addition, HDPE is less susceptible to degradation from exposure to ultraviolet light than other materials. The material specified will be similar to "Gundleline HD" manufactured by Gundle Lining Systems Inc., Houston, Texas. A material specification sheet for this material is presented on Table 7.2. Previous experience with the 80-mil thick synthetic membrane installed in Cell No. 5 in Area 5, and Cell No. 40 in Area 3, has demonstrated that this membrane can withstand installation stresses. Similarly, no unexpected problems are anticipated installing the 40-mil thick membrane along the side slopes.

Bottom heave and blow-out of a liner is caused by hydrostatic and/or gas pressures acting on the liner. Gas pressures from previously disposed wastes is not considered a potential problem since the chrome ore tailings disposed are inorganic and gas formulation is not expected.

HDPE is resistant to changes in strength caused by temperature variations. During installation, the membrane can reach temperatures of more than 160° fahrenheit (F). Low temperatures will cause some lining materials to become brittle. Manufacturer's testing in accordance with ASTM D-746 Procedure D, Brittleness Temperature of Plastics and Elastomers by Impact, indicates that the HDPE membrane can tolerate low temperatures to -40°F.

Clay layers can crack due to alternating freeze/thaw cycles if not protected from adverse cold temperatures. The clay base layer will be blanketed by a minimum thickness of 2 feet of soil prior to operation of

Area 3 attachment Table 7.2

Table 7.2: HDPE Minimum Material Specifications

80 mil

Property	Test Method	Gauge (Nominal) 40 mil	100 mil
Thickness (minimum)	ASTM D-1593 Part 8.1.3	-10%	-10%
Specific Gravity (minimum)	ASTM D-792 (Method A)	0.93	0.93
Minimum tensile properties (each direction)	ASTM D-638 (Type IV Dumb-bell at 2 ipm.)		
1. Tensile strength at break (pounds/inch-width)		140	335
2. Tensile strength at yield (pounds/inch-width)		60	150
3. Elongation at break (per cent)		500	500
4. Elongation at yield (per cent)		10	10
5. Modulus of elasticity (pounds/square inch)	ASTM D-882	80,000	80,000
Tear resistance (Pounds minimum)	ASTM D-1004 (Die C)	20	50
Low temperature	ASTM D-746 (Procedure B)	-40°F	-40°F
Dimensional stability (each direction, per cent change maximum)	ASTM D-1204 212°F 15 min.	±2	±2
Volatile loss (maximum)	ASTM D-1203 (Method A)	0.1	0.1
Resistance to soil burial (per cent change maximum in original value)	ASTM D-3083 (using ASTM D-0638 Type IV Dumb-bell at 2 ipm).		
1. Tensile strength at break and yield		±10	±10
2. Elongation at break and yield		±10	±10

Table 7.2: HDPE Minimum Material Specifications (Continued)

Property	Test Method	Gauge (Nominal) 40 mil	100 mil
3. Modulus of Elasticity		±10	±10
Ozone resistance	ASTM D-1149 (7 days 100 pphm, 104°F)	No cracks	No cracks
Environmental stress crack (minimum hours)	ASTM D-1693	500	500
Puncture resistance (pounds)	FIMS 101B (Method 2031)	175	440

I-1e(8)

the base cells. Since the maximum seasonal depth of frost in the Baltimore area is 30 inches, freeze/thaw cycling should not occur in the clay base layer. Similarly, the clay base materials will be continuously moisture-conditioned during installation of the overlying liner system to guard against moisture evaporation (heat drying) of the material, and the resultant cracking.

Differential settlement of the liner foundation can cause stresses on the liner system. As discussed in Section 5.3.2: Settlement Analyses, differential settlements in Area 3 may be as great as 2 feet per 100-foot span. If this develops, the synthetic membrane will elongate 0.02 percent. 2% According to the manufacturers test data, a HDPE membrane liner can elongate up to 10 percent before reaching the yield point and 500 percent before breaking. Therefore, a differential settlement of this order-of-magnitude will not adversely effect the integrity of the liner.

D6c(8)

The HDPE membrane will be placed on a layer of compacted clay material 2-feet thick. This material will be free of large rocks, stones, stumps, logs, roots and other deleterious material which could damage the synthethic membrane. Above the HDPE membrane, 2 feet of material will be placed to act as a drainage layer and to protect the membrane from construction and/or operational traffic. The clay layer will also serve as a sound foundation to prevent differential loadings on the membrane from construction vehicles.

D-6c(8)

7.4.4 Chemical Characteristics Compatibility

As stated above, the composite liner system underlying the Area 3 facility consists of a HDPE synthetic membrane placed over a 2-foot thick layer of compacted clay. Each of these 2 components of the liner system

will have a different chemical resistance to substances placed into contact with it. A 1-foot thick aggregate drainage layer and a 1-foot thick protective aggregate layer, placed over the synthetic membrane, will prevent waste from being placed directly in contact with the HDPE. Only leachate percolating through the drainage layer will contact the membrane.

The synthetic membrane is manufactured from a high density polyethylene resin which is chemically resistant to many chemical compounds. HDPE is primarily inert and provides good chemical and long-term weather resistance, and is superior in these respects to other currently available synthetic materials.

Certain chemicals can, however, affect the polyethylene in varying degrees. Manufacturer's immersion testing of a "Gundleline HD" membrane, by Gundle Lining Systems Inc., revealed the following chemical resistance, at 77°F, to these designated chemical groupings:

- Inorganic acids. Typically no effect, highly concentrated chromic and sulphuric acids can affect liner integrity.
- Inorganic bases. No effect.
- Organic acids. No effect.
- Alcohols. No effect.
- Aldehydes. No effect.
- Amines. No effect.
- Esters. No effect.
- Ketones. No effect.
- Detergents. No effect.
- Oils. No effect.
- Ethers. Moderate effect.

- Hydrocarbons. Moderate effect.
- Halogenated Hydrocarbons. Severe effect, these materials will chemically attack the synthetic membrane.

P13 D-6c(6)(b)

A complete listing of chemical resistance data is provided in Appendix V. In summary, only the following chemicals appear to have an adverse effect on the membrane material: chromic and sulphuric acids, hydrocarbons, halogenated hydrocarbons and ethers. Area 3 of the Hawkins Point HWL will not receive these wastes in concentrated amounts. All waste placed in Area 3 will be received in a nonliquid state. Liquids will only be produced as precipitation percolates through the waste, producing leachate. Therefore, highly concentrated amounts of the chemicals having a negative effect on the membrane will not be produced.

P12 D-6(5)

Information and data on leachate characteristics will be collected during the operation of the existing Cell No. 40. Immersion testing of the synthetic membrane and leachates generated ~~may~~ will be performed to ensure chemical compatibility. Procedures for the testing will follow ASTM D-543, "Standard Test Method for Resistance of Plastics to Chemical Reagents." Samples will be placed in the leachate solution at 23° centigrade (C) and 50°C and removed at 30, 60 and 90-day intervals. Physical property testing will be performed to determine changes in tensile and elongation strengths, weights and dimensions. Welds will also be evaluated for changes in peel and shear strength.

The clay base layer is protected by the synthetic membrane. In the rare event that the synthetic membrane were to fail, leachate could come in direct contact with the underlying clay. However, as mentioned previously,

all materials placed in the Area 3 landfill will be nonliquids. No volatile organic solvents will be placed in the landfill minimizing the potential adverse effects on the clay base. Testing of leachate collected in Cell No. 40 may be conducted to insure the integrity of the clay base.

7.5 LEACHATE COLLECTION SYSTEM

7.5.1 General

D.60 (2)

A properly designed leachate collection system will provide an effective method to collect and remove leachate from the bottom of the cells and minimize any potential impact on public health and the environment. A leachate collection system will be installed in the base cells (Nos. 40, 41, and 42) of the Area 3 facility. Precipitation on the exposed active cells will be directed into the leachate collection system; precipitation on the covered and stabilized cells; i.e., uncontaminated surface runoff, will be diverted to the surface drainage system. Leachate collected from the base of the landfill will be conveyed by gravity through the collection piping to a leachate collection sump. From the sump, the leachate will be pumped into a 30,000 gallon leachate storage tank, for removal every 90 days. The leachate will be transported off-site to a treatment facility.

The leachate collection system in exisiting Cell No. 40 was installed in June 1983. This leachate collection piping consists of 6-inch diameter, schedule 80, perforated PVC pipe surrounded by a select drainage material wrapped with filter fabric. Complete details of this collection system are provided on Sheet 3 of 15 of the "Contract 3: CHS Landfill Expansion" drawings prepared by Harrington, Lacey & Associates.

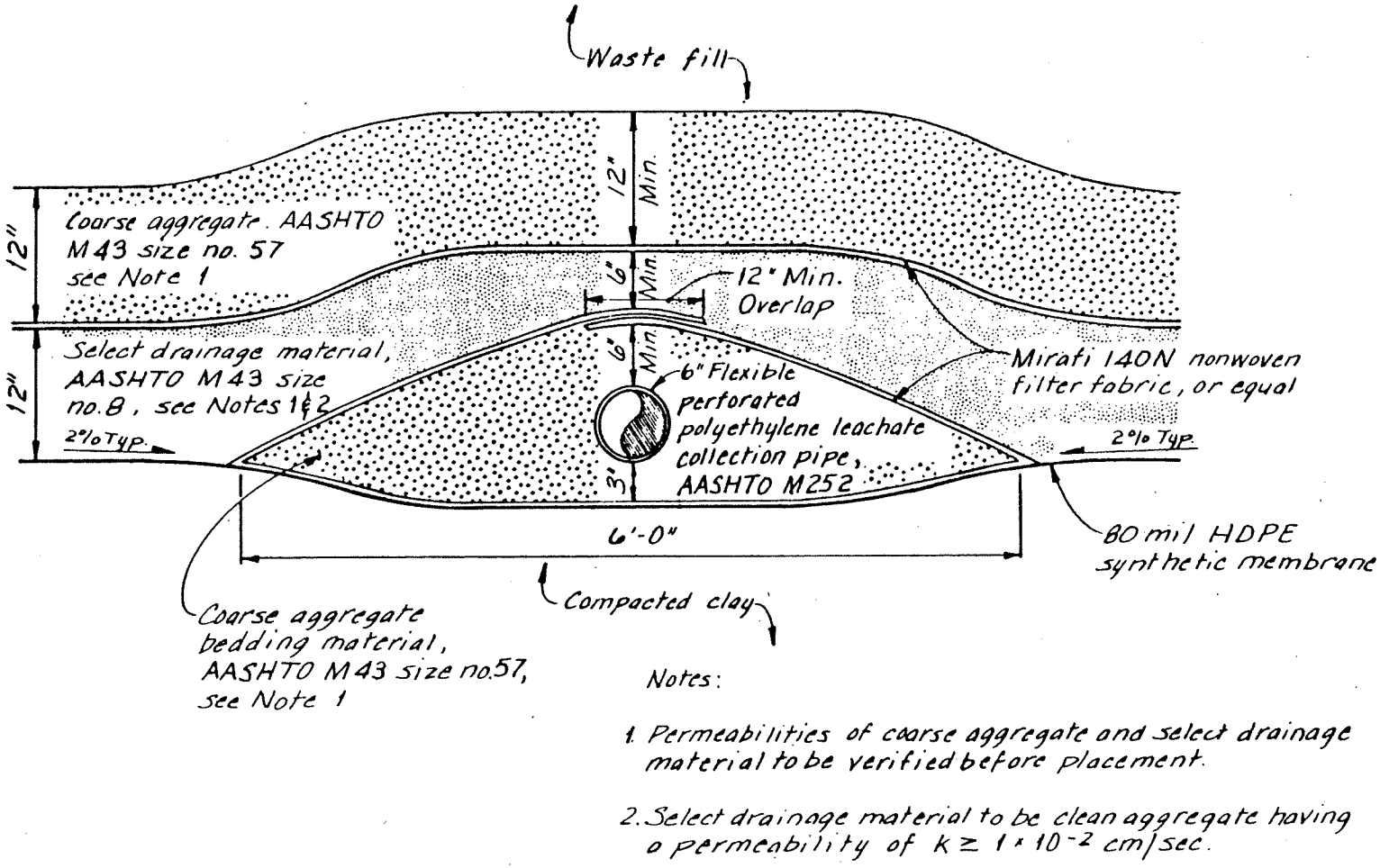
A single leachate collection lateral, consisting of 6-inch diameter perforated, heavy duty corrugated polyethylene pipe will be placed in the center of Cell Nos. 41 and 42 to collect leachate and convey it to the existing leachate collection system. This system is depicted on Drawing Nos. PD-3A-3 and 4 of the "Part B Permit Facility Design" documents. The 6-inch diameter collection header will be heavy duty, non-perforated corrugated polyethylene pipe. Details of the leachate collection trench are depicted on Figure 7.4.

7.5.2 Maximum Head of Leachate

To reduce the hydrostatic pressure head of leachate on the liner system, the leachate collection system is designed to maintain the depth of leachate on the HDPE membrane below 1 foot. The proposed leachate collection systems located in Cell Nos. 41 and 42 were evaluated to ensure that they will meet this requirement.

EPA publication SW-869, "Landfill and Surface Impoundment Performance Evaluation, April 1983," was used as an aid in determining the anticipated head of leachate. Pertinent characteristics include the drainage layer, which will consist of a clean, coarse sand/fine gravel with an average hydraulic conductivity (permeability) of 1.0×10^{-2} cm/sec (3.94×10^{-3} in/sec) and a porosity of 0.5. The liner will be sloped to the laterals at a minimum of 2 per cent. Additionally, the annual rainfall of 41.2 inches is assumed to be equally distributed throughout the year.

For a liner system with transverse slopes, perpendicular to the leachate collection system laterals, the following equation is used to calculate the maximum head of leachate on the liner:



Notes:

1. Permeabilities of coarse aggregate and select drainage material to be verified before placement.

2. Select drainage material to be clean aggregate having a permeability of $k \geq 1 \times 10^{-2}$ cm/sec.

NOT TO SCALE

LEACHATE COLLECTION TRENCH

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 7.4

$$h_{max} = \frac{L}{2n}[(e/k_{si} + \tan^2 a)^{\frac{1}{2}} - \tan a]$$

$$\frac{34}{2 \times 0.5}\left[\left(\frac{1.3 \times 10^{-6}}{3.94 \times 10^{-3}} + \tan^2 1.15\right)^{0.5} - \tan 1.15\right]$$

$$\frac{110}{1.0}$$

where:

h_{max} = maximum head of leachate on the liner (feet).

L = distance between laterals. The equation is based on a series of parallel leachate collection laterals located in valleys in the floor of the cell, with ridge lines located parallel to and midway between the laterals. Therefore, the ridge line, or the maximum distance the leachate travels, is equal to one-half the distance between laterals. Since only 1 lateral is proposed for Cell No. 41 and for Cell No. 42, the maximum distance the leachate will travel is the distance from the inside toe of the berm to the lateral. For Cell Nos. 41 and 42, this distance is approximately 17 feet and 55 feet, respectively. Therefore, L for Cell No. 41 is 34 feet, and L for Cell No. 42 is 110 feet.

D-6e (2)

n = porosity ratio of the drainage layer (0.5).

e = average annual rainfall distributed over time (1.3×10^{-6} in/sec).

k_{si} = permeability of the drainage layer (3.94×10^{-3} in/sec).

a = liner slope angle (2 per cent or 1.15°) (2.)

Performing the analysis yields respective heights of h_{max} in Cell Nos. 41 and 42 of 0.25 feet and 0.77 feet. Therefore, the leachate collection system as designed will meet the requirement for maintaining less than 1 foot of head on the liner.

0.24

7.5.3 Drainage Layer

The drainage layer, as designed, will consist of 12-inches of select drainage materials, similar to American Association of State Highway and Transportation Officials (AASHTO) M43, size No. 8, with an average hydraulic conductivity of 1.0×10^{-2} cm/sec. To prevent clogging of this drainage layer, a non-woven filter fabric similar to Mirafi 140N will be installed above the drainage layer. This fabric will prevent fine particles from clogging the drainage media. To protect the filter fabric from possible equipment traffic and deterioration, a 12-inch layer of coarse aggregate, similar to AASHTO M43, size no. 57, will be placed over the filter fabric. (See Figure 7.4).

7.5.4 Leachate Collection Piping

7.5.4.1 General. To ensure that the leachate collection piping will operate effectively over the design life, material characteristics of the piping were analyzed. The pipe material must be sufficiently strong to withstand the static pressure of the overlying waste and dynamic pressures induced by operational equipment. It must be chemically resistant to leachate produced by the wastes and be designed to operate without clogging.

7.5.4.2 Pipe Strength. Corrugated polyethylene pipe has several properties that make it a suitable structural material for use in buried applications. Among the most important of these is the high strain modulus of the material, its stress-relaxation properties under constant strain, and the longitudinal flexibility of the pipe.

Buried conduits are designed to perform as load-bearing structures in combination with bedding and backfill materials. The relative stiffness of the pipe determines the extent to which the pipeline participates in supporting the applied load. As the load from the overlying waste is applied, the flexible ring of polyethylene pipe will deflect and the gravel envelope surrounding the pipe will predominate in supporting the load. With increasing load the gravel envelope will arch and will increasingly support the load.

A detailed analysis was performed to determine if the 6-inch diameter polyethylene pipe will support the loads to be applied by the overlying waste. EPA publication SW-870, "Lining of Waste Impoundment and Disposal Facilities, March 1983," was used as a guidance document. The Spangler Formula (Iowa Formula) was used to calculate deflection:

$$y = D_e \frac{KWr^3}{EI + 0.061\ E'r^3}$$

where:

y = horizontal and vertical deflection of the pipe (in).

D_e = a factor, generally a conservative value of 1.5, compensating for the lag of time-dependent behavior of the soil/pipe system (dimensionless).

W = vertical load acting on the pipe per unit of pipe length (lb/in). The maximum amount of fill above the leachate collection pipe is 65 ft; this occurs over a portion of Cell No. 42. Assuming a conservative value of 100 pcf, in-place density for the soil/waste mix will yield a load of 45 psi on the pipe. Therefore, a 6-inch diameter pipe will have a vertical loading of 270 pounds per lineal inch.

r = mean radius of the pipe (3-inches).

E = modulus of elasticity of the pipe materials (80,000 psi).

E' = modulus of passive soil resistance (700 psi for soils of Proctor density of at least 90 per cent).

K = bedding constant, reflecting the support the pipe receives from the bottom of the trench (dimensionless). A conservative value is generally utilized (0.10).

I = moment of inertia of the pipe wall per unit of length (1.3×10^{-6} in.^{4}/in.).

Solving the equation yields a deflection of 0.95 inches. This is equal to a reduction in diameter of 16 per cent (0.95/6) for a 6-inch pipe. Corrugated polyethylene pipe can tolerate a deflection of 40 to 60 per cent before any wall buckling will occur. A deflection of 16 per cent will, therefore, not significantly affect the performance of the leachate collection piping. It should be again noted that this is a conservative estimate of deflection; loadings will be less over other areas of the system, thereby producing less deflection.

The leachate collection system in existing Cell No. 40 consists of 6-inch diameter schedule 80 PVC pipe, and was designed based on an overburden pressure to be applied by Cell No. 40 only. However, since the overburden pressure will be increased with the expansion of Cell Nos. 43 through 49, the system was re-evaluated based on the new performance requirements. Following procedures outlined in EPA publication SW-870, the following parameters were assigned:

wv = maximum vertical pressure acting on the pipe. Based on a maximum height of fill, through the development of Cell No. 49, of 57 feet, the pressure on the pipe is 40 psi.

E' = 700 psi, as previously discussed for the polyethylene analysis.

Wy/B_c = pipe deflection ratio, ranging from approximately 0.05 to 0.10. 0.10 is considered appropriate for this analysis.

Entering Figure V-6, page 384 of EPA SW-870 with E' = 700 psi and (wv)/(Wy/Bc) = 40/0.10 = 400, it is apparent that a 6-inch diameter, schedule 80 PVC pipe is adequate in this application, and will not fail as a result of the increased overburden load.

To reduce the possibility of damage from construction and operational equipment, and to maintain the integrity of the leachate collection system, waste-hauling vehicles and equipment will not be permitted to travel across the completed liner. Incoming vehicles will be unloaded from a ramp, with only crawler-type equipment operating directly on the cell floor. The leachate collection pipes were also evaluated for load-carrying capacity under standard ASSHTO H-20 truck loadings. As mentioned previously, because the corrugated polyethylene is flexible, it will deflect and transfer the load to the gravel envelope. As depicted in Figure 7.4, the 6-inch diameter pipe will be buried under 2 feet of cover. This yields a depth of cover-to-pipe diameter ratio of 4.0. Based on manufacturer's data for H-20 loadings, and assuming a worst-case situation in which the cover material is loose and not well compacted, the loading will still yield negligible pipe deflection.

Finally, the pipe was analyzed for the effects of the settlement of the landfill base. The corrugated polyethylene pipe imparts a high degree of longitudinal flexibility which will eliminate stresses due to longitudinal bending. Settlements predicted in Area 3 will, therefore, not affect the structural stability of the pipe. The maximum total settlement predicted, 2 feet per 100-feet, will elongate the pipe approximately 0.02 percent. The AASHTO M252 standard requires heavy duty polyethylene piping to tolerate an elongation of 5 percent with no loss in pipe stiffness;

therefore, the pipe is capable of tolerating elongation greater than the expected 0.02 percent.

7.5.4.3 Chemical Resistance. To insure that the polyethylene piping will maintain its integrity over the design life, its resistance to chemical leachate was evaluated. Polyethylene is primarily inert, particularly stable and contains no plasticizers which, if dissolved, would change its characteristics. Polyethylene has the ability to withstand attack from a wide variety of chemicals and is also resistant to consequent weakening.

Certain chemicals can, however, affect polyethylene to varying degrees. Testing of the chemical resistance properties of polyethylene was accomplished by a manufacturer of polyethylene pipe, Advanced Drainage Systems, Inc., Columbus, Ohio. Tests were conducted using standard procedures outlined in ASTM D-543, "Standard Test Method of Resistance of Plastics to Chemical Reagents." The test results revealed that the following substances can affect the integrity of the material through absorption: hydrocarbons, chlorinated hydrocarbons and gasoline. The result of this absorption is softening, swelling and possibly weakening of the material. Nitric and sulphuric acids, chlorine gas, and liquid bromine chemically attack the polyethylene; damage in this case is permanent. It should be noted, however, that materials such as these will not be placed in the Area 3 cells. A complete list of chemical compatibilities for polyethylene is included in Appendix W.

Wastes disposed in the Area 3 cells will be non-liquids. Liquids will only be produced when precipitation percolates through the waste material, thereby generating leachate. Cell No. 40 will be utilized to monitor the

quality of leachate generated. However, based upon the available information pertaining to waste characteristics, no negative effect on the polyethylene piping is expected.

7.5.4.4 Clogging. To prevent clogging of the leachate collecting piping, a coarse aggregate bedding material will envelope the pipe. The bedding material will be entirely surrounded by a non-woven filter fabric (see Figure 7.4). This will effectively eliminate fine particles from entering the coarse aggregate and clogging the perforated pipe. The coarse aggregate surrounding the pipe will meet the requirements of AASHTO M43, size No. 57. The minimum particle size will be 4.75 milimeter (mm), and limited to 5 percent by weight of the material. Perforations of standard 6-inch diameter polyethylene piping are approximately 2.0 mm, therefore none of the coarse bedding should enter the pipe, and clogging should not occur.

In the unlikely event clogging does occur, and in order to allow for periodic inspection, the system has been designed to be accessible from a series of manholes. Manholes are provided outside of the cells in the main collection header at all bends and junctions, and at a spacing not greater than 400 feet. This will allow closed-circuit television monitoring of the condition of the pipe, cleaning, and, to a limited extent, physical repairs to be made to the collector without excavating. It will also enable leachate samples to be obtained at various locations in the collection system.

7.6 DRAINAGE CONTROL

7.6.1 General

The contributing drainage area to the Hawkins Point Hazardous Waste Landfill is approximately bounded by Quarantine Road to the north and east, Thoms Cove to the south and Maryland Route 695 to the east (see Figure 7.5). The drainage area is primarily composed of active and closed landfill facilities. Elevations of the drainage area range from sea level at Thoms Cove to approximately el. +90 feet at the northwestern corner of the area. In conducting the drainage studies, various regulatory agencies were consulted to obtain data relevant to the site; agencies which provided documentation on previous drainage studies included the City of Baltimore, Department of Public Works; the Maryland Toll Facilities; and the Soil Conservation Service (SCS) of the U.S. Department of Agriculture (USDA).

This section of the report is divided into two subsections. The first, Run-On Control, describes the analysis and presents the design for the control of stormwater runoff generated from off-site areas and flowing toward the Hawkins Point HWL. The second subsection, Runoff Control, describes the analysis and design of stormwater runoff generated on the site. Specific factors for construction include the effects of erosion, conveyance, safety, water quality, and operational constraints.

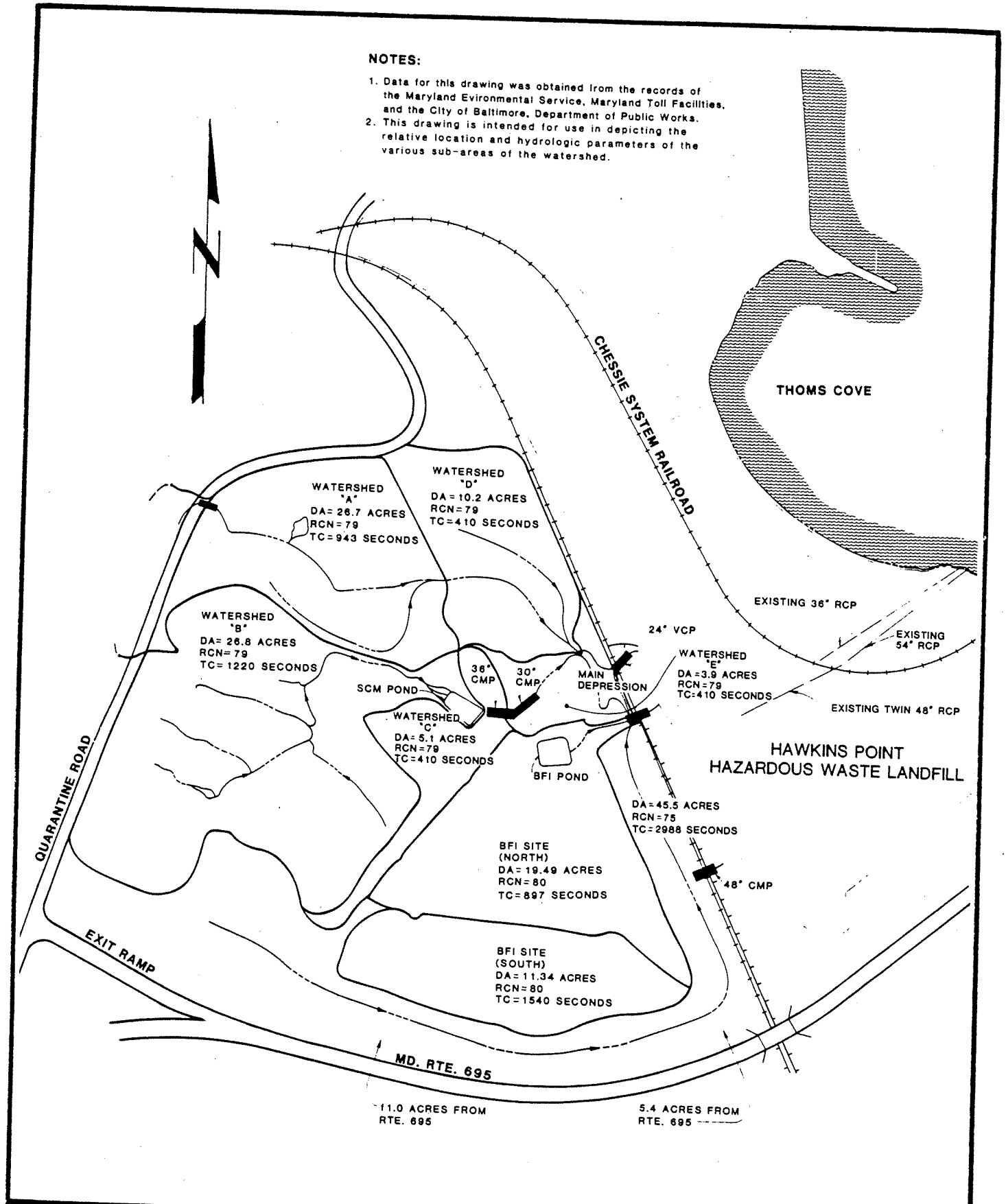
7.6.2 Run-On Control

The predominant volume of storm water runoff which affects this site originates in the area west of the Chessie System railroad near the western boundary of the site. Approximately 150 acres drain toward the railroad embankment and reach the site through 3 culverts under the railroad. Currently, this flow is conveyed by open channels to a system of underground

pipes under the site to an outfall in Thoms Cove. This system is composed of twin 48-inch diameter reinforced concrete pipes (RCP) at the upper end, through an older 54-inch diameter RCP, and finally to a 60-inch diameter RCP which outfalls at Thoms Cove.

The determination of peak rates of discharge and water-surface elevations for this off-site storm water runoff was based on the 25-year, 24-hour recurrence interval storm event for conveyance measures, with maximum water-surface elevations determined for the 100-year, 24-hour storm event. The procedures used to determine these peak rates of runoff are those contained in the SCS National Engineering Handbook, Section 4, Hydrology (NEH-4); SCS Technical Release 55, Urban Hydrology for Small Watersheds (TR-55); SCS Technical Release 20 Computer Program for Project Formulation-Hydrology (TR-20); and the Highway Drainage Manual of the Maryland Department of Transportation, State Highway Administration (SHA).

The hydrologic response of this watershed was determined through the use of the TR-20 computer program. Figure 7.5 indicates the parameters used in this analysis. Drainage areas were obtained from the existing records of the solicited agencies. The hydrologic soil group used for this analysis was selected with the assistance of the SCS District Conservationist for Baltimore County. It was determined that "made-land", soil deposited by man, most closely resembles hydrologic soil group C in runoff response. The Runoff Curve Numbers (RCN) used were obtained from TR-55, assuming an "open-space" land use and 50 to 75 per cent grass cover. This analysis yielded a RCN of 79 for the various landfill facilities. Whenever deviations from this assumption were noted, the RCN was adjusted accordingly. The times of concentation (TC) indicated were based on the recommendations of TR-55 for "Average Velocities for Estimating Travel Time for Overland Flow".



DRAINAGE AREA MAP

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Hawkins Point Hazardous Waste Landfill

figure 7.5

Technical Paper 40 (TP-40), as published by the U.S. Department of Commerce, Weather Bureau was used to determine the 25-year, 24-hour and 100-year, 24-hour rainfall for the Baltimore vicinity. This data is summarized and presented in a tabular format in the SCS Engineering Field Manual, Exhibit 2-3A. Precipitation runoff resulting from these events was determined by the TR-20 computer program with SCS Technical Release 16 (TR-16), Rainfall Runoff Tables for Selected Runoff Curve Number.

The TR-20 computer program has the capability of determining the runoff hydrograph from an area, routing this hydrograph through a stream reach, and adding hydrographs to produce the composite out flow hydrograph at the point of concern. In developing this outflow hydrograph, TR-20 also utilizes the effects of storage within a watershed formed by ponds or headwater pools of culvert crossings.

In this analysis, headwater pools at culvert crossings were determined from the Hydraulic Engineering Circular No. 5 (HEC-5) of the U.S. Department of Commerce, Hydraulic Charts for Selection of Highway Culverts, and from aerial photogrammetric surveys of the site. The results of this analysis indicated peak discharges to the site from off-site areas of 226 cubic feet per second (cfs) for the 25-year, 24-hour storm event and 308 cfs for the 100-year, 24-hour storm event.

The proposed system consists of open ditches and culverts to convey this flow around the site to outfall in Thoms Cove. This system has the advantages of separating the runoff generated on-site from the run-on flowing to the site from other installations. This allows for a much more efficient system of water quality monitoring by allowing the source of possible pollutants to be more easily identified.

The hydraulic design was conducted in accordance with the criteria contained in the Maryland SHA Design Manual. All open channels are designed to safely convey the maximum flow from a 100-year, 24-hour storm event with a minimum of 2 feet of freeboard. Culverts are designed in accordance with the Design Manual procedures and incorporate headwater pools at the culvert entrances. These headwater pools are also designed to allow a 2-foot minimum freeboard for the 100-year, 24-hour storm event. The high berms around the disposal cells preclude the possibility of any of this flow reaching the active waste cells in the event of the overtopping of the diversion system.

I-1e(5)

7.6.3 Runoff Control

The site is composed of both active disposal areas and future disposal areas. The operational plans of the facility are designed to separate the flows from the active area from those which are not contaminated. The non-contaminated flows are collected in perimeter and bench ditches and are routed to sedimentation control facilities.

The volume of surface flow in the on-site collection system was determined from the methodology recommended in TR-55 for a RCN of 79 and hydrologic soil group C. The times of concentration for the various points of design were computed from the overland flow velocities of TR-55. The design storm for these ditches is the 25-year, 24-hour storm event. The 25-year, 24-hour rainfall is 5.5 inches, as indicated in TP-40. This data was used to design the conveyance ditches for non-erosive velocities of less than 4.5 feet per second and a freeboard of 0.5 feet.

P65(1)

The capacities of the various conveyance ditches were determined for steady-state, uniform flow conditions for the peak discharge of the 25-year storm event. Whenever velocities exceeded those considered non-erosive, as listed in the Maryland SHA Drainage Manual, the ditches were lined with an appropriately sized rip-rap stone armor. Sheet flow runoff from the earthen berms of the cells is intercepted by runoff conveyance ditches along benches on the slopes wherever the vertical distance of travel equals 15 feet. These runoff conveyance ditches are designed to prevent sheet and rill erosion of the berms by intercepting this flow and safely conveying it to a stable outlet at non-erosive velocities. Wherever the length of the benches exceeds 800 feet, a rip-rap lined channel is provided to convey the runoff down the face of the slope. The runoff conveyance ditches and conveyance channels are designed in accordance with the Standards and Specifications for Soil Erosion and Sediment Control in Developing Areas prepared by the USDA, SCS.

D68(3) [ ]

7.6.4 Sedimentation and Erosion Control

Sedimentation and erosion control facilities for the site currently are comprised of perimeter and interior drainage ditches, drainage pipes and 2 sedimentation ponds. This system, designed by Harrington, Lacey & Associates, was constructed in 1982 to meet the requirements of the State of Maryland, Water Resources Administration and the Soil Conservation Service. The sedimentation ponds are designed to control the flow expected during a 10-year storm event; all ditches are designed for a 25-year storm event. The system is intended to be in service during all future expansions of the facility. Details of the sedimentation ponds are presented on

sheet 5 of 6 of the "Contract 1: Site 1 Surface Water Corrections" drawings prepared by Harrington, Lacey & Associates.

Sedimentation Pond No. 1 receives runoff from the northern portion of the Hawkins Point HWL facility, and discharges directly to Thoms Cove. Sedimentation Pond No. 2 receives runoff from the southern portion of the facility, including Area 3, and discharges to a low area draining to Thoms Cove.

Design data for the two ponds are presented in Table 7.3:

Table 7.3: Sedimentation Pond Design Data

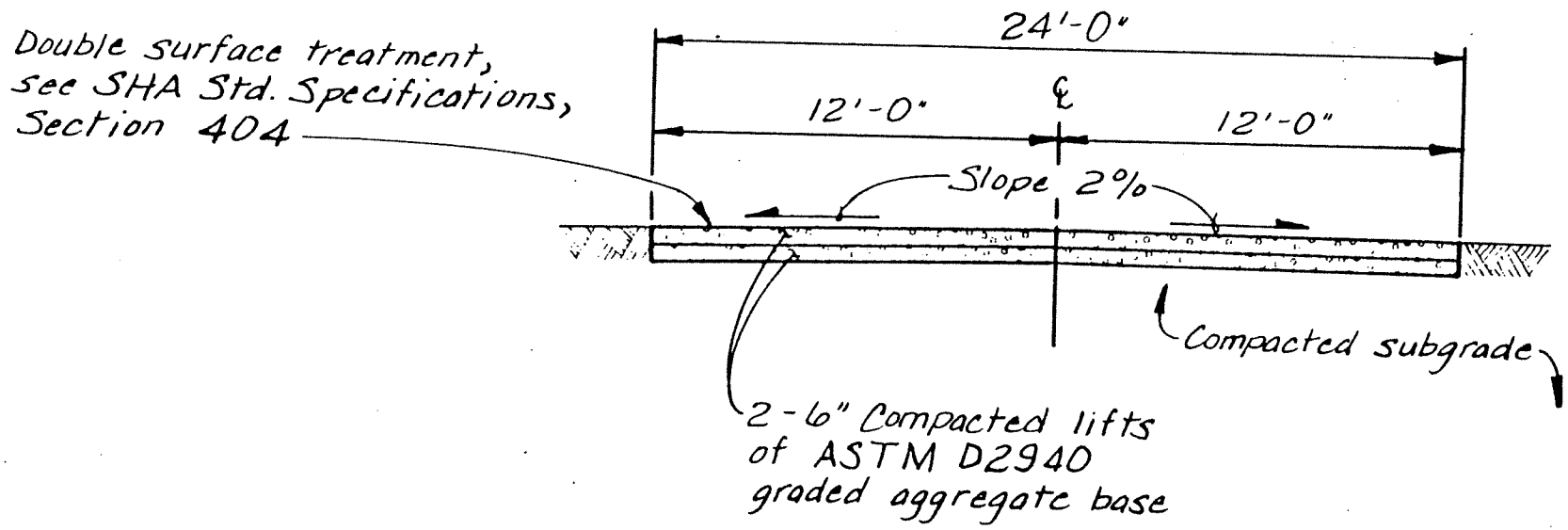
	POND NO. 1	POND NO. 2
Volume	2,400 cu yd	2,700 cu yd
Riser diameter	42 inches	42 inches
Outfall diameter	30 inches	30 inches
Discharge flow: 100-year storm	39.9 cfs	37.0 cfs
Discharge velocity: 100-year storm	8.1 fps	7.54 fps
Basin bottom el.	3.0 feet	4.0 feet
Clean out el.	4.0 feet	6.58 feet
Riser crest el.	4.4 feet	8.9 feet
Water elevations:		
2-year storm	6.10 feet	6.10 feet
10-year storm	6.25 feet	9.8 feet
100-year storm	6.6 feet	10.20 feet
Embankment el.	8.2 feet	13.2 feet

7.7 ON-SITE ROADS

All waste-hauling vehicles utilizing Area 3 will enter the facility from Quarantine Road onto a paved, 2-directional entrance road. After passing the scale plaza and adjacent parking area, vehicles will proceed onto a dual-lane, 2-directional primary access road which will serve as a transition from the entrance road to the 1-directional haul roads. A detail of the primary access road is presented on Figure 7.6. The primary access road is 24-feet wide, and consists of dense graded aggregate placed in 2 compacted 6-inch thick lifts.

A 12-foot wide haul road, consisting of similar materials as the primary access road, will be constructed in stages as individual cells in Area 3 are completed. Details of the haul road are presented on Figure 7.7. The haul road will be constructed at a 10 percent grade until the required berm elevation is reached. Access to individual cells will be provided by haul roads traversing the top of the cell berms. A 12-foot wide, 6-inch thick bituminous concrete, or crushed stone cell ramp will be constructed in each cell at a 15 per cent grade to access the cell floor. A moveable unloading platform will be positioned along the cell ramp corresponding to the elevation of the waste fill to facilitate vehicle unloading (see Figure 7.8).

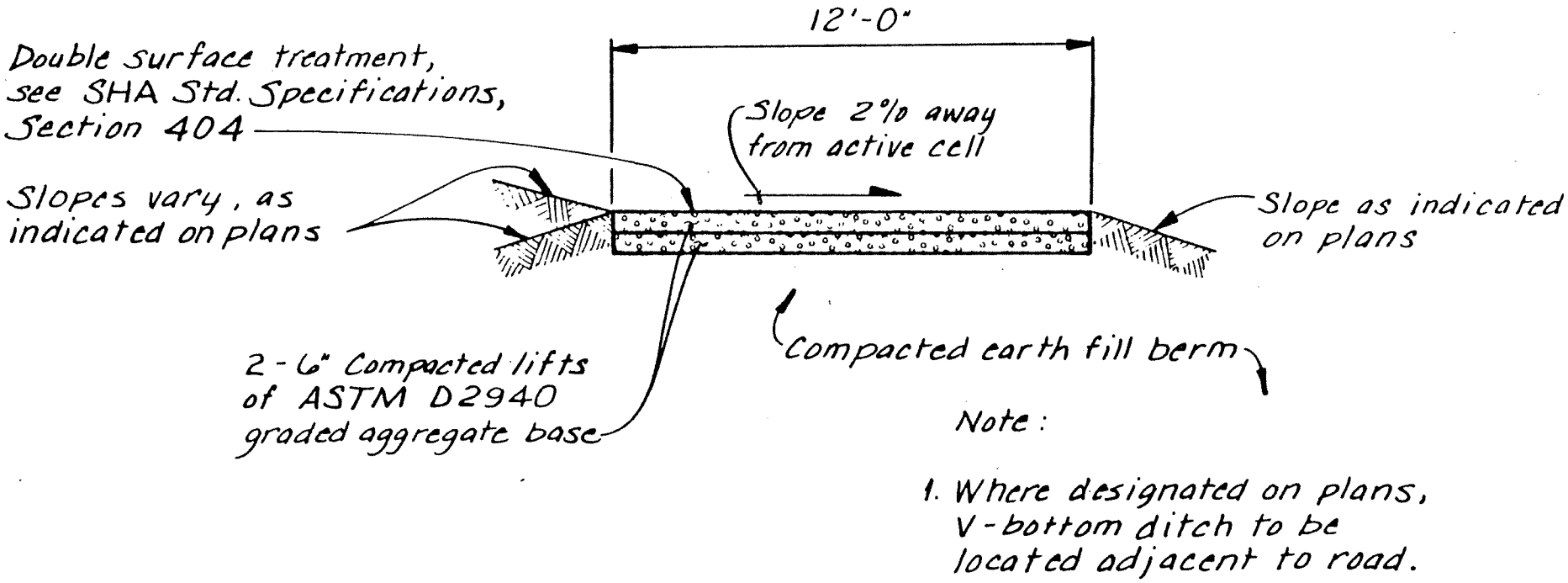
Following completion of the first cell, staged construction of the haul road entering Area 3 will continue, at a 10 per cent grade, until the required berm elevation for the second lift is reached. Interior haul roads located on the top of individual cell berms will be similar to those used for the preceding cells. Construction of the haul road for subsequent cells will continue until Area 3 is complete.



NOT TO SCALE

TYPICAL PRIMARY ACCESS ROAD

Black & Veatch Engineers-Architects	Hawkins Point Hazardous Waste Landfill	figure 7.6



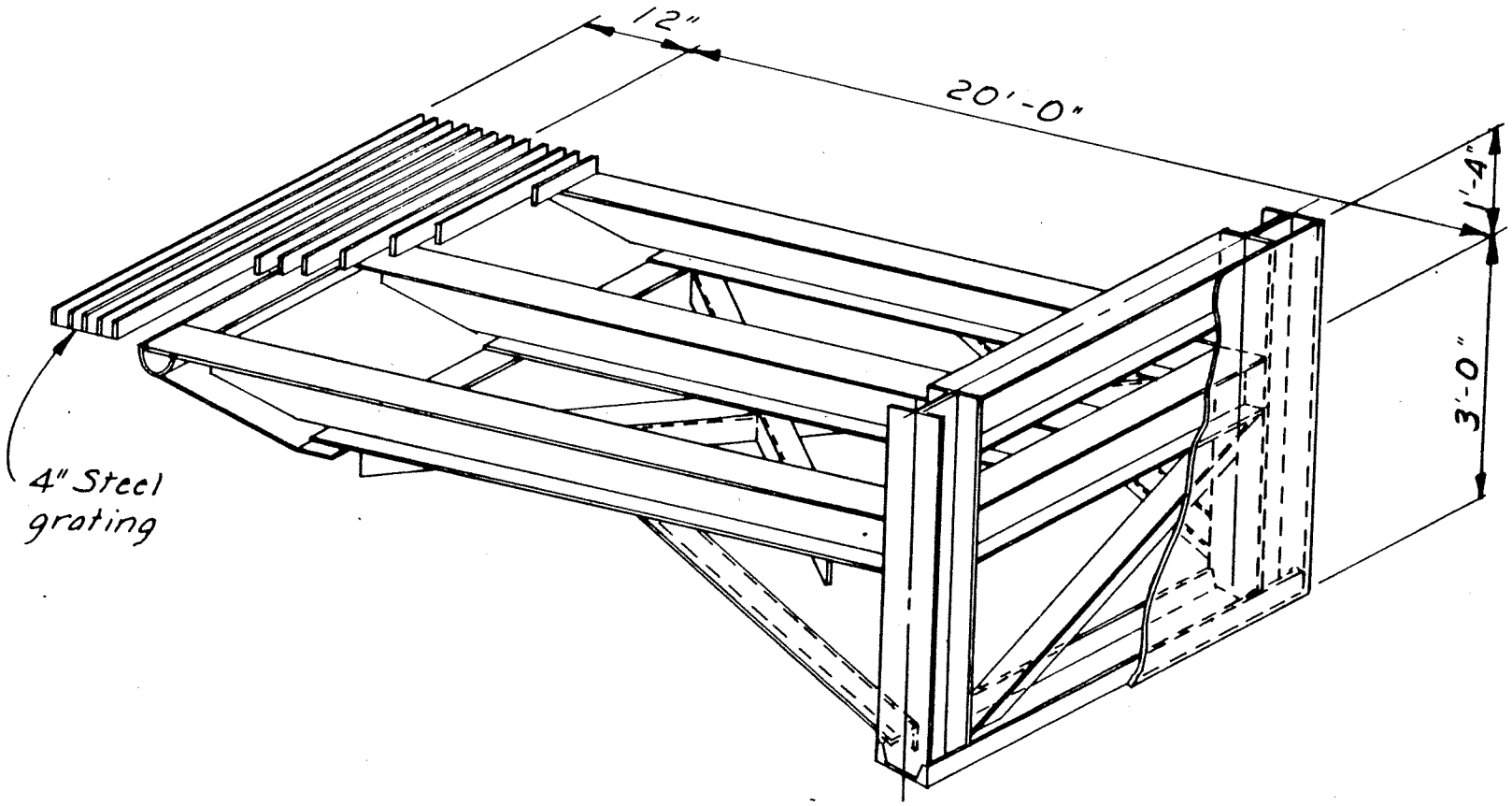
Note:

1. Where designated on plans, V-bottom ditch to be located adjacent to road.

NOT TO SCALE

TYPICAL HAUL ROAD

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 7.7



Not to scale

UNLOADING PLATFORM: CELL NOS. 41-49

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 7.8

The haul road exiting Area 3 and leading to the primary access road will consist of similiarly staged construction at a 15 percent grade. Upon exiting the Area 3 site, a paved washdown area will be provided for washing waste-hauling vehicles, as required.

A perimeter access road will be provided for inspection and maintenance of the area, and for accessing the monitoring wells. The single-lane, 2-directional perimeter access road will be 12-feet wide and consist of a 6-inch thick layer of dense-graded aggregate.

7.8 ANCILLARY FACILITIES

7.8.1 Scale Plaza

Details of the scale plaza are presented on sheet 9 of 15 of the "Contract 3: CHS Landfill Expansion" drawings prepared by Harrington, Lacey & Associates.

The scale plaza is located along the entrance road outside of the main entrance to the operational areas. The plaza consists of an inbound, dual-lane roadway and an outbound dual lane road surrounding a soil and mulch-covered island. The office and scale trailer, and the laboratory trailer are located on the island.

Two Weigh-Tronix scales (Model No. WI-110) are in operation at the scale plaza. One scale is located on the inside lane of the inbound entrance road; the other is located on the inside lane of the outbound entrance road. Vehicles are weighed before and after disposing of their contents in the active cell.

7.8.2 Truck-Wash Pads

Details of the truck-wash pads are presented on sheets 5 and 6 of 15 of the "Contract 3: CHS Landfill Expansion" drawings, prepared by

Harrington, Lacey & Associates. The wash pad area provides clean-up facilities for vehicles leaving the operational cells of each area of the landfill. A paved road leads to 2 concrete slabs, 1 each for Area 3 and Area 5 operations.

A power washer unit is installed to direct washwater on the wheel and axle assemblies of the truck. Each pad is sloped so that all washwater will drain into a grated drainage pit underlying the pad. One pad is specifically designated for trucks using each of the Area 3 and Area 5 disposal areas.

Washwater in the drainage pit flows to a waste oil interceptor. The 2 interceptors are encased in a concrete vault which includes a manhole for accessibility. Intercepted oil is collected in a waste oil tank to the east of the pad area. Effluent from the Area 3 and Area 5 interceptors flow by gravity to the respective sumps in the leachate storage and transfer area. The entire wash pad area is covered by a corrugated metal roof structure.

7.8.3 Leachate Storage and Transfer Area

Leachate draining through the leachate collection system of Area 3 will flow by gravity to a sump through the 6-inch diameter, non-perforated collection lines. Leachate from Area 5 will flow to a separate sump specified for that facility. The leachate from the two areas is segregated throughout collection, storage, and transfer.

Each sump contains 2 sump pumps; a leading pump which begins operation when the level of liquid reaches 3.5 feet, and a lagging pump which begins if the liquid rises to a height of 4.5 feet in the sump.

The leachate in each sump is pumped to a 30,000 gallon fiberglass storage tank through 2-inch diameter PVC lines. Washwater from the wash pad area discharges directly to the 30,000 gallon storage tanks. The Area 3 wash pad drains through a 4-inch diameter PVC line to the Area 3 storage tanks, and the Area 5 pad drains to the respective storage tank.

A concrete spill pad is located at ground elevation over the underground storage tanks. The spill pad is a preventative measure used during transfer of the waste liquid collected in the storage tanks. If any liquid is spilled, it drains through the grated spill pad to a 4-inch diameter line which discharges to the Area 3 storage tank.

7.8.4 Facility Control Compound

The facility control compound area is located in the northwestern corner of Area 3 in the vicinity of the wash pads. The compound area houses 3 trailers used during operation of the landfill. A crew trailer, storage trailer, and safety trailer are located in the compound area. The location of the trailers relative to Area 3, and the location of the utility lines serving the area are duplicated on sheet 11 of 15 of the "Contract 3: CHS Landfill Expansion" drawings prepared by Harrington, Lacey & Associates.

7.8.5 Utilities

Utilities at the landfill include electrical power, potable water and sanitary sewer. Buried electrical cables provide electrical power to the scale plaza trailers, the facility control compound area trailers and the truck-wash pad area.

An 8-inch diameter potable water line connects to the existing City of Baltimore water line on Quarantine Road. The 8-inch diameter pipe follows the entrance road and branches to the scale plaza, compound area, and wash pads in 2-inch diameter lines.

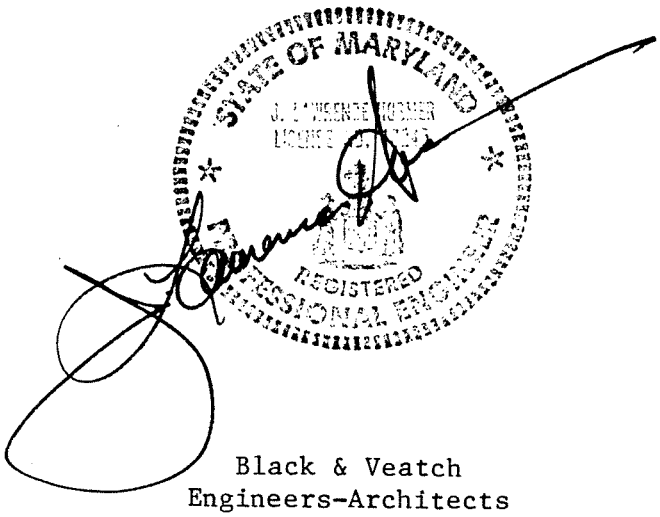
Sanitary sewage disposal is provided by 2 on-site sanitary sewerage holding systems. The first system serves the scale plaza area and consists of a 1,000 gallon precast concrete septic tank, with a 4,000 gallon liquid holding tank, and 4-inch diameter PVC piping. The second system is located in the facility control compound to serve the trailers in that area. This system consists of a 2,000 gallon septic tank, a 10,000 gallon liquid holding tank and 4-inch diameter PVC piping. Both water and sewer connections terminate at the trailers.

March 1984

Environmental Hazard Assessment

ENVIRONMENTAL HAZARD ASSESSMENT
HAWKINS POINT HAZARDOUS WASTE LANDFILL

for the:
Maryland Environmental Service



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March 1984

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5. FINDINGS AND CONCLUSIONS

5.1 FINDINGS

Based upon the review of existing published and unpublished data, the studies conducted during the preparation of the RCRA Part B permit applications, and the current leachate extraction program, several preliminary conclusions may be drawn as to the level of environmental hazard imposed by the chrome ore tailings disposed in Area 3. These conclusions, generally stated below, are based on the limited studies conducted to-date and should be considered in that light.

1. Based upon studies conducted by the USEPA, the current water quality and sediment of the Patapsco River is characterized as severely degraded, with a high loading of total chromium, copper, lead, zinc, and cadmium from many sources. Water and sediment quality degradation of the river has contributed to benthic population changes, including loss of species diversity and enhancement of resistant species. Primary sources of the degrading constituents include manufacturing facilities, wastewater treatment plants, urban runoff and riverine contributions.

2. Any vertical (downward) movement of leachate generated by the past disposal practices at the Hawkins Point HWL should be impeded by lower permeability lenses and stratigraphic layers. Due to the probability of relatively higher lateral ground-water velocities, by several orders-of-magnitude, the regional ground-water

gradients, the interposing Arundel Formation, the required depth of movement and the proximity of the Patapsco River, it is most likely that, if a contaminant plume occurs, it would be intercepted by the Patapsco River, and would not significantly impact either the Patapsco or Patuxent aquifers.

3. It appears, from the limited data available on leachate extraction, that the ground-water regime underlying Area 3 partially discharges to the chrome ore tailings cells.

4. A statistical analysis of ground-water data indicated no significant increase in USEPA Interim Primary Drinking Water constituents in Area 5 wells. Statistically significant increases in selenium and chromium were indicated for Area 3 wells. It should be noted that selenium is not a significant component of chrome ore tailings and would most probably not have leached from the underlying tailings cells. It is therefore postulated that a combination of off-site migration from the BFI and SCM/Glidden landfills and possible on-site leaching of the chrome ore tailings cells has elevated the levels of selenium and chromium measured across Area 3.

5. The rate of any movement of chromium ions toward the Patapsco River would be dependent upon the depletion of soil attenuation mechanisms, including cation adsorption, precipitation, and redox

reactions. These mechanisms are dependent on soil-ground-water pH, soil elemental composition, and ambient ground-water composition.

6. Based on toxicity data, it appears that, currently, chromium(III) and (VI) levels in the Patapsco River in Thoms Cove adjacent to the site are not sufficiently elevated to be acutely or chronically toxic to aquatic life. The risk of human exposure, through ingestion of contaminated water or organisms, is expected to be minimal. Chromium(III) is not highly toxic, and the conversion of Cr(VI) to Cr(III) is a viable mechanism within the site environment that will lessen the risk of significant Cr(VI) exposure.

5.2 CONCLUSIONS

The discussions in this report are based on the interpolation and extrapolation of a limited amount of data; it is therefore not plausible at the present time to definitively state whether contamination is migrating from the chrome ore tailings disposed in that portion of the Hawkins Point HWL site underlying Area 3 between 1975 and 1978. There is evidence that contamination has occured and degraded water quality exists beneath the the Hawkins Point site; however, there are indications that off-site activities are a contributing factor to this level of contamination. Accepting that contamination has occurred, it is, nevertheless, our opinion that this contamination has not significantly impacted the Patapsco River, and that there is limited potential for significant impacts on the Patapsco and

Patuxent aquifers underlying the site. In addition, the maximum contributory loading to the aqueous environment which could be estimated from the current data would, if it occurred, represent a relatively small portion of the overall loading from other existing sources in the Baltimore area. Furthermore, there exists little documented evidence of adverse impacts on humans from water or sediments contaminated with chromium, the primary hazardous constituent of the tailings that could potentially migrate from the disposal cells underlying the new facilities.

While the extraction of leachate from the leachate collection/underdrain system will remove a portion of the contaminants from the system, the past disposal cells are recharged by infiltration and regional ground-water movement, thereby generating additional leachate. Thus, the extraction process is marginally effective, expensive, and will not prevent the migration of leachate in the ground-water system. Since some evidence of natural attenuation of the chromium ions exists, and off-site sources could be significantly contributing to ground-water degradation, the continuation of the extraction of leachate is seen as, at most, a short-term, partially effective measure, rather than a long-term remedial solution.

In summary, although the best information to-date indicates little evidence of significant contamination being generated from beneath Area 3, further investigation, including additional monitoring wells, is recommended to further define the hydrogeologic situation at the site.

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Appendix I: Procedure for Cochran's Approximation to the Behrens-Fisher Student's t-Test.

The background mean ($\bar{X}_B$) and background variance (S_B^2) are calculated using all of the background data (N_B samples). For the monitoring well under consideration, the monitoring mean ($\bar{X}_M$) and monitoring variance (S_M^2) are calculated using all of the monitoring data (N_M samples).

For any set of data, the mean is calculated by:

$$\bar{X} = \frac{X_1 + X_2 \ldots\ldots\ldots\ldots\ldots + X_N}{N}$$

and the variance is calculated by:

$$S^2 = \frac{(X_1 - \bar{X})^2 + (X_2 - \bar{X})^2 + \ldots\ldots\ldots + (X_N - \bar{X})^2}{N-1}$$

where "N" denotes the number of observations or samples in the data set. In this case, N will always be 5 because there are five samples for each constituent and well.

The t-test uses the mean and variance to calculate a t-statistic (t^*) and a comparison t-statistic (t_c). The t^* and t_c values are compared, and a judgment is made as to whether a statistically significant change has occurred in the constituent.

The t-statistic for the constituents is calculated by:

$$t^* = \frac{\bar{X}_M - \bar{X}_B}{\frac{S_M^2}{N_M} + \frac{S_B^2}{N_B}}$$

The comparison t-statistic (t_c) is calculated using the following variables:

1) t_B, obtained from t-tables with (N_B-1) degrees of freedom, at the 0.05 level of significance (In this case, with 5-1 = 4 degrees of freedom, t_B always equals 2.132).

2) t_M, obtained from t-tables with (N_M-1) degrees of freedom, at the 0.05 level of significance (In this case, with 5-1 = 4 degrees of freedom, t_M always equals 2.132).

3) W_B and W_M, weighting factors defined as:

$$W_B = \frac{S_B^2}{N_B} \text{ and } W_M = \frac{S_M^2}{N_M}$$

The comparison t-statistic is thus calculated by:

$$t_c = \frac{W_B\, t_B + W_M\, t_M}{W_B + W_M}$$

In this case, since t_B and t_M both equal 2.132, the equation is reduced to:

$$t_c = \frac{2.132\,(W_B + W_M)}{(W_B + W_M)}$$

and t_c is always equal to 2.132. The (t^*) is now compared with the comparison t-statistic (t_c) using the following decision rule:

If t^* is less than t_c, then conclude that most likely there has not been a change in this specific constituent.

If t^* is greater than or equal to t_c, then conclude that most likely there has been a significant increase in this specific constituent.

Table I-1: t-Test Results for Area 3

Constituent	BACKGROUND WELL: Well T $\bar{X}_T$	S^2_T	MONITORING WELL: Well M $\bar{X}_M$	S^2_M	t^* a)	t_T t_M	t_c b)	$t^* < t_c$?	Increase?
Arsenic	0.0031	1.50×10^{-6}	0.0059	7.23×10^{-5}	0.73	2.132	2.132	YES	NO
Barium	0.157	8.50×10^{-3}	0.028	1.42×10^{-3}	-2.89	2.132	2.132	YES	NO
Cadmium	0.009	3.08×10^{-5}	0.012	2.29×10^{-4}	0.42	2.132	2.132	YES	NO
Chromium	0.002	5.00×10^{-6}	0.014	1.18×10^{-4}	2.42	2.132	2.132	NO	YES
Lead	0.008	1.13×10^{-5}	0.008	3.13×10^{-5}	0	2.132	2.132	YES	NO
Mercury	0.0020	1.90×10^{-6}	0.0024	1.50×10^{-6}	0.49	2.132	2.132	YES	NO
Nitrate (as N)	0.179	8.00×10^{-3}	0.0218	1.23×10^{-3}	-3.66	2.132	2.132	YES	NO
Selenium	0.009	1.80×10^{-5}	0.171	2.38×10^{-2}	2.35	2.132	2.132	NO	YES
Silver	0.001	0	0.002	1.70×10^{-6}	1.72	2.132	2.132	YES	NO

a) $t^* = \dfrac{\bar{X}_M - \bar{X}_T}{\dfrac{S^2_M}{N_M} + \dfrac{S2_T}{N_T}}$

b) $t_c = \dfrac{W_T t_T + W_M t_M}{W_T + W_M}$

$W_T = \dfrac{S^2_T}{N_T}$

$W_M = \dfrac{S^2_M}{N_M}$

Table I-2: t-Test Results for Area 5

	BACKGROUND WELL: Well 2B		MONITORING WELL: Well M						
Constituent	$\bar{X}_{2B}$	S^2_{2B}	$\bar{X}_{2D}$	S^2_{2D}	t^* a)	t_{2B} t_{2D}	t_c b)	$t^* < t_c$ c)?	Increase?
Arsenic	0.0014	3.00×10^{-7}	0.0018	5.00×10^{-7}	1.00	2.132	2.132	YES	NO
Barium	0.0299	9.75×10^{-4}	0.037	7.40×10^{-4}	0.38	2.132	2.132	YES	NO
Cadmium	0.009	2.13×10^{-5}	0.013	9.20×10^{-5}	0.84	2.132	2.132	YES	NO
Chromium	0.174	1.15×10^{-1}	0.002	1.50×10^{-6}	-1.13	2.132	2.132	YES	NO
Lead	0.006	1.57×10^{-5}	0.008	1.40×10^{-5}	0.82	2.132	2.132	YES	NO
Mercury	0.0029	1.19×10^{-5}	0.0019	9.00×10^{-7}	-.625	2.132	2.132	YES	NO
Nitrate (as N)	0.0516	5.10×10^{-3}	0.0096	3.70×10^{-5}	-1.30	2.132	2.132	YES	NO
Selenium	0.016	1.37×10^{-4}	0.021	2.30×10^{-4}	0.58	2.132	2.132	YES	NO
Silver	0.001	0	0.001	0	-	2.132	2.132	YES	NO

a) $$t^* = \frac{\bar{X}_{2D} - \bar{X}_{2B}}{\sqrt{\frac{S^2_{2D}}{N_{2D}} + \frac{S^2_{2B}}{N_{2B}}}}$$

b) $$t_c = \frac{W_{2B} t_{2B} + W_{2D} t_{2D}}{W_{2B} + W_{2D}} \qquad W_{2B} = \frac{S^2_{2B}}{N_{2B}} \qquad W_{2D} = \frac{S^2_{2D}}{N_{2D}}$$

June 27, 1985

Assessment of Continuing Releases

MARYLAND
ENVIRONMENTAL
SERVICE

June 27, 1985

Received
6-28-85

Mr. James P. Seif, Regional Administrator
U.S. Environmental Protection Agency
Region III, 841 Chestnut Building
Philadelphia, PA 19107

Re: EPA Identification No. MDD 00 073 1356
Facility Name: Hawkins Point
Hazardous Waste Landfill

177 Administration Dr
Annapolis, MD 21401
301-224-7221

Gentlemen:

Enclosed with this letter are five copies of a report titled, "Assessment of Continuing Releases Hawkins Point Hazardous Waste Landfill". This report was prepared, and is hereby submitted, as required by Part II of the final RCRA Permit issued on May 15, 1985 for this Facility. In addition, we are forwarding, under separate cover, three copies of certain documents referred to in this report. These reference documents are being sent directly to Mr. Gary Molchan of your staff.

An Agency of
the Department of
Natural Resources

If you have any questions regarding this submittal, please contact Mr. David R. Foster of my staff at (301) 224-7278.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Director
John D. Seyffert

Sincerely,

John D. Seyffert

JDS:aj
Enclosures

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1.0 BACKGROUND

1.1 GENERAL

The Hawkins Point Hazardous Waste Landfill (HWL) is located in the southeastern corner of the City of Baltimore, adjacent to the Francis Scott Key Bridge. Hawkins Point occupies the northeastern corner of a broad penninsula between Curtis Creek and the Patapsco River. Allied Chemicals presently disposes chrome ore tailings generated by its Baltimore Works facility in Area 5 of the landfill, which borders Thoms Cove, an open embayment of the Patapsco River.

The Hawkins Point HWL also contains 5 additional areas (numbered 1, 2, 3, 4 and 6); these areas, depicted on Figure 1, including facilities associated with the Area 5 disposal operations. Area 3 also contains a permitted disposal area (Cell No. 40); at present, this area is inactive. According to the Maryland Department of Health and Mental Hygiene (DHMH), portions of the Hawkins Point area have been used for the land disposal of municipal and industrial wastes for at least 50 years. Presented below are summaries of disposal practices in each area of the landfill.

1.2 AREA 1

Area 1 is located to the east of Area 2. The land is currently leased to the Eastalco Aluminum Company, but remains undeveloped. The only previous activity in this area was the stockpiling of soil during the construction of the Hawkins Point facility.

1.3 AREAS 2 AND 3

Area 3 is located to the south of Area 4 and Area 2 is located to the east of Area 3. For some time prior to the construction of the Area 5 disposal site, the Maryland Port Administration (MPA) landfilled chrome ore tailings in cells excavated in the present location of Areas 2 and 3. Disposal began in 1975 and continued into 1979. There were several cells constructed over the course of operations, with bottom elevations reported near +8 feet msl.

In the spring of 1982, ground-water interceptor trenches were constructed along the western and southern sides of Areas 2 and 3 in order to divert ground-water seepage around the cells. The western interceptor was apparently constructed between elevations +17 feet and +19 feet msl. The southern interceptor was placed at elevation +3 feet msl at the outlet, and near +9 feet msl at the junction with the western interceptor. The southern interceptor invert is generally above the base of the nearby chrome ore tailings fill in the MPA cells.

In the summer of 1982, Area 3 was retrofitted with a PVC pipe leachate collection system (LCS). The LCS header orients northeast along the northern boundary of Area 3, and laterals extend into the northern portion of the cell.

In July 1983, the MES began accepting controlled hazardous substances (CHS) in Cell No. 40 (previously designated as Cell No. 4), which is located above the old MPA cells. A small volume of CHS waste was received, but the landfill became inactive and the contents were excavated and transported off-site for ultimate disposal. The HDPE liner and leachate collection systems remain in place in Cell No. 40.

1.4 AREA 4

A relatively narrow strip of land, referred to variously as the "wedge" or Area 4, lies between Area 3 and Area 5. The southwestern portion of Area 4 has previously been used for experimenting with chrome ore tailings fixation. The experimental site is believed to have been restricted to a zone south of the current Thoms Creek channel. However, little actual data is available regarding the timing of the filling or the character of the wastes received. A presumed "paint sludge" is believed to also have been deposited in this area. This presumed deposit was discovered by MES personnel and reported to the Maryland DHMH in 1982. EP Toxicity tests conducted on this presumed "paint sludge" indicated no leaching of hazardous constituents.

1.5 AREA 5

Chrome ore tailings generated by Allied Chemicals Baltimore Works were disposed in Area 5 beginning in August 1980. The facility was, and is presently, operated by the Maryland Environmental Service (MES). Prior to operation of the facility by the MES, 2 clay-lined cells, numbered 1 and 2, were excavated to near elevation +5 feet mean sea level (msl). The MES began disposal in Cell No. 1 in August 1980. Upon completion of filling in Cell Nos. 1 and 2, the MES excavated and filled Cell No. 3. In 1982, a leachate collection system consisting of open-trenched and horizontally augered polyvinyl chloride (PVC) piping was advanced approximately 200 feet into the southern portion of the site, near the base of the original 3 cells. A ground-water interceptor trench was installed along the north, west and east sides of the site prior to 1982.

The Area 5 land disposal facility has been extended vertically through the construction of additional cells (Cell Nos. 5 through 11) above the original cells. The inner slopes of the berms surrounding Cell Nos. 5 and 6 have been lined with a 1-foot foundation of clay supporting an 80-mil thick, high density polyethylene (HDPE) synthetic membrane.

1.6 AREA 6

Area 6 lies to the north of Area 5. Although the history of land use in this sector is not well known, the area borders an industrial site which has recently been used for the packaging and drying of ferrous sulfate (QC Corporation).

3.0 DESCRIPTION OF SOLID WASTE MANAGEMENT UNITS

This section responds directly to the following requirement of Part II: Specific Conditions of the RCRA permit issued by the EPA for Area 5 of the Hawkins Point Hazardous Waste Landfill on May 15, 1985:

> "Description of Units - For each SWMU, provide a history of construction, including engineering drawings, foundations, materials of construction, dimensions, capacity and ancillary systems. Include location design, construction, and description of all monitoring systems (air, surface water, groundwater, etc.). If the SWMU is not in use, describe the methods utilized to close the facility and all construction related to closure."

Each unit presented in Section 2.0 of this document is described separately below. References, numerated as (n), are listed in Section 6.0.

3.1 Cell Nos. 5 through 11 (Area 5) - Existing

a. Construction History:

- Landfill - (1) as amended by (2), (3), (4), (5), (6), (7), (8)
- Ancillary Systems - (1) as amended by (2), (8)

b. Monitoring Systems History:

- Air - (1)
- Surface Water - (1) as amended by (2), (9)
- Ground Water -
  - Interceptor - Location - (1), (3)
    - Construction - No information available
  - Monitoring System - (1) as amended by (2), (3), (4), (10)
- Leachate - (1) as amended by (2), (3), (11)

c. Closure: Not Applicable (N/A)

3.2 Leachate Collection System and Storage Tanks - Existing

a. Construction History: (1) and (15) as amended by (2), (3), (11).

b. Monitoring History: (1) as amended by (2), (3), (11).

c. Closure: N/A

3.3 Cell No. 40 (Area 3) - Existing

a. Construction History: (4), (8), (12), (13), (14) as amended by (2), (16).

b. Monitoring Systems History:

- Air - (14), (15)
- Surface Water - (9), (13) (14), (15) as amended by (2)
- Ground Water
  - Interceptor Location and Construction - (9), (12), (13), (14), (15) as amended by (2), (16).
  - Monitoring System - (4), (10), (13), (14), (15) as amended by (2), (16), (17), (18)

c. Closure: N/A

3.4 Cell Nos. 1 through 3 (Area 5) - Former

a. Construction History: (17), (18), (19)

b. Monitoring Systems History:

- Air - N/A
- Surface Water - (19)
- Ground Water - N/A

Note: Reliable water-quality information is not available prior to 1983. Monitoring wells existing at that time have been subsequently abandoned and replaced per the instruction of the Maryland DHMH. However, information on present day ground-water quality in Area 5 is available. Refer to Secton 3.1.

- Leachate - N/A

c. Closure: N/A

3.5 MPA Cells (Area 3) - Former

a. Construction History: (17), (18), (20)

b. Monitoring Systems History:

- Air - N/A
- Surface Water - (20)
- Ground Water - N/A

Note: Monitoring was not conducted during operation of the cells and thus, no information on previous water quality was collected. However, information on present-day ground-water quality in the vicinity of the MPA cells is available. See References (17) and (18).

- Leachate - N/A

Note: A retrofit system was installed in the northern portion of the cells after completion. See References (8), (17), and (18).

c. Closure: (17), (18), (19)

3.6 Leachate Holding Lagoons (Area 4) - Former

a. Construction History: No information available.

b. Monitoring Systems History:

- Air - N/A
- Ground Water - N/A

c. Closure: No information available.

3.7 IU Conversion Systems Stabilization Demonstration Area (Area 4) - Former

a. Construction History: (21), (22).

b. Monitoring Systems History:

- Air - N/A
- Surface Water - (21), (22)
- Ground Water - N/A
- Leachate - (21), (22)

c. Closure: (22)

3.8 Presumed "Paint Sludge" Area (Area 4) -Former

a. Construction History: No information available.

b. Monitoring Systems History:

- Air - No information available.
- Surface Water - No information available.
- Ground Water - No information available.

Note: MES personnel discovered the presumed "paint sludge" area in 1982 and reported it to the Maryland DHMH. Thus, no information on ground-water quality during the time of deposition exists. However, information on present-day water quality in Area 4 is available. See Reference (10).

- Leachate - N/A

c. Closure: No information available.

Hawkins Point

Issue:

The State of Maryland has determined that no comments received at the Public Hearing held on April 16, 1985 requested a change in the draft permit for disposal at Hawkins Point. The State subsequently issued an operating permit to Maryland Environmental Service on May 10, 1985 which was effective immediately.

The EPA has determined that a comment received at the same public hearing requested denial of the draft permit, which constitutes a request for a change in the draft permit per 40 C.F.R. §124.15(b), and therefore proposes to issue the permit May 15, 1985 with an effective date of June 15, 1985.

Maryland Environmental Service cannot operate the facility without a RCRA permit. The RCRA permit consists of the State permit and the EPA permit.

Background:

- Because of the Hazardous and Solid Waste Amendments of 1984, Maryland Environmental Service will require permits from both EPA and the State to continue to operate.

- As this will be the first RCRA permit in the nation to include the provisions of the HSWA, EPA held a joint public hearing with the State on April 16, 1985 in Baltimore, Maryland.

- Maryland issued their portion of the permit effective immediately on May 10, 1985 after determining that no comments requested a change in the draft permit.

- EPA has determined that there was a request for a change in the draft permit and therefore will issue the permit on May 15, 1985 effective June 15, 1985, allowing the commenter, Maryland Waste Coalition, the right to appeal this decision as allowed by 40 C.F.R. §124.19.

Status:

The EPA permit is in concurrence and is presently in the Office of Regional Counsel.

HAWKINS POINT BRIEFING

Facility Background

The facility is located in the Curtis Bay Industrial area adjacent to Thoms Cove in the extreme southeastern corner of Baltimore City. Located on State of Maryland property, the facility is owned and operated by the Maryland Environmental Service (MES), an agency of the State of Maryland.

Presently, the Hawkins Point facility encompasses the areas as indicated in Figure 1; these comprise the boundaries of the Hawkins Point facility and are the subject of EPA's draft permit.

Between 1975 and 1980, Maryland Port Administration landfilled chrome ore tailings in Areas 2 and 3. In the spring of 1982, groundwater interceptor trenches were constructed along the western and southeastern sides of Areas 2 and 3 in order to divert groundwater around these areas.

The southwestern corner of Area 4 was used as a landfill for disposal of fixed chrome ore tailings. This filled area is believed to have ben restrictd to a zone south of the current Thoms Creek channel.

Area 5 was constructed in 1979. It contained three cells numbered 1, 2 and 3. Each cell is approximately 100 feet wide, 900 feet long, and 16 feet deep. The cells were constructed with a clay liner consisting of two feet of clay on the side walls of each cell and three feet of clay on the bottom of each cell. Operations at the facility were designed to reduce the amount of leachate generated. Cell 1 first received waste in 1980. In the spring of 1982, Cells 1, 2 and 3 were retrofitted with a leachate collection system, and a leachate storage and transfer area capable of removing the leachate generated in the cells.

In September 1982, EPA approved an expansion of the existing landfill in Area 5 under interim status to MES. This allowed for the construction of additional cells utilizing clay and synthetic liners, and the existing leachate collection system to provide a secure landfill. Leachate that is generated in Area 5 is collected and recycled or disposed of by an approved method.

In November 1982, The Maryland Department of Health and Mental Hygiene (MDHMH) issued Controlled Hazardous Substance Facility Permit A284 to MES.

The State of Maryland is authorized to operate a hazardous waste management program in lieu of the Federal program for those portions of RCRA in effect at the time of authorization which was prior to the enactment of the HSWA. Therefore, concurrent with EPA's permit action is an action by the State of Maryland to issue a State permit to MES.

The State's permit will allow the vertical expansion of two final cells in Area 5 adding approximately 25,000 cubic yards of disposal capacity to this waste management unit. Closure of Area 5 will proceed as outlined in the closure plan and a post closure monitoring and maintenance period will be in existence for 30 years.

This facility, a chrome ore tailings monofill, will only accept waste generated at the Allied Corp. Baltimore Plant.

EPA ACTIONS

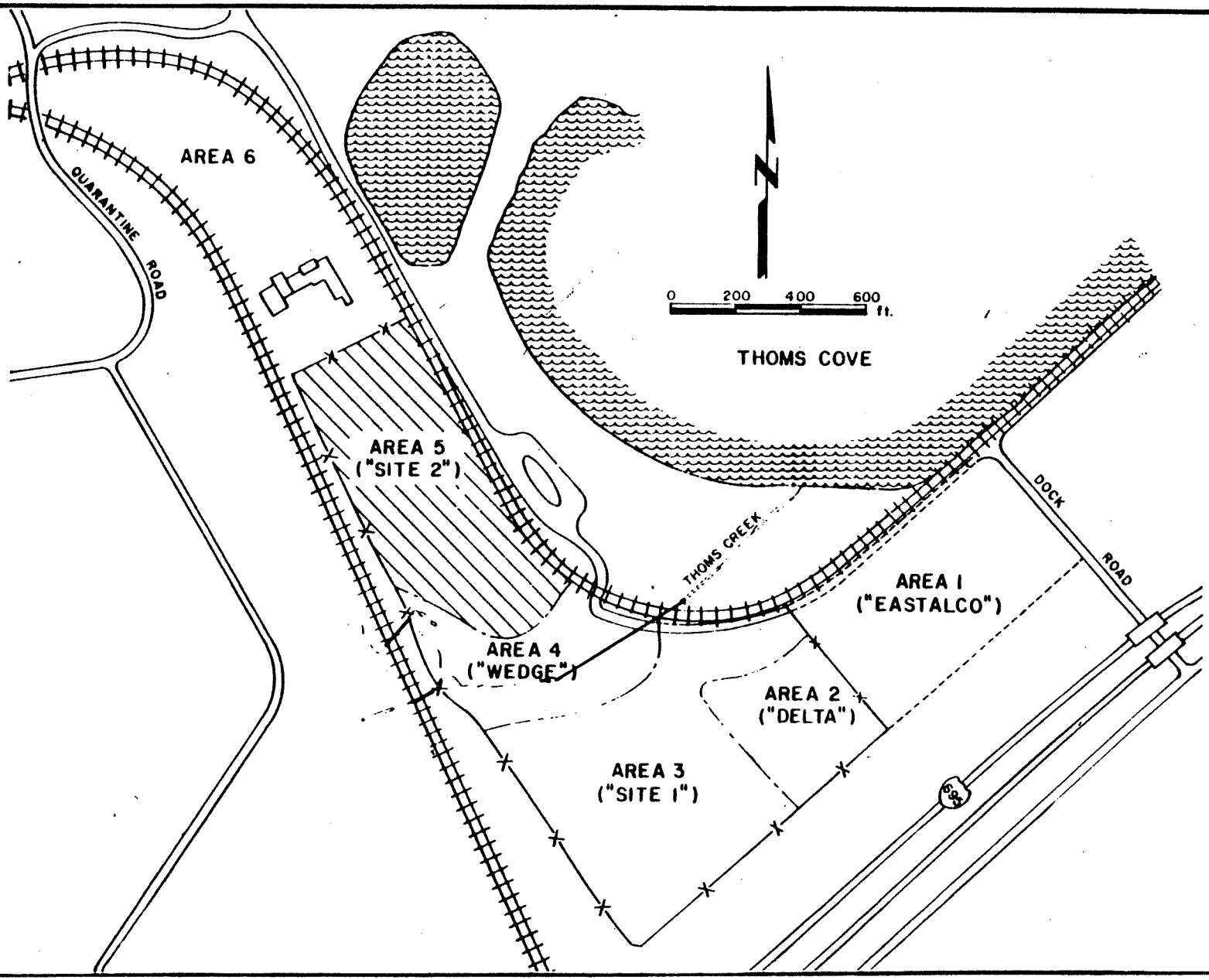
This permit, when issued, will be the first RCRA permit issued by EPA that will include the Hazardous and Solid Waste Amendments of 1984 (HSWA). Specifically, there are two portions of the HSWA that apply at Hawkins Point:

A. Sec. 206: Continuing Releases at Permitted Facilities

There has been continuous contact with Headquarters (HQ) on this new provision. We have attempted to follow HQ guidance in this area (McGraw #3 Memo (2-5-85) and recently (3-1-85) discussed with Gail Cooper, OGC, and David Fagan, OSW, the form and content of the draft permit. They were in agreement to require the applicant to submit the information as a fulfillment of the new Continuing Release Provision.

B. Sec. 212: Permit Life

The permit is for a three-year term and can be opened at any time for improvements in technology or for modifications due to the results of the preliminary assessment that will be submitted by the applicant. If the preliminary assessment shows evidence of a release, corrective action will be required.

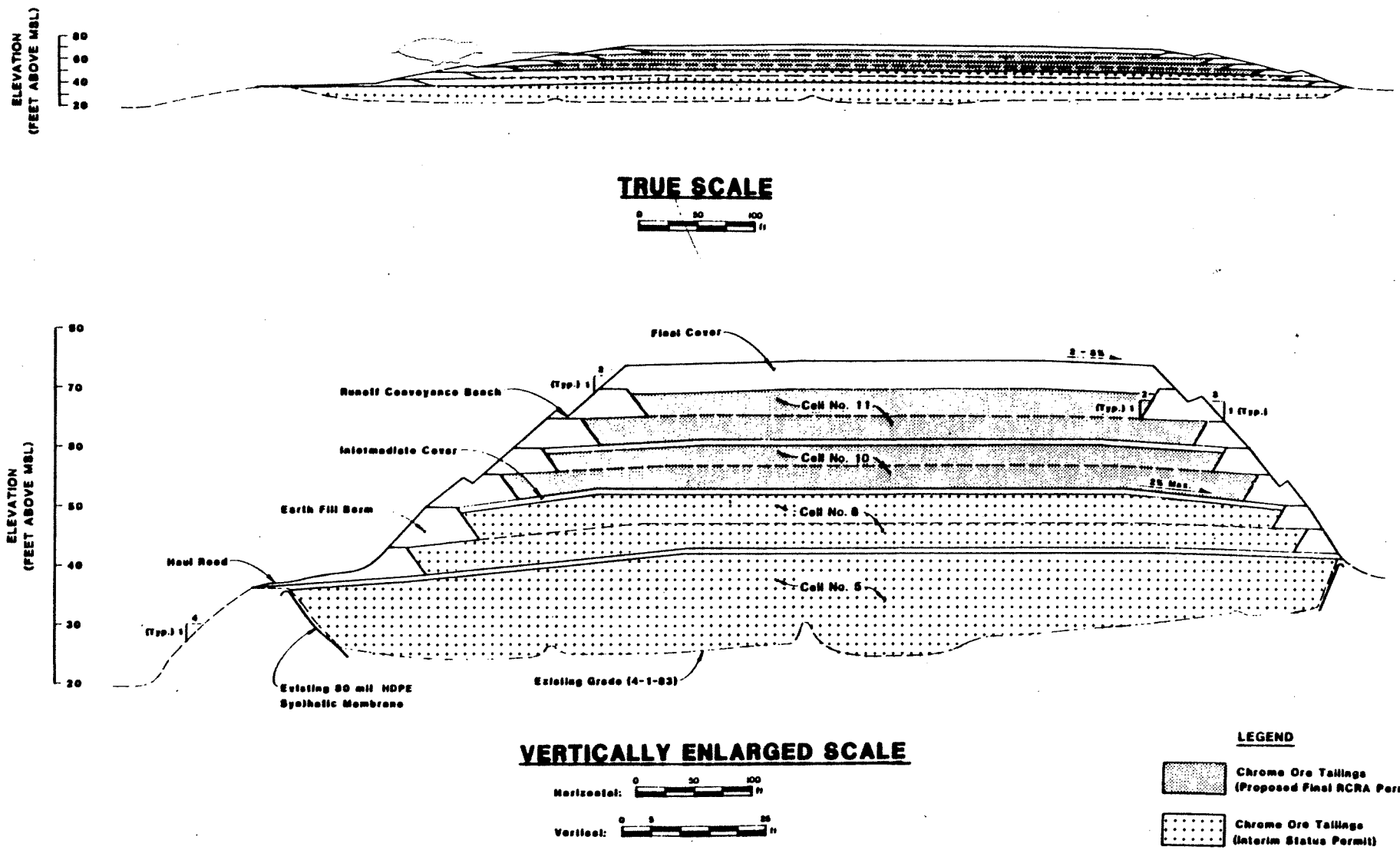


AREA LOCATOR

Black & Veatch
Engineers · Architects

Hawkins Point Hazardous Waste Landfill

figure
1

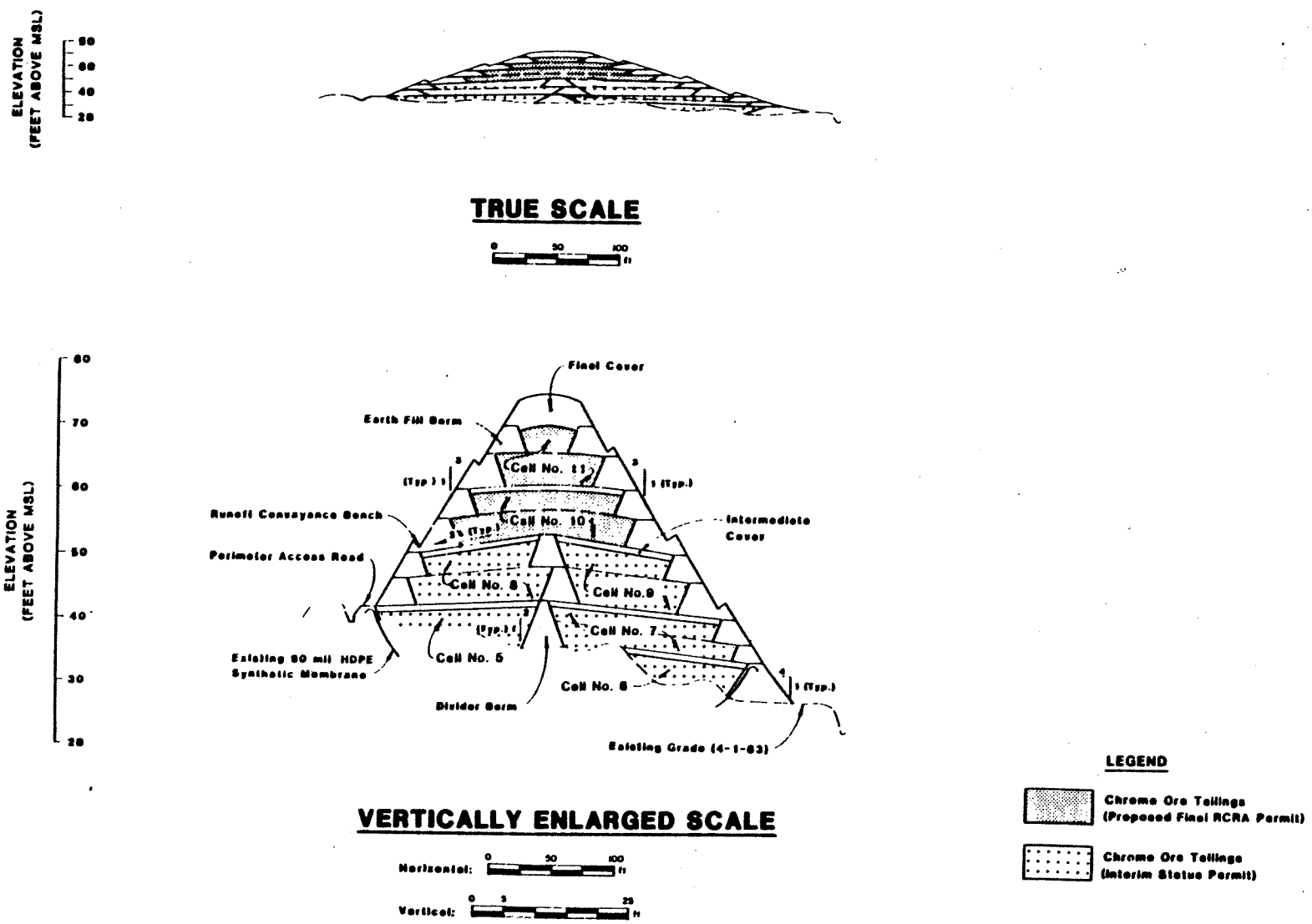


AREA 5 : SOUTH-NORTH SECTIONS

Black & Veatch
Engineers · Architects

Hawkins Point Hazardous Waste Landfill

figure 2



AREA 5 : WEST-EAST SECTIONS

Black & Veatch
Engineers · Architects

Hawkins Point Hazardous Waste Landfill

figure

September 10, 1985

Aerial Photo Analysis

7266

Aerial Photo Analysis
RCRA Check List

Date 9/10/85
Analyst J. Heskett

1. Site I.D. and Location Hawkins Point - Baltimore City, MD.
N39°12'35" W76°33'07" Date of Photography August 21, 1985

2. General site layout available? x Yes ___ No

3. General Facility Description:

x waste pile(s)
x surface impoundment(s)
x drums
x tanks
x landfill(s)
___ land treatment
___ possible incineration stacks
___ other ___

4. Drums and
5. Tanks

°Quantity 5 tanks 3 drums
°Are there containment systems or diversion structures (e.g., dike, trench, standing tank) DS = Diversion structures/containment systems
Tanks 1 Yes 4 No 0 Cannot determine (Specify) revetment
Drums 0 Yes 3 No 0 Cannot determine (Specify) ___
°Description of storage practices
3 large drums - 2 horizontal, 1 vertical located near junk pile

°Evaluation of the integrity of tanks, drums, storage areas and containment or diversion structures:
A x leaks poss leak around tanks
B ___ corrosion ___
C ___ wet spots ___
D ___ vegetation stress ___
E ___ ruptures, bulging ___
F ___ disorderliness or poor housekeeping ___
G x ground stains near some tanks
H ___ open drums/tanks ___
I ___ other ___
___ none of the above ___

6. Surface Impoundments

°Number of S.I.'s 5
°Are the following features present:

	Yes	No	Cannot Be Determined
- liners	1	2	3,4,5
- leachate collection systems		x	
- dikes, berms, or revetments	all		
If Yes, are protective covers present	all		
- monitoring wells			x
- active treatment (aerators, etc.)		x	

Site Hawkins Point

6.(con't) °Evaluation of the S.I.'s integrity (including dikes, etc.)

A ____ deterioration (e.g., erosion) ____
B ____ leaks, overflows, or breaches ____
C ____ reactions (e.g., fires, explosions) ____
D x leachate poss flowing into bay
E x vegetation stress poss along edges of SI
F ____ other ____
____ none of the above

°Characterize the wastes

1)old SI being filled with light material; orange & green standing liquid remai
2)yellowish-orange material, no liner
3)abandoned SI revegetated with areas of prob standing liquid
4)former slurry impoundment with standing liquid
5)active slurry impoundment with standing liquid

7. Waste piles

°Number of waste piles 6

°Are the following features present:

	Yes	No	Cannot Be Determined
-protection from the wind	____	x	____
-impermeable base material	____	x	____
-diversion of run-on	____	x	____
-collection of leachate and run-off or	____	x	____
-protection from precipitation	____	x	____
-containment barriers	____	x	____

°Evaluation of the waste pile's integrity including diversions, base material and barriers:

A x leaks prob from debris
B ____ site instability (e.g., erosion, settling) ____
C ____ deterioration ____
D ____ improper waste placement ____
E ____ free liquids ____
F ____ reactions (e.g., fire, explosion) ____
G ____ other ____
____ none of the above

°Characterization of wastes

1,2)crates, poss rusted drums, and other debris - Junk
3)dark mounded material - prob waste
4,5,6)light mounded material - prob waste

8. Land treatment

°Are the following features present:

	Yes	No	Cannot Be Determined
-diversion of run-on	____	____	____
-collection of run-off	____	____	____
-monitoring wells	____	____	____
-vegetative cover over inactive areas	____	____	____

°Type of crops grown ____

°Type of application (tiller, sprayer, etc.) ____

°Evaluation of the land treatment site's integrity:

A ____ surface instability (e.g., erosion, landslides) ____
B ____ runoff from contaminated areas ____
C ____ vegetation stress ____
D ____ wet spots/stains ____
E ____ inadequate draining/ponding ____
F ____ leachate ____
G ____ reactions (e.g., fire, explosion) ____
H ____ other ____
____ none of the above

Site Hawkins Point

8.(con't) °Characterization of wastes and/or soil surface

9. Landfill

°Number of Landfills 5

°Number of cells

___ active ___ inactive 1-5 closed

°Are the following features present:	Yes	No	Cannot Be Determined
-diversion of run-on		x	
-collection of run-off		x	
-control of leachate		x	
-liner			x
-adequate cover of "finished areas"	1-3,5	4	
-monitoring wells			x

°Evaluation of the landfill's integrity:

A ___ site instability (e.g., erosion, settling)
B ___ improper or inadequate draining
C ___ blowing debris
E ___ corroding/leaking containers
F ___ other ___
x none of the above

°Characterization of wastes found in landfill (note drums, tanks, sludge, liquid, solids)

1)poss former impoundment filled with solid material starting to revegetate 2)poss former impoundment filled with solid material w/tank revetments built upon w/mounds of Lt. material 3)poss former landfill now used to store mounds of solid material 4)soild waste landfill 5)poss former landfill revegetated

10. Remedial activity (past or ongoing) ___ Yes ___ No x Cannot Be Determined

°If yes, specify ___

11. Security

°artificial or natural barrier around entire facility x Yes ___ No

(Specify) railroad, fence, water

°means to control entry ___ Yes x No (Specify) ___

12. Transportation modes: x rail x road x water ___ air

13. Surrounding land uses x industrial ___ commercial ___ residential x other landfill

14. Potential problem areas of the general facility:

A ___ eruptions, explosions, fire or reactions ___
B ___ site instability (e.g., erosion, settling) ___
C ___ runoff from contaminated areas ___
D ___ deterioration of structures and equipment ___
E ___ disorderliness or poor housekeeping ___
F ___ other ___

15. Additional remarks (e.g., other activities, closed areas)

A)drainage ditches
B)culvert
C)mounds of material
D)standing liquid
E)ground scarring

EPA REGION III
RCRA RECORDS CENTER

DOC ID # 7268
PAGE # 4

IMAGERY COVER SHEET

THIS DOCUMENT IS AN UNSCANNABLE ITEM

Contact the RCRA Records Center to view this document.

FACILITY NAME Hawkins Point

EPA ID # MDD000731356

DESCRIPTION OF IMAGERY Aerial Photograph

NUMBER AND TYPE OF IMAGERY ITEM(S) 1 photograph

DATE OF IMAGERY 8-21-85

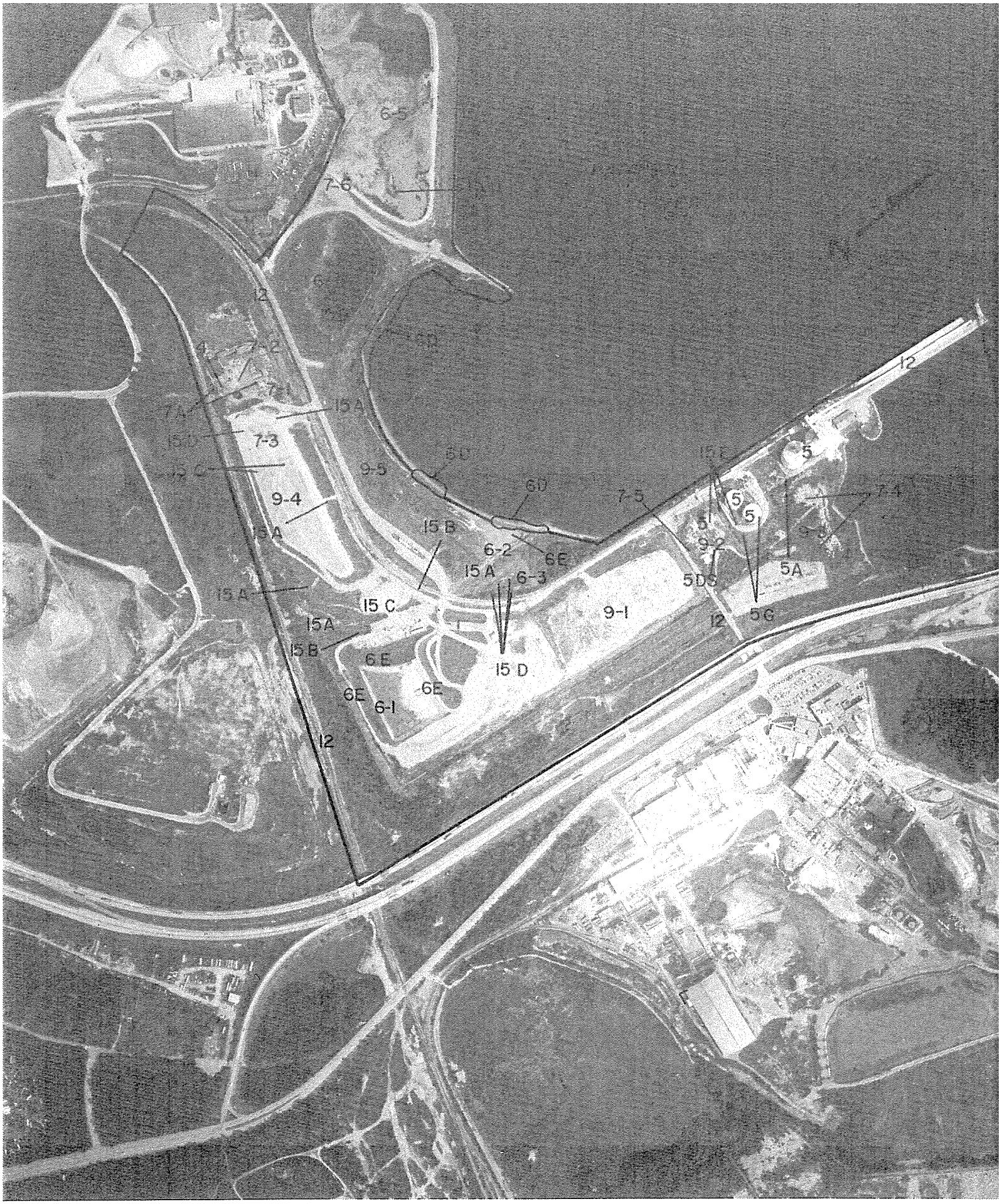


FIGURE 11
HAWKINS POINT AUGUST 21, 1985 APPROX SCALE 1

November 20, 1986

Newspaper Article regarding Allied Chemical

11-20-86
Sun

Allied gets OK to dump hazardous plant debris

By Leslie Walker
Evening Sun Staff

Allied Chemical will dump contaminated debris from its defunct chrome plant in Baltimore at the state-owned Hawkins Point Hazardous Waste Landfill under a far-reaching agreement approved by state officials yesterday.

The Maryland Board of Public Works approved a 30-year-plus agreement that gives Allied exclusive dumping rights to all remaining portions of Hawkins Point, the costly landfill that Maryland constructed and ceased operating in 1984 because it was unprofitable.

Allied still must obtain the required dumping permits from state and federal agencies before it can begin depositing demolition debris from the Baltimore Works, the plant located at the foot of Fells Point that Allied closed in February 1985.

The agreement calls for Allied to pay Maryland an initial fee of $1 million and another fee of $20 per ton dumped, up to $1 million, to cover any "remedial action" that may be required at the landfill in future years. Allied will pay construction costs for a new disposal container and will reimburse the state for all operating costs.

Under pressure from federal and state agencies to clean up the plant, Allied had to find a site that could accept the hazardous debris before it could begin dismantling the plant, which manufactured chrome for 140 years.

"This is not a wrecking ball demolition," said John Quinn, general manager of Allied's chrome chemical division. "This would require sophisticated washing and vacuuming of the facility."

Situated on a 22-acre site in the Baltimore Harbor, the plant is contaminated with chromium, believed to be a carcinogen. Workers dismantling the plant and removing the debris will have to take precautions not to inhale the hazardous substance.

A recent study commissioned by Allied to determine the extent of contamination from the plant showed that about 24 pounds of chrome are seeping into the harbor daily. The chrome has entered the Patuxent Aquifer, which runs underground in the harbor area, but is not projected to pollute nearby drinking wells within the next 100 years, the report said.

In agreeing to make Hawkins Point available to accept Allied's debris, state officials cited the difficulty the company faced in finding a suitable site. Allied officials said that if they

See DUMPING, C11, Col. 1

11-20-

Allied gets state OK to dump debris

DUMPING, From C1

could not use Hawkins Point, they likely would have to transport the debris out of state — a more costly solution that would pose additional risks during transportation.

"There's not much alternative, is there?" Gov. Harry R. Hughes said before he, Treasurer William James and Comptroller Louis Goldstein — who make up the Board of Public Works — approved the deal.

State officials also cited a 1983 agreement with Allied that allowed Allied to use Hawkins Point for seven years to dispose of refuse generated as a by-product of manufacturing chrome.

Allied officials wanted to use the 1983 agreement to justify dumping demolition debris at the landfill, but state officials said they could not. State officials said the 1983 contract did not cover any debris generated after the manufacturing plant was shut down.

State officials and Allied then worked out a new agreement that calls for Maryland to receive more money from Allied than the state would have received had Allied continued dumping chrome refuse under the 1983 agreement. The new agreement also requires Allied to pay for site monitoring for 30 years after the landfill is closed, a provision that was not in the old agreement.

"Hopefully, at the end of 30 years, the site will be stabilized," John Seyffert, director of the Maryland Environmental Service, told the public works board.

Allied's Quinn said company officials hope to begin dismantling the plant next year, but he said it could take longer to obtain the required permits. Quinn said it had not been determined how much material will be deposited at the landfill.

A lawyer for the environmentalist Sierra Club, which recently notified Allied that it plans to sue the company for polluting the Baltimore Harbor, said the club will take a close look at the new dumping proposal.

"We're concerned," said John F. King, a Baltimore attorney. "It may be a perfectly acceptable point of deposit, but it will require careful scrutiny."

November 15, 1987

Reapplication for RCRA/CHS Facility Permit

REAPPLICATION FOR RCRA/CHS FACILITY PERMIT

FOR

HAWKINS POINT HAZARDOUS WASTE LANDFILL

Submitted By

Maryland Environmental Service

November 15, 1987

REAPPLICATION FOR RCRA/CHS FACILITY PERMITS

for

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREA 5

November 15, 1987
Revision No. 00

REAPPLICATION FOR RCRA/CHS FACILITY PERMITS
for
HAWKINS POINT HAZARDOUS WASTE LANDFILL
AREA 5

I. INTRODUCTION

In August of 1983, in accordance with 40 CFR 270, the Maryland Environmental Service submitted Part B of the RCRA permit application for Area 5 of the Hawkins Point Hazardous Waste Landfill (HWL). This submittal consisted of "Engineering Analyses and Design Documentation", "Engineering Analyses and Design Documentation, Appendices", "Operation & Maintenance Manual, Area 2,4,5", and "Part B Permit Facility Design - Area 5: Site 2 Expansion". Area 5 of the Hawkins Point HWL was subsequently issued RCRA Permit Number MDD 000731356, effective May 15, 1985, and Controlled Hazardous Substances Facility Permit Number A-264, effective May 10, 1985, by the U.S. Environmental Protection Agency (USEPA) and the former Maryland Department of Health and Mental Hygiene (DHMH), respectively, to dispose of chrome are tailings. The Maryland Environmental Service is submitting this document to satisfy requirements for a reapplication for the RCRA and CHS permits currently in effect. This document updates and modifies the original submittal documents, and in conjunction with the original permit documents, comprises the reapplication materials.

As of June 1, 1985, Allied Corporation ceased the production of chromium and chromium-based products at the Baltimore Works in Baltimore, Maryland. Allied Corporation is currently conducting a Remedial Investigation/Feasibility Study to determine the schedule and extent for disassembly and ultimate disposal of the Baltimore Works plant. The use of the remaining permitted capacity of Area 5 of the Hawkins Point Hazardous Waste Landfill (HWL) for the purposes of disposal of the potentially-contaminated fraction of the disassembled plant is considered to be the most environmentally-sound and economically-feasible means of closing the Baltimore Works facility. Potentially contaminated trash and debris would be disposed in a facility designed to meet U.S. Environmental

Protection Agency (USEPA) requirements for hazardous waste disposal facilities.

The following sections of this submittal address specific modifications to each of the previously-cited documents currently utilized as the basis for the existing permits. Those portions which are not hereby altered remain in effect with this submittal. For the convenience of the reviewer, all tables and figures have been collectively presented at the close of the text.

II. OPERATIONAL MODIFICATIONS (1983 TO 1987)

A. General

1. "Allied Chemical Company" is now referred to as "Allied Corporation," and should be so modified throughout the documents.

2. The contact individual regarding post-closure care (Chapter 8 of the EADD) is revised to:

NAME:	Mr. Robert Tenanty
ADDRESS:	431 Kings College Drive Arnold, Maryland 21012
TELEPHONE:	(301) 974-3276 (work) (301) 544-6738 (home)

3. The emergency coordinators for Area 5 (Chapters 5 and 11 of the O&M Manual) are as follows:

Name	Title	Home Address	Telephone Number*
R. Tenanty	Site Superintendent/ Quality Assurance Chemist	431 Kings College Dr. Arnold, MD 21012	(H) 544-6738 (W) 974-3276
G.T. Watters, Jr.	Area 5 Operations Manager/Cell Foreman	2408 Willoughby Beach Road Edgewood, MD 21040	(H) 676-1018 (W) 355-3898

* (H) = Home Telephone number: Area Code 301
(W) = Work Telephone number: Area Code 301

4. References to "chrome ore tailings" for Cell Nos. 10 and 11 of Area 5 are modified to refer to "chrome contaminated trash and debris, chrome ore tailings and contaminated soil.

B. Engineering Analyses and Design Documentation Report

CHAPTER 3

1. The following principal ancillary facilities are no longer in operation: 1.) a scale plaza/office trailer; 2.) a laboratory trailer and 3.) a guardhouse.
2. An Area 2/3 RCRA permit application has been prepared for future landfill development in this area to accept chrome contaminated trash and debris, chrome ore tailings and contaminated soil. This facility is proposed to become operational when Area 5 reaches its design capacity. No further development plans are scheduled for Area 4.
3. In June of 1986, interim closure procedures were initiated at Area 5 to accommodate the temporary reduction of disposal materials. This interim closure serves only as an interruption to the operations; disposal procedures will continue as specified upon resuming waste-filling activities, with the exception of the changes noted herein. The existing status of the Area 5 facility is detailed in Chapter 7 of the permit reapplication.
4. An additional construction contract has been completed for the development of Area 5:
   - Contract 4: "Site Development for Cell No. 6" (June 3, 1983):
     - Cell No. 6 earthen berms and synthetic membrane liner.
     - Electrical Systems.
     - On site road construction.
     - Seeding.
     - Security Fencing.

CHAPTER 4

1. Additional monitoring wells were installed in 1983 and 1985 at the site. Also, the results of more recent hydrogeologic studies were subsequently presented in the "Hydrogeologic Assessments" for Areas 3 and 5 prepared separately for the Maryland Environmental Service and Allied Corporation, respectively, by Black & Veatch, Engineers - Architects in 1985.

   In accordance with the Area 5 permit, the following water-quality parameters are analyzed quarterly; barium, chloride, sodium, specific conductance, sulfate, total chromium, hexavalent chromium, iron, manganese, pH, and TOX.

CHAPTER 5

1. The slope stability analyses performed for Area 5 revealed a base failure for the worst-case condition; i.e., the foundation soil, rather than the in-place waste material, controlled the failure plane. This analysis therefore remains valid for the stability of the berms with the revised waste composition. In addition, the revised waste composition will have a lower density than the original waste stream, and this will increase the factor-of-safety obtained. The settlement predictions originally proposed for Area 5 will also not be significantly affected by a change in waste composition. The decreased density of the waste material will serve to slightly reduce settlements predicted based on chrome ore tailings density. However, as the majority of the landfill capacity has been in-place for over a year, further settlement is likely to be insignificant.

CHAPTER 6

1. Information to update ground-water quality data from monitoring wells at the BFI Landfill and the SCM Landfill was not available for inclusion herein.

C. Operation & Maintenance Manual

CHAPTER 1

1. The Operations and Maintenance Manual is no longer applicable to Areas 2 and 4 of the Hawkins Point facility, and is intended for use only in Area 5.

CHAPTER 2

1. Landfill equipment designated for use in Area 5 includes the following:

o For General Use:

- Water Tank Truck: Ford 8000C: 2,000-Gallon Tank.
- Safety Van: Chevrolet Van 20.
- Tracked Front-end Loader: Caterpillar Model No. 955.

o For Area 5 Use:

- Crawler Tractor with Dozer Blade: Caterpillar Model No. D-6.
- Crawler Tractor with Dozer Blade: Caterpillar Model No. D-4.
- Bulldozer: Case Model No. 450.
- Self-loading Scraper: International Model No. 412.
- Backhoe: Case Model No. 580.
- Towed Sheepsfoot Roller.
- Pickup Truck.

In addition, equipment from other areas of the facility and/or rental equipment is available for use on an as-needed basis.

CHAPTER 3

1. Area 5 has received a final RCRA permit (Permit Number MDD 000731356) from the USEPA on May 15, 1985 and a coincident final CHS permit (Permit Number A-264) from the Maryland DHMH on May 10, 1985.

CHAPTER 10

1. The following water-quality parameters are analyzed quarterly; barium, chloride, sodium, specific conductance, sulfate, total chromium, hexavalent chromium, iron and manganese, pH and TOX.

III. PERMIT MODIFICATIONS

A. Engineering Analyses and Design Documentation Report

CHAPTER 2

1. Replace the RCRA Part A Permit Application with the updated form provided herein.

CHAPTER 4

1. Replace Sections 4.5.4.2 through 4.5.4.5, 4.5.5, 4.6.1, 4.5.2 and 4.6.3 with the respective updated sections.

CHAPTER 5

1. Insert the following discussion, Section 5.1.1A after Section 5.1.1.

CHAPTER 6

1. Insert the following discussion, Section 6.1A, after Section 6.1. Replace Section 6.3.2 and Section 6.3.3 beginning with the third paragraph of Page 6-6 with the updated section.

CHAPTER 7

1. Insert the following discussion, Sections 7.1A, 7.2A and 7.3A after Sections 7.1, 7.2 and 7.3, respectively.

CHAPTER 8

1. Replace Section 8.1.8 and figure 8.2 with the respective updated section and figure.

B. Operation & Maintenance Manual

CHAPTER 4

1. Replace Sections 4.1, 4.2, 4.3, 4.5 and 4.6 with the respective updated sections.
2. The Hawkins Point HWL will receive sporadic truck traffic due to a wide range in the volume of debris generated on a daily basis. Traffic routing will be as indicated in Figure 4.5.

CHAPTER 5

1. Replace Section 5.3.6 with the updated section.

CHAPTER 6

1. Delete Section 6.3.2 regarding scale maintenance.

CHAPTER 8

1. Replace Figure 8.1 and delete Job Position Requirements for the Chemical Analyst and Quality Control Technician.

CHAPTER 11

1. Replace Table 11.1 with the updated version.

4.5.4.2 Ground-water Elevations. Based on measurements of ground-water levels in the on-site and nearby monitoring wells and piezometers, a ground-water contour map was constructed (see Figure 4.17). Ground-water elevations used in plotting this map were measured in October 1987. Elevations of ground-water (ft. above MSL) in the near-surface aquifer (the Cretaceous and post-Cretaceous sediments) on and near the site range from 1.3 to 36 feet. Ground-water elevations in Area 5 ranged from 3.0 to 15.0 feet above MSL.

The most recent local ground-water contour map, based upon the current study, is generally consistent with historic and regional information. Local ground-water contours tend to converge near the present-day Thoms Creek, which serves as a possible discharge area (Areas 4 and 5). The interpreted local flow is toward the northeast-southeast trending trough of post-Cretaceous sediments previously identified. A local ground-water mound in the landfill southwest of Area 5 seems to drive the flow through the trough. It appears that a local component of flow also exists to the southwest toward the infilled Thoms Creek Lake. This flow, however, may be reversed by the regional ground-water gradients back towards the Hawkins Point HWL site before actually reaching the former lake area.

There are two areas of local ground-water highs currently on the site, along the western side of Area 5 and in the center of Area 3. The western side of Area 5 borders a topograhic high consisting of Cretaceous sands overrun by upland gravels. The BFI and SCM-Glidden landfills have increased the ground-water mounding in this area in recent years. Both local and regional flows are generally away from this high, toward the east. The regional flow continues beneath Area 5 toward Thoms Cove.

The second, and much smaller local ground-water high occurs in Area 3 beneath Cell No. 40. Just as natural topographic highs act as recharge areas raising the water table elevations beneath them, the chrome ore tailings cells tend to retain water received from rainfall. As this extra water drains into the subsurface, it creates a local ground-water mound

beneath it. Ground-water flow radiates out from the center of the mound in all directions. This mounding effect could locally override the regional flow directions toward Thoms Cove. This mounding effect has been observed to lessen in recent years.

The entire western border of the site is bounded by other disposal facilities. Overlying the historic location of Thoms Creek Lake west of Areas 3 and 4 is a closed landfill which is maintained by BFI-Waste Systems (BFI). Adjacent to Area 5 on the west is a disposal site operated by SCM/Glidden (SCM). Portions of both of these facilities are hydraulically upgradient of the Hawkins Point facility both regionally and locally. Thoms Creek flows through the site into Thoms Cove with flow originating west of the Hawkins Point site.

4.5.4.3. Ground-water Flow/Hydraulic Conductivities. The results of aquifer tests to assess hydraulic conductivities (permeability) are indicated in Table 4.1. Included in the table are descriptions of the materials encountered within the screened interval of the well. It should be noted that the descriptions provided for the detection monitoring wells are from drillers' logs, and several descriptions appear inconsistent with the permeability test results. These soil descriptions were, therefore, not used in the hydrogeologic interpretations.

Hydraulic conductivities range from 5.5 centimeters per second (cm/sec) in sand to 2.4×10^{-8} cm/sec in clay. Table 4.2 represents the typical range of relative permeabilities measured in these materials and Figure 4.18 indicates their areal distribution.

Table 4.2: Summary of Hydraulic Conductivities

Material	Typical Range in Hydraulic Conductivities (cm/sec)
silty sand; sand	5.5 to 1.0 x 10^{-6}
clayey sand; clay and sand	2.7 x 10 -3 to 9.6 x 10^{-7}
silt; clayey silt; sandy silt	8.4 x 10 -5 to 2.4 x 10^{-7}
clay; silty clay	5.4 x 10 -6 to 2.4 x 10^{-8}

Note: Wells T and U were logged by the well drillers as silts and clays in the screened intervals, however, the hydraulic conductivities were calculated to be 6.7 x 10 -3 cm/sec, and 4.9 x 10 -4 cm/sec respectively. These hydraulic conductivity values were not included in the above table.

Ground-water gradients were assessed by using 3-point solutions of ground-water elevations and by using the ground-water contour map. Gradients in Area 5 ranged from 0.014 feet/foot to 0.041 ft/ft with an average of 0.029 ft/ft. Most gradients were between 0.020 and 0.030 ft/ft.

Most of the flow toward Thoms Cove and Thoms Creek from Area 5 exhibits a gradient ranging from 0.025 to 0.030 ft/ft. The steepest interpreted gradient occurs across the center of Area 5 through the post-Cretaceous sediment trough. The flattest gradient occurs in the northern corner of Area 5.

The velocity of ground-water can be estimated by using Darcy's seepage velocity equation:

$$V = \frac{Ki}{n}$$

where:

V = seepage velocity (ft/day)

K = hydraulic conductivity (ft/day)

i = hydraulic gradient (ft/ft)

n = effective porosity.

Based on hydraulic conductivities derived from the field aquifer tests and using an assumed porosity of 0.2, the velocity of ground-water flow beneath the various areas of the site was estimated. Although it is difficult to calculate specific values due to the complexity of the stratigraphy, generalizations can be made based on the hydraulic conductivities and gradients observed.

Sandy materials (silty sands) which predominate under Area 5 have estimated velocities on the order of 1 to 2 feet/day, or less. However, the potential for greater velocities exists since hydraulic conductivity of 5.5 cm/sec was observed in well 2E in the post-Cretaceous sediments. The trough of post-Cretaceous fluvial sediments in the center of the site is estimated to have velocities on the order of 1 foot/day. This is based on the sand layers which occur in that area and the areal distribution of hydraulic conductivities. Velocities in the more massive, siltier materials may be on the order of 0.1 ft/day. Significantly slower velocities would be associated with the Cretaceous clays of the site.

4.5.4.4 Ground-water Fluctuation. During the previous site investigation, periodic readings of water levels were obtained in the 2-inch diameter wells. The period covered from September 1981 through May 1983. During the current study, readings were obtained in all existing site wells during October 1987.

Most of the major fluctuations noted in the Harrington, Lacey & Associates report were attributed to construction activities such as excavation and filling operations and installation of the ground-water interceptor. The maximum fluctuations were on the order of 8 feet. A comparison of the recent readings to the 1981 and 1982 readings is presented in the Table 4.3. Typically, fluctuations are on the order of a few feet except for wells HB-15 and HB-16. Both these wells were discussed in the previous report as being influenced by construction activities during 1982.

Declines in the ground-water levels between the previous ground-water contours and those constructed for this study are on the order of 1 to 3 feet in Area 5. Recent changes in ground-water levels have been less than those observed in past studies.

4.5.4.5 Ground-water Recharge. The major source of ground-water recharge appears to be infiltration of precipitation through the post-Cretaceous sands and silts throughout the site and through the Cretaceous sediments to the west of Area 5. Recharge appears to be concentrated in the areas of ground-water highs (BFI and SCM-Glidden landfills).

4.5.5 Flow Rate of Chemical Constituents

The migration of leachate components through a heterogeneous soil involves an extremely complex series of mechanisms. Leachate stabilization or migration depends upon not only on the physical and chemical behavior of the leachate but also on numerous soil properties, such as texture, structure, mineralogy, and density. Leachate components could be classified according to their ionic structure; i.e. heavy metals, salts or exchangeable bases, pathogens, organics, etc., or they can be classified according to their reactive nature; i.e. more or less dense than water, organic or inorganic, reactive or inert, etc. Each component has a different solubility, affinity for absorption, and migration rate. These also vary with soil pH, temperature, and saturation. In addition, the natural chemistry of the ground-water can affect the migration of

contaminants. With consideration of these factors, only general statements can be made about the migration of leachate components.

Generally, metallic ions can be absorbed and exchanged on a clay compound, with the partitioning varying for the different metallic ions. Heavy metal anions such as chromium compounds (chromate, dichromate ions), much like chlorides and sulfates, are not highly sorbed to the solid phase in the saturated or unsaturated zone. In a high pH environment many metal ions precipitate out of solution as insoluble oxide, hydroxide, phosphate, and sulfide complexes. With a drop in pH and reducing conditions in the soil, these insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium compounds may absorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Precipitation is generally more effective than absorption. Trivalent chromium is typically only slowly mobile in aerobic, unsaturated conditions. Reports indicate that increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxide contents. Hexavalent chromium usually does not precipitate in significant amounts, and its mobility increases between pH levels of 7 to 8.

Many variables are present in the chrome ore tailings underlying Areas 3 and 5 which may tend to enhance and/or attenuate the movement of chromium compounds into the ground-water. Because attenuation properties are variable both in the nature of the waste and the subsurface environment, it is difficult to predict the rate of flow. It can be conservatively assumed that non-reactive components travel through the ground-water at a rate equal to the seepage velocity. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may cause components to travel faster than or in different directions from the flow of ground-water. Density differences in some ions (chrome in particular) may cause leachate components to sink rather than flow with the advective forces, or may slow their migration rate.

4.6 GROUND-WATER MONITORING PROGRAM

4.6.1 General

The locations of the monitoring wells installed at the Hawkins Point HWL site, and their relationship to the waste management areas are indicated on Figure 4.19. These wells were installed at the direction of the DHMH as part of the Interim Expansion Permit requirements. Additional monitoring wells were installed by Woodward-Clyde Consultants in 1984/1985. Details regarding these wells are included in Section 4.5.2. Ground-water sampling has been performed by the Maryland Environmental Service since February 1983. The historical water quality data is presented in Appendix N. Analytical testing is performed by a commercial laboratory. Initially, samples were collected on a monthly basis and analyzed for the following:

- Parameters characterizing ground water as a drinking water supply:
  - Arsenic
  - Barium
  - Cadmium
  - Chromium
  - Fluoride
  - Lead
  - Mercury
  - Nitrate (as N)
  - Selenium
  - Silver
  - Endrin
  - Lindane
  - Methoxychlor
  - Toxaphene
  - 2, 4-D
  - 2, 4, 5 TP Silvex
  - Radium
  - Gross Alpha
  - Gross Beta

- Turbidity
- Coliform Bacteria

o Parameters establishing ground-water quality:
- Chloride
- Iron
- Manganese
- Phenols
- Sodium
- Sulfate

o Parameters used as indicators of ground-water contamination:
- pH
- Specific Conductance
- Total organic Carbon
- Total Organic Halogen

Sample collection, shipment, and analyses control are included in Appendix J. In June of 1984, following more than one year of data collection, the monitoring program was reduced to include: arsenic, barium, cadmium, chromium (total), fluoride, lead, mercury, nitrate, selenium, silver, chloride, iron, manganese, phenols, sodium, sulfate, pH, specific conductance, TOC, TOX, chromium (hexavalent), nickel, and zinc. In March of 1985, the program was again reduced in scope to include: barium, chromium (total), chloride, iron, manganese, sodium, sulfate, pH, specific conductance, TOC, TOX, chromium (hexavalent). This program currently includes the following wells: 2A, 2B, 2D, 2E, 2F, 2G, 2H, 2J, M, R, S, T, U, V, W, X, Y and Z.

Numerous monitoring wells are located in the vicinity of the Hawkins Point site. Based upon the ground-water elevation contour maps constructed for this study, wells 2-B and 2-J are considered to be upgradient of Area 5. Data are also available on other upgradient wells located on adjacent sites (see Section 6.3.3). Additional wells are located hydraulically downgradient from the waste disposal areas. Figure 4.19 indicates the location of the detection monitoring program wells with

respect to the waste disposal areas and the ground-water elevation contours.

Since numerous wells exist hydraulically upgradient of the Hawkins Point site, general background water quality for monitoring purposes could be established by sampling most upgradient wells, including those on the SCM-Glidden and BFI properties. Therefore, it is recommended that all wells that might indicate ground-water quality upgradient of the Hawkins Point HWL site remain functional for this purpose.

4.6.2 Background Ground-water Data

The original monitoring wells for the facility were abandoned in 1983 at the direction of the DHMH. Data results for these wells cover a period from July 1980 to July 1982, but are considered invalid due to questionable well installation techniques. Additional detection monitoring wells were installed in late 1982 and early 1983, and new detection monitoring wells were installed in December 1984. Therefore, a minimum of one year of water quality data exclusive to Area 5 has been collected as per Part 264.97(g)(1). Thus, statistically valid increases and general background variations may be established. Resumption of quarterly sampling in Area 2/3 will provide additional data for establishing statistical changes in water quality for the parameters listed previously in accordance with 40 CFR 264.92(c).

In determining background water-quality to establish compliance with 40 CFR 264.92 (c), it may be appropriate to consider not only the results of the Hawkins Point upgradient wells, but also data obtained at nearby facilities. Off-site data may be especially useful to the potential for upgradient sources of contaminants.

4.6.3 Procedure for Determining Statistically Significant Increase in Monitored Parameters

Data from an upgradient and downgradient observation well surrounding Area 5 were analyzed by the methods outlined in 40 CFR 264, Subpart F, paragraph 97 (h)(1) and 40 CFR 264, to determine if a statistically significant increase in contaminant concentrations has occurred at the

downgradient well. The constituents used for comparison were the 9 USEPA Interim Primary Drinking Water Standard Parameters, namely arsenic, barium, cadmium, chromium, lead, mercury, nitrate (as N), selenium, and silver.

The background value for each constituent was established for Area 5, using well 2B as the background well. The compliance monitoring well used for comparison was well 2D.

As several of the 9 Water Standard Parameters are no longer monitored, the ten (10) most recent sampling events were used in the comparison. The date of the last sampling event for each parameter is indicated on the table of T-test results presented in Appendix X. A comparison of well 2J and monitoring well 2G, background well 2B and monitoring well 2F and background well 2A and well 2F was also performed. These comparisons were made for 5, 10, and 10 sampling events respectively, and included only those Interim Primary Drinking Water Standards currently monitored, barium and chromium.

The statistical analysis was performed to determine whether the difference between the mean of the constituent at the compliance monitoring well, and the mean of the constituent at the corresponding background well was significant at the 0.05 confidence level, using Cochran's Approximation to the Behrens-Fisher Student's T-test. An abbreviated explanation of the T-test, and calculated statistical parameters are provided in Appendix X.

The T-test results between wells 2B and 2D indicate that the only parameter to significantly increase in concentration downgradient from Area 5 is barium. It is proposed that this increase in barium is attributed to off-site sources, as barium is not a significant component of the waste stream. A geologic trough is hypothesized to transverse the area from the southwest to northeast and extending to Thom's Cove, and would serve as a conduit for migration from off-site. This theory is further supported by statistical results obtained in the EADD for Area 2/3 of Hawkins Point HWL, completed in February of 1987.

The comparison between wells 2B and 2F again reflects the increase in barium downgradient of the landfill. However, the increase is not

observed between upgradient well 2J and downgradient well 2G. Well 2J, which is off-site and very near the location of the suspected trough, has elevated levels of barium. Well 2G is also near the trough, but has slightly lower levels of barium.

The only significant downgradient increase of chromium resulted in the comparison of wells 2J and 2G. As both monitoring locations are influenced by the geologic trough, this increase may be attributed to off-site sources. The average concentration of chromium in the upgradient well, 2J, is 0.214 mg/l, well above the standard of 0.05 mg/l.

Finally, a comparison between well 2A and 2F produced no significant increases in well parameters.

5.1.1.A SUBSURFACE CONDITIONS

On July 2, 1984 a geophysical investigation of Area 5 was initiated. The purpose of the investigation was to identify areas in which elevated levels of chemical constituents may occur around the perimeter of the Area 5 facility. The investigation began with a general reconnaissance of the site using terrain conductivity. The conductivity surveys identified several regions where anomalously-high conductivities were encountered. Based on these results, a more detailed survey was performed in these areas using electrical resistivity, which provides an assessment of the electrical properties of soil materials with depth. The procedures utilized for both types of surveys are included in the Area 5 Hydrogeologic Assessment, 1985, as is the data for the resistivity survey.

On July 31, 1984, a subsurface exploration program was initiated in Area 5. The purpose of the program was to perform test borings and to install observation wells to monitor piezometric levels and obtain water and soil samples for subsequent chemical analysis. Four observation wells were installed: numbered 2F, 2G, 2H and 2J.

The borings were advanced to depths of 30 to 35 feet below the existing grade elevation utilizing a mobile B-61 drill rig and 6-inch inside diameter (ID) hollow stem augers. The total boring depths ranged from 30 to 35 feet. Standard Penetration Test (SPT) split-spoon samples were obtained and blow counts were recorded each 5 feet of depth, and at the intended screen depth. A 4-inch ID PVC monitoring well was installed in each completed boring. The well was then sand packed to within 2 feet above the screen, a 2-foot bentonite slurry was set above the sand-pack and a grout mix of 90 percent Portland Type I cement and 10 percent bentonite was tremied into the annulus to the ground surface. After the well was grouted, a protective steel pipe with a locking cover was installed. Normally, within 24 hours of well installation, the wells were developed. Boring logs, monitoring well installation reports, and well development records are included in the Area 5 Hydrogeologic Assessment.

6.1A WASTE AND LEACHATE CHARACTERISTICS

The wastes anticipated for disposal in Cell Numbers 10 and 11 of Area 5 will consist of chrome-contaminated trash and debris, chrome ore tailings and contaminated soil (herein referenced to as "waste"). These materials are derived from the disassembly of the Allied Corporation, Baltimore Works and were exposed to chrome ore process contamination during the plant's manufacturing operation. Therefore, it is anticipated that the leachate generated by the waste will be similar in nature to the chrome ore tailings leachate. However, due to the lower chromium exposure levels, the leachate from Cell Numbers 10 and 11 of Area 5 should be less concentrated than that from the existing chrome ore tailings in Area 5. The following discussion of chrome ore tailings leachate is therefore pertinent from the standpoint of a "worst-case" analysis in light of this similarity. The "worst-case" waste was disposed previously in Area 5 at the Hawkins Point HWL, and consisted of limed, granular chrome ore tailings. The average chemical composition of chrome ore tailings is provided in percent dry weight in 2 separate analyses reported in Table 6.1a. This waste contains approximately 5 percent trivalent chromium (as Cr_2O_3) and 1 to 2 percent hexavalent chromium by weight. Other major constituents include calcium, iron silica, magnesium and sodium.

An assay by weight indicates the presence of constituents in the chrome ore tailings; however, the actual composition of a leachate depends upon the solubility of the solid components of the waste. This, in turn, is a function of the chemical characteristics of the leaching fluid. Fortunately, in the present application, there is no need to form hypotheses on the chemistry of leachate formation; direct access to the leachate was possible. The leachate collection system for Area 5 was sampled twice in Manhole 222 (MH 222), once each in September 1984 and October 1984. The average results are presented in Table 6.1b. Furthermore, well HB-82 in Area 2 is screened within the chrome ore tailings that were deposited in the original Maryland Port Administration (MPA) cells underlying Areas 2 and 3. Samples obtained from this well also constitute a chrome ore tailings leachate. Water-quality analyses

for samples from well HB-82 were available from previous studies, and are also reported in Table 6.1b. (It should be noted, however, that the water quality in HB-82 may have been further degraded by mixing with ground-waters contaminated by upgradient, off-site sources, thereby introducing additional constituents). The level of water-quality degradation in well HB-82 is much less than that in MH-222, a feature perhaps attributable to the age of the in-place chrome ore tailings. Nevertheless, both sampled locations are qualitatively quite similar.

Two Extraction Procedure (EP) toxicity analyses were performed on the chrome ore tailings, and are reported in Appendix L. The EP toxicity test results corroborate the leachate analyses; both of the EP toxicity test results indicated significant leaching of both total and hexavalent chromium. In one or the other, but not both of the analyses, lead, nickel, zinc, and barium occurred at measurable levels. Barium yielded inconsistent EP toxicity values; one test reported an EP toxicity of 52.83 mg/l while the other test result was 0 mg/l. However, an analyses of the composition of chrome ore tailings, as presented in Table 6.1a, did not indicate the presence of barium. Therefore, barium is not likely to be a substantial component of the chrome ore tailings.

Table 6.1a: Major Components of Chrome Ore Tailings

Constituent	Average percent by dry weight
Calcium (as CaO)	36
Iron (as Fe_2O_3)	22
Aluminum (as $AlF2^{O}3$)	11
Magnesium (as MgO)	9.6
Total Chromium (as Cr_2O_3)	5.2
Silica (as NaF2RO)	1.6
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.32

As stated previously, Area 5 leachate from Cell Numbers 10 and 11 is expected to be less concentrated than the leachate described herein based upon a lesser degree of anticipated soluble chromium in the wastes.

Table 6.1b: Average Leachate Composition (mg/l)

Chemical Constituent	MH-222	HB-82
Barium	1	0.06
Chloride	700	100
Hexavalent Chromium	2,000	80
Total Chromium	2,000	80
Iron	0.01	*20
Manganese	0.01	0.02
pH (pH units)	13.6	12.6
Sodium	20,000	2,000
Specific Conductance (umhos/cm)	100,000	20,000
Sulfate	600	700
Total Organic Carbon	275	600
Total Organic Halogen	1	1

Notes: 1. Concentrations are measured in mg/l unless noted otherwise. All concentrations are averages of overall available data.

2. (*) indicates that the 2 readings for iron in HB-82 were 42 and 1.1 mg/l.

6.3.2 Monitoring Wells

After the abandonment of the 5 original wells, a new program monitoring the upper waters in the near-surface aquifer was initiated, utilizing the 10 monitoring wells indicated in Figure 4.15. Ground-water monitoring was initiated in February 1983 and additional wells were installed in 1984-1985. Complete results of these analyses are presented as Appendix N. The contaminants indicating significant concentrations when compared with the USEPA Primary and Secondary Drinking Water Standards are presented in Table 6.2. Absence of a value indicates compliance with criteria. As may be noted in Table 6.2, concentrations of contaminants which are several orders-of-magnitude higher than the appropriate standard have been reported for manganese, sulfate, iron, nickel, sodium, and selenium.

None of the wells have consistently higher average concentration levels than the other wells, and there appears to be no general trend of increasing or decreasing contaminant levels among wells. These data were used to evaluate the statistical significance of a relationship between upgradient and downgradient concentration levels. The results are discussed in Section 4.6.3 and indicate that downgradient wells do not exhibit significantly higher concentration levels.

6.3.3. OFF-SITE AND DEEP ON-SITE WELLS

Figure 6.2 depicts the isoconcentration lines for iron. These values are the average of the historical data. Data within the landfill boundary is current (1987), however data outside the landfill represents records through 1983. The highest concentrations appear to be centered in two areas, the southwestern and northeastern portions of historical Thoms Lake. Concentrations generally decrease to less than 10 ppm both to the north and southeast.

Figure 6.3 depicts similar isoconcentration lines for sulfate. It appears that there are three areas of high concentration, the same two areas as with iron and an additional area in the vicinity of Well M on the

Hawkins Point HWL site. Once again, concentrations decrease to below 60 ppm to the southeast and to below 500 ppm to the west and northwest.

Figure 6.4 depicts lines of equal specific conductance. High values are centered in the southwestern part of historical Thoms Lake and in an elongated area trending approximately east-west along the center of the Hawkins Point HWL site. Concentrations decrease to below 500 umhos/cm to the northwest and southeast. The extreme drop in specific conductivities between wells 2H and U (the isoconcentration contour decreases from 25,000 to 100 umhos/cm) indicates a wide variation in the fill materials. Several outside sources may contribute to this phenomenon. At one point, a waste fixation study was conducted in this general area. No data is available on the details of this project, however, it is possible that the conductivity of this region was reduced in this experiment. A second possibility is the introduction of artifically high specific conductivities. The high concentrations appear to follow the suspected location of the hydrogeologic trough crossing the site in the direction of Thoms Cove. The introduction of metals and other conductive materials by upgradient sources could explain the observed distribution of concentrations.

There is a striking similarity between the configurations of Figures 6.2 through 6.4 for iron, sulfate, and specific conductance. The most degraded near-surface ground water appears to occur in the upper portion of the aquifer along the line diagonally across Thoms Lake from the southwest to the northeast, along the alignment of the trough as identified in the geologic discussion. Figure 6.5 depicts the distribution of average total chrominum concentrations. It is apparent from this distribution that high concentrations of total chromium have been measured in off-site as well as on-site wells. Chromium concentrations in the upper portion of the near surface aquifer at the Hawkins Point HWL site are generally lower, however, than those measured in off-site wells immediately west (hydraulically upgradient) of the site. Figures 6.2 through 6.5 therefore reinforce the overall interpretation of the regional ground-water quality, namely:

- Shallow ground water in the upgradient areas west of the Hawkins Point HWL is of poorer quality, generally, than that of the regional near-surface aquifer, and
- the water quality appears to be degraded prior to its movement onto the Hawkins Point HWL site.
- as a result of these external factors, the on-site water quality in the near-surface aquifer at the Hawkins Point HWL may have been further degraded.

7.1A GENERAL

Cell Numbers 10 and 11 of Area 5 will receive chrome-contaminated trash and debris, chrome ore tailings and contaminated soil from Allied Corporation, Baltimore Works. The anticipated waste volume for Area 5 is expected to be approximately 13,500 cubic yards. A volumetric composition by constituent is presented on Page 4-2 of the Operation & Maintenance Manual. Earthen berms approximately 7 feet in height will be constructed from materials stockpiled on-site or borrowed from offsite to form the perimeter of each cell.

The "engineering drawings of the disposal site" are presented as a plan (Figure 7.A-1) which depicts the contours of the completed long-term interim cover, and two cross-sections, designated Section A-A and B-B on Figures 7.A-2 and 7.A-3, respectively. Figure 7.A-4 presents a typical cross-section of the completed interim cover. The contours presented on Figure 7.A-1 indicate that the cover is graded to slope radially from the crown, at a minimum slope of approximately 2 percent. Within the constraints of the site geometry, and the interim disposal volume requirements, the cover has been developed so as to maximize precipitation run-off, thereby limiting the amount of precipitation available for infiltration. The disturbed area, once covered, was reseeded with the same seed mixture utilized for the remainder of Area 5 to further induce run-off and minimize infiltration through increased evapotranspiration, and also to prevent erosion of the cover.

The clay utilized for cover system construction was obtained at an off-site borrow pit, and met the specifications for final clay cover specified for Area 5. This material is specified to consist of materials classified as CL or SC under the Unified Soil Classification System, and to exhibit an average saturated hydraulic conductivity (coefficient of permeability) not greater than 3×10^{-7} cm/sec, with no test value exceeding a hydraulic conductivity of 5×10^{-7} cm/sec. A clay cover and a synthetic membrane cover cannot be compared directly as to effectiveness for "minimizing leachate formation" since the mode of failure for each

results in different volumes and types of infiltration. A synthetic membrane will fail primarily due to physical penetration of the fabric by a sharp object (puncture) or through faulty construction practices, such as improper seam sealing. Clay, while more flexible and possessing a "self-healing" property, will permit a greater unit infiltration rate through its more porous structure, provided the appropriate head and in place conditions exist. Clay material is nevertheless more permeable than a synthetic membrane under laboratory conditions; however, installation and operational considerations which greatly affect performance in the field can dictate actual properties. In the intended use as a long-term interim cover over a wastefill with a leachate collection system, the use of a relatively thick (18 inch) clay layer is considered as appropriate and effective as a synthetic membrane cover.

The interface between the existing undisturbed area containing the synthetic membrane, and the clay cover is depicted on Figure 7.A-3. It should be noted that the existing synthetic membrane and cover soil will be removed to a depth immediately above the chrome ore tailings prior to additional waste disposal. The overlying clay cover dovetails with the undisturbed membrane cover and was extended to the limits of disturbance, or integrated with the final side slope cover on the outboard slopes of the berms. Through this overlapping, any leachate which forms in the additional waste will either percolate vertically through the chrome ore tailings or travel laterally beneath the clay cover to be intercepted by the final cover lining the berms. In either case, leachate so produced would percolate toward the underlying leachate collection system for extraction. The additional waste is therby encapsulated; leachate should not exit the fill laterally or vertically. As indicated on Figure 7.A-2, the side berms are lined with a 2-foot thick clay layer on the outboard slopes. As no additional berms were constructed for this disposal operation, the new clay cover was tied into the existing berm clay layers.

A waste placement location grid for the remaining capacity of Area 5 is presented on Figure 7.A-5. This schematic can be used to identify waste fill locations within a cell and is referenced to a fixed point.

7.2A PHASED CELL DEVELOPMENT

The projected capacities of each cell are presented in Table 7.1A. The density of the waste, based on the anticipated composition, and assuming 90 percent in-place compaction, should not exceed 1.46 tons per cubic yard (t/cy), approximately equal to 108 pounds per cubic foot.

Cell Number	Estimated Cell Volume (cubic yards)
10	3,500
11	10,000
Total	13,500

The available cell capacity is likely to be less than the total waste composition volume. Following the completion of the filling operation in Cell Numbers 10 and 11, the remaining waste volume will be disposed by Allied Corporation in an approved facility. Cell Number 10 will be constructed initially. As the cell is being filled, construction of the subsequent cell will be accomplished before the capacity of the operational cell is reached. This procedure will permit continual operation and acceptance of waste throughout the facility's active life, with no delays due to construction or cell preparation.

7.3A EARTHEN BERM CONSTRUCTION

The remaining cells of the Area 5 facility will be enclosed by earthen containment berms. Each berm will be approximately 7 feet in height and consist of compacted soil fill materials. Each berm will be

constructed in a single lift. While this configuration may not maximize the contained waste volume of each cell compared with the 5-foot high lift berms constructed previously, it will provide for greater constructability, thereby resulting in a more efficient overall operation. The berm inner and outer slopes and other related construction features will be similar to the existing permitted facility berms.

8.1.8 Schedule for Closure

It is anticipated that Cell Number 10 of Area 5 may begin accepting waste in 1989. Assuming an in-place density of 1.46 tons per cubic yard (t/cy), or 108 pcf, the cumulative waste production is 19,700 tons for Area 5. The projected life for Cell Numbers 10 and 11 is estimated to be a maximum of 3 years. Therefore, on this schedule, final closure of the Area 5 facility would not occur until 1992.

USEPA regulations require closure to be completed within 6 months of receiving the final shipment of waste. If the final volume of waste is accepted in 1992, area closure will be completed by 1993. The Maryland Environmental Service will notify the USEPA Regional Administrator 180 days before beginning final closure. The proposed schedule for closure is presented on Figure 8.2. Final closure will be supervised and certified complete by an independent registered professional engineer, in addition to certification of completion by the MES.

4.0 OPERATING PROCEDURES

4.1 HOURS OF OPERATION

Area 5 of the Hawkins Point HWL will be open aperiodically to receive waste for disposal. During active disposal times, the facility will be open from 7:00 am to 4:30 pm each Monday through Saturday. The facility will be closed all other times except for maintenance, inspections and cell construction periods. The Maryland Environmental Service (MES), an agency of the State of Maryland, operates and has ultimate responsibility for the facility at all times.

4.2 GENERAL WASTE ANALYSES

Area 5 will accept only chrome-contaminated trash and debris, chrome ore tailings and contaminated soil generated by the Allied Corporation, Baltimore Works. The trash debris is generated by the dismantling of the Baltimore Works plant. Some waste may contain a small amount of hexavalent chromium; and therefore would be a hazardous waste under the definition of EP Toxicity (D007). In addition, remnant pockets of chrome ore tailings, and excavated soil contaminated with chromium, will be disposed in the facility. The various wastes therefore exhibit no other hazardous constituents. The following analysis represents the estimated physical composition of the total waste stream by volume:

Constituent	Estimated Percentage of Total Volume (cubic yard)
Concrete	8%
Brick	10%
Insulation	4%
Wood	10%
Tile	6%
Refractory	4%
Floor Slab	44%
Miscellaneous	14%
Total	100%

The average, in-place dry density for the waste is estimated to be 108 pounds per cubic foot (lb/cu.ft.). Due to the nature of the waste composition, it is necessary to limit the physical size of materials to be placed in the active cell in order to protect the integrity of the cells and maintain the overall stability of Area 5. Therefore, the maximum dimension of any waste material to be placed in Cell Numbers 10 and 11 for routine handling is limited to 5 feet. Large or bulky items in excess of this limitation will be placed individually in the active cell under the supervision of the Area 5 Operations Manager with adequate soil material placed on all sides, and thereafter properly compacted.

Allied Corporation must notify the MES in writing at least 30 days prior to any change in the demolition process or waste stream that could significantly affect the waste characteristics. Allied Corporation will also submit a waste analysis that has been performed in accordance with the USEPA manuals, "Test Methods for Evaluating Solid Waste" (SW-846, 1982), and "Methods for Chemical Analysis of Water and Wastes" (EPA 600/4-79-020, 1979). In addition, Allied Corporation will submit an annual waste analysis update to the MES.

4.3 WASTE ACCEPTANCE PROCEDURES

4.3.1 Check-In and Weighing

All waste transport vehicles will be weighed at the Allied Corporation, Baltimore Works plant immediately prior to transport to the Hawkins Point HWL. Each waste shipment will be accompanied by a standard manifest (Figure 4.1), containing the following standard information (40 CFR 262.21):

- Document number.
- Generator name, mailing address, telephone numbers, EPA identification number.
- Transporter name and EPA identification number.
- Designated disposal facility name, address and EPA identification number.
- Waste description (49 CFR 172).

- Total quantity of waste as loaded onto the transport vehicle, and weighted at the Allied Corporation, Baltimore Works.
- Certification of manifest information by the generator.

All incoming waste transport vehicles from Allied Corporation will stop at the scale plaza for processing. The manifest information will be transmitted to the Site Superintendent on a regular basis, for incorporation into the Allied Corporation Daily Receiving Record (used for internal documentation purposes by Allied Corporation only). The Allied Corporation Shipment Receipt Record (Figure 4.2 will be completed, including the date of transmittal, the number of shipments, and the total weight of waste transported. This record is kept for documentation purposes at the Hawkins Point HWL. The clerk will then forward the manifest to the Quality Assurance Chemist and direct the truck driver to Area 5.

4.3.2 Shipment Inspection

At the unloading point in Area 5 each shipment will be visually inspected to positively identify the material, and verify that the particle size restrictions and composition limitations are met. When significant variations from either typical or programmed waste shipments are detected, the Area 5 Operations Manager will decide whether the shipment will be accepted for disposal or rejected.

4.3.3 Waste Acceptance Review

The waste will not be accepted for disposal if either of the following conditions exist:

- Any of the dimensional or type limitations for demolition debris are exceeded.
- Significant errors or omissions are evident in the manifest, labeling, placarding or other documentation accompanying the shipment.

The Site Superintendent will contact Allied Corporation to resolve any discrepancy. All discrepancies found will be noted on the manifest.

Any manifest discrepancies unresolved after 15 days must be reported to the USEPA Regional Administrator and the Secretary of the Maryland Department of the Environment (MDOE), formerly the DHMH. At the unloading point in the active cell of Area 5, the manifest will be signed and dated by qualified MES personnel, with one copy retained in the file, a copy returned to the transporter, and one copy submitted to the MDOE on a weekly basis.

4.5 WASTE PLACEMENT

4.5.1 General

The purpose of the waste placement plan is to establish and maintain a logical, efficient filling sequence that incorporates maximum volume utilization techniques and ensures personnel safety and strict environmental precautions. The operating procedures discussed below are intended to achieve these objectives.

4.5.2 Filling Sequence

The cells in Area 5 will be filled in numerical order as indicated on the "Part B Permit Facility Design" drawings. For Cell Numbers 10 and 11 this will allow for the construction and completion of the berm section required for the succeeding cell while the active cell is being filled, thereby minimizing delays in the waste placement process.

4.5.3 Filling Procedure

Each cell will be filled starting from the north end of the cell, establishing a working face, and progressing toward the south end of the cell. For the initial placement of waste within a cell, a soil ramp will be constructed to allow truck access from the top of the berm to the floor of the cell. Trucks will discharge the load, except large and bulky items near the end of the cell as directed by the Area 5 Operations Manager. The waste will thereafter be moved by a bulldozer to the proper location within the cell. Bulk wastes will be spread in uniform, thin layers and compacted to the maximum practical density through several passes of the bulldozer. Large or bulky items will be placed individually in the active

cell prior to placement of cover material. A transverse working face will be established at a slope suitable for compaction and equipment movement. The waste will be disposed to the design contours. As the waste fill advances, intermediate cover will be placed as appropriate over the completed cell. Intermediate cover will be scarified prior to placement of waste in Cell Numbers 10 and 11 in order to facilitate the free drainage of leachate to the lower cells.

A temporary 12-foot wide haul road will be constructed of the same materials as the intermediate cover, including crushed stone as needed, and will extend from the edge of the cover to the working face. As this point, trucks hauling waste will be directed from the haul road, across the intermediate cover on the temporary road, and will be isolated from the waste and the waste will not be inadvertently carried from the cell on truck tires or undercarriages. Final placement of the waste will be accomplished by the bulldozer. This procedure will be repeated advancing longitudinally along the cell, until the cell achieves the design contours.

4.6 WASTE COVER PLACEMENT

Cover materials will be stockpiled as part of the cell construction procedures. Stockpiles will be located as close to the active cell as practical in order to minimize secondary handling. Waste will not be stockpiled. In order to preclude wind dispersal, the waste will be covered with soil, where appropriate, immediately after disposal. The cover soil will be placed in horizontal lifts and compacted immediately after placement to minimize fugitive dust. The waste will receive intermediate cover as the working area advances.

A minimum of 1 foot of intermediate cover will be placed during the construction of the berms for the overlying cell. Table 4.1 presents estimates of waste capacity and necessary cover volume for each cell in the Area 5 facility.

Table 4.1: Area 5 Projected Cell Capacities and Required Intermediate Cover

Cell Number	Waste Capacity (cu. yd.)	Cover Volume (cu. yd.)
10	3,500	2,900
11	10,000	1,600

All cover material will be compacted in layers not exceeding 6 inches of compacted thickness, and to a minimum density of 85 percent of the maximum dry density obtainable by ASTM D-1557 (Method D). Moisture conditioning of the cover material will be provided, if necessary, to obtain the required degree of compaction. Compacted layers will be visually inspected to assure adequacy.

All cover materials will be free of puterscrible material, solid waste, tree stumps, logs, rocks, construction debris, frozen soil and other deleterious materials. In the fall months of the operating year, sufficient cover material for at least one month of operation will be excavated and stockpiled adjacent to the working area for use during periods when wet and freezing weather could potentially make excavation impractical.

5.3.6 Communications

A telephone system is provided which permits communication between the various on-site stations in addition to communication to outside locations. Telephones will be provided in the following locations:

- o Site Superintendent/Area 5 Operations Manager office.
- o Crew facilities.

A list of emergency telephone numbers will be displayed at each location including the following:

Site Superintendent.....974-3276
Area 5 Operations Manager.....355-3898
Police Department Headquarters: Baltimore City.....222-3333
Police: Maryland State.....761-5130
Police: Anne Arundel County.....987-0101
Fire Department Headquarters: Baltimore City.....685-1313
Ambulance (Medical 9, Brooklyn, Maryland).....396-1111
Hospital (Maryland General, Baltimore City).....728-7900
Department of Health and Mental Hygiene.....243-8700 (days)
225-6860 (nights and weekends)
DHMH Spill Response.....225-5700 (days)
243-2700 (nights and weekends)
National Response Center (U.S. Coast Guard)....1-800-424-8802
Chem-Clear of Baltimore, Inc.....685-3910 (days)
.....526-6585 (nights)
Allied Corporation, Baltimore Works.....522-5200 (24-hour)

To provide for communications with key personnel who are normally not near a telphone, 2-way radios will be provided to the following individuals:

- o Area 5 Operations Manager.
- o Emergency Coordinator.
- o Area 5 Cell Foreman

A compressed air horn will be provided at the scale plaza/office area as a third system for alerting personnel at the facility. In emergency situations, the horn will be used to alert personnel across the entire

site to the hazard through a system of coded horn blasts. The coding system will be as follows:

- Continuous, long blast : EVACUATE.
- Repeated, short blasts : SPILL or FIRE.

All site personnel will be instructed during the Training Program of the proper response to these alarms.

11.7 COORDINATION AGREEMENTS

Agreements have been made between the MES and the City police, fire departments, hospitals and emergency response teams to assist in emergency situations. Each of the following agencies have been contacted and provided with a copy of this contingency plan:

Police Department Headquarters: Baltimore City.....222-3333
Police: Maryland State.....761-5130
Police: Anne Arundel County.....987-0101
Fire Department Headquarters: Baltimore City.....685-1313
Ambulance (Medical 9, Brooklyn, Maryland).....396-1111
Hospital (Maryland General, Baltimore City).....728-7900
Department of Health and Mental Hygiene.....243-8700 (days)
225-6860(nights)
DHMH Spill Response.....225-5700 (days)
.....243-2700 (nights and weekends)
National Response Center (U.S. Coast Guard).....1-800-424-8802

The departments listed above are the primary emergency authorities in the event of maore than one department response to an emergency call. In addition, the police are available for traffic and crowd control as well as security services. These forces will assist the facility security personnel and an as-needed basis. The fire department will respond to fires and other emergency incidents. Facility personnel will coordinate efforts with the fire department in fighting large fires and assisting with rescue efforts.

PART A PERMIT

APPLICATION

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F

LABEL ITEMS

I. EPA I.D. NUMBER

II. FACILITY NAME

III. FACILITY MAILING ADDRESS

IV. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	MARK 'X' YES	MARK 'X' NO	MARK 'X' FORM ATTACHED
A. Is this facility a publicly owned treatment works which results in a discharge to waters of the U.S.? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X	
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X		X
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP HAWKINS PT HAZARDOUS WASTE LNDFLL AREA 5

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
2 TENANTY ROBERT PROJECT MANAGER	301 974 3276

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 MD ENVIR SERVICE 2020 INDUSTRIAL DR.

B. CITY OR TOWN	C. STATE	D. ZIP CODE
4 ANNAPOLIS	MD	21401

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

5 5501 QUARANTINE ROAD

B. COUNTY NAME

NA

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
6 BALTIMORE	MD	21226	

VII. SIC CODES (4-digit, in order of priority)

A. FIRST	B. SECOND
9511 (specify) Air, Water and Solid Waste Management	(specify) N/A
C. THIRD	**D. FOURTH**
(specify) N/A	(specify) N/A

VIII. OPERATOR INFORMATION

A. NAME: MARYLAND ENVIRONMENTAL SERVICE

B. Is the name listed in Item VIII-A also the owner? [XX] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

Answer: S (specify)

D. PHONE (area code & no.): A 301 974 3276

E. STREET OR P.O. BOX: 2020 INDUSTRIAL DRIVE

F. CITY OR TOWN: ANNAPOLIS

G. STATE: MD

H. ZIP CODE: 21401

IX. INDIAN LAND

Is the facility located on Indian lands? [ ] YES [XX] NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water): 9 N MD-0061417A	**D. PSD** (Air Emissions from Proposed Sources): 9 P
B. UIC (Underground Injection of Fluids): 9 U	**E. OTHER** (specify): 9 A264 (specify) Controlled hazardous substances Facility Permit
C. RCRA (Hazardous Wastes): 9 R MDD000731356	**E. OTHER** (specify): 9 85-DP-2229A (specify) State Discharge Permit

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property bounderies. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

Area 5 of the Hawkins Point Hazardous Waste Landfill functions as a facility for the disposal of chrome-contaminated trash debris, chrome ore tailings and contaminated soil generated by the Allied Corporation, Baltimore Works.

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
John D. Seyffert, Director	John D. Seyffert	11/30/85

COMMENTS FOR OFFICIAL USE ONLY

C

II. PROCESSES *(continued)*

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER – Enter the four–digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four–digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each **listed waste** entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each **characteristic** or **toxic contaminant** entered in column A estimate the total annual quantity of all the non–listed waste*(s)* that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each **listed** hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non–listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate **all** the processes that will be used to store, treat, and/or dispose of all the non–listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non–listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. EPA HAZARD. WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
X-1	K054	900	P	T03 D80	
X-2	D002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002				*included with above*

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER F M D D 0 0 0 7 3 1 3 5 6

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

[X] 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

YR.	MO.	DAY
8 0	0 8	0 5

[ ] 2. NEW FACILITY *(Complete item below.)*

FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

YR.	MO.	DAY

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

[X] 1. FACILITY HAS INTERIM STATUS

[ ] 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code*(s)* in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C).*

B. PROCESS DESIGN CAPACITY – For each code entered in column A enter the capacity of the process.

1. AMOUNT – Enter the amount.
2. UNIT OF MEASURE – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	A
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(shown in line numbers X-1 and X-2 below):* A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

C DUP 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G	
X-2	T 0 3	20	E	
1	D 8 0	13,500	Y	
2				
3				
4				
5				
6				
7				
8				
9				
10				

CONTINUE ON REVERSE

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)		FOR OFFICIAL USE ONLY	
W M D D 0 0 0 7 3 1 3 5 6	T/A C 1	W DUP	T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D 0 0 7	4,500	T	D 8 0				
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

I. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

Hazardous waste numbers entered indicate types of waste that will be accepted at the facility. This waste consists of chrome-contaminated trash and debris, chrome ore tailings and contaminated soil.

EPA I.D. NO. *(enter from page 1)*

M	D	D	0	0	0	7	3	1	3	5	6	T/A	C
													6

V. FACILITY DRAWING

All **existing** facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).* See Figure 2.1

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground–level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail).* See Figure 2.2

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
39 12 30 N	076 33 00 W

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
	C G		

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
John D. Seyffert, Director	John D. Seyffert	11/30/87

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
John D. Seyffert, Director	John D. Seyffert	11/30/87

CONTINUE ON PAGE 5

April 1992

Permit Application for Contaminated Soil Storage Facility at Hawkins Point Hazardous Waste Landfill Area 6

MARYLAND PORT ADMINISTRATION

DUNDALK MARINE TERMINAL

PERMIT APPLICATION

FOR

CONTAMINATED SOIL STORAGE FACILITY

AT

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREA 6

APRIL 1992

MARYLAND ENVIRONMENTAL SERVICE

1.0 INTRODUCTION

The Maryland Port Administration (MPA) operates the Dundalk Marine Terminal (DMT), which is located at 2700 Broening Highway, Baltimore, Md. 21224. A portion of the site was built using chrome ore tailings from the Allied Signal Chemical Plant as fill material. Construction, utility repair and maintenance activities regularly encounter contaminated soils as well as some of the identifiable chrome ore tailings. These excavated materials are hazardous waste by characteristic under Federal and (after July 1, 1991) State of Maryland hazardous waste laws and regulations because they exhibit the characteristic of corrosivity and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit of 5.0 mg/l total chromium.

As of September, 1991 MPA has 2,500 CY of contaminated material stockpiled at DMT. MPA staff anticipate that another 5,000 CY of contaminated material will be generated during Terminal improvements for a tenant and that an additional 2,000 CY will be generated by utility repair and maintenance activities each year. A Consent Order (see Appendix A) issued by MDE stipulates that the material must be managed in accordance with statutory and regulatory requirements.

The Maryland Environmental Service (MES) is currently requesting proposals from firms or contractors interested in providing a system to treat chromium contaminated soil at the Dundalk Marine Terminal. MES will proceed with design work on a storage facility, to be located on the MPA owned property formerly occupied by Cosmin Corporation in Area 6 of Hawkins Point Hazardous Waste Landfill located at 5501 Quarantine Road, Baltimore, Md. The Hawkins Point HWL is permitted by the Maryland Department of the Environment and the Environmental Protection Agency, and operated by the Maryland Environmental Service.

Analyses of material from on-site excavation indicates that with proper materials testing and segregation, only a portion of the excavated material needs to be managed as a hazardous waste. All non-hazardous material will be hauled off-site. All chromium contaminated soil will be transported to the storage facility. The storage facility will be salt dome type with a capacity of 4,000 to 5,000 CY.

This report is prepared for the permit application for the new storage facility to be located in Area 6 of the Hawkins Point Hazardous Waste Landfill.

2.0 PERMIT APPLICATION CHECKLIST

COMAR 26.13.07.02D	Requirement	Location in Application
(1)	- Description of activities requiring permit	1.0
(2)	- Name, mailing address, and location of the facility	3.6
(3)	- SIC codes	3.6
(4)	- Operator's name, address, telephone number, and ownership status	3.6
(5)	- Listing of all permits or construction approvals received or applied for	3.1
(6)	- Topographic map	3.5
(7)	- Description of the nature of business	3.0
(8)	- Latitude and longitude	3.6
(9)	- Name, address, and telephone number of the owner of the facility	3.6
(10)	- Statement that facility is new or existing	1.0
	- Statement that application is first or revised	1.0
(11)	- Scale drawing (existing facility only)	NA
(12)	- Photographs (existing facility only)	NA
(13)	- Description of the process to be used to handle wastes and the design capacity of each process	3.0
(14)	- Specification of wastes to be handled, quantity of wastes to be handled annually, and general description of processes to be used	3.0
(15)	- General description of the facility	3.0

COMAR 26.13.07.02D	Requirement	Location in Application
(16)	- Chemical and physical analyses of hazardous wastes to be handled	3.4
(17)	- Waste analysis plan	3.4
(18)	- Security procedures and equipment	4.1
(19)	- General inspection schedule	4.2
(20)	- Justification of any request for waiver(s) of the preparedness and prevention requirements	NA
(21)	- Contingency plan	5.0
(22)	- Preventive procedures, structures, or equipment	4.3
(23)	- Traffic pattern, volume, and control	3.6
(24)	- Description of precautions to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes	NA
(25)	- Political jurisdiction in which the facility is proposed to be located	3.1
(26)	- Flood map: identification of whether the facility is located within a 100-year flood plain	3.5
(27)	- Information for facilities located in a 100-year flood plain	NA
(28)	- Personnel training program	6.0
(29)	- Closure/Post-closure plan	8.0
(30)	- Documentation for hazardous waste disposal units that have been closed	NA
(31)	- Closure cost estimate and documentation required to demonstrate financial assurance	8.0

COMAR 26.13.07.02D	Requirement	Location in Application
(32)	- Post-closure cost estimate and documentation required to demonstrate financial assurance	8.0
(33)	- Documentation of insurance	8.0
(34)	- Proof of coverage by a State financial mechanism	8.0
(35)	- Topographic map	3.5
(36)	- Other information	3.6
(37)	- Exposure information	NA
(38)	- Contingency plan	5.0

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill is located in the Curtis Bay industrial area adjacent to Thoms Cove near the southern Baltimore City limits at the Francis Scott Key Bridge. The facility is owned by the Maryland Port Administration and operated by the Maryland Environmental Service, an agency of the State of Maryland. The general location of the site is presented on Figure 3.1: Vicinity Map.

The entire property is owned by the State of Maryland and encompasses approximately 67 acres, including approximately 41 acres designated for the disposal and containment of hazardous wastes and 26 acres for site development and ancillary facilities. The site is divided into 6 areas as indicated on Figure 3.2: Area Locator Map.

The Hawkins Point Hazardous Waste Landfill currently operates under DHMH Controlled Hazardous Substances Facility Permit No. A 264. Other permits include NPDES Permit MD 0061417, Disposal Permits from the City of Baltimore, Department of Health (Permit No.65, Feb. 1, 1981 to Jan. 31, 1982; Permit No. 74, Feb. 1, 1982 to Jan. 31, 1983; and will be renewed as necessary), and a Sediment Control Permit WRA No. 82SF0441 (issued on Feb. 18, 1982).

The Maryland Port Administration (MPA) operates the Dundalk Marine Terminal (DMT) located in Baltimore City and Baltimore County. Chromium contaminated soils are periodically excavated at the DMT as a result of utility repair and maintenance activities, and port improvement projects. The chromium contaminated soils have been determined to be a hazardous waste under Federal laws and regulations. After July 1, 1991, the material was classified "hazardous" under Maryland laws and regulations.

The new storage facility for the chromium contaminated soils will be located on the MPA owned property, which was formerly occupied by Cosmin Corporation (Area 6).

3.2 CONTROLLED HAZARDOUS SUBSTANCES (CHS) STORAGE FACILITY

The CHS storage facility will be a "salt dome" type, which will safely contain the chromium contaminated soil and prevent exposure to the public or loss to the environment. This storage facility has a cover to prevent runon and runoff or wind dispersion problems,and an impervious surface to prevent ground water or surface water contamination. See Appendix B for general information of the storage facility provided by the Dome Corporation of America.

Based on previous survey of the stockpiles on-site and assessment of excavated materials, MES believes that a facility sized to accommodate 4,000 to 5,000 cubic yards would be sufficient. A dome building, 100 ft. in diameter, 55 ft. high (with 6 ft. wall), is proposed for the storage of the chromium contaminated soil. A Site Plan and a Typical Dome Plan, Elevation and Details are also enclosed in Appendix B.

3.3 PHYSICAL/CHEMICAL TREATMENT PROCESS

The MES is currently requesting proposals from firms or contractors interested in providing a system to treat chromium contaminated soil at the Dundalk Marine Terminal. Some of commercially available technologies are: soil washing/acid washing, chemical reduction, solidification/stabilization, vitrification, thermal treatment, etc. The treatment process that is eventually selected must be cost effective and will reduce total chromium in the TCLP extract to less than 5.0 mg/l and remove the characteristic of corrosivity.

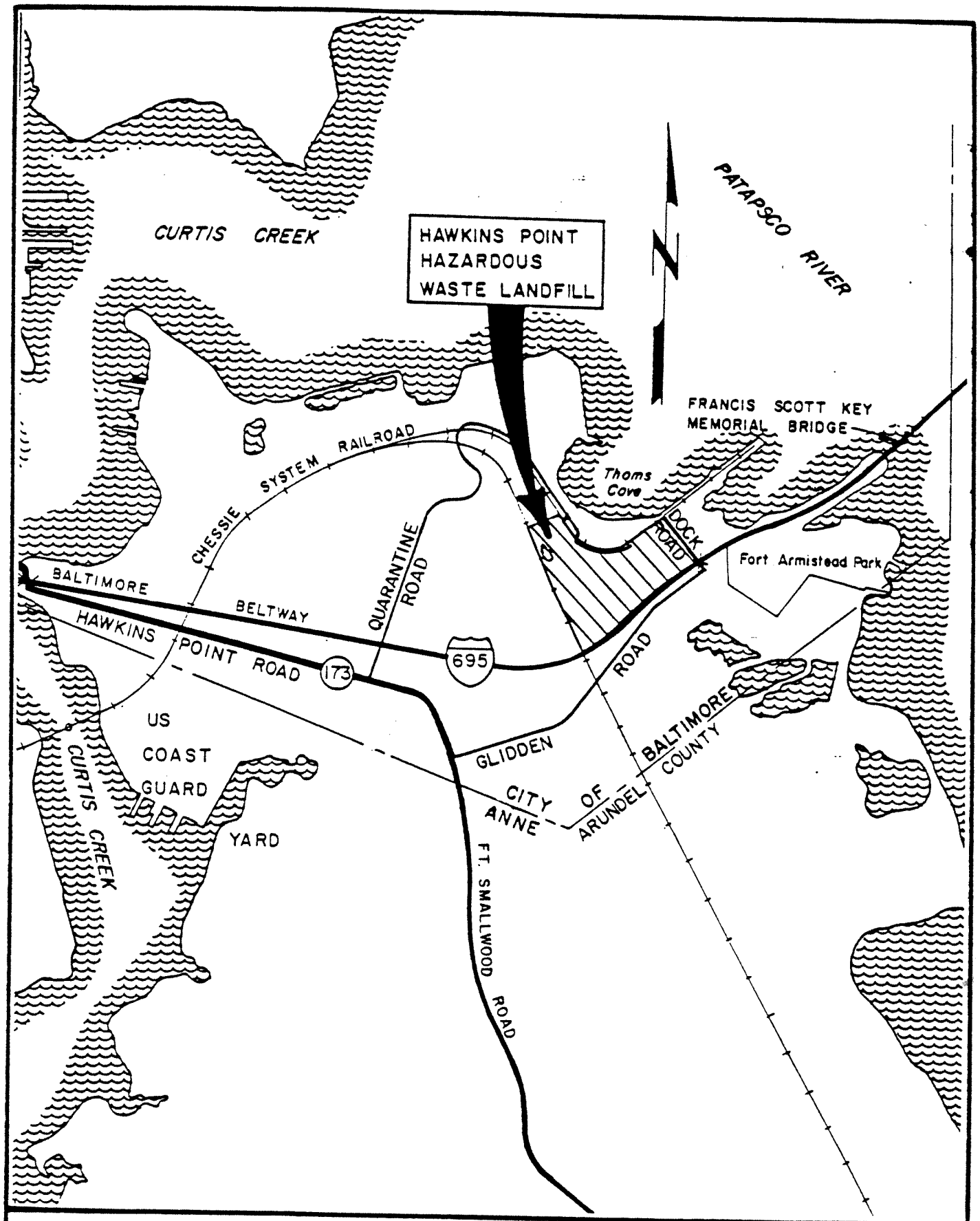
3.4 WASTES SCREENING PROCESS

Previous analyses of the material taken from the stockpile show some material in the pile is non-hazardous. A copy of the sampling/analysis program performed by MES in April 1991 is attached (see Appendix C). To separate hazardous waste from non-hazardous waste, every scoop of excavated material from DMT will be tested utilizing a "Quick Qualitative Chrome Test" (see Appendix D). All non-hazardous material will be hauled off-site, thereby reducing the volume of material that must be hauled as a hazardous waste. All hazardous waste will be transported from DMT to the new storage facility at Hawkins Point HWL.

3.5 TOPOGRAPHIC MAP

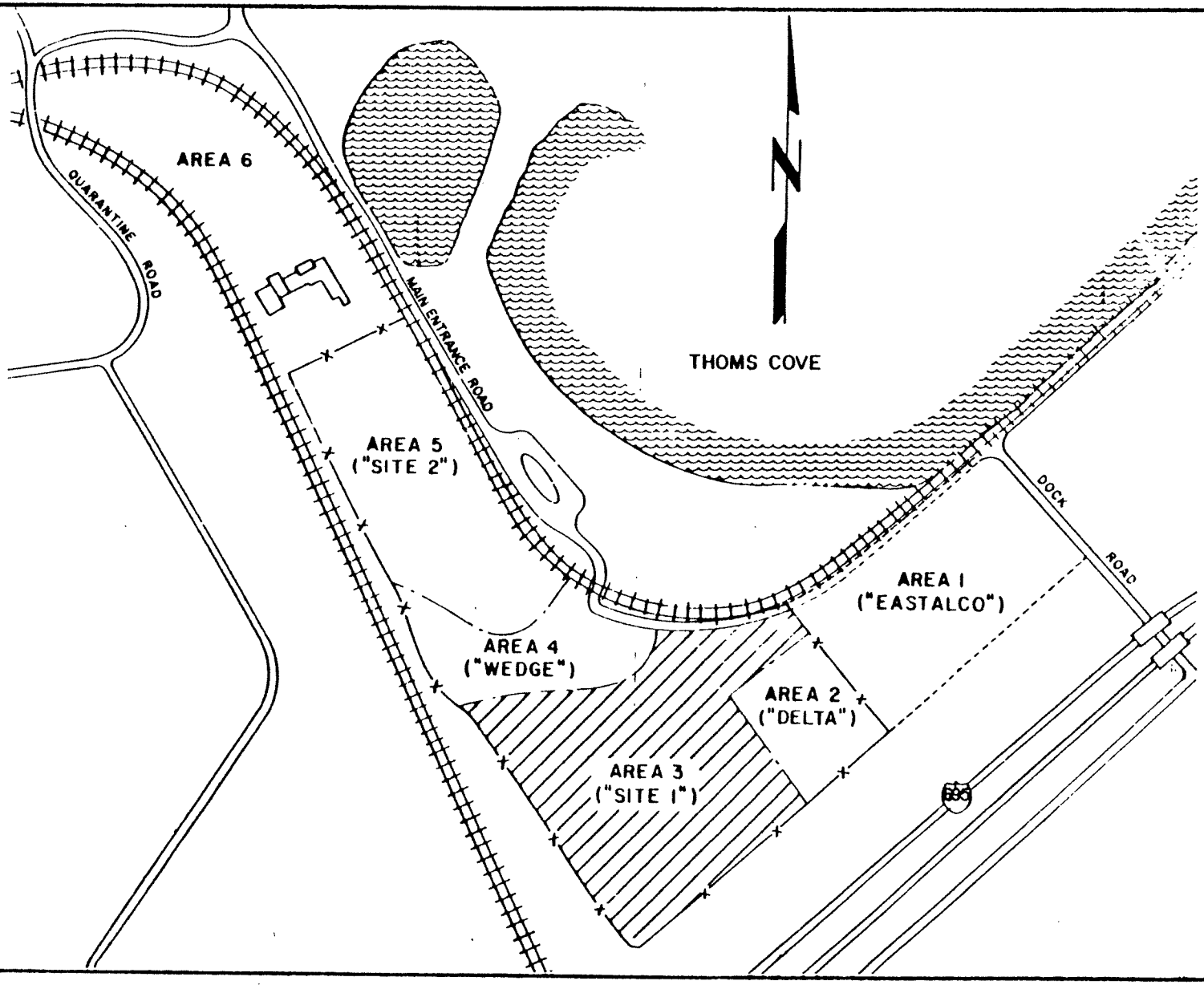
Figure 3.3: Area Topographic Map outlines the general site plan and the development of the area surrounding the site. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped land and parkland does exist as indicated. No residential land uses occur within 1,000 feet of the facility boundary.

As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval flood plain. The 100-year flood plain elevation (el.) along the shore of Curtis Bay is predominately at +8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to +10.0 feet (msl). This information is based on the records from the Federal Emergency Management Agency (FEMA).



VICINITY MAP

Black & Veatch Engineers - Architects	Hawkins Point Hazardous Waste Landfill	figure 3.1



AREA LOCATOR MAP

Black & Veatch Engineers - Architects	**Hawkins Point Hazardous Waste Landfill**	figure 3.2

Figure 3.4 depicts the annual wind rose of the meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located a distance of approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between 0 and 3 miles per hour (mph).

No recreational areas occur within 1,000 feet of the property boundary. Five fire hydrants serve the Hawkins Point facility along the main entrance road. Surface-water streams in the Hawkins Point area generally flow easterly, and discharge into Thoms Cove, on the western bank of the Patapsco River. Surface-water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area.

The main entrance road will convey traffic to and from the facility; this road is accessed from Quarantine Road. Emergency access/egress is also available from Dock Road, through Area 1. Primary and secondary access roads, and haul roads will provide on-site access to the rest of the areas in Hawkins Point HWL.

Sanitary wastewater facilities at the Hawkins Point HWL consist of 2 sanitary sewerage holding systems located in the facility control compound area and the scale plaza. The systems are checked weekly and pumped out as necessary. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge into Thoms Cove. On-site storm water runoff and treatment is classified into 3 categories:

1. Storm water that has been contaminated by waste is directed to the leachate collection system and holding tanks for transfer to suitable treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of the facility is conveyed to 1 of 2 sedimentation ponds before discharging into Thoms Cove.

3.6 TRAFFIC PATTERNS

3.6.1 Traffic Characterization and Routing

The CHS storage facility is estimated to receive an average of 2 truck-loads of chromium contaminated soil per week. The on-site traffic flow pattern is presented on Figure 3.5. All traffic, including facility employees and visitors, will enter the facility

from Quarantine Road onto the dual-lane, 2-directional entrance road. In the event of closure of Quarantine Road for all persons, waste-hauling vehicles will access the facility via the Dock Road gate.

Vehicles hauling chromium contaminated soil will turn right onto the Area 6 access road and then the unloading point. After unloading, vehicle tailgates will be brushed. The vehicles will then exit Area 6 and travel down to the truck wash pads. All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the working face of the facility, will be directed to the truck wash pads.

All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

3.6.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminated soil and waste materials are removed from the exterior of the vehicle either by use of the power washer unit or by brushing. Vehicle surfaces to be checked include the wheel and axle assemblies, rear bumper, rear of the dump bed and tailgate assembly. All contaminated washwater will flow to a separate oil interceptor and then to the leachate storage and transfer area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank should be checked daily and the tank emptied as necessary. The portable steam cleaner should be serviced in accordance with the manufacturer's instructions.

At a minimum, each waste-hauling vehicle will be washed on its last trip from the CHS storage facility each day.

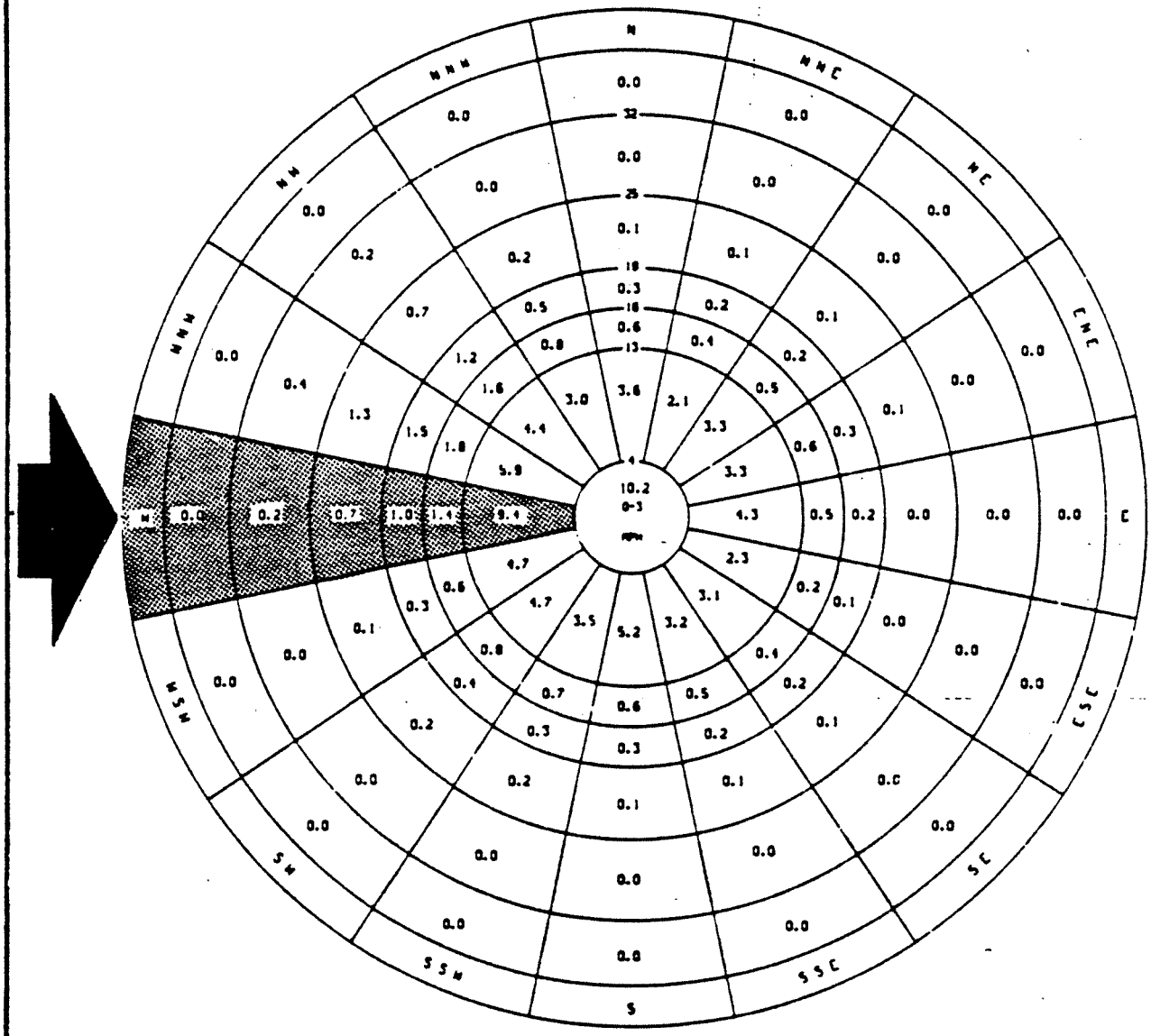
3.7 OTHER INFORMATION

1. Geographic location of the CHS storage facility:

   Latitude: $39^{0}12'30"N$ Longitude: $76^{0}33'00"W$

2. SIC code:

   9511: Air, Water, and Solid Waste Management

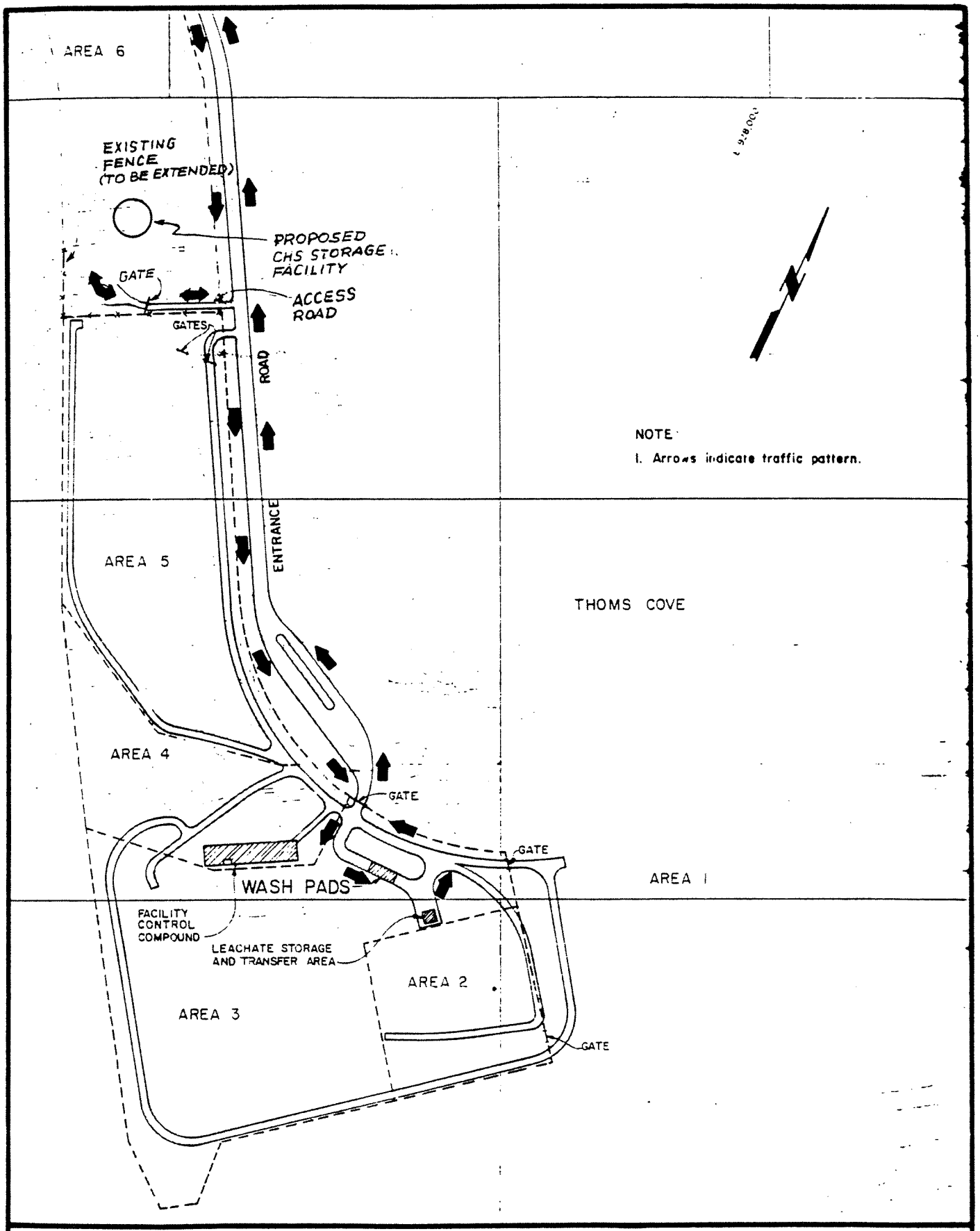


WIND ROSE FOR BALTIMORE, MARYLAND

Black & Veatch
Engineers - Architects

Hawkins Point Hazardous Waste Landfill

figure
3.4



ON-SITE TRAFFIC ROUTING: AREA 6

Black & Veatch
Engineers - Architects

Hawkins Point Hazardous Waste Landfill

figure 3.5

3. Owner:

Maryland Port Administration
World Trade Center, Baltimore, Md. 21202-3041
(410) 333-4500

4. Operator:

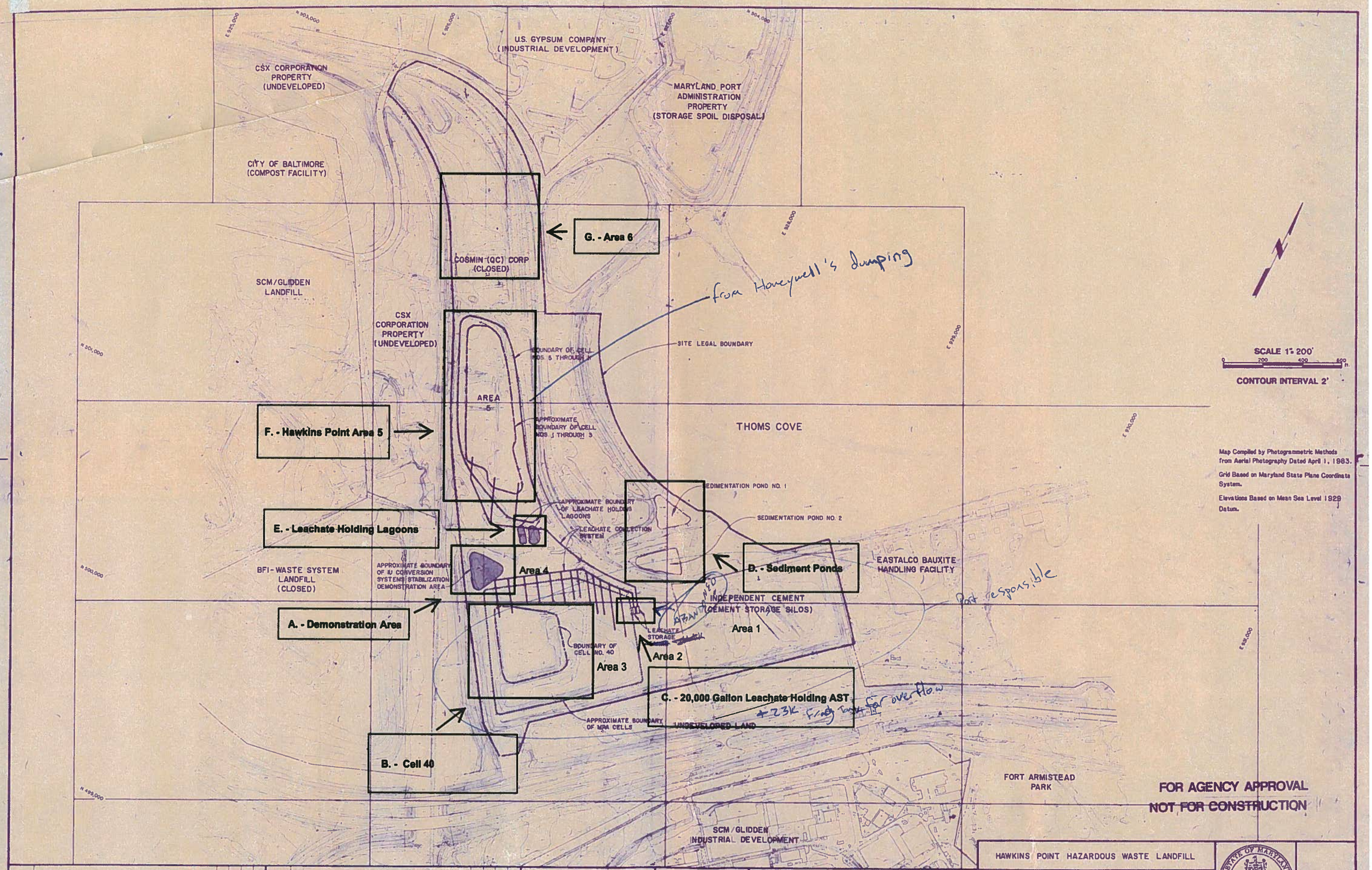
Maryland Environmental Service
2020 Industrial Dr., Annapolis, Md. 21401
(410) 974-7295

5. Facility Location:

Hawkins Point Hazardous Waste Landfill
5501 Quarantine Road, Baltimore, Md. 21226
(410) 355-3898

May 1992

1989 Adjacent Land Use Map



FOR AGENCY APPROVAL
NOT FOR CONSTRUCTION

DATE	REVISIONS AND RECORD OF ISSUE	NO.	BY	CK	APP
4/14/93	ISSUED FOR CLOSURE APPLICATION	1	DW	JT	JP
5/22/92	ISSUED TO CLIENT FOR REVIEW	0	BH	JT	JP

DESIGNED M.L.M./GH
DETAILED MR
CHECKED JT
APPROVED JP
DATE 5/92

BASIC SCIENCE AND TECHNOLOGY CORP.

PROJECT NO. 03025

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREA 5: FINAL CELL CAP CONSTRUCTION

1989 ADJACENT LAND USE

STATE OF MARYLAND
JOHN PATRICK TAYLOR
NO. 17209
REGISTERED PROFESSIONAL ENGINEER

SHEET 2 OF 5

Prepared by AIR SURVEY CORPORATION of Virginia

November 1993

Permit Application for Soil and Wastewater Treatment Facilities at Hawkins Point Hazardous Waste Facility

PERMIT APPLICATION

FOR

SOIL AND WASTEWATER TREATMENT FACILITIES

AT

HAWKINS POINT HAZARDOUS WASTE FACILITY
BALTIMORE, MARYLAND

RECEIVED
DEC 9 1993
HAZARDOUS WASTE PROGRAM

NOVEMBER 1993

MARYLAND ENVIRONMENTAL SERVICE

MARYLAND PORT ADMINISTRATION

1.0 INTRODUCTION

The Hawkins Point Hazardous Waste Facility is a facility solely for the disposal of chrome ore tailings and chromium contaminated debris generated by the dismantling of the Baltimore Works Plant owned by Allied-Signal, Inc. Chromium contaminated waste is currently being disposed in Area 5 of the site. In the past, chrome ore tailings were also disposed of in what are now closed cells in Areas 2 and 3 of the site. Chromium contaminated leachate generated in these cells and the Area 5 landfill is collected by the Maryland Environmental Service (MES) who operates this facility.

It is MES's desire to implement an on-site treatment system for use of treating the decontamination wash water and leachate generated on-site. The wastewater treatment system will treat the leachate with high chromium concentration generated from the Area 5 landfill, the MPA (Maryland Port Administration) cells in Areas 2 and 3, the groundwater pump and treatment system at Dundalk Marine Terminal (DMT), groundwater extracted from the former site of Allied-Signal's Baltimore Works facility, and other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

The Dundalk Marine Terminal (DMT) is currently utilized and operated by the Maryland Port Administration (MPA). A portion of the DMT was built using chrome ore tailings from a chromium chemical plant as fill material. Construction, utility repair and maintenance activities regularly encounter contaminated soils as well as some of the identifiable chrome ore tailings. These excavated materials contain hexavalent chromium and are hazardous waste under the definition of EP Toxicity (EPA Hazardous Waste ID No. D007). These waste materials exhibit the characteristics of corrosivity (pH values sometimes reach 11.0) and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit of 5.0 mg/l.

MPA staff anticipated that an average of 2,000 cubic yards of contaminated soil will be generated by utility repair and maintenance activities each year.

A Controlled Hazardous Substances (CHS) Storage Facility with a capacity of approximately 5,000 cubic yards is currently being designed by the MPA and to be located on the MPA owned property formerly occupied by Cosmin Corporation in Area 6 of Hawkins Point Hazardous Waste Facility. A separate permit application for the Controlled Hazardous Substances Storage Facility has been submitted to MDE in August 1992.

The chromium contaminated soil stored in the CHS Storage Facility will be sent to a treatment process/system to be located also in Area 6 of the Hawkins Point Hazardous Waste Facility. The necessity for a treatment process/system originates from MES's commitment to the Maryland Port Administration (MPA) to assist MPA with several requirements of the State issued Consent Agreement dated April 17, 1991.

The soil treatment system will handle soils generated at the DMT, sludges generated by the proposed on-site leachate treatment system, the groundwater pump and treatment system at DMT, and other chromium contaminated soils and/or sludges generated as a result of chrome ore tailings in the Baltimore area.

This RCRA permit application is submitted for the new proposed Soil and Wastewater Treatment Facilities at Hawkins Point.

The construction, operation, management or other activities related to the Soil and Wastewater Treatment Facilities shall be conducted in compliance with the Wild and Scenic Rivers Act, National Historic Preservation Act of 1966, Endangered Species Act, Coastal Zone Management Act, Fish and Wildlife Coordination Act, and the requirements of other applicable Federal laws.

2.0 PERMIT APPLICATION CHECKLIST

COMAR 26.13.07.02D	Requirement	Location in Application
(1)	- Description of activities requiring permit	1.0
(2)	- Name, mailing address, and location of the facility	3.1
(3)	- SIC Codes	3.1
(4)	- Operator's name, address, telephone number, and ownership status	3.1
(5)	- Listing of all permits or construction approvals received or applied for	3.1
(6)	- Topographic map	3.2
(7)	- Description of the nature of business	1.0, 3.1
(8)	- Latitude and longitude	3.1
(9)	- Name, address, and telephone number of the owner of the facility	3.1
(10)	- Statement that facility is new or existing	1.0
	- Statement that application is first or revised	1.0
(11)	- Scale drawing (existing facility only)	N/A
(12)	- Photographs (existing facility only)	N/A
(13)	- Description of the process to be used to handle wastes and the design capacity of each process	6.0
(14)	- Specification of wastes to be handled, quantity of wastes to be handled annually, and general description of processes to be used	6.0
(15)	- General description of the facility	6.0

COMAR 26.13.07.02D	Requirement	Location in Application
(16)	- Chemical and physical analyses of hazardous wastes to be handled	4.0
(17)	- Waste analysis plan	5.0
(18)	- Security procedures and equipment	7.0
(19)	- General inspection schedule	7.2
(20)	- Justification of any request for waiver(s) of the preparedness and prevention requirements	N/A
(21)	- Contingency plan	8.0
(22)	- Preventive procedures, structures, or equipment	7.3
(23)	- Traffic pattern, volume, and control	3.3
(24)	- Description of precautions to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes	8.5
(25)	- Political jurisdiction in which the facility is proposed to be located	3.0
(26)	- Flood map: identification of whether the facility is located within a 100-year flood plain	3.2
(27)	- Information for facilities located in a 100-year flood plain	N/A
(28)	- Personal training program	9.0
(29)	- Closure/Post-closure plan	12.0
(30)	- Documentation for hazardous waste disposal units that have been closed	N/A
(31)	- Closure cost estimate and documentation required to demonstrate financial assurance	12.0

COMAR 26.13.07.02D	Requirement	Location in Application
(32)	- Post-closure cost estimate and documentation required to demonstrate financial assurance	12.0
(33)	- Documentation of insurance	12.0
(34)	- Proof of coverage by a State financial mechanism	12.0
(35)	- Topographic map	3.2
(36)	- Other information	6.0
(37)	- Exposure information	6.0
(38)	- Contingency Plan	8.0

3.0 FACILITY BACKGROUND

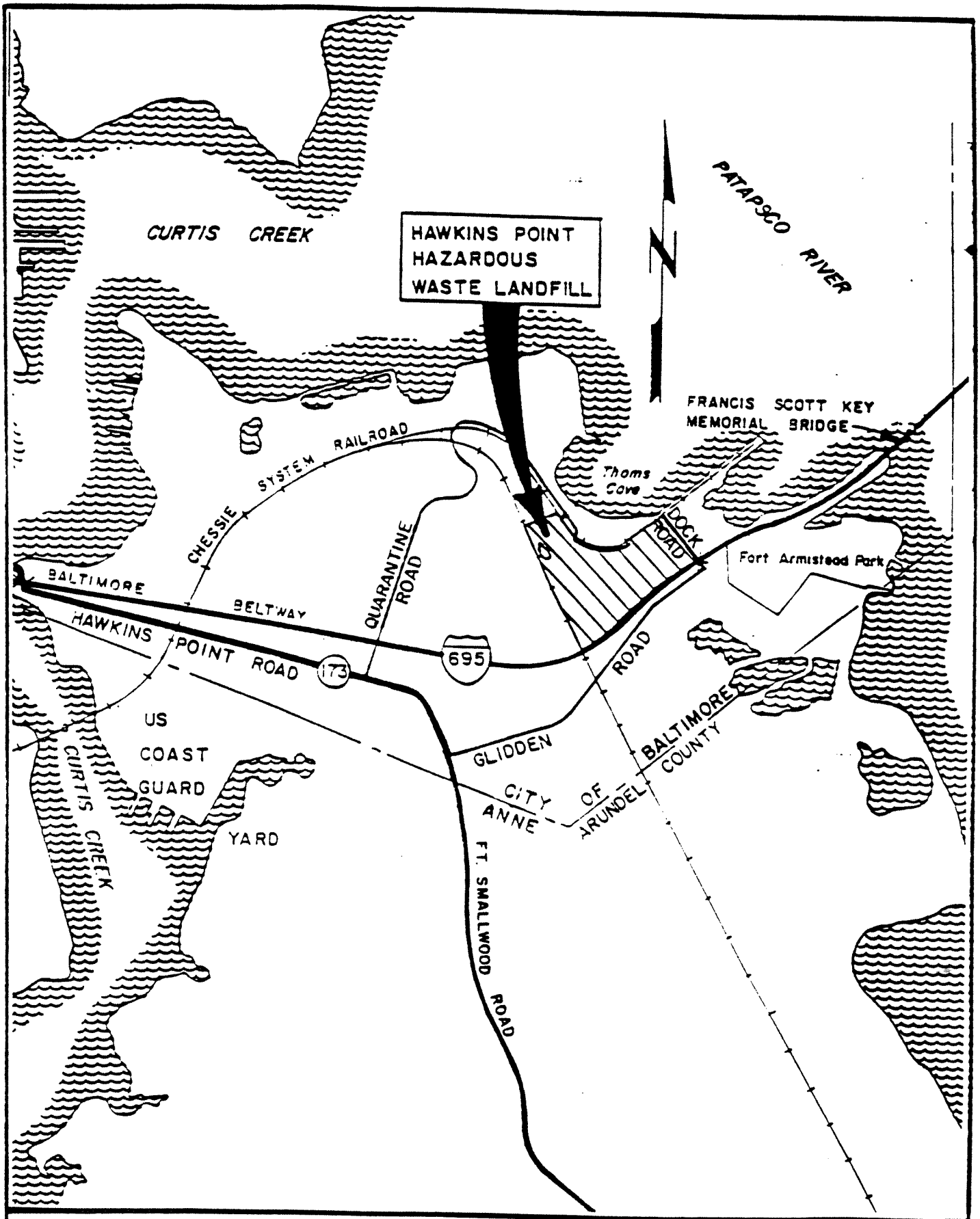
3.1 GENERAL

The Maryland Port Administration (MPA) (Offices located at World Trade Center, Baltimore, Maryland 21201, 410-333-4500; and 2310 Broening Highway, Baltimore, Maryland 21224, 410-631-1150) operates the Dundalk Marine Terminal (DMT) located in Baltimore City and Baltimore County. Chromium contaminated soils are periodically excavated at the DMT as a result of utility repair maintenance activities, and port improvement projects. The chromium contaminated soils have been determined to be a hazardous waste under Federal laws and regulations. After July 1, 1991, the material was classified "hazardous" under Maryland laws and regulations.

A soil treatment process/system is proposed to render the chromium contaminated material non-hazardous in compliance with State and Federal regulations. The Soil Treatment Facility is to be located adjacent to the Controlled Hazardous Substances (CHS) Storage Facility, which is to be constructed in Area 6 of Hawkins Point Hazardous Waste Facility (5501 Quarantine Road, Baltimore, Maryland 21226, 410-355-3898). This Soil Treatment Facility is intented to be used for the treatment of DMT soil, Hawkins Point sludge, the sludge from the groundwater pump and treatment system at DMT, and other chromium contaminated soils generated as a result of Chrome Ore Tailings in Baltimore area. An on-site wastewater treatment system is proposed to treat leachate with high chromium concentration generated from the Area 5 landfill, the MPA cells in Areas 2 and 3, the groundwater pump and treatment system at DMT, wash water from decontamination procedures, groundwater extracted from the former site of Allied-Signal's Baltimore Works facility, and other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area. The Wastewater Treatment Facility will be located adjacent to the leachate transfer area. The SIC code for these Treatment Facilities is 9511 (Air, Water, and Solid Waste Management).

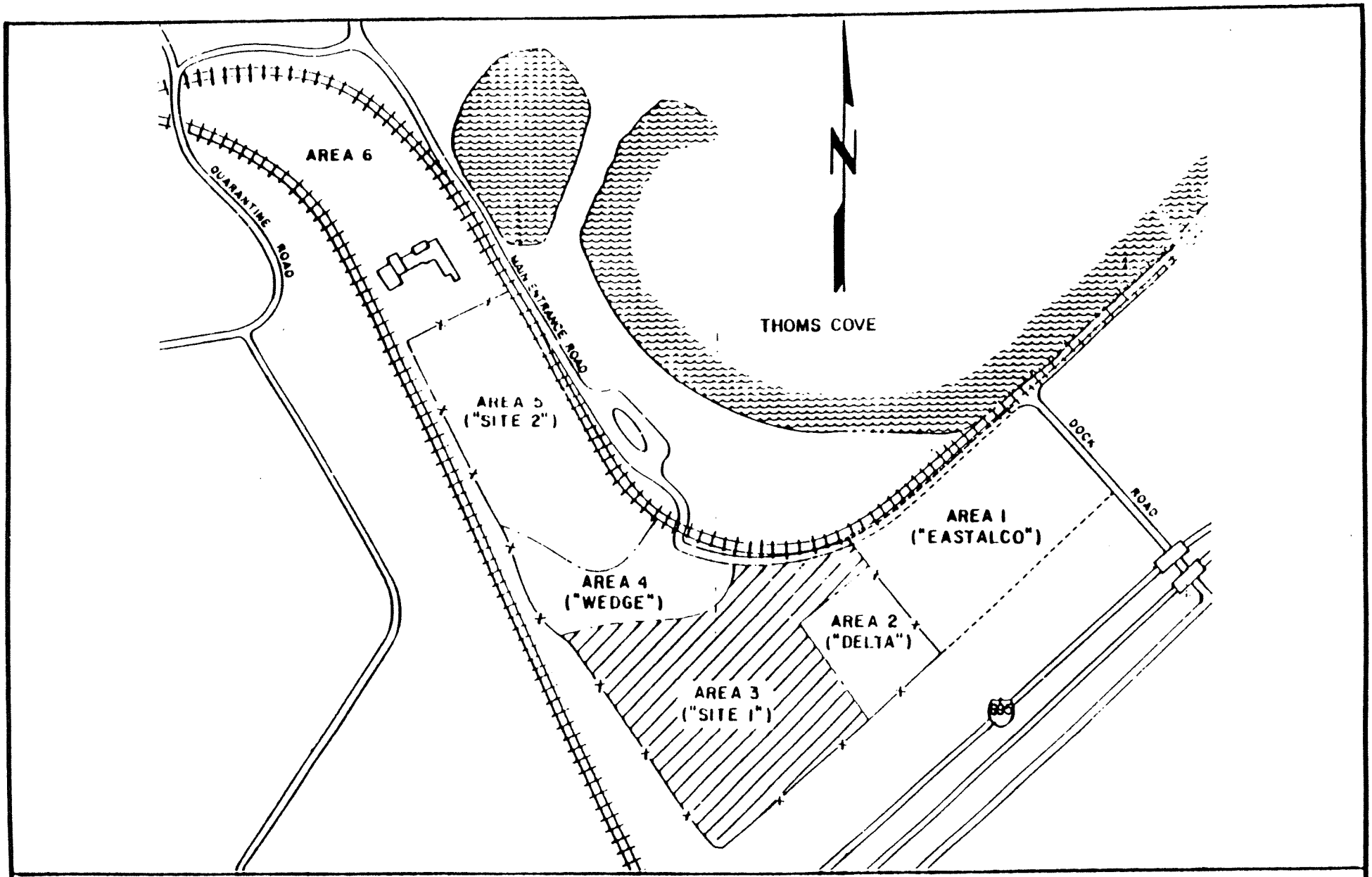
The Hawkins Point Hazardous Waste Facility is located in the Curtis Bay industrial area (Latitude: 39° 12′ 30"N, Longitude: 76° 33′ 00"W) adjacent to Thoms Cove near the southern Baltimore City limits at the Francis Scott Key Bridge. The facility is permitted by the Maryland Department of the Environment and operated by the Maryland Environmental Service (MES, 2011 Commerce Park Drive, Annapolis, Maryland 21401, 410-974-7254).

The general location of the Hawkins Point Facility is presented in Figure 3.1: Vicinity Map. It is divided into six areas as indicated in Figure 3.2: Area Locator Map.



VICINITY MAP

MES	Hawkins Point Hazardous Waste Landfill	figure 3.1



AREA LOCATOR MAP

MES	Hawkins Point Hazardous Waste Landfill	figure 3.2

The Hawkins Point Hazardous Waste Facility currently operates under MDE Controlled Hazardous Substances Facility Permit No. A-264. Other permits include NPDES Permit MD0061417, Disposal Permits from the City of Baltimore, Department of Health, and Sediment Control Permit WRA No. 82SF0441. The RCRA Permit for the Storage Facility in Area 6 was applied for in August, 1992 and is not yet issued by the MDE.

3.2 TOPOGRAPHIC MAP

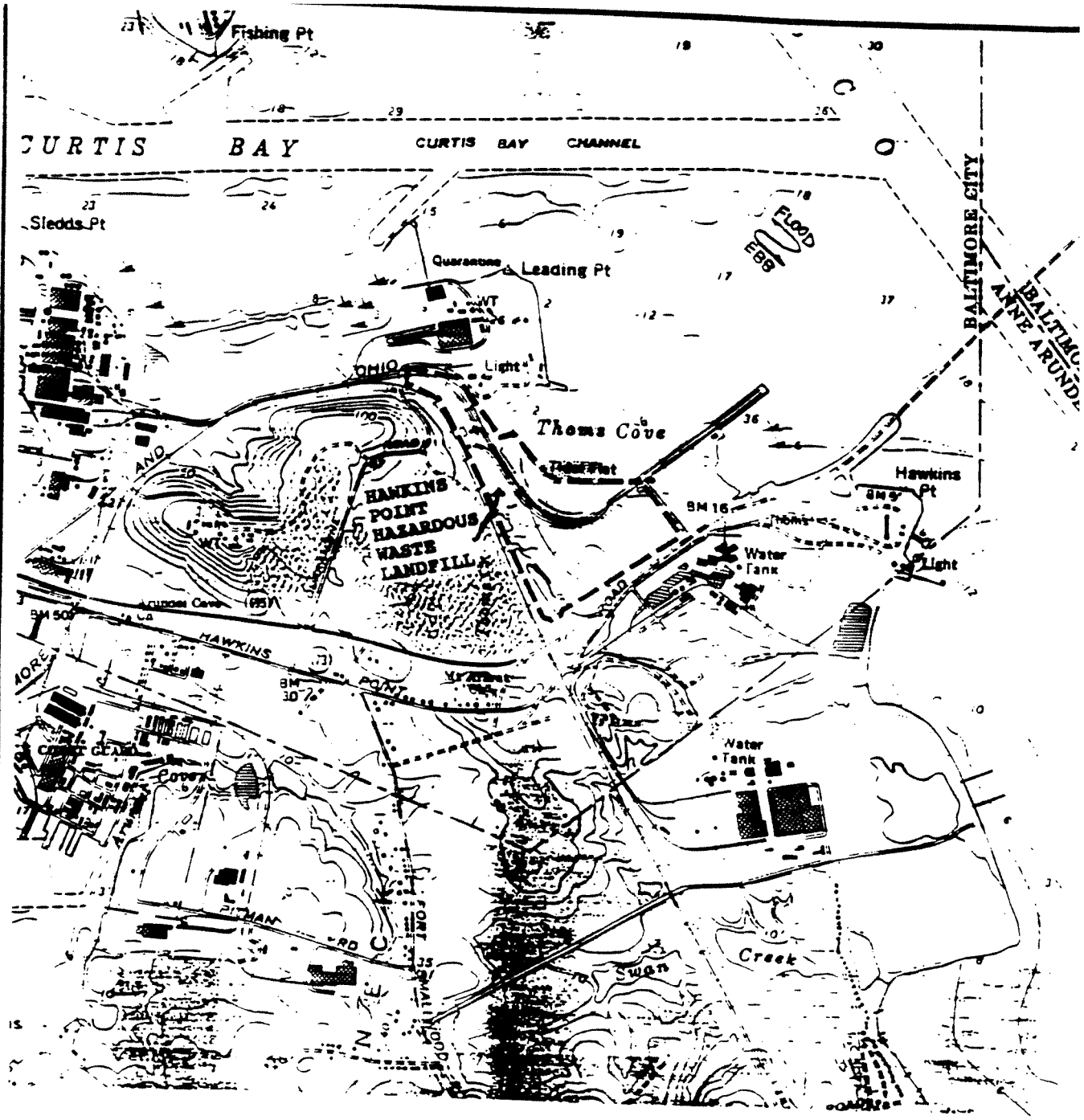
Figure 3.3: Area Topographic Map outlined the general site plan and the development of the area surrounding the site. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped parkland does exist as indicated. No residential land uses occur with 1,000 feet of the facility boundary.

As indicated on the topographic map, the facility is not located within the 100-year recurrence interval flood plan. The 100-year flood plain elevation (el.) along the shore of Curtis Bay is predominately at +8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to +10.0 feet (msl). This information is based on the records from the Federal Emergency Management Agency (FEMA).

Figure 3.4 depicts the annual wind rose of the meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located a distance of approximately 6 miles southwest of the Hawkins Point Facility. This information is supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between 0 and 3 miles per hour (mph).

No recreational areas occur within 1,000 feet of the property boundary. Five fire hydrants serve the Hawkins Point Facility along the main entrance road. Surface-water streams in the Hawkins Point area generally flow easterly, and discharge into Thoms Cove, on the western bank of the Patapsco River. Surface-water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area.

Sanitary wastewater facilities at the Hawkins Point Facility consist of 2 sanitary sewerage holding systems located in the facility control compound area and the scale plaza. The systems are checked regularly and pumped out as necessary. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge into Thoms Cove. On-site storm water runoff and treatment is classified into 3 categories:



SCALE 1:24 000

1000 0

CONTOUR INTERVAL 10 FEET

U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA

MN GN

8½°

151 MILS 0°99' 17 MILS

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1.1 FEET

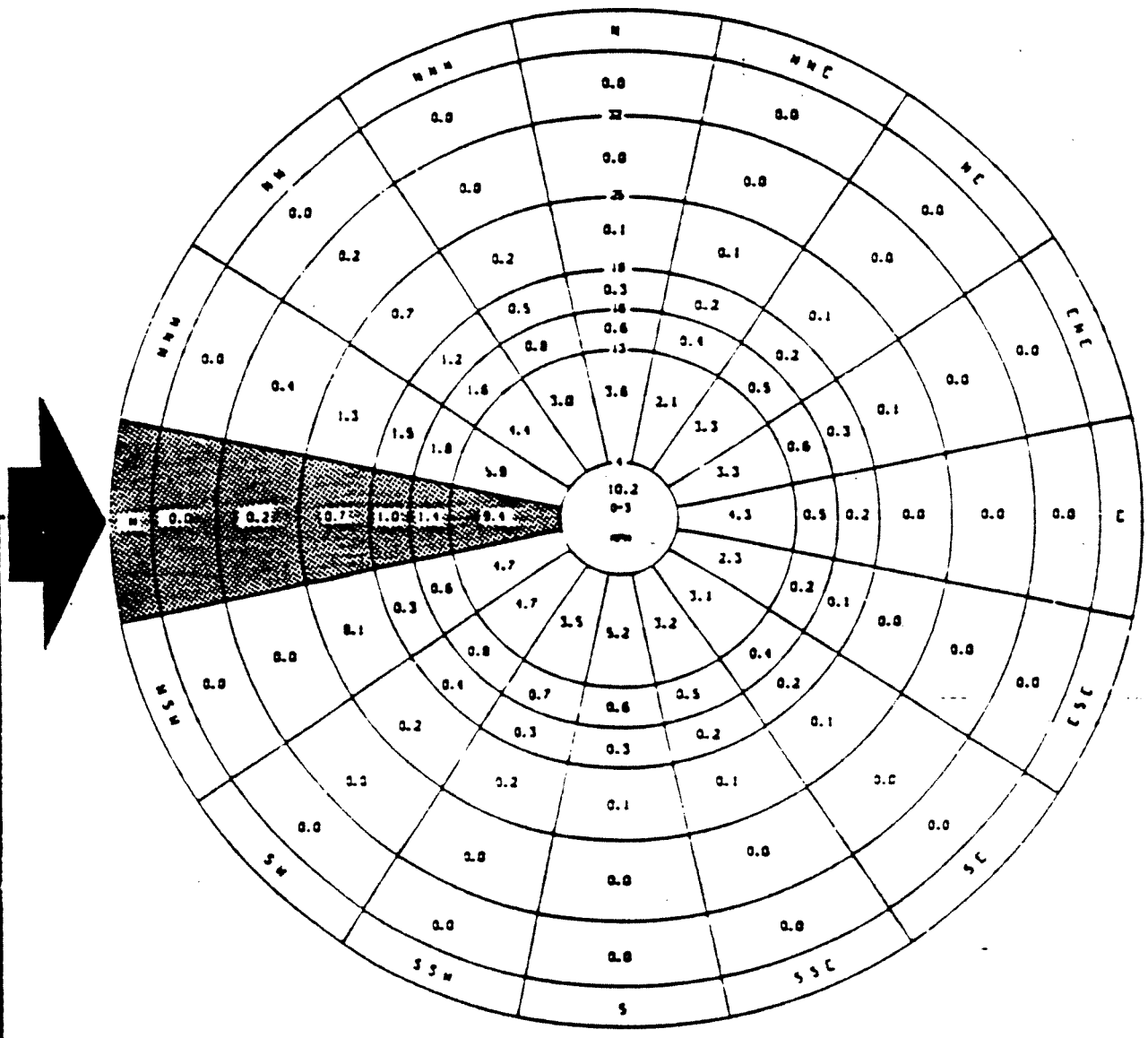
76° 33' 00" W LONGITUDE
39° 12' 30" N LATITUDE

MARYLAND ENVIRONMENTAL SERVICE

Figure 3.3

AREA TOPOGRAPHIC MAP

HAWKINS POINT HAZARDOUS WASTE LANDFILL



WIND ROSE FOR BALTIMORE, MARYLAND

MES	Hawkins Point Hazardous Waste Landfill	figure 3.4

1. Storm water that has been contaminated by waste is directed to the leachate collection system and holding tanks for transfer to suitable treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of the facility is conveyed to 1 of 2 sedimentation ponds before discharging into Thoms Cove.

3.3 TRAFFIC PATTERNS

3.3.1 Traffic Characteristics and Routing

The on-site traffic flow pattern is presented in Figure 3.5. All traffic including facility employees and visitors, will enter the Soil Treatment Facility from Quarantine Road onto the dual-lane, 2-directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

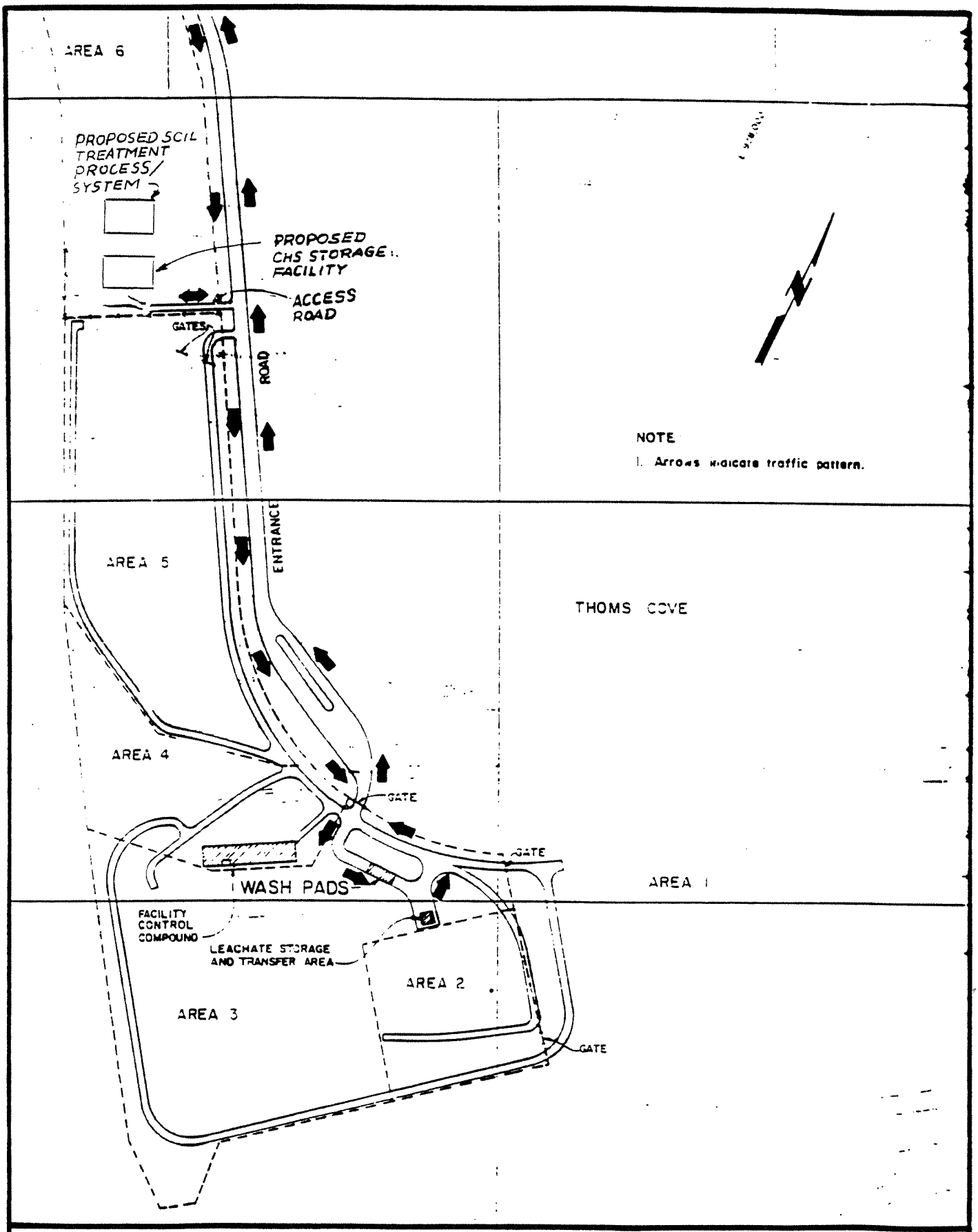
All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the working face of the Facility, will be directed to the truck wash pads of the Hawkins Point Facility.

All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

3.3.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminated soil and waste materials are removed from the exterior of the vehicle either by use of the power washer unit or by brushing. Vehicle surfaces to be checked include the wheel axle assembles, rear bumper, rear of the dump bed and tailgate assembly. All contaminated wash water will flow to a separate oil interceptor and then to the leachate storage and transfer area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank would be checked daily and the tank emptied as necessary. The portable steam cleaner should be serviced in accordance with the manufacture's instructions.



ON-SITE TRAFFIC ROUTING

MES	Hawkins Point Hazardous Waste Landfill	figure 3.5

At a minimum, each vehicle handling the waste will be washed on its last trip from the Facility each day.

August 4, 1994

Hawkins Point Hazardous Waste Landfill – Area 5 – Certificate of Closure

MARYLAND
ENVIRONMENTAL
SERVICE

William Donald Schaefer
Governor

George G. Perdikakis
Director

Dye handle

August 4, 1994

The Honorable Secretary,
David Carroll
MD. Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

RE: Hawkins Point Hazardous Waste Landfill - Area 5
CHS Permit No. A-264

Dear Mr. Carroll:

The Maryland Environmental Service (MES) and an independent engineer, B&V Waste, Science and Technology (BVWST) have completed the Certification of Closure of the Hawkins Point Area 5 Landfill as specified in COMAR 26.13.05.07F and in compliance with 40 CFR 264. Final documents, as listed below, are submitted for your approval and acceptance.

Please feel free to contact me or Robert Tenanty of my staff (Telephone # 974-7295) if you have any questions with respect to this matter.

Sincerely,

George G. Perdikakis
Director

Attachments:
1. Certification of Closure
2. Survey Plat of the Area 5, Hawkins Point Hazardous Waste Landfill
3. List of Waste Inventories and Locations

cc:
Lee Zeni w/o attachments
William Chicca w/o attachments

AUG 22 1994

2011 Commerce Park Drive • Annapolis, Maryland 21401 • 410/974/7281 • Fax 410/974/7267

CERTIFICATION STATEMENT FOR CLOSURE OF AREA 5, HAWKINS POINT LANDFILL

In reference to the closure of Area 5 of the Hawkins Point Hazardous Waste Landfill, this letter of certification satisfies the Code of Maryland Regulations Title 26.13.05 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Part .07 Closure and Post Closure, Section F Certification of Closure.

This letter certifies that Area 5 of the Hawkins Point Hazardous Waste Landfill, RCRA Permit No. A-264, has been closed in accordance with the specifications in the approved closure plan.

STATE OF MARYLAND
JOHN PATRICK TAYLOR
NO. 17206
7/22/94
REGISTERED
PROFESSIONAL ENGINEER

John P. Taylor, P.E.
Registered Professional Engineer, No. 17206
State of Maryland

Maryland Environmental Service
Permit Holder and Operator

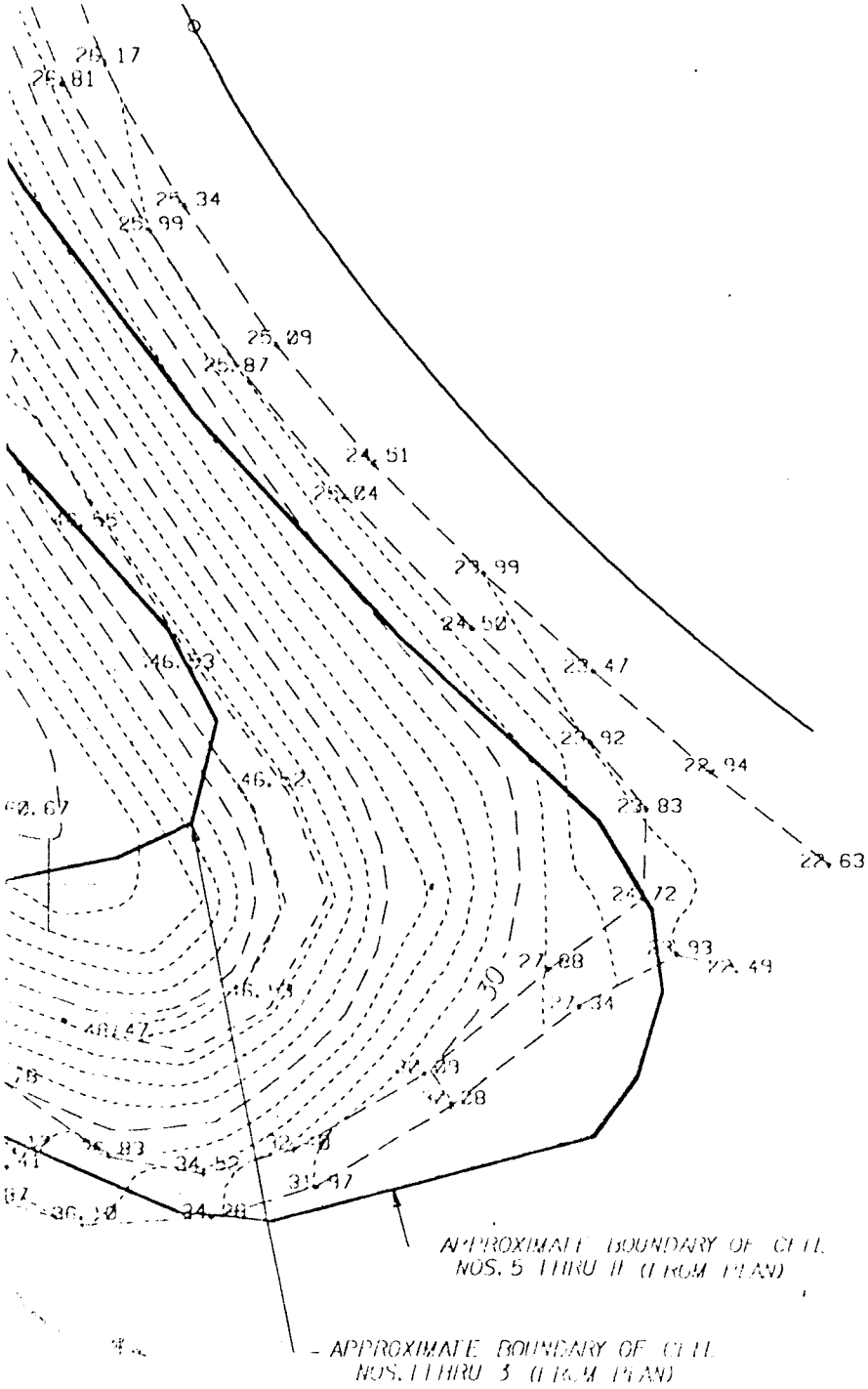
MES-HAWK/CERTIFY2.LTR
July 21, 1994

ATTACHMENT #3

LIST OF WASTE INVENTORIES AND LOCATIONS

Listed below is the tons of hazardous material accepted and placed into the 10 cells of the Area 5 facility. The waste which includes chrome ore tailings and chromium contaminated soil, structural debris, asbestos and concrete generated during the dismantling of the former Allied Chemical Baltimore Works Plant. The first 9 cells were filled predominately with chrome ore tailings and chromium contaminated trash. Cell No. 11 contains no chrome ore tailings and is filled with chromium contaminated debris and chromium contaminated asbestos waste. The amounts are based on facility logs and the hazardous waste manifest forms which accompanied the waste shipments.

Cell 1	50,568 tons
Cell 2	73,529 tons
Cell 3	57,561 tons
Cell 5	79,310 tons
Cell 6	55,146 tons
Cell 7	18,769 tons
Cell 8	5,388 tons
Cell 9	87,976 tons
Cell 10	16,303 tons
Cell 11	18,350 tons
Area 5 Total Capacity:	462,900 tons



AREA 5

HAWKINS POINT HAZARDOUS WASTE LANDFILL

BALTIMORE, MARYLAND

GREENHORNE & O'MARA, INC.
9001 EDMONSTON ROAD
GREENBELT, MARYLAND 20770
(301) 982-2800

ENGINEERS - ARCHITECTS PLANNERS - SCIENTISTS SURVEYORS - PHOTOGRAMMETRISTS

SCALE : 1" 60'	DRAWN BY : SPL	SHEET 1 OF 1
DATE : JULY 22, 1994	CHECKED BY :	FILE :

one by John E. Harms, Jr. & Associates, Inc.

501900

24. 32
. E. P. P.

OWNER'S/OPERATOR'S NOTE

This plat describes real property in which hazardous wastes have been disposed and buried in accordance with requirements of 40 CFR 264. Although the hazardous waste disposal facility is now closed, public health, environmental safety, and regulations issued by the United States Environmental Protection Agency at 40 CFR 264.117(c) require that post-closure use of the property never be allowed to disturb the integrity of the final cover, liner(s) or any attached containment system unless it can be demonstrated that any proposed disturbance will not increase any risk to the public or the environment.

Your attention is directed to the accompanying list of wastes, described by type and location, buried at the above described facility.

Owner's or operator's signature

Date

SURVEYOR'S CERTIFICATE

The information shown hereon, excepting the boundary (by others), was established by actual field survey and completed under the direct supervision of a Maryland Property Line Surveyor.

July 22, 1994

October 4, 1995

Controlled Hazardous Substances Permit

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

October 4, 1995

CERTIFIED MAIL
Return Receipt Requested

Mr. James W. Peck, Director
Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, MD 21401

Dear Mr. Peck:

On February 11, 1985 Maryland was granted authorization by the United States Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA) to operate its hazardous waste program. The operation of this program is subject to the Hazardous and Solid Waste Amendments (HSWA) of 1984. Under this authorization, Maryland has the responsibility for permitting treatment, storage, and disposal facilities within its borders. The State also has primary enforcement responsibility.

As a result of the HSWA, there is a dual State/EPA regulatory program in Maryland. To the extent that the State program is unaffected by the HSWA, the State program will operate in lieu of the EPA program. However, the EPA will administer and enforce the portions of HSWA for which the State is not authorized. This will entail the EPA issuance of RCRA permits for those nondelegated portions. Once the State receives authorization to address HSWA, the State program will assume those responsibilities from the EPA.

Pursuant to the provisions of the Environment Article, Section 7-232, Annotated Code of Maryland, and the provisions of COMAR 26.13 promulgated thereunder, the Department of the Environment, Waste Management Administration, is hereby authorizing **Maryland Environmental Service** to operate a Controlled Hazardous Substances treatment, storage, and post-closure facility in accordance with the enclosed permit conditions. The EPA must issue a permit covering those aspects of the HSWA for which the State has not received authorization. Upon issuance, the EPA permit will be combined with the State permit to create a full RCRA permit.

The State permit fee for your facility, as specified in COMAR 26.13.07.21 and in Permit Condition I.I, is a requirement to issuing this permit. An invoice covering your permit fee will be mailed to you under a separate cover.

Enclosed is the renewal of Controlled Hazardous Substances Permit No. A-264, effective October 15, 1995, for the Hawkins Point Landfill. If you have any questions in regard to this permit, please communicate with Mr. Ed Hammerberg of my staff at (410) 631-3344.

Sincerely,

Harold L. Dye, Jr., Administrator
Hazardous Waste Program

HLD/wt/cp

Enclosure

cc: Mr. Richard W. Collins (w/o enclosure)
Ms. Carol Johnson, EPA Region III
Mr. Richard Johnson
Mr. Ed Hammerberg (w/o enclosure)
Mr. Bill Turner

MARYLAND DEPARTMENT of the ENVIRONMENT

HAZARDOUS WASTE PROGRAM

Controlled Hazardous Substances Permit

CHS Permit A-264

Permittee: **Maryland Environmental Service**
Hawkins Point Landfill
Baltimore, MD 21226

October, 1995

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Hazardous Waste Program

Controlled Hazardous Substances Permit A-264

Maryland Environmental Service
Hawkins Point Landfill
Baltimore, Maryland

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Part VI - Chemical Treatment Unit.....3

Attachments

1. Waste Analysis Plan
   Part 1 Area 5 Landfill
   Part 2 Soil Treatment Facility
   Part 3 Waste Water Treatment Facility

2. Security Plan

3. Inspection Plan
   Part 1 Area 5 Landfill
   Part 2 Soil Treatment Facility and Waste Water Treatment Facility

4. Personnel Training Outline

5. Contingency Plan

6. Closure Plan

7. Post-Closure Plan

TABLE of CONTENTS (continued)

Attachments (continued)

8. Ground Water Monitoring

9. Health and Safety Plan

10. Plans and Specifications of the Soil Treatment Facility (to be issued separately)

11. Soil Treatment Facility Operations Manual (to be issued separately)

12. Plans and Specifications of the Waste Water Treatment Facility (to be issued separately)

13. Waste Water Treatment Facility Operations Manual (to be issued separately)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Hazardous Waste Program

Controlled Hazardous Substances Permit A-264

OVERVIEW

The purpose of this permit is to allow the Maryland Environmental Service to operate hazardous waste management units at the Hawkins Point Landfill, 5501 Quarantine Road, Baltimore, Maryland.

The Hawkins Point Landfill is located in the extreme southeast corner of Baltimore City. The property is owned by the Maryland Port Administration and is operated by the Maryland Environmental Service. Since hazardous waste management activities are conducted at the Hawkins Point Landfill, the Code of Maryland Regulations specifies that the Maryland Environmental Service must possess a Controlled Hazardous Substances permit.

The following hazardous waste management units are authorized by this permit:

1. Area 5 Landfill: Authorized for post-closure care only;

2. Waste Water Treatment Unit: Authorized only for the storage and treatment of waste waters generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, and Allied Signal's Baltimore Works site.

3. Soil Treatment Unit: Authorized only for the treatment of wastes generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, the Patapsco Wastewater Treatment Plant, and Allied Signal's Baltimore Works site.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway ● Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

CONTROLLED HAZARDOUS SUBSTANCES FACILITY PERMIT

Permit Number: A-264

Effective Date: October 15, 1995

Expiration Date: October 14, 1998

Pursuant to the provisions of Environment Article, Section 7-232, Annotated Code of Maryland and regulations promulgated thereunder, the Maryland Department of the Environment, Waste Management Administration, hereinafter referred to as "WAS", hereby authorizes

Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, Maryland 21401

to operate a controlled hazardous substances (CHS) treatment and storage facility and to maintain an inactive CHS land disposal facility known as the Hawkins Point Landfill and located at 5501 Quarantine Road, Baltimore, Maryland 21226 (76° 32′ 58" west longitude and 39° 12′ 29" north latitude*), in accordance with the following standard, general and special conditions including the attachments made part hereof, and the provisions of the Code of Maryland Regulations, Title 26, Department of the Environment, Subtitle 13, Disposal of Controlled Hazardous Substances, hereinafter referred to as COMAR 26.13.

This permit is based on the assumption that the information submitted in the permit renewal application dated November 1, 1993 as modified by subsequent amendments dated April 28, 1994 and July 12, 1994, and the modification application dated August 13, 1992 as modified by subsequent amendments dated March 30, 1993, December 6, 1993, March 24, 1994, September 8, 1994, September 11, 1995, and September 19, 1995 (hereafter referred to as the application) is accurate and that the facility will be constructed and operated as specified in the application. Any inaccuracies found in this information may be grounds for the modification, revocation and reissuance or termination of this permit (COMAR 26.13.07.11 & 12) and potential enforcement action. The Permittee must inform the WAS of any deviation from or changes in the information in the application which would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

* These coordinates mark the center of the site.

PART I - STANDARD CONDITIONS

A. EFFECT OF PERMIT

The Permittee is allowed to manage hazardous waste in accordance with the conditions of this permit. Any management of hazardous waste not authorized in this permit is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of Federal, State or local laws or regulations.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in COMAR 26.13.07.11 & 12. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit conditions.

C. SEVERABILITY

The provisions of this permit are severable and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. DEFINITIONS

For the purpose of this permit, terms used herein shall have the same meaning as those in COMAR 26.13 unless this permit specifically states otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

E. SIGNATORY REQUIREMENTS

All reports or other information requested by the WAS shall be signed and certified as required by COMAR 26.13.07.03 B.

F. DOCUMENTS TO BE MAINTAINED AT THE FACILITY SITE

The Permittee shall maintain at the facility, for the period required by regulations, the following documents and amendments, revisions, and modifications to these documents:

1. Waste Analysis Plan required by COMAR 26.13.05.02 D and this permit.

2. Inspection schedules and logs required by COMAR 26.13.05.02 F(2) & (4) and this permit.

3. Personnel training documents and records required by COMAR 26.13.05.02 G(4) & (5) and this permit.

4. Contingency Plan required by COMAR 26.13.05.04 and this permit.

5. Operating record required by COMAR 26.13.05.05 D and this permit.

6. Closure Plan required by COMAR 26.13.05.07 and this permit.

7. Post-Closure Plan required by COMAR 26.13.05.07 and this permit.

8. All other documents required by subsequent parts of this permit.

G. DUTIES AND REQUIREMENTS

1. Duty to Comply. The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance constitutes a violation of the Environment Article and is grounds for enforcement action, permit termination, revocation and reissuance, modifications, or denial of a permit renewal application. (COMAR 26.13.07.04 A)

2. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of the permit, the Permittee must submit a complete application for a new permit at least 180 days before this permit expires. (COMAR 26.13.07.04 B)

3. Permit Expiration. This permit and all conditions therein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application and through no fault of the Permittee, the WAS has not issued a new permit (State Government Article §10-404, Annotated Code of Maryland).

4. Need to Halt or Reduce Activity Not a Defense. It shall not be a defense for the Permittee in an enforcement action to argue that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (COMAR 26.13.07.04 C)

5. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit. (COMAR 26.13.07.04 D)

6. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facility or similar systems, when necessary, to maintain compliance with the conditions of this permit. (COMAR 26.13.07.04 E)

7. Duty to Provide Information. The Permittee shall furnish to the WAS, within a reasonable time, any relevant information which the Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the WAS, upon request, copies of records required to be kept by this permit. (COMAR 26.13.07.04 H)

8. Inspection and Entry. The Permittee shall allow the WAS, or an authorized representative, upon the presentation of credentials and other documents, as may be required by law, to:

   a. enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

   b. have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

   c. inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. sample or monitor substances or parameters at any location, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by COMAR 26.13.

9. Monitoring and Records.

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from COMAR 26.13.02.20 or an equivalent method approved by the WAS. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846, 3rd ed.), Standard Methods of Waste Water Analysis (15th ed., 1980), or an equivalent method as specified in the attached Waste Analysis Plan, Permit Attachment 1.

b. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, and record. These periods may be extended by request of the WAS at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

c. Records of monitoring information shall specify:

1. the dates, exact place, and times of sampling or measurements;

2. the individuals who performed the sampling or measurements;

3. the dates analyses were performed;

4. the individuals who performed the analyses;

5. the analytical techniques or methods used; and

6. the results of such analyses.

10. Reporting Planned Changes. The Permittee shall give notice to the WAS, as soon as possible, of any planned physical alterations or additions to the permitted

facility or any planned alterations to the permitted activity. This notice must include a description of all incidents of noncompliance reasonably expected to result from the proposed changes. (COMAR 26.13.07.04 L(1))

11. Transfer of Permits. This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to COMAR 26.13.07.10. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of COMAR 26.13 and provide the new owner with a copy of this permit.

12. Notification. The Permittee must report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. Both the oral and written reports shall include the following:

    a. Information concerning release of any hazardous waste that may endanger public drinking water supply sources.

    b. Any information of a release or discharge of hazardous waste, or of a fire or explosion at the facility, which could threaten the environment or human health. The description of the occurrence and its cause shall include:

        1. name, address, and telephone number of the owner or operator;

        2. name, address, and telephone number of the facility;

        3. date, time, and type of incident;

        4. names and quantity of material(s) involved;

        5. the extent of injuries, if any;

        6. an assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

        7. estimated quantity and disposition of recovered material that resulted from the incident.

In addition, the written submissions shall contain a description of the noncompliance and its cause; the periods of noncompliance including exact dates and times; if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce and prevent recurrence of the noncompliance. The Permittee need not comply with the five (5) day written notice requirement if the WAS waives that requirement and the Permittee submits a written report within fifteen (15) days of the time the Permittee becomes aware of the circumstances. (COMAR 26.13.07.04 L(6))

13. Anticipated Noncompliance. The Permittee shall give advance notice to the Secretary of any planned changes in the permitted facility or activity which may result in noncompliance with the permit requirements. (COMAR 26.13.07.04 L(2))

14. Other Noncompliance. The Permittee shall report other instances of noncompliance not otherwise required to be reported above at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition I.G.12. (COMAR 26.13.07.04 L(7))

15. Other Information. Whenever the Permittee becomes aware that he or she failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the WAS, the Permittee shall promptly submit such facts or information to the WAS and state the reason for the omission or inaccuracy. (COMAR 26.13.07.04 L(8))

H. CERTIFICATION OF CONSTRUCTION OR MODIFICATION

The Permittee may not manage hazardous waste at a new facility or a modified portion of the facility until:

1. The Permittee has submitted to the WAS, by certified mail or hand delivery, a letter signed by the Permittee and a registered professional engineer stating that the facility has been constructed or modified in compliance with the permit; and

2. Either:

   a. the WAS has inspected the modified or newly constructed facility and finds it is in compliance with the conditions of this permit; or

   b. the WAS has either waived the inspection or has not, within fifteen (15) days, notified the Permittee of

his/her intent to inspect after submission of the letter of paragraph one (1) of this section.

I. PERMIT FEE

Payment of the permit fee for this facility is a prerequisite to issuing this permit. Failure to pay the permit fee in a timely manner constitutes grounds for permit revocation. As specified in COMAR 26.13.07.21, the permit fee is based on the size of the facility, the nature and quantity of CHS handled at the facility, the threat that the CHS may present to human health or the environment, anticipated costs of monitoring and regulating the facility, anticipated costs attributable to the removing and properly disposing of all CHS that may escape from a facility, and anticipated needs for program development activities relating to CHS.

During the existence of this permit, the permit fee is $45,096.27 per year, in addition to the cost of public notices. The application fee, submitted with the permit application, will be credited towards the first year's annual permit fee.

J. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the WAS no later than fourteen (14) days following each schedule date.

PART II - GENERAL FACILITY CONDITIONS

A. DESIGN AND OPERATION OF FACILITY

The Permittee shall construct, maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or nonsudden release of hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

B. REQUIRED NOTICES

When the Permittee is to receive hazardous waste from an off-site source (except where the Permittee is also the generator), he/she must inform the generator in writing that he/she has the appropriate permits for, and will accept, the waste the generator is shipping. The Permittee must keep a copy of this written notice as part of the operating record.

C. GENERAL WASTE ANALYSIS

The Permittee shall follow the procedures described in Permit Attachment 1, Waste Analysis Plan. Permit Attachment 1 outlines the characteristics of the hazardous waste managed and the procedures for analyzing the waste during shipment, storage, and/or treatment. The Permittee shall verify its waste analysis as part of its quality assurance program, in accordance with current EPA practices (Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, 3rd ed.) or equivalent methods approved by the WAS. At a minimum, the Permittee shall maintain proper functional instruments, use approved sampling and analytical methods, verify the validity of sampling and analytical procedures, and perform correct calculations. If the Permittee uses a contract laboratory to perform analyses, then the Permittee shall inform the laboratory in writing that it must operate under the waste analysis conditions set forth in this permit.

D. SECURITY

The Permittee shall prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of the facility by complying with the security provisions of COMAR 26.13.05.02 E (Security) and Permit Attachment 2, Security Plan.

E. GENERAL INSPECTION REQUIREMENTS

The Permittee shall inspect the facility for malfunctions and deterioration, operator errors, and discharges which may be causing, or may lead to, a release of hazardous waste constituents to the environment or may be causing, or may lead

to, a threat to human health by following the inspection schedule set out in Permit Attachment 3, Inspection Plan.

The Permittee shall remedy any deterioration or malfunction discovered by an inspection as required by COMAR 26.13.05.02 F(3). Records of inspections shall be kept, as required by COMAR 26.13.05.02 F(4).

F. PERSONNEL TRAINING

The Permittee shall conduct personnel training as required by COMAR 26.13.05.02 G (Personnel Training). This training program shall follow the outline in Permit Attachment 4. The Permittee shall maintain documents and records, as required by COMAR 26.13.05.02 G(4) and (5).

G. PREPAREDNESS AND PREVENTION

1. Required Equipment. At a minimum, the Permittee shall maintain at the facility the equipment set forth in the Contingency Plan, Permit Attachment 5, as required by COMAR 26.13.05.03 C.

2. Testing and Maintenance of Equipment. The Permittee shall test and maintain the equipment specified in Permit Condition II.G.1 and in Permit Attachment 5, as necessary, to assure its proper operation in time of emergency, as required by COMAR 26.13.05.03 D.

3. Access to Communications or Alarm System. The Permittee shall maintain access to the communications or alarm system outlined in 5.3 Preventive Procedures, Structures, and Equipment (pg. 5-2) of the Contingency Plan, Permit Attachment 5, as required by COMAR 26.13.05.03 E.

4. Required Aisle Space. The Permittee shall maintain aisle space, as required by COMAR 26.13.05.02 I. At a minimum, the aisle space shall be no less than 2 feet in width and allow for inspections by the Maryland Department of the Environment, inspections conducted under COMAR 26.13.05.02 F, and the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency.

5. Arrangements with Local Authorities. The Permittee shall maintain arrangements with local authorities, as required by COMAR 26.13.05.03 H. If local officials refuse to enter into or renew existing preparedness and prevention arrangements with the Permittee, the Permittee shall document this refusal in the operating record and immediately notify the WAS in writing of the refusal.

H. CONTINGENCY PLAN

1. Implementation of Plan. The Permittee shall immediately carry out the provisions of the Contingency Plan, Permit Attachment 5, and follow the emergency procedures described by COMAR 26.13.05.04 G (Emergency Procedures) whenever there is an imminent or actual fire, explosion, or release of hazardous waste or constituents which threatens or could threaten human health or the environment.

2. Amendments to Plan. The Permittee shall review and immediately amend, if necessary, the Contingency Plan, under the circumstances identified in COMAR 26.13.05.04 E.

3. Copies of Plan. The Permittee shall maintain copies of the Contingency Plan and all revisions at the facility and submit copies to local police and fire departments, hospitals, and State and local emergency response teams that may be called upon to provide emergency services. (COMAR 26.13.05.04 D)

4. Emergency Coordinator. The Permittee shall comply with requirements of COMAR 26.13.05.04 F.

5. Emergency Procedures. The Permittee shall comply with the requirements of COMAR 26.13.05.04 G.

I. RECORD KEEPING AND REPORTING

In addition to the record keeping and reporting requirements specified elsewhere in this permit, the Permittee shall do the following:

1. Operating Record. The Permittee shall maintain a written operating record at the facility. COMAR 26.13.05.05 D describes the information that shall be recorded as is becomes available, and maintained in the operating record until closure of the facility.

2. Annual Report. The Permittee shall comply with all applicable annual report requirements of COMAR 26.13.05.05 F. This report shall be submitted to the Secretary by March 1st of each year and shall cover facility activities during the previous calendar year.

J. CLOSURE REQUIREMENTS

1. Performance Standard. The Permittee shall close the facility, as required by COMAR 26.13.05.07 (Closure and

Post-Closure) and in accordance with the Closure Plan, Permit Attachment 6.

2. Amendment to Closure Plan. The Permittee shall amend the Closure Plan, in accordance with COMAR 26.13.05.07 C, whenever necessary.

3. Notification of Closure. The Permittee shall notify the WAS in writing at least 45 days prior to the date on which he/she expects to begin final closure of the facility.

4. Time Allowed for Closure. After receiving the final volume of hazardous waste, the Permittee shall treat or remove from the site all hazardous waste and shall complete closure activities in accordance with the schedules specified in the Closure Plan, Permit Attachment 6.

5. Disposal or Decontamination of Equipment, Structures, and Soils. The Permittee shall decontaminate and/or dispose of all facility equipment, structures, and soils, as required by COMAR 26.13.05.07 E and the Closure Plan, Permit Attachment 6.

6. Certification of Closure. The Permittee shall certify that the facility has been closed in accordance with the specifications in the Closure Plan as required by COMAR 26.13.05.07 F.

K. POST-CLOSURE REQUIREMENTS

1. Post-Closure Care Period. The Permittee shall begin post-closure care for each landfill after completion of closure of the unit and continue for 30 years after that date. Post-closure care shall be in accordance with COMAR 26.13.05.07 G (Post-Closure Care and Use of Property) and the Post-Closure Plan, Permit Attachment 7.

2. Post-Closure Security. The Permittee shall maintain security at the facility during the post-closure care period in accordance with the Post-Closure Plan, Permit Attachment 7, and COMAR 26.13.05.07 G(3).

3. Amendment to Post-Closure Plan. The Permittee shall amend the Post-Closure Plan, Permit Attachment 7, in accordance with COMAR 26.13.05.07 H(4), whenever necessary.

4. Post-Closure Notices. The Permittee shall request and obtain a permit modification prior to post-closure removal of hazardous wastes, hazardous waste residues,

liners, or contaminated soils, in accordance with COMAR 26.13.05.07 I(3).

5. Certification of Completion of Post-Closure Care. The Permittee shall certify that the post-closure care period was performed in accordance with the specifications in the Post-Closure Plan, Permit Attachment 7, as required by COMAR 26.13.05.07 J.

L. MANIFEST SYSTEM

The Permittee shall comply with the manifest requirements of COMAR 26.13.05.05 B, reconcile significant manifest discrepancies and, if unable to do so within 15 days, report to the Secretary as required by COMAR 26.13.05.05 C. The Permittee shall submit Unmanifested Waste Reports when necessary as outlined in COMAR 26.13.05.05 G (Unmanifested Waste Report).

M. FLOODPLAIN STANDARD

The Permittee shall comply with the requirements of COMAR 26.13.06.01 B (Flood Plains) and 26.13.07.02 D(26) (Permit Information: Flood Map).

N. WASTE MINIMIZATION/SOURCE REDUCTION

The Permittee shall develop and conduct a Waste Minimization/ Source Reduction Program, in accordance with the Environment Article §7-205, Annotated Code of Maryland. The Permittee, as a generator, may not dispose of a controlled hazardous substance unless the Permittee demonstrates to the satisfaction of the Department that:

1. Recovery possibilities have been considered; and

2. The controlled hazardous substance cannot be reasonably treated further to reduce the volume of or the hazard that the controlled hazardous substance poses to the environment.

At a minimum the WAS will evaluate the waste minimization/ source reduction efforts for all hazardous waste streams on a yearly basis and notify the Permittee if these efforts are unsatisfactory. Waste reduction information shall be reported to the WAS in the annual hazardous waste report.

PART III - POST-CLOSURE CARE

A. Area 5 of the Hawkins Point Landfill is a closed land disposal unit that is currently undergoing post-closure care. The landfill was used solely for the disposal of chrome ore tailings and chromium contaminated debris generated from Allied Signal's Baltimore Works Plant. The waste is designated hazardous for Toxicity (D007) and Corrosivity (D002). Area 5 is 300 acre-feet and contains approximately 462,894 tons of waste disposed of in 10 cells. Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

B. **UNIT IDENTIFICATION**

1. The Permittee shall provide post-closure care for the following hazardous waste management units, subject to the terms and conditions of this permit, and as described as follows:

Type of Waste Unit	Unit No. or Other Designation	Maximum Waste Inventory	Description of Wastes Contained	Hazardous Waste No.
Landfill	Area 5, Cells 1-11	300 acre·ft	Chrome ore tailings	D007, D002

2. The Permittee is prohibited from treating, storing, or disposing of any hazardous waste in Area 5.

C. **POST-CLOSURE PROCEDURES AND USE OF PROPERTY**

1. The Permittee shall conduct post-closure care for each hazardous waste management unit listed in Permit Condition III.B, to begin after the completion of closure of the unit and continue for 30 years after that date, except that the 30-year post-closure care period may be shortened upon application and demonstration approved by the WAS that the facility is secure, or may be extended by the WAS if the Secretary finds this is necessary to protect human health and the environment.

2. The Permittee shall maintain and monitor the ground water monitoring system and comply with all other applicable requirements of COMAR 26.13.05.06 - .06-7 during the post-closure period.

3. The Permittee shall comply with the requirements for landfills, as follows:

   a. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap, as

necessary, to correct the effects of settling, subsidence, erosion, or other events;

b. Continue to operate the leachate collection and removal system until leachate is no longer detected;

c. Maintain and monitor the ground water monitoring system and comply with all other applicable requirements of COMAR 26.13.05.06 - .06-7;

d. Prevent run-on and run-off from eroding or otherwise damaging the final cover;

e. Protect and maintain surveyed benchmarks used in complying with the surveying and record keeping requirements of COMAR 26.13.05.14 I;

f. Maintain a vegetative cover sufficient to minimize the effects of erosion on the final cover; and

g. Prevent the growth of vegetation with deeply penetrating root systems that may compromise the integrity of the cap. The Permittee shall mow the vegetative cover during the growing season and/or remove the plants in a timely manner.

4. The Permittee shall comply with all security requirements, as specified in Permit Attachment 2, Security Plan.

5. The Permittee shall not allow any use of the units designated in Permit Condition III.B which will disturb the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems during the post-closure care period.

6. The Permittee shall implement the Post-Closure Plan, Permit Attachment 7. All post-closure care activities must be conducted in accordance with the provisions of the Post-Closure Plan.

D. INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the Inspection Plan, Permit Attachment 3.

E. NOTICES AND CERTIFICATION

1. If the Permittee or any subsequent owner or operator of the land upon which the hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous

waste residues, the liner, or contaminated soils, then he/she shall request a modification to this permit in accordance with the applicable requirements in COMAR 26.13.07 (Permits for CHS Facilities). The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of COMAR 26.13.05.07 G(4) (Post-Closure Care and Use of Property).

2. No later than 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, the Permittee shall submit to the WAS, by registered mail, a certification that the post-closure care for the hazardous waste disposal unit was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent, registered professional engineer. Documentation supporting the independent, registered professional engineer's certification must be furnished to the WAS upon request. (COMAR 26.13.05.07 J)

F. POST-CLOSURE PERMIT MODIFICATIONS

The Permittee must request a permit modification to authorize a change in the approved Post-Closure Plan. This request must be in accordance with applicable requirements of COMAR 26.13.07 and must include a copy of the proposed amended Post-Closure Plan for approval by the WAS. The Permittee shall request a permit modification whenever changes in operating plans, facility design, or other events occur that affect the approved Post-Closure Plan. The Permittee must submit a written request for a permit modification at least 60 days prior to the proposed change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the Post-Closure Plan. (COMAR 26.13.05.07 H(4))

PART IV - GROUND WATER DETECTION MONITORING

A. Area 5 of the Hawkins Point Landfill is currently monitored for releases from the waste management units with three ground water monitoring wells. Well 2B-2, an upgradient well located on the south-western boundary of Area 5, is 45 feet deep. Well 2D-2, a downgradient well located on the eastern boundary of Area 5, is 36 feet deep. Well 2F, a downgradient well located on the northern boundary of Area 5, is 30 feet deep. The Permittee will monitor the above mentioned wells to determine the ground water quality of the uppermost aquifer underlying the waste management area.

B. **WELL LOCATION, INSTALLATION AND CONSTRUCTION**

The Permittee shall install and maintain a ground water monitoring system as specified below:

1. Ground water monitoring wells shall be maintained at the locations specified on the Ground Water Monitoring Wells Location Map contained in Permit Attachment 8 and in conformance with the following list:

Well I.D.	Type of Well
Well 2B-2	background
Well 2D-2	compliance point
Well 2F	compliance point

2. The monitoring wells identified in Permit Condition IV.B.1 shall be maintained in accordance with the detailed plans and specifications presented in Permit Attachment 8, Ground Water Monitoring.

3. The monitoring wells identified in Permit Condition IV.B.1 shall be redeveloped whenever 20% of the screened interval is silted or when the well does not recharge within 24 hours of bailing.

C. **INDICATOR PARAMETERS AND MONITORING CONSTITUENTS**

The Permittee shall monitor the wells described in Permit Condition IV.B.1 for the following parameters and constituents:

Barium	Sodium
Chromium	Sulfate
Hexavalent Chromium	pH
Chloride	Specific Conductivity
Iron	Total Organic Carbon
Manganese	Total Organic Halogen
Phenols	

D. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the ground water monitoring wells described in Permit Condition IV.B.1:

1. Samples shall be collected using the techniques described in Permit Attachment 8.

2. A sequence of at least four samples shall be obtained from each well at an interval that assures an independent sample is obtained, as described in Permit Attachment 8.

3. Samples shall be preserved and shipped in accordance with the procedures specified in Permit Attachment 8.

4. Samples shall be analyzed in accordance with the procedures specified in Permit Attachment 8.

5. Samples shall be tracked and controlled using the chain-of-custody procedures specified in Permit Attachment 8.

E. ELEVATION OF THE GROUND WATER SURFACE

The Permittee shall determine the elevation of the ground water surface at each well each time the ground water is sampled in accordance with Permit Condition IV.G.2.

F. STATISTICAL PROCEDURES

When evaluating the monitoring results in accordance with Permit Condition IV.G, the Permittee shall use the following procedures:

1. A parametric Analysis of Variance shall be used to statistically evaluate the monitoring results, provided the following conditions are met:

   a. The number of data points below the Practical Quantification Limit (PQL) for a particular parameter, as defined in Appendix A of Permit Attachment 8, must be less than or equal to fifteen (15) percent of the total number of data points to be evaluated;

   b. The distribution of the data, as defined by the Shapiro-Wilk Test, must be normal; and

   c. The variances between the wells, as defined by Levene's Test, must be equal.

In conducting a parametric Analysis of Variance, the data points below the PQL shall be replaced by one half (1/2) of their respective PQL.

2. If the conditions in Permit Condition IV.F.1 are not met, a non-parametric Analysis of Variance shall be used to statistically evaluate the monitoring results.

3. Background ground water quality for a monitoring parameter or constituent shall be based on data from the current sampling event and the previous three quarterly sampling events of the background well upgradient.

4. The Permittee shall conduct the statistical procedures described in Permit Condition IV.F.1 & 2 and in Permit Attachment 8 in accordance with the procedures set forth in the U.S. EPA Office of Solid Waste Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, April 1989, and the Addendum to Interim Final Guidance, July 1992.

G. MONITORING PROGRAM AND DATA EVALUATION

1. The Permittee shall collect, preserve, and analyze samples pursuant to Permit Condition IV.D.

2. The Permittee shall determine ground water quality at each monitoring well at the compliance point quarterly during the post-closure care period. The Permittee shall express the ground water quality at each monitoring well in a form necessary for the determination of statistically significant increases (i.e., means and variances).

3. The Permittee shall determine the ground water flow rate and direction in the uppermost aquifer at least annually.

4. The Permittee shall determine whether there is a statistically significant increase over the background values for each parameter identified in Permit Condition IV.C each time ground water quality is determined at the compliance point wells. In determining whether such an increase has occurred, the Permittee must compare the ground water quality at each monitoring well specified in Permit Condition IV.B.1, in accordance with the statistical procedures specified in Permit Condition IV.F.

5. The Permittee shall perform the evaluations described in Permit Condition IV.G.4 within 30 days after completion of sampling and analysis.

H. RECORD KEEPING AND REPORTING

1. The Permittee shall enter all monitoring, testing, and analytical data obtained in accordance with Permit Condition IV.G in the operating record. The data must include all computations, calculated means, variances, Shapiro-Wilk Test results, Levene's Test results and parametric and non-parametric Analysis of Variance results.

2. The Permittee shall submit the analytical results required by Permit Conditions IV.G.2 and IV.G.3 and the results of the initial statistical analyses required by Permit Condition IV.G.4, in accordance with the following schedule:

Samples to be Collected During the Months of:	Results Due to WAS By
January - March	May 10
April - June	August 10
July - September	November 10
October - December	February 10

3. If the Permittee determines, pursuant to Permit Condition IV.G, there is a statistically significant increase above the background values for any of the parameters or constituents specified in Permit Condition IV.C.1, the Permittee shall:

   a. Notify the WAS in writing within seven days. The notification must indicate what parameters or constituents have shown statistically significant increases.

   b. Immediately sample the ground water in all wells and determine the concentration of all constituents identified in Appendix IX of 40 CFR 264.

   c. Establish the background values for each Appendix IX constituent found in the ground water.

   d. Within 90 days, submit to the WAS an application for a permit modification to establish a compliance monitoring program. The application must include the following information:

      1. An identification of the concentration of each Appendix IX constituent found in the ground water at each monitoring well at the compliance point.

2. Any proposed changes to the ground water monitoring system at the facility necessary to meet the requirements of compliance monitoring as described in COMAR 26.13.05.06-5.

3. Any proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in COMAR 26.13.05.06-5.

4. For each hazardous constituent found at the compliance point, a proposed concentration limit, or notice of intent to seek an alternate concentration limit for a hazardous constituent.

e. Submit a corrective action feasibility plan to the WAS within 180 days.

4. If the Permittee determines, pursuant to Permit Condition IV.G, there is a statistically significant increase above the background values for the parameters or constituents specified in Permit Condition IV.C.1, he/she may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted from error in sampling, analysis, or evaluation. In such cases, the Permittee shall:

a. Notify the WAS in writing within seven (7) days that he/she intends to make a demonstration.

b. Within 90 days, submit a report to the WAS which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from error in sampling, analysis, or evaluation, or from natural variation in the ground water.

c. Within 90 days, submit to the WAS an application for a permit modification to make any appropriate changes to the detection monitoring program at the facility.

d. Continue to monitor in accordance with the detection monitoring program at the facility.

I. ASSURANCE OF COMPLIANCE

The Permittee shall assure the WAS that ground water monitoring and corrective action measures necessary to achieve compliance with the ground water protection standard under COMAR 26.13.05.06-1 A are taken during the term of the permit.

J. REQUEST FOR PERMIT MODIFICATION

If the Permittee or the WAS determines the detection monitoring program no longer satisfies the requirements of the regulations, the Permittee must, within 90 days of the determination, submit an application for a permit modification to make any appropriate changes to the program which will satisfy the regulations.

PART V - STORAGE AND TREATMENT IN TANKS

A. The waste water treatment system is permitted for the storage and treatment of chromium contaminated liquids. The system will be located in the eastern part of the Hawkins Point Landfill property, near the leachate storage and transfer area. A maximum of 60,000 gallons of liquids will be stored and a maximum of 15,000 gallons per day of liquids will be treated. The influent and effluent storage tanks will be installed above ground with secondary containment systems. The treatment tanks and equipment will be enclosed within an above-ground, self-supporting, leak-proof structure and will also have secondary containment.

B. **PERMITTED AND PROHIBITED WASTE IDENTIFICATION**

1. The Permittee may store a total volume of 60,000 gallons of controlled hazardous substances in two (2) aboveground tanks subject to the terms of this permit and as follows:

Tank	Capacity (gallons)	Dimensions of Tank	Secondary Containment Required	Hazardous Waste No.
Influent Tank	TBS[1]	TBS	yes	D002, D007
Effluent Tank	TBS	TBS	yes	D002, D007

2. The Permittee may treat a total volume of 15,000 gallons of controlled hazardous substances per day in the four (4) aboveground tanks comprising the waste water treatment system subject to the terms of this permit and as follows:

Tank	Capacity (gallons)	Dimensions of Tank	Secondary Containment Required	Hazardous Waste No.
Reactor Tank	TBS	TBS	yes	D002, D007
Sludge Thickening Clarifier	TBS	TBS	yes	D002, D007
Filter Press	TBS	TBS	yes	D002, D007
Polishing Effluent Filter	TBS	TBS	yes	D002, D007

[1] Information to be submitted (TBS) by Permittee within the compliance schedule set forth under Permit Condition V.I.

3. The controlled hazardous substances identified in Permit Conditions V.B.1 and V.B.2 must be:

   a. leachate from Area 2/3 and Area 5 and washwater generated at the Hawkins Point Landfill;

   b. ground water generated by the pump and treatment system at the Dundalk Marine Terminal; or

   c. ground water extracted from Allied Signal's Baltimore Works site.

4. The Permittee is prohibited from storing or treating hazardous waste that is not identified in Permit Conditions V.B.1, V.B.2, and V.B.3.

C. SECONDARY CONTAINMENT

The Permittee shall design, construct, and operate a secondary containment system for each tank system, in accordance with the detailed design plans and descriptions to be submitted to and approved by the WAS and to be contained in Permit Attachment 12, Plans and Specifications of the Waste Water Treatment Facility.

D. OPERATING REQUIREMENTS

1. The Permittee shall not place hazardous wastes or treatment reagents in the tank systems if they could cause a tank, its ancillary equipment, or a containment system to rupture, corrode, leak, or otherwise fail.

2. The Permittee shall prevent spills and overflows from the tanks or containment systems using the methods to be submitted to and approved by the WAS and to be described in Permit Attachment 12, Plans and Specifications of the Waste Water Treatment Facility, and Permit Attachment 15, Waste Water Treatment Facility Operations Manual.

3. The Permittee shall operate the influent, effluent, and treatment tanks, and treatment equipment in accordance with the Operations Manual to be submitted to and approved by the WAS and to be contained in Permit Attachment 13, Waste Water Treatment Facility Operations Manual.

E. RESPONSE TO LEAKS OR SPILLS

In the event of a leak or spill from a tank system or a secondary containment system, or if a system becomes unfit for

continued use, the Permittee shall remove the system from service immediately and complete the following actions:

1. Stop the flow of hazardous waste into the system and inspect the system to determine the cause of the release.

2. Remove waste and accumulated precipitation from the system within 24 hours of the detection of the leak to prevent further release and to allow inspection and repair of the system. If the Permittee finds that it will be impossible to meet this time period, the Permittee shall notify the WAS and demonstrate that the longer time period is required.

   If the collected material is a CHS, it must be managed in accordance with all applicable requirements of COMAR 26.13. The Permittee shall note that if the collected material is discharged through a point source to U.S. waters or to a Publicly Owned Treatment Works, it is subject to the requirements of the Clean Water Act. If the collected material is released to the environment, it may be subject to reporting under 40 CFR Part 302, *Designation, Reportable Quantities, and Notification*.

3. Contain visible releases to the environment by immediately conducting a visual inspection of all releases and, based on that inspection:

   a. prevent further migration of the leak or spill to soils or surface water; and

   b. remove and properly dispose of any visible contamination of the soil or surface water.

4. Close the system in accordance with the Closure Plan, Permit Attachment 6, unless the following actions are taken:

   a. For a release caused by a spill that has not damaged the integrity of the system, the Permittee shall remove the released waste and make any necessary repairs to fully restore the integrity of the system before returning the tank system to service.

   b. For a release caused by a leak from the primary tank system to the secondary containment system, the Permittee shall repair the primary system prior to returning it to service.

   c. For a release to the environment caused by a leak from the aboveground portion of the tank system that does not have secondary containment, and can be

visually inspected, the Permittee shall repair the tank system before returning it to service.

5. For all major repairs to eliminate leaks or restore the integrity of the tank system, the Permittee must obtain a certification by an independent, qualified, registered professional engineer that the repaired system is capable of handling hazardous wastes without release for the intended life of the system before returning the system to service. Examples of major repairs are: installation of an internal liner, repair of a ruptured tank, or repair or replacement of a secondary containment system.

F. INSPECTION SCHEDULES AND PROCEDURES

1. The Permittee shall inspect the tank systems, in accordance with the Inspection Schedule, Permit Attachment 3, and shall complete the items in Permit Conditions V.F.2 and V.F.3 as part of those inspections:

2. The Permittee shall inspect the overfill controls, in accordance with the schedule to be submitted to and approved by the WAS and to be contained in Permit Attachment 3, Inspection Schedule.

3. The Permittee shall inspect the following components of the tank systems once each operating day:

   a. data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design;

   b. above-ground portions of the tank system to detect corrosion or releases of waste; and

   c. construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system, to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation).

4. The Permittee shall assess the condition of the tank systems, in accordance with the schedule and procedures to be submitted to and approved by the WAS and to be described in Permit Attachment 3, Inspection Schedule.

5. The Permittee shall document compliance with Permit Conditions V.F.2, V.F.3, and V.F.4 and place this documentation in the operating record for the facility.

G. RECORD KEEPING AND REPORTING

1. The Permittee shall report to the WAS, within 24 hours of detection, when a leak or spill occurs from the tank system or secondary containment system to the environment. (A leak or spill of one pound or less of hazardous waste, that is immediately contained and cleaned up, need not be reported.)

2. Within 30 days of detecting a release to the environment from the tank system or secondary containment system, the Permittee shall report the following information to the WAS:

   a. Likely route of migration of the release;

   b. Characteristics of the surrounding soil (including soil composition, geology, hydrogeology, and climate);

   c. Results of any monitoring or sampling conducted in connection with the release. If the Permittee finds it will be impossible to meet this time period, the Permittee should provide the WAS with a schedule of when the results will be available. This schedule must be provided before the required 30-day submittal period expires;

   d. Proximity of downgradient drinking water, surface water, and populated areas; and

   e. Description of response actions taken or planned.

3. The Permittee shall submit to the WAS all certifications required under Permit Condition V.E.5 not later than five days before returning the tank system to use.

4. The Permittee shall obtain, and keep on file at the facility, the written statements by those persons required to certify the design and installation of the tank system.

5. The Permittee shall submit semiannually to the WAS:

   a. the amount of waste accepted by the Permittee during the previous six months for storage in tanks, the amount of waste currently in storage in tanks, and the amount of waste treated by the Permittee in tanks during the previous six months;

   b. the results of all detailed physical and chemical waste analyses conducted on new or changed waste sources; and

c. the results of the monthly and annual waste analyses conducted on representative samples of the wastewater.

H. CLOSURE AND POST-CLOSURE CARE

1. At closure of the tank systems, the Permittee shall follow the procedures in the Closure Plan, Permit Attachment 6.

2. If the Permittee demonstrates that not all contaminated soils can be practically removed or decontaminated, in accordance with the Closure Plan, then the Permittee shall close the tank system(s) and perform post-closure care in accordance with the closure and post-closure care requirements of COMAR 26.13.05.14 J (Landfills: Closure and Post-Closure Care).

I. COMPLIANCE SCHEDULE

1. The Permittee shall submit to the WAS a report which describes the design and operating procedures of the tanks and tank systems and demonstrates compliance with the requirements of all of COMAR 26.13.05.10 - .10-7. The report shall include:

   a. References to design standards or other available information used (or to be used) in the design and construction of the tank.

   b. A description of design specifications including identification of construction materials and lining materials (including pertinent characteristics such as corrosion or erosion resistance).

   c. Tank dimensions, capacity, and shell thickness.

   d. A diagram of piping, instrumentation, and process flow for each tank system.

   e. Description of feed systems, safety cutoff, bypass systems, and pressure controls (for example, vents).

   f. A written assessment that is reviewed and certified by an independent, qualified, registered professional engineer as to the structural integrity and suitability for handling hazardous waste of each tank system, that complies with the requirements of COMAR 26.13.05.10-3 (Design and Installation of New

Tank Systems and Components). The assessment shall include the following information:

i. Design standard or standards according to which the tank system and ancillary equipment will be constructed;

ii. Hazardous characteristics of the waste or wastes to be managed;

iii. For tanks systems or components in which t external shell of a metal tank or any exter metal component of the tank system will be contact with the soil or with water, determination by a corrosion expert of:

a) factors affecting the potential corrosion, including but not limited to s moisture content, soil pH, soil sulfides lev soil resistivity, structure to soil potenti influence of nearby underground metal structures such as piping, existence of stray electric current, existing corrosion protection measures such as coating or cathodic protection; and

b) the type and degree of external corrosion protection that are needed to ensure the integrity of the system during the use of the system or component, consisting of corrosion-resistant materials of construction such as special alloys, fiberglass reinforced plastic, corrosion-resistant coating such as epoxy or fiberglass, with cathodic protection such as impressed current or sacrificial anodes, or electrical isolation devices such as insulating joints or flanges; and

iv. Design considerations to ensure that tank:

a) foundations will maintain the load of a full tank;

b) systems will be anchored to prevent flotation or dislodging where the tank system is placed in a saturated zone; and

c) systems will withstand the effects of frost heave.

g. A description of materials and equipment used to provide external corrosion protection, as required under COMAR 26.13.05.10-3 B(2)(c)(ii).

h. A detailed description of how the Permittee will install the tank systems in compliance with the following requirements:

i. Ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation;

ii. Before covering, enclosing, or placing a tank system or component in use, have the tank system inspected by an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or components, for the presence of any of the following items: weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, and other structural damage or inadequate construction or installation;

iii. Remedy all discrepancies detected in the inspection outlined in Permit Condition V.I.1.h.ii before the tank system is covered, closed, or placed in use;

iv. Use backfill material that is a noncorrosive, porous, homogeneous substance for tank systems or components that are placed underground and that are backfilled, and install the backfill material so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported;

v. Test all tanks and ancillary equipment for tightness before covering, enclosing, or placing in use;

vi. Perform all repairs necessary to remedy any leaks in the tanks system before covering, enclosing, or placing the system into use; and

vii. Ensure that ancillary equipment is supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.

i. Detailed plans and descriptions of how the secondary containment system for each tank system is or will be designed, constructed, and operated to meet the requirements of COMAR 26.13.05.10-4 A-F.

j. A description of controls and practices to prevent spills and overflows, including:

   i. Controls to prevent overfilling, such as level sensing devices, high level alarms, automatic feed cutoff, or by-pass to a standby tank;

   ii. For uncovered tanks, maintenance of sufficient freeboard to prevent overtopping by wave or wind action or by precipitation; and

   iii. Spill prevention controls, such as check valves or dry disconnect couplings.

k. As part of the Inspection Plan, procedures for inspecting overfill controls, monitoring and leak detection equipment, level of waste in uncovered tanks, above-ground portions of the tank systems, and construction materials of, the area immediately surrounding, the tanks systems, and cathodic protection systems.

l. As part of the Inspection Plan, a schedule and procedures for assessing the condition of the tanks that comply with COMAR 26.13.05.10 D(4), including procedures for emptying the tank and an explanation of proposed assessment frequencies.

m. A description of the treatment process controls, emission controls, and safety or emergency procedures that are necessary to protect human health and the environment from toxic or otherwise harmful fumes, mists, or gasses resulting from:

   i. volatilization of wastes stored or treated in the tanks;

   ii. chemical reactions in the tanks, either routine or resulting from process upsets; or

   iii. physical agitation or other forms of treatment conducted in the tank.

n. An Operations Manual detailing how the treatment tanks and system, influent and effluent storage tanks, and process control and monitoring equipment will be operated.

2. The Permittee is prohibited from constructing or operating the tanks and tank systems identified in Permit Conditions V.B.1 and V.B.2 until the WAS approves the report identified in Permit Condition V.I.1.

3. The Permittee shall submit as-built plans and specifications of the wastewater treatment and storage tanks, structures, secondary containment systems and ancillary equipment to the WAS before storing or treating hazardous waste or accepting hazardous waste for storage or treatment.

PART VI - CHEMICAL TREATMENT UNIT

A. The treatment unit is permitted for the treatment of chromium contaminated materials. The treatment unit will be located in the northwest part of the Hawkins Point Landfill property, in a portion designated Area 6. A maximum of 10 tons per hour of chromium contaminated soils and other solids will be treated by chemical reduction and stabilization. The treatment unit will be enclosed within a steel frame building that will prevent run-on and run-off. The foundation will be a reinforced concrete slab coated with a chemical resistant compound that will render the foundation impervious.

B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

1. The Permittee may treat a total mass of 10 short tons per hour of hazardous waste, subject to the terms of this permit and as follows:

Unit	Capacity (flow rate)	Description of Hazardous Waste	Hazardous Waste No.
Soil Treatment	10 short tons/hour	chromium contaminated solids	D002, D007

2. The waste identified in Permit Condition VI.B.1 must be:

   a. excavated material and leachate treatment sludge generated at the Dundalk Marine Terminal;

   b. leachate treatment sludge generated at the Hawkins Point Landfill wastewater treatment unit;

   c. sludge generated at the Patapsco Wastewater Treatment Plant; or

   d. material generated from Allied Signal's Baltimore Works site.

3. The Permittee is prohibited from treating hazardous waste that is not identified in Permit Conditions VI.B.1 and VI.B.2.

C. CONSTRUCTION AND INSTRUMENTATION REQUIREMENTS

1. The Permittee shall construct and maintain the chemical treatment unit in accordance with the design plans and specifications to be submitted to and approved by the WAS and to be contained in Permit Attachment 10, Plans and Specifications of the Soil Treatment Facility.

2. The Permittee shall install and test all instrumentation in accordance with the design plans, performance specifications, and maintenance procedures to be submitted to and approved by the WAS and to be contained in Permit Attachment 10, Plans and Specifications of the Soil Treatment Facility.

D. OPERATING REQUIREMENTS

1. The Permittee shall follow the operating practices to be submitted to and approved by the WAS and to be contained in the Soil Treatment Facility Operations Manual, Permit Attachment 11.

2. The Permittee shall not place hazardous wastes or treatment reagents in the chemical treatment unit if they could cause the treatment unit to rupture, leak, corrode, or otherwise fail before the end of its intended life.

E. INSPECTION REQUIREMENTS

The Permittee shall inspect the chemical treatment unit in accordance with the Inspection Schedule, Permit Attachment 3, and shall complete the following as part of those inspections:

1. The Permittee shall inspect the discharge control and safety equipment at least once each operating day, to ensure that it is in good working order;

2. The Permittee shall inspect data gathered from monitoring equipment, at least once each operating day, to ensure that the treatment process or equipment is being operated according to its design;

3. The Permittee shall inspect the construction materials of the chemical treatment unit and associated equipment at least weekly, to detect corrosion or leaks; and

4. The Permittee shall thoroughly inspect the construction materials of, and the area immediately surrounding, discharge confinement structures at least weekly, to detect erosion or obvious signs of leakage.

F. MONITORING REQUIREMENTS

1. The Permittee shall monitor treated soils for chromium and pH in accordance with the Waste Analysis Plan, Permit Attachment 1. The Permittee shall demonstrate to the WAS that the treatment system is capable of consistently rendering the chromium contaminated material non-hazardous before reducing the post-treatment monitoring from every batch to quarterly.

G. RECORD KEEPING AND REPORTING

1. The Permittee shall record and maintain in the operating record for this permit all monitoring and inspection data compiled under the requirements of Part VI of this permit.

2. The Permittee shall submit semiannually to the WAS:

   a. the amount of waste treated by the Permittee in the chemical treatment unit during the previous six months; and

   b. the results of all post-treatment waste analyses conducted on the treated waste.

H. CLOSURE

The Permittee shall follow the procedures in the Closure Plan, Permit Attachment 6.

I. COMPLIANCE SCHEDULE

1. The Permittee shall submit a report to the WAS which contains the following information:

   a. A detailed description of the treatment unit to be used, including the following:

      i. Physical characteristics, materials of construction, and dimensions of the unit; and

      ii. Detailed design plans, specifications and engineering reports describing how the unit and building will be located, designed, constructed, operated, maintained, monitored, and inspected.

   b. Performance specifications on the specific treatment process selected based on laboratory or field data and manufacturer's specifications.

   c. An Operations Manual for the chemical treatment unit specifically describing how the treatment unit and facility will be operated.

2. The Permittee is prohibited from constructing the chemical treatment unit or structures or treating controlled hazardous substances in the chemical treatment unit identified in Permit Condition VI.B.1 until the WAS approves the report identified in Permit Condition VI.I.1.

3. The Permittee shall submit as-built plans and specifications of the chemical treatment unit and structures to WAS before treating hazardous waste in the treatment unit.

List of Attachments

1. Waste Analysis Plan
2. Security Plan
3. Inspection Schedule
4. Personnel Training Outline
5. Contingency Plan
6. Closure Plan
7. Post-Closure Plan
8. Ground Water Monitoring Plan
9. Health and Safety Plan
10. Plans and Specifications of the Soil Treatment Facility
11. Soil Treatment Facility Operations Manual
12. Plans and Specifications of the Waste Water Treatment Facility
13. Waste Water Treatment Facility Operations Manual

RW Collins

Richard W. Collins, Director
Waste Management Administration

10-2-95
Date Signed

Notes on the Permit Attachments

The permit attachments consist of information submitted to the Maryland Department of the Environment by the applicant. Information in the permit attachments was taken directly out of the permit application. Titles the applicant used in the permit application sometimes differ from the titles of the permit attachments. For example, the applicant may refer to a section in the application as General Waste Analysis while MDE refers to the permit attachment as Waste Analysis Plan. In addition, the page numbers within the permit attachments may not be continuous since information may have been added and/or deleted during the drafting of this permit.

At the beginning of most permit attachments there is a description of the contents. Most of the permit attachments address the entire Hawkins Point facility; however, two of the attachments were divided into two or more parts. In these cases, each part of the attachment addresses specific waste management units (e.g., Area 5 landfill or Soil Treatment Facility).

In the text of the Permit Attachments the applicant may have made references to different sections, appendices, or attachments. These references are to the sections, appendices, or attachments in the actual permit application. A copy of the application is kept by MDE.

ATTACHMENT 1

WASTE ANALYSIS PLAN

ATTACHMENT 1 - WASTE ANALYSIS PLAN

PART 1
Area 5 Landfill

Part 1 Contents

Page No.

General Waste Analysis.....4-1 through 4-2

Report of Analysis.....1 through 6

Soils and Chrome Ore Tailing Chemical Analyses....no numbers

4.0 GENERAL WASTE ANALYSIS

4.1 GENERAL

Upon initiation of closure activities for Area 5, hazardous waste will no longer be accepted from off-site sources in Areas 2, 3, 4 and 5. Area 6 is currently in the processes of acquiring a RCRA permit for temporary storage and/or treatment of chromium contaminated soil generated at the Dundalk Marine Terminal. A waste analysis plan for this material is addressed in the permit application for Area 6.

Area 5 contains previously disposed chrome ore tailings and chromium contaminated soil and debris generated by AlliedSignal, Inc. The major components of the chrome ore tailings in Area 5 are shown on Table 4.1. The debris which is generated during the dismantling of the Baltimore Works plant consists of concrete, brick, asbestos, structural beams, gunnite, tile, floor slab, refractory and other miscellaneous materials. This material is considered a hazardous waste by characteristic under Federal and State of Maryland regulations because the material exhibits the characteristic of corrosivity (D002) and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit for chromium (D007.) This material exhibits no other characteristics of hazardous waste. The leachate generated from the percolation of groundwater and precipitation through the cells is also a hazardous waste by characteristics of TCLP toxicity for chromium and corrosivity. A laboratory analysis from July 19, 1993 of the leachate is included at the end of this section.

4.2 WASTE ANALYSIS PLAN

The only hazardous materials handling involved with the Area 5 facility after closure will be the chromium contaminated leachate collected by the leachate collection system. Leachate collected by this system is transferred to a 30,000 gallon underground leachate holding tank in the leachate holding and transfer area. This material is transported by a certified hazardous waste hauler to an appropriate TSD facility for treatment. The MPA cells in Areas 2 and 3 have a similar leachate collection system. Both systems are closed with known sources of contamination. It is not anticipated that the composition of either of the leachate waste streams will differ greatly over time. Leachate from both systems will therefore be collected and analyzed annually for informational purposes.

Assay	Average % by dry weight
Calcium (as CaO)	36
Iron (as Fe_2O_3)	22
Moisture	17
Aluminum (as Al_2O_3)	11
Magnesium (as MgO)	9.6
Total Chromium (as Cr_2O_3)	5.2
Silica (as SiO_2)	4.0
Sodium (as Na_2O)	1.6
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.32

MARYLAND

Major Components of Chrome Ore Tailings in Area 5

TABLE 4.1

The leachate generated in each of the two systems will be sampled by the Maryland Environmental Service (MES) from the two 0,000 gallon holding tanks by the "COLOWASA" sampling method as stated in EPA document entitled "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods". The following parameters will be analyzed using the appropriate EPA testing methods and procedures:

A.	Total Chromium	EPA 218.1, 218.2 or 200.7
B.	Hexavalent Chromium	EPA 218.4
C.	pH	EPA 150.1
D.	Sulfate	EPA 375.3
E.	Sodium	EPA 273.1
F.	Chloride	EPA 325.3 or 325.2
G.	Iron	EPA 236.1, 236.2 or 200.7
H.	Manganese	EPA 243.1 or 200.7
I.	Barium	EPA 208.1 or 200.7
J.	Conductivity	EPA 120.1
K.	Solids (Dissolved)	EPA 160.1
L.	Solids (Suspended)	EPA 160.2
M.	Total Organic Carbon	EPA 415.1

The rational for analyzing items A. through M. is to provide background information on leachate characteristics when used to compare to existing groundwater conditions and to detect possible infiltration of precipitation or ground water into the system. Items L. and M. are analyzed to demonstrate that the liquid is a wastewater by definition as listed in 40 CFR 268.2.

MES will notify the Maryland Department of the Environment (MDE) of the scheduled sampling events and a laboratory data report will be submitted to the MDE within 90 days of the sampling event.

ARTESIAN LABORATORIES

Artesian Laboratories, Inc.
630 Churchmans Road
Newark, Delaware 19702
(302) 453-6920 • 453-6986 (FAX)

REPORT OF ANALYSIS

Maryland Environmental Svc
2011 Commerce Park Drive
Annapolis, MD 21401

Attn: Ms. Tammy Banta

Purchase Order: 316942/316943 Acct:2170292
Invoice Number: 31432

Order #: 93-07-530
Date: 08/06/93 13:29
Work ID: Hawkins Point Leachate
Date Received: 07/19/93
Date Completed: 07/31/93

Client Code: MES

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	MPA
02	Allied

Entries under "Limit" in test results are Method Detection Limits (MDLs) for that test.

Certified By
Warren Van Arsdall

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AUG 1 4 1993

Sample: 01A MPA
Collected: 07/19/93 12:20

Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Barium, ICP	0.025	0.003	mg/L	RJM	07/22/93 14:58
Cadmium, ICP	ND	0.004	mg/L	RJM	07/22/93 14:58
Chromium, ICP	238	0.008	mg/L	RJM	07/23/93 01:19
Copper, ICP	0.045	0.001	mg/L	RJM	07/22/93 14:58
Digestion, Microwave	07/21/93		date digested	RJM	07/21/93 17:00
Iron, ICP	1.58	0.009	mg/L	RJM	07/22/93 14:58
Lead, ICP	ND	0.014	mg/L	RJM	07/22/93 14:58
Manganese, ICP	0.049	0.005	mg/L	RJM	07/22/93 14:58
Mercury, Cold Vapor AA	ND	0.0002	mg/L	RJM	07/20/93 17:00
Nickel, ICP	0.331	0.011	mg/L	RJM	07/22/93 14:58
Selenium, Graphite Furnace	0.010	0.005	mg/L	CKC	08/03/93 09:35
Silver, Flame AA	0.019	0.01	mg/L	ST	07/27/93 10:05
Sodium, ICP	3068	0.20	mg/L	RJM	07/23/93 01:19
Zinc, ICP	ND	0.014	mg/L	RJM	07/22/93 14:58

Sample: 01B MPA
Collected: 07/19/93 12:20

Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Phenol, Total, Aqueous	0.06	0.05	mg/L	AMH	07/21/93 15:30
Total Organic Carbon, Aq	248	1.0	mg/L	NG	07/27/93 11:30

Sample: 01C MPA
Collected: 07/19/93 12:20

Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Chloride	280	1.0	mg/L	AMH	07/23/93 13:00
Chromium, hexavalent	255	5.0	mg/L	AMH	07/20/93 09:00
Solids, Total Dissolved	9800		mg/L	NG	07/23/93 08:00
Solids, Total Suspended	40		mg/L	NG	07/23/93 16:30
Sulfate	902	0.14	mg/L	AMH	07/27/93 15:00
pH	11.7		7H Units	BTD	07/19/93 18:10

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Sample: 01D MPA
Collected: 07/19/93 12:20

Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Total Organic Halogen	75	03	ug/L	QC	08/02/93

Sample: 02A Allied
Collected: 07/19/93 12:40

Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Barium, ICP	0.025	0.003	mg/L	RJM	07/22/93 15:01
Cadmium, ICP	ND	0.004	mg/L	RJM	07/22/93 15:01
Chromium, ICP	386	0.008	mg/L	RJM	07/23/93 01:22
Copper, ICP	0.052	0.001	mg/L	RJM	07/22/93 15:01

TEST RESULTS BY SAMPLE

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Digestion, Microwave	07/21/93		date digested	RJM	07/21/93 17:00
Iron, ICP	6.46	0.009	mg/L	RJM	07/22/93 15:01
Lead, ICP	ND	0.014	mg/L	RJM	07/22/93 15:01
Manganese, ICP	0.140	0.005	mg/L	RJM	07/22/93 15:01
Mercury, Cold Vapor AA	ND	0.0002	mg/L	RJM	07/20/93 17:00
Nickel, ICP	0.441	0.011	mg/L	RJM	07/22/93 15:01
Selenium, Graphite Furnace	ND	0.005	mg/L	CKC	08/03/93 09:35
Silver, Flame AA	0.030	0.01	mg/L	ST	07/27/93 10:05
Sodium, ICP	4686	0.20	mg/L	RJM	07/23/93 01:22
Zinc, ICP	ND	0.014	mg/L	RJM	07/22/93 15:01

Sample: 02B Allied
Collected: 07/19/93 12:40
Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Phenol, Total, Aqueous	0.13	0.05	mg/L	AMH	07/21/93 15:30
Total Organic Carbon, Aq	470	1.0	mg/L	NG	07/27/93 11:30

Sample: 02C Allied
Collected: 07/19/93 12:40
Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Chloride	900	1.0	mg/L	AMH	07/23/93 13:00
Chromium, hexavalent	400	5.0	mg/L	AMH	07/20/93 09:00
Solids, Total Dissolved	15000		mg/L	NG	07/23/93 08:00
Solids, Total Suspended	40		mg/L	NG	07/23/93 16:30
Sulfate	7116	0.14	mg/L	AMH	07/27/93 15:00
pH	11.9		pH Units	BTD	07/19/93 18:10

Sample: 02D Allied
Collected: 07/19/93 12:40
Category: WW

Test Description	Result	Det Limit	Units	By	Analyzed Dt/Tm
Total Organic Halogen	130		ug/L	QC	08/02/93

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TEST METHODOLOGIES

pH, Field Measurement

EPA Method 150.1

Microwave Digestion

Wastewater	Federal Register 9/11/92
Soils/Solids	SW-846 Method 3051

Silver (Ag) - Flame AA

Wastewater & drinking water	EPA (1983) Method 272.1
RCRA TCLP & groundwater	SW 846 Method 7760
Solids	SW 846 Method 7760

Barium (Ba) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Cadmium (Cd) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Copper (Cu) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Iron (Fe) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

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Mercury, Aqueous

EPA Method 245.1 (cold vapor AA)

Nickel (Ni) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Lead (Pb) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

TEST METHODOLOGIES

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Selenium (Se) - furnace AA.

Wastewater & drinking water	EPA (1983) 270.2
RCRA TCLP & groundwater	SW 846 7740
Solids	SW 846 7740

Zinc (Zn) - ICP (Inductively Coupled Argon Plasma Emission Spectroscopy)

Wastewater & drinking water	EPA (1983) Method 200.7
RCRA TCLP & groundwater	SW 846 Method 6010
Solids	SW 846 Method 6010

Total Organic Halogen

SW 846 Method 9020

Total Dissolved Solids

EPA Method 160.1 (gravimetric, dried at 180C)

Total Organic Carbon, Aqueous

EPA Method 415.2 (low-level, persulfate oxidation)
SW 846 Method 9060

Total Suspended Solids

EPA Method 160.2 (gravimetric, dried at 105C)

Chloride

EPA Method 325.3 (titrimetric, mercuric nitrate)

Chromium, Hexavalent

SM 3500-Cr-D (colorimetric, diphenylcarbizide)

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Phenols, Total Recoverable

EPA Method 420.1
Colorimetric, manual 4-AAP with distillation

Sulfate

EPA Method 375.4 (turbidimetric)

REPORT COMMENTS

PROJECT COMMENTS

1. The hexavalent chromium analysis was rerun on 07/22/93 as part of the investigation performed in response to discussions concerning the hexavalent chromium analysis for ALI Order #9306932. The results of the 07/22/93 analysis is summarized below for your review.

Sample Identification	Results, mg/L
MPA	290
Allied	450

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AUG 12 1993
Maryland Environmental Serv.
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APPENDIX B

SOILS AND CHROME ORE TAILING CHEMICAL ANALYSES

PENNIMAN & BROWNE INC.
CHEMISTS-ENGINEERS-INSPECTORS
6252 FALLS ROAD
BALTIMORE, MARYLAND 21209

SEP 13 1982

ESTABLISHED 1896
CABLE ADDRESS "BALTEST"
TELEPHONE 825-4131
AREA CODE 301

ANALYTICAL DIVISION

REPORT OF ANALYSIS

Attn: Mr. Naparano
P.O. 022 2 5039

September 8, 1982

No. 821916

Sample of Lime Refuse

From Allied Chemical Corp.

Marked For Analysis

Chemical Analysis:	% by wgt
Moisture	13.29
Hexavalent Chrome (Water Soluble)	0.38
Hexavalent Chrome (Acid Soluble)	0.89
Silica, SiO2	4.77
Chromium as Ch203	5.67
Magnesium as MgO	9.30
Aluminum as Al203	5.90
Sodium as Na20	1.20
Iron as Fe203	21.18
Calcium as CaO	32.42
Loss on Ignition	5.56

EP Toxicity:	
Silver, mg/l	*0.04
Arsenic, mg/l	*0.002
Barium, mg/l	52.83
Cadmium, mg/l	*0.005
Chromium, mg/l	163.50
Mercury, mg/l	*0.0009
Lead, mg/l	*0.02
Selenium, mg/l	*0.004
Nickel, mg/l	0.85
Copper, mg/l	*0.01
Molybdenum, mg/l	*0.42
Zinc, mg/l	0.06
Hexavalent Chromium, mg/l	147.25
Antimony, mg/l	*0.18
pH	12.67
Oil & Grease, mg/l	*0.1
COD, mg/l	*0.1
Total Volatile Residue, %	80.15

PB Report No. 821916
Allied Chemical Corp.

September 8, 1982

Sieve Analysis:	Accumulative % Passing
1"	100
3/4"	98.2
1/2"	95.3
3/8"	94.5
4	89.5
10	86.0
20	75.3
40	51.2
100	15.1
200	8.2
325	5.9

PENNIMAN & BROWNE, INC.

Philip M. Aidt

Philip M. Aidt

spl

CHEMISTS ENGINEERS INSPECTORS
5252 FALLS ROAD
BALTIMORE, MARYLAND 21209

ANALYTICAL DIVISION

REPORT OF ANALYSIS

Attn: Mr. T. Maparano
P.O.# 022 2 0539

September 16, 1982

No. 821916

Sample of Lime Refuse

From Allied Chemical Corp.

Marked For Analysis

Chemical Analysis	% by wgt.
Moisture	13.29
Hexavalent Chrome (Water Soluble)	0.38
Hexavalent Chrome (Acid Soluble)	0.89
Silica, SiO_2	4.77
Chromium as Cr_2O_3	5.67
Magnesium as MgO	9.30
Aluminum as Al_2O_3	5.90
Sodium as Na_2O	1.20
Iron as Fe_2O_3	21.18
Calcium as CaO	32.42
Loss on Ignition	5.56

EP Toxicity	mg/l
Silver	*0.04
Arsenic	*0.002
Barium	52.83
Cadmium	*0.005
Chromium	163.50
Mercury	*0.0009
Lead	*0.02
Selenium	*0.004
Nickel	0.85
Copper	*0.01
Molybdenum	*0.42
Zinc	0.06
Hexavalent Chromium	147.25
Antimony	*0.18

*less than

continued . . . .

PB Report No. 821916
Allied Chemical Corp.

September 16, 1982

pH	12.67
Oil & Grease, mg/l	*0.1
COD, mg/l	*0.1
Total Volatile Residue, %	18.85
Cyanide, mg/l	*0.1

Sieve Analysis	Accumulative % Passing
1"	100
3/4"	98.2
1/2"	95.3
3/8"	94.5
4	89.5
10	86.0
20	75.3
40	51.2
100	15.1
200	8.2
325	5.9

PENNIMAN & BROWNE, INC.

Philip M. Aidt

spl

CHROME ORE TAILINGS CHARACTERISTICS

ASSAY	% WT. (DRY BASIS)
CaO	38.8
Fe_2O_3	23.2
Al_2O_3	15.5
MgO	9.8
SiO_2	3.2
Na_2O	2.0
Water Soluble Cr^{+6}	0.25
Acid Soluble Cr^{+6}	1.5
Total Cr	4.8
V	0.15
Ti	0.23
Mn	0.15
Moisture	20

TABLE F-1 TOTAL CONSTITUENT ANALYSES OF SOIL

WELL	DEPTH (FT)	PH	SULFATE	CHLORIDE	IRON	SODIUM	MANGANESE	ARSENIC	BARIUM	CADMIUM	TOTAL CHROMIUM	LEAD	MERCURY	SELENIUM	SILVER
2J	5.0-6.5	7.0	8400	70	8000	340	330	0.01	*	*	*	0.21	*	*	*
2G	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-3	5.5-6	3.4	17000	160	12700	200	200	*	*	0.04	0.1	0.16	*	*	*
5-3	6-6.5	3.9	17900	70	12500	140	140	*	*	*	0.1	0.08	*	*	*
2J	10-11.5	3.6	7600	80	22000	240	29	*	*	*	*	0.05	*	*	*
2G	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-3	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2J	15-16.5	8.1	11000	550	58000	990	1000	0.06	*	*	*	*	*	*	*
2G	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-3	16.5-17	6.2	760	80	28000	230	110	0.09	*	0.01	*	0.12	*	*	*
2J	20-21.5	4.5	32000	320	17000	590	350	0.06	*	*	*	0.20	*	*	*
2G	20-20.5	5.3	970	40	3800	40	68	0.07	*	*	*	0.13	*	*	*
5-3	19.5-26	3.8	9600	220	5200	246	190	0.03	*	*	*	0.29	*	*	*
5-3	21-21.5	4.6	12000	40	20000	64	14	0.01	*	*	*	0.11	*	*	*
2J	25-26.5	4.9	15000	200	25000	500	510	0.01	*	*	*	0.22	*	*	*
2G	25.5-26	3.4	15000	160	24400	84	110	0.01	*	0.04	1.6	1.06	*	*	*
5-3	24-24.5	4.3	15000	150	1600	26	18	0.01	*	*	*	0.06	*	*	*
2J	30-31.5	5.8	16000	150	18000	350	470	0.02	*	*	*	0.42	*	*	*
2G	30-30.5	4.6	13000	370	31700	190	115	0.04	*	0.01	*	0.07	*	*	*
2G	33-33.5	4.1	15000	280	2040	134	86	0.05	*	0.03	0.7	0.43	*	*	*
5-3	32-32.5	4-9	8900	250	10200	132	70	0.01	*	*	*	0.06	*	*	*
2J	35-36.5	4.6	24000	310	25000	550	450	0.01	*	*	*	0.05	*	*	*
2G	36-36.5	4.7	12000	170	15900	54	26	0.05	*	0.03	0.2	2.11	*	*	*
5-3	N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Below minimum detection limit

NOTE: All concentrations (except pH) are in mg/kg

NOTE: Borings 2G and 5-3 sampled in August, 1984
Boring 2J sampled in October, 1984

MEMBER AMERICAN ASSN. FOR LABORATORY ACCREDITATION

GASCOYNE LABORATORIES, INC.

A Certified Independent Testing Laboratory

ESTABLISHED 1887

BALTIMORE (301) 539-0195

SALISBURY (301) 543-1051

27 SOUTH GAY STREET
BALTIMORE, MARYLAND 21202

CERTIFICATE OF ANALYSIS

Report No. 841530-1

Report to: Allied Chemicals

Report Date 8-28-84

Sample I.D. As below:

EP TOXICITY	#1	#2	#3	#4	#5	#6	#7
Arsenic (As)	0.00	0.00	0.09	0.03	0.01	0.01	0.01
Barium (Ba)	0	0	0	0	0	0	0
Cadmium (Cd)	0.04	0.00	0.01	0.00	0.00	0.00	0.00
Chromium, Total (Cr)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Chromium, Hex. (Cr)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lead (Pb)	0.16	0.08	0.12	0.29	0.11	0.06	0.06
Mercury (Hg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (Se)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Silver (Ag)	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The above results are expressed in mg/liter of extract.

TOTAL CONSTITUENTS							
pH	3.4	3.9	6.2	3.8	4.6	4.3	4.9
Sulfate (SO_4)	17,000	17,900	760	9,600	12,000	15,000	8,900
Chloride (Cl)	160	<70	80	220	40	150	250
Iron (Fe)	12,700	12,500	28,000	5,200	20,000	1,600	10,200
Sodium (Na)	200	140	230	240	64	26	132
Manganese (Mn)	200	140	110	190	14	18	70

The above results are expressed in mg/kg (ppm) on as received basis.

#1 - Soil, Area 5, Boring 5, 5-3, #1, 5.5'-6
#2 - Soil, Area 5, Boring 5, 5-3, #2, 6-6.5'
#3 - Soil, Area 5, Boring 5, 5-3, #3. 16.5-17'
#4 - Soil, Area 5, Boring 5, 5-3, #4, 19.5-20'
#5 - Soil, Area 5, Boring 5, 5-3, #5, 21-21.5'
#6 - Soil, Area 5, Boring 5, 5-3, #6, 24-24.5'
#7 - Soil, Area 5, Boring 5, 5-3, #7, 32-32.5'

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1847

BALTIMORE (301) 539-0195

SALISBURY (301) 543-1051

27 SOUTH GAY STREET
BALTIMORE, MARYLAND 21202

CERTIFICATE OF ANALYSIS

Report No. 841530-2

Report Date 8-28-84

Report to: Allied Chemicals

Sample I.D. As below:

EP TOXICITY	#8	#9	#10	#11	#12	#13
Arsenic (As)	0.07	0.01	0.04	0.05	0.05	0.01
Barium (Ba)	0	0	0	0	0	0
Cadmium (Cd)	0.00	0.04	0.01	0.03	0.03	0.00
Chromium, Total (Cr)	0.0	1.6	0.0	0.7	0.2	240
Chromium, Hex. (Cr)	0.00	0.00	0.00	0.00	0.00	180
Lead (Pb)	0.13	1.06	0.07	0.43	2.11	0.12
Mercury (Hg)	0.00	0.00	0.00	0.00	0.00	0.00
Selenium (Se)	0.00	0.00	0.00	0.00	0.00	0.00
Silver (Ag)	0.00	0.00	0.00	0.00	0.00	0.00

The above results are expressed in mg/liter of extract.

TOTAL CONSTITUENTS						
pH	5.3	3.4	4.6	4.1	4.7	11.5
Sulfate (SO_4)	970	15,000	13,000	15,000	12,000	590
Chloride (Cl)	40	160	370	280	170	50
Iron (Fe)	3,800	24,400	31,700	2,040	15,900	53,700
Sodium (Na)	40	84	190	134	54	1,570
Manganese (Mn)	68	110	115	86	26	149

The above results are expressed as mg/kg (ppm) on an as received basis.

#8 - Soil, Area 5, Boring 26, #1 20-20.5'
#9 - Soil, Area 5, Boring 26, #2 25.5-26.0'
#10- Soil, Area 5, Boring 26, #3 30.0-30.0'
#11- Soil, Area 5, Boring 26, #4 33.0-33.5'
#12- Soil, Area 5, Boring 26, #5 36-36.5'
#13 - Chrome Ore Tailings

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27 SOUTH GAY STREET
BALTIMORE, MARYLAND 21202

Report No. 841768-3

CERTIFICATE OF ANALYSIS

Report to: Woodward & Clyde

Report Date 9-28-84

Sample I.D. Waste 40'W of W3 at prop. line, edge of crk. "mystery mud"

TOTAL ANALYSIS

pH	2.8
Sulfate (SO_4)	4500
Chloride (Cl)	220
Iron (Fe)	18,600
Sodium (Na)	550
Manganese (Mn)	76

Results are expressed as ppm on an as rec'd basis.

EP TOXICITY

Arsenic (As)	< 0.01
Barium (Ba)	< 1
Cadmium (Cd)	< 0.01
Chromium, Total (Cr)	< 0.1
Chromium, Hexavalent (Cr)	< 0.01
Lead (Pb)	0.1
Mercury (Hg)	< 0.01
Selenium (Se)	< 0.01
Silver (Ag)	< 0.01

Results are expressed in mg/liter of extract.

cc: Mr. Mark Sylvester, Allied Chemicals

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27 SOUTH GAY STREET
BALTIMORE, MARYLAND 21202

CERTIFICATE OF ANALYSIS

Report No. 841964

Report Date 10-18-84

Report to: Woodward & Clyde

Sample I.D. 10/8/84, W4C1314, 2J

TAL ANALYSIS	5.0-6.5	10-11.5	15-16.5	20-21.5	25-26.5	30-31.5	35-36.5
	7.0	3.6	8.1	4.5	4.9	5.8	4.6
lfate (SO_4)	8400	760	11,000	32,000	15,000	16,000	24,000
loride (Cl)	70	80	550	320	200	150	310
on (Fe)	8000	22,000	58,000	17,000	25,000	18,000	25,000
dium (Na)	340	240	990	590	500	350	550
nganese (Mn)	330	29	1000	350	510	470	450

e above results are expressed as ppm on an as received basis.

TOXICITY							
zenic (As)	0.01	< 0.01	0.06	0.06	0.01	0.02	0.01
rium (Ba)	< 1	< 1	< 1	< 1	< 1	< 1	< 1
dmium (Cd)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
romium, Tot. (Cr)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
romium, Hex. (Cr)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
ad (Pb)	0.21	0.05	< 0.05	0.20	0.22	0.42	0.05
rcury (Hg)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
lenium (Se)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
lver (Ag)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

e above results are expressed in mg/liter of extract.

SECTION II

WASTE CHARACTERISTICS

A. WASTE CHARACTERISTICS AND WASTE ANALYSIS PLAN

The treatment facility to be located in Area 6 of the Hawkins Point Hazardous Waste Facility will accept the excavated materials as a result of the construction, utility repair and maintenance activities performed at the Dundalk Marine Terminal. The waste material constitutes chromium-contaminated soils as well as some of the chrome ore tailings. Other possible sources of chromium contaminated materials to be treated in the Facility include but are not limited to the following:

- Allied-Signal Baltimore Works Plant,
- Leachate Treatment Sludge from Hawkins Point and Dundalk Marine Terminal,
- Sludge from Patapsco Wastewater Treatment Plant, and
- Any chromium contaminated material resulting from Allied chrome ore tailings.

These wastes contain hexavalent chromium and are therefore a hazardous waste under the definition of EP Toxicity (EPA Hazardous Waste ID No. D007). The pH values of the waste vary and may reach as high as 12.

The wastes to be treated in the facility are not ignitable, reactive and incompatible as described in the MSDS in Appendix F of the application.

A "Quick Qualitative Chrome Test" (Appendix D of the application) will be conducted for each truck load of waste transported to separate chromium-contaminated soil from non-chromium-contaminated soil. A composite sample from each truck load will be collected in a safe bucket for testing.

Based on previous studies, the major components of Chrome Ore Tailings are as follows (Ref: Controlled Hazardous Substances Facility Permit No. A-264 for Hawkins Point Hazardous Waste Landfill Area 5):

Constituent	Average Percent by Dry Weight
Calcium (as CaO)	36
Iron (as Fe_2O_3)	22
Aluminum (as AlF_2O_3)	11
Magnesium (as MgO)	9.6
Total Chromium (as Cr_2O_3)	5.2
Silica (as NaF_2RO)	1.6
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.32

ATTACHMENT 1 - WASTE ANALYSIS PLAN

PART 2
Soil Treatment Facility

Part 2 Contents — Page No.

Waste Characteristics.....2-1 through 2-4

Waste Analysis Plan, Part A: Soil Treatment Facility.....5-1 through 5-2

Appendix D, Quick Qualitative Chrome Test.....D-1

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B. WASTE ACCEPTANCE PROCEDURES

Before acceptance of each new or previously unanalyzed waste source, a detailed chemical and physical analysis in accordance with procedures set forth in SW-846, "Test Methods for Evaluating Solid Waste," 1986 shall be performed in order to ensure that the waste is hazardous only under TCLP D007 and Corrosivity D002. In addition, a representative sample or the waste shall be tested for free liquids by EPA Method 9095, Paint Filter Liquids Test, as described in EPA Publication SW-864, "Test Methods for Evaluating Solid Waste," 1986.

1. Shipment Inspection:

   All incoming waste transport vehicles will be visually inspected at the entrance of the treatment facility to positively identify the material as specified waste. When differences are detected from the specified waste, the quality control technician will sample the material and forward the sample container to the chemical analyst.

   The shipment will be sampled by taking five to ten grab samples from random locations throughout the shipment to obtain an approximately ten pound sample. This sample will be mixed by hand to obtain a composite sample.

   The chemical analyst will analyze the sample utilizing the Quick Qualitative Chrome Test (Appendix D of the Application) to establish chrome content of the material.

Based on the results of the on-site inspection and/or testing, the waste shipment will be accepted or rejected for disposal.

Each waste shipment will be accompanied by a manifest, developed by the transporter, containing the following standard information (40 CFR 262.21):

- Document number
- Generator name, mailing address, telephone numbers, EPA identification number
- Transporter name and EPA identification number
- Designated disposal facility name, address and EPA identification number
- Waste description (49 CFR 172)
- Total quantity of waste as loaded onto the transport vehicle
- Certification of manifest information by the generator

All trucks are to be weighed upon arrival and leaving. The transporter should submit the manifest to the Site Superintendent on a regular basis. The transporter should also submit a Shipment Receipt Record including the date of transmittal, the number of shipments, and the total weight of waste transported.

2. Waste Acceptance Review:

The waste will not be accepted for disposal if any of the following conditions exist:

- The presence of chrome is not detected through either visual inspection or testing.
- Significant errors or omissions are evident in the manifest, labeling, placarding or other documentation accompanying the shipment.

The Site Superintendent will contact the transporter to resolve any discrepancy. All discrepancies found will be noted on the manifest. Any manifest discrepancies unresolved after 15 days must be reported to the Maryland Department of the Environment (MDE).

At the unloading point of the treatment facility, the manifest will be signed and dated by a qualified MES personnel, with one copy retained in the file, a copy retained to the transporter, and one copy submitted to the MDE on a weekly basis.

3. Truck Washing:

All vehicles leaving the active disposal area which have evidence of tailings on exterior parts will be guided by posted signs to the truck washing facility adjacent to Area 2 of the Hawkins Point Facility. Determination of the necessity for truck washing will be made by qualified MES personnel in the working area of the facility. An attendant will ensure that all potentially contaminated soil and waste materials are removed from the exterior of the vehicle either by use of the power washer unit or by brushing. Vehicle surfaces to be checked include the wheel and axle assemblies, rear bumper, rear of the dump bed and tailgate assembly. All contaminated washwater will flow to a separate oil interceptor and then to the leachate storage and transfer area of the Hawkin Point Facility. The wash pad operator will ensure that all washwater is contained and that the waste oil storage tank is checked and emptied at regular intervals. At a minimum, each waste-hauling vehicle will be washed on its last trip from the storage facility each day.

4. Check-out Procedure:

Waste-hauling vehicles from either the treatment facility or the truck-washing facility will be released by an authorized MES personnel.

5.0 WASTE ANALYSIS PLAN

PART A: SOIL TREATMENT FACILITY

5.1 PRE-TREATMENT WASTE ANALYSIS

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5.3 POST-TREATMENT WASTE ANALYSIS

Once the contractor completes treating the soil material, the material will be stored to prevent contact from moisture. Composite samples from each container will be taken and analyzed using procedures in accordance with EPA-600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", and SW-846, "Test Methods for Evaluating Solid Waste", 1986.

The following parameters will be used for analysis:

Chromium (TCLP)
pH

Samples will be analyzed within 48 hours of treatment and approximately 7 days after treatment.

Sampling frequencies are as follows:

- For the first year of the treatment process/system, every batch of treated soil should be analyzed.

- Starting the second year of the treatment process/system, analysis will be performed quarterly, provided that the treatment process/system has been proved to have the ability of rendering the chromium contaminated material non-hazardous in compliance with State and Federal regulations.

APPENDIX D

QUICK QUALITATIVE CHROME TEST

QUICK QUALITATIVE CHROME TEST

A diphenyl-carbizide solution will turn purple in the presence of chromium.

Making the Diphenyl-Carbizide Solution

1. Add 0.10 grams of Diphenyl-carbizide to 50 mls. Ethanol.
2. Mix for 30 minutes.
3. Add acid solution (180 mls. distilled water plus 20 mls. concentrated Sulfuric Acid).
4. Mix for 15 minutes.
5. Transfer to sealed glass storage bottle, label and date bottle and keep refrigerated. Solution is good for one month.

Testing Soil for Chromium

Approximately 2 tablespoons of the soil are deposited in a 1 pint bottle that has been previously rinsed with tap water. Approximately 1/2 cup of tap water is add to the soil. The water-solid mixture is thoroughly mixed for several minutes, and the solid is allowed to settle until a clear water layer is visible. Add 5 drops of diphenyl-carbizide solution to the water layer. The appearance of a light to dark purple color confirms the presence of chromium.

Testing Water for Chromium

Add five drops of the diphenyl-carbizide solution to the water. The appearance of a light to dark purple color confirms the presence of chromium. This test can be done by collecting a sample in a glass bottle or adding the solution directly to standing water in the field.

Log of Solution Mix

A log shall be maintained specifying:

1. Date of preparation
2. Name of person preparing solution
3. Expiration date of solution

ATTACHMENT 1 - WASTE ANALYSIS PLAN

PART 3
Waste Water Treatment Facility

Part 3 Contents | Page No.

Waste Analysis Plan, Part B: Wastewater Treatment Facility.....5-2 through 5-3

Toxic Substance Analytical Protocol.....no numbers

December 22, 1995

Hawkins Point Landfill – Chromium Contaminated Soil Treatment Unit – Description and Operations Manual

HAWKINS POINT LANDFILL

CHROMIUM CONTAMINATED SOIL TREATMENT UNIT

DESCRIPTION AND OPERATIONS MANUAL

CHS PERMIT NUMBER A-264

DECEMBER 22, 1995

PREPARED FOR:

THE MARYLAND PORT ADMINISTRATION

BY:

THE MARYLAND ENVIRONMENTAL SERVICE

MARYLAND ENVIRONMENTAL SERVICE

MARYLAND PORT ADMINISTRATION

RECEIVED

DEC 27 1995

HAWKINS POINT LANDFILL

CHROMIUM CONTAMINATED SOIL TREATMENT UNIT

DESCRIPTION AND OPERATIONS MANUAL

CHS PERMIT NUMBER A-264

DECEMBER 22, 1995

HAWKINS POINT LANDFILL
CHROMIUM CONTAMINATED SOIL TREATMENT UNIT
DESCRIPTION AND OPERATIONS MANUAL

CHS PERMIT NUMBER A-264

INTRODUCTION

On October 15, 1995, the Maryland Department of the Environment (MDE) issued Controlled Hazardous Substances (CHS) Permit A-264 to the Maryland Environmental Service (MES). This permit authorizes MES to treat chromium contaminated solids in Area 6 of the Hawkins Point Landfill. Part VI, Section I of this Permit prohibits the Permittee (MES) from treating controlled hazardous substances until MDE approves a report which includes a detailed description of the treatment unit to be used, performance specifications on the treatment process and an Operations Manual for the chemical treatment unit. The purpose of this document is to comply with Part VI, Section I concerning the required report.

The intent to permit the Hawkins Point Facility to authorize treatment of chromium contaminated solids is to install a permanent treatment unit enclosed in a pre-engineered metal building. Prior to construction of this building, the permit allows portable treatment equipment to be brought on-site to treat the waste material. This report only provides the description and Operations Manual for the portable treatment equipment process.

DESCRIPTION OF TREATMENT PROCESS

The portable treatment equipment will be staged on an existing concrete pad located in Area 6 of the Hawkins Point facility. This pad was the floor slab for a building that was dismantled in the late 1980's. Runon and runoff control is provided by 6 to 12 inch earthen dikes around the pad perimeter. Electricity will be provided by portable diesel powered generators, and water will be obtained from a nearby fire hydrant.

Treatment of the contaminated soil will be performed by qualified independent contractors that have demonstrated by past performance that they can consistently treat the soil to chromium levels which are non-hazardous. All treatment equipment will be owned or leased by this independent contractor.

Treatment equipment will consist of the following:

1.	Screener/Shredder	Powerscreen Model MK II
2.	Mixer with: * spray bar liquid delivery system * sealed mixing basin w/vacuum scrubber * drum lift and solid reagent delivery attachment	Maxon Maxcrete II
3.	3,000 Gallon Polytank w/containment	Terracon Model CXF-3000
4.	5 HP Pump with: * AC inverter (V.S.) * Base and recirculation manifold * Piping to tank and mixer	Viking Model H24197D
5.	Flow Meter (up to 50 gpm)	Hays Model MR-1-1 1/2
6.	Rubber-Tired Backhoe	Case Model 580

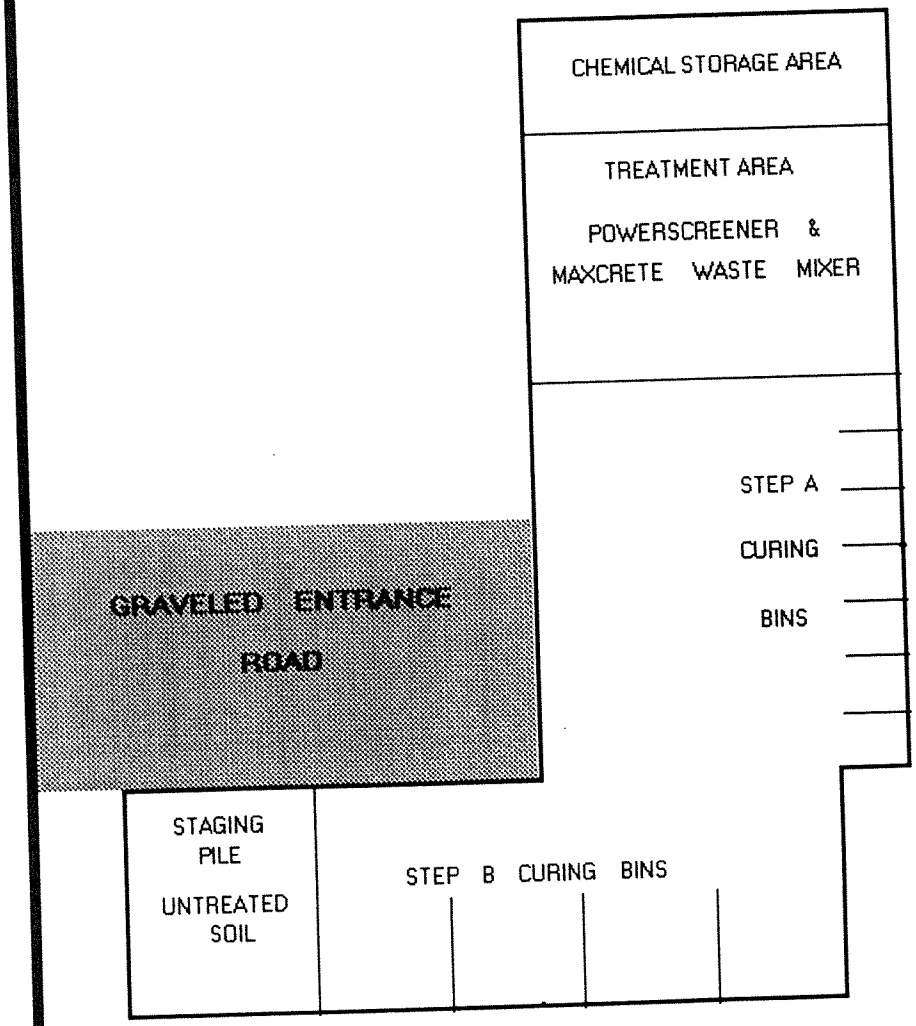
Appendix A consists of the "Interim Work Plan for the Onsite Processing of Chromite Soils and Residuals using the MAECTITE Chemical Treatment Process at Hawkins Point in Baltimore, Maryland". This Work Plan was developed by Sevenson Environmental Services, Inc. Sevenson will be the independent contractor mobilizing at the Hawkins Point site to treat the chromium contaminated soil. This Work Plan presents the description of the treatment process, operational controls and testing procedures to be used to confirm adequate treatment of the material. It should be noted that the initial use of the portable treatment equipment will not be under a roof. All untreated material will be adequately covered to eliminate the potential of rain water entering the material and causing chromium contaminated runoff. The treatment process will be terminated if precipitation causes any generation of chromium contaminated liquid by coming in contact with the chromium contaminated soils.

The attached Work Plan includes Sevenson's Conceptual Treatment Pad Design. This drawing presents a schematic of the treatment process using a 150 foot by 100 foot pad depicting the staging pile, chemical storage, equipment layout and curing bins. As previously stated, initially MES will be utilizing an existing concrete pad in Area 6 for the treatment operation. This existing

pad is L-Shaped, measuring approximately 40 feet in width with sides of 125 feet and 185 feet. Attached Figure 1 presents the conceptual treatment pad layout for the existing pad in Area 6.

INSPECTION AND MONITORING

MES will have inspection personnel onsite at all times the contractor is treating soil. The inspector will assure compliance with the Hawkins Point Health & Safety Plan included in the site's Permit. Independent off-site testing by a qualified testing laboratory will determine if the treated soil is non-hazardous prior to it being removed from the treatment pad. Soil not rendered non-hazardous by the contractor will be retreated or properly disposed of off-site by the contractor at another permitted hazardous waste treatment facility.



HAWKINS POINT - AREA 6

CONCEPTUAL

SOIL TREATMENT SYSTEM

CONCRETE PAD LAYOUT

FIGURE 1

April 1998

Permit Application for Hazardous Waste Management Units at Hawkins Point Hazardous Waste Landfill Area 3, 5 and 6

PERMIT APPLICATION

FOR

HAZARDOUS WASTE MANAGEMENT UNITS

AT

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREAS 3, 5 AND 6

APRIL 1998
(REVISED MAY 14, 1999, FEBRUARY 2000, DECEMBER 2001)

DEC 1 3

MARYLAND
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I. Certification of Area 5 Closure
J. Quick Qualitative Chrome Test
K. Permit Modificaton Compliance Schedule Correspondence

1.0 INTRODUCTION / EXECUTIVE SUMMARY

Due to the multiple changes that have occurred since the last draft's submission in May 1999, a revised version of the application is submitted for your review. Major changes are highlighted with yellow text as seen in this paragraph.

The Hawkins Point Hazardous Waste Facility, located at 5501 Quarantine Road, Baltimore, Maryland 21226 is owned by the Maryland Port Administration (MPA), and is permitted by the Maryland Department of the Environment and the U.S. Environmental Protection Agency. The Maryland Environmental Service (MES) currently operates the facility and performs environmental monitoring, post-closure care of the Area 5 chrome ore tailings landfill and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3. In the past, chrome ore tailings were disposed of in what are now closed cells in Areas 2,3 and 5 of the site. Chromium contaminated leachate generated in these cells is collected by the MES.

The following hazardous waste management units are currently authorized under the existing CHS Permit A-264:

1. Area 5 Landfill: Authorized for post-closure care only;

2. Waste Water Treatment Unit: Authorized only for the storage and treatment of waste waters generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, and Honeywell Baltimore Works Site, as well as other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

3. Soil Treatment Unit (Area 6): Authorized only for the treatment of wastes generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, the Patapsco Wastewater Treatment Plant, and Allied Signal's Baltimore Works site.

This permit application is for the reissuance of Controlled Hazardous Substance Permit A-264, with the following modifications:

1. Area 5 Landfill: No change in authorization requested the area will be used for post-closure care only;

2. Waste Water Treatment Unit: Construction of the on-site wastewater treatment unit has been postponed due to changes in the economics of treating leachate. MARYLAND ENVIRONMENTAL SERVICE has never discharged effluent per this permit and will continue to haul leachate offsite for the foreseeable future. In the future, we request

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that this management unit be left active so that we can pursue the treatment option, if it becomes economically viable. In the event of designing a WWTP, the effluent shall be in accordance with the NPDES permit (91-DP-2229) for outfall 006.

3. Soil Treatment Unit (Area 6): We have abandoned the plan for onsite soil treatment facilities and request that this management option be deleted from the permit.

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For EPA Regional Use Only	
Date Received	Month Day Year

EPA

United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

I. Facility's EPA ID Number *(Mark 'X' in the appropriate box)*

[ ] A. First Part A Submission

[X] B. Revised Part A Submission (Amendment # 1)

C. Facility's EPA ID Number	D. Secondary ID Number *(If applicable)*
MDD000731356	

II. Name of Facility

HAWKINS POINT HAZARDOUS WASTE LANDFILL

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street

5501 QUARANTINE ROAD

Street *(Continued)*

City or Town	State	Zip Code
BALTIMORE	MD	21226 –

County Code *(If known)*	County Name

B. Land Type (Enter code)	C. Geographic Location LATITUDE (Degrees, minutes, & seconds)	LONGITUDE (Degrees, minutes & seconds)	D. Facility Existence Date Month	Day	Year
	39 12 30N	076 33 00W	8	5	1980

IV. Facility Mailing Address

Street or P.O. Box

MES 2011 COMMERCE PARK DRIVE

City or Town	State	Zip Code
ANNAPOLIS	MD	21401 –

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(Last)*	*(First)*
FERGUSON	DAVID
Job Title	**Phone Number** *(Area Code and Number)*
CHIEF, WASTE REMEDIATION	410-974-7254

VI. Facility Contact Address *(See Instructions)*

A. Contact Address Location	Mailing	Other	B. Street or P.O. Box
	X		

City or Town	State	Zip Code

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MDD000731356	

VII. Operator Information *(See instructions)*

A. Name of Operator		
MARYLAND ENVIRONMENTAL SERVICE		
Street or P.O. Box		
2011 COMMERCE PARK DRIVE		
City or Town	**State**	**ZIP Code**
ANNAPOLIS	MD	21401 –

Phone Number *(Area Code and Number)*	B. Operator Type	C. Change of Operator Indicator	Date Changed Month	Day	Year
410-974-7254	S	Yes [ ] No [X]			

VIII. Facility Owner *(See instructions)*

A. Name of Facility's Legal Owner		
MARYLAND ENVIRONMENTAL SERVICE		
Street or P.O. Box		
2011 COMMERCE PARK DRIVE		
City or Town	**State**	**ZIP Code**
ANNAPOLIS	MD	21401 –

Phone Number *(Area Code and Number)*	B. Owner Type	C. Change of Owner Indicator	Date Changed Month	Day	Year
410-974-7254	S	Yes [ ] No [X]			

IX. NAICS Codes *(In order of significance; start in left box)*

First	924110		Third		
(Description) ADMIN. OF AIR & WATER RESOURCE & SOLID WASTE MGMT. PROGRAMS			*(Description)*		
Second			**Fourth**		
(Description)			*(Description)*		

X. Other Environmental Permits *(See instructions)*

A. Permit Type *(Enter code)*	B. Permit Number	C. Description
N	MD0061417	STORMWATER, LEACHATE TREATMENT
F	A264	MD CHS PERMIT

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XI. Nature of Business *(Provide a brief description)*

THE HAWKINS POINT HAZARDOUS WASTE LANDFILL IS A CLOSED CHROME ORE TAILINGS DISPOSAL FACILITY. LEACHATE IS STILL GENERATED AND WILL BE HAULED OFF-SITE.

XII. Process Codes and Design Capacities

A. **PROCESS CODE** - ***Enter the code from the list of process codes below that best describes each process to be used at the facility. Thirteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in item XIII.***

B. **PROCESS DESIGN CAPACITY** - ***For each code entered in column A, enter the capacity of the process.***
   1. **AMOUNT** - ***Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.***
   2. **UNIT OF MEASURE** - ***For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.***

C. **PROCESS TOTAL NUMBER OF UNITS** - ***Enter the total number of units used with the corresponding process code.***

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage:	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment:	
T01	Tank Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, Or Refining Furnace	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Hour; Liters Per Hour; or Million Btu Per Hour
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR §260.10	
T94	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X):	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V

UNIT OF MEASURE	UNIT OF MEASURE CODE
Short Tons Per Hour	D
Metric Tons Per Hour	W
Short Tons Per Day	N
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	R
Million Btu Per Hour	X

UNIT OF MEASURE	UNIT OF MEASURE CODE
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
Btu Per Hour	I

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M D D 0 0 0 7 3 1 3 5 6

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XII. Process Codes and Design Capabilities *(Continued)*

EXAMPLE FOR COMPLETING ITEM XII (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	2. Unit Of Measure (Enter code)	C. Process Total Number Of Units	For Official Use Only
X 1	S 0 2	5 3 3 . 7 8 8	G	0 0 1	
1	T 0 1	7 . 000	U	0 0 1	
2	S 0 2	20 . 000	G	0 0 1	
3	D 8 0	. 190	A	0 0 1	
4		.			
5		.			
6		.			
7		.			
8		.			
9		.			
10		.			
11		.			
12		.			
13		.			

NOTE: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in item XIII.

XIII. Other Processes *(Follow instructions from item XII for D99, S99, T04 and X99 process codes)*

Line Number (Enter #s in seq w/XII)	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	2. Unit Of Measure (Enter code)	C. Process Total Number Of Units	D. Description Of Process
X 1	T 0 4	.			In-situ Vitrification
1		.			
2		.			
3		.			
4		.			

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EPA ID Number *(Enter from page 1)*

M	D	D	0	0	0	7	3	1	3	5	6

Secondary ID Number *(Enter from page 1)*

XIV. Description of Hazardous Wastes

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C UNIT OF MEASURE - *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/ or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of item XIV-D(1).*
3. *Use additional sheet, enter line number from previous sheet, and enter additional code(s) in item XIV-E.*

2. PROCESS DESCRIPTION: *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.*
3. *Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA HAZARD WASTE NO. (Enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (Enter code)	D. PROCESS (1) PROCESS CODES (Enter)									D. PROCESS (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
X	1	K	0	5	4	900	p	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

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Secondary ID Number *(Enter from page 1)*:

XIV. Description of Hazardous Wastes *(Continued; use additional sheets as necessary)*

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D007	3500	T	T01	CHROME LEACHATE
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					

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EPA I.D. Number *(Enter from page 1)*	Secondary ID Number *(Enter from page 1)*
D D 0 0 0 7 3 1 3 5 6	

XV. Map

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (See instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

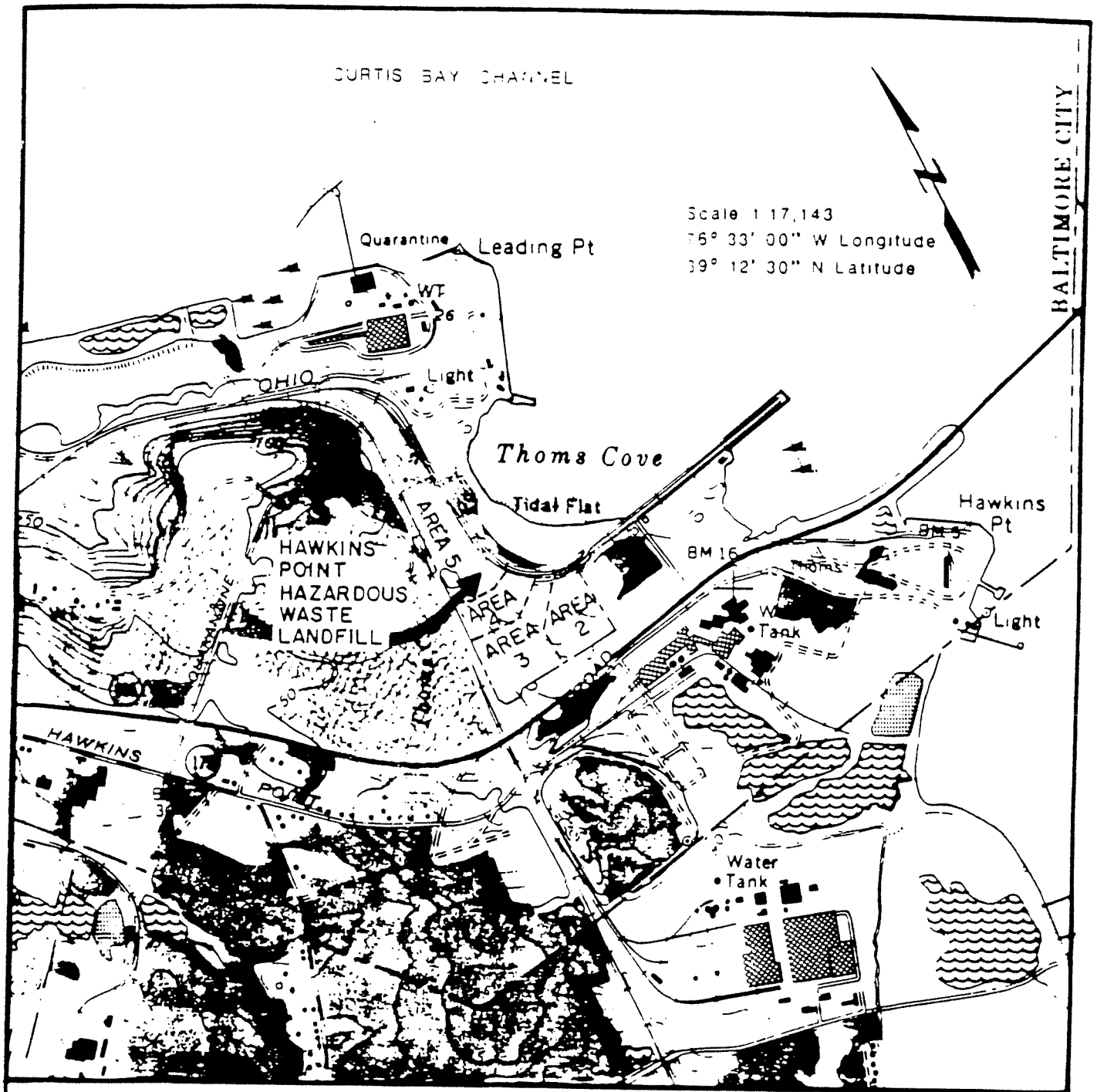
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner Signature	Date Signed 5/18/99
Name and Official Title (Type or print) DIRECTOR, MES	
Owner Signature	Date Signed
Name and Official Title (Type or print)	
Operator Signature	Date Signed 5/18/99
Name and Official Title (Type or print) JAMES W PECK, DIRECTOR	
Operator Signature	Date Signed
Name and Official Title (Type or print)	

XIX. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. (Refer to instructions for more information)

Notes



LEGEND

- Surface water
- Facility boundaries
- Area boundaries
- Direction of surface water flow

Notes:

1. Contour interval is 10 feet.
2. Mean range of tide is approximately 1.1 feet.

AREA TOPOGRAPHIC MAP

Black & Veatch
Engineers · Architects

Hawkins Point Hazardous Waste Landfill

figure 2-1

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill is a secure hazardous waste facility in Maryland, permitted by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southwestern corner of Baltimore City (see Figure 3.1).

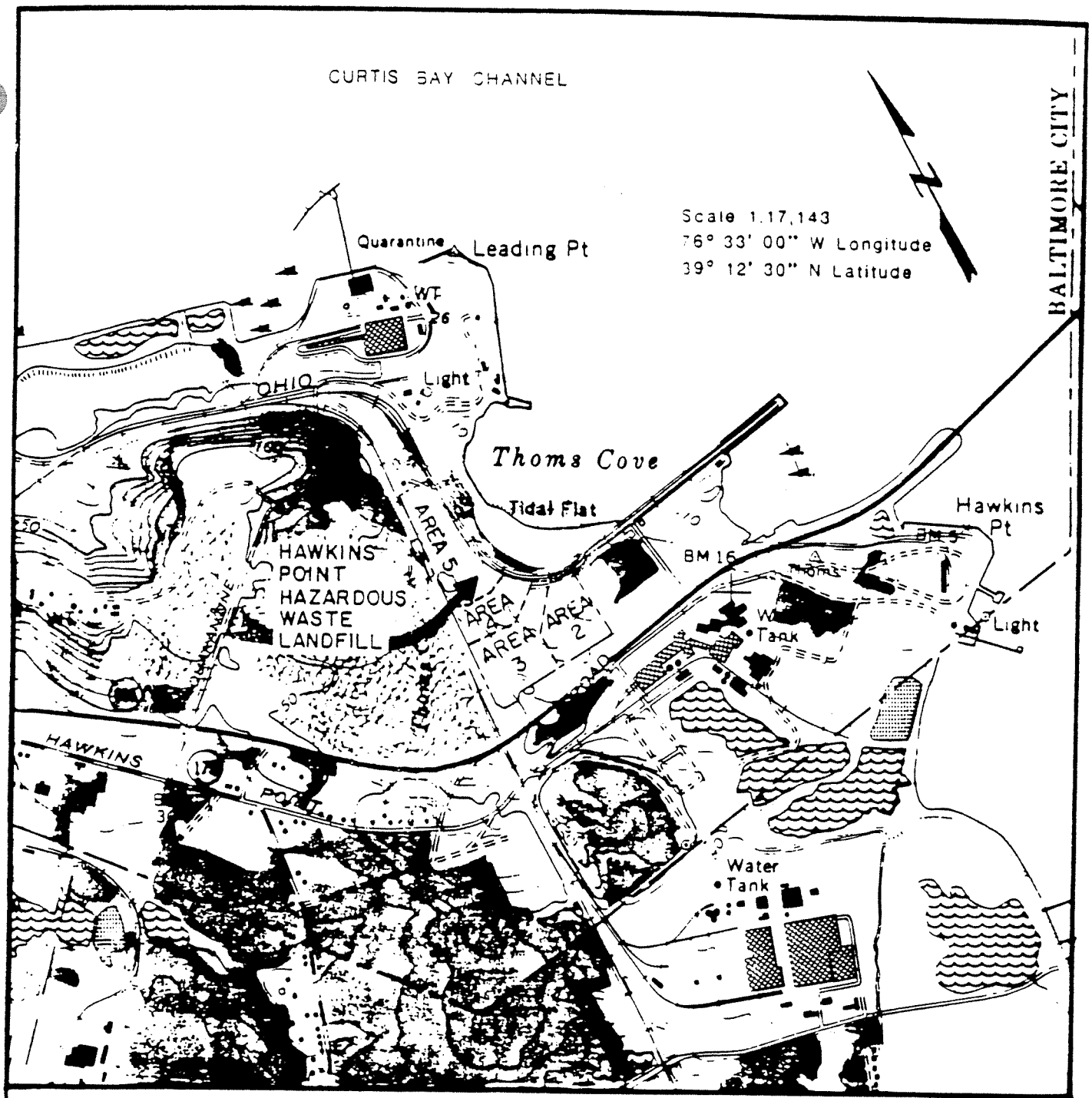
The Hawkins Point property, owned by the Maryland Port Administration (MPA), an agency of the State of Maryland, encompasses approximately 67 acres and is divided into six areas (See figure 3.2). Areas 1 and 6 are presently outside of the fenced area of the Hawkins Point facility. Area 1 is currently leased for use to EASTALCO Aluminum Co. Area 6 was previously leased to the Cosmin Corporation and is not currently being used.

Area 5, currently in post-closure care, was dedicated to the sole use of AlliedSignal, Inc. for the disposal of chromium contaminated waste. In January of 1983, MES began accepting chrome ore tailings from the Baltimore works facility owned by AlliedSignal. In 1985, the Baltimore Works facility closed. As part of closure, portions of the Baltimore Works facility were dismantled and handled as hazardous waste. The chromium contaminated debris which consisted of structural beams and concrete, brick, asbestos, soil (up until May 8, 1990) and other additional chromium contaminated debris was disposed in Area 5 until the ultimate capacity was reached in 1993. An estimated 451,450 tons of hazardous waste is disposed in Area 5. Presently, the only waste handling from Area 5 is the leachate generated within the capped landfill. In 1998, 280,686 gallons of leachate were generated, in 1999, 258,903 gallons were generated and in 2000 336,955 gallons were generated.

Areas 2 and 3 contain closed chrome ore tailing cells constructed by the MPA and monitored and dewatered by the MES. The tailings are also from the former Baltimore Works plant. These cells continue to be monitored and maintained in the dewatered condition. Leachate generated from these cells was 277,217 gallons in 1998, 297,525 gallons in 1999 and 336,955 gallons in 2000.

**********statement regarding Leachate Plant Start-up Removed **********

During January of 1983, Cell 40 in Area 3 was opened to accept controlled hazardous waste. The cell was operated by MES for approximately eleven months and due to economic reasons was then closed. All waste material was removed and transported to Fondessy, Ohio for disposal and the cell was returned to an "unused" condition. The 80 mil HDPE liner is still in place in the cell and acts as an impervious cap over the underlying old chrome cells in the area. Ponded rain water is periodically pumped out of the cell into the site surface drainage system and is



LEGEND

- Surface water
- Facility boundaries
- Area boundaries
- Direction of surface water flow

Notes:

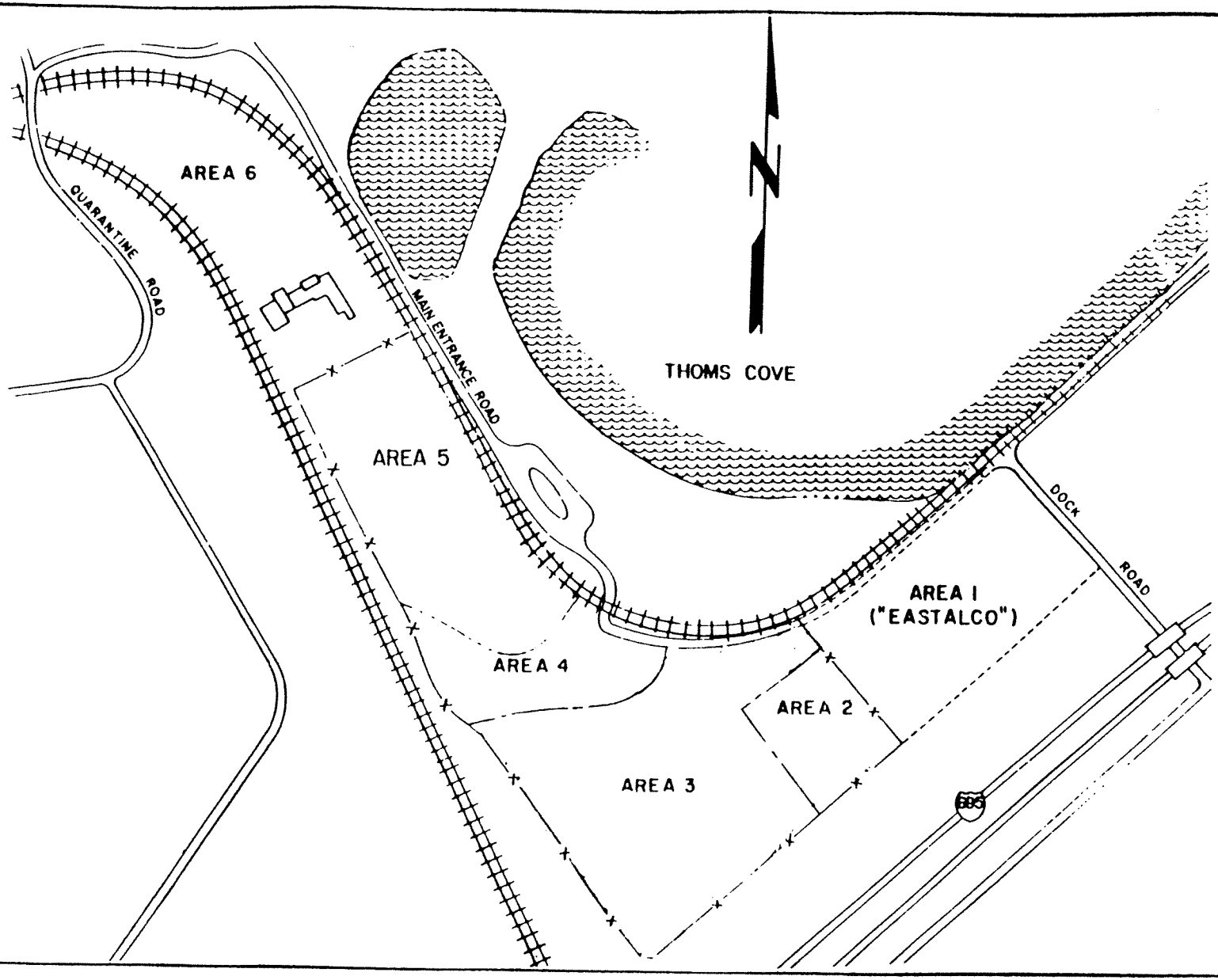
1. Contour interval is 10 feet.
2. Mean range of tide is approximately 1.1 feet.

AREA TOPOGRAPHIC MAP

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.1



AREA LOCATOR MAP

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.2

discharge after flowing through Sediment Pond #2. Discharge from Sediment Pond #2 is monitored under the site's NPDES Permit. In the future MES may pursue filling in Cell 40, in order to reduce the ponding in that area. MES will consult MDE and perform an evaluation of the area will be performed prior to filling Cell 40.

Area 4 has previously been used for experimenting with chrome ore tailings fixation. However, little actual data is available regarding the dates of the filling or the characteristics of the wastes received. A "paint sludge" is believed to also have been deposited in this area. The deposit was discovered by MES personnel and reported to the Maryland Department of Health and Mental hygiene in 1982.

3.2 SITE DEVELOPMENT

To date, 4 construction contracts have been completed for facilities to serve all areas of the Hawkins Point HWL site. These include:

A. "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).

- Groundwater interceptor bordering the western and southern edge of Area 3.
- Sedimentation Ponds No. 1 and 2.
- Drainage ditches and culverts tributary to the sedimentation ponds.

B. "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982)

- Leachate storage and transfer area.
- Leachate collection system for chrome ore tailings underlying Area 3 and Area 5.
- Electrical service improvements.

C. "Contract 3: CHS Landfill Expansion" (November 5, 1982)

- Entrance road.
- Scale plaza.
- Truck-wash pads.
- Sanitary sewerage holding systems.
- Drainage improvements.

- Security fencing.
- Cell No. 40 earthen berms, liner system, and leachate collection system.

D. "Contract 4 – Leachate storage tanks" Feburary 1999contract ID No. 97-03-44R

- Abandoned two 30,000 gallon underground leachate storage tanks and replaced with one 20,000 gallon above ground storage tank,

MES is also in the process of contracting future improvements in the leachate collection lines and will also install an additional manhole (MH) between MH 220 and MH 221 in order to clean out leachate collection lines.

Capping of Area 5 was performed under MES construction contract ID No. 93-03-140 "Area 5 Final Cap Construction - Hawkins Point Hazardous Waste Landfill" (July 1993). Area 5 was certified closed by an independent Professional Engineer on July 22, 1994. A copy of the Certification is included in Appendix I.

**********Statement concerning WWTP deleted**********

3.3 PERMITS

The Hawkins Point HWL currently operates under EPA Final RCRA Permit Number MDD 000731356, and State of Maryland Controlled Hazardous Substances Facility Permit Number A-264, effective October 15, 1995, with an expiration date of October 14, 1998. This document is intended as an application to renew CHS Permit A-264.

**********Statement concerning soil treatment facility removed**********

The original Controlled Hazardous Substances Facility Permit Number A-264, which became effective November 30, 1982, authorized the disposal of specified general hazardous wastes in Cell No. 40 of Area 3. A RCRA Part B permit application for the expansion of Area 3 with Cell No. 41 through 49 was submitted to the EPA on August 1, 1983, while the facility operated under interim status. After cessation of active operations the interim status of Area 3 expired on November 8, 1985.

Various other permits are required and have been issued for environmental and support features of the site. Disposal permits from the City of Baltimore, Department of Health have been issued (Permit No. 65, February 1, 1981 to January 31, 1982; Permit No. 74, February 1, 1982 to January 31, 1983) and renewed as necessary. A sediment control permit, WRA No. 82SF0441, was

issued on February 18, 1982 by the State Water Resources Administration (WRA). A National Pollutant Discharge Elimination System (NPDES) permit for the facility (State Permit No. 85-DP-2229, NPDES Permit No. ND 0061417) was originally issued on May 1, 1986 and reissued on April 1, 1997. A copy of this permit is included in Appendix H. This permit includes effluent limits for the discharge of an effluent stream from the proposed leachate treatment system. A Waste Water Discharge Permit application (Identification No. 1-08955) was submitted to the City of Baltimore on March 18, 1992. A permit is not applicable for this facility and will not be issued because there is no discharge into the City sewer system. The application will be retained in City files for information only.

3.4 TOPOGRAPHIC MAP

3.4.1. Figure 3.3 depicts a topographic map outlining the existing general site plan and the development of the area surrounding the site. The topographic map was derived from aerial photography obtained on April 1, 1983.

The following details are required under COMAR 26.13.07.02D(6) to be described and depicted on the topographic map in Figure 3.3 to aid in the permit application review.

a. Intake and Discharge Structures. There are no intake structures for this facility. There are two existing discharge structures labeled as Sediment Pond 1 and 2. The sediment ponds collect surface water run-off from the facility and then discharge into Thoms Cove. An NPDES permit regulates these discharges. A potential third discharge is that of the leachate treatment plant effluent pipe. This discharge will also be regulated under the sites NPDES permit.

**********Statement concerning soil treatment facility removed.**********

b. Hazardous Waste Treatment, Storage, or Disposal Facilities. Each of the disposal areas, Area 5, Cell 40 and the MPA cells in Area 3 are shown on the map. Cell 40 is no longer a disposal site. Two 30,000 gallon underground leachate holding tanks are shown on the map. These two tanks have been abandoned and removed in accordance with MDE regulations and replaced with an above ground 20,000 gallon tank as part of the leachate treatment facility This tank is permitted to store leachate. The hazardous waste leachate treatment and storage facilities are depicted on the map.

c. Wells Where Fluids Are Injected Underground. There are no wells at this facility where fluids from the facility are injected underground.

d. Wells, Springs, and Other Surface Water Bodies Within 1/2 Mile of the Facility Boundary. All existing facility wells and surface water bodies are designated on the map. A listing of wells registered in public records was requested from the Maryland Department of the Environment. These wells are also shown on the topographic map on Figure 3.3.

3.4.2. The following details are required under COMAR 26.13.07.02D(35) to be described and depicted on a topographic map as shown on Figure 3.3 to aid in the permit application review.

a. Map Scale and Date. Please note that the referenced topographic map was derived from aerial photography obtained on April 1, 1983 and has a scale of 1 inch equal to 200 feet, and a contour interval of 2 feet.

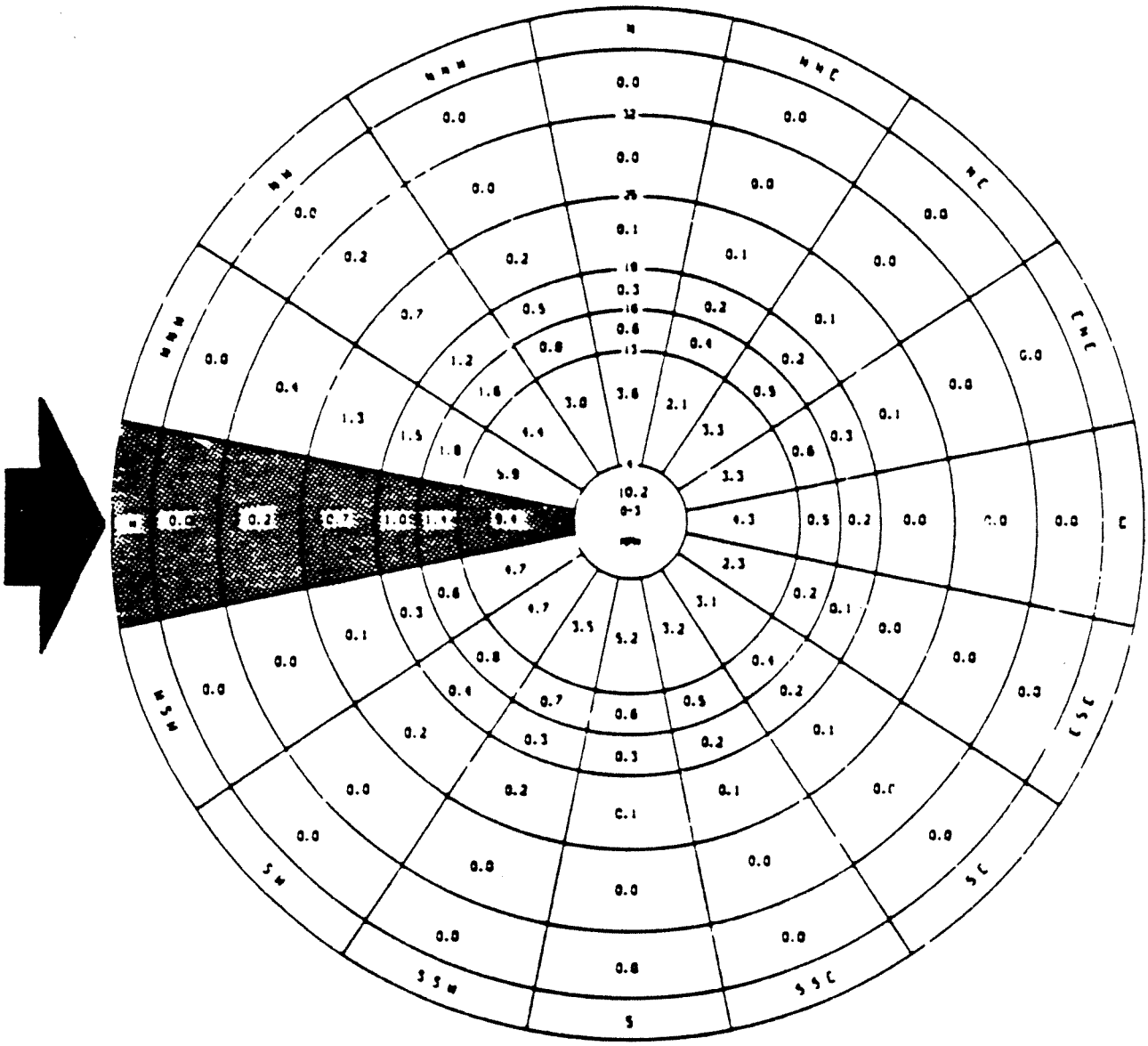
b. 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone X, areas determined to be outside of 500 year floodplain, by the Federal Emergency Management Agency (FEMA).

c. Surface Waters. Surface water streams in the Hawkins Point Area generally flow easterly, and discharge into Thoms Cove on the western bank of the Patapsco River. Surface water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area; the directions of these flows are indicated on the topographic map.

d. Land Uses. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped land and park land does exist as indicated. No residential land uses occur within 1,000 feet of the property boundary.

e. Wind Rose. Figure 3.4 depicts the annual wind rose of meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between O and 3 miles per hour.

**********Statement deleted concerning Soil treatment**********



WIND ROSE FOR BALTIMORE, MARYLAND

Maryland Environmental Service	Hawkins Point Hazardous Waste Landfill	Figure 3.4

g. Facility Boundary. The facility boundaries encompass Areas 2,3,4,5 and 6. These five areas are formerly or presently in use with the exception of area 6 which was never used as a hazardous waste treatment, storage or disposal area.

h. Access Control. The main entrance road will convey traffic to and from the facility; this road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1 and at the northern end of Area 5. A 6-foot high chain-link security fence with a barbed-wire top, 3-strand barbed wire fence and a total of 5 access gates surrounds the facility as shown in Figure 3.3.

i. Injection and Withdrawal Wells. There are no injection or withdrawal wells associated with this facility.

**********Statement regarding start up of WWTP removed **********

j. Building, Treatment, Storage, or Disposal Operations, or Other Structures. Existing structures within the facility include a leachate loading facility, having a corrugated metal roof shelter located in the leachate loading and transfer area; and a truck wash facility, which has a corrugated metal roof shelter located in the truck wash pad area. A trailer on site serves as a office, crew quarters and safety station. An above ground leachate storage tank and a metal building that was the proposed location of the leachate treatment system building are also located on site.

k. Barriers for Drainage or Flood Control. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into three categories:

1. Storm water that has the potential of being contaminated by contact with hazardous waste is directed to the leachate collection system and holding tanks for transfer to permitted treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of facility is conveyed to one of two sedimentation ponds or a perimeter drainage swale before discharging into Thoms Cove. Discharges from the site are covered by a National Pollutant Discharge Elimination System (NPDES) permit approved by the Maryland Department of the Environment.

**********Statement changed concerning tanks and wwtp**********

I. Location of Operational Units Within the Hazardous Waste Management Facility Site, Where Hazardous Waste is Treated, Stored or Disposed. Closure of Area 5 is complete. Hazardous waste treatment facilities may in the future be constructed to treat the chromium leachate. Two 30,000 gallon underground leachate holding tanks were abandoned and a new 20,000 gallon above ground storage tank has been installed. Areas where hazardous waste has been disposed of during prior years is delineated on Figure 3.3. The now nonexistent leachate holding lagoons and the IU conversion systems stabilization demonstration area are two such areas. Leachate from the two previous areas of disposal (Areas 3 and 5) will continue to be collected and transferred from the above ground storage tank at the leachate loading area.

3.5 TRAFFIC PATTERNS

3.5.1. Traffic Characterization and Routing

The on-site traffic flow pattern is presented in figure 3.5. All traffic including facility employees and visitors, will enter the Wastewater Treatment Facility from Quarantine Road onto the dual lane, 2 directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

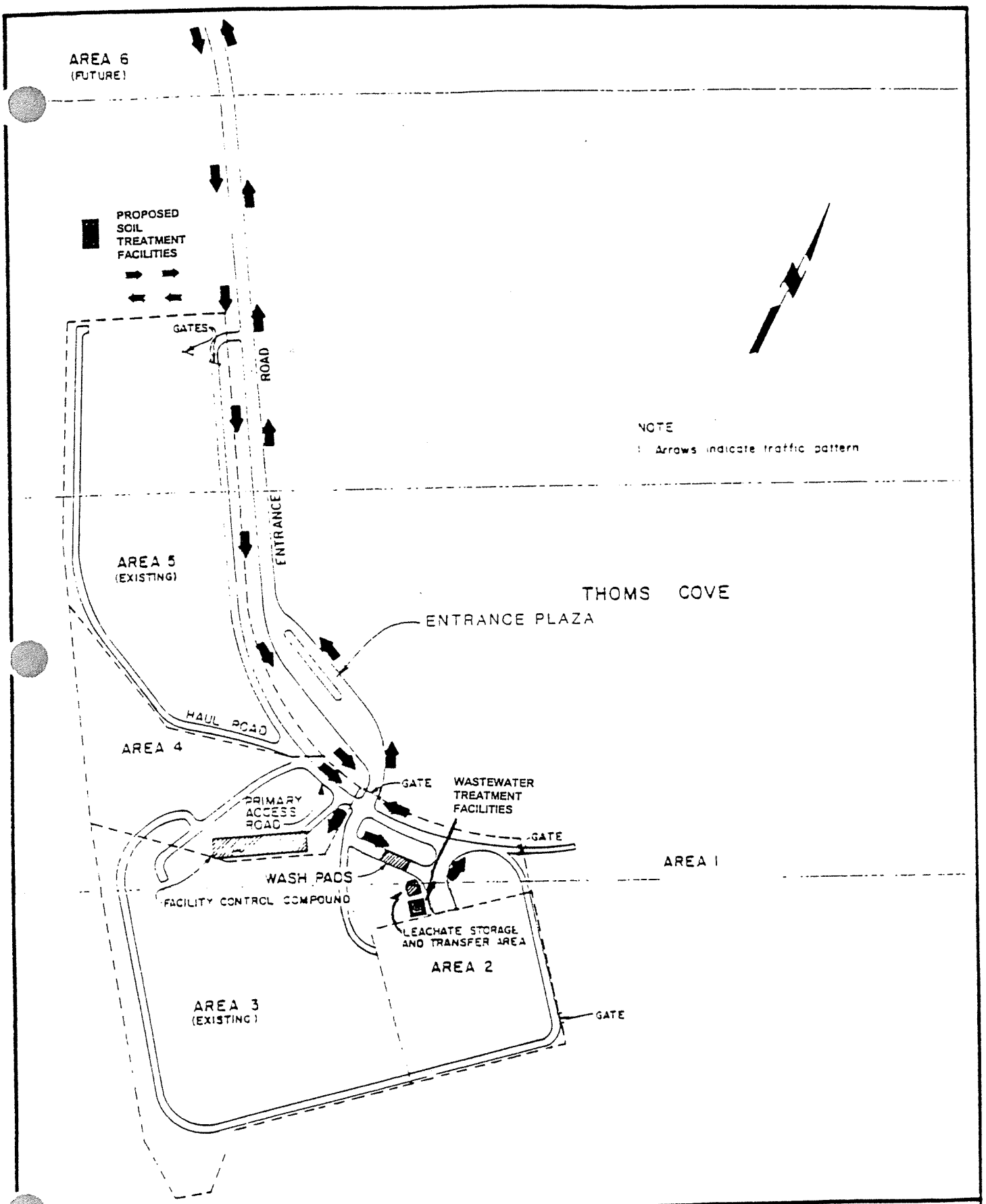
All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the unloading areas, will be directed to the truck wash pads of the Hawkins Point Facility.

All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

Quarantine Road accesses the U.S. Gypsum Company Plant and the BFI, SCM and Hawkins Point HWL. The traffic imposed on this road is minimal, consisting primarily of waste hauling vehicles, tractor-trailers, and employee passenger vehicles. The road is designed for the H-S 20 ton truck, highway bridge loading of the AASHTO Standard Specifications for Highway Bridges.

3.5.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminate soil and waste materials are removed from the exterior of the vehicle either by use of a potable water hose, power washer unit or by brushing. Vehicle surfaces to be checked include the wheel axle assembles, rear bumper, rear of the



ON-SITE TRAFFIC ROUTING: AREA 5

MARYLAND ENVIRONMENTAL SERVICE

Hawkins Point Hazardous Waste Landfill

Figure 3.5

Rev. February 2000

dump bed and tailgate assemble. All contaminated wash water will flow to a separate oil interceptor and then to the leachate storage area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank would be checked daily when the wash rack is used and the tank emptied as necessary. The portable steam cleaner should be serviced in accordance with the manufacture's instructions.

3.6 ADDITIONAL BACKGROUND INFORMATION

3.6.1. NAICS Code:

924110: Administration of Air and Water Resource and Solid Waste Management Programs

3.6.2. Geographic Location of Facility:

Latitude: 39 12'30" N Longitude: 76 33'00" W

3.6.3. Operator:

Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, Maryland 21401
(410) 974-7254
Operator status: Agency of the State of Maryland

3.6.4. Owner:

Maryland Port Administration
World Trade Center
Baltimore, Maryland 21202-3041
(410) 333-4500
Owner status: Agency of the State of Maryland

3.6.5. Political Jurisdiction of Facility:

District 47 of Baltimore City

3.6.6. Photographs of the facility:

a. Existing Structures and Areas

- Truck wash facility on Picture 7
- Leachate loading area on Picture 9

- Sediment pond no. 1 on Picture 2
- Sediment pond no. 2 on Picture 3
- Area 6 on picture 1

b. Existing treatment, storage and disposal areas (tank information added)

- Disposal Area 5 on Picture 4
- MPA disposal cells underlying Cell No. 40 on Picture 5
- 20,000 gallon storage tank on Picture 8

b. Future treatment, storage and disposal areas

**********Soil Treatment Facility statement removed**********

- Wastewater treatment plant building on Picture 6

3.6.7 Indian Lands

This facility is not on Indian Lands.

3.6.8 Faults

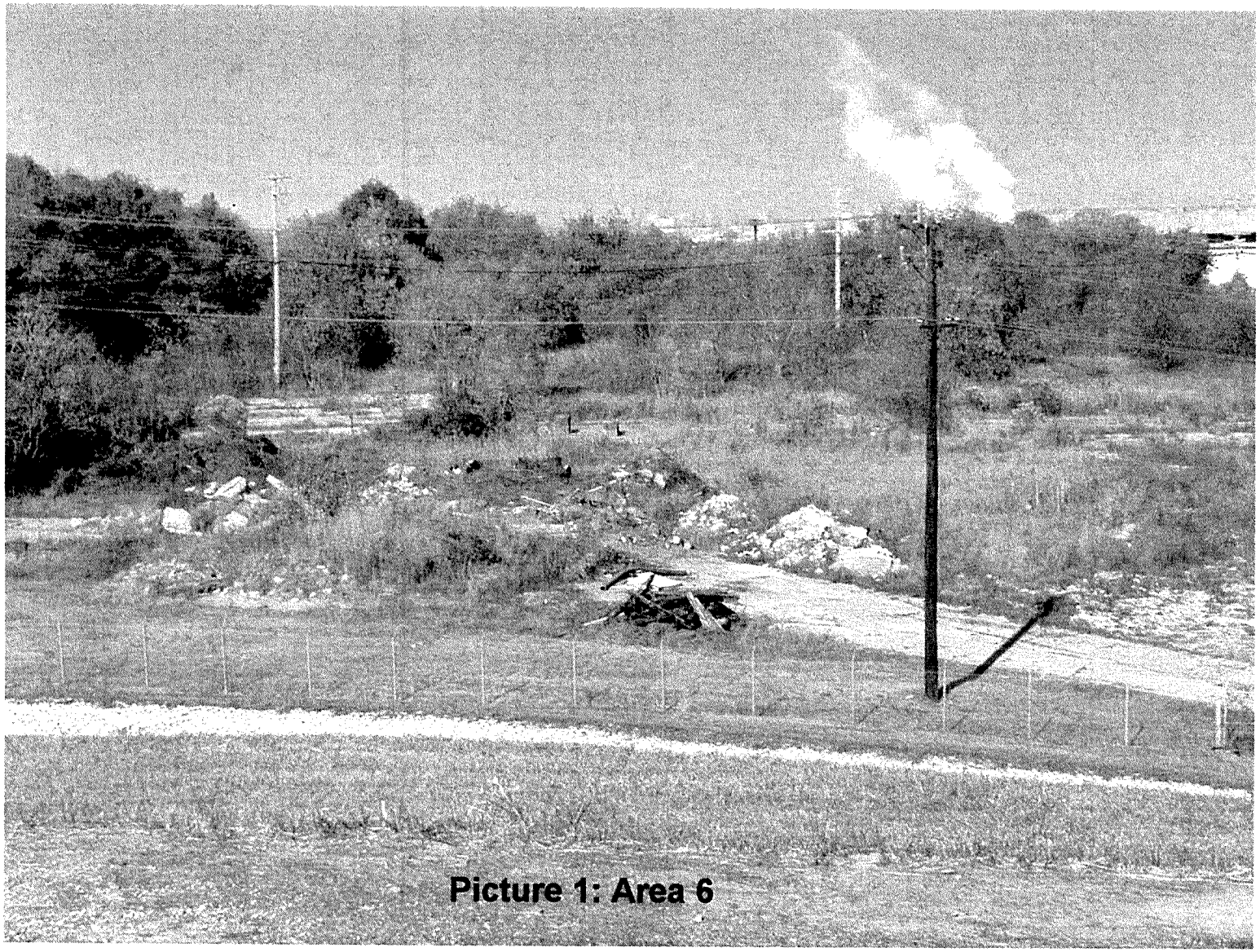
According to the Map of Young Faults in the United States, published by the United States Geological Survey (USGS) in 1977, there are no known fault displacements within the last 15 million years in Maryland or Delaware. The nearest mapped fault of any age is inferred to be approximately 6 miles to the northwest of the site.

3.7 FEDERAL COMPLIANCE

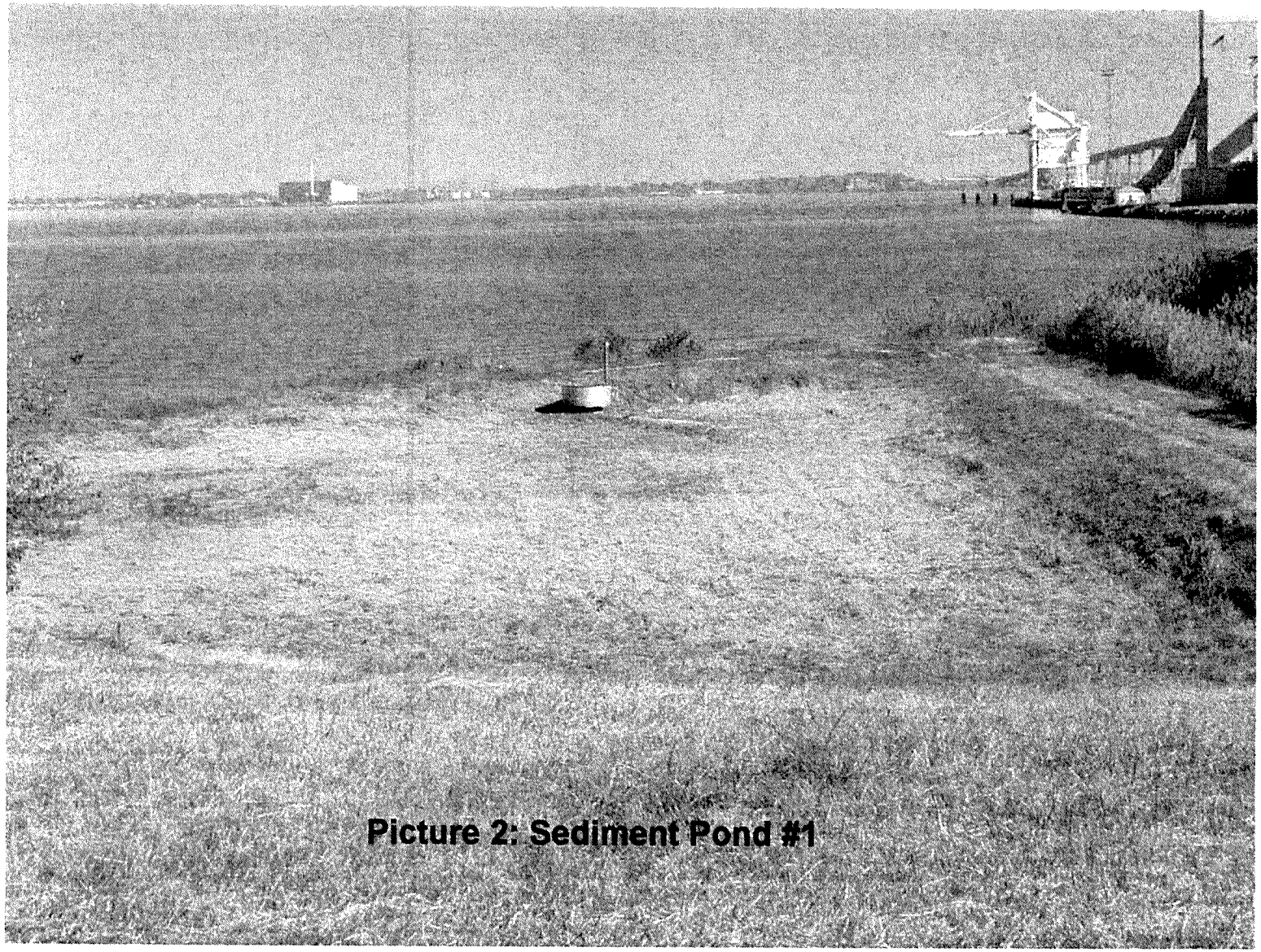
The facility is in compliance with the applicable Federal laws listed in 40 CFR 270.3 as follows:

3.7.1 Wild and Scenic Rivers Act

Section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established. This facility is not a water resources project, and is therefore in compliance. In addition, the only river in the nearby vicinity of the Hawkins Point facility is the Patapsco River, which is not a national wild and scenic river.

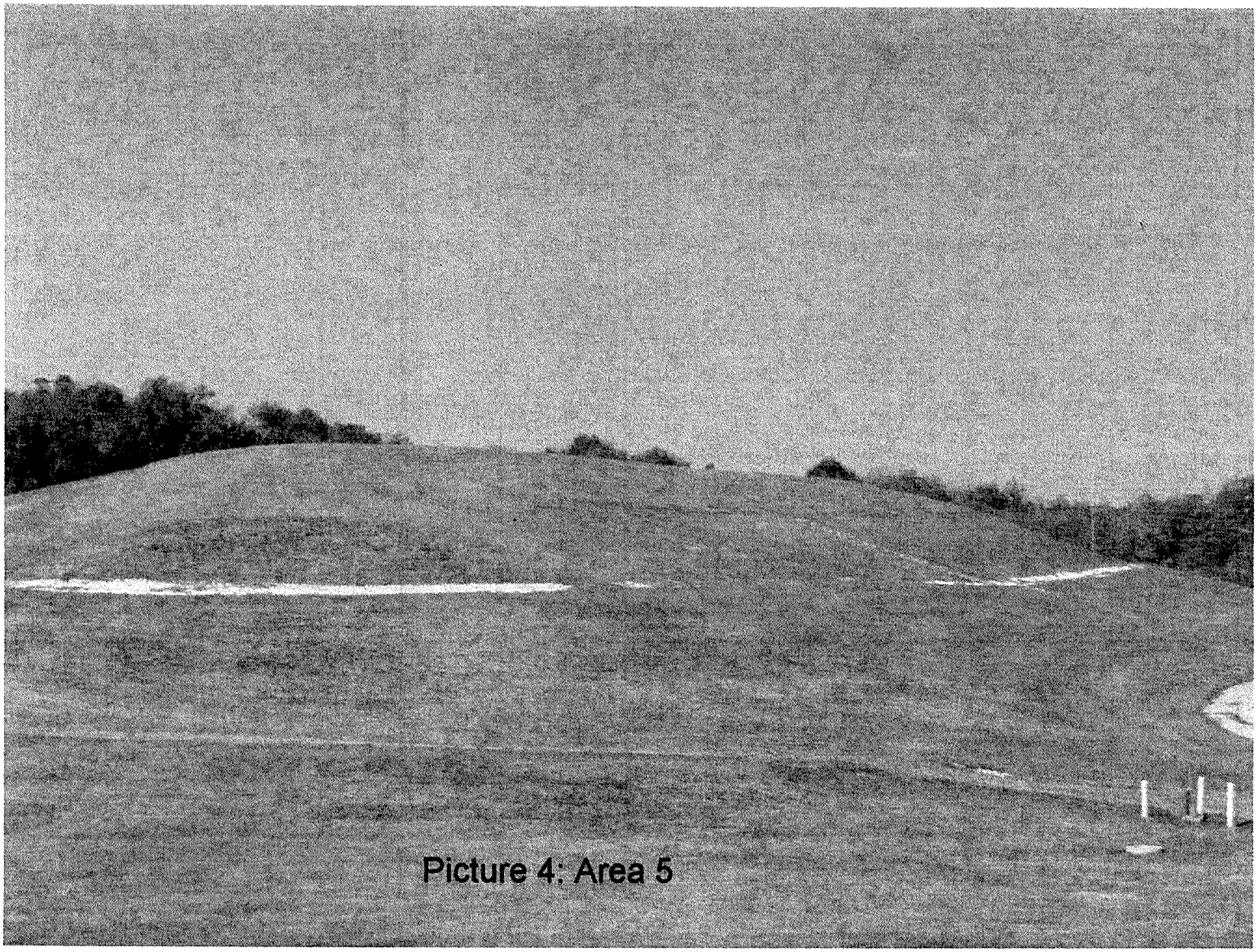


Picture 1: Area 6

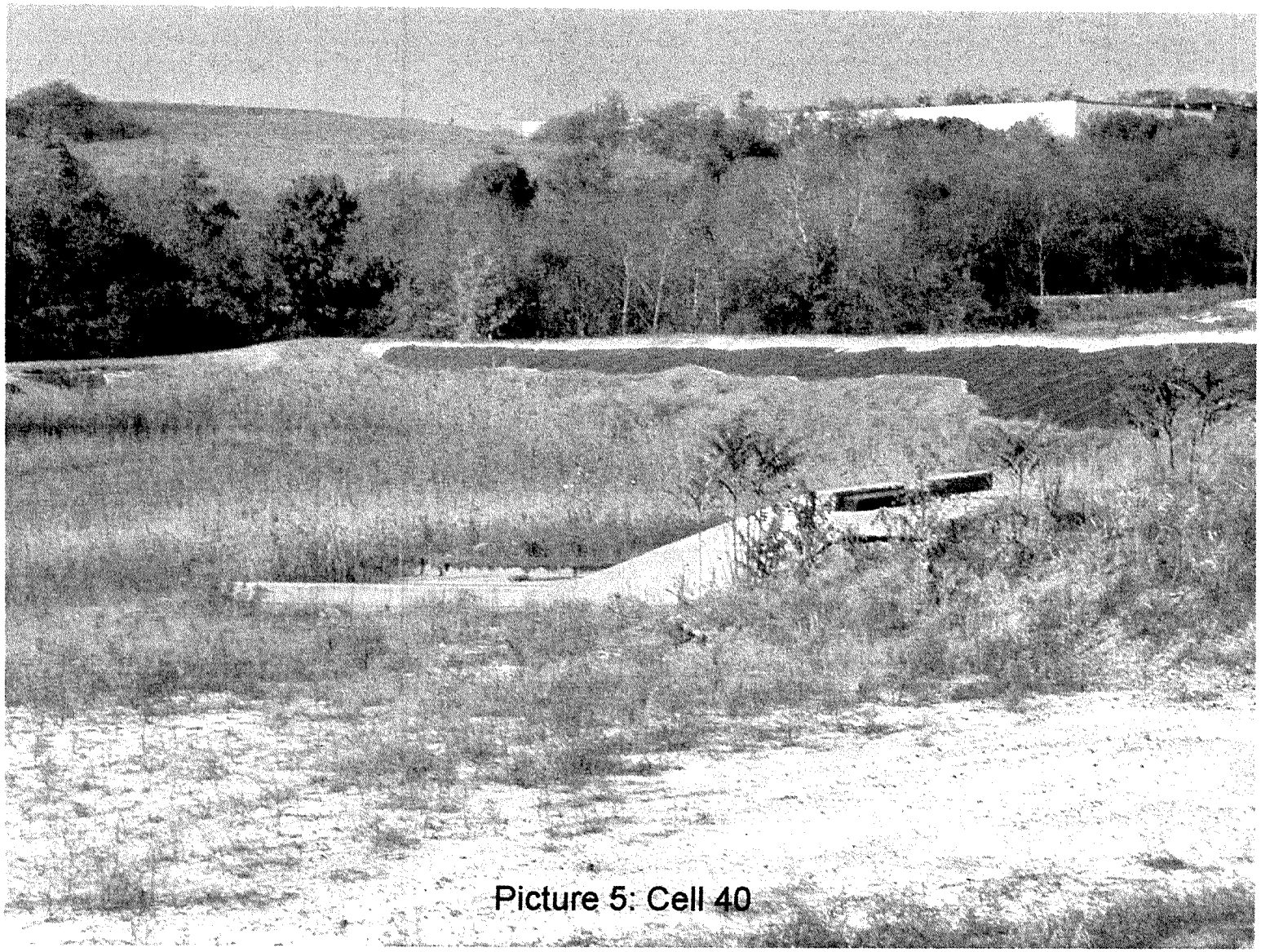


Picture 2: Sediment Pond #1

Picture 3: Sediment Pond #2



Picture 4: Area 5



Picture 5: Cell 40

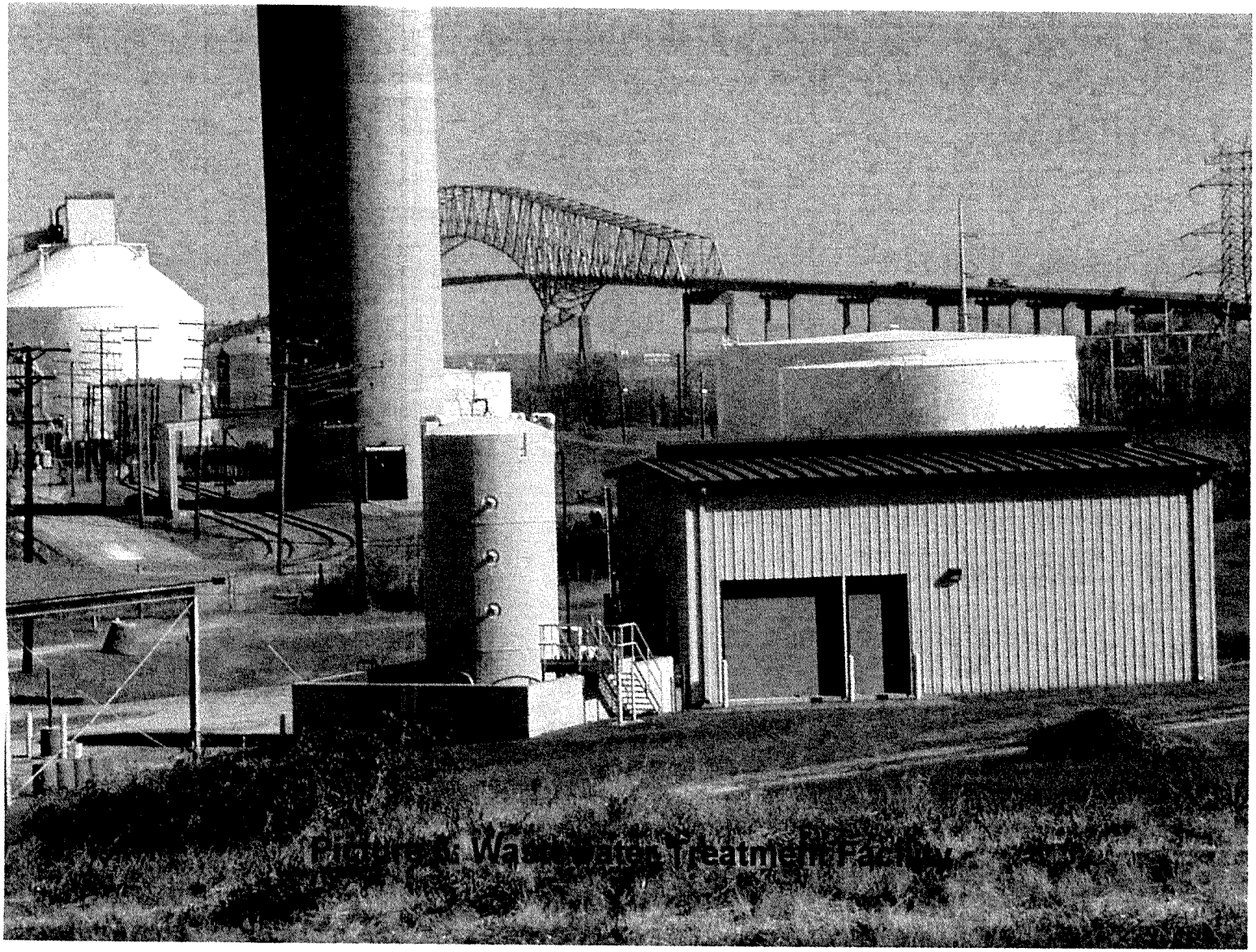
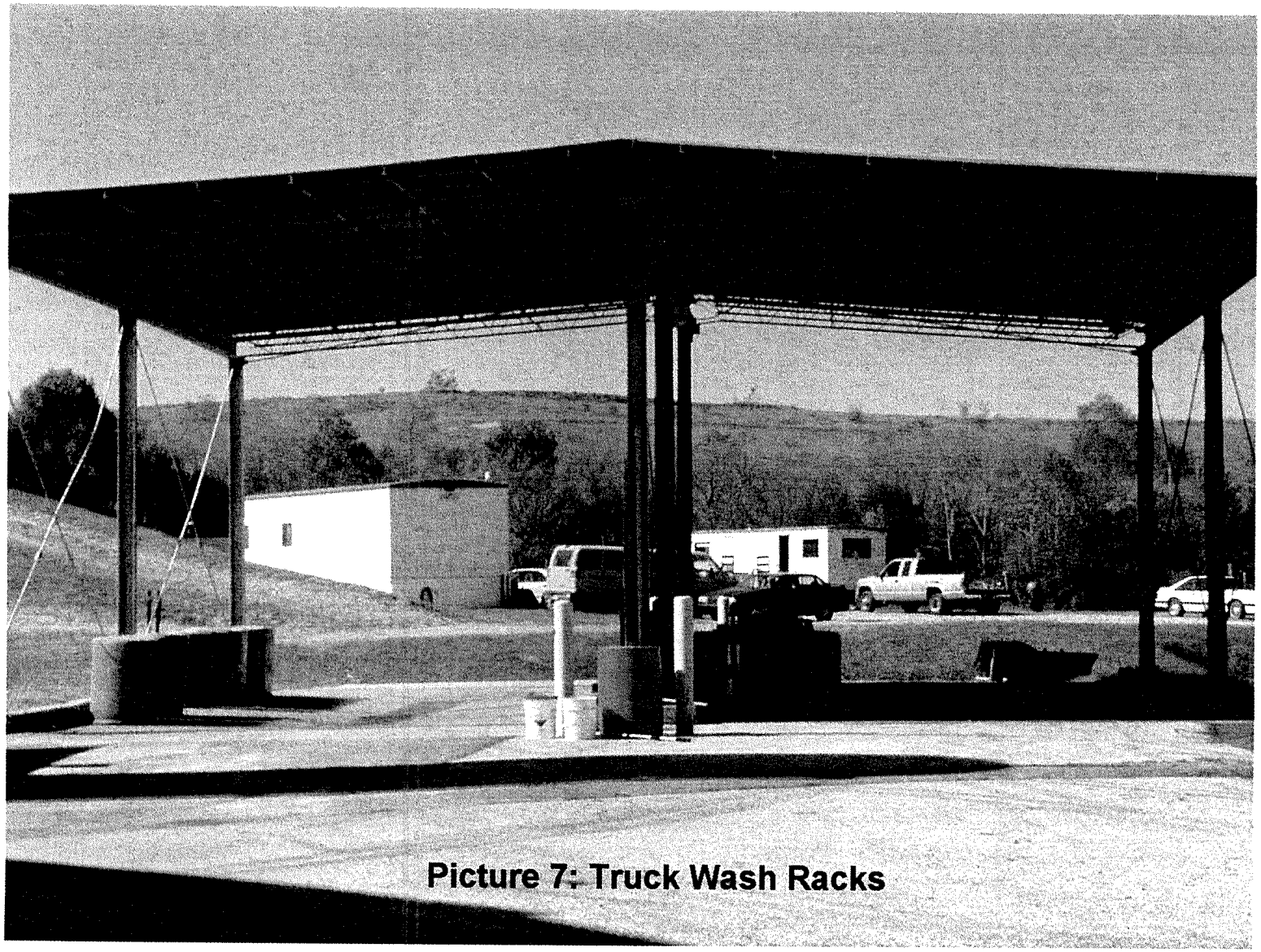
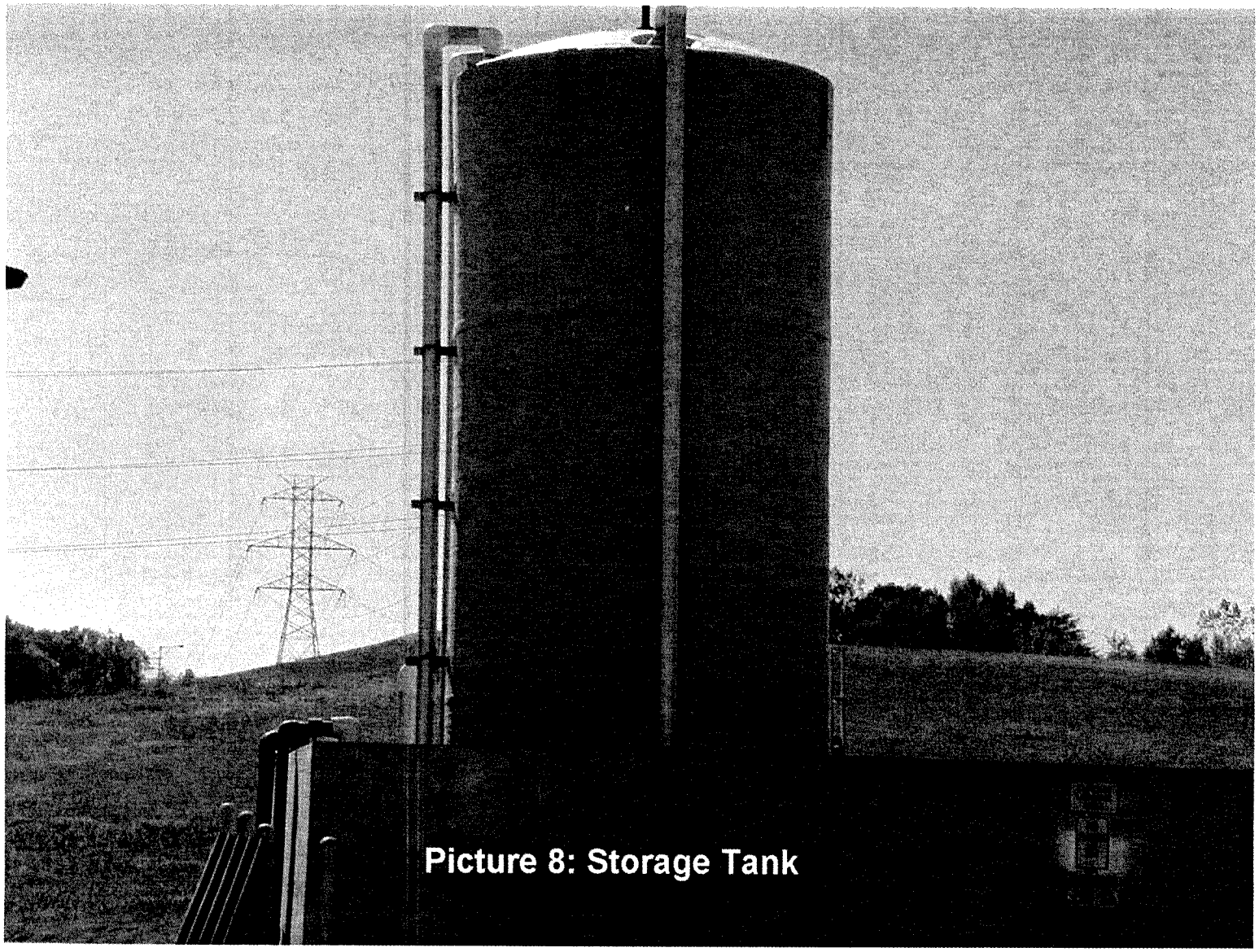


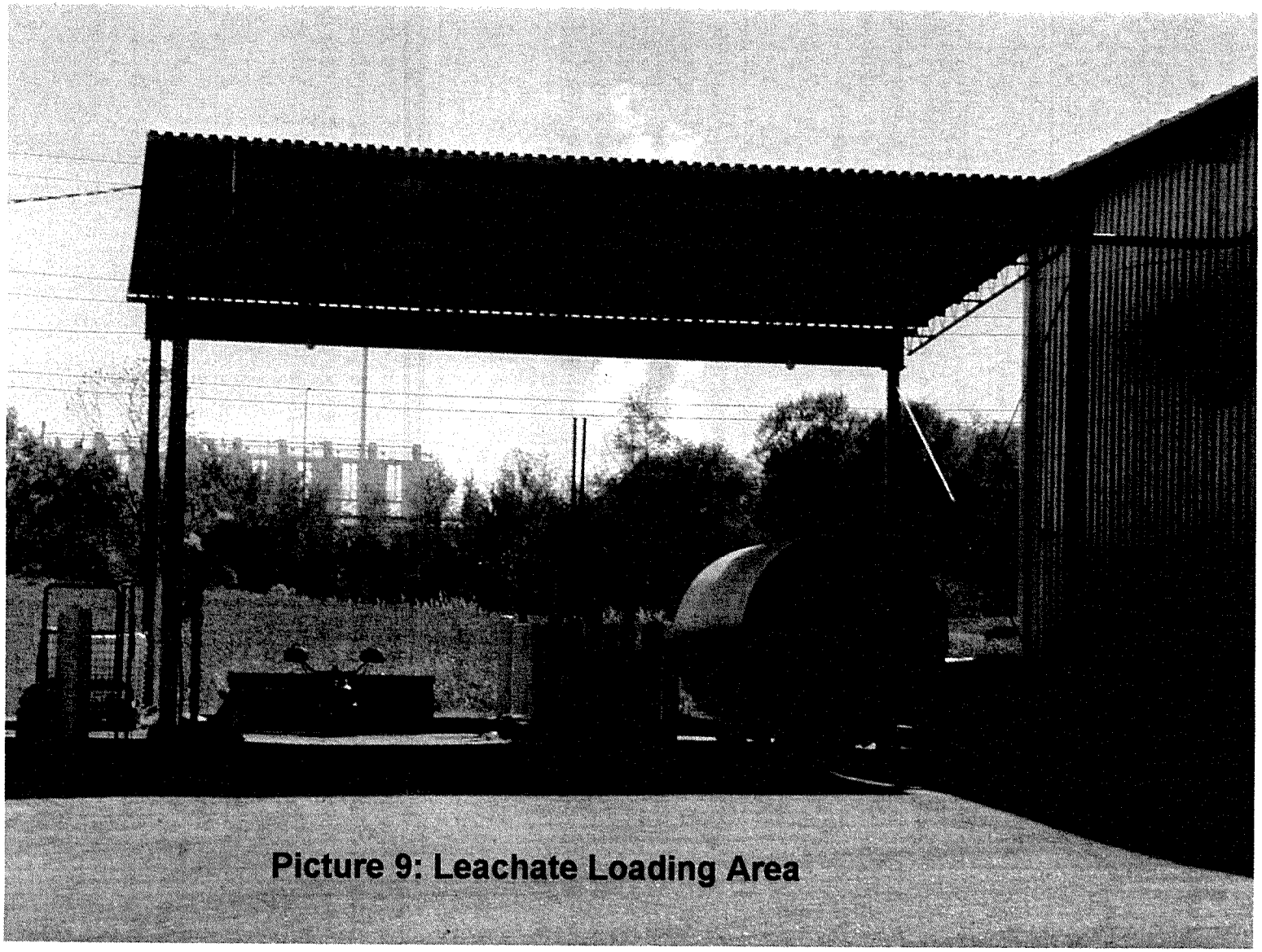
Figure 6. Wastewater Treatment Facility



Picture 7: Truck Wash Racks



Picture 8: Storage Tank



Picture 9: Leachate Loading Area

3.7.2 Natural Historic Preservation Act of 1966

Section 106 of the Act, and implementing regulations (36 CFR 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. Since there are no licensed activities and properties listed or eligible for listing in the Register near the facility, it is in compliance with the Act.

3.7.3 Endangered Species Act

Section 7 of the Act and implementing regulations (50 CFR 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior of Commerce, that any action authorized by the USEPA is not likely to jeopardize the continued existence of any endangered or threatened species, or adversely or threatened species in the area, the facility is in compliance with the Act.

3.7.4 Coastal Zone Management Act

Section 307(c) of the Act, and implementing regulations (15 CFR 930) prohibit the USEPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management Program, and the State or its designated agency concurs with the certification (or the Secretary of Commerce override the State's non-concurrence). This facility is located in a riverine area, not a coastal zone, and therefore is in compliance with the Act.

3.7.5 Fish and Wildlife Coordination Act

The Act requires that the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve those resources. The facility does not impound, divert, or control or modify any body of water, and therefore is in compliance with the act.

12.0 EXPOSURE INFORMATION

Data and related information pertaining to site hydrology and aquifer usage presented in this Section is a synopsis of the 1985 document by Black & Veatch, Engineers-Architects, "Hydrogeologic Assessment - Area 5, Hawkins Point Hazardous Waste Landfill."

12.1 Potential for Human Exposure via the Groundwater Pathway

12.1.1 General Hydrogeology

12.1.1.1 Area 5 and 6

In summary, local ground water contours indicate flow across Area 5 and 6 from the east and northeast toward Thoms Cove. This conforms to regional ground water flow directions from the uplands west of the site toward Thoms Cove. A component of the local flow indicates some ground water movement toward a trough at the southern end of Area 5. This may indicate flow through the thick post-Cretaceous sediments associated with Thoms Creek and toward Thoms Cove. Thus in the site area, the general flow direction for the near surface aquifer is toward Thoms Cove, away from any current or potential withdrawal locations.

The logs of borings in and around the site indicate distinct silt and/or clay layers, even in borings which encounter primarily sand strata. As a consequence, vertical ground water flow may be impeded, both during infiltration and during ground water migration to deeper strata. Low conductivity inclusions can be responsible for locally-confined conditions, and significant vertical head gradients may be observed across such barriers to flow. On a regional level, much of the Patapsco Formation is reported to be under confined conditions. At the site, most of the field permeability test data conforms to the hypothesis of a confined aquifer. Hydraulic conductivity estimates were also developed from field test results. The hydraulic conductivity estimates in the vicinity of Area 5 generally range over more than 3 orders of magnitude, from 0.03 centimeters per second (cm/see) to less than 0.00001 cm/sec.

12.1.1.2 Area 3

Ground water contours across Area 3 indicate flow generally in an easterly direction toward Thoms Cove, although local ground water contours indicate a mound in the surface water table beneath Cell No. 40 in Area 3. This local mounding is interpreted to be the result of precipitation draining from the increased storage capacity of fill place in the area, causing local flow to radiate

away from the center of the pile. This effect is attenuated by the regional flow gradients moving onto the site from the west toward Thoms Cove; normalized piezometric elevations (without mounding) are estimated to range from elevation +10.0 to +5.0 feet mat within the old Maryland Port Administration (MPA) tailing cells. Thus, any regional lateral movement of leachate from the cells would be expected to be toward the Patapsco River. In addition, a ground water interceptor system in Areas 2 and 3 constructed in an "L" configuration along the western and southern boundaries of the MPA cells appears to be lowering water levels and creating a depression along the southern boundary of the cells.

The vertical (downward) movement of leachate is impeded in the area by lower permeability lenses and stratigraphic layers, including the Arundel Formation clay at an estimated depth of 200 feet below the tailings cells. Due to the probability of relatively greater lateral than vertical ground water velocities, the regional ground water gradients, and the proximity of the Patapsco River (approximately 600 feet from the MPA tailing cells), it is most likely that if contaminant movement occurred, it would be intercepted by the river and would not significantly impact the Patapsco or Patuxent aquifers. This would preclude any adverse impact on current or future areas of withdrawal by contaminants emanating from the Hawkins Point site.

The rate at which this movement occurs cannot be precisely determined due to the complex geologic stratigraphy characteristic of the site. In Areas 2 and 3, clays predominate but lenses of silt and sand have been documented. Hydraulic conductivities under and in the vicinity of Area 3 vary by a factor if 10 , from 5.5 x 10 centimeters per second (cm/see) to 6.6 x 10 cm/sec. Lateral velocities for ground water in Area 3 have been estimated to range from 2 feet per day to less than 0.02 feet per day within clay-type soils.

12.1.2 Aquifer Usage

The Patapsco Formation comprises the most widely used aquifer in the Maryland Coastal Plain. The Patapsco aquifer is a source of ground water for the towns of Annapolis, Glen Burnie, Odenton, Forest Heights, Indian Head and Bowie, all located south of the site. Many industries in the Baltimore area additionally utilize cooling water obtained from the Patapsco aquifer. A large, untapped supply of water is available for future development from this formation.

The Anne Arundel County, Department of Public Works - Glen Burnie System has the capability to operate approximately 20 large capacity wells within a 7-mile radius of the site, that utilize the Patapsco aquifer, it is considered unlikely that the Hawkins Point HWL site could have an averse effect on the quality of these wells. Several other landfills (such as the BFI/Quarantine Road, SCM/Glidden, and the BFI/Solley Road facilities) are located closer to the Glen Burnie well system than the Hawkins Point facility.

Water quality in the Patapsco aquifer is generally good, however, localized degradation has been observed in the upper portion of the aquifer, particularly in the Hawkins Point area. Use of the aquifer at the Bethlehem Steel Sparrows Point Plant has been discontinued due to high chloride content. Water quality monitoring wells at the SCM/Glidden and BFI waste disposal facilities, located adjacent to and up-gradient of the Hawkins Point HWL, exhibit manganese, sulfate, iron and chromium concentrations which are several orders-of-magnitude higher than the EPA Drinking Water Standards. Due to regional gradients, the proximity of the Patapsco River and usage patterns, it does not appear likely that contaminants entering the aquifer in the Hawkins Point area would impact any current or future areas of withdrawal.

The Patuxent aquifer underlies the Patapsco aquifer, separated by the confining clays of the Arundel Formation. The Arundel Formation averages 100 feet in thickness in the Hawkins Point area and forms an aquiclude, or barrier separating the 2 aquifers. The formation forms an effective barrier both to hydraulic interconnection and to the spread of any contamination to the Patuxent aquifer from surficial sources.

The Patuxent Formation is used as a source for ground water for drinking and industrial purposes in Charles, Prince Georges, Anne Arundel, Baltimore, Harford and Cecil Counties in Maryland. In the counties to the south and east, the surface of the Paxtuxent Formation is too deep (approximate elevation -1,000 msl) to be practically tapped. In locations where the Patuxent is easily tapped, it remains a significant source of potable ground water supplies.

The ground water obtained from the Patuxent aquifer in the Baltimore area requires treatment to reduce its acidity and to remove iron before distribution for municipal use. The hardness, dissolved solids and chloride content generally are reported to be within the Secondary Standards established by the EPA in 1979. In the Baltimore industrial area, it is of good general quality, although somewhat high in hardness.

12.1.3 Facility Location Assessment

Based on the general hydrogeology in the vicinity of the facility and aquifer usage patterns, the potential for human exposure from releases to ground water is considered moderate due to ground water flow patterns and rates, proximity of withdrawal wells, and low net precipitation (reported to be -4.88" for 1984). This assessment only considers facility location and does not consider design and operating features, which significantly decrease the potential for release.

12.1.4 Design and Operating Procedures

The Area 5 facility was constructed with an in-situ clay bottom, 2-1/2 to 3 feet of compacted clay on side slopes of Cell Nos. 5 through 11 and composite liner on the side slopes of Cell Nos. 5 and 6 including a 1-foot of compacted clay and an 80-mil thick HDPE synthetic membrane. Since this facility is an expansion of an existing chrome ore tailings disposal site (Cell Nos. 1, 2, and 3) beneath the ground surface underlying Cell No. 5 and 6, the existing in-situ clay comprises the bottom. This in-situ material consists of relatively impervious fine-grained soil. The synthetic membrane and clay layer on the side slopes of Cell Nos. 5 and 6, above the ground surface, are designed to prevent the potential lateral movement of contaminates from the cell and direct all percolation vertically to the underlying clay bottom which includes a leachate collection/underdrain system. The final closure cap which includes a capillary break layer, clay layer, 60-mil thick HDPE synthetic membrane, drainage layer and vegetative cover is designed to eliminate or minimize any infiltration of precipitation through the surface of closed Area 5 and promote efficient drainage while minimizing the effects of erosion of the final cover. Maintenance of the final cover is included in Section 4.2.

12.1.5 Overall Area 5 Exposure Potential

Based on facility location and design, the overall human exposure potential from releases to the ground water regime by Cell #'s. 1 through 11 is considered remote. This is due to the presence of the clay bottom and leachate collection system underlying Cell #'s. 1, 2, and 3, and the side slope and final closure cap system. It is possible that Cell #'s. 1, 2, and 3 present a higher exposure potential from ground water releases due to the absence of a composite liner, but no evidence exists that such migration has occurred. In fact, the results of the "Hydrogeologic Assessment - Area 5" indicate that water quality downgradient of Area 5 is comparable to or better than the quality of water which enters the site from upgradient. It should be noted that the potential for human exposure from the contamination of food-chain cross is remote, due to both the low probability of ground water contamination and the lack of agriculture in the area.

A leachate collection/underdrain system was installed in each of the existing base cells (#'s 1, 2, and 3) above the in-situ natural clay layer underlying Area 5 by either open-cut trenching or horizontally angering 6-inch diameter polyvinyl chloride (PVC) pipe a distance approximately 200 feet into each base cell. The leachate collection system drains in a southerly direction toward a common header pipe which transmits the collected leachate to the leachate holding and transfer area. Additionally, a trench drain consisting of coarse gravel wrapped in non-woven filter fabric connects the northern and southern sector of Cell No. 2. Ground water monitoring is accomplished with 18 monitoring wells located around the facility. These wells are monitored quarterly for the parameters specified the Monitoring and Analysis Program in Section 10.

A system of open conveyance ditches and culverts is employed to convey run-on and run-off surface water flows through and around the facility to 2 sedimentation ponds and ultimately, Thoms Cove. These facilities have been designed to pass the 100-year, 24-hour recurrence interval storm event. All open channels are designed to safely convey storm flows with a minimum of 2 feet of freeboard.

12.1.6 Overall Area 3 Exposure Potential

The underlying MPA chrome tailings cells may present a slightly higher degree of exposure potential, as explained in Section 12.1.1.2. However, the data presented in the "Hydrogeologic Assessment" indicates a lack of chromium above detectable levels, implying that chromium derived from the MPA cells has not entered the ground water sampled by monitoring wells downgradient of the cells. In addition, the conclusions in the "Hydrogeologic Assessment" imply that the MPA cells have had no current impact of the Lower Patapsco aquifer. Ground water samples obtained for the Lower Patapsco aquifer indicate the water quality is generally consistent with baseline values established during the performance of previous studies.

12.1.7 Leachate Collection System

In summary, Leachate draining through the Leachate collection system of Area 5 flows by gravity to a sump through the 6-inch diameter, non-perforated collection lines. Leachate from Area 3 flows to a separate section of the same sump specified for that system.

**********underground tank reference changed**********

**********paragraph on spill pad removed**********

The leachate in each section of the sump is pumped to one 20,000 gallon above ground fiberglass holding tank through two separate 4-inch diameter PVC lines with flow meters to record the leachate quantity collected from Area 3 and Area 5. Wash water from the wash pad area drains through PVC lines to the Area 3 and Area 5 sumps and then is pumped to the 20,000 gallon holding tank.

In order to allow for periodic inspection, the system has been designed to be accessible from a series of manholes. Manholes are provided in the main collection header, at all bends and junctions, and at spacing no greater than 400 feet. This enables cleaning, and, to an extent physical repairs to be made to the collector without excavating. It also enables leachate samples to be obtained at various locations in the collection system.

Based on location and design, the overall human exposure potential from releases to ground water is considered remote. This is particularly due to the fact that the system is essentially closed and a portion of the system was recently relined with an HDPE liner. Routine maintenance and inspection, detailed in Section 4.2, provide for monitoring and early detection of potential leaks.

12.1.8 Wastewater Treatment Facility

**********SOIL TREATMENT FACILITY statement removed**********

The wastewater treatment facility is designed to house all treatment equipment within a pre-engineered building. All hazardous wastes will be contained within this building. Waste that spills within the building will be contained by the reinforced concrete floor, thereby not allowing any contamination to reach the ground water. Based on this design, the overall human exposure potential from releases to ground water is considered remote.

12.2 Potential for Human exposure via the Surface Water Pathway

12.2.1 Facility Location Assessment

The only major surface water body near the facility is the lower Patapsco River and several of its tributaries. Thoms Cove is located adjacent to the site, and is tidal in nature. No drinking water intakes are located on the lower Patapsco River, including downstream of the site. The Patapsco River is characterized by weak estuarine circulation, with an order of 95 to 100 percent sediment trapping efficiency which results in limited flow/flushing. The only actual mechanism for human exposure to the surface water would be via recreational boating since the river is not used for drinking water, swimming or as a food supply. In this light, the potential for human exposure from a surface water release would be high. However, it should be noted that the Patapsco River is classified as "severely polluted", and is one of the most degraded tributaries to the Chesapeake Bay in terms of nutrient concentrations, toxic organic and metallic compounds in water and sediments, dissolved oxygen levels, and populations of aquatic organisms. Overall, the facility location is considered to present moderate human exposure potential via the surface-water pathway.

12.2.2 Design and Operating Features

All design and operating features detailed in Section 12.1.4 are relevant to Area 5 operations. Additional information for Area 5 is presented below.

Run-off from the Cell Nos. 5 through 11 final closure cap is uncontaminated and is discharged in sheet flow down the side slopes, intercepted by benches and drained to Sedimentation Pond No. 1. Run-off from Areas2/3 is also

uncontaminated and is discharged in sheet flow to drainage ditches which drain to Sedimentation Pond No. 2.

12.2.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to surface water from the Area 5 landfill after closure and the closed MPA Cells in Area 2 and 3 is considered remote. The monitoring of surface water in the sedimentation ponds and surface water areas serves as check points to prevent human exposure to contaminated surface water. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent near any point along the lower Patapsco River.

12.2.4 Leachate Collection System

The leachate collection system is described in Section 12.1.7. Since the system is completely underground, the potential for human exposure from releases to surface water from the system is considered remote.

12.2.5 Wastewater Treatment Facilities

**********SOIL TREATMENT FACILITY statement removed**********

Since this facility is within buildings with secondary containment, the potential for human exposure from releases to surface water from the system is considered remote.

12.3 POTENTIAL FOR HUMAN EXPOSURE VIA THE AIR PATHWAY

12.3.1 Facility Location Assessment

The area immediately surrounding the facility is industrial, unpopulated and regionally flat in topography. The prevailing wind direction is from the west, at a wind speed of between 0 and 3 miles per hour. The mean daily average for this time period was 55.0 F. with a maximum daily average of 65.0 F and a minimum daily average of 44.8 F.

Overall, the facility location presents a remote potential for human exposure via the air pathway. Although no great dispersions or high wind speeds are characteristic of the atmosphere, moderate temperatures and precipitation as well as relatively level topography balance the atmospheric ability to disperse air releases. In addition, the population density within 2 miles of the facility is very low, and no people live within 1 mile of the facility.

12.3.2 Design and Operating Features

No subsurface gas generation is expected to occur in the Cells in Areas 5 or 2/3. In addition, the only waste received in the cells is chromium and/or asbestos contaminated, which is not reactive, ignitable or volatile. In order to preclude wind dispersal during the early stages of closure activities, chrome contaminated trash is covered with heavier chrome contaminated debris.

12.3.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to air from the Cells of Areas 5 and 2/3 is considered remote. The only potential for release is through wind dispersal of chrome ore tailings; however, these cells are now capped and are not exposed to wind. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent in the area and wind dispersal of waste at levels exceeding regulatory guidelines is nearly impossible.

12.3.4 Leachate Collection System

The leachate collection System is described in Section 12.1.7. Since the system is enclosed and underground, the potential for human exposure from releases to the air is considered nonexistent.

12.4 POTENTIAL FOR HUMAN EXPOSURE FROM SUBSURFACE GAS RELEASES

Since no municipal wastes have been disposed in any area of the facility the generation of subsurface gas is not likely to occur. However, an assessment of the facility is provided to assure regulatory compliance.

Three underground conduits are located on the facility property: 1) a buried electrical conduit; 2) an 8-inch diameter potable water line which follows the entrance road and branches to the area of the former scale plaza, compound area, and wash pads in 2-inch diameter lines; and 3) a 4-inch diameter PVC sewer pipe connecting a 2,000 gallon septic tank with a 10,000 gallon liquid holding tank (See Figure 3.3). The only structures located on the site are 2 trailers and corrugated metal roof structure over the wash pad and leachate collection areas. Overall, the potential for human exposure from subsurface gas releases is considered remote since the gas is not likely to be generated and there are no large conduits or structures at the facility which would promote gas release.

12.5 POTENTIAL FOR HUMAN EXPOSURE FROM RELEASES TO SOIL

12.5.1 Facility Location Assessment

The potential for exposure from releases to surface water and air has been discussed previously. The proximity of the facility to a surface water body increases the potential for transport of contaminated soil to surface waters. In addition, the relatively level topography and amount of facility surface area increase the potential for the transport of contaminated soil to air. Based on facility location alone, the potential for contaminated soil transport to other pathways is remote; however, the assessment of the other pathways revealed only remote exposure potential to humans from those pathways. There is a remote potential for direct human exposure to contaminated soil since the facility is not located in a densely populated area, and security procedures are employed to limit public access to the facility.

12.5.2 Design and Operating Procedures

Several precautions are taken to prevent the contamination of soils on and near the facility. To prevent the spillage of wastes, covers are required on all bulk waste hauling vehicles entering and leaving the facility. Special procedures are followed at the unloading areas to minimize contact of the waste with the truck under carriage. All waste-hauling vehicles whose exterior comes in contact with the waste are required to proceed through the truck washing facilities before leaving the site. Any in-place wastes which could be dispersed off-site by wind erosion are covered. Any soils which are contaminated from the operation of the facility are considered and handled as hazardous waste material. Soil will be properly treated and or disposed. Soil contamination is further minimized by the control of runoff and surface water, as discussed previously. Spill response procedures are included in the Contingency Plan as described in Section 6.0.

12.5.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to soil from the Area 5 facility is considered remote. This is due to design and operating procedures which are specifically intended to minimize soil contamination and to rectify any potential spill situation quickly and effectively. These procedures, coupled with surface water and wind dispersal management procedures, in addition to the fact that the landfill will be closed, essentially eliminate the possibility of contaminated soil transport to other pathways, and ultimate exposure to humans. It should be noted that agriculture is not practiced near the facility, thus eliminating the potential for food chain contamination.

12.5.4 Leachate Collection System

Since the system is regularly maintained and inspected, and just recently relined with an HDPE lining, the potential for soil contamination by the system is

considered remote. If the soil was to be contaminated, the chances of direct human contact would be remote since contamination would be underground.

12.5.5 Wastewater Treatment Facilities

**********SOIL TREATMENT FACILITY statement removed**********

The wastewater treatment equipment and all treatment is performed within an enclosed building with secondary containment. If the hazardous waste would spill outside the building, contaminating the soil, the contaminated soil would be collected immediately and disposed of in accordance with hazardous waste regulations. The potential for soil contamination by these facilities is considered remote, and therefore the overall human exposure from releases to the soil is considered remote.

12.6 POTENTIAL FOR HUMAN EXPOSURE FROM TRANSPORT RELATED RELEASES

Leachate will be transported from the facility on an intermittent basis through industrial areas in sealed tank trucks. Spill prevention programs are practiced by the haulers. In addition, off-site spill response procedures are included in the Contingency Plan in Section 6.0.

No spills or situations involving potential human exposure to waste by Hawkins Point HWL facility transportation vehicles have ever occurred. Therefore, the potential for human exposure from releases related to transportation accidents or spills is considered remote.

12.7 POTENTIAL FOR HUMAN EXPOSURE FROM WORKER MANAGEMENT PRACTICES

All Hawkins Point personnel are required to participate in safety training sessions and to abide by the site Health and Safety Plan, detailed in Section 9.0. Employees are equipped with high visibility headgear, gloves, safety shoes and tyvek coveralls, at a minimum; goggles, respirators and ear plugs are available and are used as conditions dictate. All heavy equipment is equipped with audible back-up signals and fire extinguishers.

All employees are also required to participate in a training program, which includes both classroom and on-the-job training. A list of subject items included in the training for each job position is presented in Section 7.0. The training covers safety and first aid; office, operations, maintenance, and equipment operation procedures; and an environmental protection program.

A contingency and emergency plan is summarized in Section 6.0. The plan describes emergency coordination and designates coordination contacts; identifies

limits of authority; designates emergency personnel and respective roles; provides decision making criteria for plan implementation; delineates emergency response procedures for spills, fires and explosion; outlines clean-up activities; lists emergency equipment and details evacuation procedures.

February 5, 1999

Correspondence Regarding Leachate UST Closures

REMEDIATION, INC.
Post Office Box 97, Dover, PA 17315-0097
Phone (717) 292-4432
FAX (717) 292-7569
Email jcc-ri.com
Office located at 4331 Fox Run Road, Dover, PA 17315

ACCREDITED QUALITY CONTRACTOR
SAFETY-BENEFITS-TRAINING COMMUNITY

RECEIVED
FEB 11 1999
HAZARDOUS WASTE ENFORCEMENT DIVISION

February 5, 1999

Mr. Jim Leizear
Maryland Department of Environment
Waste Management Administration
Hazardous Waste Program
2500 Broening Highway
Baltimore, MD 21224

Re: Hawkins Point Landfill
Leachate UST Closures

Dear Mr. Leizear:

Remediation, Inc. has completed the tank closures at the Hawkins Point Landfill in Baltimore. One tank was cleaned on Thursday, January 21 and the other was cleaned on Tuesday, January 26, 1999. All sludge and rinseate was removed and disposed under a separate contract with MES.

We filled the tanks on Thursday, January 28, 1999. The tanks were filled with a Flow Ash material. A total of 308 CY was used to fill both tanks. MES collected the delivery slips, therefore, I did not attach a copy of each as documentation.

Thanks for your assistance during the project. If you should require any other information, please do not hesitate to call.

Sincerely,

REMEDIATION, INC.

Karl F. Rice
Project Manager

KFR/sr

cc: Steve Morra
Johnston Construction Company

J:\JOBS\JOB#S\7034 Hawkins Point\03-CORR\CLIENT\4-MISC\TO-MISC\mddeptof, 2-5-99, UST Closures

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February 22, 2000

Hawkins Point Hazardous Waste Landfill – Permit Renewal Addendum #2

MARYLAND
ENVIRONMENTAL
SERVICE

Parris N. Glendening
Governor

James W. Peck
Director

February 22, 2000

FEB 23

Mr. Edward Hammerberg, Chief
Regulations/Permitting Division
Hazardous Waste Program
Maryland Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

RE: CHS Permit A-264
Hawkins Point Hazardous Waste Landfill
Permit Renewal Addendum #2

Dear Mr. Hammerberg:

The following attachment (Attachment A) is submitted to your office as Addendum #2 of the permit renewal application for the above referenced facility. The permit renewal application for the Hazardous Waste Management Units at the Hawkins Point Hazardous Waste Landfill was originally submitted to the Maryland Department of the Environment (MDE) in April 1998 and was later modified May 14, 1999 in response to MDE's April 1, 1999 Notice of Deficiency List.

Attachment A, dated February 2000, is in response to several correspondences occurring from May 7, 1999 to February 9, 2000 (Attachment B) between the Hazardous Waste Program (HWP) of MDE and the Maryland Environmental Service (MES), and minor changes reflecting the current status of the waste management units. For your convenience, a summary of the changes is included in Addendum #2 to the permit renewal application for the Hazardous Waste Management Units at Hawkins Point HWL and is enclosed as Attachment C.

In a letter to Mr. Harold Dye, Jr. of HWP dated November 22, 1999, MES responded to the October 20, 1999 letter from Mr. Dye regarding an apparent statistically significant increase in barium concentration in the groundwater at Area 5. MES responded by presenting information supporting a "natural fluctuation or variance in the observed barium concentrations in the groundwater at the site." "Concentrations of barium detected in groundwater at this site is in the parts per billion (ppb) range. The average barium concentration in the upgradient well 2B is 28 ppb. The average in the down gradient wells 2D and 2F are 45 and 29 ppb. At these low levels, a minor

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laboratory error is sufficient to impact the statistical analyses. Therefore, a minor variation although natural in its occurrence, is enough to cause a statistically significant increase. The range of barium in the groundwater does not appear unusually high."

To support this position, in a November 22, 1999 letter MES presented groundwater data reported by the US Geological Survey taken from wells located at various sites in and around Baltimore County to represent "background" concentration data unaffected by Hawkins Point. "It is evident upon review of the USGS data that there is a naturally occurring range of barium concentrations in groundwater in Maryland. A hydrogeologic study on the nearby CSX Swan Creek site performed by Woodward-Clyde Consultants in 1992 shows barium levels in the groundwater at concentrations ranging from 50 ppb to 78 ppb. Given this natural range in barium concentrations, and considering that the low levels detected at Hawkins Point are within this natural range, MES believes that Area 5 is not adversely impacting the groundwater quality for barium." Additionally, as stated in the December 6, 1999 letter from HWP, "A document obtained from EPA also states that (barium) Ba can occur in groundwater as a result of 'erosion of natural deposits'. The same document states that the maximum contaminant limit of barium in drinking water is 2,000 ppb. Historic data indicate that the barium concentrations in all three Area 5 monitoring wells are normally less than 100 ppb, so that the Ba concentrations observed in groundwater at the landfill do not appear to be a human health hazard." Also in the December 6, 1999 letter, HWP stated "Chromium (Cr) is the main constituent of concern at the facility, and significant quantities of Cr exist in the leachate collected by MES. However, Cr concentrations have not significantly increased in site wells. HWP has concluded that implementation of the enhanced monitoring requirements specified in COMAR 26.13.05.06 to .06-7, based solely on increased Ba concentrations, would not generate significant information beyond what is already known, and would not provide a basis for requiring the implementation of corrective action."

The current facility permit includes barium within the list of parameters required to be monitored quarterly in the Area 5 compliance wells and the monitoring data used to perform statistical analyses. Therefore, it is with this submittal of the Addendum # 2 that MES requests the removal of barium from the list of indicator parameters used to monitor the compliance of Area 5. As such, barium would be removed from the statistical analysis requirement, but would continue to be monitored in the Area 5 wells on a quarterly basis.

MES believes this submittal provides sufficient information for both the request of the removal of barium from the list of compliance parameters for Area 5 and for the modification of the permit application to accurately reflect the current status of the facility's waste management units. Updated facility operations and maintenance manuals will be provided to MDE as the innovative treatment technology is refined.

If you require additional information or have any questions, please contact me at (410) 974-7295.

Sincerely,

Vanessa S. Jones, P.E.
Chief, Waste Remediation

3 Copies of Enclosures
cc w/ enclosures:

William E. Chicca
Tarsem Thohan

ATTACHMENT A

ADDENDUM NO. 2
PERMIT APPLICATION FOR HAZARDOUS WASTE MANAGEMENT UNITS AT HAWKINS POINT HAZARDOUS WASTE LANDFILL
AREAS 3, 5 AND 6

ADDENDUM NUMBER 2
PERMIT APPLICATION FOR
HAZARDOUS WASTE MANAGEMENT UNITS AT HAWKINS POINT
HAZARDOUS WASTE LANDFILL
AREAS 3, 5 AND 6

FEBRUARY 2000

Please make the following revisions to the reference Permit Application dated April 1998 and revised by Addendum No. 1 dated May 14, 1999:

Cover Sheet

Delete and replace with Cover Sheet revised February 2000

Table of Contents

Delete Table of Contents sheet beginning with Section 10.2 and Table of Contents sheet beginning with Section 10.7 and replace with sheets revised February 2000

Executive Summary

Delete and replace with Executive Summary revised February 2000

Section 1

Delete Pages 1-1 and 1-2 and replace with Pages 1-1 and 1-2 revised February 2000

Section 2

Delete Page 1 of the EPA Part A Permit Application and replace with Page 1 revised February 2000

Section 3

Delete Pages 3-1 through 3-7 and replace with Pages 3-1 through 3-7 revised February 2000

Delete Figure 3.5 and replace with Figure 3.5 revised February 2000

Section 4

Delete Pages 4-1 and 4-2 and replace with Pages 4-1 and 4-2 revised February 2000

Section 5

Delete Page 5-4 and replace with Page 5-4 revised February 2000

Section 6

Delete Page 6-2 and replace with Page 6-2 revised February 2000

Section 9

Delete Pages 9-1 and 9-5 and replace with Pages 9-1 and 9-5 revised February 2000

Section 10

Delete Page 10-3, Pages 10-14 through 10-17 and Pages 10-19 through 10-26 and replace with Page 10-3, Pages 10-14 through 10-17 and Pages 10-19 through 10-26 revised February 2000

Section 12

Delete Page 12-5 and replace with Page 12-5 revised February 2000

Section 13

Delete Pages 13-4 through 13-5 and replace with Pages 13-4 through 13-6 revised February 2000.

Delete Figure 13-1.

PERMIT APPLICATION

FOR

HAZARDOUS WASTE MANAGEMENT UNITS

AT

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREAS 3, 5 AND 6

APRIL 1998
(REVISED MAY 14, 1999, FEBRUARY 2000)

MARYLAND
ENVIRONMENTAL
SERVICE

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12.1.2 Aquifer Usage 12-2

EXECUTIVE SUMMARY

This document is presented by the Maryland Environmental Service (MES) for the reissuance of Controlled Hazardous Substance Permit A-264 for the Hawkins Point Hazardous Waste Landfill. The facility, located at 5501 Quarantine Road, Baltimore, Maryland 21226 is owned by the Maryland Port Administration (MPA), and is permitted by the Maryland Department of the Environment and the U.S. Environmental Protection Agency. MES currently operates the facility and performs environmental monitoring, post-closure care of the Area 5 chrome ore tailings landfill and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3.

The following hazardous waste management units are currently authorized under the existing CHS Permit A-264:

1. Area 5 Landfill: Authorized for post-closure care only;

2. Waste Water Treatment Unit: Authorized only for the storage and treatment of waste waters generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, and the former site of AlliedSignal's (presently Honeywell) Baltimore Works site, as well as other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

3. Soil Treatment Unit (Area 6): Authorized only for the treatment of wastes generated at the Hawkins Point Landfill, facility, the Dundalk Marine Terminal, the Patapsco Wastewater Treatment Plant, AlliedSignal's Baltimore Works site, and other chromium contaminated soils and/or sludges generated as a result of chrome ore tailings in the Baltimore area.

Construction of the building that will house the on-site wastewater treatment system is complete. Start-up operations for the on-site wastewater treatment unit are currently ongoing. Construction of the on-site soil treatment unit has been postponed.

This document serves as an application to continue managing the above referenced hazardous waste management units at the Hawkins Point Hazardous Waste Facility.

1.0 INTRODUCTION

The Hawkins Point Hazardous Waste Facility, located at 5501 Quarantine Road, Baltimore, Maryland 21226, is owned by the Maryland Port Administration (MPA), and is permitted by the Maryland Department of the Environment and the U.S. Environmental Protection Agency. The Maryland Environmental Service (MES) currently operates the existing facility and performs environmental monitoring, post-closure care of the Area 5 chrome ore tailings landfill and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3. In the past, chrome ore tailings were disposed of in what are now closed cells in Areas 2, 3 and 5 of the site. Chromium contaminated leachate generated in these cells is collected by the MES.

This permit application is for the reissuance of Controlled Hazardous Substance Permit A-264. The following hazardous waste management units are currently authorized under the existing CHS Permit A-264:

1. Area 5 Landfill: Authorized for post-closure care only;

2. Waste Water Treatment Unit: Authorized only for the storage and treatment of waste waters generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, and the former site of Allied Signal's Baltimore Works site, as well as other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

3. Soil Treatment Unit (Area 6): Authorized only for the treatment of wastes generated at the Hawkins Point Landfill facility, the Dundalk Marine Terminal, the Patapsco Wastewater Treatment Plant, AlliedSignal's Baltimore Works site, and other chromium contaminated soils and/or sludges generated as a result of chrome ore tailings in the Baltimore area.

Start-up operations are currently ongoing for the on-site wastewater treatment unit for treating the decontamination wash water and leachate generated on-site. The wastewater treatment system will treat leachate with high chromium concentrations generated from the Area 5 landfill, the MPA cells in Areas 2 and 3, and the groundwater pump and treatment system at Dundalk Marine Terminal (DMT). The wastewater treatment system will also treat groundwater extracted from the former site of AlliedSignal's Baltimore Works facility, and other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

The Dundalk Marine Terminal (DMT) is currently utilized and operated by the Maryland Port Administration (MPA). A portion of the DMT was built using chrome ore tailings from a chromium chemical plant as fill material. Construction, utility repair and maintenance activities regularly encounter contaminated soils as well as

some of the identifiable chrome ore tailings. These excavated materials contain hexavalent chromium and are hazardous waste under the definition of EP Toxicity (EPA Hazardous Waste ID No. D007). These waste materials exhibit the characteristics of corrosivity (pH values sometimes reach 13.0) and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit of 5.0 mg/l.

MPA staff anticipated that an average of 2,000 cubic yards of contaminated soil will be generated by utility repair and maintenance activities each year. The chromium contaminated soil will be sent to a treatment process/system to be located in Area 6 of the Hawkins Point Hazardous Waste facility. The necessity for a treatment process/system originates from MES's commitment to the MPA to assist MPA with several requirement of the State issued Consent Agreement dated April 17, 1991.

The soil treatment system will handle soils generated at the DMT, sludges generated by the proposed on-site leachate treatment system, the groundwater pump and treatment system at DMT, and other chromium contaminated soils and/or sludges generated as a result of chrome ore tailings in the Baltimore area.

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved. OMB No. 2050-0034 Expires 10/31/99
GSA No. 0248-EPA-OT

For EPA Regional Use Only

Date Received
Month Day Year

United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

I. Installation's EPA ID Number *(Mark 'X' in the appropriate box)*

[ ] A. First Part A Submission

[XX] B. Part A Amendment # 1

C. Installation's EPA ID Number: MDD000731356

D. Secondary ID Number *(If applicable)*:

II. Name of Facility

HAWKINS PT HAZDOUS WASTE LNDFL

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street: 5501 QUARANTINE ROAD

Street *(Continued)*:

City or Town: BALTIMORE

State: MD

Zip Code: 21226-

County Code *(If known)*:

County Name: NA

B. Land Type *(Enter code)*:

C. Geographic Location

LATITUDE *(Degrees, minutes, & seconds)*: 39 12 30 N

LONGITUDE *(Degrees, minutes & seconds)*: 076 33 00 W

D. Facility Existence Date

Month Day Year: 08 05 1980

IV. Facility Mailing Address

Street or P.O. Box: MES 2011 COMMERCE PARK DRIVE

City or Town: ANNAPOLIS

State: MD

Zip Code: 21401-

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(Last)*: JONES

(First): VANESSA

Job Title: CHIEF

Phone Number *(Area Code and Number)*: 410-974-7295

VI. Facility Contact Address *(See instructions)*

A. Contact Address

Location [ ] Mailing [X] Other [ ]

B. Street or P.O. Box:

City or Town:

State:

Zip Code: -

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill is a secure hazardous waste facility in Maryland, permitted by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southwestern corner of Baltimore City (see Figure 3.1).

The Hawkins Point property, owned by the Maryland Port Administration (MPA), an agency of the State of Maryland, encompasses approximately 67 acres and is divided into six areas (See figure 3.2). Areas 1 and 6 are presently outside of the fenced area of the Hawkins Point facility. Area 1 is currently leased for use to EASTALCO Aluminum Co. Area 6 was previously leased to the Cosmin Corporation and is not currently being used. Future plans are to implement a hazardous waste treatment facility in Area 6 for the chromium contaminated soil generated at the Dundalk Marine Terminal during construction, utility repair and maintenance activities.

Area 5, currently in post-closure care, was dedicated to the sole use of AlliedSignal, Inc. (presently known as, Honeywell) for the disposal of chromium contaminated waste. In January of 1983, MES began accepting chrome ore tailings from the Baltimore works facility owned by AlliedSignal. In 1985, the Baltimore Works facility closed. As part of closure, portions of the Baltimore Works facility were dismantled and handled as hazardous waste. The chromium contaminated debris which consisted of structural beams and concrete, brick, asbestos, soil (up until May 8, 1990) and other additional chromium contaminated debris was disposed in Area 5 until the ultimate capacity was reached in 1993. An estimated 451,450 tons of hazardous waste is disposed in Area 5. Presently, the only waste handling from Area 5 is the leachate generated within the capped landfill. In 1995, 243,648 gallons of leachate were generated, in 1996, 235,257 gallons were generated and in 1997 213,105 gallons were generated. It is expected that this quantity will continue to decrease over time.

Areas 2 and 3 contain closed chrome ore tailing cells constructed by the MPA and monitored and dewatered by the MES. The tailings are also from the former Baltimore Works plant. These cells continue to be monitored and maintained in the dewatered condition. Leachate generated from these cells was 182,761 gallons in 1995, 238,551 gallons in 1996 and 211,571 gallons in 1997. Start-up operations of an on-site leachate treatment plant are currently ongoing.

During January of 1983, Cell 40 in Area 3 was opened to accept controlled hazardous waste. The cell was operated by MES for approximately eleven months and due to economic reasons was then closed. All waste material was removed and transported to Fondessy, Ohio for disposal and the cell was returned to an

"unused" condition. MES is currently in the process of hiring an independent professional engineer to certify clean closure of Cell 40. The 80 mil HDPE liner is still in place in the cell and acts as an impervious cap over the underlying old chrome cells in the area. Ponded rain water is periodically pumped out of the cell into the site surface drainage system and is discharge after flowing through Sediment Pond #2. Discharge from Sediment Pond #2 is monitored under the site's NPDES Permit.

Area 4 has previously been used for experimenting with chrome ore tailings fixation. However, little actual data is available regarding the dates of the filling or the characteristics of the wastes received. A "paint sludge" is believed to also have been deposited in this area. The deposit was discovered by MES personnel and reported to the Maryland Department of Health and Mental hygiene in 1982.

3.2 PREVIOUS SITE DEVELOPMENT

To date, 3 construction contracts have been completed for facilities to serve all areas of the Hawkins Point HWL site. These include:

A. "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).

- Groundwater interceptor bordering the western and southern edge of Area 3.
- Sedimentation Ponds Nos. 1 and 2.
- Drainage ditches and culverts tributary to the sedimentation ponds.

B. "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982)

- Leachate storage and transfer area.
- Leachate collection system for chrome ore tailings underlying Area 3 and Area 5.
- Electrical service improvements.

C. "Contract 3: CHS Landfill Expansion" (November 5, 1982)

- Entrance road.
- Scale plaza.
- Truck-wash pads.
- Sanitary sewerage holding systems.

- Drainage improvements.
- Security fencing.
- Cell No. 40 earthen berms, liner system, and leachate collection system.

Capping of Area 5 was performed under MES construction contract ID No. 93-03-140 "Area 5 Final Cap Construction - Hawkins Point Hazardous Waste Landfill" (July 1993). Area 5 was certified closed by an independent Professional Engineer on July 22, 1994. A copy of the Certification is included in Appendix I.

Construction of the leachate treatment facilities at the Hawkins Point Hazardous Waste Facility under MES construction contract, ID No. 97-03-44R is complete. This contract provides for a new above ground 20,000 gallon leachate storage tank, abandonment of the existing two 30,000 gallon underground leachate storage tanks, a new building to house the treatment system, the treatment system and effluent line with diffuser. Start-up operations for the on-site wastewater treatment unit are presently ongoing.

3.3 PERMITS

The Hawkins Point HWL currently operates under EPA Final RCRA Permit Number MDD 000731356, and State of Maryland Controlled Hazardous Substances Facility Permit Number A-264, effective October 15, 1995, with an expiration date of October 14, 1998. This document is intended as an application to renew CHS Permit A-264.

In August 1992, a permit application for a soil storage facility was submitted. This application for a soil storage facility was later modified to delete the storage facility and add soil treatment facilities in Area 6. The soil treatment facility is included in the existing CHS Permit A-264 and authorizes the treatment of chromium contaminated waste soil generated at the Dundalk Marine Terminal, Hawkins Point Landfill, Patapsco Wastewater Treatment Plant and AlliedSignal's Baltimore Works site. It is anticipated that the contaminated soil would be treated on-site and rendered non-hazardous.

The original Controlled Hazardous Substances Facility Permit Number A-264, which became effective November 30, 1982, authorized the disposal of specified general hazardous wastes in Cell No. 40 of Area 3. A RCRA Part B permit application for the expansion of Area 3 with Cell Nos. 41 through 49 was submitted to the EPA on August 1, 1983, while the facility operated under interim status. After cessation of active operations the interim status of Area 3 expired on November 8, 1985.

Various other permits are required and have been issued for environmental and support features of the site. Disposal permits from the City of Baltimore, Department of Health have been issued (Permit No. 65, February 1, 1981 to January 31, 1982; Permit No. 74, February 1, 1982 to January 31, 1983) and renewed as necessary. A sediment control permit, WRA No. 82SF0441, was issued on February 18, 1982 by the State Water Resources Administration (WRA). A National Pollutant Discharge Elimination System (NPDES) permit for the facility (State Permit No. 85-DP-2229, NPDES Permit No. ND 0061417) was originally issued on May 1, 1986 and reissued on April 1, 1997. A copy of this permit is included in Appendix H. This permit includes effluent limits for the discharge of an effluent stream from the proposed leachate treatment system. A Waste Water Discharge Permit application (Identification No. 1-08955) was submitted to the City of Baltimore on March 18, 1992. A permit is not applicable for this facility and will not be issued because there is no discharge into the City sewer system. The application will be retained in City files for information only.

3.4 TOPOGRAPHIC MAP

3.4.1. Figure 3.3 depicts a topographic map outlining the existing general site plan and the development of the area surrounding the site. The topographic map was derived from aerial photography obtained on April 1, 1983.

The following details are required under COMAR 26.13.07.02D(6) to be described and depicted on the topographic map in Figure 3.3 to aid in the permit application review.

a. Intake and Discharge Structures. There are no intake structures for this facility. There are two existing discharge structures labeled as Sediment Pond 1 and 2. The sediment ponds collect surface water run-off from the facility and then discharge into Thoms Cove. An NPDES permit regulates these discharges. A third discharge is the effluent pipe from the soon to be completed leachate treatment facilities. This discharge will also be regulated under the sites NPDES permit.

b. Hazardous Waste Treatment, Storage, or Disposal Facilities. Each of the disposal areas, Area 5, Cell 40 and the MPA cells in Area 3 are shown on the map. Cell 40 is no longer a disposal site. Two 30,000 gallon underground leachate holding tanks are shown on the map. These tanks were abandoned in February 1999 in accordance with MDE regulations and have been replaced with an above ground 20,000 gallon tank as part of the leachate treatment facilities construction. This tank is permitted to temporarily store leachate. The hazardous waste leachate treatment and storage facilities are depicted on the map.

Facilities for the soil treatment process have not been designed but are designated to be located in Area 6.

c. Wells Where Fluids Are Injected Underground. There are no wells at this facility where fluids from the facility are injected underground.

d. Wells, Springs, and Other Surface Water Bodies Within 1/2 Mile of the Facility Boundary. All existing facility wells and surface water bodies are designated on the map. A listing of wells registered in public records was requested from the Maryland Department of the Environment. These wells are also shown on the topographic map on Figure 3.3.

3.4.2. The following details are required under COMAR 26.13.07.02D(35) to be described and depicted on a topographic map as shown on Figure 3.3 to aid in the permit application review.

a. Map Scale and Date. Please note that the referenced topographic map was derived from aerial photography obtained on April 1, 1983 and has a scale of 1 inch equal to 200 feet, and a contour interval of 2 feet.

b. 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone X, areas determined to be outside of 500 year floodplain, by the Federal Emergency Management Agency (FEMA).

c. Surface Waters. Surface water streams in the Hawkins Point Area generally flow easterly, and discharge into Thoms Cove on the western bank of the Patapsco River. Surface water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area; the directions of these flows are indicated on the topographic map.

d. Land Uses. The surrounding land use is primarily zoned for heavy industrial use; limited undeveloped land and park land does exist as indicated. No residential land uses occur within 1,000 feet of the property boundary.

e. Wind Rose. Figure 3.4 depicts the annual wind rose of meteorological data collected from 1948 through 1981. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area, as measured at the Baltimore-Washington International Airport (BWI), located approximately 6 miles southwest of the Hawkins

Point facility. This information was supplied by the National Climatic Center, Asheville, North Carolina. The predominate wind direction is from the west, at a wind speed of between O and 3 miles per hour.

g. Facility Boundary. The facility boundaries encompass Areas 2, 3, 4, 5 and 6. These five areas are formerly or presently in use with the exception of area 6 which was never used as a hazardous waste treatment, storage or disposal area. A portion of Area 6 may be used as the future site of a contaminated soil treatment facility.

h. Access Control. The main entrance road will convey traffic to and from the facility; this road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1 and at the northern end of Area 5. A 6-foot high chain-link security fence with a barbed-wire top, 3-strand barbed wire fence and a total of 5 access gates surrounds the facility as shown in Figure 3.3.

i. Injection and Withdrawal Wells. There are no injection or withdrawal wells associated with this facility.

j. Building, Treatment, Storage, or Disposal Operations, or Other Structures. Existing structures within the facility include a leachate loading facility, having a corrugated metal roof shelter located in the leachate loading and transfer area; and a truck wash facility, which has a corrugated metal roof shelter located in the truck wash pad area. A trailer on site serves as an office, crew quarters and safety station. A leachate treatment system building and new leachate storage tank within a secondary containment have been constructed between the existing leachate loading area and truck wash pad area. Start-up operations for the wastewater treatment unit are currently ongoing.

k. Barriers for Drainage or Flood Control. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into three categories:

1. Storm water that has the potential of being contaminated by contact with hazardous waste is directed to the leachate collection system and holding tanks for transfer to permitted treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of facility is conveyed to one of two sedimentation ponds or a

perimeter drainage swale before discharging into Thoms Cove. Discharges from the site are covered by a National Pollutant Discharge Elimination System (NPDES) permit approved by the Maryland Department of the Environment.

I. Location of Operational Units Within the Hazardous Waste Management Facility Site, Where Hazardous Waste is Treated, Stored or Disposed. Closure of Area 5 is complete. In Area 3, a hazardous waste leachate treatment facility has been constructed to treat the chromium leachate and is currently under start-up operations. The construction included abandonment of the existing two 30,000 gallon underground leachate holding tanks and installation of a new 20,000 gallon above ground storage tank. Areas where hazardous waste has been disposed of during prior years are delineated on Figure 3.3. The now nonexistent leachate holding lagoons and the IU conversion systems stabilization demonstration area are two such areas. Leachate from the two previous areas of disposal (Areas 3 and 5) will continue to be collected and transferred from the underground holding tanks at the leachate loading area.

3.5 TRAFFIC PATTERNS

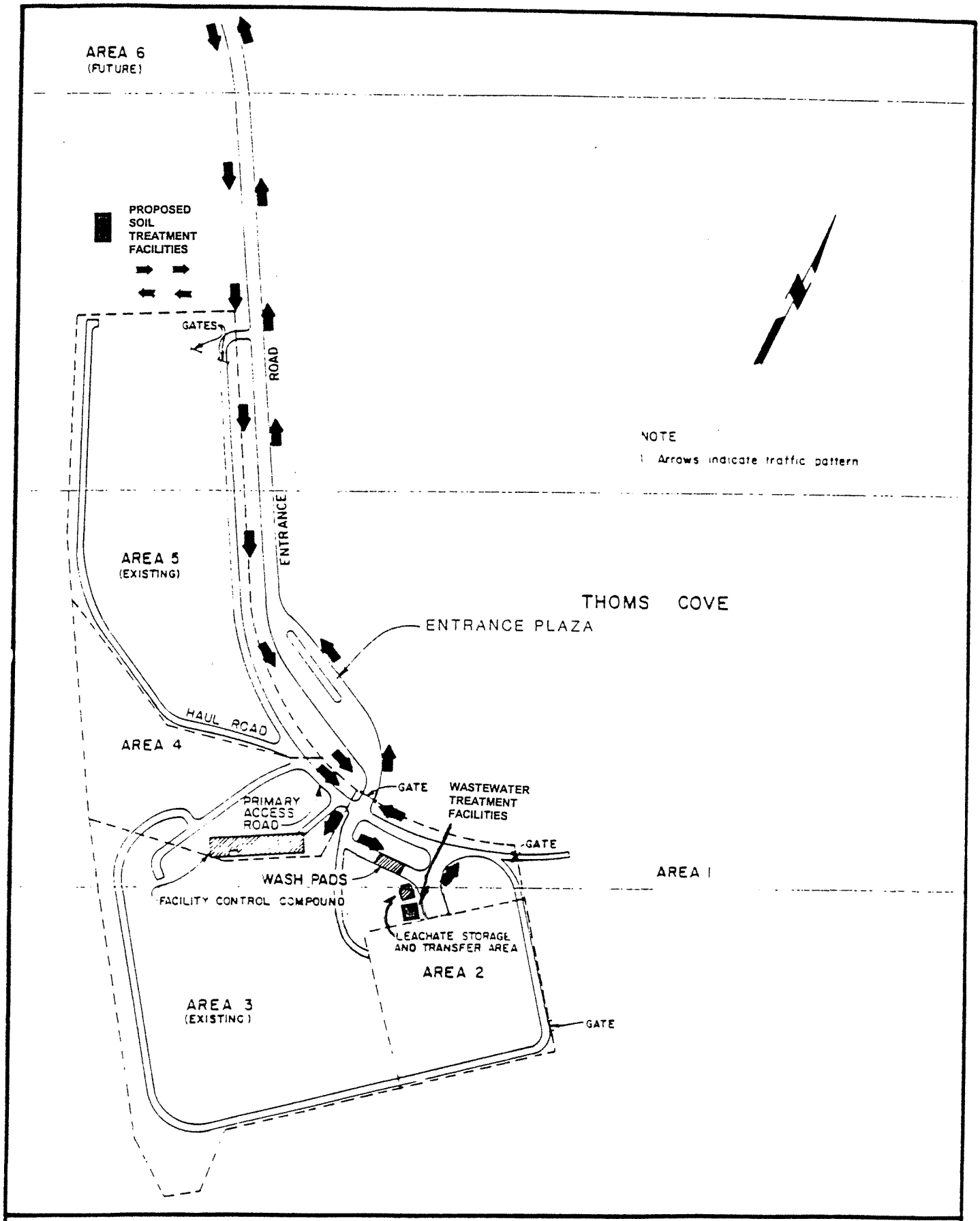
3.5.1. Traffic Characterization and Routing

The on-site traffic flow pattern is presented in figure 3.5. All traffic including facility employees and visitors, will enter the Soil Treatment Facility and Wastewater Treatment Facility from Quarantine Road onto the dual lane, 2 directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the unloading areas, will be directed to the truck wash pads of the Hawkins Point Facility.

All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

Quarantine Road accesses the U.S. Gypsum Company Plant and the BFI, SCM and Hawkins Point HWL. The traffic imposed on this road is minimal, consisting primarily of waste hauling vehicles, tractor-trailers, and employee passenger vehicles. The road is designed for the H-S 20 ton truck, highway bridge loading of the AASHTO Standard Specifications for Highway Bridges.



ON-SITE TRAFFIC ROUTING: AREA 5

Maryland Environmental Service	**Hawkins Point Hazardous Waste Landfill**	Figure 3.5

Rev. February 2000

4.0 WASTE ANALYSIS PLAN

4.1 GENERAL

Areas 2, 3 and 5 contain previously disposed chrome ore tailings and chromium contaminated soil and debris generated by AlliedSignal, Inc. The major components of the chrome ore tailings are shown on Table 4.1. The debris which was generated during the dismantling of the Baltimore Works plant consisted of concrete, brick, asbestos, structural beams, gunnite, tile, floor slab, refractory and other miscellaneous materials. The debris and the chrome ore tailings are considered a hazardous waste by characteristic under Federal and State of Maryland regulations because the material exhibits the characteristic of corrosivity (D002) and the extract from the Toxicity Characteristic Leaching Procedure (TCLP) exceeds the regulatory limit for chromium (D007.) This material exhibits no other characteristics of hazardous waste. The leachate generated from the percolation of groundwater and precipitation through the cells is also a hazardous waste by characteristics of TCLP toxicity for chromium and corrosivity. Laboratory analyses of the leachate over the past years is included at the end of this section. The AlliedSignal data is the Area 5 leachate and the MPA data is the Area 2/3 leachate.

The chromium contaminated leachate is collected by the leachate collection system. Leachate collected by this system is transferred to a 20,000 gallon leachate holding tank with secondary containment in the leachate holding and transfer area. Presently, this material is transported by a certified hazardous waste hauler to an appropriate TSD facility for treatment and will later be treated at the on-site wastewater treatment system upon completion of start-up operations. The MPA cells in Areas 2 and 3 have a similar leachate collection system. Both systems are closed with known sources of contamination. It is not anticipated that the composition of either of the leachate waste streams will differ greatly over time. Leachate from both systems will therefore be collected and analyzed annually for informational purposes.

The leachate generated in each of the two systems will be sampled by the Maryland Environmental Service (MES) by the "COLOWASA" sampling method as stated in EPA document entitled "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods". The following parameters will be analyzed using the appropriate EPA testing methods and procedures:

A. Total Chromium	7190, 7191, 6020
B. Hexavalent Chromium	7196
C. pH	9040B
D. Sulfate	9056
E. Sodium	7770, 6020

F. Chloride	9056
G. Iron	7380, 6020
H. Manganese	7450, 6020
I. Barium	7080A, 7081, 6020
J. Conductivity	EPA 120.1
K. Solids (Dissolved)	EPA 160.1
L. Solids (Suspended)	EPA 160.2
M. Total Organic Carbon	EPA 415.1

The rational for analyzing items A. through M. is to provide background information on leachate characteristics when used to compare to existing groundwater conditions and to detect possible infiltration of precipitation or ground water into the system. Items L. and M. are analyzed to demonstrate that the liquid is a wastewater by definition as listed in 40 CFR 268.2.

MES will notify the Maryland Department of the Environment (MDE) of the scheduled sampling events and a laboratory data report will be submitted to the MDE within 90 days of the sampling event.

Waste water received from the Dundalk Marine Terminal or AlliedSignal's Baltimore Works will also be hazardous by characteristic for corrosivity (D002) and leachable chromium (D007).

Chromium contaminated soils are periodically excavated at the Dundalk Marine Terminal as a result of utility repair and maintenance activities, and port improvement projects. The chromium contaminated soils have been determined to be a hazardous waste under Federal laws and State of Maryland regulations. The composition of the excavated contaminated material at the DMT varies. The contaminated materials at the DMT include sand, small stones, rocks, soil, clay and chrome ore tailings. Table 4.1 displays the major components of chrome ore tailings. The concentration of chromium contamination varies in contaminated material from the Terminal due to the location in which the material originated and the type of material. Past TCLP analysis of excavated soil have ranged from 5.0 to 60.0 mg/l.

The pH values of the excavated contaminated material at the DMT vary and may sometimes reach 11. However, the material is not ignitable, reactive and incompatible with other material.

In addition, intermixed with the Terminal material are "rock-like cemented soil and chrome ore tailings conglomerates" which apparently are an accretion of chrome ore tailings in a soil matrix which may be formed when moisture causes lime to bleed from the tailings cementing the mixture together as it dries. These "rock-like" materials vary in size from approximately 1 to 18 inches. A one gram sample

5.3.2 Surface Water Runoff Control

The site is generally sloped so that surface runoff and precipitation falling outside of the facilities will be directed to the perimeter ditches and drainage channels. Since the soil and wastewater treatment systems are protected by leak-proof closed buildings, runon and runoff problems will be eliminated. There will not be any contaminated surface water runoff generated in the leachate holding and transfer area because the area is cleaned after each transfer operation.

5.3.3 Groundwater Quality Protection

Groundwater quality contamination as a result of facility operations will be prevented by epoxy-coating the foundations. Any spills within the soil treatment facility may be treated by standard industrial absorbent. Spills within the wastewater treatment facility will able directed to containment dikes and drains.

Groundwater quality will be monitored periodically to assure the integrity of the Facilities.

Ground water and surface water contamination due to the presence of the Area 5 landfill is prevented by the clay liner, leachate collection system, clay berms and the final composite closure cap. During the post-closure period MES will continue to monitor the ground water as required by the site current RCRA Permit and the surface water as required by the sites current National Discharge Elimination Permit. The 20,000 gallon leachate holding tank with secondary containment will be inspected and leak tested biennially. The leachate collection system will also be inspected biennially.

5.3.4 Equipment Failure and Power Outages

Generators will be used as power sources for electric-powered equipment in case of power failure. When equipment failure is investigated, repairs or replacement of the equipment will be made in a timely basis.

5.3.5 Prevention of Exposure to Personnel

To prevent hazardous exposure to personnel and to prevent other facility related accidents, the MES has incorporated training and safety programs for all employees at Hawkins Point. The training program is outlined in Section 7.0 of this application and the Health and Safety Program is outlined in Section 9.0. The Health and Safety Program lists the possible hazards

Emergency Coordinator #2

Name: Tarsem Thohan

Address: 9010 Hedgerow Way
Baltimore, Maryland 21236

Telephone: (410) 974-7295 (Office)
(410) 256-8450 (Home)
(410) 525-6991 (Beeper)

Emergency Coordinator #3

Name: Vanessa S. Jones, P.E.

Address: 43 Water Street
Annapolis, Maryland 21401

Telephone: (410) 974-7295 (Office)
(410) 280-0388 (Home)
(410) 525-6990 (Beeper)

The name of the emergency coordinator on-site will be posted at all times on the emergency coordination bulletin board located in the office trailer. The bulletin board will be changed as necessary to indicate the currently designated emergency coordinator. The designated emergency coordinator will not leave the site without designating a replacement coordinator and posting the name on the bulletin board.

During non-operating hours, an emergency coordinator and an equipment operator will be on call during all non-operating hours; these individuals will be available to respond during all on-call times. Their names and telephone numbers will be posted in the office trailer. On-call persons are provided with a beep-only pager which will be carried at all times while on call.

6.2.2 Limit of Authority

The emergency coordinator will be authorized to expend, using emergency procurement procedures, the resources necessary to prevent or mitigate fires, spills, explosions or other incidents or conditions that may threaten life, property or the environment.

9.0 HEALTH AND SAFETY PLAN

9.1 INTRODUCTION

The Hawkins Point Hazardous Waste Landfill is a secure hazardous waste facility in Baltimore, Maryland permitted by the Maryland Department of the Environment and operated by the Maryland Environmental Service (MES). The Facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southeastern corner of Baltimore City (See Figure 9.1).

The purpose of this plan is to advise personnel of the presence of hazardous materials at this facility and to provide methods whereby operations by personnel can be conducted in a manner that protects public health and the environment. Although adverse health effects are not expected in this particular operation, failure to use proper safeguards and/or work practices when in direct contact with chromium bearing leachate can result in skin and mucus membrane irritation. Lung cancer has been associated with airborne concentrations of certain chromate dusts, exclusively in an industrial setting.

9.2 BACKGROUND

Before closure, Area 5 of the Hawkins Point facility received chrome ore tailings and chromium contaminated debris from the dismantling of the former AlliedSignal plant in Baltimore, Maryland. Some chromium chemicals are believed to cause cancer when inhaled by humans. Under the current federal and state testing criteria, the chromium ore tailings and contaminated debris is classified as a characteristic hazardous waste. The leachate which is generated within the landfill from percolating rainfall is collected by the leachate collection system. The chromium bearing leachate is a hazardous waste with a pH as high as 13. Therefore, all personnel of the Soil and Wastewater Treatment Facilities shall conduct operations in accordance with the following requirements and procedures.

9.2.1 Training Requirements

All personnel who will be engaged in activities within the Facility must complete the 40 hour hazardous waste training course or if previously trained, an appropriate 8 hour refresher course. The training must comply with OSHA Regulations 29 CFR 1910.120. Certification must be maintained by all employees working on the site. At least one person with valid current 8 hour supervisory training certification shall be on the site at all times when work is in progress. Certifications will be maintained on-site.

TABLE 9.2

Emergency Contacts

Primary Emergency Contact

Name:	Russell Downs
Address:	390 West Court Glen Burnie, Maryland 21061
Telephone:	(410) 355-3898 (Office) (410) 760-3583 (Home) (410) 525-6951 (Beeper)

Emergency Contact #2

Name:	Tarsem Thohan
Address:	9010 Hedgerow Way Baltimore, Maryland 21236
Telephone:	(410) 974-7295 (Office) (410) 256-8450 (Home) (410) 525-6991

Emergency Contact #3

Name:	Vanessa S. Jones, P.E.
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Local Emergency Contacts

Ambulance	911
Hospital	
Harbor Hospital	410-347-3200
Emergency Room	410-347-3510
Police	
Glen Burnie Barracks	410-761-5130
Baltimore City Headquarters	911
Fire Department (Balto. City HQ)	911
National Response Center	800-424-8802

10.1.7 Determination of Time Required to Purge

The time required to purge three times the volume of water in the casing shall be calculated. This time must be calculated for each well because of the different well depths, which changes the amount of time required for the pump to lift the required volume of water.

The following are steps used to determine this time:

A. Measure Time to Fill a 2.5 gallon bucket, in seconds

B. Divide this time by 2.5 to get seconds/gallon

C. Seconds/gallon X Total Volume to be Purged = Total Time in Seconds to Purge 3 volumes.

10.1.8 Purging Procedure

Each well is purged using a designated submersible well pump powered by a portable air compressor. The submersible well pumps are either stainless steel or Teflon sample pumps (each pump will contain a Teflon bladder). The type of tubing used with the pumps per well is polyethylene bonded twin tubing. A pump controller is used to regulate the compressed air needed to operate the air driven purge and sample pumps.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Once the air compressor is started, the air driven pump, pumps groundwater through the uptake side of the twin tubing into 55 gallon polyethylene drums.

10.1.9 Handling Procedures for Purged Groundwater

During post-closure, all groundwater will be purged directly into polyethylene drums and disposed of in the leachate holding tanks and will be handled in the same manner as the leachate.

10.1.10 Safety

Occupational Safety and Health Administration's (OSHA) Forty-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response is required of all personnel prior to groundwater monitoring of this site.

1. Submit in writing to MES the procedures describing how to identify and correct deficiencies in the analytical process.
2. These procedures must include specific steps to take in correcting deficiencies such as preparation of new standards and reagents, re-calibration and re-standardization of equipment, re-analysis of samples, or additional training of laboratory personnel in methods and procedures.
3. The procedures should specify that each corrective action has been documented with a description of the deficiency and the corrective action taken, and must include the person(s) responsible for implementing the corrective action.

Data Reduction and Validation

All data for this facility will be reviewed, by the MES contract manager, prior to being entered into the existing databases. The trip blanks, field blanks, duplicates, and surrogate spikes (volatile organic compounds only) will be reviewed for the presence of targeted compounds. As stated above, detection of target analytes in trip and field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. Upon verification from laboratory and/or corrective actions taken by the laboratory, MES will implement the procedures as described. In the event that the percent recovery for the surrogate spike is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as described in above sections, Quality Assurance and Quality Control & Corrective Action.

Before data is validated and entered into the database, MES' reporting staff will compute and interpret the results from all QC samples to verify that the analytical results are reported correctly. In addition, precision and bias, including evaluations of reagent, equipment rinsate, and trip blanks, calibration standards, control samples, duplicate and matrix spike samples, and surrogate recovery, will routinely be monitored by periodically requesting daily QC/QA runs. The sole purpose of these procedures is to assure that the contracted laboratory has in place and is implementing corrective actions when necessary before submitting data MES.

10.2 GENERAL GROUNDWATER AND SURFACE WATER MONITORING

The post-closure environmental monitoring program will continue for a period of thirty years with sampling and analyses of the indicator and groundwater quality parameters performed on a quarterly basis. Although, barium and pH have been removed from the list of indicator parameters, they will continue to be monitored on a quarterly basis. All other parameters, (those characterizing the suitability of the ground water as a drinking water supply as listed in Section 10.1.21) will be analyzed annually. This additional monitoring as stated in COMAR 26.13.05.06J, shall determine whether additional hazardous constituents are present in the uppermost aquifer.

10.2.1 Indicator and Groundwater Quality Parameters

The preservation of the quarterly indicator and groundwater quality parameters as listed in 40 CFR Part 264.93 and 264.98(a) are as follows:

EPA/MDE Site Specific	Container Preservation
1 Chromium	" "
2 Hexavalent Chromium	P 4°C

EPA General Constituents	Container Preservation
3 Chloride	P 4°C
4 Iron	P pH<2 HNO_3
5 Manganese	" "
6 Phenols	A/G H_3PO_4 & $CuSO_4$
7 Sodium	P pH<2 HNO_3
8 Sulfate	P 4°C

EPA General Constituents	Container Preservation
9 Specific Conductivity	None, field test
10 Total Organic Carbon	A/G Unpreserved
11 Total Organic Halogens	A/G Unpreserved

Note: P - HDPE, High density polyethylene A/G - Amber Glass bottle with a Teflon lid

10.2.2 Analytical Procedures for Indicator and Groundwater Quality Parameters

Parameter	Method Number
Chromium	7190, 7191, 6020
Hexavalent Chromium	7196
Chloride	9056
Iron	7421, 6020
Manganese	7450, 6020
Phenols	8040
Sodium	7770, 6020
Sulfate	9056
Specific Conductivity	120.1
Total Organic Carbon	9060
Total Organic Halogen	9020B, 9022

10.2.3 Type, Quantities, Concentrations Expected in Wastes

During post-closure, the indicator parameter of specific conductivity, and the waste constituent parameter of total chromium, will continue to be utilized as the basis for the detection monitoring for the Area 5 facility. Monitoring and analysis of these parameters provide the data base necessary to determine if any leakage from the Area 5 regulated unit occurs.

As outlined in Appendix B, entitled "Soils and Chrome Ore Tailings Chemical Analyses: Laboratory Reports", the content of chromium in the waste material was significantly greater than any other hazardous constituent, and thus should continue to be a representative indicator parameter of any heavy metal migrating from the cells containing chromium ore tailings. Barium will no longer be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the Hawkins Point facility. Barium would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells indicate that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. Barium will however continue to be monitored on a quarterly basis.

All other parameters listed in section 10.2.2 will continue to be utilized in establishing groundwater quality and as additional indicators of groundwater contamination.

10.2.4 Identification of Uppermost Aquifer

As outlined in the November 1992 Slug test, performed by Black & Veatch (See Appendix F), the upper aquifer under-lying Area 5 is an unconfined aquifer composed of post-cretaceous sediments and the upper member of the cretaceous deposits known as the Patapsco Formation. The base of this aquifer rests on the top of approximately 100 feet of Arundel Clay.

The Patapsco Formation consists of interbeded, banded silts and clays with clayey sands. Water-bearing sands of the Patapsco aquifer occur as irregularly bounded sheets to isolated ribbons, separated by layered silts and clays. Arundel Formation underlying the Patapsco Formation primarily consists of silts and clays. This layer has a low hydraulic conductivity and forms a no flow boundary under the Patapsco Aquifer.

10.2.5 Mobility And Stability In The Unsaturated Zone

The mobility and stability of Area 5 leachate depends on the physical and chemical behavior of each constituent as well as the different properties of the soils (those soils associate with the Patapsco Formation). Each constituent has a different solubility, adsorption, and migration rate that varies with soil pH, temperature and saturation. These factors alone have made, and will continue to make, determining the mobility and stability of the constituents of the leachate from Area 5 complex; therefore only general statements about mobility and stability will be made.

Heavy metal cations such as chromium, much like the chlorides and sulfates anions, are not highly responsive to attenuation in the saturated or unsaturated zone. In a high pH environment many metallic ions precipitate out of solution as insoluble oxides, hydroxides, phosphates, and sulfides. However, with a drop in pH and reducing soil conditions, these same insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium may adsorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Trivalent chromium is typically slowly mobile in aerobic, unsaturated conditions (Reports indicate increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxyl oxide contents). Hexavalent chromium usually does not precipitate in significant amounts; however it's mobility does increases between pH levels of 7 and 8.

Since attenuation properties depend on both the nature of the waste and the subsurface environment one can conservatively assume, over the active life of the facility, the non-reactive components of the leachate have traveled through the groundwater at a rate equal to the seepage velocity of Area 5. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may or may not

Barium and pH will be monitored quarterly along with the indicator parameters, but will not be included in the quarterly statistical analyses. The barium and pH data will be used to run quarterly trends analyses.

10.3.2 Justification for Proposed Monitoring

This proposal is requested because Wells 2G, 2E and 2H are not in the same hydrogeologic formation as the other three compliance wells. Monitoring of these wells continue to reveal the presence of contaminants which are not characteristic of the chromium ore tailing disposed of in the Area 5 facility, indicating that this well is contaminated from a source other than Area 5.

In 1985, a hydrogeologic assessment of the site by Black and Veatch identified a "trough" of less dense post-Cretaceous age sediments running across the southern end of Area 5 which allows groundwater to move more rapidly down-gradient across the southern end of Area 5 toward Wells 2G and 2E. Well 2H lies within the trough as it enters the property and is up-gradient from Wells 2G and 2E.

MES has tabulated pH data from December 1993 to present for monitoring wells 2B, 2D, 2F, 2E, 2G and 2H, the wells in question. Historically, the pH coming on-site through the up-gradient wells 2B & 2H are consistently less than the pH in the down-gradient wells 2D, 2F, 2E & 2G. This pH data was graphed, as shown, the pH of wells 2H and 2D are consistently lower then the pH of wells 2D & 2F; 2G & 2H, respectively.

The methods of statistical analyses used are the Parametric and Non-Parametric Analysis of Variance (ANOVA). These analyses are used to determine if there is a difference between the up-gradient well mean and the two down-gradient well means at a given point in time. These methods, like other methods, assume that a significant increase in the tested parameter indicates that the numbers down-gradient are higher than the numbers up-gradient. However, this is not the case at Hawkins Point with respect to pH. At the Hawkins Point facility, the quality of water coming on-site, through the Trough Area as well as beneath Area 5, has been shown through years of testing to be deteriorated due to high concentrations of Chloride, Iron, Manganese, Sodium, Sulfate, Barium, and low pH (the pH averages 3.4 for well 2H and 3.5 for well 2D since December 1993).

Prior to 1993, pH was not statistically analyzed at the site. The original permit did not require such testing. MES began statistically analyzing pH at the site in 1993. Inclusion of pH as an indicator parameter at the site became effective after renewal of CHA Permit A-264, which was issued on October 15, 1995. Since 1993, each quarterly analysis has determined that statistically significant increases in pH has occurred in down-gradient wells 2D, 2F, 2E and 2G intermittently. MES has consistently responded that pH differences are indicative of off-site contamination.

This off-site contamination is causing a false positive in the statistical analyses, erroneously indicating an increase in pH in down-gradient wells.

MES' response to this observation has consistently been that pH differences are indicative of off-site contamination moving onto the Hawkins Point property. This off-site contamination is causing a false positive in the statistical analysis, erroneously indicating an increase in pH in down-gradient wells when in fact the pH of the up-gradient well has consistently been well below that of the down-gradient wells.

MES continues to believe that pH in the down-gradient wells are not increasing and that the statistically significant increase in pH is a false positive because the ground water coming on-site (through up-gradient wells 2H and 2B) has an extremely low pH which at times does decrease. The former landfills immediately up-gradient of Hawkins Point are positioned as potential cause of the decreased pH of the ground water entering the site and result in a false positive for a statistically significant increase in pH in the wells down-gradient to 2H and 2B. MES believes that the data clearly supports the position that the regulated unit in Area 5 is not the cause of this statistical increase.

Barium will not be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the facility and therefore would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells are normally less than 100 ppb, indicating that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. The maximum contaminant limit of barium in drinking water is 2,000 ppb.

10.3.3 Designated Wells

Area 5 will be monitored by three groundwater monitoring wells 2B (upgradient), 2D, and 2F (points of compliance) which will continue to be statistically evaluated on a quarterly basis. Groundwater monitoring wells 2A, 2B, 2D, 2F, 2E, 2G and 2H will continue to be designated as regulated wells for the facility. The installation, location and depths of these wells are also in accordance with 40 CFR Part 264.97.

10.3.4 Background and Regulated Wells

In the first evaluation Monitoring Well 2B continues to be designated as the background well as defined in 40 CFR Part 264.97, it represents the quality of background water that has not been affected by leakage from Area 5. Down-gradient monitoring wells 2D and 2F will continue to represent the quality of groundwater passing through Area 5.

In the second evaluation, Monitoring Well 2H continues to be designated as the background well for the area west of Area 5 known as the "trough area". As defined in

40 CFR Part 264.97, background quality may be based on sampling of wells that are not up-gradient from the waste management area when: sampling at other wells will provide an indication of back-ground groundwater quality that is as representative or more representative than that provided by the up-gradient wells. Wells 2E and 2G will continue to be designated as the down-gradient monitoring wells for the Trough Area.

10.3.5 Use of Well Data

Historical data from the up-gradient wells will continue to be used to establish background data for the statistical evaluations. The historical data from the remainder of the compliance wells listed in this section has been compiled into a groundwater data base and will continue to be used to determine seasonal trends, potential contamination and/or any other possible future uses. The four quarterly replicates from each down-gradient well shall be compared to the combined pool of current and historical replicates from the background well. This historical data used shall not exceed two years.

The amount of historical replicates to be used shall be specified in the permit. In addition, the historical replicates from the background well shall not be averaged prior to use in the ANOVA procedure. The total sample size is twenty-four (24) data points:

- Up-gradient (Background) data consist of four (4) data points from the current quarterly monitoring and the data points from the three most previous quarterly monitoring events

- Down-gradient data consist of four (4) data point from the current quarterly monitoring of each of the two down-gradient wells.

10.3.5.1 Historical Data Spreadsheets

In addition to statistical evaluations, the data collected from the quarterly groundwater monitoring will continue to be compiled into a groundwater database for that particular well. This will be used to help determine seasonal trends if necessary. Appendix C contains historical groundwater monitoring data from 1994-1998.

10.3.5.2 Comparison of Each Constituent in the Compliance Wells to the Background Wells.

Once the quarterly analyses are completed, each constituent is compared to the same constituent in the background data. A quarterly statistical evaluation per constituent is performed following the procedures outlined in section 10.4.

10.4 STATISTICAL EVALUATION

This section contains procedures for performing a comparison of up-gradient and down-gradient groundwater analytical results to determine whether contamination has occurred. The procedures include:

10.4.1 A Proposed Statistical Method That Complies With 40CFR PART 264.97.

The proposed method of statistical analysis is the Parametric Analysis of Variance (ANOVA), an EPA approved statistical method under 40CFR PART 258.53(h) and (i). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Using ANOVA followed by a pos hoc comparison determines if an actual difference in groundwater quality exists for a given sampling period among a group of wells. For Area 5 wells, this analysis will determine if there is a difference between the background well mean and the two down-gradient well means at a given point in time for each monitoring parameter. The parametric ANOVA assumes that the data are normally distributed and have equal variances.
Two tests will determine if the data follow those assumptions. If not, the data will be statistically evaluated using a non-parametric ANOVA.

10.4.2 Evaluation of Non-Detected Parameters

If less than fifteen percent (15%) of the data points are below the laboratory detection limit, each data point that is below detection will be replaced by one half of its Practical Quantification Limit (PQL/2). All data shall then be evaluated by the parametric ANOVA.

However, if greater than fifteen (15%) of the data points are below the laboratory detection limit, a non-parametric ANOVA method shall be used to statistically evaluate the data. In the non-parametric ANOVA, all data points are ordered and replaced by their numeric rank. Those data points below detection are tied and equal to the average of the ranks as if they were slightly different.

10.4.3 Normal and Log-Normal Distribution

The EPA has reversed its previous guidance on the distribution of groundwater data according to the "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Draft, Addendum to Interim Final Guidance", dated July 1992. The EPA has indicated that ground water concentration data usually follow a log-normal distribution as opposed to a normal distribution. Therefore, all data points shall be logged prior to checking the distribution.

The Shapiro-Wilk Test shall be used to determine whether the data points follow the log-normal distribution. If the test statistic is greater than a critical value, the

data are log-normal, however, if the test rejects the logged-data, the data shall be unlogged and retested for a normal distribution.

10.4.4 Equality of Variances

To determine if the different wells have similar variances, The Levine Test shall be used. In this analysis, each data point is replaced by the absolute value of its respective residual:

$$z_{ij} = x_{ij}^{3} - x_{i}^{3}$$

10.4.5 ANOVA Procedures

1. Arrange the data (or the natural log of data) in a table using the number of wells and the number of replicates,

Well No.	R1	R2	R3	R4	
1	1	2	3	4	BACKGR. CURRENT
2	1	2	3	4	BACKGR. PREQRT
3	1	2	3	4	BACKGR. PREQRT
4	1	2	3	4	BACKGR. PREQRT
5	1	2	3	4	DOWNGR. CURRENT
6	1	2	3	4	DOWNGR. CURRENT

2. Record the number of observations n,
   n = (#wells) * (# replicates)
   here n = 6 X 4 = 24

3. Sum the readings (replicates) per well, from i to m number of wells

$$S\,X_i = (R1_i+R2_i+R3_i+R4_i)$$

4. Calculate the mean (average) of the replicates per well, $X_i..X_m$, where m is the total number of wells.

   $\bar{X} = S\,X_i / N$, where N is the number of readings per well.

5. Expand the table to include the sum of each well and the well mean. (See Figure 10.4)

6. Add all the sums together to get the sum of sums (SSUM) and take the average of all the means to get the mean of means (MMEAN). Numerically the,

$$SSUM = (S\ X_i + S\ X_j + \ldots S\ X_m) \text{ and the,}$$

$$MMEAN = (\bar{X}_i + \bar{X}_j + \ldots \bar{X}_m)/m \text{ (\# of wells)}$$

7. Square the Sum of each well and arrange in a table along with the SSUM and MMEAN, SUMSQ

   $$SUMSQ = (S\ X_i)^2$$

8. Calculate the sum of squares between the wells, SS_{well}

   $$SS_{well} = [(S\ X_i)^2 + (S\ X_j)^2 + \ldots (S\ X_m)^2] - 1/N^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

   with m number of wells-1 being the degree of freedom for between wells.

9. Calculate the corrected total sum of squares, SS_{total}

   $$SS_{total} = (R1_i^2 + R2_i^2 + \ldots + R3_j^2 + R4_j^2 + \ldots$$

   $$R4_m^2) - 1/n^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

   with n number of readings-1 being the degree of freedom for between observations.

10. Find the error within the wells, SS_{error}

$SS_{error} = SS_{total} - SS_{well}$, with n(# of observations)-m(# of wells) being the degree of freedom for the error.

11. Arrange the calculations in a table using the number of wells by the calculations. (See Figure 10.4)

12. Calculate the mean squares between the wells and within the wells MSBW and MSWW.

    $$MSBW = SS_{well}/m\text{-}1 \text{ and } MSWW = SS_{error}/n\text{-}1$$

13. Now divide MSBW by MSWW to obtain the calculated F statistic, F_{cal}.

14. Using Table 1, of Appendix D, m-1 degrees of freedom, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated F can be found, F_{tab}.

15. Using the above calculations the one-way ANOVA table should be set up as shown in the attached example (Figure 10.4).

16. If and only if the calculated F ratio exceeds the tabulated F ratio should pos hoc comparisons be made, otherwise can conclude that there is no significant statistical difference (well means are the same) among the wells at the given time period.

10.4.6 Procedures For pos hoc Comparison

1. To compute the pos hoc comparisons (Bonferroni t-statistics), let M=the # of compliance wells, which will also be the number of comparisons to be made.

2. Sum the total number of observations in the background well nb.

3. From ANOVA worksheet list the average

concentration of the background well, $\bar{X}b$.

4. Calculate the difference between the average concentration of each compliance well and the average of the background well.

$$DIFF=\bar{X}i-\bar{X}b.$$

5. Calculate the standard error of each difference (SE), however, if the number of observations is the same for all the compliance wells then the standard error for each well will be equal.

$$SE = [MSWW*(1/nb+1/M)^{1/2}]$$

6. Using Table 2 (Bonferroni's t Table) of Appendix D, # of compliance wells M, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated Critical t value can be found, crit. t.

Crit.t value obtained from Table 2, Appendix D

7. Multiply the Critical t value by the Standard error to obtain the D quantities for each well, once again if the number of observations is the same for all the compliance wells then the D quantity for each compliance well is equal.
D = Crit. t * SE

8. Compare the difference $\bar{X}i - \bar{X}b$ to the value D, if the difference exceeds the D value, conclude that compliance well has significantly higher concentrations than the average background wells. Otherwise conclude that the well is not contaminated. This must be performed per compliance well.

9. Finally, calculate the residuals $R1_i$, which are the differences between each observation and its predicted value (in this case, the mean of that particular well X_i). The residuals can be used to check for departures from normality.

$$R1_i = X1_i - \bar{X}_i$$

10. Using the above calculations for pos hoc comparisons, set up table along with an interpretation of the data and calculations as shown in the attached example (See Figure 10.5).

Appendix E is a working example of the ANOVA statistical analysis using actual data from a groundwater monitoring event of both Area 5 and the Trough Area.

10.4.7 Non-Parametric ANOVA

The non-parametric ANOVA procedure shall be used when: 1) the data does not follow a normal or log-normal distribution, 2) the data has unequal variances between wells, or 3) greater than fifteen percent (15%) of the data points are below laboratory detection. Under this procedure, the Kruskal-Wallis Test is used to determine if there is a statistically significant increase among the wells.

10.4.7.1 Kruskal-Wallis Procedures

The procedures for the Kruskal-Wallis Test is as follows:

1) Rank all observations (N) from least to greatest,

2) Calculate the sum of the ranks of observations in each well (RK_i) and the average of the ranks for each well.

3) Calculate H,

$$H = [\ 12/N(N+1)*S\ R_i^2/N_i\ ]-3(N+1)$$

where N, is the number of data points for each well.

4) If there are ties among the ranks, then the adjusted Kruskal-Wasllis statistics must be calculated as follows:

$$H' = H/1-(\sum_{i=1}^{g} t_i^3 - t_i/N^3 - N)$$

where, g is the number of groups of distinct tied observations and t_i is the number of observations in the tied group i.

12.1.6 Overall Area 3 Exposure Potential

The underlying MPA chrome tailings cells may present a slightly higher degree of exposure potential, as explained in Section 12.1.1.2. However, the data presented in the "Hydrogeologic Assessment" indicates a lack of chromium above detectable levels, implying that chromium derived from the MPA cells has not entered the ground water sampled by monitoring wells downgradient of the cells. In addition, the conclusions in the "Hydrogeologic Assessment" imply that the MPA cells have had no current impact of the Lower Patapsco aquifer. Ground water samples obtained for the Lower Patapsco aquifer indicate the water quality is generally consistent with baseline values established during the performance of previous studies.

12.1.7 Leachate Collection System

In summary, Leachate draining through the Leachate collection system of Area 5 flows by gravity to a sump through the 6-inch diameter, non-perforated collection lines. Leachate from Area 3 flows to a separate sump specified for that facility. Leachate from each of the two areas is segregated from the leachate collection systems through the sumps.

The Leachate in each sump is pumped to one 20,000 gallon holding tank through separate 4-inch diameter PVC lines with flow meters to record the leachate quantity collected from Area 3 and Area 5. Wash water from the wash pad area drains through PVC lines to the Area 3 and Area 5 sumps and then is pumped to the 20,000 gallon holding tank.

A concrete spill pad is located at ground elevation over the underground holding tanks. The spill pad is a preventative measure used during transfer of the waste liquid collected in the holding tanks. If any liquid is spilled, it drains through the grated spill pad to a 4-inch diameter line which discharges to the Area S holding tank.

In order to allow for periodic inspection, the system has been designed to be accessible from a series of manholes. Manholes are provided in the main collection header, at all bends and junctions, and at a spacing no greater than 400 feet. This enables cleaning, and, to an extent physical repairs to be made to the collector without excavating. It also enables leachate samples to be obtained at various locations in the collection system.

Based on location and design, the overall human exposure potential from releases to ground water is considered remote. This is particularly due to the fact that the system is essentially closed and a portion of the system was recently relined with an HDPE liner. Routine maintenance and inspection, detailed in Section 4.2, provide for monitoring and early detection of potential leaks.

SLM unit. Leachate passes through 50 micron cartridge filters to reduce suspended solids prior to entering the supported liquid membrane cartridge. Chemical feed pumps automatically introduce sulfuric acid into in-line mixers to reduce the pH of the wastestream from 13.0 to 2.0. The wastestream then passes into the supported liquid membrane cartridge where the hexavalent chromium ion is transported across the liquid membrane to the Strip Solution. The Strip Solution consists of 500 gallons of clean water which is adjusted to a pH of 12.5 to 13.0. The Strip Solution is recirculated on the opposite side of the liquid membrane from the wastewater. As the hexavalent chromium ion is transported across the liquid membrane to the Strip Solution the concentration of chromium steadily increases in the Strip Solution. When the concentration of the Strip Solution reaches 50,000 ppm, the solution is replaced. This high concentration chromium solution will then be recycled to metal plating companies or other industries for use in their process, or else taken to a permitted hazardous waste facility.

After exiting the first SLM unit the wastewater will have a chromium concentration of less than 50 ppm. Prior to entering the second SLM unit the wastewater will pass through an oil separator which will collect any organic liquid membrane material which may become separated from the porous polymeric fabric supporting the liquid. The wastewater will then enter the second SLM unit which will reduce the hexavalent chromium to less than 0.05 ppm and total chromium of approximately 10 ppm. Upon exiting this unit the wastewater pH will be adjusted to 7.0 and again passes through an oil separator.

Upon exiting the second oil separator, the wastewater will pass through the secondary removal system to lower the total chromium concentration to less than 0.5 ppm.

Treated leachate will be pumped from the effluent sump through a two-inch diameter HDPE pipe into the Patapsco River. The end of the discharge pipe is approximately 800 feet out into the river and is marked with an orange buoy. The line is submerged in the river with 4 inch timber piles every fifteen feet. The final 20 feet of the discharge pipe is the diffuser. The diffuser mixes the effluent with the river water as the effluent is pumped through the pipe. The diffuser is attached with a flanged connector so that it can be removed for inspection or repair. Effluent monitoring will be performed and regulated under the facility's National Pollutant Discharge Elimination System (NPDES) permit.

The secondary removal system will produce some sludge which will be transported off-site to a permitted hazardous waste treatment or disposal facility. The high concentration chromium strip solution and ion exchange backwash solution will be recycled to industrial users or taken to a permitted hazardous waste facility. It is estimated that approximately 15,000 gallons of strip solution will be produced each year. The media caught by the system filters will be analyzed and the used filters will be transported to an appropriate permitted waste disposal facility.

Chemical Requirements

Chemical requirements for the wastewater treatment facility are provided in Appendix M, Plans and Specifications for the Wastewater Treatment Facility.

Operating Considerations

Equipment is oriented within the building in flow sequence to minimize inter-vessel transfers. The equipment layout of the wastewater treatment facility is provided in the plans and specifications in Appendix M. The building foundation has been designed to allow for the floor area to act as a containment volume for the largest tank within the building. Space has been allowed for operating access to the main control panel and for a work area for one operator.

One or two operators will be required to operate the plant under normal conditions. The second operator is recommended when chemical containers are required to be changed or when additional operating or maintenance duties are required.

Control logic for normal operation is presented on the process and instrument diagrams. Operating status lights are present at the main control panel. the emergency shutdown sequence is designed to ensure that, in the event of the failure of a critical component, the equipment upstream of that failure mode is shut down in a controlled manner. In the event of an emergency shutdown, an alarm system is activated.

Both the building and the influent tank containment area are designed with a sump to accommodate liquid spills. The building sump contains a sump pump which discharges liquid to the Influent Tank, T-101. The tank containment area sump has no installed pump, and a portable pump will be needed in the event of spillage. Normal liquid contents in the containment sump (rainfall) can be discharged by opening the locked discharge drain valve.

The facility operations and maintenance manuals are included as Appendix K. These manuals will be updated as needed to reflect the refinement of this innovative treatment technology.

Materials of Construction

Materials of construction have been selected to maintain consistency between equipment where possible, and also with material selection for the Dundalk Marine Terminal groundwater treatment facility. Where possible, FRP vessels have been specified; this material is compatible with the wide range of pH that may be encountered during operation. Otherwise HDPE or carbon steel have been specified where acidic conditions will not occur (primarily after the treatment process).

The sump pumps and chemical feed pumps have stainless steel or plastic parts to accommodate the variety of pH conditions expected. Piping and valving inside the building is PVC. PVC piping is capable of handling a wide variety of pH. Outside the building, where influent liquid is handled, carbon steel piping is selected. Carbon steel is specified for robustness in outdoor applications under high pH. Where vibration may impact piping integrity, carbon steel has been specified.

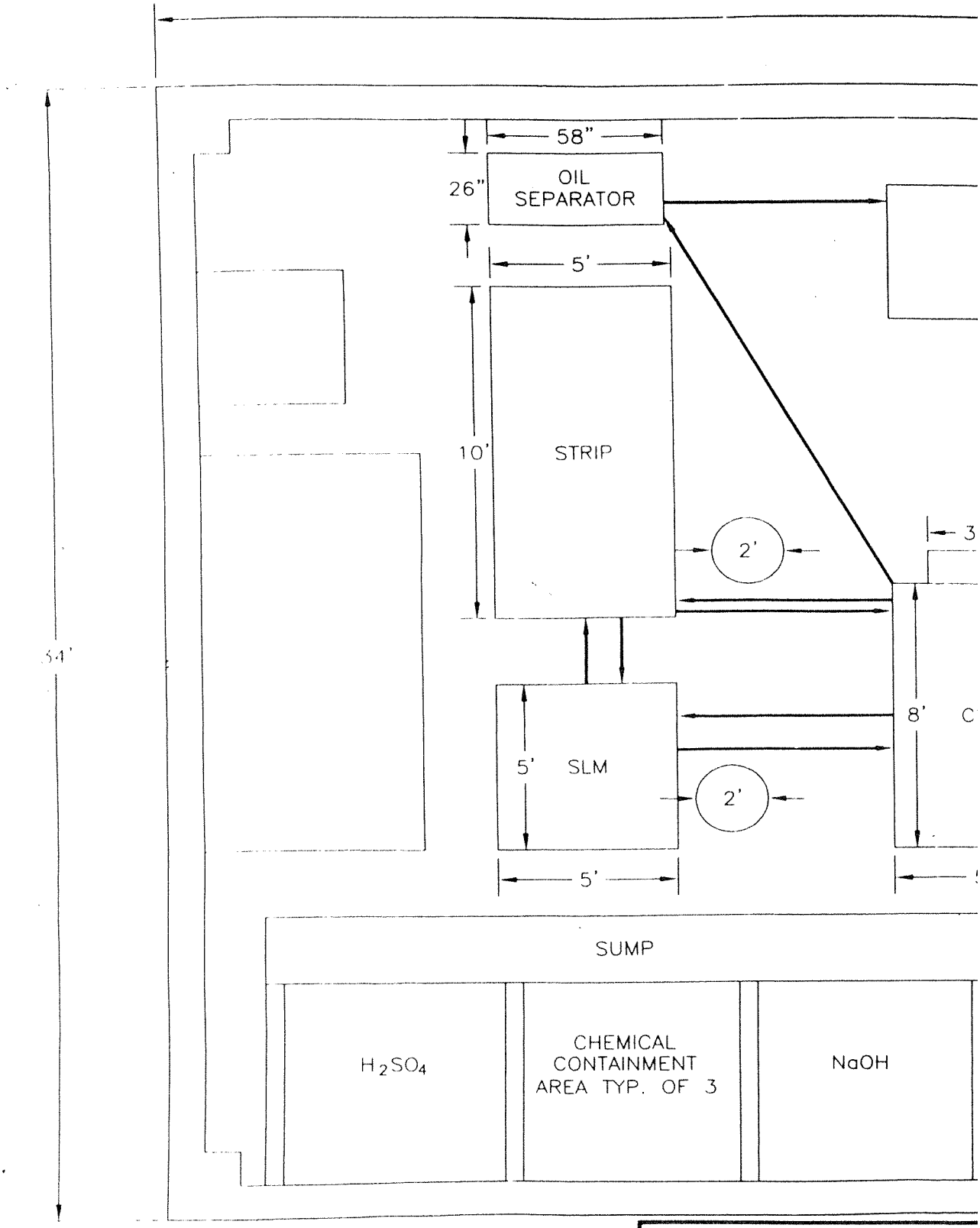
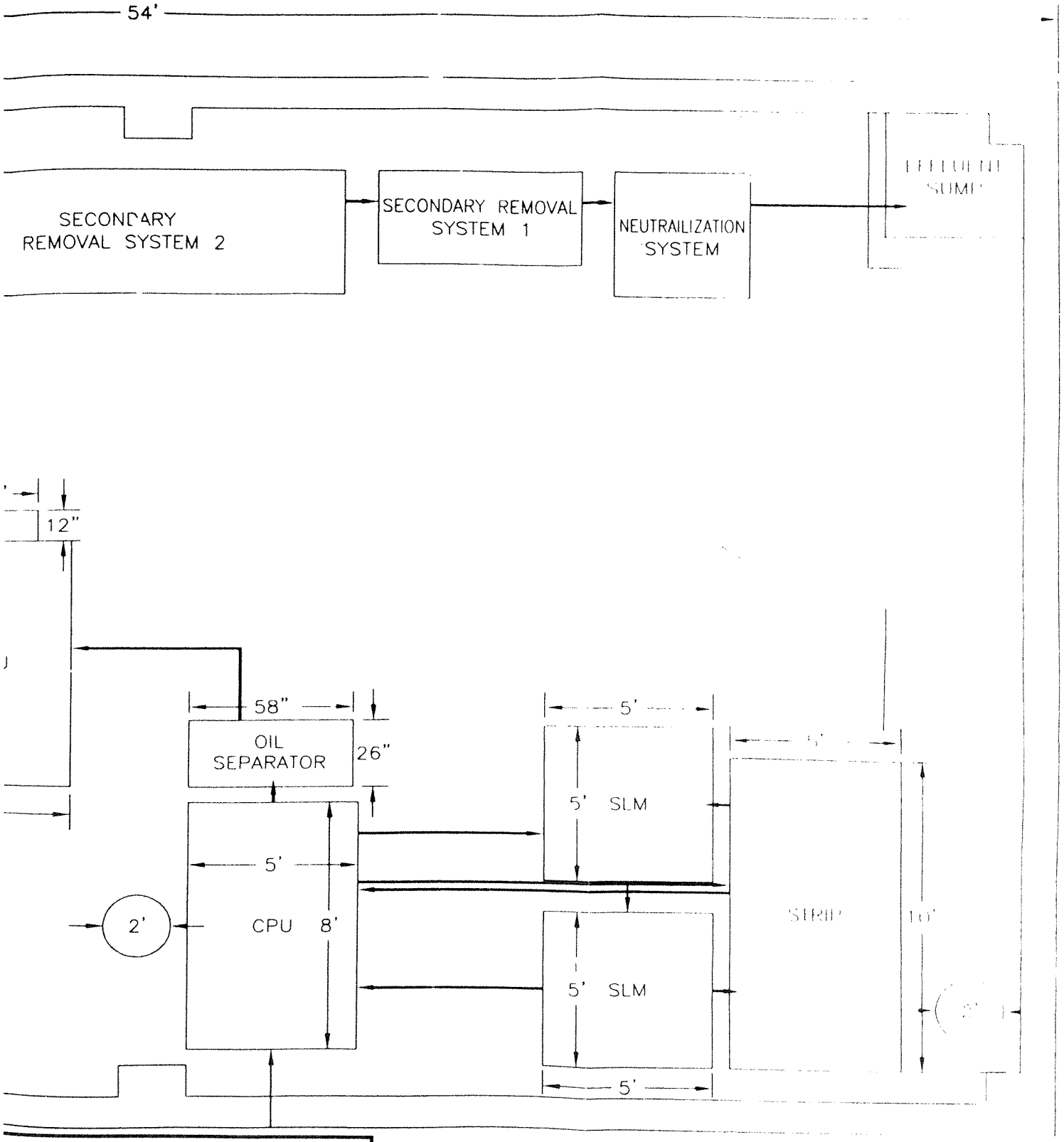


FIGURE 13-1
HAWKINS POINT LEACH
TREATMENT BUILDING



.TE TREATMENT PLANT
AYOUT

January 21, 2004

Correspondence Regarding Discontinuation of NPDES Permit

02-SW 1814 • 91-DP-2229

MARYLAND
ENVIRONMENTAL
SERVICE

Robert L. Ehrlich, Jr.
Governor

January 21, 2004

John S. Sparkman
Acting Director

Edward Gertler
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

RECEIVED
JAN 22 2004
INDUSTRIAL PERMITS DIVISION

Re: Hawkins Point Hazardous Waste Landfill
NOI, General Permit for Stormwater Discharge
State Discharge Permit 91-DP-2229
NPDES Permit MD 00061417

Dear Mr. Gertler,

As per our conversation on January 8, 2004, the Maryland Environmental Service would like to formally request the discontinuation of the NPDES Permit for Hawkins Point Landfill. Hawkins Point Landfill, located at 5501 Quarantine Road in Baltimore Maryland, at this time does not plan to treat and discharge leachate from its facility. Currently and in all future practices, the leachate produced at the site will be transported to a disposal facility by a licensed hazardous waste hauler. Attached, please find, a copy of the Notice of Intent to register under the General Discharge Permit for Storm Water Associated with Industrial Activities.

The sampling performed for the NPDES Permit at this time consists of six outfalls sampled once a quarter, during a wet weather event. Upon discontinuation of the NPDES Permit it is our understanding that no sampling will be performed for NPDES, as is stated in the general permit.

If you have any questions, please do not hesitate to call me at (410) 974-7254.

Sincerely,

Amy Furrow
Environmental Specialist III
Waste Remediation Division

Cc: w/ enclosure: NOI - Hawkins Point
Jim Leizear (MDE), Frank Ciurca (MDE),
Mark Kreafle (MPA), and Ola Awosika (Honeywell)

2011 Commerce Park Drive • Annapolis, Maryland 21401 • 410/974/7281 • Fax 410/974/7267

1814

January 28, 2004

Correspondence Regarding NOI to Register for General Discharge Permit for Storm Water

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

FILE

Robert L. Ehrlich, Jr.
Governor

Kendl P. Philbrick
Acting Secretary

Michael S. Steele
Lt. Governor

January 28, 2004

William E. Chicca, Director
Program Development and Engineering Support Division
Maryland Environmental Service
2011 Commerce Park Drive
Annapolis, Maryland 21401

Re: Termination of State Discharge Permit 91-DP-2229 (NPDES Permit MD0061417) and Registration under General Permit 02-SW-1814

Dear Mr. Chicca:

The Maryland Department of the Environment has received Maryland Environmental Service 's Notice of Intent (NOI) to register its facility under the General Discharge Permit for Storm Water Associated with Industrial Activities, Permit No. 02-SW. This letter will serve as notification that the NOI has been accepted.

In signing the NOI, you have certified the Service's agreement to comply with the terms of this permit for the Hawkins Point Hazardous Waste Landfill located at 5501 Hawkins Point Road, Baltimore (City). Your facility's permit coverage shall be identified by **registration number 02-SW-1814** and extends until November 30, 2007 or as specified in Part I.E of the permit.

By obtaining this coverage under the general permit, it is no longer necessary for this facility to hold the above individual wastewater discharge permit. The Department is therefore terminating 91-DP-2229, effective the date of this letter, and will cease processing the renewal application 01-DP-2229. Please note that while the previous requirement for monitoring of the six storm water outfalls is not part of the general permit, we recommend that your pollution prevention plan continues to implement monitoring of these outfalls at least annually.

If you have any questions, please do not hesitate to call me at (410) 537-3323.

Sincerely,

Edward Gertler

Edward Gertler, Technical Advisor
Industrial Discharge Permits Division
Wastewater Permits Program

cc: Beverly Archable
Robert Daniel
Bill Lee
Paul Stoner (re. Baltimore City)

April 13, 2004

Seep Evaluation and Recommendation Report – Hawkins Point Hazardous Waste Landfill – Baltimore, Maryland

PARSONS

100 Summer Street, 8th Floor • Boston, Massachusetts 02110 • (617) 457-7900 • Fax: (617) 457-7979 • www.parsons.com

April 13, 2004

Mr. James Leizear
Maryland Department of the Environment
Hazardous Waste Enforcement Division
1800 Washington Boulevard, Suite 645
Baltimore, Maryland 21230

Subject: Seep Evaluation and Recommendation Report
Hawkins Point Hazardous Waste Landfill – Baltimore, Maryland

Dear Mr. Leizear:

In accordance with the Work Plans (and addenda) dated May 2, 2003, July 11, 2003, October 1, 2003, and November 4, 2003, attached are two copies of the Seep Evaluation and Recommendation Report.

Please feel free to contact me directly at 617-457-7902 if you have any questions.

Very truly yours,

K Sullivan for:

Paul G. Boyajian, P.E.
Project Manager / Geotechnical Engineer

PGB/pgb/jjm

Attachments

cc: Chris French (Honeywell)
David Ferguson (MES)
Paul Rich (Parsons)
Ola Awosika (Parsons)

SEEP EVALUATION AND RECOMMENDATION REPORT

HAWKINS POINT HAZARDOUS WASTE LANDFILL (AREA 5)

BALTIMORE, MARYLAND

Prepared For:

MARYLAND ENVIRONMENTAL SERVICE

Maryland Environmental Service, Inc.
2011 Commerce Park
Annapolis, Maryland

Prepared By:

PARSONS

100 Summer Street, 8th Floor
Boston, Massachusetts 02110
Phone: (617) 457-7900
Fax: (617) 457-7979

April 14, 2004

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1 INTRODUCTION

1.1 Purpose and Organization of Report

Parsons is pleased to submit this Seep Evaluation and Recommendation Report for the Hawkins Point Hazardous Waste Landfill (Area 5) located at 5501 Quarantine Road in Baltimore County. Parsons completed this work to:

- Identify potential sources of the landfill leachate seep; and
- Recommend a path forward to alleviate the seep.

The work was completed in general accordance with the:

- Parsons, Leachate Seep Engineering Evaluation Work Plan, May 2, 2003;
- Parsons, Leachate Seep Engineering Evaluation Work Plan – Addendum I (Revision I), July 11, 2003;
- Parsons, Leachate Seep Engineering Evaluation Work Plan – Addendum II, October 1, 2003; and
- Parsons, Leachate Seep Engineering Evaluation Work Plan – Addendum III, November 4, 2003.

In summary, Parsons performed the following tasks:

- Reviewed and evaluated the available site information;
- Reviewed the previous engineering analyses performed as part of the original design (1980's to 1993);
- Performed a geophysical survey with electromagnetic terrain conductivity (EM) mapping and electrical imaging (EI);
- Performed a geophysical leak detection survey, and subsequently a hand excavation program to verify the results;
- Drilled 23 shallow soil borings with Shelby tube soil sampling, and performed geotechnical laboratory test;
- Installed 3 temporary groundwater piezometers;
- Surveyed the locations of soil borings, piezometers, and site features;
- Measured the daily flow rate from the seep, and obtained weekly groundwater and piezometers elevations;
- Completed an infiltration analysis; and
- Developed a recommended approach to remediate the seep.

The remainder of this section presents background information about the leachate seep and landfill. Section 2 summarizes the available site information and Section 3 summarizes the previous slope stability, settlement, and infiltration analyses that were performed during the design phases. The methodology and test results of the field investigation program are presented in Section 4. Section 5 presents observations of the results and Section 6 presents a recommended approach to alleviate the seep.

1.2 Leachate Seep Background

The Hawkins Point Hazardous Waste Landfill (Area 5) is located at 5501 Quarantine Road in Baltimore County. The geophysically derived limit of waste is approximately 6.5 acres. On March 18, 2003 leachate was observed seeping from the landfill's southeast side slope in the area of well 2G, as shown in Figure 1. It was later determined that the leachate contained hexavalent chromium concentrations of approximately 190 mg/L and high levels of pH. A soil berm was constructed around the effected area (approximately 75 feet by 95 feet) and covered with plastic. In addition, a system was installed to collect the seep and pump it to the existing leachate collection system where it is later sent offsite for disposal.

A sampling plan to delineate the extent of the area that was impacted by the leachate was developed by Maryland Environmental Services (MES) and submitted to the Maryland Department of the Environment (MDE) in April 2003. The results of the sampling are presented in the Results of Leachate Seep Work Plan (MES, May 2003). This report concluded that the soil results were below the Non-Residential Clean-up Standard presented in the MDE Interim Final Guidance Document on Cleanup Standards for Soil and Groundwater (August 2001). As a result, no immediate removal of soils in the area was conducted. MES implemented a daily inspection program of the seep and currently maintains the berm and erosion control measures, as necessary.

1.3 Landfill Overview

According to Black and Veatch and Woodward-Clyde (1983) the Hawkins Point Hazardous Waste Landfill began operating under interim status in 1980 and was issued a RCRA Permit (MDD000731356) by the USEPA and a Controlled Hazardous Substances (CHS) Facility Permit (A-264) by the Maryland Department of Health and Mental Hygiene. The landfill consists of ten cells (Cells 1 through 3 and 5 through 11) that consist of chrome ore tailings, chrome process waste, and chrome-contaminated soil, trash, and debris from the Allied Corporation, Baltimore Works (MES, 1987).

It is believed that the bottom of the landfill consists of an in-situ silt / clay bottom liner (Black & Veatch, February 1985) however, old photographs indicate that the bottom of the landfill is paved with asphalt. Cells 5 and 6 have a side slope composite liner consisting of 1-foot of stockpiled compacted clay and an 80 mil HDPE synthetic liner. Chrome ore tailings deposited in Cells 5 and 6 were placed directly on an HDPE membrane. The chrome wastes in Cells 7

through 11 were placed on compacted fill side slopes, without HDPE/clay composite liner systems (B&V, 1997). The available drawings schematically indicate the approximate locations of the individual cells and the type of cover material, however the exact locations are not known.

While MES was actively operating the Allied Cell at Hawkins Point to manage the COPR produced from the Allied Baltimore Works Site (BWS), efforts were made to pump leachate from the active cell to a manhole, which is part of the existing leachate collection system. However, when the BWS ceased production of chromium chemicals, the cell was not immediately closed and capped. There was an unknown time period when the cell was held open pending a decision by Allied and the regulatory agencies (EPA and MDE) as to an acceptable time schedule for dismantling the BWS and a decision as to what waste material from the BWS site was acceptable for disposal in the Cell at Hawkins Point. While the Cell was opened, there was the potential for accumulation of precipitation in the cell. Eventually, a temporary earth cap was installed over the cell. When an agreement was reached between Allied and the regulatory agencies, and dismantling of the BWS commenced, the Cell was reopened and raised to its permitted vertical limit to accept waste material from the decommissioning of the BWS. When the Cell was reopened, water was found to be present. A shallow sump was created and leachate was removed. The sump was not dug to the bottom of the Cell.

The landfill stopped accepting wastes in 1993 and is currently covered with a cap consisting of:

- Clay on the side slopes;
- Composite HDPE and GCL cap on the landfill's upper northern portion; and
- Composite GCL cap on the landfill's upper southern portion.

The landfill is generally graded to promote positive drainage with side slopes varying from 1 vertical to 3 horizontal (1V to 3H) to 1V to 5H and the upper portion at approximately 5 percent. The landfill cap is maintained and well vegetated.

1.4 References

The following documents were reviewed as part of this work:

- Boring Location Drawing, dated October 12, 1982;
- Generalized Subsurface Profiles, dated October 12, 1982;
- Black and Veatch Waste Science Technology, Hawkins Point Hazardous Waste Landfill, *Area 5 Site 2 Interim Expansion Permit Modifications*, June 1983.
- Black and Veatch Waste Science Technology, Hawkins Point Hazardous Waste Landfill, *Area 5: Site 2 Expansion, Part B Permit Facility Design, Project No. 10833, Drawing No. PD-5C-18, Sheet 18 of 19, Sections and Details*, July 15, 1983
- Black and Veatch, Engineers-Architect and Woodward-Clyde Consultants, *Operation & Maintenance Manual Area 2,4,5 Revision 00*, 1983

- Vertical Expansion Plan – Site 2 (Sheet 4 of 15), July 1983
- Site geology and hydrogeology from the Hydrogeologic Assessment Report, 1985;
- Maryland Environmental Service, *Reapplication for RCRA/CHS Facility Permit for Hawkins Point Hazardous Waste Landfill*, November 15, 1987
- Calculation Package, Black and Veatch Waste Science Technology, *Calculations to determine settlement of foundation soils due to placement of building debris in Cell 11*, June 24, 1989.
- Black and Veatch Waste Science Technology, *Department Design Control Memorandum, Re: Calculations for Slope Stability on Proposed Design of Area 5 Cell 11*, September 14, 1989.
- Black and Veatch Waste Science Technology, Memorandum, *Report on Preliminary Efforts Regarding Slope Stability at the north end of the Hawkins Point Landfill*, May 18, 1990.
- Black and Veatch Waste Science Technology, Memorandum, Allied-Signal, *Hawkins Point Hazardous Waste Landfill, HELP Modeling of Final Cover*, March 9, 1993.
- Black and Veatch Waste Science Technology, Hawkins Point Hazardous Waste Landfill, *Area 5 Final Cell Cap Construction Typical Section and Details*, April 14, 1993.
- Several photographs of the site;
- Information provided by Maryland Environmental Services (MES), including leachate volume, precipitation values, and groundwater elevations.
- Maryland Environmental Services, *Hawkins Point Landfill Seep Assessment Sampling Plan*, April 22, 2003;
- Maryland Environmental Services, *Results of Leachate Seep Work Plan*, May 2003.

2 SUMMARY OF EXISTING CONDITIONS

2.1 Subsurface Soil Conditions

Based on the information presented in the subsurface profiles (October 12, 1982), the subsurface soil conditions in the landfill area generally consist of "silty clay to clayey sand", underlained by a layer of "sandy to clayey silt", followed by another deposit of "sand". It should be noted that the soil descriptions presented on the profiles are "all encompassing" and do not follow standard soil classifications, such as the Burmeister Soil Classification System or the Unified Soil Classification System (ASTM 2487). In addition, geotechnical laboratory test results (including grain size distribution, Atterberg limits, and permeability) were not available for review.

2.2 Groundwater Conditions

Based on Parsons review of the Hawkins Point Quarterly Reports, groundwater flow is generally from west to east, towards Thoms Cove. Seventeen monitoring wells (unconfined aquifer) are

located in the area of the site, however, no wells are located within the limits of the landfill. Water elevation data is available since April 1998 and currently the wells are being monitored on a quarterly basis. Table 1 and Figure 2 provide the third quarter 2003 groundwater elevation contour plan developed by MES. Figure 3 provides a summary of all the groundwater elevations at the site and Figure 4 provides a summary of the groundwater elevations located in the area of landfill, seep, and existing leachate collection system (MW-2A, 2B2, 2D2, 2E, 2F2, 2G, and 2H).

2.3 Precipitation Conditions

Daily precipitation data for the site was available from September 1997 through September 2003 and Figure 5 presents a monthly summary of the daily precipitation values.

2.4 Existing Leachate Collection System

A leachate collection system was installed in the early 1980s in the southern portion of the landfill. The system includes three separate 6-inch PVC perforated pipes protruding into the landfill, as shown on Figure 1. The pipe segments exiting MH-222 extends approximately 100 feet into the landfill, the pipe segment exiting MH-221 extends approximately 250 feet into the landfill, and the pipe segment exiting MH-221A extends approximately 200 feet into the landfill. Leachate is collected and directed to a holding tank, and is subsequently disposed offsite at a disposal facility (Envirite). Analytical testing of the leachate is not required prior to off site disposal.

Based on the measurements provided by MES, the manholes have the following invert elevations:

Manhole No.	Top of MH Elev	Invert In Elev	Invert Out Elev
MH-220	23.48	5.23	5.32
MH-221A	25.06	4.54	4.63
MH-221	21.13	5.33	5.10
MH-222	Not available	Not available	Not available

In should be noted that the Invert In Elevations were higher than the Invert Out Elevations for MH-220 and MH-221A and that the leachate collection pipe invert elevations (within the landfill) were not available. Leachate volume data (on a monthly basis) was available from January 1992 through February 2004, as shown in Figure 6. Figure 7 presents the precipitation data superimposed on the leachate data.

During the time period between February and June 2002, AM Liner cleaned, TV-inspected and relined the leachate collection system. In addition, they installed a manhole and relined the last

segment of the leachate collection system. In August 2002, MES and TPH also cleaned the leachate collection lines. TPH also cleaned the above ground storage tank and had it inspected by Waste-Tron.

3 PREVIOUSLY PERFORMED SLOPE STABILITY, SETTLEMENT, AND INFILTRATION ANALYSES

In an effort to identify the source of the seep, Parsons initially reviewed the previous analyses that were performed as part of the landfill design and construction. Parsons conducted this review to identify if the design had identified areas of potential instability or excessive settlements that could lead to infiltration through the cap. In addition, Parsons reviewed the infiltration analysis to determine if excessive infiltration was originally estimated and if a method to accommodate was presented.

3.1 Slope Stability

Three stability analyses were conducted for the Hawkins Point Hazardous Waste Landfill. The first analysis conducted in 1985 examined the stability of the completed landfill, as it was originally designed. The second analysis conducted in 1989 evaluated the slope stability of the landfill if Cell 11 was to be filled with construction debris. The third analysis consisted of an examination of the global stability of the landfill by the 'wedge' method, after a crack developed in an earthen berm.

3.1.1 1985 Black and Veatch Analysis of Overall Slope Stability

Slope stability analyses were conducted by Black and Veatch using the Woodward-Clyde Consultants computer program "STABR". Two sections were analyzed: a typical section through Area 5 and a 'worst-case' condition through the berm adjacent to Area 4.

The groundwater table for this analysis was assumed to be at elevation 10 feet (MSL). The following geotechnical parameters were used in the analyses:

Soil Type	Cohesion (psf)	Friction Angle (degrees)	Unit Weight (pcf)
Earthen Berms	1,000	24	110
Chrome Ore Tailings/Chrome Process Wastes	3,000	36	120
Firm Clayey Silt/Silty Clay	450	29	100
Soft Clayey Silt	300	20	100
Organic Silts	150	25	80

Soil Type	Cohesion (psf)	Friction Angle (degrees)	Unit Weight (pcf)
Cretaceous Clay	3,000	24	120
Cretaceous Sand	0	40	125
General Hazardous Wastes	30	0	80

Based on these inputs, a factor of safety for the typical cross-section of 3.5 was calculated. The factor of safety for the 'worst-case' cross-section was 2.5. No seismic evaluation was conducted.

3.1.2 1989 Black and Veatch Slope Stability Analysis of Cell 11

A slope stability analysis was conducted on the proposed design of Cell 11. Two cross-sections were considered, and a simplified Janbu, simplified Bishop, or Spencer's Method of Slices was used. The following geotechnical parameters were used in the analyses:

Soil Type	Cohesion (psf)	Friction Angle (degrees)	Unit Weight (pcf)
1) Earthen Berm	1,000	24	110
2) Clay	3,000	24	120
3) Waste #1	0	30	130
4) Waste #2	3,000	36	120

Sub-grade soils do appear to have been incorporated in the profile, and it appears that the bottom of the landfill was not considered (as the cross-sections were drawn from coordinate 100 to 130, and the landfill is approximately 60 feet high). The analysis does not appear to have incorporated the groundwater table. There was no discussion of its location in the reference documents and none was found on the cross-sections.

The minimum factor of safety for cross-section #1 was 12.077. The minimum factor of safety calculated for cross-section #2 was 7.62. No seismic evaluation was conducted.

3.1.3 1990 Black and Veatch Slope Stability Analysis of North End After Development of Tension Crack

After a tension crack developed in a berm at the north end of the site, a preliminary assessment of the global stability in the area of the crack was conducted. Slope stability calculations were made using a sliding wedge analysis and the 'worst-case' scenario that water had built-up within the landfill and was impounded behind the embankment.

Factors of safety of 24 and 35 were determined for the two wedge analyses conducted.

3.1.4 Slope Stability Evaluation

The slope stability analyses that were performed as part of the design of this landfill resulted in factor of safeties for static global slope stability ranging from 2.5 to 35.0. These values exceed the current EPA guidance of 1.5 for static analysis (EPA Guide to Technical Resources for the Design of Land Disposal Facilities). In addition, based on Parsons site visits in April and August 2003, the landfill slopes appeared to be well vegetated and maintained, and that no observations of "significant" erosion or global slope instability was made.

3.2 Settlement Analyses

Two settlement analyses were conducted for the Hawkins Point Hazardous Waste Landfill. One analysis conducted in 1985 examined the settlement of the completed landfill, as it was intended to be constructed. The second analysis conducted in 1989 evaluated the settlement of the landfill if Cell 11 was to be filled with construction debris.

3.2.1 1985 Black and Veatch Analysis of Settlement

The report concluded that, based on the analyses of several simplified soil profiles, the foundation settlements under Area 5 could range from one-half foot to approximately five feet. Settlement in the center of the facility was expected to be on the order of 3 feet. Approximately 50 percent of the total settlement was expected to occur rapidly as the waste was placed, and that within one year most of the consolidation settlement would have occurred.

The differential settlements in the foundation soils were not expected to exceed 2 feet per 100 feet. This differential settlement was not expected to adversely affect the integrity of the clay and synthetic liners, but may adversely effect portions of the leachate pipe gradient underneath the southern portion of the facility. It was specified that if the settlements during construction do occur such that they impede outflow, the manholes would be utilized as temporary pumping stations and remedial action would be implemented as appropriate to the existing leachate collection system.

3.2.2 1989 Black and Veatch Analysis of Settlement

A calculation was conducted to determine the settlement of foundation soils due to placement of building debris in Cell 11. Three scenarios were examined, Case 1 with Cell 11 full of chrome waste with a unit weight of 120 lb/ft^3, Case 2 with Cell 11 full of building debris with a unit weight of 135 lb/ft^3, and Case 3 with chrome waste up to Cell 10 (the existing conditions at the time). Cases 1 and 2 both predicted a total settlement of 6.9 ft. Case 3 (the existing conditions) predicted a total settlement of 5.2 ft.

It was concluded that differential settlement due to the placement of the building debris in Cell 11 would be low, as the cohesive nature of the chrome ore tailings would dissipate the stress across a large area of the landfill.

3.2.3 Settlement Evaluation

Although the maximum settlement initially predicted for the landfill of 5 ft, and the second prediction of 6.9 feet appear to be significant, differential settlements typically govern the design of landfill caps and liners, and are considered to be of greater importance. The initial settlement analysis conducted in 1985 predicted low differential settlement (less than 2 ft vertical in 100 ft horizontal) due to the uniformity of the sub-grade. This differential settlement was not expected to adversely affect the integrity of the clay and synthetic liners, but may adversely affect portions of the leachate pipe gradient underneath southern portion of the facility. The 1989 calculations also predicted low differential settlements, but it was not quantified.

3.3 Infiltration Modeling of Final Cover

An infiltration analysis was conducted for the Hawkins Point Hazardous Waste Landfill in 1993 using the U.S. Army Corps of Engineers "Hydrologic Evaluation of Landfill Performance" (HELP) computer program. The location of all the HELP model simulations were described as "the entire cap - 40,100 sq ft", however, it is unclear as to the actual location on the landfill that this area was intended to simulate. In addition, the data input or outputs were not available for review and no specified slope or drainage length was presented (an input variable to determine lateral drainage rates).

Each cross section analyzed consisted infiltration layer consisting of 4 inches of topsoil and 20 inches of earthfill. Different drainage layers and barrier layers were then evaluated. The following nine cross-sections were analyzed, as presented below:

Run	Drainage Layer	Barrier Layer	Annual Percolation Through Barrier Layer (gal.)
1	6" Gravel	24" Clay	7.5
2	6" Gravel	36" Clay	7.5
3	6" Gravel	GCL	0
4	Drainage Composite	24" Clay	7.5
5	Drainage Composite	36" Clay	7.5
6	Drainage Composite	GCL	0
7	6" Gravel + Drainage Composite	24" Clay	7.5

8	6" Gravel + Drainage Composite	36" Clay	7.5
9	6" Gravel + Drainage Composite	GCL	0

A typical hydraulic conductivity was assumed for each layer. A liner leakage fraction (the ratio of the area of holes the GCL to its total surface area) of 0.0005 was assumed, corresponding to a 0.9 inch diameter hole for every square yard of liner.

The maximum infiltration predicted was 7.5 gallons per year of leakage for simulations with clay barrier layers. In the simulations where a GCL was used, the analysis indicated that no infiltration through the cap would occur.

4 SITE INVESTIGATION AND ANALYSIS TO SUPPORT THE SEEP EVALUATION

This section summarizes the field investigation and laboratory testing program that was conducted to support the Seep Evaluation Report. Parsons conducted the program in general accordance with the workplans referenced in Section 1. The purpose of the program was to:

- Evaluate the integrity of the existing landfill cap, and its effectiveness in preventing (or minimizing) water infiltration;
- Identify the materials, properties, thickness, and general locations of the existing landfill cap (including side slopes);
- Identify the source of water for the seep, primarily along the southeastern portion of the landfill; and
- Observe the groundwater elevations within the landfill.

The site investigation program consisted of a combination of non-intrusive (geophysical) and intrusive (soil borings) investigation methods, including the following elements:

- Geophysical survey with electromagnetic terrain conductivity (EM) mapping and electrical imaging (EI);
- Geophysical leak detection survey, and a hand excavation program to verify the results;
- 23 shallow soil borings with Shelby tube sampling, and geotechnical laboratory tests;
- 3 temporary groundwater piezometers;
- Survey of the soil borings and piezometer locations; and
- Daily flow rate measurements of the seep, and weekly groundwater and piezometers elevations measurements;

4.1 EM and EI Geophysical Survey

4.1.1 Geophysical Survey Investigation Program

A geophysical survey with electromagnetic terrain conductivity (EM) mapping and electrical imaging (EI) was conducted at the site by The Hutchinson Group, Ltd. on June 2 through June 5, 2003. The purpose of the survey was to provide a general indication of the location of leachate. A terrain conductivity imaging or mapping (EM-31 combined with GPS) was performed to indicate areas where conductive water (or leachate) is present within the landfill, but more importantly, where leachate may be emanating (i.e. seeping) from the waste mass. Two different EM tools were deployed; a shallow focused (4 feet) and a deep focused (greater than 20 feet) terrain conductivity mapping tool. Thirty-three thousand records over an 18 acre area were collected with the deep focused tool and 9,000 records were collected with the shallow focused tool.

Continuous or roll along EI techniques were used to collect records across portions of the landfill that had anomalous EM readings and to maximize information about presence of a geomembrane. Four resistivity lines (A, B, C, and D) were collected using Schlumberger resistivity imaging techniques for a total of over 1,418 linear feet.

A more detailed description of the investigation techniques is provided the Electromagnetic Terrain Conductivity and Electrical Imaging Report, dated June 20, 2003 (Appendix A).

4.1.2 Geophysical Survey Results

The EM geophysical survey identified three areas of elevated conductivity within the footprint of the landfill. These areas are designated as Areas A, B, and C, and are shown in the figures presented in Appendix A. Area A consists of the southeastern portion of the landfill and is contiguous with the observed seep. Area B is located along the lower drainage ditch on the eastern side of the landfill, approximately 75 feet north of the drainage swale that ties the upper and lower drainage ditches. Area C is located in the northern portion of the landfill.

The EI geophysical survey verified the location of the geosynthetic composite liner (geomembrane and GCL) that covers the upper portion of the landfill (1.8 acres), as shown in Figure 8.

A description of the findings is presented in the Electromagnetic Terrain Conductivity and Electrical Imaging Report, dated June 20, 2003 and is presented in Appendix A.

4.2 Geophysical Leak Detection Survey

4.2.1 Leak Detection Survey Investigation Program

A geophysical leak detection survey was conducted on the upper portion of the landfill (in the area of the HDPE/GCL composite cap and the GCL composite cap) by The Hutchinson Group, Ltd. on August 19 through 21, 2003. The purpose of the survey was to determine the locations of any anomalies in the HDPE liner. The survey area included approximately 1.8 acres of the top of the landfill. The survey was conducted following guidelines outlined in the ASTM Standard Guide D6747. A description of the investigation techniques is provided in the Geophysical Analysis of the Geomembrane Cap Letter Report, dated November 1, 2003 (Appendix B).

4.2.2 Leak Detection Survey Results

The geophysical leak detection survey indicated 25 potential anomalies on the HDPE/GCL composite cap and the GCL composite cap. Of the 25 potential anomalies, 9 were located in areas where the HDPE/GCL composite cap was present and 16 were located where a GCL composite cap was present. It should be noted that the leak detection survey is only applicable to identify anomalies for geomembranes, and as such, the 16 points identified in the area where GCL only was present is considered "background noise" and not anomalies.

Subsequently, a hand excavation program was performed in three locations to verify the geophysical results. Two hand excavations were performed in the area of the GCL composite cap (13% of the anomalies) and one hand excavation was performed in the area of the HDPE/GCL composite cap (11% of the anomalies). Results of the hand excavation verified that the HDPE/GCL and GCL composite caps were present at these locations. In addition, based on visual observations, no damage (i.e. rips, tears, punctures) was observed on the HDPE/GCL and GCL composite caps at these locations.

Descriptions of the findings are presented in Geophysical Analysis of the Geomembrane Cap Letter Report, dated November 1, 2003 (Appendix B).

In areas were the landfill cap was removed, the GCL was repaired on October 14, 2003. The area was patched by cleaning the existing GCL and overlapping the cut area using geosynthetic clay liner and granularized bentonite. Once the GCL was in place, the soil was reapplied at six-inch lift intervals and compacted using a jumping jack. The area was restored to original grade and vegetated.

4.3 Shallow Soil Borings

4.3.1 Shallow Soil Boring Investigation Program

Twenty-three shallow soil borings (SSB-1 through SSB-23) were drilled into the landfill side slope's clay cap, as shown in Figure 8. The shallow soil borings were drilled to supplement the information obtained from the geophysical survey and to identify the properties, thickness, and general locations of the clay cap on the side slopes and below the drainage swales and access roads.

Soil borings were drilled by SGS Environmental Drilling (formerly CT&E) of Baltimore, Maryland. The soil borings were drilled from August 12 through August 14, 2003. The soil borings were drilled using a 66-DT track-mounted Geoprobe® drill rig. Generally, the soil borings were drilled through the clay cap and terminated once the waste was encountered. As a result, most of the soil borings were drilled 10 feet below grade, with the exception of SSB-11 (15 feet below grade), SSB-12 (5 feet below grade), and SSB-21 (5 feet below grade). Soil samples were continuously obtained at each location using a 2-inch inside diameter, 5-foot macrocore sampler. A Parsons field geologist monitored the test borings and visually classified samples recovered using the Burmister Soil description and the Unified Soil Classification System (USCS) (ASTM D2488). Soil samples were placed in glass jars, labeled accordingly, and held in storage for potential future laboratory testing. Soil boring logs are presented in **Appendix C**.

Based on the results of the initial borehole, the depth and thickness of the clay cap was known. Subsequently, the drill rig was moved approximately 5 feet and an undisturbed soil sample was obtained of the clay. Twenty-two undisturbed soil samples were collected using 3-inch diameter, 30-inch long thin-walled Shelby tubes. Each Shelby tube was pushed and sealed in accordance with the procedures presented in the Work Plan. Shelby tubes were transported to Penniman & Brown, Inc. of Baltimore, Maryland for storage and geotechnical laboratory testing.

Upon completion of each soil boring, the boreholes were filled with bentonite chips and hydrated, backfilled with native material to the ground surface, and grass seed was placed on the surface.

4.3.2 Shallow Soil Boring Results

A summary of the materials that the shallow soil boring encountered is presented in Table 2. Based on these results, the side slope cover material general consists of (from top down):

- Cover material consisting of vegetation, sand, and gravel and visually classified as a silty sand (SM). The thickness varies from 0 to 2.2 feet, with an average thickness of 0.9 feet;
- Lean clay (CL) varying in thickness from 0.9 to 9.5 feet, with an average thickness of 5.4 feet;

- Underlying the lean clay was the fine grained waste material (COPR waste).

The clay cap was located in all soil boring locations including below the drainage swales and access roads.

4.4 Geotechnical Laboratory Testing Program and Results

Fourteen Shelby tube samples were submitted to Penniman & Brown, Inc. for geotechnical laboratory for testing, including:

- Sieve analysis (ASTM D422);
- Atterberg limits (ASTM D4318);
- Water content (ASTM D2216);
- Specific gravity (ASTM D854); and
- Flexible wall permeability (ASTM D5084).

Thirteen of the fourteen tests were performed on samples from the clay cap (including SSB-8) and were classified as a "lean clay" (CL). The 14th sample was obtained at a different location within the Shelby tube sample SSB-8 and was determined to be a clayey sand (SC). Geotechnical laboratory test results are presented in Appendix D and a summary of the test results is presented in Table 3. A summary of the thirteen clay cap test results is as follows:

- The water content varied from 18.0 to 24.0 percent, with an average of 21.2 percent;
- The specific gravity varied from 2.556 to 2.698, with an average of 2.65;
- The clay material was classified as a "lean clay" (or CL);
- The percent passing the #200 sieve varied from 57.6 to 95.4 percent, with an average value of 83.7 percent;
- The plasticity index of the lean clay varied from 13 to 22 percent, with an average value of 18.2 percent;
- The vertical permeability of the lean clean ranged from 3.4×10^{-8} cm/sec to 8.5×10^{-7} cm/sec, with a mean value of 3.1×10^{-7} cm/sec.

Based on the results of the subsurface investigation program and geotechnical laboratory testing program, it appears that the clay generally satisfies the permeability requirements of the original design (1×10^{-7} cm/sec) and is of sufficient thickness to serve as an effective barrier to infiltration.

4.5 Temporary Piezometers

4.5.1 Temporary Piezometer Investigation Program

Three temporary piezometers (TPZ-1 through TPZ-3) were installed between January 5, 2004 and January 13, 2004. The purpose of the temporary piezometers was to:

- Supplement the information obtained from the geophysical survey and shallow soils borings;
- Identify (or estimate) the components of the individual deeper cell cover and bottom materials;
- Observe the pieziometric pressure (i.e., water elevations) in the individual cells;
- Observe the potential for "perched" water over the intermediary cell liners / caps; and
- Estimate if there is hydraulic communication between the vertical cells.

The locations of the temporary piezometers were established in the field using a GPS unit prior to installation. The temporary piezometers were located as follows:

- TPZ-1 was located approximately 50 feet from the seep to provide groundwater and soil data in the immediate vicinity of the seep;
- TPZ-2 was located beneath the composite GCL liner to provide data in the area of the composite GCL; and
- TPZ-3 was located beneath the composite GCL and HDPE liner to provide data in the area of the composite GCL and HDPE liner.

The soil borings were drilled and the piezometers were installed by T.L.B. of Baltimore, Maryland. The work was completed using an Acker MP-8 track-mounted hollow stem auger drill rig. Continuous split spoon samples were collected in accordance with ASTM D1586 and field classified using the Modified Burmeister Classification System and the Unified Soil Classification System (ASTM D2488). Soil samples were placed in glass jars, labeled accordingly, and held in storage for potential future laboratory testing.

Upon completion the soil borings, temporary piezometers were installed within the soil boring. The peizometers were installed once water was encountered and were screened within the water. The piezometers consist of 2-inch diameter PVC screens with a PVC riser section. A summary of the piezometer construction is presented in Table 4. Soil boring logs and well construction diagrams are presented in Appendix E and F, respectively.

4.5.2 Temporary Piezometer Results

The subsurface conditions (from top to bottom) generally consisted of the clay or composite cap followed by interbedded layers of COPR waste and silt/clay. Approximately nine feet of clay

cap was encountered in TPZ-1 and 2.7 feet was encountered in TPZ-2. No clay cap was encountered in TPZ-3 (the location of the HDPE/GCL composite cap). Following the cap, COPR waste was encountered in all borings with periodical layers of silt/clay. The periodical silt/clay layers could represent the boundaries of the separate landfill cells.

Weekly water elevations were obtained from the newly installed temporary piezometers TPZ-1, 2 and 3 as well as the existing monitoring wells MW-2A, 2B2, 2D2, 2E, 2F2, 2G, 2H during the time period of January 23, 2004 through February 13, 2004. In addition, the elevation of the seep was surveyed to be 28.675. Based on these measurements, the average piezometric head elevation was 31.5, 31.7, and 25.6 for TPZ-1, TPZ-2, and TPZ-3, respectively. Figures 3 and 4 presents the weekly piezometric heads superimposed on the groundwater data obtained from the monitoring wells. Figure 10 presents a schematic landfill cross-section illustrating the relative locations of the groundwater, existing leachate collection piping, seep, and piezometeric water elevations.

4.6 Seep Monitoring

During the time period of October 26, 2003 through March 3, 2004, the seep flow rate was measured on a daily basis. MES obtained the measurements by pumping the liquid from the seep area into a 300 gallon plastic container for a 24 hour period. The container was monitored, measured and reset on a daily basis and flow estimates were recorded. Leachate collected in the container was discharged into the existing leachate collection system manholes after the reading were taken.

Based on these measurements, the average seep flow rate was 8.4 gallons per hour (or 73,560 gallons per year) as presented in Table 5. It should be noted that the flow measurements do not include the volume of leachate that is absorbed into the ground and includes the rainwater runoff that is collected during rain events.

4.7 Survey

Three surveys were conducted at the Site. On August 7, 2003 Parsons personnel located and staked 21 (of the 23) proposed soil boring locations using a Trimble Pro XRS GPS unit. Before and after the temporary piezometer installation, Green Horne & O'Mara surveyed the proposed and actual locations and elevations of the temporary piezometers and the seep using a GPS system with a remote base station located in Fort Armisted Park using NGS control on December 13, 2003 and January 24, 2004. In addition, Green Horne & O'Mara surveyed the southeastern area for topography and location, including access roads and drainage swales. Survey results are shown in Figure 9.

4.8 Infiltration Analysis

As discussed above in Section 3, an infiltration analysis was previously performed as part of the original design, however, the data input and output was not available for review and it was not evident what part of the landfill the analysis was performed on or what landfill configuration was used, i.e. slope and drainage length. As a result, Parsons performed an infiltration analysis that incorporated the three different types of caps located throughout the landfill (i.e. top and side slopes).

The cap sections from the top of the landfill were similar to those presented in the original design analysis, however the side slope cap section was modified based on findings from Parsons shallow soil boring investigation.

The infiltration analysis was performed using the Hydrologic Evaluation of Landfill Performance (HELP) model. The results of this evaluation are presented in Appendix G and summarized in Table 6. The result indicate that less than 1 gallon per year infiltrates through the HDPE/GCL composite liner, approximately 15,650 gallons per year infiltrate through the GCL composite liner, and 422,350 gallons per year infiltrate through the clay cap.

5 OBSERVATIONS

Based on the information presented above, the following observations are presented:

- The average groundwater elevation near the seep (EL 4.15 at MW-2G) is lower than the water elevation at the seep (El 28.675) and within the landfill (piezometers vary from EL 25.6 to 31.7). This information is presented in Figures 4 and 10 and indicates that groundwater is most likely not a source of water for the seep.
- Average groundwater elevations in the area of the existing leachate collection system (EL 4.15 at MW-2G, EL 2.91 at MW-2D2, and EL. 18.31 at MW-2H) indicate that the existing leachate collection system (manhole invert ~EL 5) may be collecting groundwater.
- Based on observations during landfill operation, the landfill was uncapped for a period of time and as a result, accumulated water due to precipitation. This volume is indicated by the initial amount of leachate collected after the construction of the cap over the top portion of the landfill and the sharp decrease in the leachate volume in July 1993.
- The volume of leachate collected between Fall 1993 and November 2002 remained fairly stable. A sharp increase in leachate volume was observed starting in November 2002, followed by a leveling off during the time period from April to July 2003, followed by a decreasing trend, which has continued through the present (Figure 6).
- There does not appear to be a correlation between precipitation and groundwater elevation, however, there appears to be a correlation between the volume of leachate

collected and precipitation during the time period between January 2001 through the present (Figure 7).

- Three areas of elevated conductivity were identified within the footprint of the landfill (Areas A, B, and C). Area A coincides with the location of the identified seep. No seeps were observed in Areas B and C.
- The presence of the HDPE/GCL and GCL composite liners were visually verified in the upper portion of the landfill. In addition, based on visual observations, no damage (i.e. rips, tears, punctures) was observed on the HDPE/GCL and GCL composite caps.
- The side slopes consist of clay (CL) with an average thickness of 5.4 feet and a mean vertical permeability of 3.1×10^{-7} cm/sec. It appears that the lean clay generally satisfies the permeability requirements of the original design (1×10^{-7} cm/sec) and is of sufficient thickness to serve as an effective barrier to infiltration.
- The results of the infiltration analysis performed as part of this report indicate a total of approximately 438,000 gallons per year infiltrate through the landfill. Based on Parsons experience with landfills that are capped with clay, this order of magnitude quantity appears reasonable and is frequently addressed through a leachate collection system.
- The slope stability analyses that were performed as part of the original design of this landfill resulted in factor of safeties for static global slope stability ranging from 2.5 to 35.0. These values exceed the current EPA guidance of 1.5 for static analysis (EPA Guide to Technical Resources for the Design of Land Disposal Facilities). In addition, based on Parsons site visits in April and August 2003, the landfill slopes appeared to be well vegetated and maintained, and that no observations of "significant" erosion or global slope instability was made.
- The estimated average seep flow rate is 8.6 gallons per hour (or 75,153 gallons per year).

6 RECOMMENDED APPROACH TO ALLEVIATE THE SEEP

Based on the information presented above, Parsons has developed an approach to alleviate the seep. The approach consists of installing a new leachate collection system within the southeastern portion of the landfill. The purpose of the system would be to remove leachate within the landfill and reduce the pieziometric pressure to minimize the occurrence of future seeps in this area. The leachate collection system would consist of a gravel filled collection trench. The collection trench would be gravity drained to the existing leachate collection system manholes and combined with the current leachate that is being collected, as schematically shown in Figure 11. The gravity drain could either be below grade (within the landfill cap) or above grade (which may require heat tracing and insulation).

Table 1
Hawkins Point Hazardous Waste Landfill Baltimore, Maryland
Summary of Groundwater Elevation

Well No	TOC Elev	Depth to Screened interval	Depth to bottom	4/1/1998	7/2/1998	10/1/1998	1/6/1999	4/1/1999	7/6/1999	10/12/1999	1/3/2000	4/4/2000	7/3/2000	10/13/2000
TPZ-1	40.06	Table 4	Table 4											
TPZ-2	66.03	Table 4	Table 4											
TPZ-3	78.57	Table 4	Table 4											
2A	44.48	54-64	64.0	3.38	2.98	2.88	1.78	2.18	1.48	2.68	2.18	3.88	3.08	3.08
2B2	42.38	37-47	47	15.48	14.88	14.48	12.68	13.38	12.98	13.68	14.13	15.08	14.78	14.68
2D2	28.05	26-36	36	3.95	2.65	2.85	1.35	2.65	0.75	2.87	2.55	3.75	2.85	2.95
2E	24.07	29-39	39	6.77	5.37	4.67	3.07	5.67	3.67	5.92	5.07	5.37	5.47	5.17
2F2	32.16	20-30	30	10.66	10.06	9.46	7.16	7.96	7.36	9.04	8.76	9.56	9.66	10.06
2G	22.76	25-35	35	6.36	4.06	3.36	1.26	4.66	2.46	5.32	4.16	5.46	4.66	3.76
2H	26.38	20-30	30	19.98	18.38	17.78	12.98	18.78	15.08	19.43	18.58	19.93	19.28	19.18
M	19.90	29-39	39	3.5	2.4	1.7	0.3	4.1	0.7	2.57	1.8	3.4	2.3	1.9
R	29.66	60-70	70	11.16	8.46	10.86	9.96	9.96	7.16	7.66	9.96	10.06	9.96	13.26
S	40.28	50-60	60.66	8.88	8.78	5.88	6.88	7.98	6.18	7.53	7.88	7.58	8.48	4.18
T	39.80	41-51	51	9.1	8.9	9	6.8	7.1	7.4	7.6	17	9.6	8.5	9.3
U	35.41	51-61	61	10.61	10.11	9.61	8.41	9.51	8.51	9.01	9.51	11.11	9.81	10.21
V	28.71	36-46	46	7.31	5.81	5.21	3.41	5.81	4.11	6.11	5.41	6.31	5.81	5.81
W	24.01	N/A	36	3.31	2.91	2.91	0.81	2.51	1.21	2.94	2.51	2.91	2.81	3.01
X	29.79		47	3.59	3.39	3.29	1.49	2.89	2.09	2.89	2.89	3.24	3.19	2.99
Y	27.09		43.3	9.99	9.29	9.89	8.09	9.19	8.39	7.74	9.84	9.59	9.39	10.39
Z	18.54		31.2	3.44	2.64	2.24	0.94	1.04	0.34	3.06	2.34	2.34	2.34	2.34

Note: 1. Data obtained and provided by Maryland Environmental Services.
2. 'N/A' or a blank space indicates that data is not available.

Table 1
Hawkins Point Hazardous Waste Landfill Baltimore, Maryland
Summary of Groundwater Elevation

Well No	TOC Elev	1/3/2001	3/1/2001	7/17/2001	7/23/2001	10/2/2001	1/16/2002	4/2/2002	7/16/2002	10/1/2002	1/7/2003	1/16/2003	4/1/2003	7/1/2003
TPZ-1	40.06													
TPZ-2	66.03													
TPZ-3	78.57													
2A	44.48	2.48		4.18	4.18	3.48	2.28	-7.72	2.68	1.48	2.88	2.28		3.78
2B2	42.38	14.08		13.88	13.88	15.38	13.28	13.28	13.78	13.18	14.18	14.3	14.58	15.18
2D2	28.05	2.35		2.85	2.85	3.35	2.05	2.75	2.95	2.95	5.05	2.05	4.35	4.65
2E	24.07	4.47		6.07	6.07	5.22	2.97	4.77	4.67	4.57	6.47	2.97	6.47	6.37
2F2	32.16	9.06		10.16	10.16	9.7	7.86	7.96	8.76	8.16	9.06	7.86	9.66	10.46
2G	22.76	3.16		4.26	4.26	3.96	2.26	3.36	3.26	3.06	5.86	2.26	6.06	6.06
2H	26.38	17.38		18.88	18.88	18.28	16.98	17.68	17.68	17.18	19.08	16.98	19.68	19.58
M	19.90	1.4		2.2	2.2	2.2	1	1.7	1.7	1.6	1.3	1	3.1	3.1
R	29.66	11.46	9.86	11.16	11.16	10.4	11.76	-0.64	9.16	7.06	10.66	11.76	4.76	11.46
S	40.28	8.98	8.58	9.48	9.48	9.41	8.38	8.48	8.48	8.28	7.88	8.38	8.29	8.83
T	39.80	9.1		9.6	9.6	9.5	8.6	8.6	8.6	8.2	8.2	8.6	8.5	8.95
U	35.41	10.41		10.31	10.31	10.11	8.61	9.91	9.71	9.21	8.91	8.61	10.46	10.41
V	28.71	5.01		5.91	5.91	5.71	4.71	5.11	5.21	4.91	4.71	4.71	6.91	7.01
W	24.01	2.51		-3.69	-3.69	3.41	2.51	2.71	2.21	2.91	2.01	2.51	-1.99	3.46
X	29.79	2.49		3.09	3.09	3.36	2.49	2.59	2.79	2.69	2.19	2.49	3.04	3.39
Y	27.09	10.09		9.39	9.39	9.99	9.99	-0.91	8.69	8.59	8.69	9.99	8.89	9.46
Z	18.54	2.34		2.74	2.64	2.84	2.29	3.14	2.14	2.64	2.64	2.29	3.24	2.64

Table 1
Hawkins Point Hazardous Waste Landfill Baltimore, Maryland
Summary of Groundwater Elevation

Well No	TOC Elev	10/1/2003	1/23/2004	1/30/2004	2/6/2004	2/13/2004	Avg
TPZ-1	40.06		31.74	31.70	31.64	31.75	31.71
TPZ-2	66.03		32.08	32.12	31.38	32.14	31.93
TPZ-3	78.57		26.26	26.21	24.25	26.26	25.74
2A	44.48	3.78	1.68	1.38	1.23	1.5	2.26
2B2	42.38	14.98	15.69	15.63	15.56	15.67	14.38
2D2	28.05	3.85	2.69	2.63	2.41	2.62	2.91
2E	24.07	5.97	5.42	5.4	5.35	5.39	5.17
2F2	32.16	10.56	10	9.97	9.9	9.93	9.25
2G	22.76	4.96	4.58	4.53	4.41	4.5	4.15
2H	26.38	19.18	18.99	18.92	18.86	18.96	18.31
M	19.90	2.5					2.07
R	29.66	11.96					9.62
S	40.28	9.08					8.09
T	39.80	9.2					8.98
U	35.41	10.21					9.73
V	28.71	6.31					5.55
W	24.01	2.41					1.88
X	29.79	3.39					2.88
Y	27.09	10.19					8.93
Z	18.54	2.64					2.39

Table 2
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Shallow Soil Borings

BORING	Coordinates (1) EASTING	NORTHING	Bottom of Borehole Depth (ft)	Depth to Top of Clay (ft)	Depth to Bottom of Clay (ft)	Clay Thickness (ft)	Depth to Top of COPR (ft)
SSB-1	562568.4015	1439498.888	10	0.5	1.7	1.2	6.7
SSB-2	562460.4863	1439482.754	10	0.7	8.9	8.2	9.0
SSB-3	562453.3804	1439570.752	10	0.0	8.0	8.0	8.0
SSB-4	562384.3398	1439550.943	10	0.4	6.1	5.7	(3)
SSB-5	562221.7351	1439653.643	10	1.9	6.0	4.1	6.0
SSB-6	562135.7277	1439758.46	10	2.0	5.0	3.0	6.8
SSB-7	562051.9681	1439849.74	10	1.8	8.9	7.1	(3)
SSB-8	562023.0355	1439796.383	10	0.0	8.5	8.5	8.5
SSB-9	561960.8135	1439804.423	10	0.7	6.1	5.4	(3)
SSB-10	562020.1429	1439770.813	10	0.6	9.1	8.5	9.1
SSB-11	562070.268	1439635.212	15	2.0	7.8	5.8	10.0
SSB-12	562143.4091	1439552.246	10	1.5	3.5	2.0	3.5
SSB-13	562182.177	1439470.502	10	0.5	2.8	2.3	5.0
SSB-14	562387.7762	1439335.206	10	1.5	3.6	2.1	5.0
SSB-15	562464.9619	1439268.344	10	2.1	5.0	2.9	5.0
SSB-16	562535.6491	1439294.359	10	0.4	9.5	9.1	9.5
SSB-17	562607.4064	1439217.83	10	0.3	7.1	6.8	7.1
SSB-18	562672.0952	1439150.048	10	2.2	7.2	5.0	7.2
SSB-19	562677.4549	1439229.356	10	0.6	8.1	7.5	8.1
SSB-20	562718.4902	1439321.412	10	0.3	1.2	0.9	6.2
SSB-21	562742.6824	1439236.093	5	0.2	3.0	2.8	3.1
SSB-22	(2)	(2)	10	0.2	7.0	6.8	(3)
SSB-23	(2)	(2)	10	0.5	10.0	9.5	(3)
			Average:	0.91		5.36	

NOTES:
(1) Surveying performed by Parsons using a Trimble Pro XRS GPS Unit.
(2) Borings were field located after GPS Survey was conducted.
(3) COPR was not encountered or observed at the boring location.

Table 3
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Geotechnical Laboratory Test Results

BORING AND SAMPLE NUMBER (1)	SHELBY TUBE SAMPLE DEPTH (feet)	UNIFIED SOIL CLASS. (ASTM D2487)	PHYSICAL DESCRIPTION (2)	GRADATION ANALYSIS (ASTM D422) SIEVE SIZES (% PASSING)						ATTERBERG LIMITS (ASTM D4318)			WATER CONTENT (ASTM D2216) (%)	SPECIFIC GRAVITY (ASTM D854)	VERTICAL PERMEABILITY K_v ASTM D5084 (cm/sec)
				1/2"	#4	#10	#20	#40	#200	LL	PL	PI			
SSB-1	5.0 - 7.5	CL	Reddish almost black Sandy lean Clay with Gravel	88.9	82	78.4	73	67.7	57.6	37	18	19	18.6	(3)	7.64E-07
SSB-2	2.0 - 4.5	CL	Almost Black to Gray Lean Clay with Little White Clay Lumps.	(3)	100	99.8	99	97.8	95.2	45	23	22	22.8	(3)	2.48E-07
SSB-3	4.0 - 6.5	CL	Brown Reddish Sandy Lean Clay	(3)	100	88.70	85	79.1	67.8	39	23	16	24.0	2.698	3.11E-07
SSB-4	1.0 - 3.5	CL	Gray Reddish White Lean Clay with Sand	(3)	100	99.2	96	91.2	76.5	35	22	13	20.2	(3)	6.18E-07
SSB-7	2.0 - 4.5	CL	Reddish Lean Clay	(3)	100	95.00	93.7	92.6	89.6	41	24	17	20.8	2.696	3.40E-08
SSB-8	1.0 - 3.5	SC	Yellow Light Brown Clayey Sand	(3)	91	85.6	79.4	55	30.1	26	16	10	12.5	(3)	1.61E-05
SSB-8	1.0 - 3.5	CL	Reddish Lean Clay	(3)	(3)	100	98.8	98	95.4	41	19	22	18.0	(3)	6.17E-07
SSB-10	1.5 - 4.0	CL	Brown Lean Clay	(3)	100	100	99.2	98.1	95.4	45	25	20	22.2	(3)	3.70E-08
SSB-13	1.0 - 3.5	CL	Almost Black to Gray Lean Clay with Sand with Little White Clay Lumps.	(3)	100	98.1	93.7	86.2	76.2	41	23	18	20.7	(3)	8.50E-07
SSB-16	1.0 - 3.5	CL	Gray Lean Clay with Little White and reddish Clay Lumps	(3)	100	99.6.	97.8	96.3	93.9	40	22	18	22.5	(3)	4.20E-07
SSB-17	1.0 - 3.5	CL	Reddish almost Black Lean Clay with Sand	(3)	100	99.5	95.9	93	79.8	40	22	18	20.9	(3)	4.23E-07
SSB-18	2.0 - 4.5	CL	Brown Lean Clay with Sand	(3)	100	97.4	94.6	92.7	84.3	40	23	17	19.9	(3)	1.94E-07
SSB-19	2.0 - 4.5	CL	Almost Black Lean Clay with Little Brown and White Clay Lumps.	(3)	100	98.3	97.3	96.3	93.7	42	23	19	22.8	2.556	9.17E-08
SSB-21	0.5 - 3.0	CL	Purple Reddish Lean Clay with Sand	(3)	(3)	100	97.4	93.7	83.2	39	22	17	22.7	(3)	3.03E-07
MEDIAN (5)									**-**			**-**	**-**		**3.11E-07**
AVERAGE (5)									**83.7**			**18.2**	**21.2**	**2.65**	**-**

Notes:

(1) Refer to Appendix E for complete geotechnical lab results.

(2) Description taken from geotechnical lab results.

(3) Sample not tested for indicated parameters

(4) NP = Non Plastic

(5) Average and medians do not include the clayey sand sample SSB-08 (1.0 to 3.5 feet) - SC. This sample does not represent the clay cap.

Table 4
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Temporary Piezometers

			Elevation (ft)						1/23/2004		1/30/2004		2/6/2004		2/13/2004	
Piez.	Northing	Easting	Ground Surface	Top of Screen	Bottom of Screen	Bot of Hole	Outer Casing	Inner Casing	Depth to water	GW Elev	Depth to Water	GW Elev	Depth to Water	GW Elev	Depth to Water	GW Elev
TPZ-1	562018	1439829	37.36	28.36	23.36	22.86	40.062	39.891	8.32	31.57	8.36	31.53	8.42	31.47	8.31	31.58
TPZ-2	562109	1439678	62.80	32.80	22.80	22.30	66.032	65.832	33.95	31.88	33.91	31.92	34.65	31.18	33.89	31.94
TPZ-3	562373	1439455	75.76	28.76	18.76	18.26	78.565	78.4	52.31	26.09	52.36	26.04	54.32	24.08	52.31	26.09

Note:
1. Water elevation obtained and provided by MES.

Table 5
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Seep Flow Rate

Msmt	Start Time	Start Date	Stop Time	Stop Date	Duration of measurement (hr)	Gallons Generated	Gallons per hour	Notes
1	3:30 PM	10/26/2003	7:30 AM	10/27/2003	16	95	5.9	0.74 inches of rain 10/26
2	7:30 AM	10/27/2003	2:30 PM	10/27/2003	7	200	28.6	2.5 inches of rain 10/27
3	3:30 PM	10/27/2003	7:30 AM	10/28/2003	16	150	9.4	-
4	7:30 AM	10/28/2003	3:30 PM	10/29/2003	8	200	25.0	0.22 inches of rain 10/28
5	3:30 PM	10/29/2003	7:30 AM	10/30/2003	16	80	5.0	-
6	7:30 AM	10/30/2003	3:30 PM	10/30/2003	8	50	6.3	0.75 inches of rain 10/29
7	3:30 PM	10/30/2003	7:30 AM	10/31/2003	16	80	5.0	sunny 10/30
8	7:30 AM	10/31/2003	3:30 PM	10/31/2003	8	50	6.3	sunny
9	3:30 PM	10/31/2003	7:30:AM	11/1/2003	16	80	5.0	sunny
10	7:30 AM	11/1/2003	3:30 PM	11/1/2003	8	50	6.3	sunny
11	3:30 PM	11/1/2003	7:30 AM	11/2/2003	16	80	5.0	sunny
12	7:30 AM	11/2/2003	3:30 PM	11/2/2003	8	50	6.3	sunny
13	3:30 PM	11/2/2003	7:30 AM	11/3/2003	16	125	7.8	sunny
14	7:30 AM	11/3/2003	3:30 PM	11/3/2003	8	50	6.3	sunny
15	3:30 PM	11/3/2003	7:30 AM	11/4/2003	16	100	6.3	sunny
16	7:30 AM	11/4/2003	3:30 PM	11/4/2003	8	50	6.3	sunny
17	3:30 PM	11/4/2003	7:30 AM	11/5/2003	16	80	5.0	cloudy
18	7:30 AM	11/5/2003	3:30 PM	11/5/2003	8	50	6.3	cloudy/Precipitation .01
19	3:30 PM	11/5/2003	7:30 AM	11/6/2003	16	175	10.9	Rain
20	7:30 AM	11/6/2003	3:30 PM	11/6/2003	8	75	9.4	Precipitation 1.24
21	3:30 PM	11/6/2003	7:30 AM	11/7/2003	16	160	10.0	lite rain
22	7:30 AM	11/7/2003	3:30 PM	11/7/2003	8	75	9.4	Precipitation 0.43
23	3:30 PM	11/11/2003	7:30 AM	11/12/2003	16	130	8.1	Precipitation 046
24	7:30 AM	11/12/2003	3:30 PM	11/12/2003	8	75	9.4	Rain
25	3:30 PM	11/13/2003	7:30 AM	11/14/2003	16	150	9.4	Precipitation 0.15
26	7:30 AM	11/14/2003	3:30 PM	11/14/2003	8	75	9.4	Sunny
27	3:30 AM	11/14/2003	7:30 AM	11/15/2003	16	150	9.4	Sunny
28	7:30 AM	11/15/2003	3:30 PM	11/15/2003	8	50	6.3	Sunny
29	3:30 PM	11/15/2003	7:30 AM	11/16/2003	16	150	9.4	sunny
30	7:30 AM	11/16/2003	3:30 PM	11/16/2003	8	50	6.3	sunny
31	3:30 AM	11/16/2003	7:30 AM	11/17/2003	16	150	9.4	Cloudy
32	7:30 AM	11/17/2003	3:30 PM	11/17/2003	8	50	6.3	Cloudy
33	3:30 PM	11/17/2003	7:30 AM	11/18/2003	16	150	9.4	Cloudy
34	7:30 AM	11/18/2003	3:30 PM	11/18/2003	8	50	6.3	Cloudy
35	3:30 PM	11/18/2003	7:30 AM	11/19/2003	16	150	9.4	Sunny
36	7:30 AM	11/19/2003	3:30 PM	11/19/2003	8	50	6.3	Sunny
37	3:30 PM	11/19/2003	7:30 PM	11/20/2003	16	180	11.3	Precipitation 1.83
38	7:30 AM	11/20/2003	3:30 PM	11/20/2003	8	75	9.4	Sunny
39	3:30 PM	11/20/2003	7:30 AM	11/21/2003	16	150	9.4	Sunny
40	7:30 AM	11/21/2003	3:30 PM	11/21/2003	8	50	6.3	Sunny
41	3:30 PM	11/21/2003	7:30 AM	11/22/2003	16	150	9.4	Sunny
42	7:30 AM	11/22/2003	3:30 PM	11/22/2003	8	50	6.3	Sunny
43	3:30 PM	11/22/2003	7:30 AM	11/23/2003	16	150	9.4	Sunny
44	7:30 AM	11/23/2003	3:30 PM	11/23/2003	8	50	6.3	Sunny
45	3:30 PM	11/23/2003	7:30 AM	11/24/2003	16	150	9.4	Sunny
46	7:30 AM	11/24/2003	3:30 PM	11/24/2003	8	50	6.3	Sunny
47	3:30 PM	11/24/2003	7:30 AM	11/25/2003	16	180	11.3	Precipitation 0.16
48	7:30:AM	11/25/2003	3:30 PM	11/25/2003	8	80	10.0	Clear
49	3:30 PM	11/25/2003	7:30 AM	11/26/2003	16	150	9.4	Clear
50	7:30 AM	11/26/2003	3:30 AM	11/26/2003	8	50	6.3	Clear
51	3:30 PM	11/26/2003	7:30 AM	11/27/2003	16	180	11.3	Clear
52	7:30 AM	11/27/2003	3:30 PM	11/27/2003	8	50	6.3	Clear
53	3:30 PM	11/27/2003	7:30 AM	11/28/2003	16	175	10.9	Precipitation 0.02
54	7:30 AM	11/28/2003	3:30 PM	11/28/2003	8	80	10.0	Sunny
55	3:30 PM	11/28/2003	7:30 AM	11/29/2003	16	175	10.9	Sunny
56	7:30 AM	11/29/2003	3:30 PM	11/29/2003	8	80	10.0	Sunny
57	3:30 PM	11/29/2003	7:30 AM	11/30/2003	16	150	9.4	Sunny
58	7:30 AM	11/30/2003	3:30 PM	11/30/2003	8	50	6.3	Cloudy
59	3:30 PM	11/30/2003	7:30 AM	12/1/2003	16	150	9.4	Precipitation 0.78
60	7:30 AM	12/1/2003	3:30 PM	12/1/2003	8	50	6.3	Clear
61	3:30 PM	12/1/2003	7:30 AM	12/2/2003	16	150	9.4	Sunny

Table 5
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Seep Flow Rate

Msmt	Start Time	Start Date	Stop Time	Stop Date	Duration of measurement (hr)	Gallons Generated	Gallons per hour	Notes
62	7:30 AM	12/2/2003	3:30 PM	12/2/2003	8	50	6.3	Sunny
63	3:30 PM	12/2/2003	7:30 AM	12/3/2003	16	150	9.4	Sunny
64	7:30 AM	12/3/2003	3:30 PM	12/3/2003	8	50	6.3	Sunny
65	3:30 PM	12/3/2003	7:30 AM	12/4/2003	16	150	9.4	Sunny
66	7:30 AM	12/4/2003	3:30 PM	12/4/2003	8	50	6.3	Sunny
67	3:30 PM	12/4/2003	7:30 AM	12/5/2003	16	150	9.4	Snow
68	7:30 AM	12/5/2003	3:30 PM	12/5/2003	8	80	10.0	Snow
69	3:30 PM	12/5/2003	7:30 AM	12/6/2003	16	180	11.3	Snow
70	7:30 AM	12/6/2003	3:30 PM	12/6/2003	8	50	6.3	Snow
71	3:30 PM	12/6/2003	7:30 AM	12/7/2003	16	160	10.0	Clear
72	7:30 AM	12/7/2003	3:30 PM	12/7/2003	8	50	6.3	Clear
73	3:30 PM	12/7/2003	7:30 AM	12/8/2003	16	150	9.4	Precipitation 1.01
74	7:30 AM	12/8/2003	3:30 PM	12/8/2003	8	50	6.3	Clear
75	3:30 PM	12/8/2003	7:30 AM	12/9/2003	16	150	9.4	Clear
76	7:30 AM	12/9/2003	3:30 PM	12/9/2003	8	50	6.3	Clear
78	3:30 PM	12/9/2003	7:30 PM	12/10/2003	16	150	9.4	Rain
79	7:30 AM	12/10/2003	3:30PM	12/10/2003	8	60	7.5	Rain
80	3:30 PM	12/10/2003	7:30 AM	12/11/2003	16	180	11.3	Precipitation 1.00
81	7:30 AM	12/11/2003	3:30 PM	12/11/2003	8	50	6.3	Sunny
82	3:30 PM	12/11/2003	7:30 AM	12/12/2003	16	180	11.3	Cloudy
83	7:30 AM	12/12/2003	3:30 PM	12/12/2003	8	60	7.5	cloudy 1.03
84	3:30 PM	12/12/2003	7:30 AM	12/13/2003	16	150	9.4	Snow
85	7:30 AM	12/13/2003	3:30 PM	12/13/2003	8	50	6.3	Snow
86	3:30 PM	12/13/2003	7:30 AM	12/14/2003	16	180	11.3	Snow
87	7:30 AM	12/14/2003	3:30 PM	12/14/2003	8	60	7.5	Snow
88	3:30 PM	12/14/2003	7:30 AM	12/15/2003	16	180	11.3	Precipitation 1.00
89	7:30 AM	12/15/2003	3:30 PM	12/15/2003	8	50	6.3	Partly Cloudy
90	3:30 PM	12/15/2003	7:30 AM	12/16/2003	16	150	9.4	Partly Cloudy
91	7:30 AM	12/16/2003	3:30 PM	12/16/2003	8	50	6.3	cloudy
92	3:30 PM	12/16/2003	7:30 AM	12/17/2003	16	180	11.3	Precipitation 0.68
93	7:30 AM	12/17/2003	3:30 PM	12/17/2003	8	80	10.0	Rain/Snow
94	3:30 PM	12/17/2003	7:30 AM	12/18/2003	16	200	12.5	Precipitation 0.30
95	7:30 AM	12/18/2003	3:30 PM	12/18/2003	8	50	6.3	Clear
96	3:30 PM	12/18/2003	7:30 AM	12/19/2003	16	150	9.4	Clear
97	7:30 AM	12/19/2003	3:30 PM	12/19/2003	8	50	6.3	Clear
98	-	-	-	12/20/2003	-	-	-	no flow due to electrical
99	-	-	-	12/21/2003	-	-	-	no flow due to electrical
100	7:30 AM	12/21/2003	3:30 PM	12/21/2003	8	50	6.3	Clear
101	3:30 PM	12/21/2003	7:30 AM	12/22/2003	16	150	9.4	Clear
102	7:30 AM	12/22/2003	3:30 PM	12/22/2003	8	50	6.3	Clear
103	3:30 PM	12/22/2003	7:30 AM	12/23/2003	16	150	9.4	Clear
104	7:30 AM	12/23/2003	3:30 PM	12/23/2003	8	50	6.3	Clear
105	3:30 PM	12/23/2003	7:30 AM	12/24/2003	16	150	9.4	Clear
106	7:30 AM	12/24/2003	3:30 PM	12/24/2003	8	50	6.3	Clear
107	3:30 PM	12/24/2003	7:30 AM	12/25/2003	16	150	9.4	Clear
108	7:30 AM	12/25/2003	3:30 PM	12/25/2003	8	50	6.3	Clear
109	3:30 PM	12/25/2003	7:30	12/26/2003	16	150	9.4	Clear
110	7:30 AM	12/26/2003	3:30 PM	12/26/2003	8	50	6.3	Clear
111	3:30 PM	12/26/2003	7:30 AM	12/27/2003	16	150	9.4	Clear
112	7:30 AM	12/27/2003	3:30 PM	12/27/2003	8	50	6.3	Clear
113	3:30 PM	12/27/2003	7:30 AM	12/28/2003	16	150	9.4	Clear
114	7:30 AM	12/28/2003	3:30 PM	12/28/2003	8	50	6.3	Clear
115	3:30 PM	12/28/2003	7:30 AM	12/29/2003	16	150	9.4	Clear
116	7:30 AM	12/29/2003	3:30 PM	12/29/2003	8	50	6.3	Clear
117	3:30 PM	12/29/2003	7:30 AM	12/30/2003	16	150	9.4	Clear
118	7:30 AM	12/30/2003	3:30 PM	12/30/2003	8	50	6.3	Clear
119	3:30 PM	12/30/2003	7:30 AM	12/31/2003	16	150	9.4	Clear
120	7:30 AM	12/31/2003	3:30 PM	12/31/2003	8	50	6.3	Clear
121	3:30 PM	12/31/2003	7:30 AM	1/1/2004	16	150	9.4	Clear
122	7:30 AM	1/1/2004	3:30 PM	1/1/2004	8	50	6.3	Clear
123	3:30 PM	1/1/2004	7:30 AM	1/2/2004	16	150	9.4	Clear

Table 5
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Seep Flow Rate

Msmt	Start Time	Start Date	Stop Time	Stop Date	Duration of measurement (hr)	Gallons Generated	Gallons per hour	Notes
124	7:30 AM	1/2/2004	3:30 PM	1/2/2004	8	50	6.3	Clear
125	3:30 PM	1/2/2004	7:30 AM	1/3/2004	16	150	9.4	Clear
126	7:30 AM	1/3/2004	3:30 PM	1/3/2004	8	50	6.3	Lite Rain
127	3:30 PM	1/3/2004	7:30 AM	1/4/2004	16	150	9.4	Lite Rain
128	7:30 AM	1/4/2004	3:30 PM	1/4/2004	8	50	6.3	Clear
129	3:30 PM	1/4/2004	7:30 AM	1/5/2004	16	160	10.0	Rain
130	7:30 AM	1/5/2004	3:30 PM	1/5/2004	8	50	6.3	Clear
131	3:30 PM	1/5/2004	7:30 AM	1/6/2004	16	150	9.4	Clear
132	7:30 AM	1/6/2004	3:30 PM	1/6/2004	8	50	6.3	Clear
133	3:30 PM	1/6/2004	7:30 AM	1/7/2004	16	150	9.4	Clear
134	7:30 AM	1/7/2004	3:30 PM	1/7/2004	8	50	6.3	Clear
135	3:30 PM	1/7/2004	7:30 AM	1/8/2004	16	150	9.4	Clear
136	7:30 AM	1/8/2004	3:30 PM	1/8/2004	8	50	6.3	Clear
137	3:30 PM	1/8/2004	7:30 AM	1/9/2004	16	150	9.4	Clear
138	-	-	-	1/9/2004	to 2/29/04	-	-	-
139	7:30 AM	2/29/2004	7:30 AM	3/1/2004	24	225	9.4	Clear
140	7:30 AM	3/1/2004	7:30 AM	3/2/2004	24	225	9.4	Clear
141	7:30 AM	3/2/2004	7:30 AM	3/3/2004	24	225	9.4	Lite Rain
142	7:30 AM	3/3/2004	7:30 AM	3/4/2004	24	225	9.4	Lite Rain
Cumulative Average:							8.4	gallons per hour
							201.5	gallon per day
							73,563.9	gallons per year

Notes:
1. All data provided by Maryland Environmental Services.
2. Flow rate does not include leachate seeping into the ground or evaportranspiration.
3. '-' indicates that no data was available.

Table 6
Hawkins Point Hazardous Waste Landfill - Baltimore, Maryland
Summary of Infiltration Results

Location	Cap Liner	Area (Projected on Horizontal Plane) (acres)	Cover		Annual Infiltration/Leakage through Layer		
			Layers	Thickness			
			(from surface)	(in)	(ft^3/yr)	(gal/yr)	% of annual percipitation
Northern portion of top of Landfill	HDPE and GCL	1.25	Top Soil	6	--		--
			Bedding	6	--		--
			Drainage composite	0.23	--		--
			60mil HDPE liner	0.006	0.046	0.34	0.00002
			GCL	--(1)	--		--
Southern portion of top of Landfill	GCL only	0.4	Top Soil	6	--		--
			Bedding	6	--		--
			GCL	0.23	2,092	15,648	3.31
Side Slopes	Clay	5.24	Top Soil	11	--		--
			Clay	64	56,466	422,366	6.82

Notes:
(1) Because the HELP software does not allow a two geomembrane liner on top of each other, the two liners were assumed to be one. To account for the effect of both liners, the liner with the lower permeability was used and it condition was assumed to be 'perfect'.

August 2, 2006

Permit Application for Hazardous Waste Management Units at Hawkins Point Hazardous Waste Landfill Areas 3, 5, and 6

PERMIT APPLICATION

FOR

HAZARDOUS WASTE MANAGEMENT UNITS

AT

HAWKINS POINT HAZARDOUS WASTE LANDFILL

AREAS 3, 5 AND 6

AUGUST 2, 2006

RECEIVED
AUG - 3 2006
Hazardous Waste Program

MARYLAND
ENVIRONMENTAL
SERVICE

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PERMIT APPLICATION CHECKLIST

COMAR in 26.13.07.02D Application	Requirement	Location
(1)	- Description of activities requiring permit	1.0
(2)	- Name, mailing address, and location of the facility	2.0
(3)	- NAICS codes	3.6
(4)	- Operator's name, address, telephone number, and ownership status	3.6
(5)	- Listing of all permits or construction approvals received or applied for	3.3
(6)	- Topographic map	3.4
(7)	- Description of the nature of business	3.1
(8)	- Latitude and longitude	3.6
(9)	- Name, address, and telephone number of the owner of the facility	3.6
(10)	- Statement that facility is new or existing	1.0
	- Statement that application is first or revised	1.0
(11)	- Scale drawing (existing facility only)	Fig. 3.2
(12)	- Photographs (existing facility only)	3.6

COMAR in 26.13.07.02D Application	Requirement	Location
(13)	- General description of the facility	3.0
(14)	- Chemical and physical analyses of hazardous wastes to be handled	4.0
(15)	- Waste Analysis Plan	4.0
(16)	- Security procedures and equipment	5.1
(17)	- General inspection schedule	5.2
(18)	- Justification of any request for waiver(s) of the preparedness and prevention requirements	NA
(19)	- Contingency Plan	6.0
(20)	- Preventive procedures, structures, or equipment	5.9
(21)	- Traffic pattern, volume, and control	3.5
(22)	- Description of precautions to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes	6.5
(23)	- Political jurisdiction in which the facility is proposed to be located	3.1
(24)	- Flood map: identification of whether the facility is located within a 100-year flood plain	3.4
(25)	- Information for facilities located in a 100-year flood plain	NA

COMAR in 26.13.07.02D Application	Requirement	Location
(26)	- Personnel training program	7.0
(27)	- Closure/Post-Closure Plan	11.0
(28)	- Documentation for hazardous waste disposal units that have been closed	Appendix I
(29)	- Closure cost estimate and documentation required to demonstrate financial assurance	11.4
(30)	- Post-closure cost estimate and documentation required to demonstrate financial assurance	11.4
(31)	- Documentation of insurance	11.6
(32)	- Proof of coverage by a State financial mechanism	11.5
(33)	- Topographic map	Fig. 3.3
(34)	- Other information	3.6
(35)	- Exposure information	12.0
(36)	- Contingency Plan	6.0

1.0 INTRODUCTION / EXECUTIVE SUMMARY

The Hawkins Point Hazardous Waste Facility, located at 5501 Quarantine Road, Baltimore, Maryland 21226 is owned by the Maryland Port Administration (MPA), and is permitted by the Maryland Department of the Environment and the U.S. Environmental Protection Agency. The Maryland Environmental Service (MES) originally constructed the facility and has continually operated it since the 1970s. MES performs environmental monitoring, post-closure care of the Area 5 chrome ore tailings landfill, and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3. In the past, chrome ore tailings were disposed of in what are now closed cells in Areas 2,3 and 5 of the site. Chromium contaminated leachate generated in these cells is collected by the MES, hauled off-site by a licensed hazardous waste company to a licensed TSDF.

The following hazardous waste management units are currently authorized under the existing RCRA permit.

1. Area 5 Landfill: Authorized for post-closure care only;

2. Waste Water Treatment Unit: Authorized only for the storage and treatment of waste waters generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, and Honeywell Baltimore Works Site, as well as other chromium contaminated liquid generated as a result of chrome ore tailings in the Baltimore area.

3. Soil Treatment Unit (Area 6): Authorized only for the treatment of wastes generated at the Hawkins Point Landfill, the Dundalk Marine Terminal, the Patapsco Wastewater Treatment Plant, and Allied Signal's Baltimore Works site.

This permit application is for the reissuance of the RCRA permit, with the following modifications:

1. Area 5 Landfill: No change in authorization requested. The area will be used for post-closure care only;

2. Waste Water Treatment Unit: MES notified MDE that the on-site wastewater treatment plant (WWTP) was dismantled in 2000 and closed because the effluent could not meet the requirements of the NPDES permit. Maryland Environmental Service will continue to haul leachate offsite for the foreseeable future. MES requests that this management unit be left in the permit so that the treatment option can be pursued if it becomes viable to do so in the future. In the event of

re-opening the WWTP, the effluent would be in accordance with a new NPDES permit.

3. The NPDES permit was terminated and the site operates under a General Discharge Permit for Storm Water Associated with Industrial Activities, dated December 1, 2002.

4. Soil Treatment Unit (Area 6): We have abandoned the plan for onsite soil treatment facilities and request that this management option be deleted from the permit.

SEND COMPLETED FORM TO: The Appropriate State or EPA Regional Office.

United States Environmental Protection Agency

RCRA SUBTITLE C SITE IDENTIFICATION FORM

1. Reason for Submittal (See instructions on page 14.)

MARK ALL BOX(ES) THAT APPLY

Reason for Submittal:

- ☐ To provide Initial Notification of Regulated Waste Activity (to obtain an EPA ID Number for hazardous waste, universal waste, or used oil activities)
- ☑ To provide Subsequent Notification of Regulated Waste Activity (to update site identification information)
- ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application
- ☐ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #_____)
- ☐ As a component of the Hazardous Waste Report

2. Site EPA ID Number (page 15)

EPA ID Number: MDD010017311 3516

3. Site Name (page 15)

Name: Hawkins Point Hazardous Waste Landfill

4. Site Location Information (page 15)

Street Address: 5501 Quarantine Road

City, Town, or Village: Baltimore | State: Maryland

County Name: | Zip Code: 21226

5. Site Land Type (page 15)

Site Land Type: ☐ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☑ State ☐ Other

6. North American Industry Classification System (NAICS) Code(s) for the Site (page 15)

A. 924110 | B. |

C. | D. |

7. Site Mailing Address (page 16)

Street or P. O. Box: MES 259 Nagoles Road

City, Town, or Village: Millersville

State: Maryland

Country: USA | Zip Code: 21108

8. Site Contact Person (page 16)

First Name: Thomas | MI: D | Last Name: Ferguson

Phone Number: 410 729 8305 | Extension: | Email address: dferg@menv.com

9. Operator and Legal Owner of the Site (pages 16 and 17)

A. Name of Site's Operator: Maryland Environmental Service | Date Became Operator (mm/dd/yyyy):

Operator Type: ☐ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☒ State ☐ Other

B. Name of Site's Legal Owner: Maryland Port Administration | Date Became Owner (mm/dd/yyyy): July 3 1958

Owner Type: ☐ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☒ State ☐ Other

EPA ID NO: M D D 0 0 0 7 3 1 3 5 6 OMB#: 2050-0034 Expires 11/30/2005

9. Legal Owner (Continued) Address	
	Street or P. O. Box: 2700 Broening Highway Dunmar Bldg N, Suite 120
	City, Town, or Village: Baltimore
	State: Maryland
	Country: USA — Zip Code: 21222

10. Type of Regulated Waste Activity
Mark "Yes" or "No" for all activities; complete any additional boxes as instructed. (See instructions on pages 18 to 21.)

A. Hazardous Waste Activities
Complete all parts for 1 through 6.

Y ☒ N ☐ **1. Generator of Hazardous Waste**
If "Yes", choose only one of the following - a, b, or c.

☒ a. LQG: Greater than 1,000 kg/mo (2,200 lbs./mo.) of non-acute hazardous waste; or

☐ b. SQG: 100 to 1,000 kg/mo (220 - 2,200 lbs./mo.) of non-acute hazardous waste; or

☐ c. CESQG: Less than 100 kg/mo (220 lbs./mo.) of non-acute hazardous waste

In addition, indicate other generator activities.

Y ☐ N ☒ d. United States Importer of Hazardous Waste

Y ☐ N ☒ e. Mixed Waste (hazardous and radioactive) Generator

Y ☐ N ☒ **2. Transporter of Hazardous Waste**

Y ☐ N ☒ **3. Treater, Storer, or Disposer of Hazardous Waste (at your site)** Note: A hazardous waste permit is required for this activity.

Y ☐ N ☒ **4. Recycler of Hazardous Waste (at your site)**

Y ☐ N ☒ **5. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark each that applies.
☐ a. Small Quantity On-site Burner Exemption
☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☒ **6. Underground Injection Control**

B. Universal Waste Activities

Y ☐ N ☒ **1. Large Quantity Handler of Universal Waste (accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste generated and/or accumulated at your site. If "Yes", mark all boxes that apply:**

	Generate	Accumulate
a. Batteries	☐	☐
b. Pesticides	☐	☐
c. Thermostats	☐	☐
d. Lamps	☐	☐
e. Other (specify) _____	☐	☐
f. Other (specify) _____	☐	☐
g. Other (specify) _____	☐	☐

Y ☐ N ☐ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities
Mark all boxes that apply.

Y ☐ N ☒ **1. Used Oil Transporter**
If "Yes", mark each that applies.
☐ a. Transporter
☐ b. Transfer Facility

Y ☐ N ☒ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark each that applies.
☐ a. Processor
☐ b. Re-refiner

Y ☐ N ☒ **3. Off-Specification Used Oil Burner**

Y ☐ N ☒ **4. Used Oil Fuel Marketer**
If "Yes", mark each that applies.
☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

EPA ID NO: M D D 0 0 0 7 3 1 1 3 3 6 1

OMB#: 2050-0034 Expires 11/30/2005

11. Description of Hazardous Wastes (See instructions on page 22.)

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D002						
D007						

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed for waste codes.

12. Comments (See instructions on page 22.)

13. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
For the RCRA Hazardous Waste Part A Permit Application, all operator(s) and owner(s) must sign (see 40 CFR 270.10 (b) and 270.11). **(See instructions on page 22.)**

Signature of operator, owner, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
[illegible]	- DIRECTOR MD. ENV. SERVICE	8-2-06
[illegible]	DEPUTY DIRECTOR OF ENGINEERING MPA	8-2-06

EPA ID NO: MDD000731356 OMB #: 2050-0034 Expires 11/30/2005

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact (See instructions on page 23)	First Name: Russell	MI:	Last Name: Downs
	Phone Number: 443-534-6001		Phone Number Extension:
2. Facility Permit Contact Mailing Address (See instructions on page 23)	Street or P.O. Box: 5501 Quarantine Road		
	City, Town, or Village: Baltimore		
	State: Maryland		
	Country: USA		Zip Code: 21226
3. Operator Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: MES 259 Majoles Road		
	City, Town, or Village: Millersville		
	State: Maryland		
	Country: USA	Zip Code: 21108	Phone Number 410-729-8305
4. Legal Owner Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: MPA 401 East Pratt Street		
	City, Town, or Village: Baltimore		
	State: Maryland		
	Country: USA	Zip Code: 21202	Phone Number
5. Facility Existence Date (See instructions on page 24)	Facility Existence Date (mm/dd/yyyy): August 5, 1980		

6. Other Environmental Permits (See instructions on page 24)

A. Permit Type (Enter code)	B. Permit Number	C. Description
F	A264	MD CHS Permit

← Other Pe... on Page 3 why not en... here

7. Nature of Business (Provide a brief description; see instructions on page 24)

Process Codes and Design Capacities (See instructions on page 24) - Enter information in the Sections on Form Page 3.

A. PROCESS CODE - *Enter the code from the list of process codes in the table below that best describes each process to be used at the facility. Fifteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), enter the process information in Item 9 (including a description).*

B. PROCESS DESIGN CAPACITY- *For each code entered in Section A, enter the capacity of the process.*

1. AMOUNT - *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.*
2. UNIT OF MEASURE - *For each amount entered in Section B(1), enter the code in Section B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.*

C. PROCESS TOTAL NUMBER OF UNITS - *Enter the total number of units for each corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure in Code Table Below
	Storage:	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure in Code Table Below
	Treatment:	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour
	Treatment (continued):	
T81	Cement Kiln	For T81-T93:
T82	Lime Kiln	
T83	Aggregate Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed In 40 CFR §260.10	
T94	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X):	
X01	Open Burning/Open Detonation	Any Unit of Measure in Code Table Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V

UNIT OF MEASURE	UNIT OF MEASURE CODE
Short Tons Per Hour	D
Metric Tons Per Hour	W
Short Tons Per Day	N
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	R
Million Btu Per Hour	X

UNIT OF MEASURE	UNIT OF MEASURE CODE
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
Btu Per Hour	I

EPA ID NO: M D D 0 0 0 7 3 1 1 3 5 6 1

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Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 8 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure (Enter code)	C. Process Total Number of Units	For Official Use Only
X	1	S 0 2	5 3 3 . 7 8 8	G	0 0 1	
	1		.			
	2		.			
	3		.			
	4		.			
	5		.			
	6		.			
	7		.			
	8		.			
	9		.			
1	0		.			
1	1		.			
1	2		.			
1	3		.			
1	4		.			
1	5		.			

NOTE: If you need to list more than 15 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in Item 9.

9. Other Processes (*See instructions on page 25 and follow instructions from Item 8 for D99, S99, T04 and X99 process codes*)

Line Number (Enter #s in sequence with Item 8)		A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure (Enter code)	C. Process Total Number of Units	D. Description of Process
X	2	T 0 4	1 0 0 . 0 0 0	U	0 0 1	In-situ Vitrification
			.			
			.			
			.			
			.			
			.			

9. Description of Hazardous Wastes (See instructions on page 25) - Enter information in the Sections on Form Page 5.

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in Section A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Section A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. UNIT OF MEASURE - *For each quantity entered in Section B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the listed hazardous wastes.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of Item 10.D(1).*
3. *Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 10.E.*

2. PROCESS DESCRIPTION: *If a code is not listed for a process that will be used, describe the process in Item 10.D(2) or in Item 10.E(2).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in Section A. On the same line complete Sections B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In Section A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Section D(2) on that line enter "included with above" and make no other entries on that line.*
3. *Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING Item 10 (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION- (If a code is not entered in D(1))
X 1	K 0 5 4	900	P	T	0	3	D	8	0				
X 2	D 0 0 2	400	P	T	0	3	D	8	0				
X 3	D 0 0 1	100	P	T	0	3	D	8	0				
X 4	D 0 0 2												Included With Above

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D. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number pages as 5 a, etc.)

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)			D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
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21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37							
38							
39							

EPA ID NO: M D D 0 0 0 7 3 1 3 5 6

OMB #: 2050-0034 Expires 11/30/2005

5. Description of Hazardous Wastes (Continued. Use this Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)			E. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in E(1))
4 0							

11. Map (See instructions on pages 25 and 26)

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

12. Facility Drawing (See instructions on page 26)

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

13. Photographs (See instructions on page 26)

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

14. Comments (See instructions on page 26)

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill (HWL) is a secure hazardous waste facility in Maryland, permitted by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southwestern corner of Baltimore City -(see Figure 3.1).

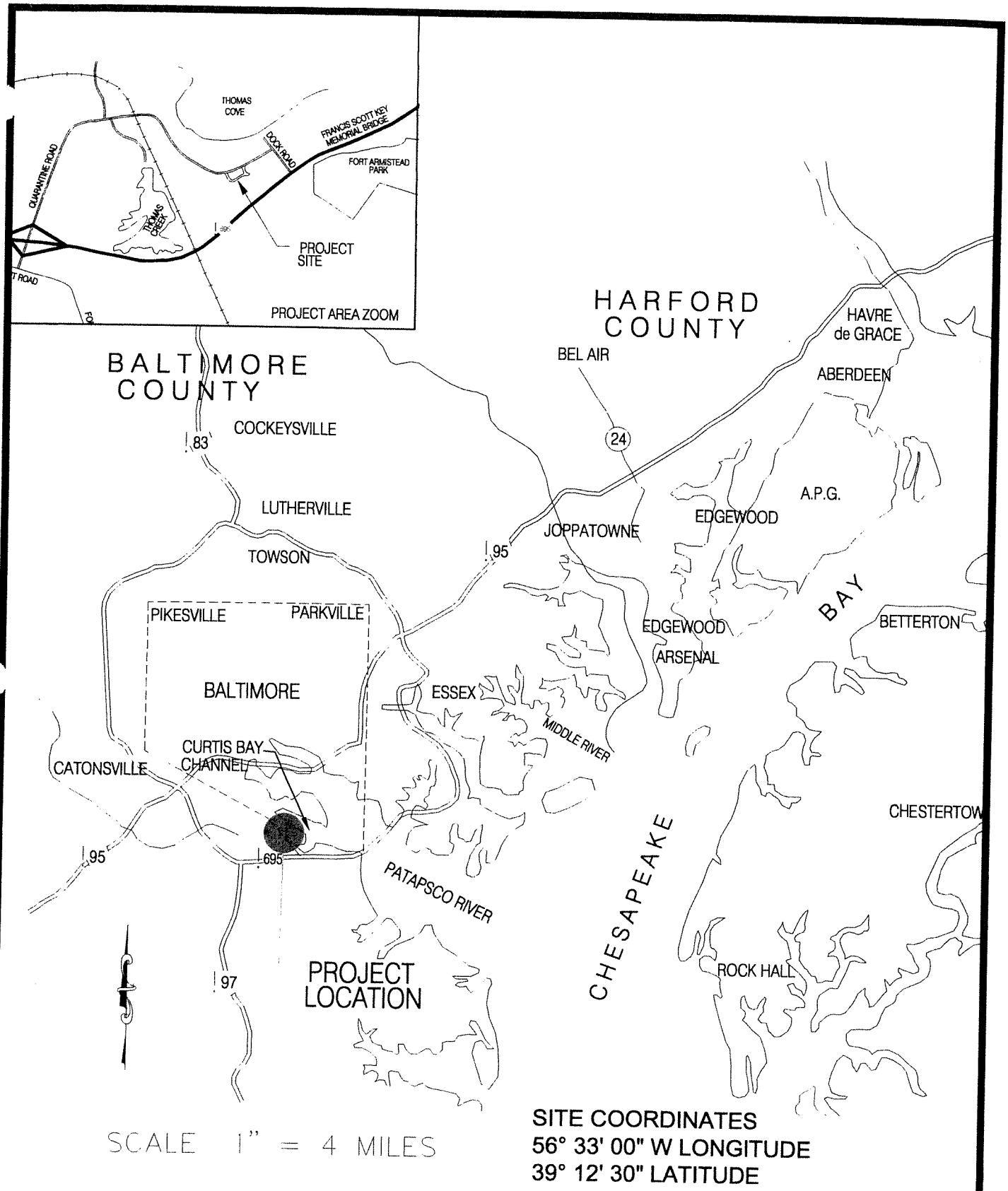
The Hawkins Point property, owned by the Maryland Port Administration (MPA), an agency of the State of Maryland, encompasses approximately 67 acres and is divided into six (6) areas (see Figure 3.2). Areas 1 and 6 are presently outside of the fenced area of the Hawkins Point facility. Area 1 is currently leased for use to EASTALCO Aluminum Co. Area 6 was previously leased to the Cosmin Corporation and is not currently being used.

Area 5, currently in post-closure care, was dedicated to the sole use of AlliedSignal, Inc (now Honeywell). for the disposal of chromium contaminated waste. In January of 1983, Maryland Environmental Services began accepting chrome ore tailings from the Baltimore Works facility owned by AlliedSignal. In 1985, the Baltimore Works facility closed. As part of closure, portions of the Baltimore Works facility were dismantled and handled as hazardous waste. The chromium contaminated debris which consisted of structural beams and concrete, brick, asbestos, soil (up until May 8, 1990) and other additional chromium contaminated debris was disposed in Area 5 until the ultimate capacity was reached in 1993. An estimated 451,450 tons of chromium–laden hazardous waste is disposed in Area 5. Presently, the only waste handling from Area 5 is the leachate generated from within the capped landfill.

Areas 2 and 3 contain closed chrome ore tailing cells constructed by the MPA and monitored and dewatered by the MES. The tailings are also from the former Baltimore Works plant. These cells continue to be monitored and maintained in the dewatered condition.

There was approximately 1,627,373 gallons of leachate collected from Areas 2, 3 and 5 in 2004 and approximately 1,058,735 gallons collected in 2005. The collected leachate is hauled to a Treatment, Storage, and Disposal (TSD) facility operated by Envirite in York, PA.

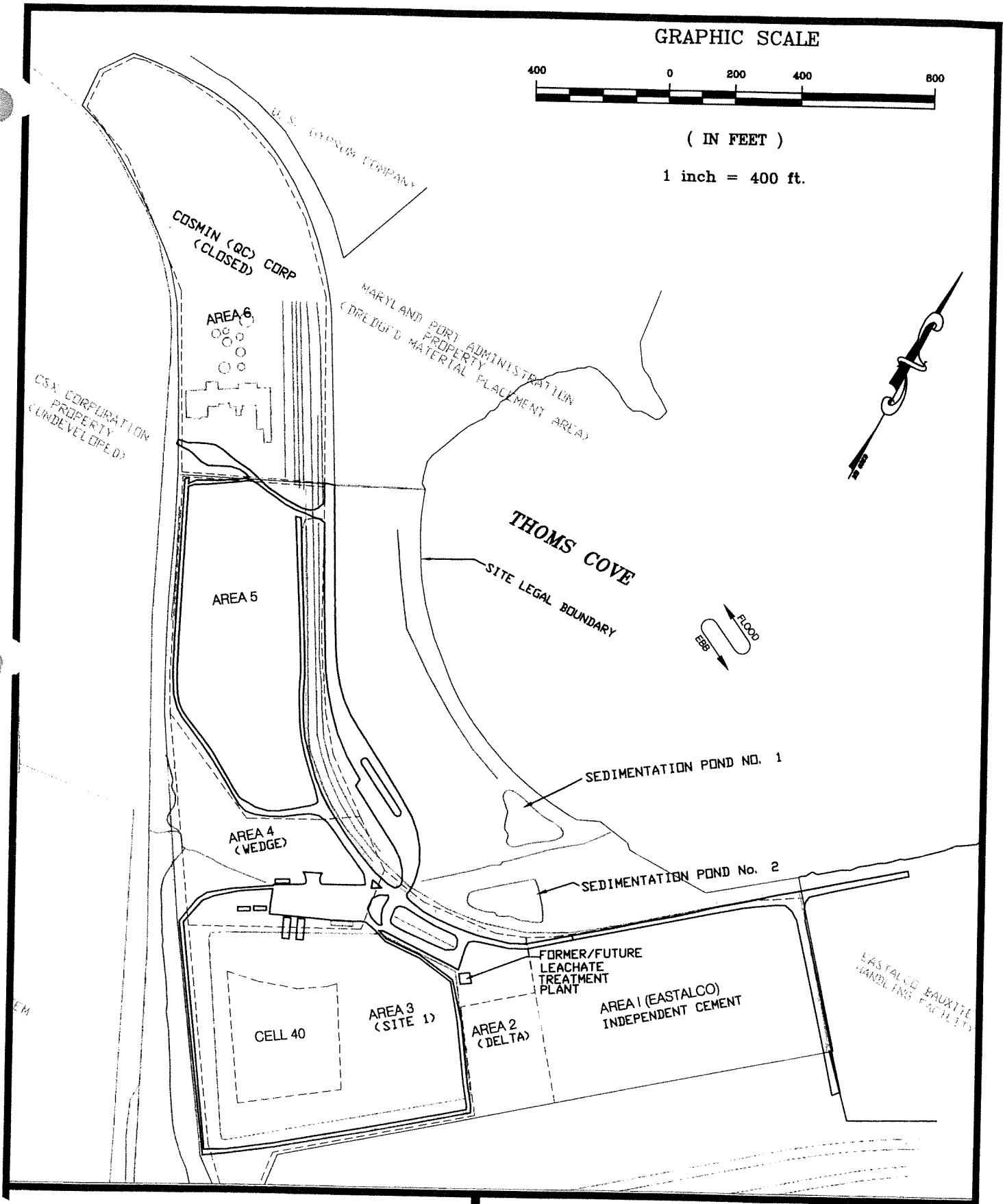
During January of 1983, Cell 40 located in Area 3 was opened to accept controlled hazardous waste. The cell was operated by MES for approximately eleven (11) months and due to economic reasons was then closed. All waste material was removed and transported to Fondessy, Ohio for disposal and the cell was returned to an "unused" condition. The 80 mil HDPE liner is still in place in the cell and acts as an impervious cap over the underlying old chrome cells in the area.



SITE COORDINATES
56° 33' 00" W LONGITUDE
39° 12' 30" LATITUDE

MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT HAZARDOUS WASTE FACILITY
VICINITY MAP
FIGURE 3.1



MARYLAND
ENVIRONMENTAL
SERVICE

HAWKINS POINT HAZARDOUS WASTE LANDFILL
FACILITY DRAWING
FIGURE 3.2

C:\HMI\NC\DRW '93.DWG

Area 4 has previously been used for experimenting with chrome ore tailings fixation. However, little actual data is available regarding the dates of the filling or the characteristics of the wastes received. A "paint sludge" is believed to also have been deposited in this area. The deposit was discovered by MES personnel and reported to the Maryland Department of Health and Mental Hygiene in 1982.

In March 2003, a seep was discovered at the southeastern corner of Area 5. Honeywell performed a detailed engineering study to evaluate Area 5 cap integrity. As a result, in December 2005, a toe drain was installed at the location of the seep to retrieve the seep and direct contaminated liquid to the existing leachate collection system.

3.2 SITE DEVELOPMENT

To date, four (4) construction contracts have been completed for facilities to serve all areas of the Hawkins Point -HWL site. These include:

6 Cont'd expl'd below

A. "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).

- Groundwater interceptor bordering the western and southern edge of Area 3.
- Sedimentation Ponds No. 1 and 2.
- Drainage ditches and culverts tributary to the sedimentation ponds.

B. "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982)

- Leachate storage and transfer area.
- Leachate collection system for chrome ore tailings underlying Area 3 and Area 5.
- Electrical service improvements.

C. "Contract 3: CHS Landfill Expansion" (November 5, 1982)

- Entrance road.
- Scale plaza.
- Truck-wash pads.
- Sanitary sewerage holding systems.

- Drainage improvements.
- Security fencing.
- Cell No. 40 earthen berms, liner system, and leachate collection system.

D. Capping of Area 5 was performed under MES Construction Contract ID No. 93-03-140 "Area 5 Final Cap Construction - Hawkins Point Hazardous Waste Landfill" (July 1993). Area 5 was certified closed by John P Taylor, an independent Professional Engineer on July 22, 1994. A copy of the Certification is included in Appendix I.

E. "Contract 4 – Leachate storage tanks" February 1999 contract ID No. 97-03-44R

- Abandoned two (2) 30,000-gallon underground leachate storage tanks and replaced with one (1) 20,000-gallon above ground storage tank

F. "Contract 5 – Additional Manhole between 220 & 221"

G. "Contract 6 – Repairs to Seep in Area 5

- Engineering study on cap integrity
- Design and construction of toe drain with tie-in to existing leachate system

3.3 PERMITS

The Hawkins Point HWL currently operates under EPA Final RCRA Permit Number MDD 000731356, and State of Maryland Controlled Hazardous Substances Facility Permit Number A-264, effective January 28, 2002, with an expiration date of January 27, 2007. This document is intended as an application to renew the RCRA Permit.

The original Controlled Hazardous Substances Facility Permit Number A-264, which became effective November 30, 1982, authorized the disposal of specified general hazardous wastes in Cell No. 40 of Area 3. A RCRA Part B permit application for the expansion of Area 3 with Cell No. 41 through 49 was submitted to the EPA on August 1, 1983, while the facility operated under interim status. After cessation of active operations the interim status of Area 3 expired on November 8, 1985.

Various other permits are required and have been issued for environmental and support features of the site. Disposal permits from the City of Baltimore, Department of Health have been issued (Permit No. 65, February 1, 1981 to January 31, 1982; Permit No. 74, February 1, 1982 to January 31, 1983) and renewed as necessary. A Sediment Control permit, WRA No. 82SF0441, was issued on February 18, 1982 by the State Water Resources Administration (WRA). A National Pollutant Discharge Elimination System (NPDES) permit for the facility (State Permit No. 85-DP-2229, NPDES Permit No. ND 0061417) was originally issued on May 1, 1986 and reissued on April 1, 1997. Since the WWTP stopped operating, the site now operates under the State of Maryland General Discharge Permit for Storm Water Associated with Industrial Activities (Discharge Permit No. 02-SW) which was issued December 1, 2002 with the expiration date of November 30, 2007. A copy of this permit is included in Appendix H. A Wastewater Discharge Permit application (Identification No. 1-08955) was submitted to the City of Baltimore on March 18, 1992 for discharge of an effluent stream from the leachate treatment system. Since the WWTP stopped operating, the permit is not applicable for this facility and will not be issued because there is no discharge into the City sewer system. The application will be retained in City files for information only.

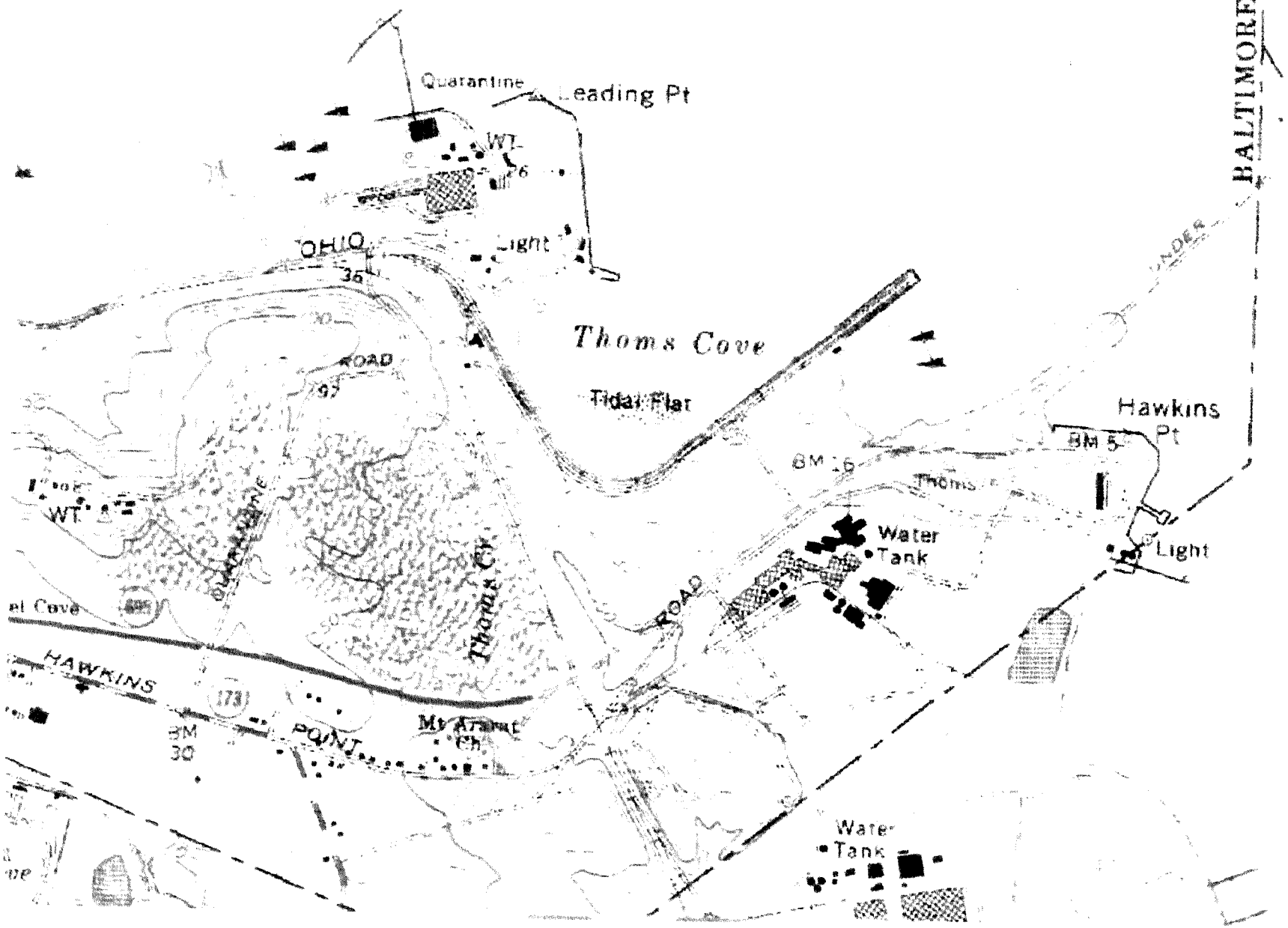
3.4 TOPOGRAPHIC MAP

3.4.1. Figure 3.3 depicts a topographic map outlining the existing general site plan and the development of the area surrounding the site. The topographic map was derived from aerial photography obtained on July 1, 1982.

The following details are required under COMAR 26.13.07.02D(6) to be described and depicted on the topographic map in Figure 3.3 to aid in the permit application review.

a. Intake and Discharge Structures. There are no intake structures for this facility. There are two (2) existing discharge structures labeled as Settlement Pond 1 and 2. The sediment ponds collect surface water run-off from the facility and then discharge into Thoms Cove.

b. Hazardous Waste Treatment, Storage, or Disposal Facilities. Each of the disposal areas: Area 5, Cell 40, and the MPA cells in Area 3 are shown on the map. Cell 40 is no longer a disposal site. Two (2) 30,000-gallon underground tanks are shown on the map. These two (2) tanks are no longer in use (closed March 1999) and replaced with a single aboveground 20,000-gallon tank as part of the leachate holding and transfer area (refer to Section 4.0 for additional tank information).



HAWKINS POINT HAZARDOUS WASTE FACILITY

AREA TOPOGRAPHIC MAP

FIGURE 3.3

c. Wells Where Fluids Are Injected Underground. There are no wells at this facility where fluids from the facility are injected underground.

d. Wells, Springs, and Other Surface Water Bodies Within 1/2 Mile of the Facility Boundary. Surface water bodies are designated on the map. A listing of wells within ½ mile of the site registered in public records was requested from the Maryland Department of the Environment.

3.4.2. The following details are required under COMAR 26.13.07.02D(35) to be described and depicted on a topographic map as shown on Figure 3.3 to aid in the permit application review.

Topo
Need
& info.

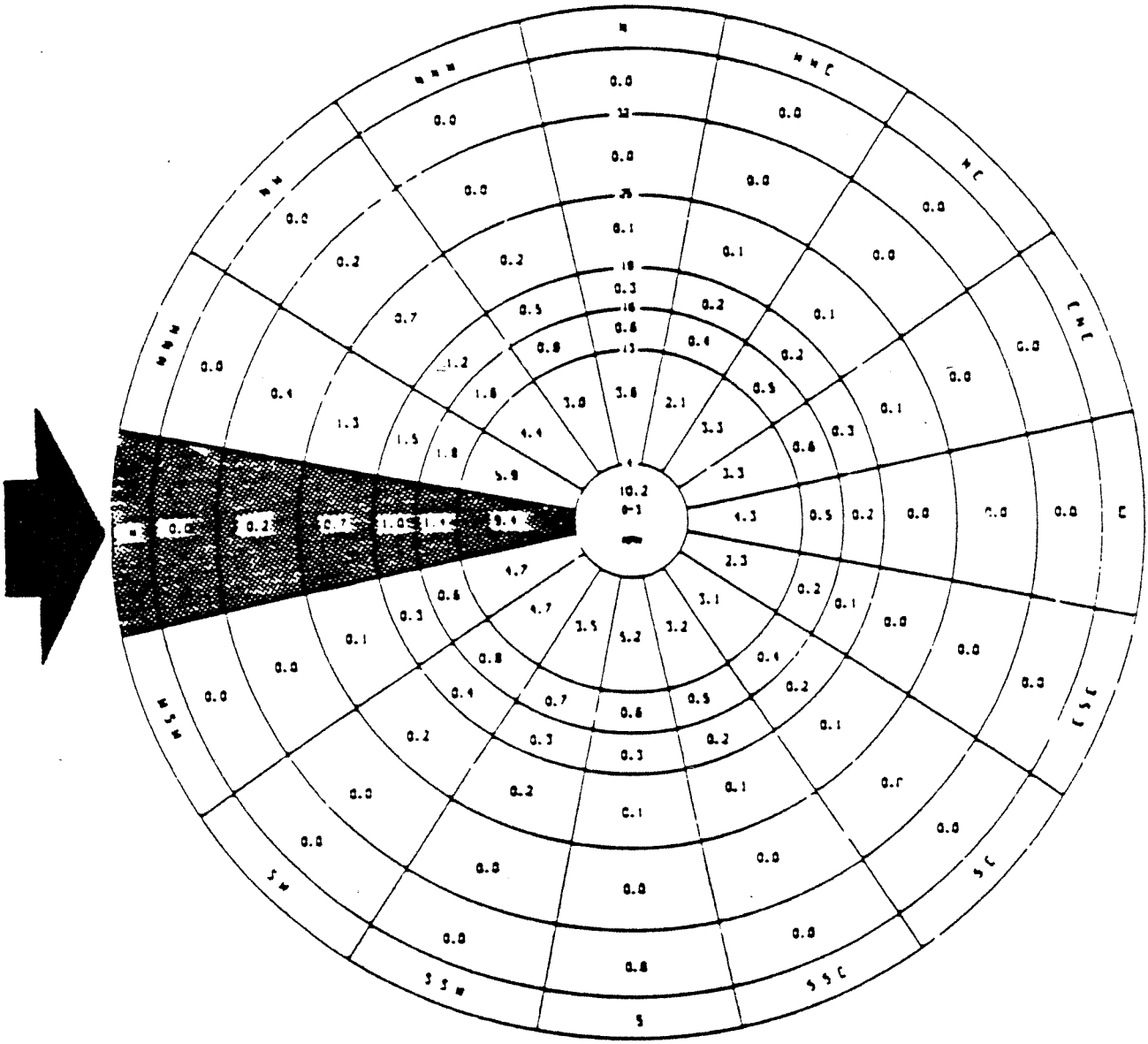
a. Map Scale and Date. Please note that the referenced topographic map was derived from aerial photography obtained on April 1, 1983 and has a scale of 1 inch equal to 200 feet, and a contour interval of 2 feet.

b. 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone X, areas determined to be outside of 500 year floodplain, by the Federal Emergency Management Agency (FEMA).

c. Surface Waters. Surface water streams in the Hawkins Point Area generally flow easterly, and discharge into Thoms Cove on the western bank of the Patapsco River. Surface water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area. The directions of these flows are indicated on the topographic map.

d. Land Uses. The surrounding land use is primarily zoned for heavy industrial use. Limited undeveloped land and park land does exist as indicated. No residential land uses occur within 1,000 feet of the property boundary.

e. Wind Rose. Figure 3.4 depicts the wind rose of meteorological data collected from 1987 through 1988 and 1990 through 1992. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area from April 1 through October 31, This data is measured at the Baltimore-Washington International Airport (BWI), located approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Data Center. The predominate wind direction is from the west and average wind speeds are below 10 miles per hour.



WIND ROSE FOR BALTIMORE, MARYLAND

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.4

g. Facility Boundary. The facility boundaries encompass Areas 2, 3, 4, 5 and 6. These five (5) areas are formerly, or presently, in use with the exception of Area 6 which was never used as a hazardous waste treatment, storage or disposal area.

h. Access Control. The main entrance road will convey traffic to and from the facility. This road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1 and at the northern end of Area 5. A 6-foot high chain-link security fence with a barbed-wire top, 3-strand barbed wire fence, and a total of 5 access gates, surrounds the facility as shown in Figure 3.3.

i. Injection and Withdrawal Wells. There are no injection or withdrawal wells associated with this facility.

j. Building, Treatment, Storage, or Disposal Operations, or Other Structures. Existing structures within the facility include a leachate loading facility, having a corrugated metal roof shelter located in the leachate loading and transfer area; and a truck wash facility which has a corrugated metal roof shelter located in the truck wash pad area. A trailer on site serves as an office, crew quarters and safety station. An aboveground leachate storage tank and a metal building that was the location of the leachate treatment system building are also located on site.

k. Barriers for Drainage or Flood Control. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into three (3) categories:

1. Storm water that has the potential of being contaminated by contact with hazardous waste is directed to the leachate collection system and holding tank for transfer to permitted treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of facility is conveyed to one of two sedimentation ponds or a perimeter drainage swale before discharging into Thoms Cove.

l. Location of Operational Units Within the Hazardous Waste Management Facility Site, Where Hazardous Waste is Treated, Stored or Disposed. Closure of Area 5 is complete. Two (2) 30,000-gallon underground leachate

holding tanks are no longer in use and a new 20,000-gallon above ground storage tank has been installed. Areas where hazardous waste has been disposed of during prior years is delineated on Figure 3.3. The now nonexistent leachate holding lagoons and the IU conversion systems stabilization demonstration area are (2) two such areas. Leachate from the two (2) previous areas of disposal (Areas 3 and 5) will continue to be collected and transferred from the aboveground storage tank at the leachate holding and transfer area.

3.5 TRAFFIC PATTERNS

3.5.1. Traffic Characterization and Routing

The on-site traffic flow pattern is presented in Figure 3.5. All traffic including facility employees and visitors, will enter the facility from Quarantine Road onto the dual lane, 2-directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

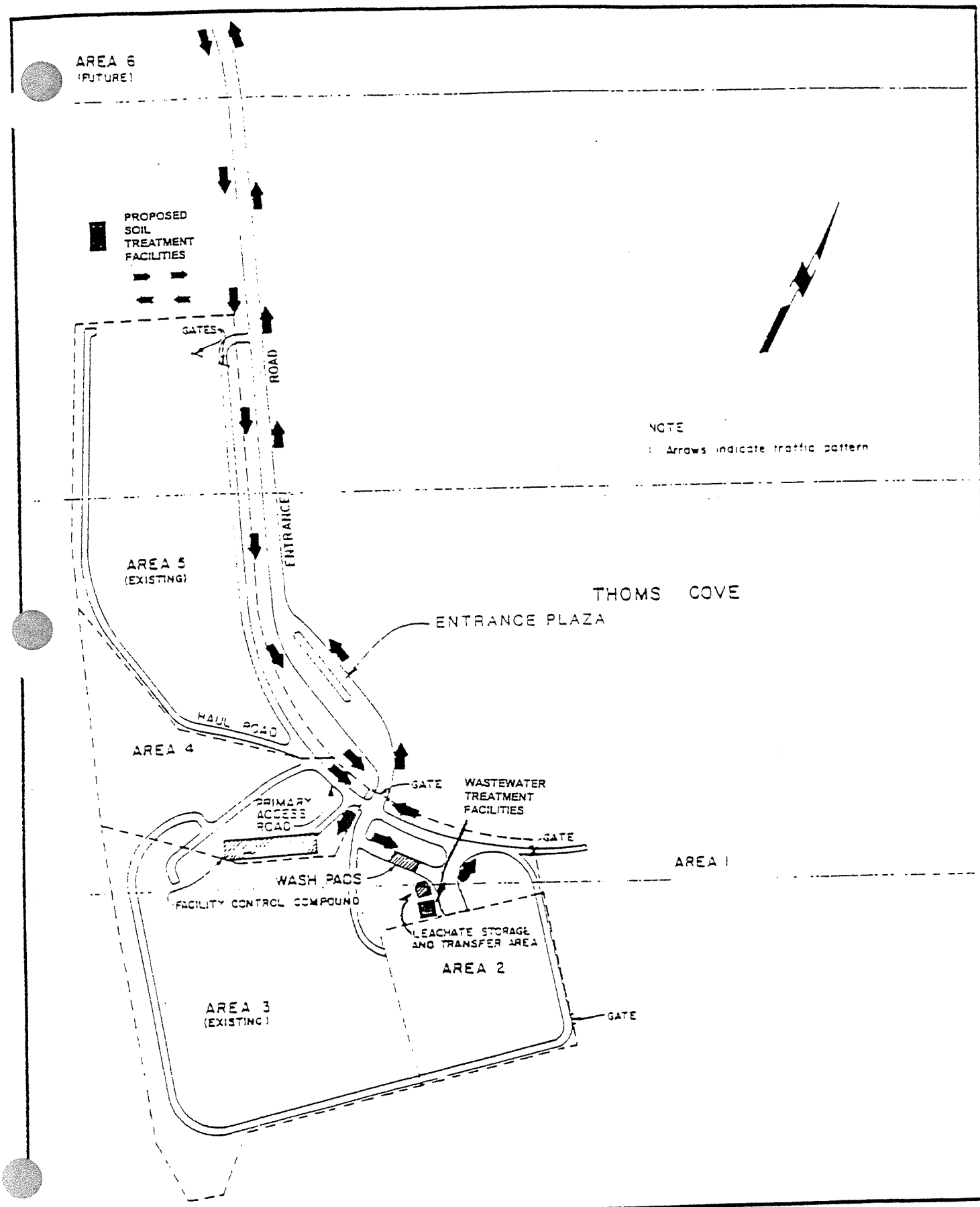
All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the unloading areas, will be directed to the truck wash pads of the Hawkins Point Facility. All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

Quarantine Road accesses the U.S. Gypsum Company Plant and the BFI, SCM, Hawkins Point HWL, and the Baltimore City landfill. The traffic imposed on this road is minimal, consisting primarily of waste hauling vehicles, tractor-trailers, and employee passenger vehicles. The road is designed for the H-S 20 ton truck, highway bridge loading of the AASHTO Standard Specifications for Highway Bridges.

3.5.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminated soil and waste materials are removed from the exterior of the vehicle either by use of a potable water hose, power washer unit or by brushing. Vehicle surfaces to be checked include the wheel axle assemby, rear bumper, rear of the dump bed and tailgate assembly. All contaminated wash water will flow to a separate oil interceptor and then to the leachate storage area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank, and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank would be checked daily when the wash rack is used and the tank emptied as necessary. The



ON-SITE TRAFFIC ROUTING: AREA 5

Maryland Environmental Service

Hawkins Point Hazardous Waste Landfill

Figure 3.5

portable steam cleaner should be serviced in accordance with the manufacturer's instructions.

3.6 ADDITIONAL BACKGROUND INFORMATION

3.6.1. NAICS Code:

924110: Administration of Air and Water Resource and Solid Waste Management Programs

3.6.2. Geographic Location of Facility:

Latitude: 39 12'30" N Longitude: 76 33'00" W

3.6.3. Operator:

Maryland Environmental Service
259 Najoles Road
Millersville, Maryland 21108
(410) 729-8200
Operator status: Agency of the State of Maryland

3.6.4. Owner:

Maryland Port Administration (MPA)
2700 Broening Highway
Dunmar Building N, Suite 120
Baltimore, Maryland 21222
(410) 333-4500
Owner status: Agency of the State of Maryland

3.6.5. Political Jurisdiction of Facility:

District 46 of Baltimore City

3.6.6. Photographs of the facility, Figure 3.6 are as follows:

a. Existing Structures and Areas

- Truck wash facility on Picture 7
- Leachate holding and transfer area on Picture 9
- Settlement pond no. 1 on Picture 2
- Settlement pond no. 2 on Picture 3
- Area 6 on Picture 1

b. Existing treatment, storage and disposal areas (tank information added)

- Disposal Area 5 on Picture 4

- MPA disposal cells underlying Cell No. 40 on Picture 5
- 20,000-gallon storage tank on Picture 8

c. Past / possible future treatment, storage and disposal areas

- Former WWTP building on Picture 6

3.6.7 Indian Lands

This facility is not on Indian Lands.

3.6.8 Faults

According to the Map of Young Faults in the United States, published by the United States Geological Survey (USGS) in 1977, there are no known fault displacements within the last 15 million years in Maryland or Delaware. The nearest mapped fault of any age is inferred to be approximately 6 miles to the northwest of the site.

3.7 FEDERAL COMPLIANCE

The facility is in compliance with the applicable Federal laws listed in 40 CFR 270.3 as follows:

3.7.1 Wild and Scenic Rivers Act

Section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established. This facility is not a water resources project, and is therefore in compliance. In addition, the only river in the nearby vicinity of the Hawkins Point facility is the Patapsco River, which is not a national wild and scenic river.

3.7.2 Natural Historic Preservation Act of 1966

Section 106 of the Act and implementing regulations (36 CFR 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. Since there are no licensed activities and properties listed or eligible for listing in the Register near the facility, it is in compliance with the Act.

3.7.3 Endangered Species Act

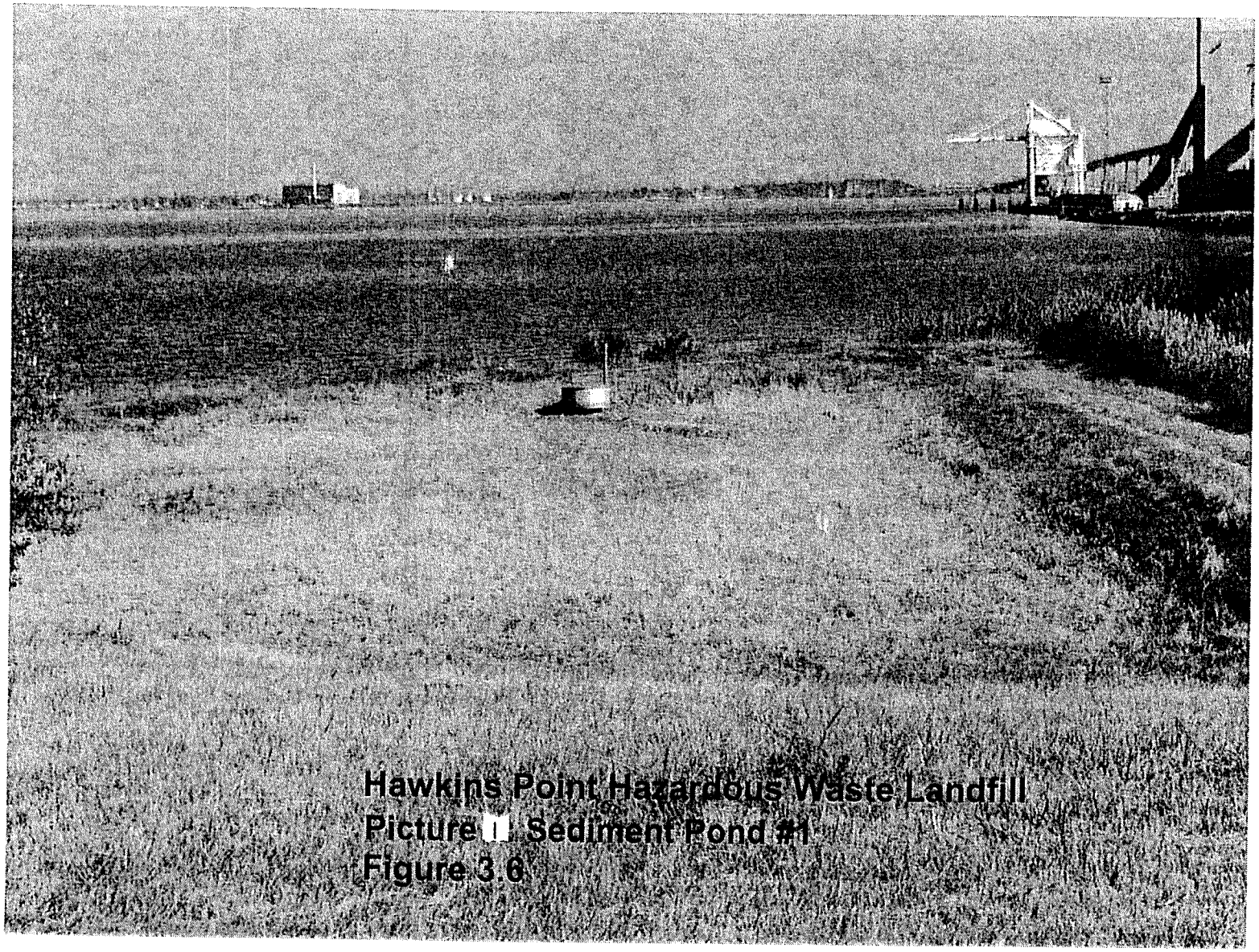
Section 7 of the Act and implementing regulations (50 CFR 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior of Commerce, that any action authorized by the USEPA is not likely to jeopardize the continued existence of any endangered or threatened species, or adversely or threatened species in the area, the facility is in compliance with the Act.

3.7.4 Coastal Zone Management Act

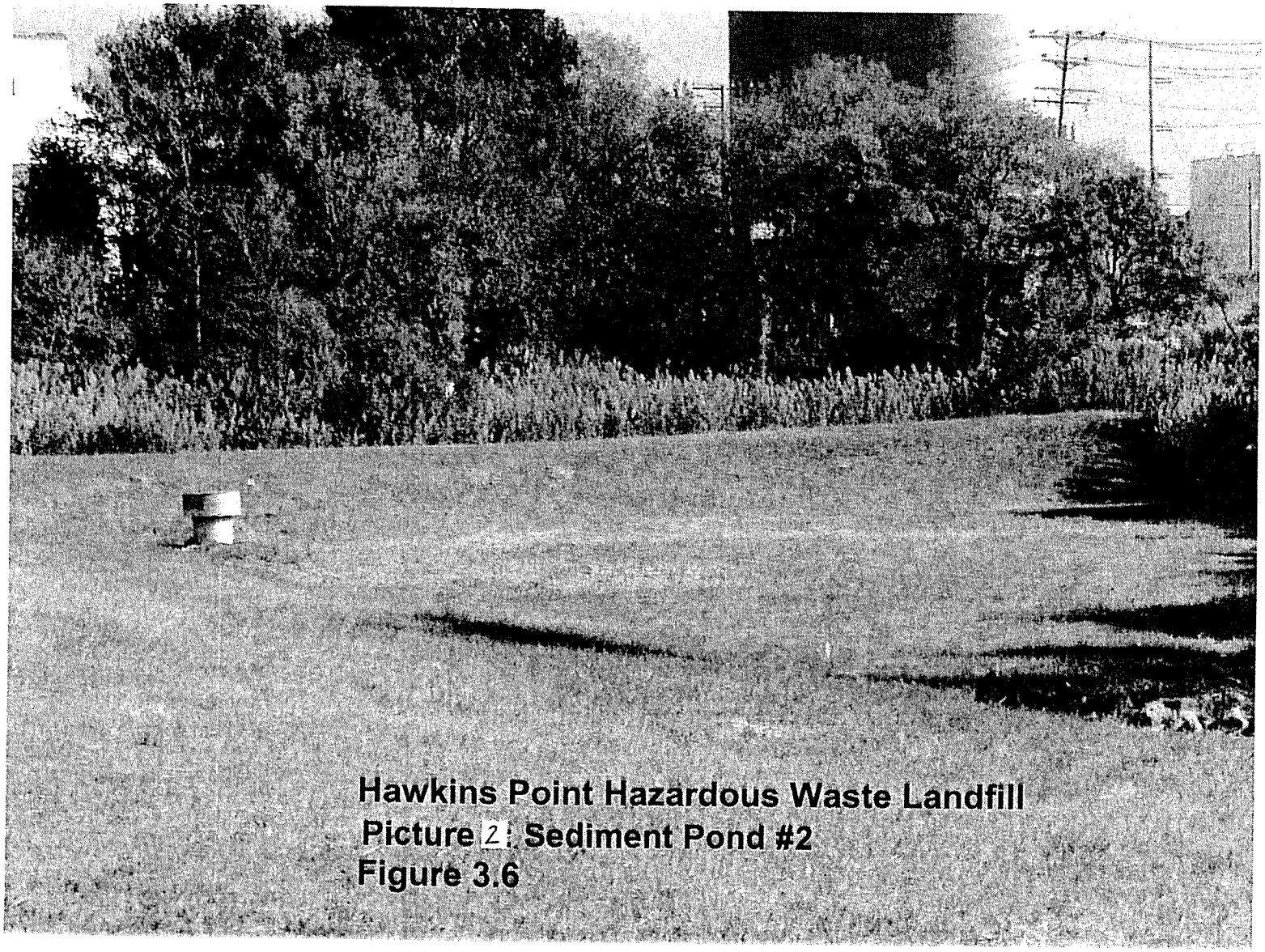
Section 307(c) of the Act and implementing regulations (15 CFR 930) prohibit the USEPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management Program; and the State or its designated agency concurs with the certification (or the Secretary of Commerce override the State's non-concurrence). This facility is located in a riverine area, not a coastal zone; and therefore, is in compliance with the Act.

3.7.5 Fish and Wildlife Coordination Act

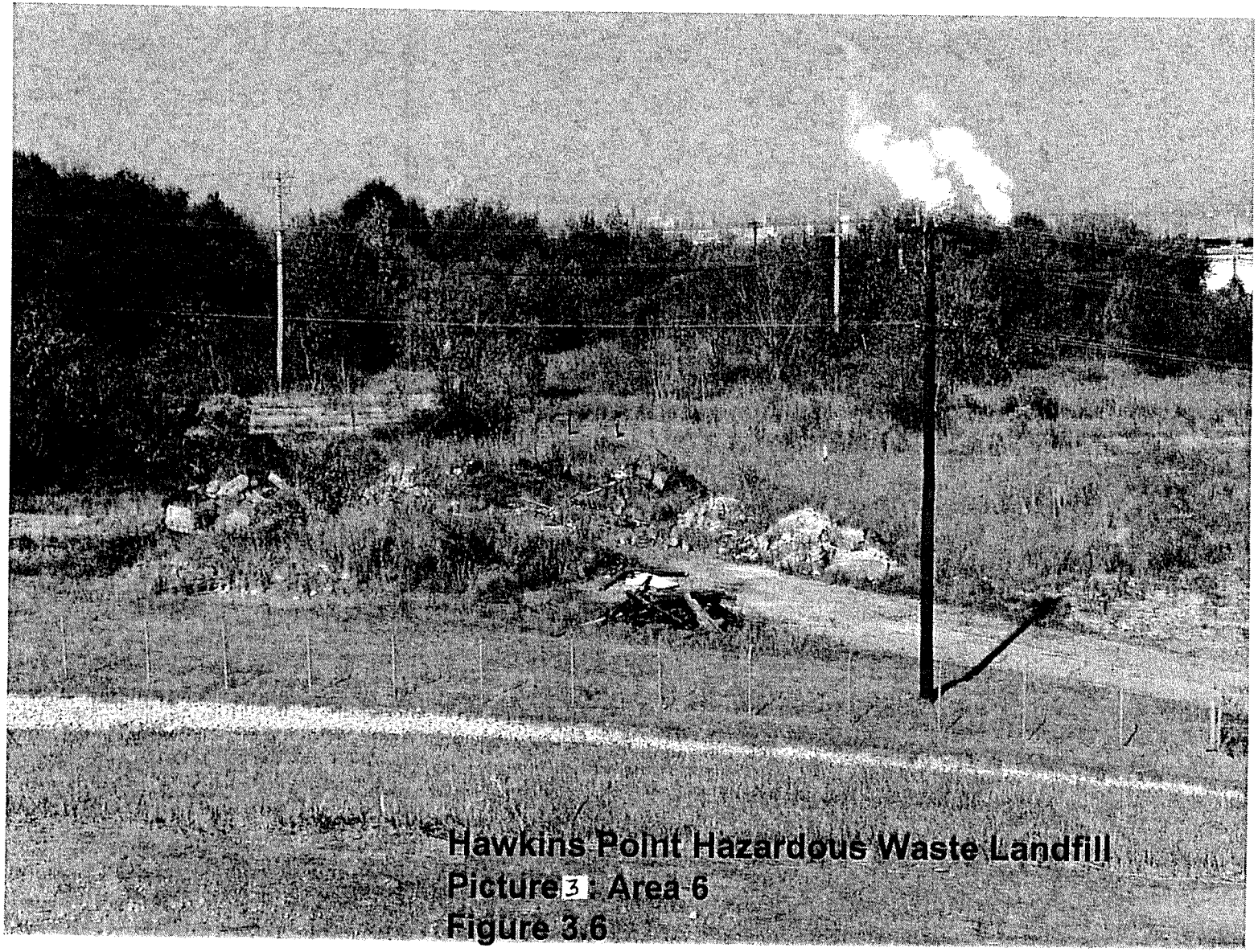
The Act requires that the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve those resources. The facility does not impound, divert, or control or modify any body of water, and therefore is in compliance with the act.



Hawkins Point Hazardous Waste Landfill
Picture 1. Sediment Pond #1
Figure 3.6

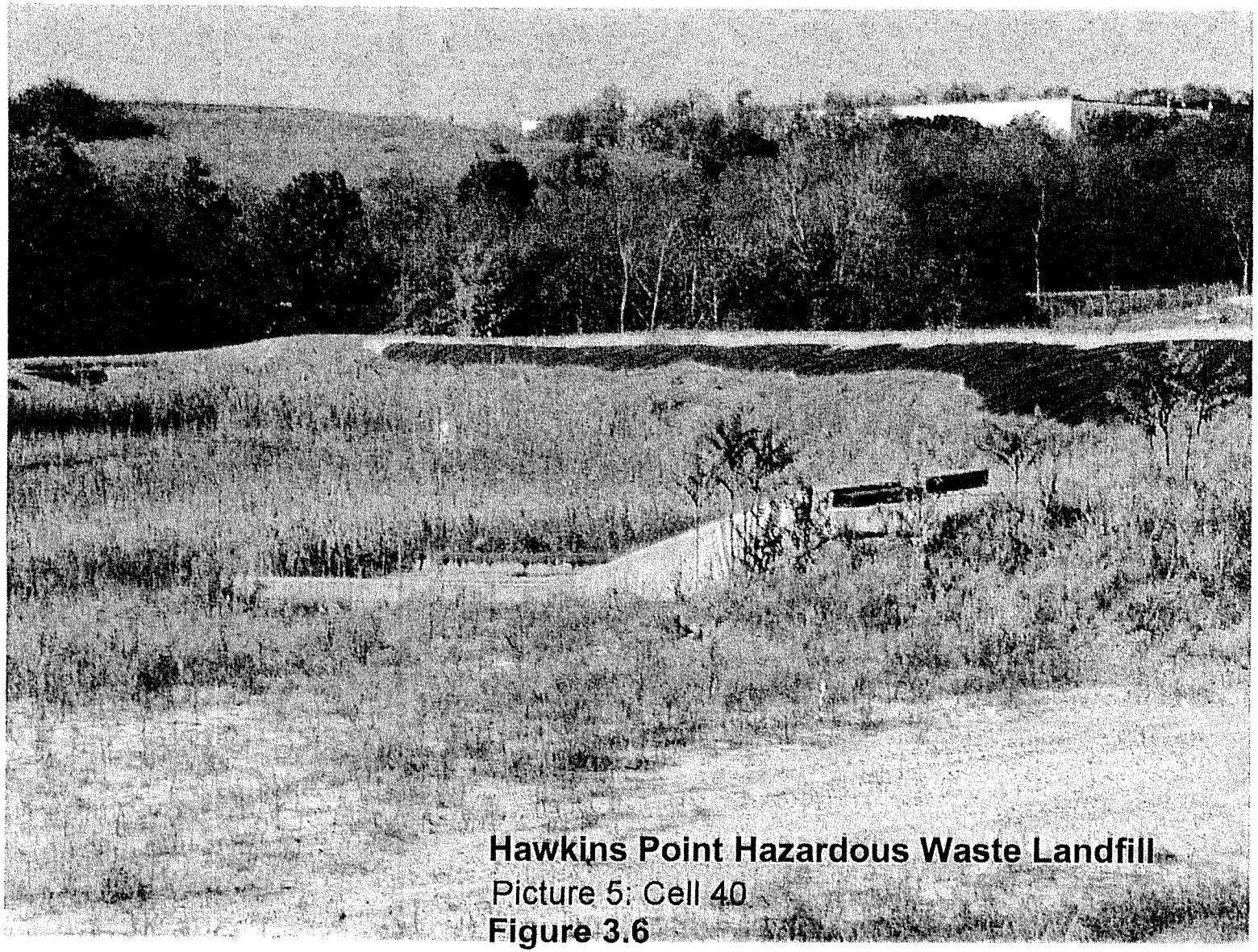


Hawkins Point Hazardous Waste Landfill
Picture 2: Sediment Pond #2
Figure 3.6

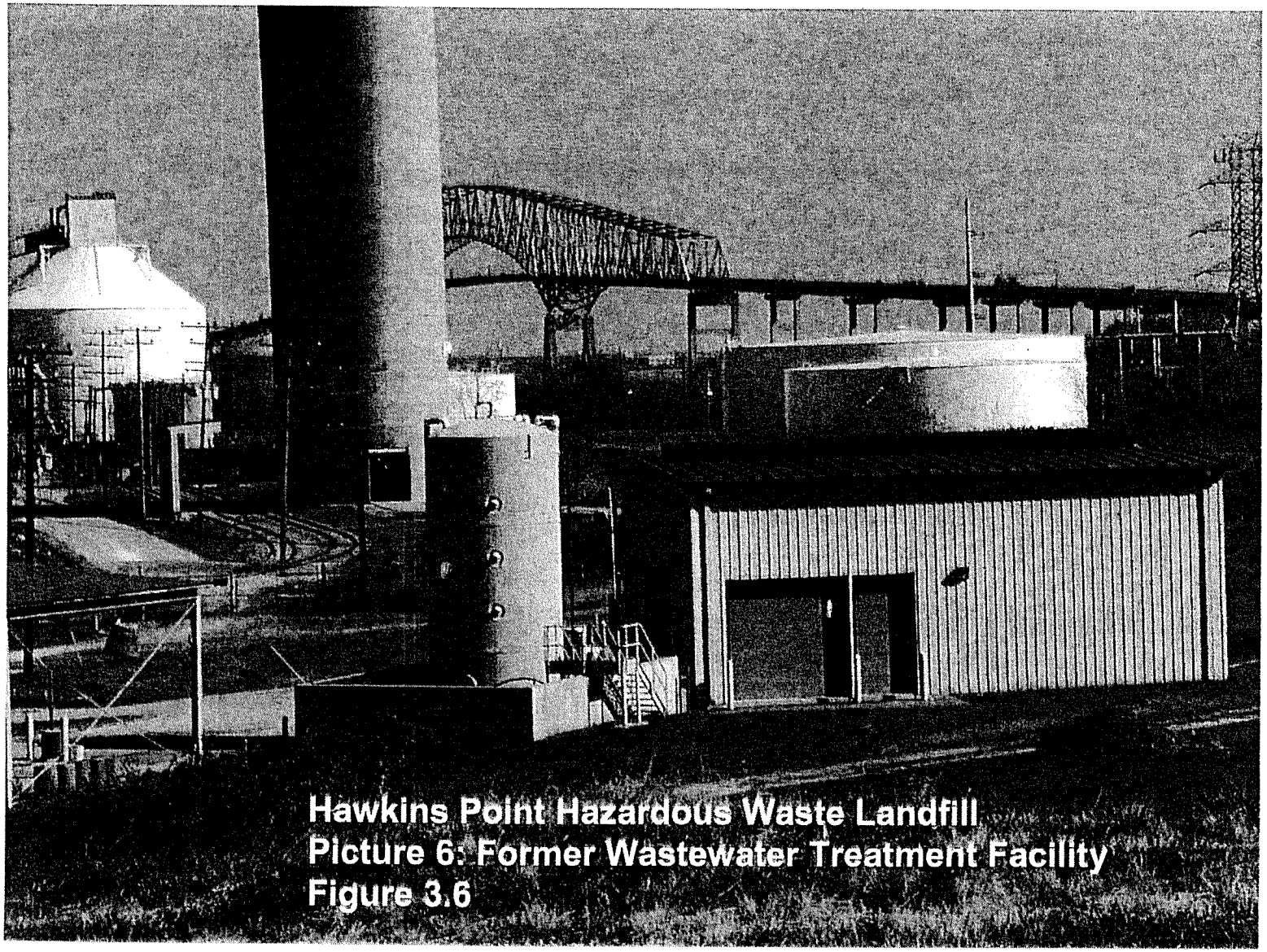


Hawkins Point Hazardous Waste Landfill
Picture 3 Area 6
Figure 3.6

Hawkins Point Hazardous Waste Landfill
Picture 4: Area 5
Figure 3.6

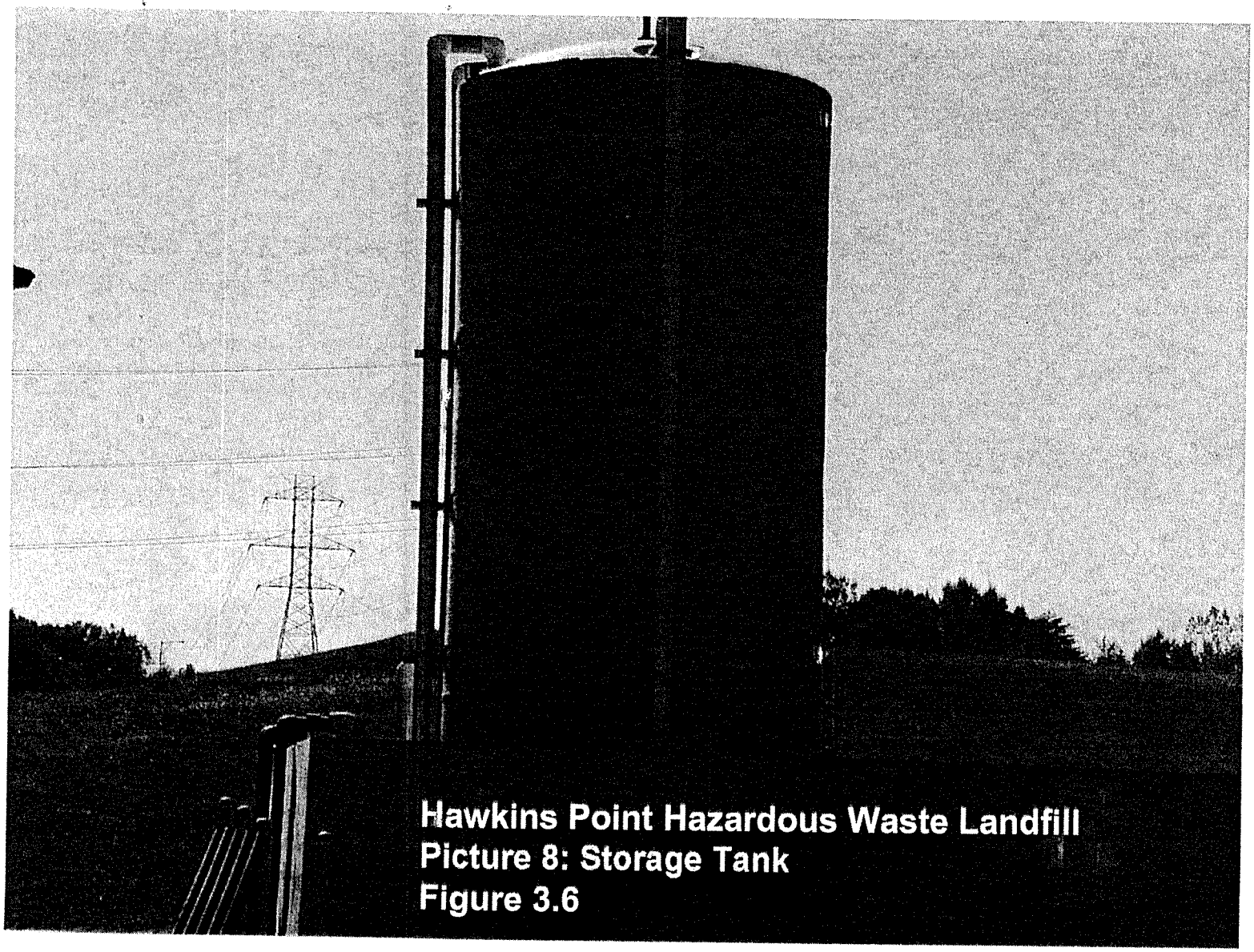


Hawkins Point Hazardous Waste Landfill
Picture 5: Cell 40
Figure 3.6

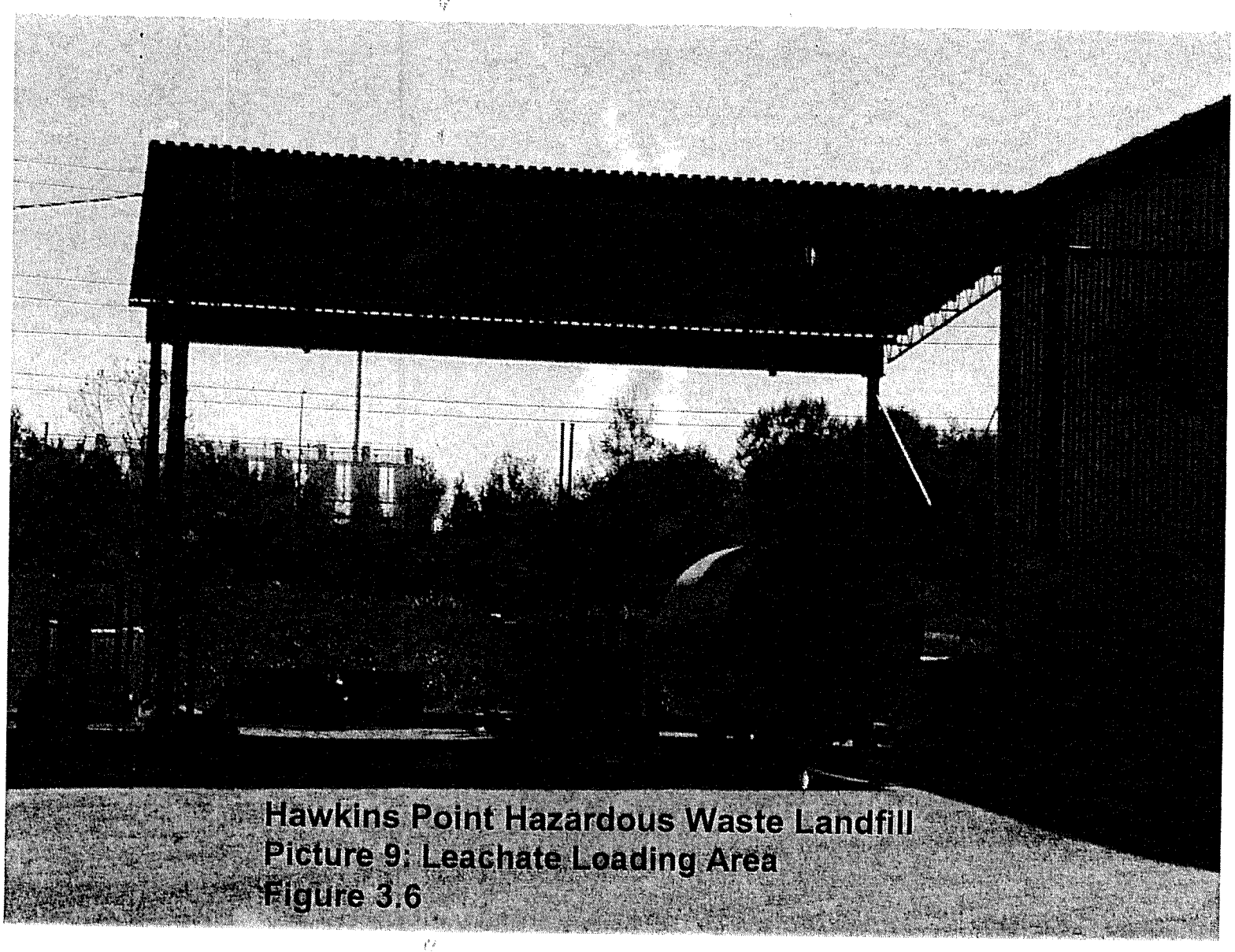


Hawkins Point Hazardous Waste Landfill
Picture 6: Former Wastewater Treatment Facility
Figure 3.6

Hawkins Point Hazardous Waste Landfill
Picture 7: Truck Wash Racks
Figure 3.6



Hawkins Point Hazardous Waste Landfill
Picture 8: Storage Tank
Figure 3.6



Hawkins Point Hazardous Waste Landfill
Picture 9: Leachate Loading Area
Figure 3.6

12.0 EXPOSURE INFORMATION

Data and related information pertaining to site hydrology and aquifer usage presented in this Section is a synopsis of the 1985 document by Black & Veatch, Engineers-Architects, "Hydrogeologic Assessment - Area 5, Hawkins Point Hazardous Waste Landfill."

12.1 Potential for Human Exposure via the Groundwater Pathway

12.1.1 General Hydrogeology

12.1.1.1 Area 5 and 6

In summary, local ground water contours indicate flow across Area 5 and 6 from the east and northeast toward Thoms Cove. This conforms to regional ground water flow directions from the uplands west of the site toward Thoms Cove. A component of the local flow indicates some ground water movement toward a trough at the southern end of Area 5. This may indicate flow through the thick post-Cretaceous sediments associated with Thoms Creek and toward Thoms Cove. Thus in the site area, the general flow direction for the near surface aquifer is toward Thoms Cove, away from any current or potential withdrawal locations.

The logs of borings in and around the site indicate distinct silt and/or clay layers, even in borings which encounter primarily sand strata. As a consequence, vertical ground water flow may be impeded, both during infiltration and during ground water migration to deeper strata. Low conductivity inclusions can be responsible for locally-confined conditions, and significant vertical head gradients may be observed across such barriers to flow. On a regional level, much of the Patapsco Formation is reported to be under confined conditions. At the site, most of the field permeability test data conforms to the hypothesis of a confined aquifer. Hydraulic conductivity estimates were also developed from field test results. The hydraulic conductivity estimates in the vicinity of Area 5 generally range over more than 3 orders of magnitude, from 0.03 centimeters per second (cm/see) to less than 0.00001 cm/sec.

12.1.1.2 Area 3

Ground water contours across Area 3 indicate flow generally in an easterly direction toward Thoms Cove, although local ground water contours indicate a mound in the surface water table beneath Cell No. 40 in Area 3. This local mounding is interpreted to be the result of precipitation draining from the increased storage capacity of fill place in the area, causing local flow to radiate

away from the center of the pile. This effect is attenuated by the regional flow gradients moving onto the site from the west toward Thoms Cove; normalized piezometric elevations (without mounding) are estimated to range from elevation +10.0 to +5.0 feet mat within the old Maryland Port Administration (MPA) tailing cells. Thus, any regional lateral movement of leachate from the cells would be expected to be toward the Patapsco River. In addition, a ground water interceptor system in Areas 2 and 3 constructed in an "L" configuration along the western and southern boundaries of the MPA cells appears to be lowering water levels and creating a depression along the southern boundary of the cells.

The vertical (downward) movement of leachate is impeded in the area by lower permeability lenses and stratigraphic layers, including the Arundel Formation clay at an estimated depth of 200 feet below the tailings cells. Due to the probability of relatively greater lateral than vertical ground water velocities, the regional ground water gradients, and the proximity of the Patapsco River (approximately 600 feet from the MPA tailing cells), it is most likely that if contaminant movement occurred, it would be intercepted by the river and would not significantly impact the Patapsco or Patuxent aquifers. This would preclude any adverse impact on current or future areas of withdrawal by contaminants emanating from the Hawkins Point site.

The rate at which this movement occurs cannot be precisely determined due to the complex geologic stratigraphy characteristic of the site. In Areas 2 and 3, clays predominate but lenses of silt and sand have been documented. Hydraulic conductivities under and in the vicinity of Area 3 vary by a factor if 10-, from 5.5 x 10 centimeters per second (cm/sec) to 6.6 x 10 cm/sec. Lateral velocities for ground water in Area 3 have been estimated to range from 2 feet per day to less than 0.02 feet per day within clay-type soils.

12.1.2 Aquifer Usage

The Patapsco Formation comprises the most widely used aquifer in the Maryland Coastal Plain. The Patapsco aquifer is a source of ground water for the towns of Annapolis, Glen Burnie, Odenton, Forest Heights, Indian Head and Bowie, all located south of the site. Many industries in the Baltimore area additionally utilize cooling water obtained from the Patapsco aquifer. A large, untapped supply of water is available for future development from this formation.

The Anne Arundel County, Department of Public Works - Glen Burnie System has the capability to operate approximately 20 large capacity wells within a 7-mile radius of the site, that utilize the Patapsco aquifer, it is considered unlikely that the Hawkins Point HWL site could have an averse effect on the quality of these wells. Several other landfills (such as the BFI/Quarantine Road, SCM/Glidden, and the BFI/Solley Road facilities) are located closer to the Glen Burnie well system than the Hawkins Point facility.

Water quality in the Patapsco aquifer is generally good, however, localized degradation has been observed in the upper portion of the aquifer, particularly in the Hawkins Point area. Use of the aquifer at the Bethlehem Steel Sparrows Point Plant has been discontinued due to high chloride content. Water quality monitoring wells at the SCM/Glidden and BFI waste disposal facilities, located adjacent to and up-gradient of the Hawkins Point HWL, exhibit manganese, sulfate, iron and chromium concentrations which are several orders-of-magnitude higher than the EPA Drinking Water Standards. Due to regional gradients, the proximity of the Patapsco River and usage patterns, it does not appear likely that contaminants entering the aquifer in the Hawkins Point area would impact any current or future areas of withdrawal.

The Patuxent aquifer underlies the Patapsco aquifer, separated by the confining clays of the Arundel Formation. The Arundel Formation averages 100 feet in thickness in the Hawkins Point area and forms an aquiclude, or barrier separating the 2 aquifers. The formation forms an effective barrier both to hydraulic interconnection and to the spread of any contamination to the Patuxent aquifer from surficial sources.

The Patuxent Formation is used as a source for ground water for drinking and industrial purposes in Charles, Prince Georges, Anne Arundel, Baltimore, Harford and Cecil Counties in Maryland. In the counties to the south and east, the surface of the Paxtuxent Formation is too deep (approximate elevation -1,000 msl) to be practically tapped. In locations where the Patuxent is easily tapped, it remains a significant source of potable ground water supplies.

The ground water obtained from the Patuxent aquifer in the Baltimore area requires treatment to reduce its acidity and to remove iron before distribution for municipal use. The hardness, dissolved solids and chloride content generally are reported to be within the Secondary Standards established by the EPA in 1979. In the Baltimore industrial area, it is of good general quality, although somewhat high in hardness.

12.1.3 Facility Location Assessment

Based on the general hydrogeology in the vicinity of the facility and aquifer usage patterns, the potential for human exposure from releases to ground water is considered moderate due to ground water flow patterns and rates, proximity of withdrawal wells, and low net precipitation (reported to be -4.88" for 1984). This assessment only considers facility location and does not consider design and operating features, which significantly decrease the potential for release.

12.1.4 Design and Operating Procedures

The Area 5 facility was constructed with an in-situ clay bottom, 2-1/2 to 3 feet of compacted clay on side slopes of Cell Nos. 5 through 11 and composite liner on the side slopes of Cell Nos. 5 and 6 including a 1-foot of compacted clay and an 80-mil thick HDPE synthetic membrane. Since this facility is an expansion of an existing chrome ore tailings disposal site (Cell Nos. 1, 2, and 3) beneath the ground surface underlying Cell No. 5 and 6, the existing in-situ clay comprises the bottom. This in-situ material consists of relatively impervious fine-grained soil. The synthetic membrane and clay layer on the side slopes of Cell Nos. 5 and 6, above the ground surface, are designed to prevent the potential lateral movement of contaminantes from the cell and direct all percolation vertically to the underlying clay bottom which includes a leachate collection/underdrain system. The final closure cap which includes a capillary break layer, clay layer, 60-mil thick HDPE synthetic membrane, drainage layer and vegetative cover is designed to eliminate or minimize any infiltration of precipitation through the surface of closed Area 5 and promote efficient drainage while minimizing the effects of erosion of the final cover. Maintenance of the final cover is included in Section 4.2.

12.1.5 Overall Area 5 Exposure Potential

Based on facility location and design, the overall human exposure potential from releases to the ground water regime by Cell #'s. 1 through 11 is considered remote. This is due to the presence of the clay bottom and leachate collection system underlying Cell #'s. 1, 2, and 3, and the side slope and final closure cap system. It is possible that Cell #'s. 1, 2, and 3 present a higher exposure potential from ground water releases due to the absence of a composite liner, but no evidence exists that such migration has occurred. In fact, the results of the "Hydrogeologic Assessment - Area 5" indicate that water quality downgradient of Area 5 is comparable to or better than the quality of water which enters the site from upgradient. It should be noted that the potential for human exposure from the contamination of food-chain cross is remote, due to both the low probability of ground water contamination and the lack of agriculture in the area.

A leachate collection/underdrain system was installed in each of the existing base cells (#'s 1, 2, and 3) above the in-situ natural clay layer underlying Area 5 by either open-cut trenching or horizontally augering 6-inch diameter polyvinyl chloride (PVC) pipe a distance approximately 200 feet into each base cell. The leachate collection system drains in a southerly direction toward a common header pipe which transmits the collected leachate to the leachate holding and transfer area. Additionally, a trench drain consisting of coarse gravel wrapped in non-woven filter fabric connects the northern and southern sector of Cell No. 2. Ground water monitoring is accomplished with 18 monitoring wells located around the facility. These wells are monitored quarterly for the parameters specified in the Monitoring and Analysis Program in Section 10.

A system of open conveyance ditches and culverts is employed to convey run-on and run-off surface water flows through and around the facility to 2 sedimentation ponds and ultimately, Thoms Cove. These facilities have been designed to pass the 100-year, 24-hour recurrence interval storm event. All open channels are designed to safely convey storm flows with a minimum of 2 feet of freeboard.

12.1.6 Overall Area 3 Exposure Potential

The underlying MPA chrome tailings cells may present a slightly higher degree of exposure potential, as explained in Section 12.1.1.2. However, the data presented in the "Hydrogeologic Assessment" indicates a lack of chromium above detectable levels, implying that chromium derived from the MPA cells has not entered the ground water sampled by monitoring wells downgradient of the cells. In addition, the conclusions in the "Hydrogeologic Assessment" imply that the MPA cells have had no current impact of the Lower Patapsco aquifer. Ground water samples obtained for the Lower Patapsco aquifer indicate the water quality is generally consistent with baseline values established during the performance of previous studies.

12.1.7 Leachate Collection System

In summary, Leachate draining through the Leachate collection system of Area 5 flows by gravity to a sump through the 6-inch diameter, non-perforated collection lines. Leachate from Area 3 flows to a separate section of the same sump specified for that system.

The leachate in each section of the sump is pumped to one 20,000 gallon above ground fiberglass holding tank through two separate 4-inch diameter PVC lines with flow meters to record the leachate quantity collected from Area 3 and Area 5. Wash water from the wash pad area drains through PVC lines to the Area 3 and Area 5 sumps and then is pumped to the 20,000 gallon holding tank.

In order to allow for periodic inspection, the system has been designed to be accessible from a series of manholes. Manholes are provided in the main collection header, at all bends and junctions, and at spacing no greater than 400 feet. This enables cleaning, and, to an extent physical repairs to be made to the collector without excavating. It also enables leachate samples to be obtained at various locations in the collection system.

Based on location and design, the overall human exposure potential from releases to ground water is considered remote. This is particularly due to the fact that the system is essentially closed and a portion of the system was recently relined with an HDPE liner. Routine maintenance and inspection, detailed in Section 4.2, provide for monitoring and early detection of potential leaks.

12.1.8 Wastewater Treatment Facility

The wastewater treatment facility was designed to house all treatment equipment within a pre-engineered building. All hazardous wastes are contained within this building. Waste that spills within the building will be contained by the reinforced concrete floor, thereby not allowing any contamination to reach the ground water. Based on this design, the overall human exposure potential from releases to ground water is considered remote.

12.2 Potential for Human exposure via the Surface Water Pathway

12.2.1 Facility Location Assessment

The only major surface water body near the facility is the lower Patapsco River and several of its tributaries. Thoms Cove is located adjacent to the site, and is tidal in nature. No drinking water intakes are located on the lower Patapsco River, including downstream of the site. The Patapsco River is characterized by weak estuarine circulation, with an order of 95 to 100 percent sediment trapping efficiency which results in limited flow/flushing. The only actual mechanism for human exposure to the surface water would be via recreational boating since the river is not used for drinking water, swimming or as a food supply. In this light, the potential for human exposure from a surface water release would be high. However, it should be noted that the Patapsco River is classified as "severely polluted", and is one of the most degraded tributaries to the Chesapeake Bay in terms of nutrient concentrations, toxic organic and metallic compounds in water and sediments, dissolved oxygen levels, and populations of aquatic organisms. Overall, the facility location is considered to present moderate human exposure potential via the surface-water pathway.

12.2.2 Design and Operating Features

All design and operating features detailed in Section 12.1.4 are relevant to Area 5 operations. Additional information for Area 5 is presented below.

Run-off from the Cell Nos. 5 through 11 final closure cap is uncontaminated and is discharged in sheet flow down the side slopes, intercepted by benches and drained to Sedimentation Pond No. 1. Run-off from Areas 2 and 3 is also uncontaminated and is discharged in sheet flow to drainage ditches which drain to Sedimentation Pond No. 2.

12.2.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to surface water from the Area 5 landfill after closure and the

closed MPA Cells in Area 2 and 3 is considered remote. The monitoring of surface water in the sedimentation ponds and surface water areas serves as check points to prevent human exposure to contaminated surface water. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent near any point along the lower Patapsco River.

12.2.4 Leachate Collection System

The leachate collection system is described in Section 12.1.7. Since the system is completely underground, the potential for human exposure from releases to surface water from the system is considered remote.

12.2.5 Wastewater Treatment Facilities

Since this facility is within buildings with secondary containment, the potential for human exposure from releases to surface water from the system is considered remote.

12.3 POTENTIAL FOR HUMAN EXPOSURE VIA THE AIR PATHWAY

12.3.1 Facility Location Assessment

The area immediately surrounding the facility is industrial, unpopulated and regionally flat in topography. The prevailing wind direction is from the west, at a wind speed of between 0 and 3 miles per hour. The mean daily average for this time period was 55.0 F. with a maximum daily average of 65.0 F and a minimum daily average of 44.8 F.

Overall, the facility location presents a remote potential for human exposure via the air pathway. Although no great dispersions or high wind speeds are characteristic of the atmosphere, moderate temperatures and precipitation as well as relatively level topography balance the atmospheric ability to disperse air releases. In addition, the population density within 2 miles of the facility is very low, and no people live within 1 mile of the facility.

12.3.2 Design and Operating Features

No subsurface gas generation is expected to occur in the Cells in Areas 5 or 2 or 3. In addition, the only waste received in the cells is chromium and/or asbestos contaminated, which is not reactive, ignitable or volatile. In order to preclude wind dispersal during the early stages of closure activities, chrome contaminated trash was covered with heavier chrome contaminated debris.

12.3.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to air from the Cells of Areas 5 and 2/ and 3 is considered remote. The only potential for release is through wind dispersal of chrome ore tailings; however, these cells are now capped and are not exposed to wind. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent in the area and wind dispersal of waste at levels exceeding regulatory guidelines is nearly impossible.

12.3.4 Leachate Collection System

The leachate collection system is described in Section 12.1.7. Since the system is enclosed and underground, the potential for human exposure from releases to the air is considered nonexistent.

12.4 POTENTIAL FOR HUMAN EXPOSURE FROM SUBSURFACE GAS RELEASES

Since no municipal wastes have been disposed in any area of the facility the generation of subsurface gas is not likely to occur. However, an assessment of the facility is provided to assure regulatory compliance.

Three underground conduits are located on the facility property: 1) a buried electrical conduit; 2) an 8-inch diameter potable water line which follows the entrance road and branches to the area of the former scale plaza, compound area, and wash pads in 2-inch diameter lines; and 3) a 4-inch diameter PVC sewer pipe connecting a 2,000 gallon septic tank with a 10,000 gallon liquid holding tank (See Figure 3.3). The only structures located on the site are 2 trailers and corrugated metal roof structure over the wash pad and leachate collection areas. Overall, the potential for human exposure from subsurface gas releases is considered remote since the gas is not likely to be generated and there are no large conduits or structures at the facility which would promote gas release.

12.5 POTENTIAL FOR HUMAN EXPOSURE FROM RELEASES TO SOIL

12.5.1 Facility Location Assessment

The potential for exposure from releases to surface water and air has been discussed previously. The proximity of the facility to a surface water body increases the potential for transport of contaminated soil to surface waters. In addition, the relatively level topography and amount of facility surface area increase the potential for the transport of contaminated soil to air. Based on facility location alone, the potential for contaminated soil transport to other pathways is remote; however, the

assessment of the other pathways revealed only remote exposure potential to humans from those pathways. There is a remote potential for direct human exposure to contaminated soil since the facility is not located in a densely populated area, and security procedures are employed to limit public access to the facility.

12.5.2 Design and Operating Procedures

Several precautions are taken to prevent the contamination of soils on and near the facility. To prevent the spillage of wastes, covers are required on all bulk waste hauling vehicles entering and leaving the facility. Special procedures are followed at the unloading areas to minimize contact of the waste with the truck under carriage. All waste-hauling vehicles whose exterior comes in contact with the waste are required to proceed through the truck washing facilities before leaving the site. Any in-place wastes which could be dispersed off-site by wind erosion are covered. Any soils which are contaminated from the operation of the facility are considered and handled as hazardous waste material. Soil will be properly treated and or disposed. Soil contamination is further minimized by the control of runoff and surface water, as discussed previously. Spill response procedures are included in the Contingency Plan as described in Section 6.0.

12.5.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to soil from the Area 5 facility is considered remote. This is due to design and operating procedures which are specifically intended to minimize soil contamination and to rectify any potential spill situation quickly and effectively. These procedures, coupled with surface water and wind dispersal management procedures, in addition to the fact that the landfill will be closed, essentially eliminate the possibility of contaminated soil transport to other pathways, and ultimate exposure to humans. It should be noted that agriculture is not practiced near the facility, thus eliminating the potential for food chain contamination.

12.5.4 Leachate Collection System

Since the system is regularly maintained and inspected, and just recently relined with an HDPE lining, the potential for soil contamination by the system is considered remote. If the soil was to be contaminated, the chances of direct human contact would be remote since contamination would be underground.

12.5.5 Wastewater Treatment Facilities

The wastewater treatment equipment and all treatment is performed within an enclosed building with secondary containment. If the hazardous waste would spill outside the building, contaminating the soil, the contaminated soil would be collected immediately and disposed of in accordance with hazardous waste regulations. The potential for soil contamination by these facilities is considered

remote, and therefore the overall human exposure from releases to the soil is considered remote.

12.6 POTENTIAL FOR HUMAN EXPOSURE FROM TRANSPORT RELATED RELEASES

Leachate will be transported from the facility on an intermittent basis through industrial areas in sealed tank trucks. Spill prevention programs are practiced by the haulers. In addition, off-site spill response procedures are included in the Contingency Plan in Section 6.0.

No spills or situations involving potential human exposure to waste by Hawkins Point HWL facility transportation vehicles have ever occurred. Therefore, the potential for human exposure from releases related to transportation accidents or spills is considered remote.

12.7 POTENTIAL FOR HUMAN EXPOSURE FROM WORKER MANAGEMENT PRACTICES

All Hawkins Point personnel are required to participate in safety training sessions and to abide by the site Health and Safety Plan, detailed in Section 9.0. Employees are equipped with high visibility headgear, gloves, safety shoes and tyvek coveralls, at a minimum; goggles, respirators and ear plugs are available and are used as conditions dictate. All heavy equipment is equipped with audible back-up signals and fire extinguishers.

All employees are also required to participate in a training program, which includes both classroom and on-the-job training. A list of subject items included in the training for each job position is presented in Section 7.0. The training covers safety and first aid; office, operations, maintenance, and equipment operation procedures; and an environmental protection program.

A contingency and emergency plan is summarized in Section 6.0. The plan describes emergency coordination and designates coordination contacts; identifies limits of authority; designates emergency personnel and respective roles; provides decision making criteria for plan implementation; delineates emergency response procedures for spills, fires and explosion; outlines clean-up activities; lists emergency equipment and details evacuation procedures.

September 2006

RCRA Operation and Maintenance Inspection

Maryland Department of the Environment
Waste Management Administration
Hazardous Waste Program

RCRA Operation and Maintenance Inspection of Maryland Environmental Service Hawkins Point Hazardous Waste Landfill Baltimore, Maryland

September 2006

Prepared for the
United States Environmental Protection Agency
Region III
Philadelphia, Pennsylvania

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Operation and Maintenance RCRA Inspection Report
Maryland Environmental Service
Hawkins Point Hazardous Waste Landfill
September 2006

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Executive Summary

The Maryland Department of the Environment (MDE) conducted an Environmental Protection Agency Operation and Maintenance Inspection (EPA-O&M) on the groundwater monitoring systems at the Maryland Environmental Service's (MES) Hawkins Point Hazardous Waste Landfill during a groundwater sampling event in June 2006. Hawkins Point Hazardous Waste Landfill is located in the Curtis Bay industrial area adjacent to Thoms Cove, near the southern Baltimore City Limits, at the Francis Scott Key Bridge. The site is owned by the Maryland Port Administration (MPA), has a total area of 67 acres, and is permitted by the MDE and the EPA. MES designed, constructed, and operated the secured, controlled hazardous waste landfill from 1980 to 1994. MES completed closure activities for Area 5 on May 20, 1994. MDE issued Post-Closure Permit A-264 on October 15, 1995. The permit expired in 1998, but was renewed on January 28, 2002. Detection monitoring of three (3) wells is conducted quarterly for Area 5. MES also performs environmental monitoring and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3 with a groundwater interceptor trench and leachate collection system.

This O&M Inspection addresses Area 5 of the landfill, which is regulated by CHS facility permit A-264. The operating record was

reviewed and found to be complete and well organized. Operation and maintenance of the system was performed in acceptable manner. Monitoring wells are sampled using disposable Teflon bailers. Sampling personnel followed the sampling and analysis plan during the observed sampling events. The water level indicator and pH meters performed acceptably. Decontamination procedures were adequate. The groundwater monitoring system appears to be adequate to monitor any chrome releases from the landfill to the shallow aquifer.

Section 1 Introduction

1.1 Purpose

The objectives of this inspection were to determine whether the operator's personnel who collect groundwater samples were collecting them properly, that the operator's sampling devices were in working order and that the operator was abiding by maintenance provisions as outlined in MES's RCRA permit. Additionally, the OAM was intended to determine that individual monitoring wells within a groundwater monitoring system continue to yield representative and reliable groundwater samples and reliable hydrologic data; identify flagrant violations in operation and maintenance programs, and trigger a more thorough scrutiny of the operator's groundwater monitoring program; identify issues or concerns that the enforcement staff should assess in a future Comprehensive Groundwater Monitoring Evaluation; obtain groundwater elevation data; determine direction(s) of groundwater flow; and assess, generally the viability of past decisions made by the operator regarding the number and placement of monitoring wells. This Operation and Maintenance Inspection was conducted according to EPA guidelines as outlined in the "Operation and Maintenance Inspection Guide (RCRA Groundwater Monitoring Systems), 1988".

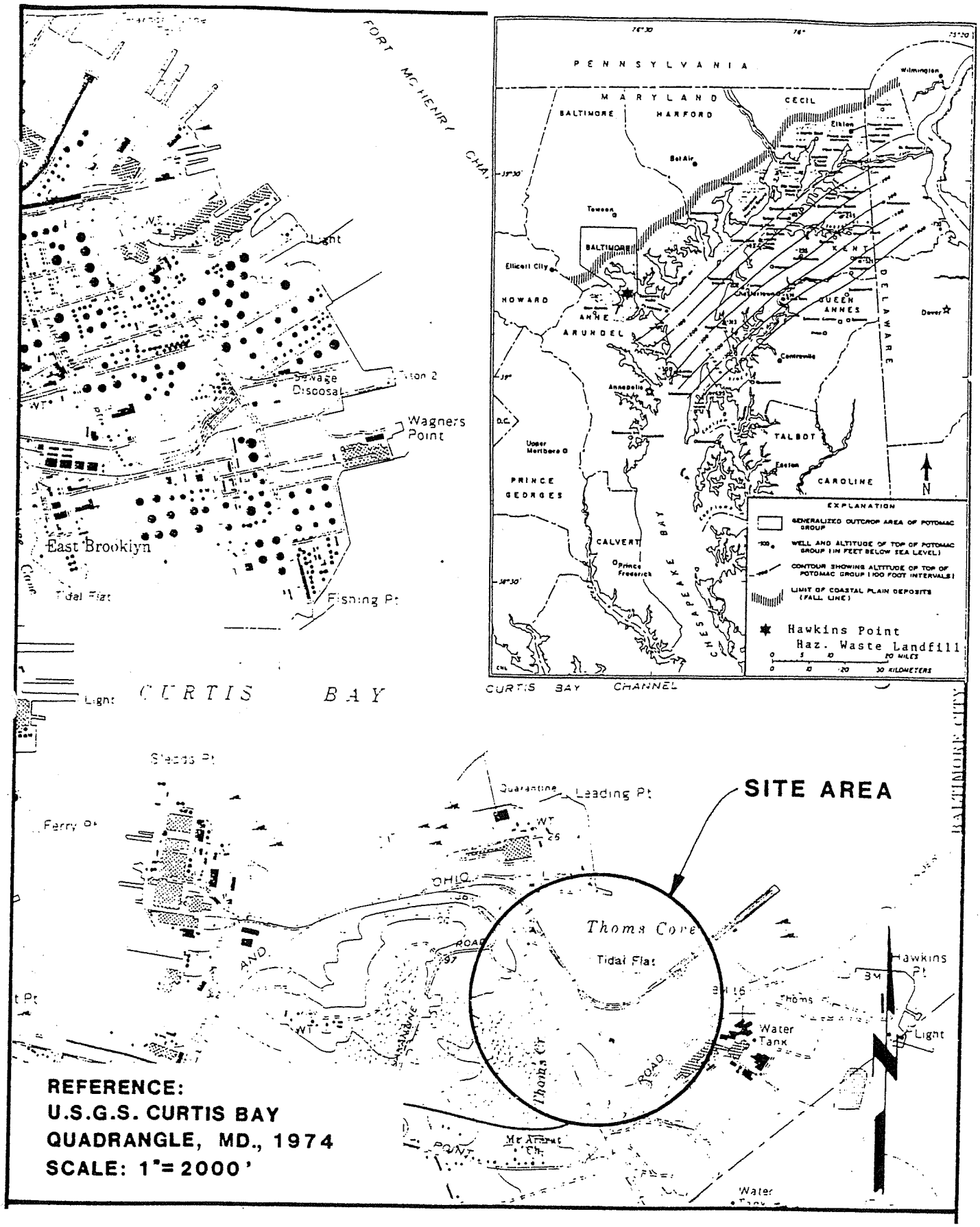


Figure 1.- Location map for the Maryland Environmental Service's Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland (taken from Black & Veatch, 1985(b))

1.2 Site History

The Hawkins Point Hazardous Waste Landfill is located in the heavily developed Curtis Bay area of southern Baltimore City. The Maryland Port Adminisration (MPA) obtained the 67 acre site in 1958 and developed it as a landfill for chrome-ore waste obtained from the Honeywell (formerly AlliedSignal, Inc.) Baltimore Works Plant. The site is divided into six areas. From 1975 to 1979, chrome-ore waste was disposed in three clay lined cells located in Site 1 (Area 2/3) (figure 2).

In 1979, the Maryland Environmental Service (MES) began operating the facility for the Maryland Port Authority (MPA). MES soon ceased disposal of chrome-ore tailings in Site 1 (Area 2/3), and began the construction of new disposal cells in Site 2 (Area 5). Chrome-ore tailings were deposited between 1980 to 1986, and contaminated construction debris was disposed between 1990 to 1993 in Area 5. In 1994, the final cover for Area 5 was completed. Post-Closure permit A-264 was issued by MDE on October 15, 1995. Area 1 is currently leased for use to EASTALCO Aluminum Company.

MES is also permitted to store and treat chromium contaminated wastes in tanks, and installed a treatment system in 1999 that

failed to perform according to design requirements. This system was removed from site, and no new system had been installed.

1.3 History and Description of Solid Waste Management Units

The Hawkins Point Hazardous Waste Landfill was constructed in two units: Site 1 was constructed by the MPA between 1975 and 1979 and contains approximately 267,718 tons of chromium ore tailings (D002, D007 waste codes). Quality control during construction was of dubious effectiveness and releases were a continuing problem until the area was retrofitted with a leachate collection system in 1983. There have been no documented releases since that time.

In 1980, MES began disposing of chrome ore tailing in Site 2. The construction was financed by AlliedSignal, Inc., and the overall quality of construction was much better than Site 1. The clay lined cells were reinforced by asphalt paving anyplace the quality of the clay liner was suspect. Originally the initial cells had leachate collection sumps but these were converted to horizontal drains to allow for vertical expansion of the landfill.

Maryland's Department of Health and Mental Hygiene (DHMH) issued Controlled Hazardous Substances Facility (CHS) Permit A-264 on November 30, 1982 for the expansions of Sites 1 and 2. Site 1 was

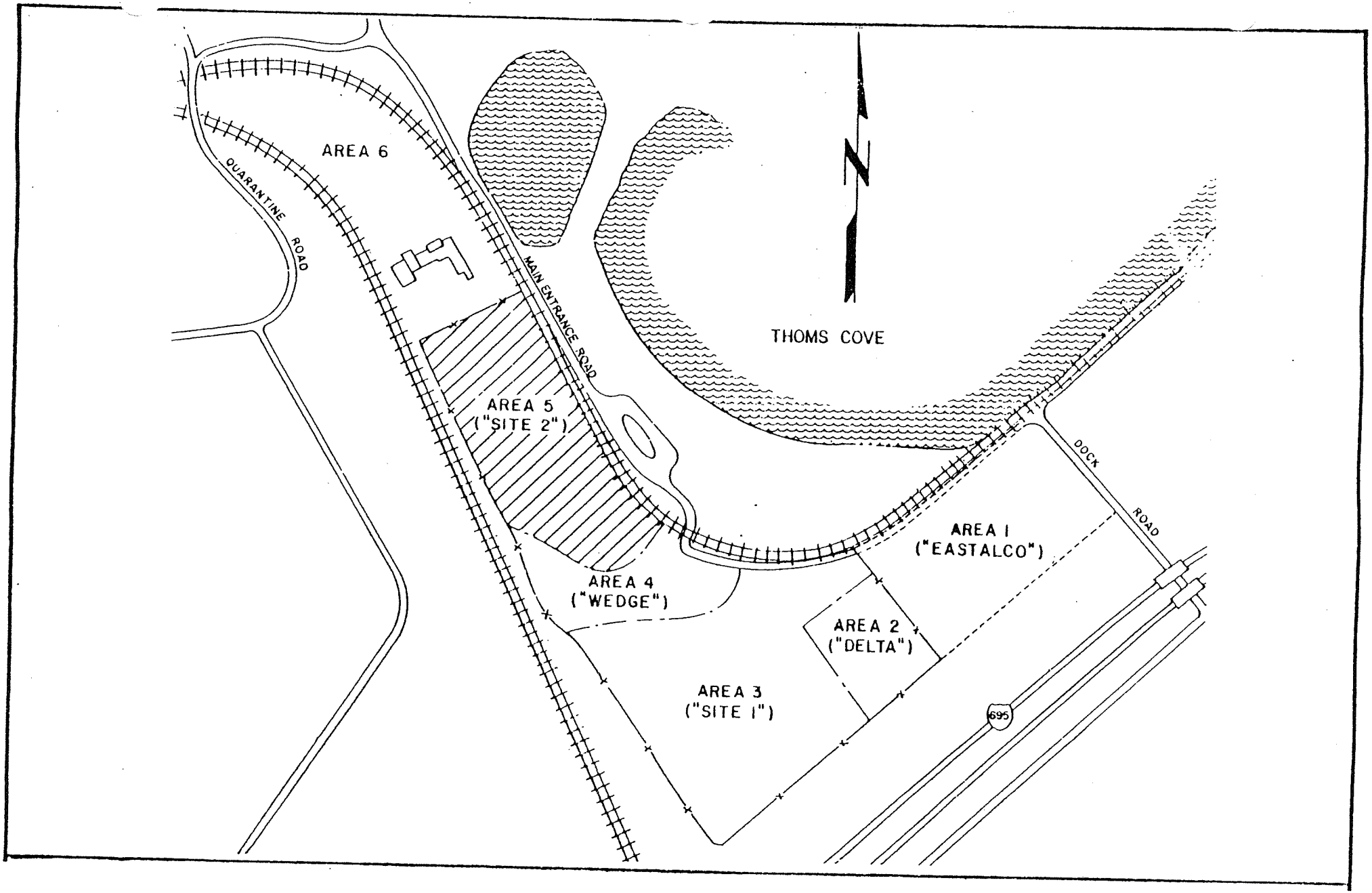


Figure 2.- Site map for Hawkins Point Landfill (taken from Black & Veatch, 1983).

renamed Area 2/3. Site 2 was renamed Area 5.

Prior to 1982, a groundwater interceptor trench was installed along the north, west, and east sides of Area 5 to divert groundwater flow around the cells. In the spring of 1982, cells 1, 2, and 3 of Area 5 were retrofitted with a leachate collection system and a leachate storage/transfer area was installed. The collection system consists of open-trenched and horizontally augured PVC piping which advanced 200 feet into the southern portion of the area, near the base of the original three cells (figures 3, 4).

In the spring of 1982, groundwater interceptor trenches were constructed along the western and southern sides of Area 3. Area 3 was retrofitted with a leachate collection system during the summer of 1983.

In January 1983, MES began accepting controlled hazardous substances in Cell 40 of Area 3, which was located above the older MPA chrome cells. MES operated Cell 40 for eleven months and then closed the cell due to economic reasons. Approximately 1,000 tons of waste in Cell 40 was removed and transported to Fondessy, Ohio for disposal. Cell 40 was clean closed and the liner was left in

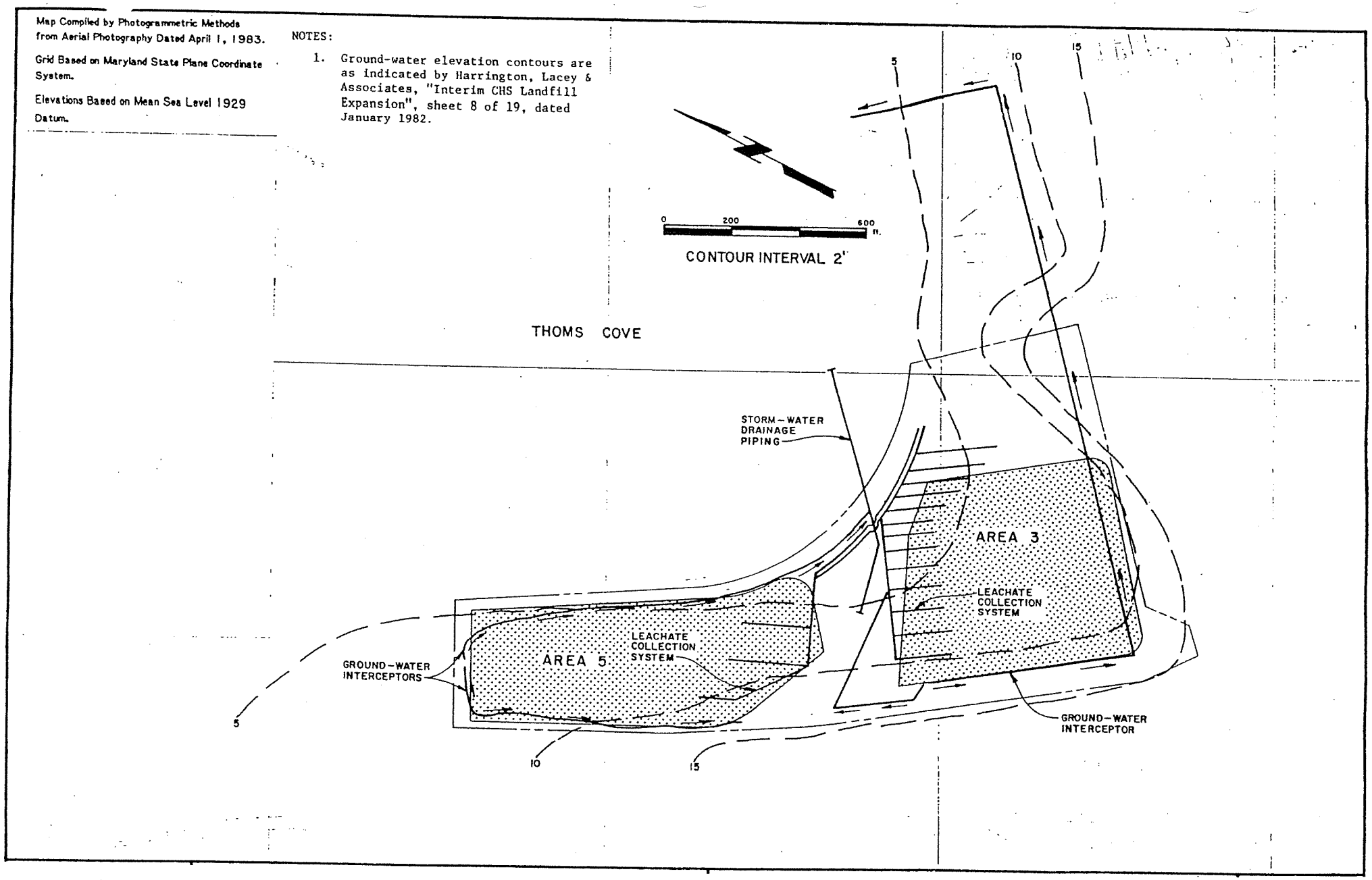
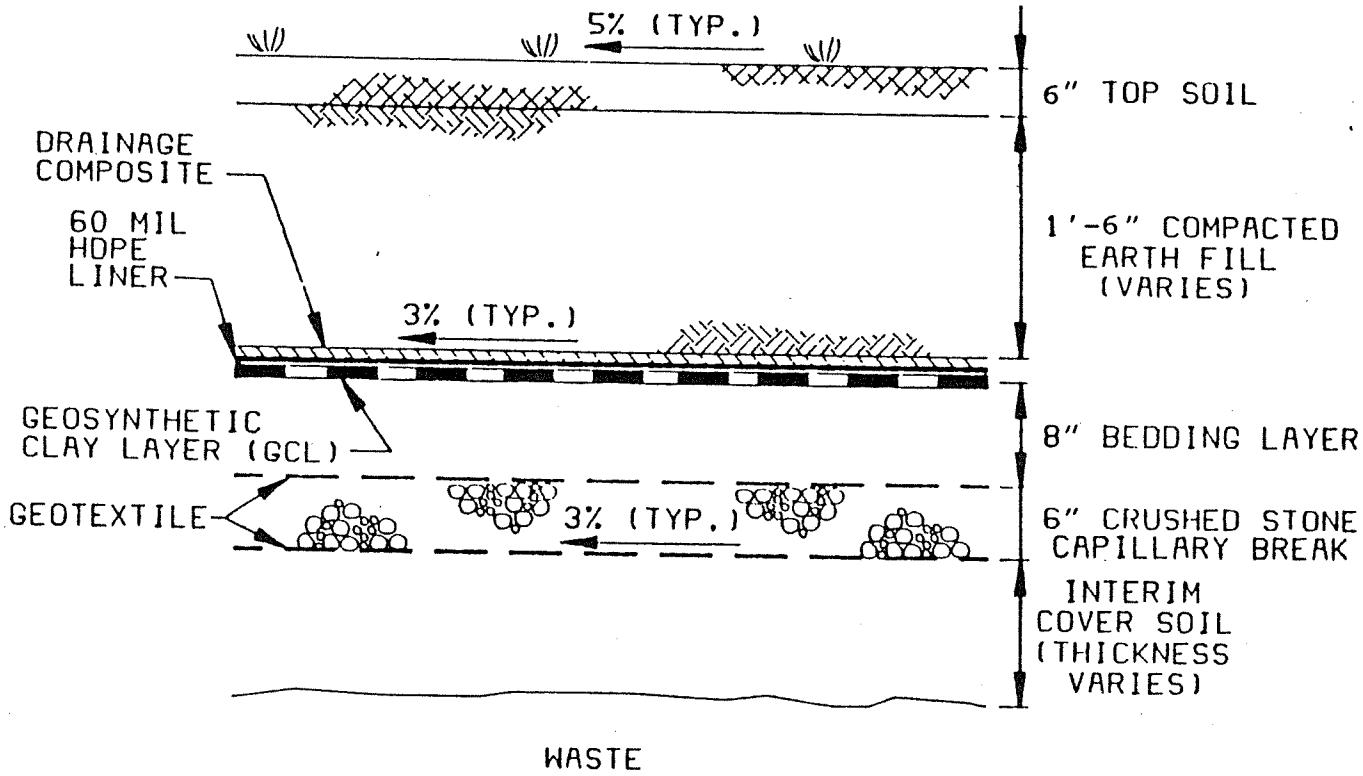


Figure 3.- Leachate and groundwater interceptor system (taken from Black & Veatch, 1983).



NOT TO SCALE

NOTES:

1. EARTH FILL, BEDDING LAYER AND INTERIM COVER SOIL TO BE CONSTRUCTED OF SUITABLE ON-SITE SOIL.

2. GCL SHALL HAVE A TYPICAL PERMEABILITY ON THE ORDER OF 1×10^{-9} CM/SEC.

Figure 5.- Schematic diagram of the Hawkins Point Landfill closure cap for Area 5 (taken from MES, 1993).

place to act as an infiltration barrier to the underlying MPA waste cells (MES, 1993).

On May 15, 1985, EPA issued a RCRA permit to MES for Area 5. DHMH reissued A-264 on May 10, 1985 for Area 5. MES currently operates under the permit issued on January 28, 2002.

Area 5 ceased accepting waste on October 25, 1993. A total of ten cells were constructed in Area 5 which contain approximately 462,894 tons of waste. Area 5 was covered with a capillary break layer consisting of 6" crushed stone, an 8" bedding layer, a geosynthetic clay layer with a typical permeability in the order of 1×10^{-9} centimeters per second, a 60-mil thick synthetic membrane, drainage composite layer, and a minimum 2 feet of vegetative cover

Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

1.4 Waste types and quantities

In Area 2/3, 267,718 tons of chrome ore tailings were deposited between 1975 and 1979. In Cell 40, 1000 tons of D005, D006, D007, D008, D101, and F006 wastes were deposited and later removed (MES,

Table 1.- Major components of chrome ore tailings in Area 5 (taken from MES, 1993).

Assay	Average % by dry weight
Calcium (as CaO)	36
Iron (as Fe_2O_3)	22
Moisture	17
Aluminum (as Al_2O_3)	11
Magnesium (as MgO)	9.6
Total Chromium (as Cr_2O_3)	5.2
Silica (as SiO_2)	4.0
Sodium (as Na_2O)	1.6
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.32

1993).

Area 5 contains approximately 462,894 tons of chrome ore tailings and chromium contaminated soil and debris generated by AlliedSignal, Inc. The major components of the chrome ore tailings in Area 5 are shown on table 1. Chrome-ore tailings waste is a mixture of iron oxides, calcium, magnesium, and aluminum that contains ~0.2% water soluble hexavalent chromium and 1.3% acid-soluble chromium. The chrome-ore tailings generated by Allied vary in chemical composition in accordance with the operating mode. The first mode involves the use of lime as a sequestering agent for the removal of impurities in the chrome ore. The second mode requires no lime, with processing measures for removal of impurities from the crude product as additional manufacturing steps (MES, 1993).

1.5 Geology

Sixty-five soil borings have been drilled at the Hawkins Points Landfill; however; a detailed geologic cross section for the site has not been constructed. The surface materials at Hawkins Point Landfill are part of the clay facies of the Potomac Group Patapsco Formation which was deposited during the Cretaceous Period. The

SEDIMENTARY ROCKS

al

Artificial Fill

Composed of heterogeneous materials such as rock, unconsolidated sediment, slag, refuse, and dredge spoil. Only major areas of filled ground have been mapped and include areas such as: former quarry sites, diked flood plains, low lying areas adjacent to streams and Chesapeake Bay shoreline, and transportation corridors across topographically low areas. Three meters or more thick.

Qal

Alluvium

Interbedded gravel, sand, silt, and clay of variable composition and sorting. Typically confined to flood plains of perennial streams, upland gathering areas, and marshes adjacent to estuaries. Sediment size, sorting, and mineralogy are strongly controlled by the source geology and geomorphic setting. The quartzose sands and polymict gravels are typically well-bedded and loosely compacted, the silts and clays are often water saturated and poorly bedded.

Minor amounts of colluvium (unmapped) may interfinger with alluvium at or near the bases of slopes. In urban areas Qal cannot be adequately shown since it is commonly overlain by artificial fill and/or has been extensively modified. Unit thickness is 0.5 to 5 meters.

Qls | Qlc

Talbot Formation

Qlc clay facies Typically buff to orange, poorly sorted, poorly bedded ... with kaolinite, illite, and montmorillonite clays. Very sparse leaf and twig debris in bedded silts. In the Sparrows Point area, thick accumulations of gray to blue clays containing shell layers are documented by numerous test borings and water well logs. Silt and silty clays probably accumulated in alluvial flood plain-open marsh environments. Clays probably accumulated in an estuarine environment.

Qls Sand facies Well-bedded, medium to coarse quartz sand, typically occurring near present shorelines. Low-angle, cross stratification and high degree of sorting suggest a beach or strandline as possible environment of deposition. The Talbot Formation varies from 0.5 to 10 meters in thickness.

ug

Upland Gravel

Orange-brown, poorly sorted, fine sand to boulder size particles commonly floating in a clay-silt matrix. Poorly bedded sediments show abrupt lateral and vertical sediment size changes with ferruginous cement along horizons of abrupt change. Deposits are occasionally well-bedded; fining-upward gravel to silt sequences (1-3 meters thick) are rare. Sparse to abundant gravel and large blocks of fresh to weathered mafic rock are diagnostic framework components. Thickness varies from 0.5 to 8 meters.

Kpc | Kps

Patapsco Formation

... facies (Kpc) (0.5-50 meters thick) Typically buff, red-yellow, and ...tled kaolinitic clays. Variable amounts of quartz sand and silt as ... interbeds, dispersed throughout the clay. Rare occurrences of ... concretions and lignitized plant remains. Rare laminated ...-clay ... contain plant debris. Deposition in oxidized flood plain ... flat environment is postulated.

...nd facies (Kps) (0.5-30 meters thick) Well-sorted, medium to fine grained ...artz sand with locally abundant quartz gravel and clay clasts. Minimal ...y-silt matrix in sand interstices. Sands are planar to high-angle cross-...

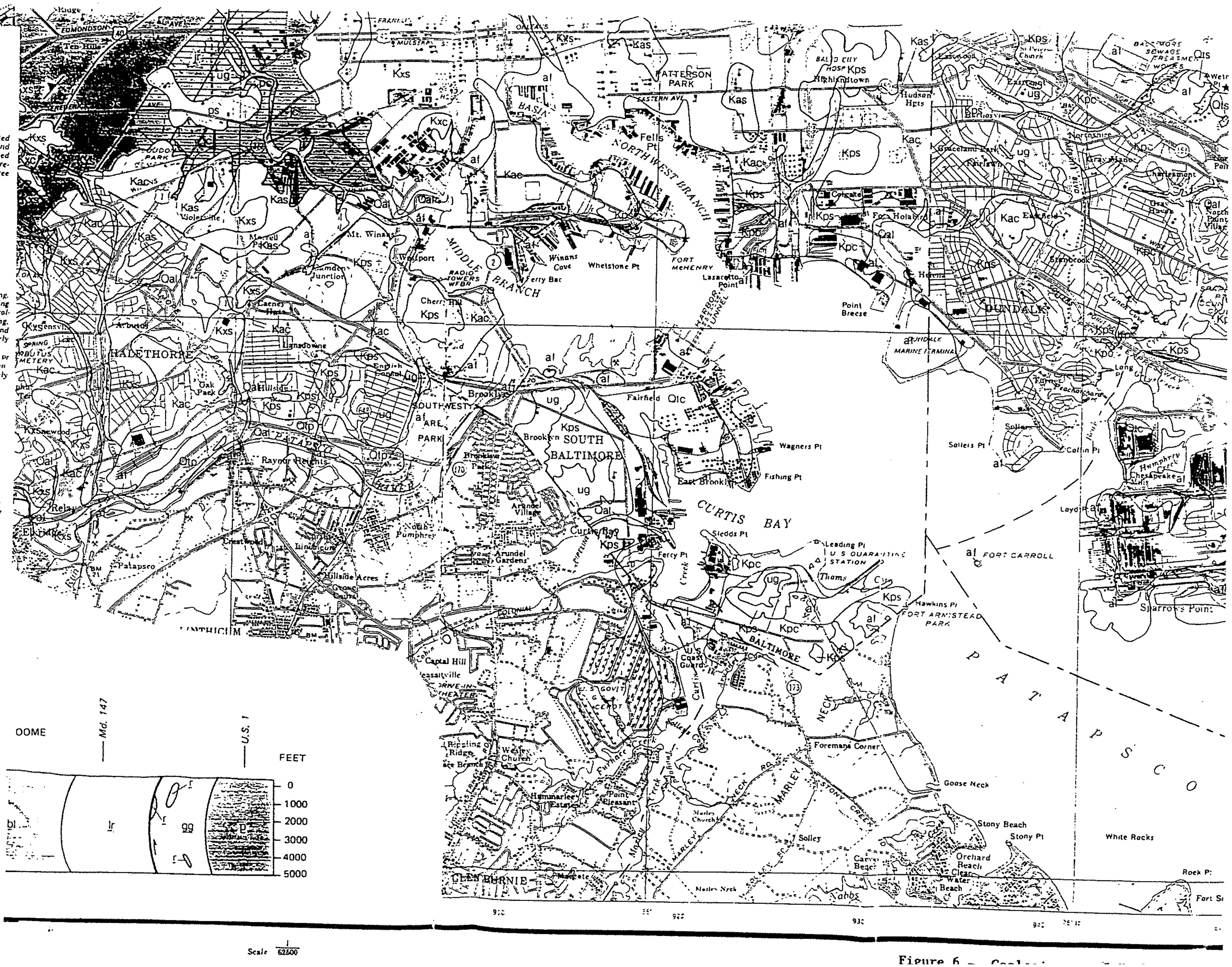


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Figure 6 — Geol...

clay facies contains varying amounts of interbedded fine sand and silt within the hard clay. The thickness of the clay at the site ranges from trace amounts at the north end to 100 feet at the south end. The average uninterrupted thickness of clay is interpreted to be 10- to 20-foot. Below the clay is a sand facies which consists of well-sorted, fine- to medium-grained quartz sand with local areas of abundant quartz gravel. The sand and gravel strata (upper Patapsco Formation) constitute the uppermost aquifer. The thickness of the sand and gravel strata is estimated to be 100 feet at the site. (Harrington, Lacey, & Associates, 1982)

1.6 Hydrogeology

A perched water table was encountered on the northern part of Area 6 and Area 2/3. This condition occurs when water moving downward through the unsaturated zone is intercepted by a layer of low-permeability material and accumulates on top of the lens. A layer of saturated soil will form above the main water table. This is termed a perched aquifer (figure 7). Unconfined and confined groundwater conditions were found elsewhere at the site in the post-Cretaceous and Cretaceous sediments. (Dames & Moore, 1982) Shallow groundwater flows from the southwest along the B&O Railroad tracks to the northeast along Thoms Cove and the Patapsco

River.

Black & Veatch performed several slug tests on the monitoring wells located in Areas 4 and 5 in November of 1992. The first water bearing zone for Area 5 is described as an unconfined aquifer composed of post-Cretaceous sediments and the upper member of the Cretaceous deposits (Patapsco Formation). The base of the aquifer rests on top of approximately 100 feet of Arundel Clay. The estimated seepage velocity for area 5 was calculated to be 0.014 ft/day. Seepage velocity for Area 4 was calculated to be 0.136 ft/day. (MES, 1993)

1.7 Groundwater Quality

The groundwater quality at Area 5 has been monitored since July 31, 1980 in five observation wells (less than 60 feet deep). The July 1980 sampling event indicated that groundwater at Area 5 was contaminated by iron, manganese, sulfate, aluminum, and low pH. Also zinc, copper, lead, and several organics, such as methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,1-dichloroethene, and dichloroethane appear in both upgradient and downgradient wells. Poor water quality is the result of previous site activities and other industries and landfill practices in the surrounding area. (Dames & Moore, 1982)

Groundwater and surface water contamination due to the presence of the Area 5 landfill should be prevented by the clay liner, leachate collection system, clay berms, and the composite closure cap (MES, 1993). Constituents indicative of chrome ore tailing leachate, specifically hexavalent chromium and an elevated pH, have not been detected in the groundwater under Area 5.

Section 2 Office Preparation

2.1 Enforcement/Permitting Action

A violation was issued to MES on February 19, 1980 by the Maryland Department of Natural Resources based on an inspection conducted in January, 1980. It was noted that an unknown quantity of chromium contaminated waste was stockpiled at the site without proper permitting. Leachate from the pile had discharged to ground and surface water.

DHMH issued Controlled Hazardous Substances Facility (CHS) Permit A-264 on November 30, 1982 for the expansions of Sites 1 and 2. Site 1 was renamed Area 2/3. Site 2 was renamed Area 5. On May 15, 1985, EPA issued Final RCRA Permit Number MDD 000731356 to MES for Area 5. DHMH reissued A-264 on May 10, 1985 for Area 5. MES currently operates under the 2002 permit. Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

2.2 Sampling and Analysis Program

Area 5 of the Hawkins Point Landfill is currently monitored for releases from the waste management units (10 cells) with three groundwater monitoring wells. Well 2B-2, an upgradient well located on the southwestern boundary of Area 5, is 45 feet deep. Well 2D-2, a downgradient well located on the eastern boundary of Area 5, is 36 feet deep. Well 2F-2, a downgradient well located on the northern boundary of Area 5, is 30 feet deep. Groundwater monitoring well logs are attached in Appendix D. MES is required to monitor the above mentioned wells to determine the groundwater quality of the uppermost aquifer underlying the waste management area.

The water samples obtained from monitoring wells 2B-2, 2D-2, and 2F are analyzed for the following parameters:

Barium	Sodium
Chromium (total)	Sulfate
Hexavalent Chromium	pH
Chloride	Specific Conductivity
Iron	Total Organic Carbon
Manganese	Total Organic Halogen
Phenols	

The techniques and procedures used to obtain and analyze samples

from the groundwater monitoring wells are described in the Sampling and Analysis Plan (Appendix C). MES determines the elevation of the groundwater surface at each well each time the groundwater is sampled. The groundwater flow rate and direction in the uppermost aquifer is determined annually.

MES determines the groundwater quality at each monitoring well at the compliance point quarterly during the active life of a regulated unit, including the closure period, and post-closure care period. MES will determine if a statistically significant increase has occurred at each monitoring well. The method of statistical analysis is the Analysis of Variance (ANOVA). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Should the requirements related to use of the ANOVA technique be violated (i.e., non-normal data of too many non-detects), MES uses non-parametric methods such as the Kruskal- Wallis Test to analyze the data.

2.3 Operation and Maintenance Program

Monitoring and maintenance of the closed facility is performed by MES, which will insure that all post-closure requirements are met.

Each monitoring well will be thoroughly inspected and repaired as necessary during each sampling period. All groundwater monitoring wells and locks will be inspected for signs of corrosion, damage, and inaccessibility. The protective standpipe, locking cap mechanism and well pipe will be inspected for damage. If damaged, the standpipe will be realigned and re-grouted or replaced. The well pipe will be inspected for vertical alignment and replaced is misalignment is sufficiently severe to inhibit proper sampling.

Maintenance inspections will be performed monthly for the first year years and then decrease to semi-annual and continue for the next 24 years at a minimum.

Part 2

Section 3 Field Inspection

3.1 Review of Operating Record

MES shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, and records of all data used to complete the application for the RCRA permit for a period of at least three (3) years from the date of the sample, measurement, report, and record.

Records of monitoring information shall specify:

1. the dates, exact place, and times of sampling or measurements;
2. the individuals who performed the sampling or measurements;
3. the dates analyses were performed;
4. the individuals who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

MES's operating record was reviewed and was found to be complete and well organized.

EPA inspection forms are attached in Appendix A. MES submits quarterly groundwater elevation maps using the average groundwater elevation for each well.

3.2 Groundwater monitoring well inspection

All Area 5 groundwater monitoring wells were inspected during a groundwater sampling event occurring in June 2006. Monitoring wells were in good physical condition. All monitoring wells were secured. EPA monitoring well inspection forms were completed during the inspection and are attached in Appendix A.

3.3 Observations of groundwater sampling crew

WAS observed one groundwater sampling event in 2006 at the Hawkins Point Landfill. EPA field inspection forms were completed during these sampling events and are attached in Appendix A.

MES samples monitoring wells on a quarterly basis. At each well the depth to water and depth to well bottom are measured; depth to water is plunked using the water level probe. Minimal cleaning of the water level indicator is done and consists of spraying the

entire instrument and cord with distilled water.

Static water levels used to construct the quarterly potentiometric map are measured prior to purging the well. Area 5 monitoring wells are purged and sampled on different dates. Groundwater elevation data collected for these areas was combined from different dates and used to produce the average quarterly potentiometric surface map.

Field parameters (pH, temperature, and specific conductivity) were measured at the time of sampling, but not during purging activities. Teflon or stainless steel bladder pumps are used to purge the monitoring wells - samples wer obtained by using Teflon bailers. An Air-Mate, gasoline-
powered air compessor was used to supply compressed gas to the Well Wizard controller box that controls the gas pressure that inflates the bladder located in the submersible pump. A filter was not installed between the gasoline-powered air compressor and the controller box.

Area 5 monitoring wells were purged by MES employees. Artesian Laboratory and MES personnel sampled the wells the following day. Groundwater levels in the wells were measured prior to sampling. Quality assurance/quality control (QA/QC) included trip and field

blanks.

Part 3

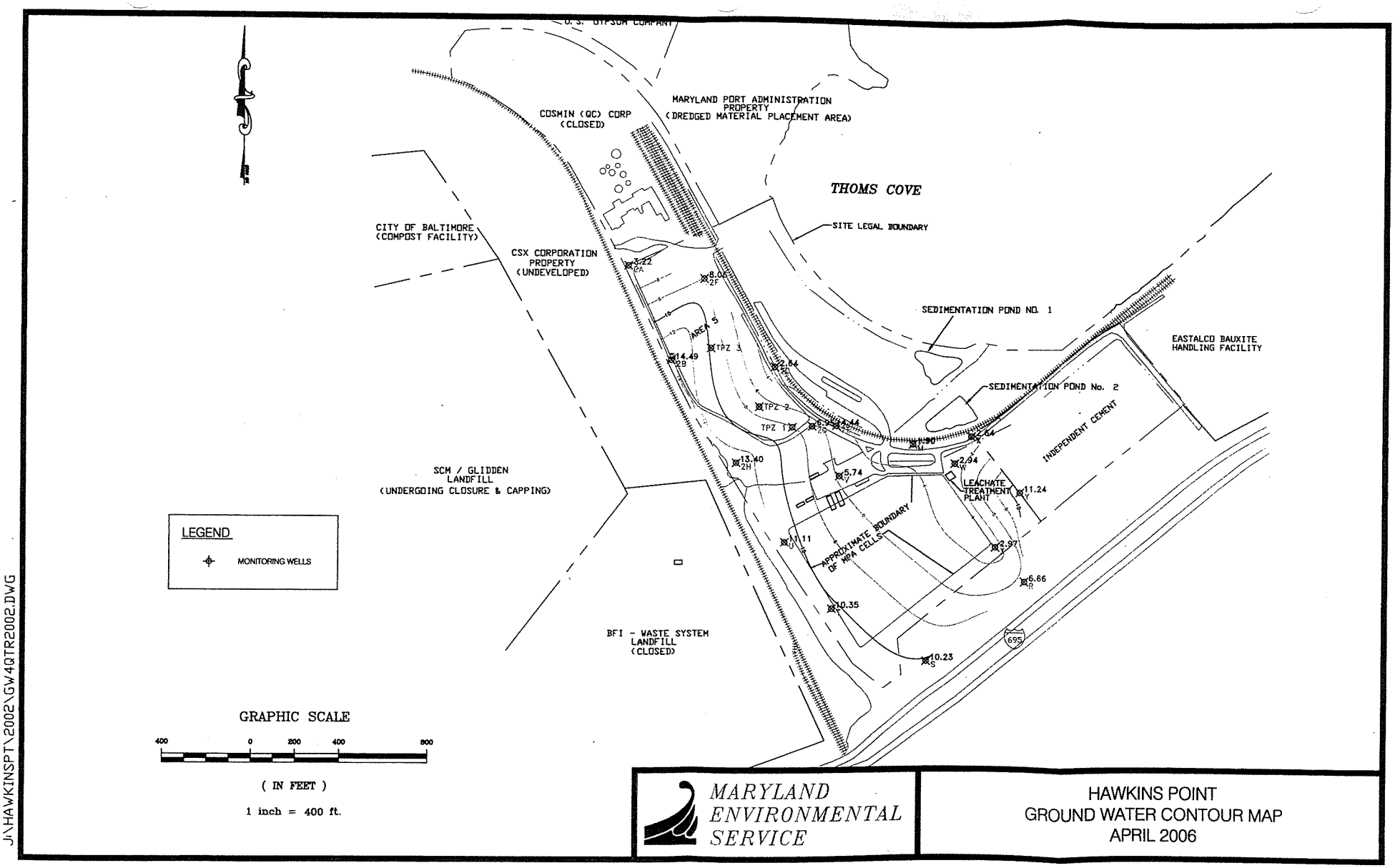
Section 4 Compliance Decision-Making

4.1 Potentiometric map

Included in this report is a potentiometric map for the April 2006 (figure 8). Shallow groundwater flows from the southwest to the northeast. The background monitoring well, 2B-2, was installed upgradient of the permitted waste disposal cells. Monitoring wells 2F-2 and 2D-2 were constructed directly downgradient of the chrome ore tailing cells.

MES has been inconsistent in describing the aquifer under the disposal cells at Area 5. The aquifer has been described as both an unconfined aquifer (MES, 1993, p. 10-12) and a confined aquifer (MES, 1993, p. 11-1). The MES has drilled over 85 borings, conducted several slug tests, and pump tests at the site. With the amount of data available for the site, the MES should be able to characterize the hydrogeology at the site.

4.2 Violations observed during the June 2006 sampling event



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Sampling personnel were observed during the June 2006 sampling event. At all times the sampling crew followed the approved sampling plan. No violations of the plan were observed.

4.3 Enforcement action

EPA O&M Inspection Guide Table 3, Relationship of Technical Inadequacies to Ground-Water Standards, was used to determine if an enforcement action was warranted at the MES Hawkins Point Landfill (Appendix B). After reviewing these criteria, it was determined that no enforcement action was necessary at this time. In 1994, WAS requested that MES include well redevelopment in its maintenance activities. MDE added well redevelopment requirements to the groundwater monitoring system operation and maintenance section in MES's permit. Monitoring wells will be redeveloped when 20% or more of the screened interval is covered by silt.

4.4 Conclusion and Recommendations

The groundwater monitoring system in place at the MES Hawkins Point Landfill is adequate to detect releases from Area 5.

It is recommended that static water levels be measured prior to any purging activities. Groundwater elevation data used to generate the quarterly potentiometric map must be collected on the

same day.

It is recommended that groundwater samples are collected immediately after purging activities and the well has adequately recharged.

It is recommended that MES follow EPA decontamination protocol for groundwater monitoring equipment and any nondedicated sampling equipment.

Quality assurance/quality control (QA/QC) procedures should include obtaining duplicate samples labeled "Blind Duplicates"; these samples should have a different identification number than the well name.

4.5 References

Black & Veatch, 1985(a). Hydrogeologic Assessment, Hawkins Point Hazardous Waste Landfill, Area 3, with appendices.

Black & Veatch, 1985(b). Hydrogeologic Assessment, Hawkins Point Hazardous Waste Landfill, Area 5, with appendices.

Black & Veatch, 1983. Engineering Analyses and Design Documentation, Hawkins Point Hazardous Waste Landfill, Area 5, with appendices.

Dames & Moore, 1982. Environmental Effects Report for the Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland.

Fetter, C.W., 1994. Applied Hydrogeology, Third Edition, Macmillan College Publishing Company, New York, p. 111-113.

Harrington, Lacey & Associates, Inc., 1982. Hawkins Point CHS Disposal Facility Interim Expansion, Operating Plan & Procedures.

Maryland Environmental Service, 1994, Controlled Hazardous Substances Facility Permit.

Maryland Environmental Service, 1993, Permit Application for Closure/Post-Closure of Area 5, Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland.

U.S. EPA, Office of Waste Programs Enforcement, 1988. Operation and Maintenance Inspection Guide (RCRA Ground-Water Monitoring Systems), 14p. and appendices.

Appendix A

Operation and Maintenance Worksheet

PART ONE

The field inspector and the enforcement official will meet and complete four tasks. Those tasks are: 1) review enforcement and permitting actions taken to date at the facility, 2) review the owner/operator's sampling and analysis program, 3) review the owner/operator's O&M program, and 4) prepare site-specific inspection objectives.

1. Facility identification number MDD 000 731 356

2. Name of facility contact DAVID FERGUSON
   phone number (410) 729 8300

3. Address of facility 5501 QUARANTINE ROAD
   BALTIMORE MD 21226

4. Does the facility have:
   Interim Status? (go to 5a) NO
   - detection monitoring
   - assessment monitoring
   - corrective action (§3008(h))

   Permit Status? (go to 5b) YES
   - detection monitoring ✓
   - compliance monitoring
   - corrective action

5a. Past actions taken at facility (interim status)

Type	Date(s)
Operation and Maintenance Inspection	APRIL 2003
Comprehensive (Ground-Water)	
Monitoring Evaluation	
Case Development Inspection	
RCRA Facility Assessment	
Compliance Evaluation Inspection	JULY 14, 2005
Ground-Water Task Force Investigation	

Complete the following questions in regard to the actions listed on the previous page:

- Do you have a copy of completed inspection reports or site studies? Yes ✓ No ___

- For each, summarize deficiencies identified in the owner/operator's sampling program and/or the owner/operator's operation and maintenance program. N/A

Go to 6a.

5b. Actions taken at the facility (permit status)

Type	Date
• Permit Issuance	012202
• Operation and Maintenance Inspection	0403
• Comprehensive (Ground-Water)	
• Monitoring Inspection	
• Case Development Inspection	
• Compliance Evaluation Inspection	071405
• Other	050206

Complete the following in regard to the actions listed above:

- Do you have a copy of the permit and copies of inspection reports completed after permit issuance? Yes ✓ No ___

- Summarize deficiencies identified after permit issuance regarding the owner/operator's operation and maintenance program. NA

Go to 6b

6a. Identify enforcement actions issued to the facility in regard to interim status violations. NA

Action	Date(s)
• §3008(a) complaint/order	_____
• §3013 complaint/order	_____
• §3008(h) complaint/order	_____
• §7003 complaint/order	_____
• Referral for litigation	_____
• Other	_____

Complete the following regarding the actions listed above:

- For each, identify if the enforcement action is focused on the owner operator's sampling and analysis program and/or the owner/operator's operation and maintenance program. Summarize relevant requirements imposed on the owner/operator.

Go to 7

6b. Identify enforcement actions issued to the facility after the permit issuance date.

Action	Date(s)
• §3008(a) complaint/order	
• §3013 complaint/order	
• §3008(h) complaint/order	
• §7003 complaint/order	
• Referral for litigation	
• Other	050406

Complete the following regarding the actions listed above:

- **For each, identify if the enforcement action focused on the owner/operator's sampling and analysis program and/or the owner/operator's operation and maintenance program. Summarize relevant requirements imposed on the owner/operator.**

REQUIRED GROUNDWATER MONITORING REPORTS FOR THIRD & FOURTH QUATER 2005 WERE SUBMITTED AFTER PERMIT ESTABLISHED DATES. NOTICE OF VIOLATION SUBMITTED 050406. PERMITTEE HAS RETURNED TO COMPLIANCE.

Go to 7

7. Review and summarize the owner/operator's sampling and analysis plan. (Note: Revise or add to the table if permit conditions dictate a different requirement the owner/operator must follow.) Does the Sampling and Analysis Plan:	**Y/N**
Include provisions for the measurement of static water elevations in each well prior to each sampling event?	Y
Specify the device to be used for measuring water level elevations?	Y
Specify the procedure for measuring water levels?	Y
Provide for the measurement of depth to standing water and depth to the bottom of the well to 0.01 feet?	Y
Explain whether dedicated or non-dedicated sampling equipment is used and the type of sampling equipment?	Y
Describe procedures for evacuating wells?	Y
Provide for the use of sampling devices constructed of inert materials such as fluorocarbon resin or stainless steel?	Y
Provide for dedicated sampling devices for each well or alternately provide for decontamination of sampling devices and the collection of blanks between wells?	Y
Provide for the collection and containerization of samples in the order of volatilization potential?	Y
Identify the preservation methods and sample containers the owner/operator will use?	Y
Describe procedures for transferring samples to off-site laboratories?	Y
Describe a chain-of-custody program which includes the use of sample labels, sample seals, field logbooks, chain-of-custody records, sample analysis request sheets, and laboratory logbooks?	Y
Include provisions for collection of field, trip, and equipment blanks?	Y, Y, N
Include an inventory of sampling equipment and sampling devices used as part of the monitoring program?	Y
Include detailed operating, calibration, and maintenance procedures for each sampling device?	Y

(Continued)

(Continued from previous page)	Y/N
Include maintenance schedules for sampling equipment? (Refer to Appendix D for discussion of maintenance techniques for gas bladder pumps.)	Y
Include decision criteria to be used to replace or repair sampling equipment and/or monitoring wells?	Y
*Describe in detail sample handling procedures in place at the owner/operator's laboratory (refer to RCRA Laboratory Audit Inspection Guide for more detail)?	Y
*Describe in detail the procedures that will be used to perform analyses in the owner/operator's laboratory (refer to RCRA Laboratory Audit Inspection Guide for more detail)?	Y
*Describe in detail quality assurance/quality control procedures in place? (refer to RCRA Laboratory Audit Inspection Guide for more detail.)	Y

*NOTE: *The RCRA Laboratory Audit Inspection Guide (RCRA Ground-Water Monitoring Systems)* describes the information the owner/operator should include in the Sampling and Analysis Plan regarding the owner/operator's laboratory program. The inspector may want to supplement the checklist in this manual with the checklist in the *RCRA Laboratory Audit Inspection Guide* while planning an operation and maintenance inspection.

Go to 8

COMMENTS ON SAMPLING AND ANALYSIS PLAN

8. Complete the following table. Use a separate entry for each well and piezometer in the monitoring system:

Identification Number	Type of Well Sampling Equipment (pump or bailer)	Depth to Water Last Inspection (if available)	Depth to Bottom Last Inspection (if available)	Notes/Comments
1. 2B-2	BAILER			
2. 2D-2	"			
3. 2F	"			
4. 2E	"			
5. 2G	"			
6. 2H	"			
7.				
8.				
9.				
10.				
11.				

2. Visually inspect each well and piezometer and complete the table below (one line entry for each well or piezometer):

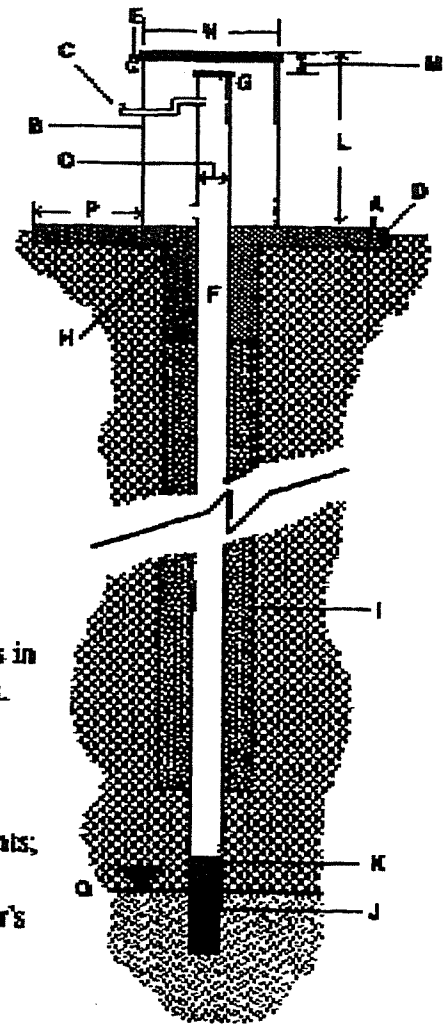
Well/ Piezometer	Survey Mark Present?	Standing or Ponded Water?	Evidence of Collision Damage?	Evidence of Frost Heaving?	Evidence of Casing Degradation?	Lock in Place?	Evidence of Well Subsidence?	Photograph Taken?
2B-2	N	N	N	N	N		N	
2D-2	N	N	N	N	N		N	
2F	N	N	N	N	N		N	
2E	N	N	N	N	N		N	
2G	N	N	N	N	N		N	
2H	N	N	N	N	N		N	

3. Obtain data on depth to standing water and depth to the bottom of each monitoring well and piezometer in the owner/operator's monitoring system. Record depth measurements to the nearest 0.01 feet. Record the measurements

Date	Well/ Piezometer I.D. No.	Depth to Water (0.01')	Depth of Well/ Piezometer (0.01')
060800	2B-2	27.3	47.65
"	2D-2	24.91	38.20
"	2F	18.12	32.15
	2G	19.1	42.40
	2G	19.4	37.50
	2H	8.0	32.40

Key:

A - survey elevation mark
B - protective outer casing
C - gas vent
D - concrete apron
E - fixed lock
F - primary casing material
G - cap for primary casing
H - bore hole seal
I - annular space seal
J - well screen
K - filter pack
L - height of riser
M - elevation difference
N - diameter of outer casing
O - diameter of primary casing
P - radius of apron
Q - water level below surface



1. The field inspector has several options in collecting ground water elevation data. The inspector may:
   a. obtain past data from the operating record;and/or
   b. take his/her own depth measurements; and/or
   c. obtain data from the owner/operator's sampling crew.

PART TWO

The field inspector will complete four tasks during the field inspection. They are:
1) review the operating record to identify evidence of deficiencies in the owner/operator's sampling and/or operation and maintenance programs; 2) visually inspect each well and piezometer for evidence of damage or deterioration; 3) obtain measurements from the operations record of depths of water levels and well depths for each well and piezometer; and 4) visually observe the owner/operator's field crew as they collect ground-water samples.

Name of inspector(s) J. LAZAR

Date(s) of inspection 060806

1. Review the operating record of the facility. Does the operating record:	**Y/N**
Include annual reports of ground-water monitoring results including ground-water level data from each well and piezometer in the monitoring system?	Y
Include an inventory of all sampling devices and purging equipment in use at the facility and information on model number, serial number and manufacurers name?	Y
Include detailed operating, calibration and maintenance procedures for each sampling device?	Y
Describe decision criteria to be used to replace or repair sampling equipment and/or monitoring wells?	Y
Include schedules for performing operation and maintenance activities related to the ground-water monitoring system?	Y
Include records for ground-water monitoring which provide information on 1) the date, exact place and time of sampling or measurements; 2) the individual(s) who performed the sampling or measurements; 3) the date(s) analyses were performed; 4) the analytical techniques or methods used; and 5) the results of such analyses?	Y
Include records of all monitoring information including all calibration and maintenance records?	Y
Include records of monitoring information including determination of ground-water surface elevations?	Y
Include a determination of ground-water flow rate and direction(s) in the uppermost aquifier on an annual basis (e.g., prepare a potentiometric map annually using data collected during the year)?	DIRECTION ONLY
Provide for more frequent and intensive inspection of wells constructed of non-inert casing such as PVC? (Refer to Appendix A for permit example.)	N

COMMENTS ON OPERATING RECORD

4. Observe the owner/operator's staff as they collect ground-water samples at several wells. Complete the following table for each well (Note: revise or add to the table if permit conditions dictate a different requirement the owner/operator must follow):

Position/Title	Name	Sampling Experience (years and type)

Well Identification Number 2D-2	Y/N	Photograph Taken Y/N
Did the sampling crew measure static water levels in the well and well depths prior to the sampling event?	Y	Y
Did the sampling crew use a steel tape or electronic device totake depth measurements?	Y	
Did the sampling crew record depths to +/– 0.01 feet?	Y	
Did the sampling crew follow these procedures: 1. remove locking and protective cap; 2. sample the air in the well head for organic vapors; 3. determine the static water level; and 4. lower an interface probe into the well to detect immiscible layers.	Y N Y N	
If immiscible samples were collected, were they collected prior to well purging?	NA	
Did the sampling crew evacuate low yielding wells to dryness prior to sampling?	NA	
Did sampling crew evacuate high yielding wells so that at least three casing volumes were removed?	Y	
Did the sampling crew collect the purge water for storage and analysis or for shipment off-site to a RCRA treatment facility?	Y	
Were sampling devices constructed of fluorocarbon resins or stainless steel?	Y	

(Continued)

Well Identification Number _____	Y/N	Photograph Taken Y/N
If the sampling crew used dedicated samplers, did they disassemble and thoroughly clean the devices between samples?	NA	
If samples are collected for organic analyses, did the cleaning procedure include the following steps: 1. non phosphate detergent wash 2. tap water rinse 3. distilled/deionized water rinse 4. acetone rinse 5. pesticide-grade hexane rinse?	NA	
If samples are collected for inorganic analyses, does the cleaning procedure include the following steps: 1. dilute acid rinse (HNO_3 or HCL) 2. distilled/de-ionized water rinse?	N	
Did the sampling crew take trip blanks, field blanks and equipment blanks?	Y	
If the sampling crew used bailers, were they bottom valve bailers?	N	
If the sampling crew used bailers, was "teflon" coated wire, single strand stainless steel wire or monofilament used to raise and lower the bailer?	N	
If the sampling crew used bailers, did they lower the bailer slowly to the well?	Y	
If the sampling crew used bailers, were the bailer contents transferred to the sample container to minimize agitation and aeration?	Y	
Did the sampling crew take care to avoid placing clean sampling equipment, hoses, and lines on the ground or other contaminated surfaces prior to insertion in the well?	Y	
If the sampling crew used dedicated bladder pumps: Was the compressed gas from an oilless compressor certified quality commercial compressed gas cylinder? If not, was a suitable oil removal purification system installed and maintained?	NA	
Was the bladder pump controller capable of throttling the bladder pump discharge flow to 100 mi/min or less for continuous periods of at least 20-30 seconds without restricting liquid discharge?	NA	

(Continued)

Well Identification Number _____	Y/N	Photograph Taken Y/N
Were samples taken from the bladder pump discharge tube, and not from any purge device discharge tube?	NA	
Was the bladder pump discharge flow checked for the presence of gas bubbles before each sample collection, as a test for bladder integrity?	NA	
Was bladder pump flow performance monitored regularly for dropoff in flow rate and discharge volume per cycle?	NA	
Was the bladder pump incorporated in a combination sample-purge pump design which can expose the bladder pump interior and discharge tubing to the pump drive gs? If so, were operating procedures established and followed to prevent at all times the entry of drive gas into the sample flow or into the bladder pump interior?	NA	
Did the sampling crew collect and containerize samples in the order of the volatilization sensitivity of the parameters?	NA	
Did the sampling crew measure the following parameters in the field: pH, temperature; specific conductance?	Y	
Did the sampling crew sample background wells before sampling downgradient wells?	N	
Did the sampling crew use fluorocarbon resin or polyethylene containers with polypropylene caps for samples requiring metals analysis?	Y	
Did the sampling crew use glass bottles with fluorocarbon resin-lined caps for samples requiring metals analysis?	N	
If metals were the analytes of concern, did the sampling crew use containers cleaned with nonphosphate detergent and water, and rinsed with nitric acid, tap water, hydrochloric acid, tap water and finally Type II water?	NZW	
If organics were the analytes of concern, did the sampling crew use containers cleaned with nonphosphate detergent, rinsed with tap water, distilled water, acetone, and finally pesticide quaility hexane?	NA	
Did the sampling crew filter samples requiring analysis for organics?	NA	

COMMENTS ON SAMPLING PROGRAM

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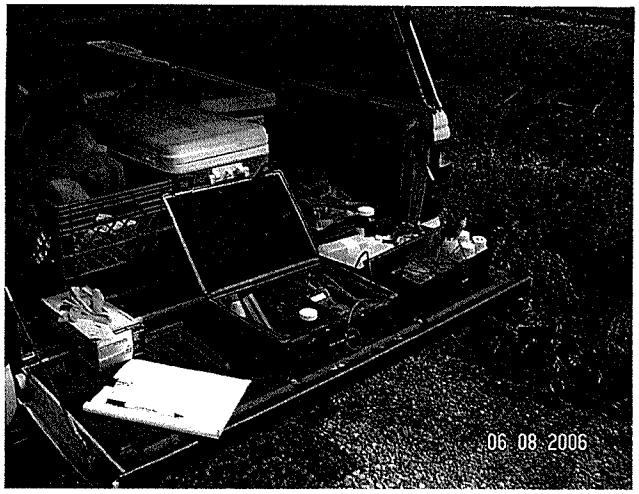
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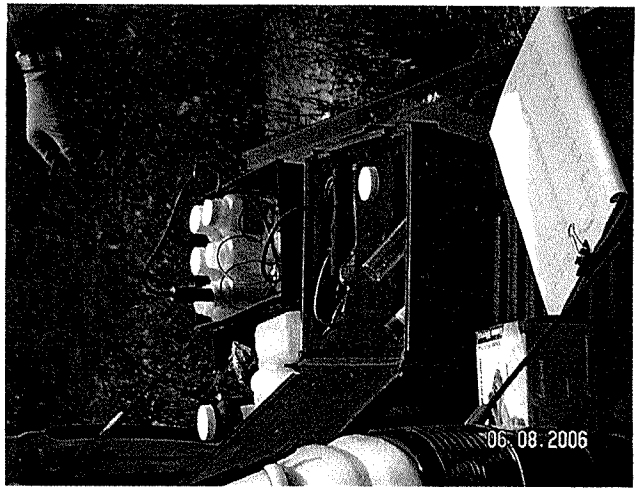
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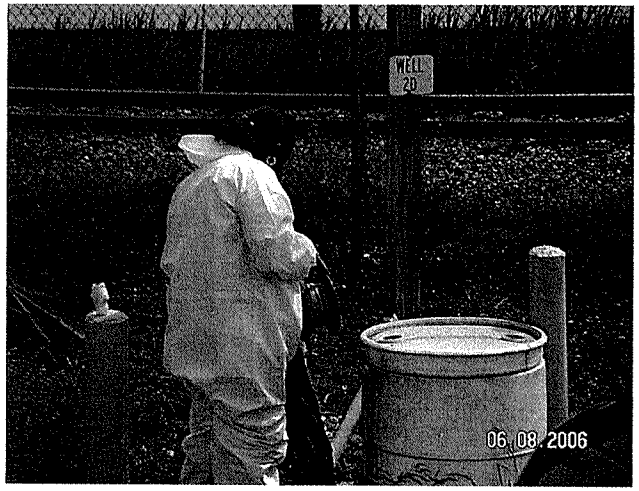
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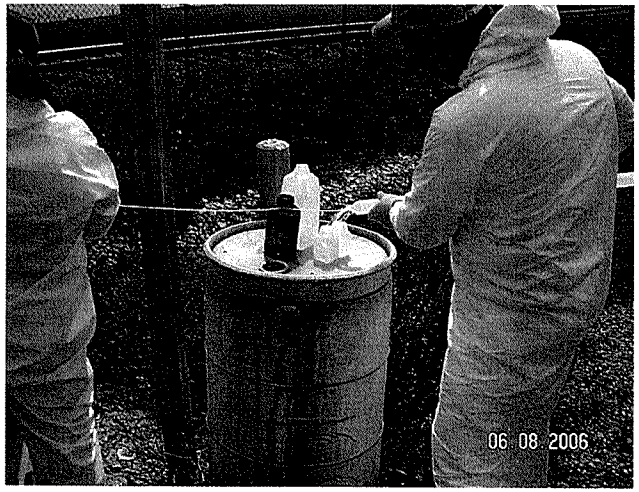
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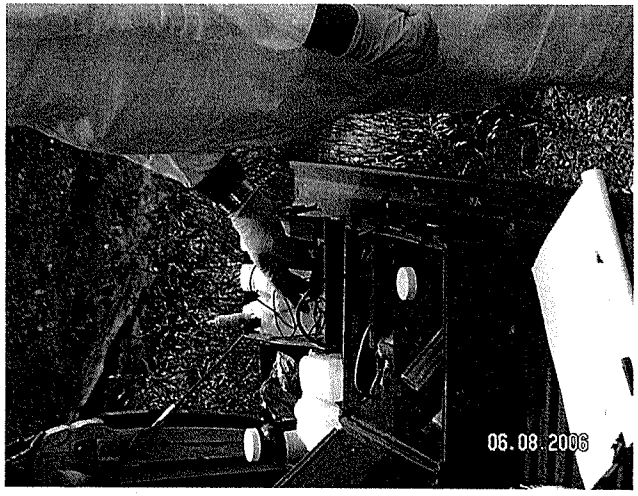
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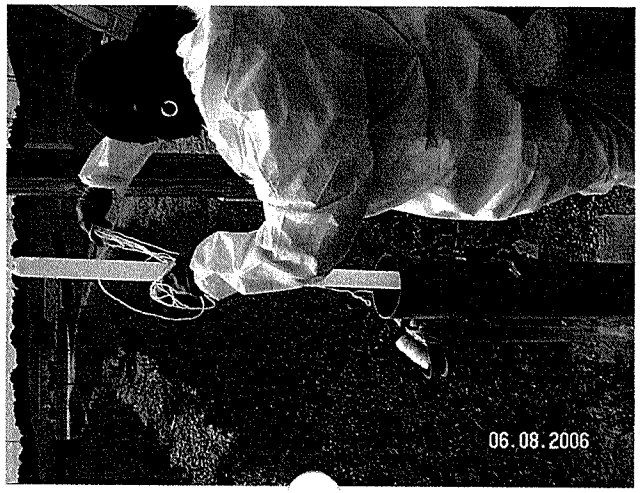
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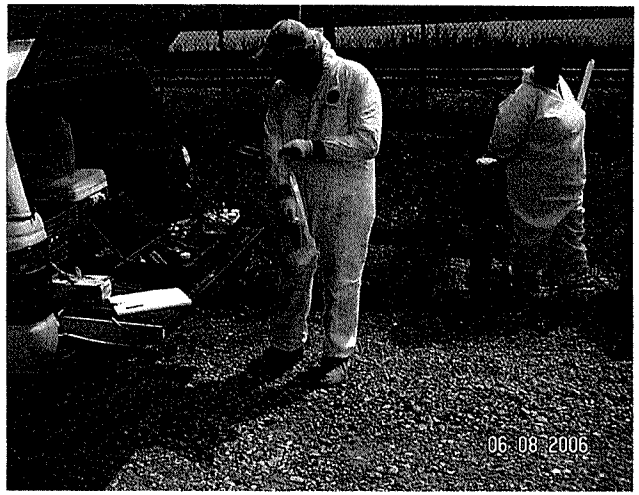
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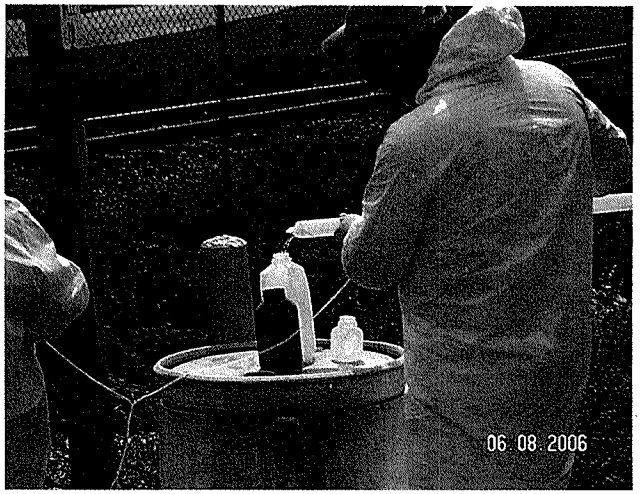
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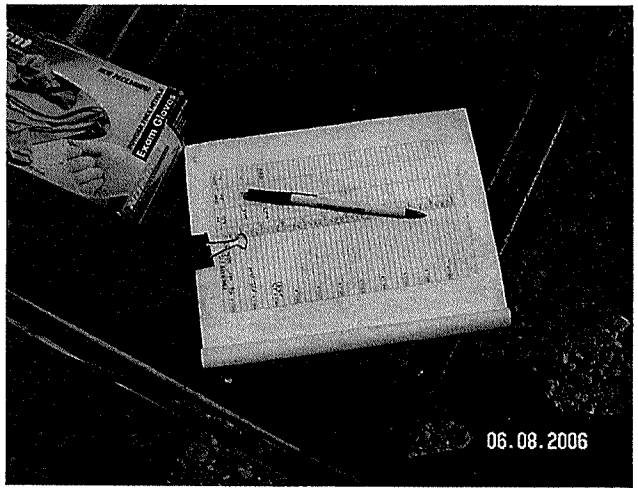
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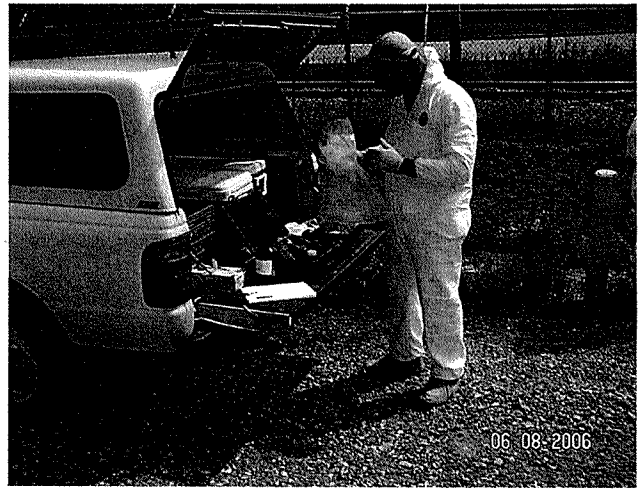
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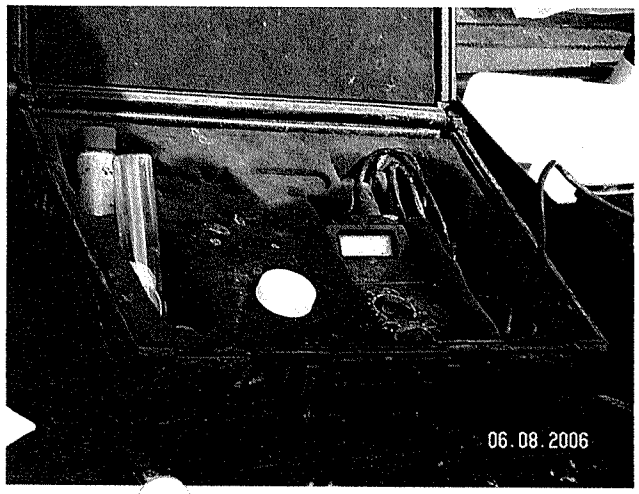
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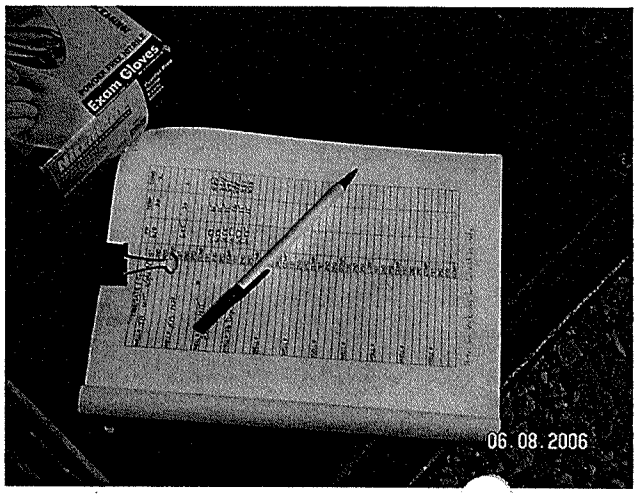
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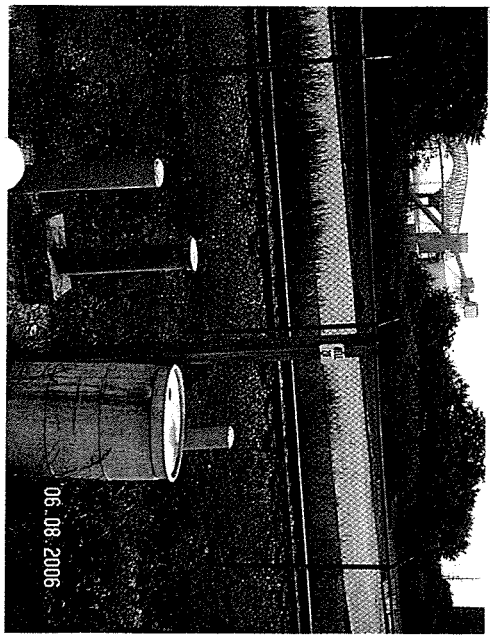
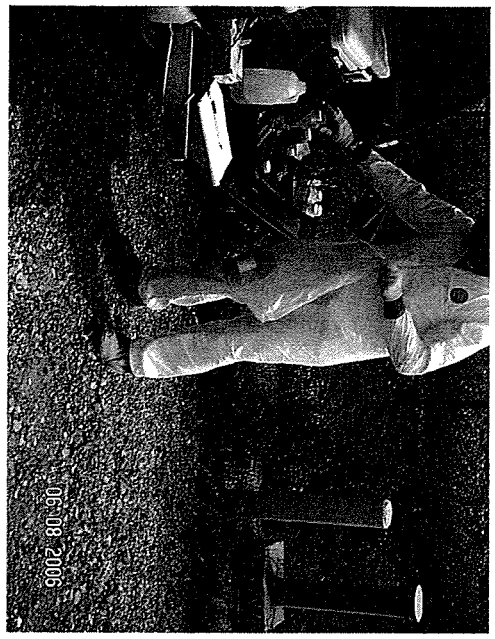




Appendix B:

Relationship of Technical Inadequacies to Groundwater Standards

Table 3

Relationship of Technical Inadequacies to Ground-Water Standards

This table illustrates examples of situations which may constitute noncompliance on the part of the owner/operator. The enforcement official should apply this table in determining if an enforcement action is warranted on a site-specific basis.

Regulatory Objectives	Examples of Technical Inadequacies That May Constitute Violations	Regulatory Citations
1. Owner/Operator must follow specified procedures for collecting ground-water samples	• Failure of owner/operator's sampling crew to follow written sampling and analysis plan for collecting ground-water samples (interim status)	265.92(a)
	• Failure of owner/operator's sampling crew to follow permit conditions related to the collection of ground water samples (permit status)	264.97(d) 264.97(e) 264.98(f) 264.99(g)
2. Owner/Operator must maintain an operating record	• Failure of owner/operator to keep a written operating record	264.73(a) 265.73(a)
	• Failure of owner/operator to keep the operating record on- site	264.73(b) 265.73(b) 270.30(j)(2)
	• Failure of the owner/operator to maintain an operating record which covers all O&M activities for the prior three years (i.e., gaps in the operating record)	264.73(b) 265.73(b) 270.30(j)(2)
	• Inability of owner/operator to produce a complete operating record at the time of inspections	264.74(a) 265.74(a) 270.30(h) 270.30(i)(2)h
3. Owner/Operator must implement a suitable operation and maintenance program for ground-water monitoring systems	• Failure of owner/operator to develop an inventory of all sampling devices and purging equipment in use at the facility including information on model number, serial number and manufacturer's name	265.15(b)(1) 264.15(b)(1)
	• Failure of owner/operator to develop detailed operating, calibration and maintenance procedures for each sampling device	270.30(j)(2) 264.15(b) 265.15(b) 270.30(e)

(Continued)

TABLE 3

Regulatory Objectives	Examples of Technical Inadequacies that May Constitute Violations	Regulatory Citations
3. Owner/operator must implement a suitable operation and maintenance program for ground water monitoring systems (continued)	• Failure of owner/operator to describe decision criteria to be used to replace or repair sampling equipment and/or monitoring wells	270.30(e) 264.15(b)(3) 265.15(b)(3)
	• Failure of owner/operator to maintain schedules for performing operation and maintenance activities related to the ground-water monitoring system	264.15(b) 265.15(b)
	• Failure of the owner/operator to maintain records for ground-water monitoring which provide information on 1) the date, exact place, and time of sampling or measurement; 2) the individual(s) who performed the sampling or measurement; 3) the date(s) analyses were performed; 4) the analytical techniques or methods used; and 5) the results of such analyses	264.73(b)(6) 264.15(b)(2) 270.30(j)(2) 270.30(j)(3) 265.73(b)(5) 265.73(b)(6)
	• Failure of the owner/operator to maintain records of all monitoring information including all calibration and maintenance records	270.30(j)(2)
	• Failure of the owner/operator to maintain records of monitoring information including determination of ground-water surface elevations	270.30(j)(2) 265.73(b) 264.73(b)(6) 265.74(a) 264.74(a) 265.94(a)(1) 264.97(f)
	• Failure of the owner/operator to assess ground-water flow rate and direction(s) in the uppermost aquifer on an annual basis (e.g., each year draw potentiometric maps(s) using data collected during the year)	265.94(a)(1) 264.98(e) 264.99(e)
	• Failure of the owner/operator to develop procedures to assess degradation of well casing (refer to Appendix A and question #13 in Appendix D)	270.30(e) 264.15(b)(1) 265.15(b)(1) 264.15(b)(3) 265.15(b)(3) 264.15(b)(4) 265.15(b)(4)

(Continued)

TABLE 3

Regulatory Objectives	Examples of Technical Inadequacies that May	Regulatory Citations
4. Owner/Operator must ensure the continued integrity of individual wells in the monitoring system ok	• Wells in monitoring system are silted in • Wells in monitoring system are cracked, corroded, or degraded • Wells show high levels of pH • Wells show evidence of frost heaving, subsidence, or collision damage • Wells show evidence of biolgical fouling • The hydraulic performance characteristic(s) of wells changes • Ground-water elevation data collected by field inspector indicate wells are improperly placed • Owner/operator does not replace wells which have failed	265.91(a) 265.91(c) 264.97(a) 264.97(c)
5. Owner/Operator's ground-water monitoring system must continue to satisfy its design objectives ok	• Ground-water elevation data collected by field inspector indicate wells are improperly placed • Owner/operator does not replace wells which have failed	270.30(e) 265.91(a) 265.91(c) 264.97(a)
6. Owner/Operator must collect ground-water samples properly ok	• Failure to evacuate stagnant water from the well before sampling • Failure to sample wells within a reasonable amount of time after well evacuation • Improper decisions regarding iltering or non-filtering of samples prior to analysis (e.g., use of filtration on samples to be analyzed for volatile organics)	265.90(a) 265.92(a) 265.93(d)(4) 270.14(c)(4)

(Continued)

TABLE 3

Regulatory Objectives	Samples of Technical Inadequacies that May	Regulatory Citations
6. Owner/Operator must collect ground-water samples properly OK	• Use of an inappropriate sampling device • Use of improper sample preservation techniques • Samples collected with a device that is constructed of materials that interfere with sample integrity • Samples collected with a non-dedicated sampling device that is not cleaned between sampling events • Improper use of a sampling device such that sample quality is affected (e.g., degassing of sample caused by agitation of bailer) • Improper handling of samples (e.g., failure to eliminate headspace from containers of samples to be analyzed for volatiles) • Failure of the sampling plan to establish procedures for sampling immiscibles (i.e., "floaters" and "sinkers") • Failure to follow appropriate QA/QC procedures	(See previous page)

(Continued)

TABLE 3

Regulatory Objectives	Examples of Technical Inadequacies that May	Regulatory Citations
6. Owner/Operator must collect ground-water samples properly OK	• Failure to ensure sample integrity through the use of proper chain-of-custody procedures • Failure to demonstrate suitability of methods used for sample analysis other than those specified in SW-846 • Failure to perform analysis in the field on unstable parameters or constituents (e.g., pH, Eh, specific conductance, alkalinity, dissolved oxygen) • Use of sample containers that may interfere with sample quality (e.g., synthetic containers used with volatile samples) • Failure to make proper use of sample blanks	(See previous page)

Appendix C:

Groundwater Sampling and Analysis Plan

Permit Number: A-264

Attachment 8

GROUNDWATER MONITORING

(There are 39 pages in this attachment)

10.0 GROUNDWATER AND SURFACE WATER MONITORING PROGRAM

10.1 GENERAL SAMPLING AND ANALYSES PROTOCOL

The Maryland Environmental Service continues to be the consultant carrying out the groundwater and surface water monitoring plan.

10.1.1 Laboratory Capabilities

Any laboratory contracted to carry out the sampling and analysis will be a full-service wet chemistry, organic and metals analysis laboratory; equipped with all of the basic and specialized equipment required to perform analyses as required by the EPA and Maryland Department of the Environment. The laboratory should conduct its operations in such a way as to provide reliable information. The contracted laboratory may use a subcontractor for certain analyses. Currently, the contracted laboratory is:

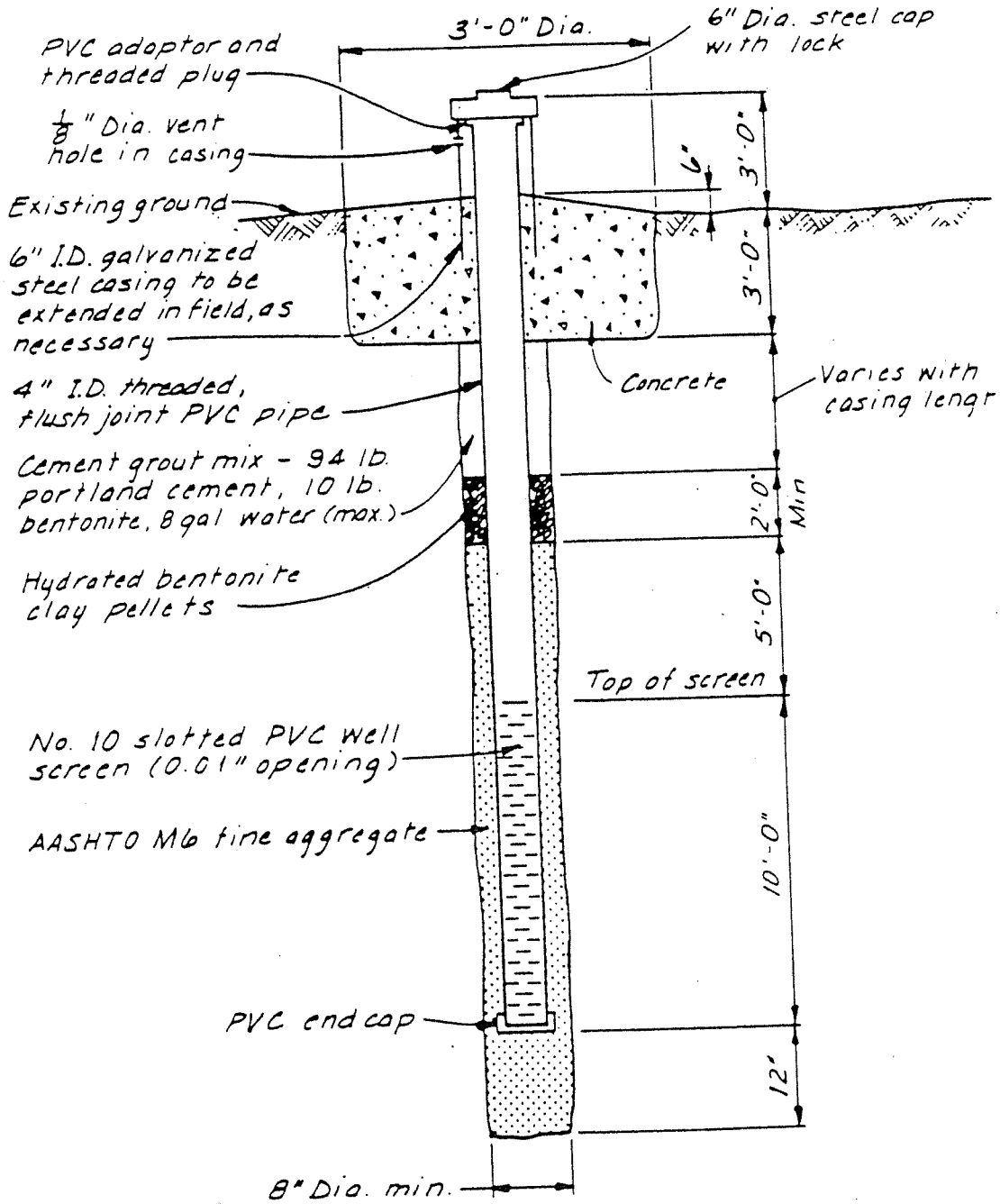
Atlantic Coast Laboratories, Inc.
(Artesian Laboratories)
630 Churchmans Road
Newark, Delaware 19702

10.1.2 Laboratory Certification

The contracted and/or Subcontracted Laboratories must have a Maryland Department of Health and Mental Hygiene Certification for drinking water analysis.

10.1.3 Well Installation And Maintenance

All monitoring wells are cased in a manner that the integrity of the well bore hole is maintained. Each well is provided with casings and locking caps for security. Each well is set in concrete. The casings are screened and packed at a minimum of ten feet with sand. The space between the bore hole and well casing above the sampling depth has been sealed with hydrated bentonite clay pellets (bentonite plug). Above the bentonite plug is a mixture of ten percent bentonite clay by weight and ninety percent cement. The depth of this mixture varies with the length of the casing. The installation of all wells are in accordance with 40 CFR Part 264.98. Figure 10.1 is a general diagram of the well installation used. Each monitoring well will be thoroughly inspected and repaired as necessary during each sampling period. The protective standpipe, locking cap mechanism and well pipe will be inspected for damage. If damaged, the standpipe will be re-aligned and re-grouted or replaced. The well pipe will be inspected for vertical alignment and replaced if misalignment is sufficiently severe to inhibit proper sampling. The actual well installation reports are located in Appendix A.



GROUND-WATER MONITORING WELL

MARYLAND

Hawkins Point Hazardous Waste Landfill

FIGURE 10.1

10.1.4 Well Evacuation Procedures

Before monitoring wells are purged, the water elevation is measured, by taking the known elevation at the top of the well casing and subtracting the depth of water plunked. After measuring the elevation of water, the depth to the bottom of the well is measured. The volume of water standing in the well is calculated using a conversion factor that converts the depth of water in a 4 inch diameter well into gallons. This volume (standing depth) is multiplied by three to determine total volume of water to be purged from the well.

The time required to purge this volume is determined using a 2.5 gallon bucket and a stop watch. The time required to fill the bucket is determined using the stop watch. This time is divided by the 2.5 gallon volume of the bucket to get gallons per second. This is multiplied by 60 seconds per minute to determine the pump rate in gallons per minute. Then the number of gallons is divided by the pump rate to determine the number of minutes required to purge three volumes from the well.

10.1.5 Measurement of Standing Water in Well

Water elevation is measured using a weighted tape measure which is marked to 0.1 foot. Water elevation is measured each time samples are collected. Depth to water and depth to the bottom of the casing is measured and recorded. Each well shall have a permanent reference point from which the initial measurement is taken.

The weighted tape measure shall be rinsed with deionized water before using in another well to avoid cross contamination between wells.

The measurement of the standing water will continue to be measured during each sampling event.

10.1.6 Determination of Volume to be Purged

The volume of three times the water in the casing shall be calculated per well. This is the volume of water which will be purged from each well. If the well purges to dryness before three volumes is obtained, this purged volume is sufficient.

Calculations: Conversion from depth to volume for a 4" well - 0.65 gallons/foot

A. Depth to Bottom - Depth to Water = Depth of Standing Water, in feet

B. Depth of Standing Water X 0.65 gallon/feet = Gallons of Standing Water

C. Gallons of Standing Water X 3 = Total Volume to be Purged

10.1.7 Determination of Time Required to Purge

The time required to purge three times the volume of water in the casing shall be calculated. This time must be calculated for each well because of the different well depths, which changes the amount of time required for the pump to lift the required volume of water.

The following are steps used to determine this time:

A. Measure Time to Fill a 2.5 gallon bucket, in seconds

B. Divide this time by 2.5 to get gallons/second

C. Gallons/second X Total Volume to be Purged = Total Time to Purge 3 volumes.

10.1.8 Purging Procedure

Each well is purged using a designated submersible well pump powered by a portable air compressor. The submersible well pumps are either stainless steel or Teflon sample pumps (each pump will contain a Teflon bladder). The type of tubing used with the pumps per well is polyethylene bonded twin tubing. A pump controller is used to regulate the compressed air needed to operate the air driven purge and sample pumps.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Once the air compressor is started, the air driven pump pumps groundwater through the uptake side of the twin tubing into 55 gallon polyethylene drums.

10.1.9 Handling Procedures for Purged Groundwater

During post-closure, all groundwater will be purged directly into polyethylene drums and disposed of in the leachate holding tanks and will be handled in the same manner as the leachate.

10.1.10 Safety

Occupational Safety and Health Administration's (OSHA) Forty-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response is required of all personnel prior to groundwater monitoring of this site.

10.1.11 Determination of Rate and Direction of Groundwater Flow in Uppermost Aquifer

Rate and direction of groundwater flow shall be determined using measured water elevations, adjusted to mean sea level. The direction of flow shall be determined by comparing the height of groundwater (water elevation) in each well. Water elevations, groundwater contours and hydraulic gradient shall be used to calculate seepage velocity using Darcy's Equation. The seepage velocity shall be calculated annually. The frequency of determining the rate and direction of groundwater flow in the uppermost aquifer is also annually. Groundwater flow shall be measured quarterly to establish seasonal and temporal variations in flow velocity and direction.

10.1.12 Quarterly Preparation of Groundwater Contours

Groundwater contours shall be prepared quarterly and shall be compared to previous contours to detect changes. Tracking the changes in the quarterly contours shall determine if these changes are seasonal or spatial variations or if they are the result of groundwater contamination.

10.1.13 Sample Withdrawal Techniques

Sample withdrawal shall be accomplished with equipment and procedures selected to yield representative samples for all monitoring parameters.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Upon starting the air compressor, groundwater will be pumped through the uptake side of the twin tubing into the appropriate sample bottle.

10.1.14 No Field Filtration of Samples

Samples shall not be field filtered prior to delivery to the laboratory as per 40 CFR Part 264.97.

10.1.15 Sampling Equipment and Materials

During the Post-closure period each well will continue to have a designated pump assigned to it. Depending on the pH of the groundwater in that well, the pump will be either a Teflon or stainless steel submersible pump. As stated by the Environmental Protection Agency (EPA), a pH < 5.0 or > 10.0 should not, but could possibly cause leaching of the stainless steel; therefore, all of the permitted wells, including wells 2E and 2H have designated Teflon submersible pumps. The following is a list of the remainder of the materials and equipment needed to purge and sample this site: portable air compressor, pump controllers, nylon rope, bonded twin tubing and plastic drums.

As previously stated each well pump and pump tubing is designated and will remain in that well for the life of the pump and/or pump tubing. Although the portable air compressor and pump controllers will be used to purge and sample all the wells, only the designated pump tubing will come in contact with any potentially contaminated groundwater. Therefore, decontamination is not necessary. All sampling equipment will be inspected during each quarterly sampling event and will be repaired and/or replaced on an as needed basis if found defective.

10.1.16 Sample Handling and Preservation Techniques

Sample preservation shall be according to 40 CFR Part 136 and SW-846, as shown on the following table. All samples shall be stored at 4°C after collection. The preservation of the parameters as listed in 40 CFR 264.93 and 264.98 (a) are as follows:

Metals		Container Preservation
1	Antimony	Plastic pH<2 w/ HNO_3
2	Arsenic	"
3	Barium	"
4	Beryllium	"
5	Cadmium	"
6	Chromium	"
7	Cobalt	"
8	Copper	"
9	Lead	"
10	Nickel	"
11	Selenium	"
12	Silver	"
13	Thallium	"
14	Vanadium	"
15	Zinc	"

EPA-Organic Constituents		Container Preservation
16	Acetone	Glass 4°C for all organic compounds
17	Acrylonitrile	"
18	Benzene	"
19	Bromochloromethane	"
20	Bromodichloromethane	"
21	Bromoform: Tribromomethane	"

CONTINUED,

	EPA-Organic Constituents	Container Preservation
22	Carbon disulfide	Glass 4°C for all organic compounds
23	Carbon tetrachloride	"
24	Chlorobenzene	"
25	Chloroethane: Ethyl chloride	"
26	Chloroform: Trichloromethane	"
27	Dibromochloromethane: Chlorodibromomethane	"
28	1,2-Dibromo-3-chloropropane: DBCP	"
29	1,2-Dibromomethane: Ethylene dibromide, EDB	"
30	1,2-Dichlorobenzene: 1,2-Dichlorobenzene	"
31	p-Dichlorobenzene: 1,4-Dichlorobenzene	"
32	trans-1,4-Dichloro-2-butane	"
33	1,1-Dichloroethane: Ethylene chloride	"
34	1,2-Dichloromethane: Ethylene dichloride	"
35	1,1-Dichloroethylene: 1,1-Dichloroethene: Vinylethylene Chloride	
36	cis-1,2-Dichloroethylene: cis-1,2-Dichloroethene"	
37	trans-1,2-Dichloroethyelene: trans-1,2-Dichloroethene	"
38	1,2-Dichloropropane	"
39	cis-1,3-Dichloropropane	"
40	trans-1,2-Dichloropropene	"
41	Ethylbenzene	"
42	2-Hexanone: Methyl butyl ketone	"
43	Methyl bromide: Bromomethane	"
44	Methyl chloride: Chloromethane	"
45	Methylene bromide: Dibromomethane	"
46	Methylene chloride: Dichloromethane	"
47	Methyl ethyl ketone: MEK: 2-Butanone	"
48	Methyl iodide: Iodomethane	"
49	4-Methyl-2-pentanone: Methyl isobutyl ketone	"
50	Styrene	"
51	1,1,1,2-Tetrachloroethane	"
52	1,1,2,2-Tetrachloroethylene:	"
53	Tetrachloroethylene: Tetrachloroethene: Perchloroethylene	
54	Toluene	"
55	1,1,1-Trichloroethane: Methylchloroform	"
56	1,1,2-Trichloroethane	"
57	Trichloroethylene: Trichloroethene	"
58	Trichlorofluoromethane: CFC-11	"
59	1,2,3-Trichloropropane	"
60	Vinyl acetate	"
61	Vinyl chloride	"
62	Xylenes	"

CONTINUED,

MDE-Other Constituents		Container Preservation
63	Alkalinity	P 4°C
64	Ammonia Nitrogen	P pH<2 H_2SO_4
65	Bicarbonates (by titration)	P 4°C
66	Biochemical Oxygen Demand	P 4°C
67	Calcium (by atomic absorption)	P pH<2 HNO_3
68	Chemical Oxygen Demand	P pH<2 H_2SO_4
69	Chloride	P 4°C
70	Cyanide (Total)	pH>12 NaOH, Ascorbic Acid
71	Hardness	P pH<2 HNO_3 or H_2SO_4
72	Iron	"
73	Magnesium	"
74	Mercury	P 4°C
75	Nitrate Nitrogen	P 4°C
76	pH	None, field test
76	Potassium	P pH<2 HNO_3
77	Sodium	P pH<2 HNO_3
78	Solids (dissolved)	P 4°C
79	Sulfate	P 4°C
80	Total Organic Carbon	P pH<2 H_2SO_4
81	Temperature	None, field test
82	Conductivity	None, field test
83	Acrolein	G 4°C for all organic compounds
84	4-Bromofluorobenzene	"
85	2-Chloroethyl vinyl ether	"
86	Chloromethane	"
87	Dichlorodifluoromethane	"
88	1,2 Dichloroethane	"
89	trans-1,2-Dichloroethane	"
90	cis-1,3-Dichloropropylene	"
91	trans-1,3-Dichloropropylene	"
92	1,4-Difluorobenzene	"
93	Ethanol	"
94	Ethyl methacrylate	"
95	Iodomethane	"

P - HDPE, High density polyethylene
G - Glass bottle with a Teflon lid

10.1.17 Sample Delivery to Laboratory

Samples shall be picked up by the contracted laboratory at MES headquarters or directly from the facility, unless sampling is being performed by the contracted laboratory in which case the samples will be taken directly from the site with the control of the sample delivery being the responsibility of the contracted laboratory. The samples shall be transported in such a manner that they meet all holding times and preservation requirements as per the methodologies detailed in SW-846.

a. Sample Labels

To prevent sample misidentification, the sampler shall affix a label to each sample container (bottle). Sample labels shall be sufficiently durable to remain legible even when wet. Sample labels shall contain, at a minimum, the following information:

- Sample identification number;
- Name and signature of collector;
- Date and time of collection;
- Place of collection; and
- Parameters requested (if space permits).

The samples shall be labeled by recording the above information directly on the sample containers. The descriptive information for the samples (referenced to the identification number) must be recorded in two places. One copy shall be kept in a separate file or logbook, and a second copy shall be shipped with the samples to the laboratory.

10.1.18 Chain of Custody Control

The tracing of sample possession shall be accomplished by use of a chain-of-custody record as described in Chapter One of SW-846. A chain of custody form shall be completed for all sample bottles which uniquely identifies each sample, the sample collection point, the person(s) performing the sample collection, time and date of sample collection and the analyses to be performed including the methodologies and detection limits. The chain of custody shall be signed whenever the sample changes hands and shall show that all required preservations were maintained and the samples at the time of delivery were chilled to $4^{\circ}C$. The contract laboratory must furnish a chain of custody for any samples they collect which includes all of the above. A chain-of-custody form shall be completed and shall accompany every sample shipment. The chain-of-custody shall contain enough copies so that each person possessing the shipment receives his/her own copy. At a minimum, the chain-of-custody shall contain the following information:

MARYLAND ENVIRONMENTAL SERVICE
SAMPLE CHAIN OF CUSTODY

PROJECT #: 32-0815
SAMPLE PURPOSE: QUARTERLY WELLS

PROJECT NAME: HAWKINS POINT
FORM: HPQTWELS, REV 12/18/92

SAMPLE NUMBER	SAMPLE LOCATION	DATE	TIME	SAMPLE TYPE	ANALYSIS REQUIRED	# OF CONT.
CHILLED TO 4 DEG C ? ___ YES ___ NO					TOTAL # CONTAINERS	

RELINQUISHED BY: DATE: TIME: ACCEPTED BY: DATE: TIME:

RELINQUISHED BY: DATE: TIME: ACCEPTED BY: DATE: TIME:

ANALYSIS:
1 UNPRES. LITER for CHLORIDE (EPA# 325.3), SULFATE (EPA#375.3) Cr+6(EPA# 218.4)
1 500 ML HNO3 for BARIUM (EPA# 200.7), TOTAL CHROMIUM (EPA# 218.2), IRON (EPA# 200.7), MANGANESE (EPA# 200.7), AND SODIUM (EPA# 273.1)
1 250 ML UNPRES. AMBER for TOXICITY (EPA# 9020)

FIELD PARAMETERS: pH (EPA# 150.1), SPECIFIC CONDUCTANCE (EPA# 120.1), AND TEMPERATURE

- Sample number;
- Signature of collector;
- Date and time of collection;
- Sample type (e.g., ground water, soil, surface water, etc.);
- Identification of sampling point (e.g. well number, outfall location);
- Number of containers;
- Analyses requested;
- Preservatives used;
- Signature of persons involved in the chain of possession;
- Inclusive dates and times of possession;
- Internal temperature of shipping/transportation container when samples were sealed into the container for shipping/transporting;
- Internal temperature of container when opened at the laboratory; and
- Remarks section to identify potential hazards or to relay other information to the laboratory.

Sample Transportation

Samples should be transported to the receiving lab in clean coolers and in vehicles free of cigarette smoke and cross contamination from other sites. A trip blank will be used, which measures potential contamination from bottles, preservatives, sample handling and transportation procedures. Detection of target analytes in trip blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, sample transportation and laboratory practices. Detection of target analytes in the trip blank greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and/or re-sampling shall occur.

Detection of target analytes in the trip blank greater than an order of magnitude of the detection limit (in the absence of a MCL) or the field results for that parameter shall invalidate the results and re-sampling shall occur.

10.1.19 Sample Collection Quality Assurance and Quality Control

Sample collection and preservation shall be performed by the contract laboratory for the regulated wells. [reference to sedimentation pond samples removed]. All other monitoring wells will be sampled by MES and analyzed by the contract laboratory.

Sample collection quality control shall be accomplished with a trip blank, a field blank and duplicate samples. One trip blank and one field blank shall be prepared each sample day. One duplicate for every 10 samples shall be collected and analyzed. The trip blank measures potential contamination from bottles, preservative and sample handling procedures.

The field blank establishes quality control for sample collection techniques. The duplicate establishes quality control for sample collection techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Detection of target analytes in field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. The concentrations of any contaminants found in field blanks should not be used to correct data. The contaminant concentration (target analytes) in these blanks should be documented. If the concentrations are more than an order of magnitude greater than the field sample results, this shall invalidate the results and re-sampling [word: payment removed] shall occur. Detection of target analytes in trip and field blanks greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-sampling shall occur.

Field Logbooks

When a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample collection, rather than a change in the ground-water quality, are responsible. Therefore, examination of the field logbook is critical in this process. A field log should be kept each time monitoring activities are conducted in the field. The field logbook should document the following:

- Sample location identification;
- Presence of debris and/or solids;
- Sample withdrawal procedure and equipment;
- Date and time of collection;
- Monitoring Well sampling sequence;
- Types of sample bottles used and sample identification number;
- Preservatives used;
- Parameters requested for analysis;
- Field observations of sampling event;
- Name of collector;
- Weather Conditions, including air temperature; and
- Internal temperature of field and shipping containers.

10.1.20 Laboratory Analytical Techniques

This section includes RCRA SW-846 analytical methods, quality assurance, and quality control procedures, for solid waste and wastewater. Where maximum contaminant level's (MCL's) have been finalized or where Primary or Secondary Drinking Water Standards exist, the analytical method used shall provide the detection limit required to determine compliance with the MCL or Standard.

10.1.21 Analytical Procedures

All Volatile Organic Compounds shall be analyzed using SW-846 Method 8240. All analytical procedures shall be methods approved or referenced in SW-846. The RCRA SW-846 method for the remainder of the parameters are listed as follows:

Metals	Method Number
Antimony	7040, 6020
Arsenic	7060A, 7061A, 6020
Barium	7080A, 6020
Beryllium	7090, 7091, 6020
Cadmium	7130, 7131A, 6020
Chromium	7190, 7191, 6020
Cobalt	7200, 7201, 6020
Copper	7210, 7211, 6020
Iron	7380, 6020
Lead	7421, 6020
Magnesium	7450, 6020
Nickel	7520, 6020
Selenium	7740, 7741A, 7742, 6020
Silver	7761, 6020
Thallium	7841, 6020
Vanadium	7910, 7911
Zinc	7950, 7951, 6020

Other Parameters

Alkalinity	EPA 310.1
Ammonia Nitrogen	EPA 350.1 or 350.2
Bicarbonates (by titration)	EPA 310.1
Biochemical Oxygen Demand	EPA 405.1
Calcium	7140, 6020
Chemical Oxygen Demand	EPA 410.4 or 410.1,2.3
Chloride	9056
Cyanide (Total)	9012A

CONTINUED,

Metals	Method Number
Hardness	EPA 130.2
Mercury	7470
Nitrate Nitrogen	EPA 352.1
pH	9040B
Potassium	7610, 6020
Sodium	7770, 6020
Solids (dissolved)	EPA 160.1
Sulfate	9056
Total Organic Carbon	9060
Temperature	EPA 170.1
Conductivity	EPA 120.1
Total Organic Halogens	9020B, 9022

10.1.22 Quality Assurance and Quality Control

Laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the SDWA, 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be available for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis. The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

The type, purpose, and frequency of QC samples to be analyzed in the laboratory and the acceptance criteria is specified below. Additional information has been detailed in the specific plans and include the applicability of the QC sample to the analytical process, the statistical treatment of the data, and the responsibility of laboratory staff and management in generating and using the data. The laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be made available by the laboratory for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis

The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

Cases when a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample analyses, rather than a change in the water quality, are responsible. The laboratory duplicate establishes quality control for sample preparation and analytical techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Laboratory Blanks document contamination resulting from the analytical process. Detection of target analytes in laboratory blanks shall trigger investigation of potential sources of contamination in reagents, preservatives, sample preparation techniques, and laboratory practices.

A method blank will only be acceptable for use with the accompanying samples, when the concentration in the blank of any analyte of concern is not higher than the highest of either:

(1) The method detection limit, or
(2) Five percent (5%) of the regulatory limit for that analyte, or
(3) Five percent (5%) of the measured concentration in the sample.
(4) ½ of MDE's PQL

In addition to the above, detection of target analytes in laboratory blanks (method blanks) greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-analyzing shall occur. Detection of target analytes in laboratory blanks equal to or greater than an order of magnitude of higher than the method detection limit for that parameter shall invalidate the results and re-analyses shall occur. The concentrations of any contaminants found in blank samples should not be used to correct the data.

Equipment and Instrumentation

Equipment and instrumentation should meet the requirements and specifications of the specific test methods and other procedures as specified in the SW-846 and this permit. The laboratory should maintain an equipment/instrument description list that includes the manufacturer, model number, year of purchase, accessories, and any modifications, updates, or upgrades that have been made.

Corrective Action

All laboratory control samples, matrix spike, surrogate spike and matrix duplicate samples must be within the acceptable range given in the specific EPA method used. In the event that the percent recovery is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as follows:

1. Submit in writing to MES the procedures describing how to identify and correct deficiencies in the analytical process.

2. These procedures must include specific steps to take in correcting deficiencies such as preparation of new standards and reagents, re-calibration and re-standardization of equipment, re-analysis of samples, or additional training of laboratory personnel in methods and procedures.
3. The procedures should specify that each corrective action has been documented with a description of the deficiency and the corrective action taken, and must include the person(s) responsible for implementing the corrective action.

Data Reduction and Validation

All data for this facility will be reviewed by the MES contract manager prior to being entered into the existing databases. The trip blanks, field blanks, duplicates, and surrogate spikes (volatile organic compounds only) will be reviewed for the presence of targeted compounds. As stated above, detection of target analytes in trip and field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. Upon verification from laboratory and/or corrective actions taken by the laboratory, MES will implement the procedures as described. In the event that the percent recovery for the surrogate spike is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as described in above sections, Quality Assurance and Quality Control & Corrective Action.

Before data is validated and entered into the database, MES' reporting staff will compute and interpret the results from all QC samples to verify that the analytical results are reported correctly. In addition, precision and bias, including evaluations of reagent, equipment rinsate, trip blanks, calibration standards, control samples, duplicate and matrix spike samples, and surrogate recovery, will routinely be monitored by periodically requesting daily QC/QA runs. The sole purpose of these procedures is to assure that the contracted laboratory has in place and is implementing corrective actions when necessary before submitting data to MES.

10.2 GENERAL GROUNDWATER AND SURFACE WATER MONITORING

The post-closure environmental monitoring program will continue for a period of thirty years with sampling and analyses of the indicator and groundwater quality parameters performed on a quarterly basis. Although barium and pH have been removed from the list of indicator parameters, they will continue to be monitored on a quarterly basis. All other parameters, (those characterizing the suitability of the ground water as a drinking water supply as listed in Section 10.1.21) will be analyzed annually. This additional monitoring as stated in COMAR 26.13.05.06J, shall determine whether additional hazardous constituents are present in the uppermost aquifer.

10.2.1 Indicator and Groundwater Quality Parameters

The preservation of the quarterly indicator and groundwater quality parameters as listed in 40 CFR Part 264.93 and 264.98(a) are as follows:

EPA/MDE Site Specific	Container Preservation
1 Chromium	P pH<2 HNO_3
2 Hexavalent Chromium	P 4°C

EPA General Constituents	Container Preservation
3 Chloride	P 4°C
4 Iron	P pH<2 HNO_3
5 Manganese	" "
6 Phenols	A/G H_3PO_4 & $CuSO_4$
7 Sodium	P pH<2 HNO_3
8 Sulfate	P 4°C

EPA General Constituents	Container Preservation
9 Specific Conductivity	None, field test
10 Total Organic Carbon	A/G Unpreserved
11 Total Organic Halogens	A/G Unpreserved

Note: P - HDPE, High density polyethylene A/G - Amber Glass bottle with a Teflon lid

10.2.2 Analytical Procedures for Indicator and Groundwater Quality Parameters

Parameter	Method Number
Chromium	7190, 7191, 6020
Hexavalent Chromium	7196
Chloride	9056
Iron	7421, 6020
Manganese	7450, 6020
Phenols	8040
Sodium	7770, 6020
Sulfate	9056
Specific Conductivity	120.1
Total Organic Carbon	9060
Total Organic Halogen	9020B, 9022

10.2.3 Type, Quantities, Concentrations Expected in Wastes

During post-closure, the indicator parameter of specific conductivity, and the waste constituent parameter of total chromium, will continue to be utilized as the basis for the detection monitoring for the Area 5 facility. Monitoring and analysis of these parameters provides the data base necessary to determine if any leakage from the Area 5 regulated unit occurs.

As outlined in Appendix B, entitled "Soils and Chrome Ore Tailings Chemical Analyses: Laboratory Reports", the content of chromium in the waste material was significantly greater than any other hazardous constituent, and thus should continue to be a representative indicator parameter of any heavy metal migrating from the cells containing chromium ore tailings. Barium will no longer be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the Hawkins Point facility. Barium would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells indicate that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. Barium will however continue to be monitored on a quarterly basis.

All other parameters listed in section 10.2.2 will continue to be utilized in establishing groundwater quality and as additional indicators of groundwater contamination.

10.2.4 Identification of Uppermost Aquifer

As outlined in the November 1992 Slug test, performed by Black & Veatch (See Appendix F), the upper aquifer under-lying Area 5 is an unconfined aquifer composed of post-cretaceous sediments and the upper member of the cretaceous deposits known as the Patapsco Formation. The base of this aquifer rests on the top of approximately 100 feet of Arundel Clay.

The Patapsco Formation consists of interbeded, banded silts and clays with clayey sands. Water-bearing sands of the Patapsco aquifer occur as irregularly bounded sheets to isolated ribbons, separated by layered silts and clays. Arundel Formation underlying the Patapsco Formation primarily consists of silts and clays. This layer has a low hydraulic conductivity and forms a no flow boundary under the Patapsco Aquifer.

10.2.5 Mobility And Stability In The Unsaturated Zone

The mobility and stability of Area 5 leachate depends on the physical and chemical behavior of each constituent as well as the different properties of the soils (those soils associate with the Patapsco Formation). Each constituent has a different solubility, adsorption, and migration rate that varies with soil pH, temperature and saturation. These factors alone have made, and will continue to make, determining the mobility and stability of the constituents of the leachate from Area 5 complex; therefore only general statements about mobility and stability will be made.

Heavy metal cations such as chromium, much like the chlorides and sulfates anions, are not highly responsive to attenuation in the saturated or unsaturated zone. In a high pH environment many metallic ions precipitate out of solution as insoluble oxides, hydroxides, phosphates, and sulfides. However, with a drop in pH and reducing soil conditions, these same insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium may adsorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Trivalent chromium is typically slowly mobile in aerobic, unsaturated conditions (Reports indicate increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxyl oxide contents). Hexavalent chromium usually does not precipitate in significant amounts; however it's mobility does increases between pH levels of 7 and 8.

Since attenuation properties depend on both the nature of the waste and the subsurface environment one can conservatively assume, over the active life of the facility, the non-reactive components of the leachate have traveled through the groundwater at a rate equal to the seepage velocity of Area 5. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may or may not

cause some components to travel faster than, or in different directions from, the flow of groundwater. In addition the density differences in some ions (chrome in particular) may cause some leachate components to sink rather than flow with the advective forces, or may slow down their migration rate.

Again, one may conservatively assume that during the closure and post-closure period, the stabilization and migration of the constituents of the leachate from Area 5 will continue in the same manner as described above.

The actual monitoring protocol is divided into three sub- sections. The first section addresses the monitoring of the groundwater surrounding Area 5 including Sedimentation Pond No 1 (stormwater runoff from Area 5). The second section addresses the monitoring of the observation wells surrounding the old MPA cell. The third section addresses the monitoring of the surface water outfalls throughout the facility.

10.3 GROUNDWATER MONITORING OF AREA 5

The effectiveness of the leachate collection system will be determined by statistically evaluating the groundwater in the upper most aquifer surrounding Area 5 and by monitoring the surface water of Sedimentation Pond No. 1, for the indicator parameters. The indicator parameters are outlined in section 10.2.2, as being characteristic of the leachate and/or contaminated groundwater from Area 5.

10.3.1 Proposed Monitoring Of Regulated Wells

It is proposed that monitoring for Area 5 continue to be performed as two different statistical evaluations to match the two different hydrogeologic formations that have been identified. This will continue to more accurately represent the groundwater quality of and around Area 5 by allowing an accurate evaluation of potential contamination caused by Area 5 in the one formation, while evaluating the degree of off-site contamination in the other formation (Trough Area).

In the first evaluation, monitoring Well 2B-1 shall continue to be designated as the up-gradient well for Area 5, with monitoring Wells 2D and 2F remaining the down-gradient wells. In this evaluation, Well 2G would no longer be used in the statistical analyses of this portion of Area 5.

In the second evaluation, monitoring well 2H shall continue to be designated as the up-gradient monitoring well for the area west of Area 5 known as the "Trough Area". Wells 2E and 2G would be the down-gradient monitoring wells for this evaluation.

Well 2A will continue to be monitored in quadruplicate for possible future use. All data received from quadruplicate monitoring will be compiled into a data base for possible future use.

Barium and pH will be monitoring quarterly along with the indicator parameters, but will not be included in the quarterly statistical analysis. The barium and pH data will be used to run quarterly trends analyses.

10.3.2 Justification for Proposed Monitoring

This proposal is requested because Wells 2G, 2E and 2H are not in the same hydrogeologic formation as the other three compliance wells. Monitoring of these wells continue to reveal the presence of contaminants which are not characteristic of the chromium ore tailing disposed of in the Area 5 facility, indicating that this well is contaminated from a source other than Area 5.

In 1985, a hydrogeologic assessment of the site by Black and Veatch identified a "trough" of less dense post-Cretaceous age sediments running across the southern end of Area 5 which allows groundwater to move more rapidly down-gradient across the southern end of Area 5 toward Wells 2G and 2E. Well 2H lies within the trough as it enters the property and is up-gradient from Wells 2G and 2E.

MES has tabulated pH data from December 1993 to present for monitoring wells 2B, 2D, 2F, 2E, 2G and 2H, the wells in question. Historically, the pH coming on-site through the up-gradient wells 2B & 2H are consistently less than the pH in the down-gradient wells 2D, 2F, 2E & 2G. This pH data was graphed; as shown, the pH of wells 2H and 2D are consistently lower then the pH of wells 2D & 2F; 2G & 2H, respectively.

The methods of statistical analyses used are the Parametric and Non-Parametric Analysis of Variance (ANOVA). These analyses are used to determine if there is a difference between the up-gradient well mean and the two down-gradient well means at a given point in time. These methods, like other methods, assume that a significant increase in the tested parameter indicates that the numbers down-gradient are higher than the numbers up-gradient. However, this is not the case at Hawkins Point with respect to pH. At the Hawkins Point facility, the quality of water coming on-site, through the Trough Area as well as beneath Area 5, has been shown through years of testing to be deteriorated due to high concentrations of Chloride, Iron, Manganese, Sodium, Sulfate, Barium, and low pH (the pH averages 3.4 for well 2H and 3.5 for well 2D since December 1993).

Prior to 1993, pH was not statistically analyzed at the site. The original permit did not require such testing. MES began statistically analyzing pH at the site in 1993. Inclusion of pH as an indicator parameter at the site became effective after renewal of CHA Permit A-264, which was issued on October 15, 1995. Since 1993, each quarterly analysis has determined that statistically significant increases in pH has occurred in down-gradient wells 2D, 2F, 2E and 2G intermittently. MES has consistently responded that pH differences are indicative of off-site contamination.

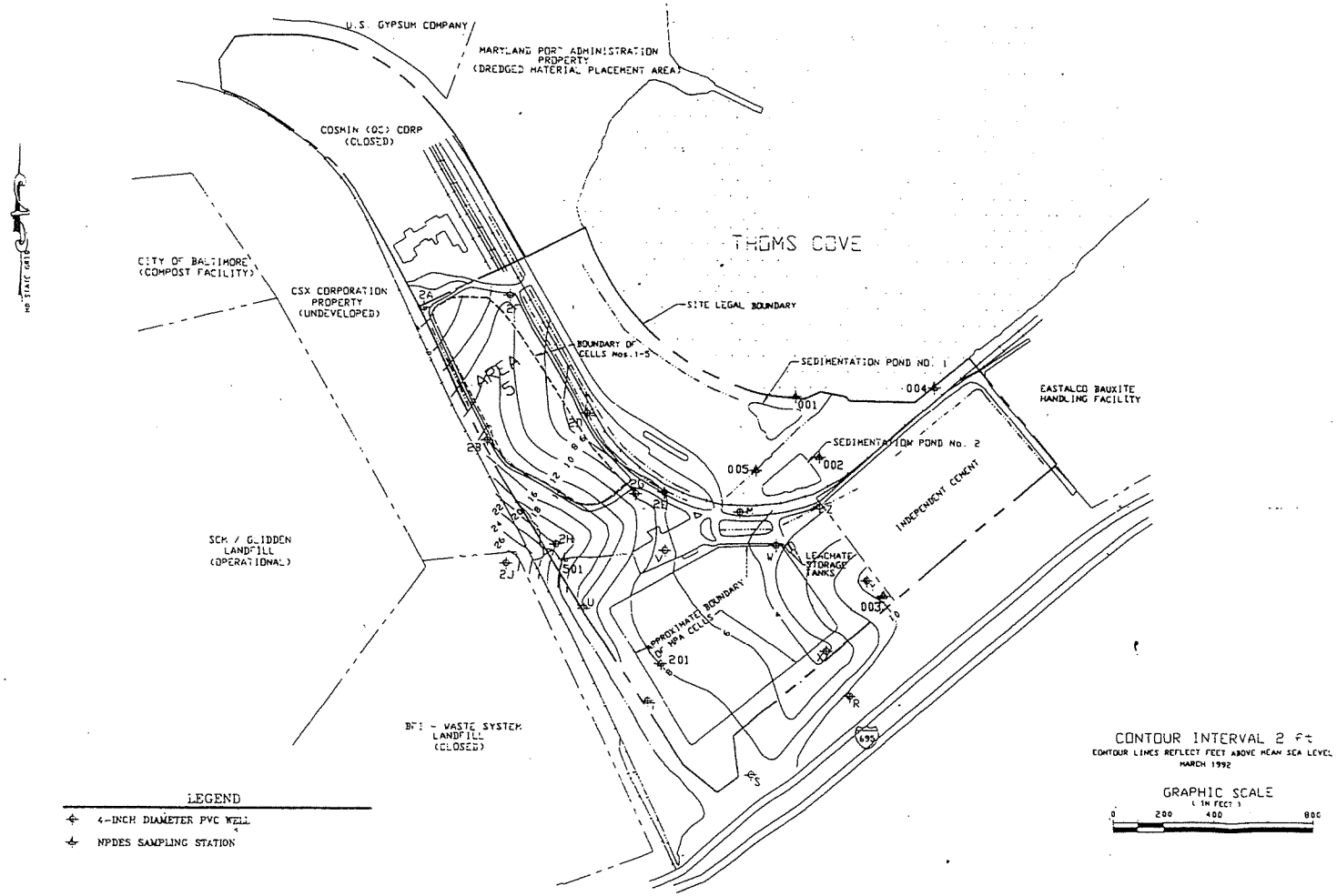


FIGURE 10.3

MARYLAND ENVIRONMENTAL

HAWKINS POINT HAZARDOUS WASTE LANDFILL
GROUND WATER CONTOURS

This off-site contamination is causing a false positive in the statistical analyses, erroneously indicating an increase in pH in down-gradient wells

MES' response to this observation has consistently been that pH differences are indicative of off-site contamination moving onto the Hawkins Point property. This off-site contamination is causing a false positive in the statistical analysis, erroneously indicating an increase in pH in down-gradient wells when in fact the pH of the up-gradient well has consistently been well below that of the down-gradient wells.

MES continues to believe that pH in the down-gradient wells are not increasing and that the statistically significant increase in pH is a false positive because the ground water coming on-site (through up-gradient wells 2H and 2B) has an extremely low pH which at times does decrease. The former landfills immediately up-gradient of Hawkins Point are positioned as potential cause of the decreased pH of the ground water entering the site and result in a false positive for a statistically significant increase in pH in the wells down-gradient to 2H and 2B. MES believes that the data clearly supports the position that the regulated unit in Area 5 is not the cause of this statistical increase.

Barium will not be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the facility and therefore would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells are normally less than 100 ppb, indicating that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. The maximum contaminant limit of barium in drinking water is 2000 ppb.

10.3.3 Designated Wells

Area 5 will be monitored by three groundwater monitoring wells 2B (upgradient), 2D, and 2F (points of compliance) which will continue to be statistically evaluated on a quarterly basis. Groundwater monitoring wells 2A, 2B, 2D, 2F, 2E, 2G and 2H will continue to be designated as regulated wells for the facility. The installation, location and depths of these wells are also in accordance with 40 CFR Part 264.97.

10.3.4 Background and Regulated Wells

In the first evaluation Monitoring Well 2B continues to be designated as the background well as defined in 40 CFR Part 264.97, it represents the quality of background water that has not been affected by leakage from Area 5. Down-gradient monitoring wells 2D and 2F will continue to represent the quality of groundwater passing through Area 5.

In the second evaluation, Monitoring Well 2H continues to be designated as the background well for the area west of Area 5 known as the "trough area". As defined in

40 CFR Part 264.97, background quality may be based on sampling of wells that are not up-gradient from the waste management area when: sampling at other wells will provide an indication of back-ground groundwater quality that is as representative or more representative than that provided by the up-gradient wells. Wells 2E and 2G will continue to be designated as the down-gradient monitoring wells for the Trough Area.

10.3.5 Use of Well Data

Historical data from the up-gradient wells will continue to be used to establish background data for the statistical evaluations. The historical data from the remainder of the compliance wells listed in this section has been compiled into a groundwater data base and will continue to be used to determine seasonal trends, potential contamination and/or any other possible future uses. The four quarterly replicates from each down-gradient well shall be compared to the combined pool of current and historical replicates from the background well. This historical data used shall not exceed two years.

The amount of historical replicates to be used shall be specified in the permit. In addition, the historical replicates from the background well shall not be averaged prior to use in the ANOVA procedure. The total sample size is twenty-four (24) data points:

- Up-gradient (Background) data consist of four (4) data points from the current quarterly monitoring and the data points from the three most previous quarterly monitoring events

- Down-gradient data consist of four (4) data point from the current quarterly monitoring of each of the two down-gradient wells.

10.3.5.1 Historical Data Spreadsheets

In addition to statistical evaluations, the data collected from the quarterly groundwater monitoring will continue to be compiled into a groundwater database for that particular well. This will be used to help determine seasonal trends if necessary. Appendix C contains historical groundwater monitoring data from 1994-1998.

10.3.5.2 Comparison of Each Constituent in the Compliance Wells to the Background Wells.

Once the quarterly analyses are completed, each constituent is compared to the same constituent in the background data. A quarterly statistical evaluation per constituent is performed following the procedures outlined in section 10.4.

10.4 STATISTICAL EVALUATION

This section contains procedures for performing a comparison of up-gradient and down-gradient groundwater analytical results to determine whether contamination has occurred. The procedures include:

10.4.1 A Proposed Statistical Method That Complies With 40CFR PART 264.97.

The proposed method of statistical analysis is the Parametric Analysis of Variance (ANOVA), an EPA approved statistical method under 40CFR PART 258.53(h) and (i). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Using ANOVA followed by a pos hoc comparison determines if an actual difference in groundwater quality exists for a given sampling period among a group of wells. For Area 5 wells, this analysis will determine if there is a difference between the background well mean and the two down-gradient well means at a given point in time for each monitoring parameter. The parametric ANOVA assumes that the data are normally distributed and have equal variances.
Two tests will determine if the data follow those assumptions. If not, the data will be statistically evaluated using a non-parametric ANOVA.

10.4.2 Evaluation of Non-Detected Parameters

If less than fifteen percent (15%) of the data points are below the laboratory detection limit, each data point that is below detection will be replaced by one half of its Practical Quantification Limit (PQL/2). All data shall then be evaluated by the parametric ANOVA.

However, if greater than fifteen (15%) of the data points are below the laboratory detection limit, a non-parametric ANOVA method shall be used to statistically evaluate the data. In the non-parametric ANOVA, all data points are ordered and replaced by their numeric rank. Those data points below detection are tied and equal to the average of the ranks as if they were slightly different.

10.4.3 Normal and Log-Normal Distribution

The EPA has reversed its previous guidance on the distribution of groundwater data according to the "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Draft, Addendum to Interim Final Guidance", dated July 1992. The EPA has indicated that ground water concentration data usually follow a log-normal distribution as opposed to a normal distribution. Therefore, all data points shall be logged prior to checking the distribution.

The Shapiro-Wilk Test shall be used to determine whether the data points follow the log-normal distribution. If the test statistic is greater than a critical value, the

data are log-normal, however, if the test rejects the logged-data, the data shall be unlogged and retested for a normal distribution.

10.4.4 Equality of Variances

To determine if the different wells have similar variances, The Levine Test shall be used. In this analysis, each data point is replaced by the absolute value of its respective residual:

$$z_{ij} = x_{ij}^{3} - x_{i}^{3}$$

10.4.5 ANOVA Procedures

1. Arrange the data (or the natural log of data) in a table using the number of wells and the number of replicates,

Well No.	R1	R2	R3	R4	
1	1	2	3	4	BACKGR. CURRENT
2	1	2	3	4	BACKGR. PREQRT
3	1	2	3	4	BACKGR. PREQRT
4	1	2	3	4	BACKGR. PREQRT
5	1	2	3	4	DOWNGR. CURRENT
6	1	2	3	4	DOWNGR. CURRENT

2. Record the number of observations n,

n = (#wells) * (# replicates)

here n = 6 X 4 = 24

3. Sum the readings (replicates) per well, from i to m number of wells

$$S\,X_i = (R1_i+R2_i+R3_i+R4_i)$$

4. Calculate the mean (average) of the replicates per well, $X_i..X_m$, where m is the total number of wells.

$\overline{X} = S\,X_i\,/N$, where N is the number of readings per well.

5. Expand the table to include the sum of each well and the well mean. (See Figure 10.4)

6. Add all the sums together to get the sum of sums (SSUM) and take the average of all the means to get the mean of means (MMEAN). Numerically the,

\2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

STATISTICAL ANALYSIS FOR HAWKINS POINT HAZARDOUS WASTE LANDFILL
ANALYSIS OF VARIANCE (ANOVA) REPORT DATE: 15-Jun-92
MARCH 1992 TOTAL BARIUM DATA FROM THE CONTRACT LABORATORY (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4
BACKGR 2H	50.0	50.0	90.0	600.0 *
2H	40.0	40.0	40.0	40.0
2E	230.0	230.0	240.0	220.0
2G	20.0	20.0	20.0	20.0

*MATRIX INTERFEREN
CONTRACT LABORAT

NATURAL LOG OF TOTAL BARIUM (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4	SUM_X	MEAN	BACKGR ME
BACKGR 2H	3.912	3.912	4.500	6.397	18.72	4.68	4.68
2H	3.689	3.689	3.689	3.689	14.76	3.69	
2E	5.438	5.438	5.481	5.394	21.75	5.44	
2G	2.996	2.996	2.996	2.996	11.98	3.00	

READINGS (N)

****SQUARE OF SAMPLE CONCENTRATION DATA********

					SUM OF SUMS	MEAN OF MEANS
BACKGR 2H	15.30	15.30	20.25	40.92	67.21	4.20
2H	13.61	13.61	13.61	13.61		
2E	29.57	29.57	30.04	29.09		
2G	8.97	8.97	8.97	8.97		

****SUM OF SQUARES SCRATCH-PAD****

WELL NO.	SUM_X	SUM(_X_SQR)	READINGS (N)	(SUM_X)^2	(SUM_X)^2/n	MEAN
BACKGR 2H	18.72	91.78	4	350.47	87.62	4.68
2H	14.76	54.43	4	217.73	54.43	3.69
2E	21.75	118.27	4	473.08	118.27	5.44
2G	11.98	35.90	4	143.59	35.90	3.00

****(ONE WAY) ANALYSIS OF VARIANCE TABLE****

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	ESTIMATE OF STD	CALCULATED F RATIO	TABLED F RATIO
BETWEEN WELLS	13.90	3	4.63	13.349	3.49
SAMP. ERROR	4.16	12	0.347		
TOTAL	18.06	15			

IF THE CALCULATED F RATIO IS GREATER THEN (>) THE TABLED F RATIO, THEN
pos hoc COMPARISONS ARE NECESSARY.

BACKGROUND DATA FOR WELL 2H CONSIST OF DATA FROM 1988-1991.

$$SSUM = (S\ X_i + S\ X_j + \ldots S\ X_m) \text{ and the,}$$

$$MMEAN = (\bar{X}_i + \bar{X}_j + \ldots \bar{X}_m)/m \text{ (\# of wells)}$$

7. Square the Sum of each well and arrange in a table along with the SSUM and MMEAN, SUMSQ

$$SUMSQ = (S\ X_i)^2$$

8. Calculate the sum of squares between the wells, SS_{well}

$$SS_{well} = [(S\ X_i)^2 + (S\ X_j)^2 + \ldots (S\ X_m)^2] - 1/N^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with m number of wells-1 being the degree of freedom for between wells.

9. Calculate the corrected total sum of squares, SS_{total}

$$SS_{total} = (R1_i^2 + R2_i^2 + \ldots + R3_j^2 + R4_j^2 + \ldots$$

$$R4_m^2) - 1/n^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with n number of readings-1 being the degree of freedom for between observations.

10. Find the error within the wells, SS_{error}

$SS_{error} = SS_{total} - SS_{well}$, with n(# of observations)-m(# of wells) being the degree of freedom for the error.

11. Arrange the calculations in a table using the number of wells by the calculations. (See Figure 10.4)

12. Calculate the mean squares between the wells and within the wells MSBW and MSWW.

$$MSBW = SS_{well}/m\text{-}1 \text{ and } MSWW = SS_{error}/n\text{-}1$$

13. Now divide MSBW by MSWW to obtain the calculated F statistic, F_{cal}.

14. Using Table 1, of Appendix D, m-1 degrees of freedom, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated F can be found, F_{tab}.

15. Using the above calculations the one-way ANOVA table should be set up as shown in the attached example (Figure 10.4).

16. If and only if the calculated F ratio exceeds the tabulated F ratio should pos hoc comparisons be made, otherwise can conclude that there is no significant statistical difference (well means are the same) among the wells at the given time period.

10.4.6 Procedures For pos hoc Comparison

1. To compute the pos hoc comparisons (Bonferroni t-statistics), let M=the # of compliance wells, which will also be the number of comparisons to be made.

2. Sum the total number of observations in the background well nb.

3. From ANOVA worksheet list the average

concentration of the background well, $\overline{X}b$.

4. Calculate the difference between the average concentration of each compliance well and the average of the background well.

$$DIFF=\overline{X}i-\overline{X}b.$$

5. Calculate the standard error of each difference (SE), however, if the number of observations is the same for all the compliance wells then the standard error for each well will be equal.

$$SE = [MSWW*(1/nb+1/M)^{1/2}]$$

6. Using Table 2 (Bonferroni's t Table) of Appendix D, # of compliance wells M, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated Critical t value can be found, crit. t.

Crit.t value obtained from Table 2, Appendix D

7. Multiply the Critical t value by the Standard error to obtain the D quantities for each well, once again if the number of observations is the same for all the compliance wells then the D quantity for each compliance well is equal.
D = Crit. t * SE

8. Compare the difference $\overline{X}i$ - $\overline{X}b$ to the value D, if the difference exceeds the D value, conclude that compliance well has significantly higher concentrations than the average background wells. Otherwise conclude that the well is not contaminated. This must be performed per compliance well.

9. Finally, calculate the residuals $R1_i$, which are the differences between each observation and its predicted value (in this case, the mean of that particular well X_i). The residuals can be used to check for departures from normality.

$$R1_i = X1_i - \overline{X_i}$$

10. Using the above calculations for pos hoc comparisons, set up table along with an interpretation of the data and calculations as shown in the attached example (See Figure 10.5).

Appendix E is a working example of the ANOVA statistical analysis using actual data from a groundwater monitoring event of both Area 5 and the Trough Area.

10.4.7 Non-Parametric ANOVA

The non-parametric ANOVA procedure shall be used when: 1) the data does not follow a normal or log-normal distribution, 2) the data has unequal variances between wells, or 3) greater than fifteen percent (15%) of the data points are below laboratory detection. Under this procedure, the Kruskal-Wallis Test is used to determine if there is a statistically significant increase among the wells.

10.4.7.1 Kruskal-Wallis Procedures

The procedures for the Kruskal-Wallis Test is as follows:

1) Rank all observations (N) from least to greatest,

2) Calculate the sum of the ranks of observations in each well (RK_i) and the average of the ranks for each well.

3) Calculate H,

$$H = [\, 12/N(N+1)*S\ R_i^2/N_i \,]-3(N+1)$$

where N, is the number of data points for each well.

4) If there are ties among the ranks, then the adjusted Kruskal-Wasllis statistics must be calculated as follows:

$$H' = H/1 - (\sum_{i=1}^{g} t_i^3 - t_i / N^3 - N)$$

where, g is the number of groups of distinct tied observations and t_i is the number of observations in the tied group i.

a:\2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

DEGF. = DEGREES OF FREEDOM
M = # OF COMPLIANCE WELLS (ALSO # OF COMPARISONS TO BE MADE)
nb = TOTAL # OF SAMPLES IN BACKGROUND WELLS
Xb= AVERAGE CONCENTRATION OF BACKGROUND WELLS

DEGF=	12
M=	3
nb=	4
Xb=	4.68

The difference between the mean of the five compliance wells and the mean of the background well.

meanXi - meanXb = difference

2H=	-0.99
2E=	0.76
2G=	-1.68

SE = STANDARD ERROR OF EACH DIFFERENCE.
Since the # of observations is the same for all compliance wells, the standard errors for the four differences will be equal.
Di = COMPUTE THE QUANTITIES Di FOR EACH DIFFERENCE
Once again since the # of observations are the same, D1=D2=D3...
CRT. t = CRITICAL t, CONSTANT FROM TABLE 2
D = SE*CRT. t

SE=	0.450
CRT. t=	2.45
D=	1.102

Since calculate F was > tabled F the Bonferroni multiple comparisons procedure was used to determine for which wells there was statistically significant evidence of contamination.

Of the three comparisons, none exceeded the critical value D, it can be concluded that there was no statistical difference among the camparisons.

COMPUTING THE RESIDUALS USING ln DATA

WELL NO.	RPL 1	RPL 2	RPL 3	RPL 4
2H=	0.00	0.00	0.00	0.00
2E=	0.00	0.00	0.04	-0.04
2G=	0.00	0.00	0.00	0.00

5) If H or H' is less than the tabulated chi-squared value with (k-q) degrees of freedom, where k is the number of groups, then one can conclude that there is no significant statistical increase (no contamination present). However, if H or H' is greater, then one must proceed with step 6.

6) Compute the critical difference C_i, for each well:

$$C_i = Z_{(a/(k-1))} * \ddot{O}N(N+1)/12*(1/n_b+1/n_i)$$

where n_b, is the number of data points in the background well, here n_b=16, and $Z_{(a/(k-1))}$ is the upper (a/(k1)) percentile from the standard normal distribution.

7) Compute the differences between each down-gradient well's average among the ranks and the background (up-gradient) well rank average. If this value for any well exceed C_i, then one can conclude that there is a significant statistical increase and therefore evidence of contamination in that particular well.

10.4.8 Statistically Significant Evidence of Contamination

Within one month after receiving the analytical results from the last replica taken for that quarter, it will be determined whether there is a statistically significant increase in contaminates per detection monitoring point using the procedures outlined in Sections 10.4.1-10.4.7.

If it is determined that there is statistically significant evidence of contamination for chemical parameters or hazardous constituents as specified in 40 CFR Part 264.98, then the following procedures will be followed:

1. The Regional Administrator (EPA) and the Regulatory Agency (MDE) will receive written notification within seven days. This notification will specify which chemical parameters or hazardous constituents have shown statistically significant evidence of contamination.

2. All monitoring wells shall immediately be sampled to determine the presence and concentration of any constituents listed in Appendix IX of 40 CFR Part 264.

3. Should any of the constituents listed in Appendix IX of CFR Part 264 be found present, then that well will be re-sampled and analyzed within one month of receiving the initial analytical results. Both sets of results will be submitted to MDE within a timely manner of receiving the second results.

4. Should the results from the second set of analyses confirm the finding of the first set of analyses, then the results of both sets of analyses along with an application for permit modification to establish a compliance monitoring

program will be submitted to MDE. The submission of this finding shall occur within ninety days of receiving the second set of analytical results. The permit modification application shall follow the guidelines outlined in 40 CFR Part 264.98

10.5 DETERMINING THE SAMPLING INTERVAL

In no instance are any of the sampling events allowed to exceed ninety calendar days from the initiation of sampling. To determine the sampling interval, hydrogeologic conditions of the regulated unit were evaluated to determine the groundwater flow velocity. Using the calculated seepage velocity, the sampling interval is generated.

10.5.1 Hydrogeologic Conditions

Slug tests were performed on the existing and proposed compliance wells by Black and Veatch in November 1992. A copy of the report can be found in appendix F.

The data from this report was used to estimate the minimum time interval between sampling per event that would allow four independent samples per well of the groundwater surrounding both Area 5 and the Trough Area.

The following calculations were used to determine the minimum time required to obtain an independent sample from each compliance well:

Vh=(Kh)(i)/Ne, where

Vh = Horizontal component of the average linear velocity, (seepage velocity)

Kh = Horizontal hydraulic conductivity,

Ne = Effective porosity and

i = Hydraulic gradient.

D = Well Diameter

D/Vh = minimum time required for an independent sample of groundwater to pass through the diameter of the well.

These calculations are based on Darcy's Equation, and follow the guidelines given in the EPA document, "Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities", April 1989.

10.5.2 Estimated Seepage Velocity and Time Required to Pass Through a Four-Inch Well Diameter

According to the Slug Test Report referenced above, the estimated seepage velocity was calculated as 0.014 feet/day (0.168 inches/day) for Area 5 and 0.136 ft/day (1.632 inches/day) for the Trough Area. Therefore the average minimum time required for an independent sample of groundwater to pass through the four inch diameter well is as follows:

Minimal time required for Area 5 is D/Vh = (4 inches/0.168 inches/day) = 23.8 days

Minimal time required for Trough Area is D/Vh=(4 inches/1.632 inches/day) = 2.5 days

10.6 SAMPLING INTERVAL

Based on the information from Section 10.5.2 and to assure that all samples are taken within the ninety (90) day window (21 days between replicates), the suggested sampling interval for Area 5 is once every 21 days. The suggested sampling interval for the Trough Area is once every 3 days (3 days between replicates until all four replicates are taken). Procedures for the suggested sampling interval are outlined below. Each sampling interval assures that the replicates are taken far enough apart in time to prevent any type of auto correlation.

10.6.1 Sampling Interval Procedures

On Day One of the sampling event purge each well following the procedures outlined in Sections 10.1.5 through 10.1.11. All field information including depth to water, volume of water purged, date, time and samplers initials shall be documented in a field notebook.

On Day Two, sample each of the wells using the sampling procedures outlined in sections 10.1.14 through 10.1.16. All field information such as pH readings, specific conductivity readings, temperature, date/time and sampler initials shall be recorded in a field notebook. This set of samples will be the first replicate.

Twenty-one days (three for the Trough Area) after the wells were initially sampled, sample each again (without purging). This set of samples will be the second replicate.

Twenty-one days (three for the Trough Area) after the second replicate, sample each of wells (without purging). This set of samples will be the third replicate.

Finally twenty-one days (three for the Trough Area) after the third replicate, sample each of the wells again (without purging). This set of samples will be the

fourth and final replicate of the sampling event. Below are examples of the proposed sampling Intervals:

Sampling Interval For Area 5

Date	Replicate No.
June 1	Purge Only
June 2	1
June 23	2
July 13	3
August 3	4

Sampling Interval For Trough Area

Date	Replicate No.
June 1	Purge Only
June 2	1
June 5	2
June 8	3
June 11	4

10.6.2 Sampling Frequency

The sampling frequency shall remain quarterly for at least 30 years, with yearly analysis being performed on those parameters outlined in section 10.1.16.

10.7 PROPOSED METHOD FOR DATA ORGANIZATION AND PRESENTATION

10.7.1 Data Organization

Upon receiving the data from the contract laboratory, it will be checked against the chain of custody. This will assure the samples were analyzed for the proper group of parameters. The blanks, Trip Blanks, Duplicates and when applicable surrogates will be reviewed. Data will then be entered into a groundwater computer database. The first spreadsheet will consist of data for all wells sampled during that particular sampling event. The second spreadsheet will consist of all data from historical and current sampling events per well. e.g., if there are six wells then, there will be six different spreadsheets (Shown in Figures 10.6 and 10.7). The four independent samples (replicates) will be used to establish a statistical profile of the groundwater surrounding Area 5 and the trough Area for that given time as shown in Figures 10.4 and 10.5.

Indicator parameters are those parameters that are characteristic of landfill leachate and could indicate leakage from the landfill. Each indicator parameter will be statistically evaluated according to procedures outlined Section 10.4.

HAWKINS POINT GROUNDWATER QUALITY MONITORING

DATE 03/11/92

		SAMPLING POINT 2A					2B1					2D2					2E				
	UNITS	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	A
pH	UNITS	4.7	4.6	4.7	4.7	4.7	4.5	4.5	4.5	4.5	4.5	5.9	5.8	5.8	5.8	5.8	4.7	4.7	4.7	4.7	
SP CONC.	UMHOS/CM	100	100	100	100	100	2500	2350	2500	2500	2463	520	520	520	520	520	10320	9030	10320	10320	
TOX	MG/L	0.012	0.013	0.025	0.010 L	0.015	0.010	0.056	0.013	0.011	0.023	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.030	0.010 L	0.018	
CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.01	0.01 L	0.01 L	0.01	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.155	0.155	0.160	0.155	
HEX CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	
CHLORI	MG/L	8	7	7	7	7	34	33	34	33	34	20	20	20	20	20	350	360	350	350	
SULFAT	MG/L	31	29	29	30	29.8	3400	3300	3200	3300	3300	250	250	250	250	250	19000	19000	19000	19000	
BARIUM	MG/L	0.16	0.19	0.17	0.17	0.17	0.05 L	0.05 L	0.05 L	0.05 L	0.05 L	0.16	0.16	0.16	0.17	0.16	0.23	0.23	0.24	0.22	
IRON	MG/L	1.30	1.40	1.40	1.40	1.38	1100.0	1100.0	1100.0	1000.0	1075.0	13.00	13.00	13.00	13.00	13.00	6900	7000	6900	6900	
MANGAN.E	MG/L	0.07	0.06	0.06	0.06	0.06	28.0	28.0	28.0	28.0	28.0	0.81	0.81	0.83	0.80	0.81	270	270	270	270	
SODIUM	MG/L	5.3	5.3	5.2	5.2	5.25	21.0	11.0	21.0	21.0	18.5	10.00	11.00	11.00	11.00	10.75	310	310	310	310	
DEPTH .. WATER	FEET	41.4					27.8					23.2					18.2				
DATUM		64.5					47					37.5					42.2				

.. INDICATE THE VALUE OBTAINED FOR THAT PARAMETER WAS LESS THAN THE DETECTION LIMIT TO THE LEFT. SRM. 21-May-92

44.48

HAWKINS POINT HAZARDOUS WASTE LANDFILL
EPA Identification No. MDD 00 073 1356

JUNO WATER MONITORING WELL 2A
Permit No. BC 81-0102

TOP OF STEEL CASING ELEVATION = 44.48
BOTTOM OF SCREEN ELEVATION - 21.7

	STANDARD/UNITS	DET.LIMIT	3/23/89	6/22/89	9/28/89	12/21/89	3/22/90	6/21/90	9/20/90	12/06/90	03/21/91	06/20/91	09/19/91	12/12/91	03/11/92	06/19/92
WATER ELEVATION (MSL DATUM)			1.98	1.78	2.98	2.18	2.48	3.28	3.48	2.78	3.58	3.38	3.08	2.68	3.08	1.94
BARIUM	1.0 mg/l	0.010	0.050 L	0.06	0.09	0.05 L	0.05 L	0.11	0.05 L	0.05 L	0.05 L	0.07	0.05 L	0.050 L	0.017	0.060
CHROMIUM(TOTAL)	.05 mg/l	0.001	0.004	0.005 L	0.005 L	0.01 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.003	0.005 L	0.010 L	0.005 L
CHLORIDE	250 mg/l	0.100	10.0	10	7	10	8	10	7	8	8	9	8	6	7	8.000
IRON	0.3 mg/l	0.001	1.70	3.50	0.16	0.02 L	0.24	0.50	0.30	0.48	0.73	0.49	4.75	1.28	1.38	4.700
MANGANESE	0.05 mg/l	0.001	0.05	0.09	0.03	0.05 L	0.06	0.09	0.06	0.06	0.06	7.1	0.19	0.04	0.06	0.180
SODIUM	20.0 mg/l	0.100	3.4	5.3	5.0	5.4	4.85	7.15	5.73	4.85	5.45	6.85	4.63	4.630	5.250	4.980
SULFATE	250 mg/l	0.10	25	38	25	43	56	34	23	41	35	41.3	1475	11.50	29.80	8.80
pH	6.5 8.5 units	0.1	4.93	4.8	4.3	4.8	4.8	5.3	4.5	4.8	6.5	4.9	4.4	4.1	4.7	4.1
SPEC. CONDUCT	umhos/cm	1	1428	158	57	80	90	97	71	69	130	74	103	50	100	78
COD	mg/l	0.01	0.010 L	0.02	0.02	0.04	0.04	0.1	0.0225	0.01 L	0.28	0.01 L	0.011	0.03	0.02	0.06
CHROMIUM (HEX)	0.05 mg/l	0.010	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.010 L	0.010 L

NOTE: BDL-Below Detection Limit
NOTE: An "L" indicates a less than value
NOTE: IN SEPT AND DEC OF 1990, THE CONTRACT LABORATORY EXPERIENCED MATRIX INTERFERENCES AND ONLY REPORTED ONE OR TWO VALUES FOR EACH OF THE TWO SAMPLE SETS.

Other parameters outlined in Section 10.1.16 will be monitored annually but will not be statistically evaluated unless there is a specific reason for concern, or specific guidance from the regulatory agency (Maryland Department of the Environment (MDE)). There will be no statistical evaluation of the Volatile Organic Compounds (VOC's). Instead, the procedures outlined in Section 10.7.2 shall be followed for reporting VOC concentrations to MDE.

10.7.2 Reporting the Presence of Volatile Organic Compounds (VOC)

If any of the organic compounds described in Section 10.1.16 are present, a report shall be submitted to MDE following the procedures described below:

1. Each VOC that is present will be compared to the Maximum Contaminant Level (MCL) for that compound, as listed in the EPA document titled "Drinking Water Regulations and Health Advisories", April 1992. (see Appendix G.) The MCL is the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

2. If any VOC is present, but is less than the MCL for that compound, then a letter and a copy of the data report will be submitted to MDE within one month of receiving the data. The well will continue to be closely monitored for VOC levels (VOC's will be monitored semi-annually as opposed to annually for that year).

3. If the concentration of any VOC is greater than the listed MCL for that compound, the monitoring well will be immediately re-sampled, using the procedures in Section 10.1.21. A letter and the data reports from both sampling events will be submitted to MDE within one month of receiving the second data report.

10.7.3 Schedule For The Submission Of Data Collected

All data collected for the previous quarter shall be submitted to MDE one month after receiving data from contract laboratory.

10.7.4 Quarterly Data Submission Package

A copy of the data as received from the contract laboratory, individual well spreadsheets, statistical evaluations for sampling event and a summary or interpretation of the data will be submitted to MDE one month after receiving the final data report from laboratory. A copy of this data package will also be filed on site.

10.7.5 Submission of Letters Documenting Presence of VOC's or Exceedance of VOC MCL's

Within one month of receiving the yearly data analyses from the contract laboratory, if any volatile organic compounds are present, a letter stating such shall be submitted to MDE.

If a VOC MCL is exceeded, a letter and data report will be sent to MDE within one month of receiving the data report from the second sampling event.

10.8 SURFACE WATER MONITORING

During post-closure all surface water monitoring will continue to be performed in accordance with the National Pollution Discharge Elimination System (NPDES) permit. A NPDES permit renewal was submitted to the regulatory agency (MDE) in July of 1990. Monitoring will be performed in accordance with the new permit when received. A copy of the permit renewal application is enclosed in Appendix H.

Appendix D:

Well Construction Diagrams and Logs

REPORT ON HAWKINS POINT

Area 5 Slug Test

In accordance with the Work Plan to estimate aquifer hydraulic conductivity, B&V Waste Science and Technology Inc. (BVWST) performed slug tests at six monitoring wells in Area 5 at the Hawkins Point Landfill. All six monitoring wells (2B, 2D-2, 2E, 2F, 2G, and 2H) were tested at least once on November 10, 1992. Since the aquifer testing was accomplished ahead of schedule, BVWST field personnel were able to conduct additional slug tests at monitoring wells 2F and 2G.

Monitoring wells were slugged by approximately 10 gallons of water during each test. A Hermit 1000 data logger was used to monitor and record water levels. Field measured data were downloaded to a computer for analysis. A computer program, AQTESOLV, was used to analyze the data using the Bower and Rice method for unconfined aquifers.

Results of the slug tests are listed in Table 1 and are also shown on the attached graphs.

TABLE 1 - Hydraulic Conductivity Results

Monitoring Well	Hydraulic Conductivity (ft/day)	(cm/sec)
2B	0.28	9.88×10^{-5}
2D-2	0.09	3.17×10^{-5}
2E	0.19	6.70×10^{-5}
2F*	0.04, 0.06	1.41×10^{-5}, 2.11×10^{-5}
2G*	0.82, 1.03	2.89×10^{-4}, 3.63×10^{-4}
2H	2.97	1.05×10^{-3}

* Two slug tests were performed.

A summary of the slug test input and output data are presented in Appendix A. Appendix B contains a copy of the work plan.

Area 5 Seepage Velocity

Table 2 shows measured ground water levels at the six text wells.

TABLE 2 - Measured Ground Water Levels

Monitoring Well	EL (MSL) Top of Casing (ft)	Depth to Water Level (ft) 11/10/92	11/10/92 Water Level Elevation (ft)
2B	42.38	28.90	13.48
2D-2	27.09	24.25	2.84
2E	24.07	19.30	4.77
2F	30.97	20.65	10.32
2G	22.76	19.70	3.06
2H	26.38	10.40	15.98

- The 11/10/92 Measured water levels at the six test wells are in good agreement with the July, 1990 - June, 1991 ground water contour lines for the upper most aquifer.
- Ground water flow from Area 5 is towards Thoms Cove with an average hydraulic gradient of 0.03 ft/ft.
- The previous estimated value of 0.3 for effective porosity is reasonable.
- The mean hydraulic conductivity of the eight slug test results is 0.69 ft/day.
- Using the relationship of $V = \frac{ki}{n}$

  where:

  V = Seepage Velocity (ft/day)
  k = hydraulic conductivity (ft/day)
  i = hydraulic gradient (ft/ft)
  n = effective porosity

  the estimated average seepage velocity is 0.07 ft/day.

ENVIRONMENTAL AGENCY. RETURN ALL OTHER PARTS TO DEPARTMENT OF ENVIRONMENT, 2500 BROENIN
HIGHWAY, BALTIMORE, MARYLAND 21224.

2B-1

Associated Pri

C 1 — SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITH 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER

CO USE ONLY
E Received

DATE WELL COMPLETED: 0 8 0 3 9 0

Depth of Well: 4 5 (TO NEAREST FOOT)

PERMIT NO. FROM PERMIT TO DRILL: B C - 8 8 - 0 8

OWNER: MARYLAND ENVIRONMENTAL SERVICE
last name / first name
STREET OR RFD _____ TOWN: ANNAPOLIS
SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
BROWN SILTY SAND	0	14	
MULTICOLORED SILTY CLAY	14	25	
TAN CLAYEY SILT	25	29	
TAN BROWN SILTY SAND	29	34	
GRAY SAND TRACE OF SILT	34	46	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y / no N
TYPE OF GROUTING MATERIAL
CEMENT C M — BENTONITE CLAY B C
NO. OF BAGS 9 — NO. OF POUNDS 900
GALLONS OF WATER 56
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 3 0 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
S T STEEL — C O CONCRETE — P L PLASTIC — O T OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
P L	4	3 5

EACH CASING — OTHER CASING (if used): diameter inch, depth (feet) from, to

SCREEN RECORD
screen type or open hole insert appropriate code below
S T STEEL — B R BRASS BRONZE — H O OPEN HOLE — P L PLASTIC — O T OTHER

C 2

EACH SCREEN	DEPTH (nearest ft.)		
1	P L	3 5	4 5
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 4 (NEAREST INCH)

GRAVEL PACK from 30 to 45
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W.O.

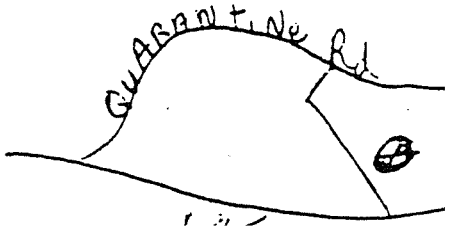
C 3

PUMPING TEST
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min. to nearest gal.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING
WHEN PUMPING
TYPE OF PUMP USED (for test)
A air — P piston — T turb
C centrifugal — R rotary — O other (des below)
J jet — S submersible

MONITORIN G

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above / − below — LAND SURFACE 0 2 (near foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED NA
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO. 336
Michael D. Haler
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

1 1582 (DEP USE ONLY)

; NUMBER IS TO BE PUNCHED
OLS 3-4 ON ALL CARDS.

e Received
P use only)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

DATE WELL COMPLETED: 283

Depth of Well: 47 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": BC-81-0049

NER: Maryland Environmental ~~Survey~~ Service (last name / first name)

IEET OR RFD: 60 West St. TOWN: Annapolis, Md. 21401

DIVISION: Hawkins Point SECTION: LOT:

Well Log
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

SCRIPTION (Use ...tional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
rown Sand clayish	0	11	
Red clay	11	19	
Brown clay	19	26	
ed + white clay	26	33	
and clayish	33	38	
andish clay	38	40	
SAND	40	47	

CIRCLE APPROPRIATE BOX

- [A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- [E] ELECTRIC LOG OBTAINED
- [P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO: 291

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION

SITE SUPERVISOR: sign of driller or journeyman responsible for sitework if different from permittee)

Grouting Record

WELL HAS BEEN GROUTED (Circle Appropriate Box): Y (yes) N (no)

TYPE OF GROUTING MATERIAL

CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS: 12 NO. OF POUNDS: 94

GALLONS OF WATER: 72

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. to 34 ft. (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top/main casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	37

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS, BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (seq no)

EACH SCREEN	DEPTH (nearest ft.)	
PL	37	47

SLOT SIZE: 0 1 0

DIAMETER OF SCREEN: 4 (NEAREST INCH)

GRAVEL PACK from 34 to 47

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

DEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W O

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 (seq no)

PUMPING TEST

HOURS PUMPED (nearest hour): 2

PUMPING RATE (gal. per min. to nearest gal.): 1

METHOD USED TO MEASURE PUMPING RATE:

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 28

WHEN PUMPING:

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES [Y] NO [N]

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [−] below LAND SURFACE 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

MES. DESIGNATION - WELL 2B

NOTE: CEMENT GROUT CONTAINS 10% BENTONITE BY WEIGHT

BALTIMORE, MARYLAND 21201 ... OTHER PARTS TO DEPARTMENT OF ENVIRONMENT, 201 W. PRESTO

Well 2D-

C 1 3547 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED 45 DAYS AFTER WELL IS COMPLETI

COUNTY NUMBER

DATE Received

DATE WELL COMPLETED 0 6 0 8 9 0

Depth of Well 3 6 (TO NEAREST FOOT)

PERMIT NO FROM "PERMIT TO DI B C - 8 8 -

OWNER MARYLAND ENVIRONMENTAL SERVICE
last name first name
STREET OR RFD
TOWN ANNAPOLIS
SUBDIVISION
SECTION
LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
BROWN SILTY SAND	0'	12'	
MULTICOLORED SILTY CLAY	12'	23'	
TAN, CLAYEY SILT	23'	28'	
TAN, BROWN, SILTY SAND	28'	32'	
GRAY, SAND, TR SILT	32'	36'	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL
CEMENT C M BENTONITE CLAY B C
NO. OF BAGS 8 NO. OF POUNDS 800
GALLONS OF WATER 56
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 2 4 ft.
TOP BOTTOM
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
S T STEEL C O CONCRETE P L PLASTIC O T OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
P L	4	2 6

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below
S T STEEL B R BRASS BRONZE H O OPEN HOLE P L PLASTIC O T OTHER

C 2

EACH SCREEN — DEPTH (nearest ft.)

1	P L	2 6	3 6
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 4 (NEAREST INCH)

GRAVEL PACK from 24 to 36
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) WQ

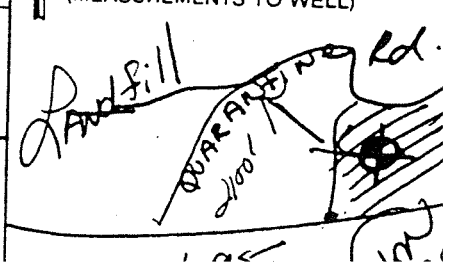
C 3

PUMPING TEST
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min. to nearest gal.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land sur
BEFORE PUMPING
WHEN PUMPING
TYPE OF PUMP USED (for test)
A air P piston T
C centrifugal R rotary O
J jet S submersible

MONITORING

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES
IF DRILLER INSTALLS PUMP, THIS SEC MUST BE COMPLETED FOR ALL WELL EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX-SEE ABOVE:
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing heigh
+ above
− below
LAND SURFACE 0 2 (pe f

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SU BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LE THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED N/A
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT. NO. 336

Michael W. Fuller
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

1010 (DEP USE ONLY)

NUMBER IS TO BE PUNCHED
OLS 3-4 ON ALL CARDS).

Received
P use only)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER

DATE WELL COMPLETED: 12883

Depth of Well: 39 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": BC-81-0103

NER: MARYLAND ENVIRONMENTAL ~~SERVICE~~ SERVICE (last name / first name)

IEET OR RFD: 60 West St. TOWN: Annapolis, Md. 21401

IDIVISION: Hawkins Point SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

SCRIPTION (Use ational sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Fill	0	7	
clay	7	16	
silt	16	23	
Clay	23	31	
silty sand	31	35	
sand	35	40	
clay	40	41	

CIRCLE APPROPRIATE BOX

- [A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- [E] ELECTRIC LOG OBTAINED
- [P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS' IDENT NO: 291

[signature]
DRILLERS' SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): YES [Y] NO [N]

TYPE OF GROUTING MATERIAL: CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS: 8 NO. OF POUNDS: 44

GALLONS OF WATER: 48

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. to 26 ft. (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top/main casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	29

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS, BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C2

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	29	39
2			
3			

SLOT SIZE: 0 1 0

DIAMETER OF SCREEN: 4 (NEAREST INCH)

GRAVEL PACK from 26 to 39

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

DEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C3

PUMPING TEST

HOURS PUMPED (nearest hour): 2

PUMPING RATE (gal. per min. to nearest gal.): 10

METHOD USED TO MEASURE PUMPING RATE:

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 16'8"

WHEN PUMPING:

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES [Y] NO [N]

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above / [−] below LAND SURFACE: 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

M.E.S. DESIGNATION - WELL 2E

NOTE: CEMENT GROUT CONTAINS 10% BENTONITE BY WEIGHT

LOG of BORING No. 2F

DATE July 31, 1984 SURFACE ELEV. 29 feet LOCATION See Figure

DEPTH, FEET	SAMPLES / SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0	12	Loose to medium dense, brown and red silty fine SAND, trace organics, dry					
5	8	-silt lense with trace mica, slightly damp	22.0				
10	8	Firm mottled gray brown silty CLAY slightly moist					
15	7		13.5				
		Loose tan brown silty fine SAND with trace fine gravel and organics, very moist					
20	22		9.0				
	7	Firm red to light brown-brown silty CLAY, trace medium to coarse sand, very moist	6.0				
25	7	Loose to medium dense tan to gray silty fine-coarse SAND, wet					
	16						
	21	-clay lense (1-2" thick) -trace gravel					
30	19	-tan to white clayey silty fine-medium SAND					
		Stiff mottled tan to light gray silty CLAY, moist	-2 -3				
35		NOTE: Well installed, screened from 20 to 30 feet					

COMPLETION DEPTH 32' WATER DEPTH 18.9' from TOC DATE Aug. 10, 84

SAMPLER: 2" O.D. SPLIT BARREL SAMPLER

PROJECT ALLIED/AREA 5

LOCATION Hawkins Point, Baltimore, Maryland

Date Completed August 8, 1984 Original Depth 32 ft.

Inspected By Gower/GAmble Date August 8, 1984

Checked By Date

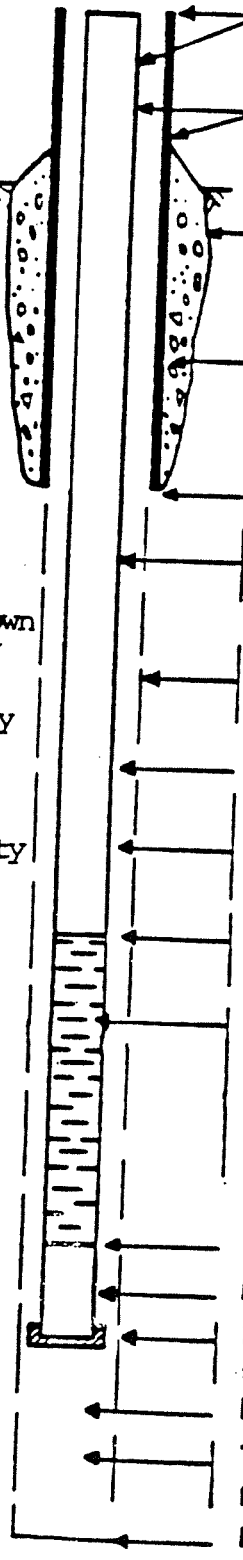
Page 1 of 1

Well No. BC-81-0197

Aquifer N/A

Depth Interval N/A

Ground Elevation 29.0



Generalized Stratigraphy and Water Level

0-8' Brown and red silty SAND

8-16' Mottled gray-brown silty CLAY

16-20' Tan brown silty SAND

20-23' Red to brown sandy, silty CLAY

23-31' Tan to grey silty SAND

31-32 Mottled tan to light grey silty CLAY

G.W.T. @ El. 10.9 on 03 OCT 84

WCC Boring 2F

Elevation of top of surface casing / riser pipe.	32.40/
Height of top of surface casing / riser pipe above ground surface	3.42/
Depth of surface seal below ground surface	16.5'
Type of surface seal: grout mix of 90% cement & 10% bentonite	
I.D of surface casing.	6"
Type of surface casing: steel pipe with locking cover	
Depth of surface casing below ground	±2'
I. D. of riser pipe.	4"
Type of riser pipe: sch 40 PVC pipe	
Diameter of borehole	12"
Depth of borehole	32'
Type of backfill: grout mix of 90% cement 10% bentonite	
Elev./depth top of seal.	/16.5
Type of seal: bentonite	
Elev./depth bottom of seal.	/18'
Type of sand pack.	
Depth of top of sand pack.	/18'
Elev./depth top of screened section.	/20.25'
Type of screened section: slotted	
Discribe openings .010 inch wide, 1 inch long	
I.D. of screened section.	4"
Elev./depth bottom of screened section.	/29.66'
Length of blank section.	4"
Elev./depth bottom of plugged blank section.	/30'
Elev./depth bottom of sand column.	/31.5'
Type of backfill below observation pipe. sand	
Elev/depth of hole.	/32'

Woodward-Clyde Consultants

May 19, 2008

Revisions to RCRA Hazardous Waste Permit Application for Hawkins Point Landfill

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ENVIRONMENTAL
SERVICE

Martin O'Malley, Governor

James M. Harkins, Director

May 19, 2008

RECEIVED
MAY 19 2008

Mr. Jeffry Parker
Regulations/Permitting Division - Waste
Maryland Department of the Environment
1800 Washington Boulevard, Suite 645
Baltimore, MD 21230

Re: Revisions to the Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit Application for Hawkins Point Landfill

Dear Mr. Parker:

This is in response to the email sent to Maryland Environmental Service (MES) from the MDE on April 24, 2008 for revisions to the Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit Application for Hawkins Point Landfill. MES has revised the application based on the MDE comments listed below. MES responses to the comments follow the corrections and are listed in bold print.

1. In the EPA Form 8700-23: Item 6B(2) the handwritten F should be an A.

   MES has made this requested correction, and it is included in Section 1, as part of the Hazardous Waste Permit Information Form.

2. On Page 3-5, section 3.4.2g it was stated that Area 6 was never used as a hazardous waste treatment, storage, or disposal area; however, Area 6 was used for a soil treatment demonstration and has since been clean closed.

   MES has revised this statement to reflect the Area's usage in the demonstration and its closure.

3. On Page 3-4 and 3-5 the beginning of Section 3.4.2 repeats what was stated at the beginning of Section 3.4.1.

   MES has revised removed the statement from both Sections and has add a blanket statement about the topographic map in Section 3.4.

4. On Page 9-15, Section VII, the fifth line has "b" where it should state "by"

   MES has made this correction.

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5. On Page 9-16, Section VIII – Control Measures, Ventilation; this box contains the misspelling "I" instead of "in".

   MES has made this correction.

6. On Page 9-69, the third (3rd) line from the bottom uses the term "infusible" instead of "unfeasible"

   MES has made this correction.

7. On Page 10-9 the last line has a misspelling of "forall" instead of "for all."

   MES has made this correction.

8. In Table 11.1, the row for Other Contracts shows the unit cost to be $220,00; however, the total cost is $120,000.

   MES has revised Table 11.1 to reflect this correction and several other corrections.

9. On Page 12-4, Sections 12.1.4 and 12.1.5 read "Cell Nos." instead of "Cells No."

   MES has made these corrections throughout both Sections.

10. The first page of Appendix E is a continuation from a deleted page of Appendix D and is no longer relevant.

    MES has removed this page from Appendix E.

As requested by the MDE, MES has included only the affected pages in this response. It is our hope that these revisions will be acceptable for this permit application. Should you have any questions or require any additional information please contact Dave Ferguson at 410-729-8305 or dferg@menv.com.

Sincerely,

David Ferguson
Senior Engineer
Technical and Environmental Services Group

Attachments

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Martin O'Malley, Governor

James M. Harkins, Director

April 4, 2008

Mr. Jeffery Parker
Regulations/Permitting Division - Waste
Maryland Department of the Environment
1800 Washington Boulevard, Suite 645
Baltimore, MD 21230

Re: Revisions to the Controlled Hazardous Substance (CHS) Permit Number A-264 for Hawkins Point Landfill

Dear Mr. Parker:

This is in response to the letter sent to Maryland Environmental Service (MES) from the MDE on February 5, 2008 for revisions to the Controlled Hazardous Substance (CHS) Permit Number A-264 for Hawkins Point Landfill. MES has revised the application based on the MDE comments listed below. MES responses to the comments follow the corrections and are listed in bold print.

1. In Section 2, Part A application form, Page 1 of 6, in block number 6, 'Other Environmental Permits' issued to the facility need to be listed. However, although a number of such permits are mentioned in the first paragraph on page 3-4 of Section 3-4 of Section 3 (Part B) of the application, none is entered in Part A form. Please correct.

   MES has made these requested corrections, and these are included in Section 2, Part A, Page 1 of 6 of the application form. In Part C on Page 1 of 6, MES has noted that the Permits mentioned within the application in Section 3.3, Pages 3-3 and 3-4 have expired and therefore, no longer in effect, as directed.

2. On Page 6 of 6 of the Part A form, block number 11 requires that a topographic map of the facility be attached to the form. No such map is provided. It would be acceptable to use a map included in Part B of the application to meet this requirement. However, although a map is included in Section 3 of the application as Figure 3.3, the map that has been provided is not acceptable. Please provide an acceptable map, either appended to the Part A form or included in Section 3.

   MES has created a topographic map and this has been included as Figure 3.3. The following items which are required by COMAR, access control, injection and withdraw wells, building, treatment, storage, disposal operations, facility structures, barriers for drainage or flood control, and location of operational units within the hazardous waste management facility site have been added to the drawing.

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3. In Section 3.2, Site Development, it is stated that four (4) contracts have been completed for facilities. However, in the text that follows the statement, six (6) contracts are listed and explained.

   MES has revised Section 3.2 Pages 3-2 and 3-3 to include the correct number of contracts. To date, seven (7) contracts have been completed for Hawkins Point Hazardous Waste Landfill.

4. Figure 3.3 presented as a topographic map in the application does not satisfy the requirements of COMAR 26.13.07.02D(6) and COMAR 26.13.0702D(35). None of the features required by the cited regulations, and reiterated in the text of the application under subsections 3.4.1 and 3.4.2, are depicted in this figure, as intended. Please revise the figure as needed and provide a topographic map as required by the regulation. Insert a reference to the revised map in Section 14 (Comments) of Part A application as mentioned under comment number 2, above.

   MES has created a topographic map and this has been included as Figure 3.3.

5. Subsection 5.2.1, first paragraph, states that the site inspections will be conducted quarterly both before and after two years since closure of the site. Explain the significance of the two-year point.

   MES has revised this referenced statement to the following located in Subsection 5.2.1 on Page 5-2, "During the post-closure period of the Area 5 Landfill, site inspections will be performed quarterly for the remainder of the post-closure period."

6. Table 5.1 spans pages 5-3 through 5-8 but us presented as a separate table on each page. Either divide the table or indicate that all pages are the continuation of one table.

   MES has revised Table 5.1 to indicate that all pages are the continuation of one table. Table 5.1 can be found on Pages 5-3 through 5-8.

7. A reference to Appendix A should have been included in Subsection 10.1.3. However, no reference to the Appendix is found there or elsewhere in the application. The information included in the Appendix is found there or elsewhere in the application. The information included in the Appendix is not complete or sufficiently descriptive. We recommend that this Appendix be revised to include a comprehensive table including only the existing active wells that are regularly monitored. The table must include the well number and the other information currently presented in the list included in the Appendix. Well installation dates, sizes (diameter), casing and screen type and material should also be included in the table.

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The revised appendix must also include a scaled map clearly showing the exact location of the wells included in the table in relation to the boundaries and other main features of the facility. There is no need to include the well that have been abandoned, or are not included in the monitoring network. If driller logs are available they should be included in the appendix. However, there is no need to include copies of the well installation permits.

MES has revised Appendix A to include the State of Maryland Well Completion Reports which also contain the drill log for each listed well, and additionally all of the information requested in order to update the table. This table had been revised per MDE request and has been inserted as the first page in Appendix A. MES does not possess driller logs for wells W, Y, and Z. A scaled drawing of each of the current well locations has additionally been included in Appendix A.

8. The third paragraph of Subsection 10.3.2, last sentence, states that the pH of wells 2H and 2D is lower then the pH of wells 2D and 2H. Please check and clarify that statement. The Subsection also references graphs of pH. No such graphs are found in the document. Also missing from the document are Figures 10.4, 10.5, 10.6, and 10.7 references in Subsections 10.4.5.5, 10.4.5.11, 10.4.5.15, 10.4.6.10, and 10.7.1.

   MES has revised the statement in Section 10.3.2 to say, "Historically, the pH coming on-site through the upgradient wells 2B and 2H are consistently less then the pH in the down gradient wells 2D, 2F, 2E, and 2G." Figures 10.4 and 10.5 have been inserted into Section 10 as appropriate. Figures 10.6 and 10.7 were not relevant and were deleted.

9. Subsection 10.4.5.14 references Table 1 in Appendix D. Subsection 10.4.6.6 references Table 2 in Appendix D. Copies of the statistical tables included in Appendix D are not marked to show what constitute Tables 1 and 2, as intended. The second form in Appendix D does not appear to be Table 2. The last page of Appendix D, which has been partially truncated in copying, apparently does not belong to the Appendix, but is transposed with the first page of Appendix E. Please correct these discrepancies, identify the referenced tables properly and make sure that provided documents are complete and legible.

   MES has reviewed the data in the referenced Table 1 and Table 2 in Appendix D, and these documents are no longer relevant to the current statistical analysis process that is used for the quarterly groundwater monitoring reports, and therefore have been deleted from Appendix D. Appendix D remains reserved for future use.

10. In Subsection 12.1.1.1, Area 5 and 6, the statement "local ground water contours indicate flow across Area 5 and 6 from the east and northeast toward Thomas Cove" does not conform with groundwater contours depicted in Figure 10.2. The general groundwater flow in Areas 5 and 6 as depicted in the Figure is from the southeast and south towards the northeast and north to Thomas Cove. Please check and correct as appropriate.

    MES has revised the statement in Subsection 12.1.1.1, Page 12-1, Paragraph 1 to the following, "local groundwater contours indicate flow across Area 5 and 6 from the southeast and south towards the northeast and north to Thoms Cove."

11. In Section 12.1.1.2, clarify the term 'mat' used while referencing piezometric elevations within Maryland Port Administration tailing cells in the first paragraph on Page 12-2.

    MES has revised the text in Section 12.1.1.2, Page 12-2 to the following, "This effect is attenuated by the regional flow gradients moving onto the site from the west toward Thomas Cove. Thus, any regional lateral movement of leachate from the cells would be expected to be toward the Patapsco River."

12. The hydraulic conductivities reported in the 3rd paragraph, Page 12-2 for Area 3, ranging from 5.5x10 to 6.6x10 centimeter per second appear to be exceptionally high for the aquifer material discussed on the cited page, contrasted with lateral groundwater velocities for Area 3 given in the same paragraph at 0.2 – 2 feet per day, and compared with the values reported for Area 5 on Page 12-1, at 0.3 – 0.00001 centimeter per second. The statement that those hydraulic conductivities vary by a factor of 10 is also not supported by the presented values. Please check and explain the corrected statement as necessary

    MES has checked the hydraulic conductivity data and has revised this statement to be consistent with the quarterly reports. The updated text can be found in Subsection 12.1.1.2 on Page 12-2.

13. Subsections 12.1.4 and 12.1.5 discuss the configuration of disposal cells in Area 5, the cells' structural layers and the leachate collection/underdrain system associated with them. As verbally explained Cells 5 through 11 overlays Cells 1 through 3. There is no mention of Cell 4 in the text. The verbal descriptions do not give the reader a clear understanding of the layout of the leachate collection or underground systems. Scaled drawings of the system's layout and profiles are required.

    MES can find no reference to Cell 4 in its own records. MES is still is still researching its own records and client's records to determine if Cell 4 references or scaled drawings of the system layout exist.

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14. Appendix B, Historical Leachate Data, first page (numbered 13-21) depicts analytical results for Sample Collection Date of 4/31/06 [sic]. Please correct the date as appropriate. Also on this same page and on the next one (numbered 13-22) a unit of measure for TCLP Chromium is shown as 'Mall'. Presumably, the unit intended is mg/l. Please clarify and correct.

    MES has inserted the correct Historical Leachate Data into Appendix B.

15. In Appendix C, Historical Groundwater Monitoring Data, a pH of 124.5 on 4/11/97 is entered for Well U. Please check and correct entry.

    MES has corrected Appendix C and has provided MDE with updated Historical Groundwater Monitoring Data provided from the Fourth Quarter 2007 Hawkins Point Landfill Quarterly Reports.

16. **MES has made all of the following minor changes:**
    - **a.** Page 6-4 – Editing marks have been removed.
    - **b.** Page 9-75 – The spelling error has been corrected from 'wit' to 'with'.
    - **c.** Page 9-77 – The acronym ACGIH has been added and defined.
    - **d.** Page 9-85 – MES has provided clarification to statement 4.5.
    - **e.** Page 9-87 – All editing strikeovers and editing marks have been removed.
    - **f.** Page 11-4 through 11-7 – The format of these pages has been finalized.
    - **g.** Page 11-6 (Line E) the word 'spelling' has been changed to 'spalling'.
    - **h.** In Section 12 – All references to 'Cell Nos.' has been changes to 'Cells Nos.'.
    - **i.** Figure 3.1 – This map has been revised as requested.

MDE
APR 04 2008
3:45 pm
RW

It is our hope that these revisions will be acceptable for this permit application. Should you have any questions or require any additional information please contact Dave Ferguson at 410-729-8305 or dferg@menv.com.

Sincerely,

David Ferguson
Senior Engineer
Technical and Environmental Services Group

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EPA ID NO: MDD 0 0 0 7 3 1 3 5 6

OMB #: 2050-0034 Expires 11/30/2005

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact (See instructions on page 23)	First Name: Mr. Chris	MI:	Last Name: King
	Phone Number: (443) 370-8635		Phone Number Extension:
2. Facility Permit Contact Mailing Address (See instructions on page 23)	Street or P.O. Box: 5501 Quarantine Road		
	City, Town, or Village: Baltimore		
	State: MD		
	Country: USA		Zip Code: 21226
3. Operator Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: Maryland Environmental Service 259 Najoles Road		
	City, Town, or Village: Millersville		
	State: MD		
	Country: USA	Zip Code: 21108	Phone Number (410) 729-8305
4. Legal Owner Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: Maryland Port Administration 401 East Pratt Street		
	City, Town, or Village: Baltimore		
	State: MD		
	Country: USA	Zip Code: 21202	Phone Number
5. Facility Existence Date (See instructions on page 24)	Facility Existence Date (mm/dd/yyyy): 08/05/1980		

6. Other Environmental Permits (See instructions on page 24)

A. Permit Type (Enter code)	B. Permit Number	C. Description
	0 2 S W	State of Maryland General s Storm Water Discharge Permit (expired 1
	F 0 2 6 4	CHS Permit
	9 1 D P 2 2 2 9	State of Maryland Discharge Permit
	M D 0 0 6 1 4 1 7	NPDES

7. Nature of Business (Provide a brief description; see instructions on page 24)

3.0 FACILITY BACKGROUND

3.1 GENERAL DESCRIPTION

The Hawkins Point Hazardous Waste Landfill (HWL) is a secure hazardous waste facility in Maryland, permitted by the U.S. Environmental Protection Agency and the Maryland Department of the Environment. The facility is located in the Curtis Bay industrial area adjacent to Thoms Cove in the extreme southwestern corner of Baltimore City -(see Figure 3.1).

The Hawkins Point property, owned by the Maryland Port Administration (MPA), an agency of the State of Maryland, encompasses approximately 67 acres and is divided into six (6) areas (see Figure 3.2). Areas 1 and 6 are presently outside of the fenced area of the Hawkins Point facility. Area 1 is currently leased for use to EASTALCO Aluminum Co. Area 6 was previously leased to the Cosmin Corporation and is not currently being used.

Area 5, currently in post-closure care, was dedicated to the sole use of AlliedSignal, Inc (now Honeywell). for the disposal of chromium contaminated waste. In January of 1983, Maryland Environmental Services began accepting chrome ore tailings from the Baltimore Works facility owned by AlliedSignal. In 1985, the Baltimore Works facility closed. As part of closure, portions of the Baltimore Works facility were dismantled and handled as hazardous waste. The chromium contaminated debris which consisted of structural beams and concrete, brick, asbestos, soil (up until May 8, 1990) and other additional chromium contaminated debris was disposed in Area 5 until the ultimate capacity was reached in 1993. An estimated 451,450 tons of chromium–laden hazardous waste is disposed in Area 5. Presently, the only waste handling from Area 5 is the leachate generated from within the capped landfill.

Areas 2 and 3 contain closed chrome ore tailing cells constructed by the MPA and monitored and dewatered by the MES. The tailings are also from the former Baltimore Works plant. These cells continue to be monitored and maintained in the dewatered condition.

There was approximately 1,627,373 gallons of leachate collected from Areas 2, 3 and 5 in 2004 and approximately 1,058,735 gallons collected in 2005. The collected leachate is hauled to a Treatment, Storage, and Disposal (TSD) facility operated by Envirite in York, PA.

During January of 1983, Cell 40 located in Area 3 was opened to accept controlled hazardous waste. The cell was operated by MES for approximately eleven (11) months and due to economic reasons was then closed. All waste material was removed and transported to Fondessy, Ohio for disposal and the cell was returned to an "unused" condition. The 80-mil HDPE liner is still in place in the cell and acts as an impervious cap over the underlying old chrome cells in the area.

Area 4 has previously been used for experimenting with chrome ore tailings fixation. However, little actual data is available regarding the dates of the filling or the characteristics of the wastes received. A "paint sludge" is believed to also have been deposited in this area. The deposit was discovered by MES personnel and reported to the Maryland Department of Health and Mental Hygiene in 1982.

In March 2003, a seep was discovered at the southeastern corner of Area 5. Honeywell performed a detailed engineering study to evaluate Area 5 cap integrity. As a result, in December 2005, a toe drain was installed at the location of the seep to retrieve the seep and direct contaminated liquid to the existing leachate collection system.

3.2 SITE DEVELOPMENT

To date, seven (7) construction contracts have been completed for facilities to serve all areas of the Hawkins Point HWL site. These include:

A. "Contract 1: Site 1 Surface Water Corrections" (January 26, 1982).

- Groundwater interceptor bordering the western and southern edge of Area 3.
- Sedimentation Ponds No. 1 and 2.
- Drainage ditches and culverts tributary to the sedimentation ponds.

B. "Contract 2: Site 1 Subsurface Clean-up" (February 18, 1982)

- Leachate storage and transfer area.
- Leachate collection system for chrome ore tailings underlying Area 3 and Area 5.
- Electrical service improvements.

C. "Contract 3: CHS Landfill Expansion" (November 5, 1982)

- Entrance road.
- Scale plaza.
- Truck-wash pads.
- Sanitary sewerage holding systems.
- Drainage improvements.

- Security fencing.

- Cell No. 40 earthen berms, liner system, and leachate collection system.

D. Contract 4 – Capping of Area 5 was performed under MES Construction Contract ID No. 93-03-140 "Area 5 Final Cap Construction - Hawkins Point Hazardous Waste Landfill" (July 1993). Area 5 was certified closed by John P Taylor, an independent Professional Engineer on July 22, 1994. A copy of the Certification is included in Appendix I.

E. "Contract 5 – Leachate storage tanks" February 1999 contract ID No. 97-03-44R

- Abandoned two (2) 30,000-gallon underground leachate storage tanks and replaced with one (1) 20,000-gallon above ground storage tank

F. "Contract 6 – Additional Manhole between 220 & 221", 2003

G. "Contract 7 – Repairs to Seep in Area 5, December 2005

- Engineering study on cap integrity
- Design and construction of toe drain with tie-in to existing leachate system

3.3 PERMITS

The Hawkins Point HWL currently operates under EPA Final RCRA Permit Number MDD 000731356, and State of Maryland Controlled Hazardous Substances Facility Permit Number A-264, effective January 28, 2002, with an expiration date of January 27, 2007. This document is intended as an application to renew the RCRA Permit.

The original Controlled Hazardous Substances Facility Permit Number A-264, which became effective November 30, 1982, authorized the disposal of specified general hazardous wastes in Cell No. 40 of Area 3. A RCRA Part B permit application for the expansion of Area 3 with Cell No. 41 through 49 was submitted to the EPA on August 1, 1983, while the facility operated under interim status. After cessation of active operations the interim status of Area 3 expired on November 8, 1985.

Various other permits are required and have been issued for environmental and support features of the site. Disposal permits from the City of Baltimore, Department of Health have been issued (Permit No. 65, February 1, 1981 to January 31, 1982; Permit No. 74, February 1, 1982 to January 31, 1983) and renewed as necessary. A Sediment Control permit, WRA No. 82SF0441, was

issued on February 18, 1982 by the State Water Resources Administration (WRA). A National Pollutant Discharge Elimination System (NPDES) permit for the facility (State Permit No. 85-DP-2229, NPDES Permit No. MD 0061417) was originally issued on May 1, 1986, reissued on April 1, 1997, and has been extended through May 2008. Since the WWTP stopped operating, the site now operates under the State of Maryland General Discharge Permit for Storm Water Associated with Industrial Activities (Discharge Permit No. 02-SW) which was issued December 1, 2002 with the expiration date of November 30, 2007. A copy of this permit is included in Appendix H. A Wastewater Discharge Permit application (Identification No. 1-08955) was submitted to the City of Baltimore on March 18, 1992 for discharge of an effluent stream from the leachate treatment system. Since the WWTP stopped operating, the permit is not applicable for this facility and will not be issued because there is no discharge into the City sewer system. The application will be retained in City files for information only.

3.4 TOPOGRAPHIC MAP

3.4.1. COMAR 26.13.07.02D(6)

Figure 3.3 depicts a topographic map outlining the existing general site plan and the development of the area surrounding the site.

The following details are required under COMAR 26.13.07.02D(6) to be described and depicted on the topographic map in Figure 3.3 to aid in the permit application review.

a. Intake and Discharge Structures. There are no intake structures for this facility. There are two (2) existing discharge structures labeled as Settlement Pond 1 and 2. The sediment ponds collect surface water run-off from the facility and then discharge into Thoms Cove.

b. Hazardous Waste Treatment, Storage, or Disposal Facilities. Each of the disposal areas: Area 5, Cell 40, and the MPA cells in Area 3 are shown on the map. Cell 40 is no longer a disposal site. Two (2) 30,000-gallon underground tanks are shown on the map. These two (2) tanks are no longer in use (closed March 1999) and replaced with a single aboveground 20,000-gallon tank as part of the leachate holding and transfer area (refer to Section 4.0 for additional tank information).

c. Wells Where Fluids Are Injected Underground. There are no wells at this facility where fluids from the facility are injected underground.

d. Wells, Springs, and Other Surface Water Bodies Within 1/2 Mile of the Facility Boundary. Surface water bodies are designated on the map. A listing of wells within ½ mile of the site registered in public records was requested from the Maryland Department of the Environment.

listing of wells within ½ mile of the site registered in public records was requested from the Maryland Department of the Environment.

Dupl. Prior

3.4.2. COMAR 26.13.07.02D(35)

The following details are required under COMAR 26.13.07.02D(35) to be described and depicted on a topographic map as shown on Figure 3.3 to aid in the permit application review.

a. Map Scale and Date.

b. 100-Year Interval Floodplain. As indicated by the shaded areas on the topographic map, the facility is not located within the 100-year recurrence interval floodplain. The 100-year floodplain elevation along the shore of Curtis Bay is predominately at + 8.0 feet mean sea level (msl). Wave action in some cases will raise the elevation to + 10.0 feet (msl). The designated fill areas of the site are classified as Zone X, areas determined to be outside of 500 year floodplain, by the Federal Emergency Management Agency (FEMA).

c. Surface Waters. Surface water streams in the Hawkins Point Area generally flow easterly, and discharge into Thoms Cove on the western bank of the Patapsco River. Surface water flows are controlled primarily by channelization, ditches and drainage piping as a result of development of the area. The directions of these flows are indicated on the topographic map.

d. Land Uses. The surrounding land use is primarily zoned for heavy industrial use. Limited undeveloped land and park land does exist as indicated. No residential land uses occur within 1,000 feet of the property boundary.

e. Wind Rose. Figure 3.4 depicts the wind rose of meteorological data collected from 1987 through 1988 and 1990 through 1992. The graph depicts wind direction versus wind speed during all weather conditions in the Baltimore area from April 1 through October 31, This data is measured at the Baltimore-Washington International Airport (BWI), located approximately 6 miles southwest of the Hawkins Point facility. This information was supplied by the National Climatic Data Center. The predominate wind direction is from the west and average wind speeds are below 10 miles per hour.

g. Facility Boundary. The facility boundaries encompass Areas 2, 3, 4, 5 and 6. These five (5) areas are formerly, or presently, in use with the exception of Area 6 which was never used as a hazardous waste treatment, storage or disposal area.

Area [illegible] Dem

h. Access Control. The main entrance road will convey traffic to and from the facility. This road is accessed from Quarantine Road, as is denoted. Emergency access/egress is also available from Dock Road, through Area 1 and at the northern end of Area 5. A 6-foot high chain-link security fence with a barbed-wire top, 3-strand barbed wire fence, and a total of 5 access gates, surrounds the facility as shown in Figure 3.3.

i. Injection and Withdrawal Wells. There are no injection or withdrawal wells associated with this facility.

j. Building, Treatment, Storage, or Disposal Operations, or Other Structures. Existing structures within the facility include a leachate loading facility, having a corrugated metal roof shelter located in the leachate loading and transfer area; and a truck wash facility which has a corrugated metal roof shelter located in the truck wash pad area. A trailer on site serves as an office, crew quarters and safety station. An aboveground leachate storage tank and a metal building that was the location of the leachate treatment system building are also located on site.

k. Barriers for Drainage or Flood Control. Off-site storm water runoff collects through a series of drainage pipes and is diverted into surface streams which discharge to Thoms Cove. On-site storm water runoff and treatment is classified into three (3) categories:

1. Storm water that has the potential of being contaminated by contact with hazardous waste is directed to the leachate collection system and holding tank for transfer to permitted treatment facilities.

2. Storm water run-on to the property is conveyed to Thoms Cove through a series of pipes and surface ditches.

3. Storm water which has come in contact with uncontaminated areas of facility is conveyed to one of two sedimentation ponds or a perimeter drainage swale before discharging into Thoms Cove.

l. Location of Operational Units Within the Hazardous Waste Management Facility Site, Where Hazardous Waste is Treated, Stored or Disposed. Closure of Area 5 is complete. Two (2) 30,000-gallon underground leachate holding tanks are no longer in use and a new 20,000-gallon above ground storage tank has been installed. Areas where hazardous waste has been disposed of during prior years is delineated on Figure 3.3. The now nonexistent leachate holding lagoons and the IU conversion systems stabilization demonstration area are (2) two such areas. Leachate from the two (2) previous areas of disposal (Areas 3 and 5) will continue to be

collected and transferred from the aboveground storage tank at the leachate holding and transfer area.

3.5 TRAFFIC PATTERNS

3.5.1. Traffic Characterization and Routing

The on-site traffic flow pattern is presented in Figure 3.5. All traffic including facility employees and visitors, will enter the facility from Quarantine Road onto the dual lane, 2-directional entrance road. In the event of closure of Quarantine Road all persons and vehicles will access the Facility via the Dock Road gate.

All exiting vehicles for which exterior contamination is evident, as determined by qualified MES personnel at the unloading areas, will be directed to the truck wash pads of the Hawkins Point Facility. All vehicles will exit through the main gate and follow the entrance road to the facility exit at Quarantine Road.

Quarantine Road accesses the U.S. Gypsum Company Plant and the BFI, SCM, Hawkins Point HWL, and the Baltimore City landfill. The traffic imposed on this road is minimal, consisting primarily of waste hauling vehicles, tractor-trailers, and employee passenger vehicles. The road is designed for the H-S 20 ton truck, highway bridge loading of the AASHTO Standard Specifications for Highway Bridges.

3.5.2 Truck Washing

An attendant of the truck washing area will ensure that all potentially contaminated soil and waste materials are removed from the exterior of the vehicle either by use of a potable water hose, power washer unit or by brushing. Vehicle surfaces to be checked include the wheel axle assemby, rear bumper, rear of the dump bed and tailgate assembly. All contaminated wash water will flow to a separate oil interceptor and then to the leachate storage area.

Equipment associated with the truck washing facilities consists of waste oil interceptor tanks, flow-control valves, a waste oil storage tank, and a portable steam cleaner. The waste oil interceptor tanks and associated piping will be inspected monthly and cleaned as necessary. The level gauge on the storage tank would be checked daily when the wash rack is used and the tank emptied as necessary. The portable steam cleaner should be serviced in accordance with the manufacturer's instructions.

3.6 ADDITIONAL BACKGROUND INFORMATION

3.6.1. NAICS Code:

924110: Administration of Air and Water Resource and Solid Waste Management Programs

3.6.2. Geographic Location of Facility:

Latitude: 39 12'30" N Longitude: 76 33'00" W

3.6.3. Operator:

Maryland Environmental Service
259 Najoles Road
Millersville, Maryland 21108
(410) 729-8200
Operator status: Agency of the State of Maryland

3.6.4. Owner:

Maryland Port Administration (MPA)
2700 Broening Highway
Dunmar Building N, Suite 120
Baltimore, Maryland 21222
(410) 333-4500
Owner status: Agency of the State of Maryland

3.6.5. Political Jurisdiction of Facility:

District 46 of Baltimore City

3.6.6. Photographs of the facility

Figure 3.6 are as follows:

a. Existing Structures and Areas

- Truck wash facility on Picture 7
- Leachate holding and transfer area on Picture 9
- Settlement pond no. 1 on Picture 2
- Settlement pond no. 2 on Picture 3
- Area 6 on Picture 1

b. Existing treatment, storage and disposal areas (tank information added)

- Disposal Area 5 on Picture 4
- MPA disposal cells underlying Cell No. 40 on Picture 5
- 20,000-gallon storage tank on Picture 8

c. Past / possible future treatment, storage and disposal areas

- Former WWTP building on Picture 6

3.6.7 Indian Lands

This facility is not on Indian Lands.

3.6.8 Faults

According to the Map of Young Faults in the United States, published by the United States Geological Survey (USGS) in 1977, there are no known fault displacements within the last 15 million years in Maryland or Delaware. The nearest mapped fault of any age is inferred to be approximately 6 miles to the northwest of the site.

3.7 FEDERAL COMPLIANCE

The facility is in compliance with the applicable Federal laws listed in 40 CFR 270.3 as follows:

3.7.1 Wild and Scenic Rivers Act

Section 7 of the Act prohibits the Regional Administrator from assisting by license or otherwise the construction of any water resources project that would have a direct, adverse effect on the values for which a national wild and scenic river was established. This facility is not a water resources project, and is therefore in compliance. In addition, the only river in the nearby vicinity of the Hawkins Point facility is the Patapsco River, which is not a national wild and scenic river.

3.7.2 Natural Historic Preservation Act of 1966

Section 106 of the Act and implementing regulations (36 CFR 800) require the Regional Administrator, before issuing a license, to adopt measures when feasible to mitigate potential adverse effects of the licensed activity and properties listed or eligible for listing in the National Register of Historic Places. Since there are no licensed activities and properties listed or eligible for listing in the Register near the facility, it is in compliance with the Act.

3.7.3 Endangered Species Act

Section 7 of the Act and implementing regulations (50 CFR 402) require the Regional Administrator to ensure, in consultation with the Secretary of the Interior of Commerce, that any action authorized by the USEPA is not likely to jeopardize the continued existence of any endangered or threatened species, or adversely or threatened species in the area, the facility is in compliance with the Act.

3.7.4 Coastal Zone Management Act

Section 307(c) of the Act and implementing regulations (15 CFR 930) prohibit the USEPA from issuing a permit for an activity affecting land or water use in the coastal zone until the applicant certifies that the proposed activity complies with the State Coastal Zone Management Program; and the State or its designated agency concurs with the certification (or the Secretary of Commerce override the State's non-concurrence). This facility is located in a riverine area, not a coastal zone; and therefore, is in compliance with the Act.

3.7.5 Fish and Wildlife Coordination Act

The Act requires that the Regional Administrator, before issuing a permit proposing or authorizing the impoundment (with certain exemptions), diversion, or other control or modification of any body of water, consult with the appropriate State agency exercising jurisdiction over wildlife resources to conserve those resources. The facility does not impound, divert, or control or modify any body of water, and therefore is in compliance with the act.

Section V - Reactivity Data

Stability	Conditions to Avoid
Stable	N/A

Incompatibility (Materials to avoid)
None

Hazardous Decomposition or Byproducts
None

Hazardous Polymenzation	Conditions to Avoid
Will not occur	N/A

Section VI - Health Hazard Data

Inhalation
Inhalation of mists can cause ulceration and perforation of the nasal septum, as well as irritation and ulceration of the respiratory system. Overexposure to hexavalent chromium may cause risk of lung cancer

Skin
Can cause irritation. Contact with breaks in the skin can cause "chrome sores" (skin ulcers). Bichromates and chromates are skin sensitizers. Skin absorption has been reported.

Ingestion
Can be harmful or fatal. Toxic effects may not appear right away. Systemic poisons: chromate and bichromate are primarily toxic to the kidneys, liver and gastro-intestinal tract.

Eyes
Can cause severe irritation and conjunctivitis.

Section VII - Precautions For Safe Handling and Use

Steps to Be Taken In Case Material Is Spilled
Immediately contain material and prevent from entering sewers or waterways with use of berms and or absorbent materials. Clean up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors. If material is spilled on soil or other porous material, the soil must be immediately dug up and placed in a properly labeled sealed container and sent b a certified hauler to a certified treatment facility. Any equipment or supplies used to clean up the spill can be thoroughly decontaminated immediately, the equipment or supplies will be considered a contaminated waste and must be treated as such. In case of a spill notify the National Response Center a 1-800-424-8802. Ensure compliance with local, state and federal regulations

b = by

Precautions To Be Taken In Handling And Storage
Keep in a tightly closed container, stored in a cool, dry ventilated area. Protect against physical damage. Wear special protective equipment for maintence break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before exiting and do not eat, drink or smoke in workplace.

Section VIII - Control Measures

Respiratory Protection

Where required, use a NIOSH approved, high-efficiency mist respirator. For some exposures, a NIOSH approved, self-contained breathing apparatus or air-supplied respirator may be necessary.

Ventilation

Sufficient to reduce chromium concentration I air below current permissible TLV/TWA levels.

Hands, Arms and Body

Wear impervious boots and gloves, and long-sleeve shirt and trousers for routine washwater handling. Head and neck should be covered. For increased protection, wear impervious jacket and trousers. Take hot shower after work, using plenty of soap.

Eye Protection

Face shield or eye glasses suggested. .

Section IX - Emergency/First Aid

Skin

Wash with plenty of soap and water without delay. Continue showering for a least 15 minutes.

Eyes

Immediately flush with plenty of water continuing for at least 15 minutes and get medical attention.

Inhalation

Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Ingestion

If conscious, immediately have victim drink water, DO NOT induce vomiting, followed by more water.

Additional First Aid

In all cases, call a physician.

Section X - Additional Information

For manufacturing use only. Not for consumption. Absorption through broken, burned, or intact skin, may cause systemic poisoning affect on kidney and liver functions, which can be fatal. Chronic exposure can also cause such poisoning. Recent studies indicate a significant risk of lung cancer among long term employees of the chromate-producing industry. Furthermore, on the basis of tests with laboratory animals, investigative results suggest that all chromium (VI) compounds be treated as suspect carcinogens which may pose a lung cancer-risk through overexposure. Good practice dictates precautions to minimize worker exposure via skin contact and the escape of dust or mist into the air. Caution should also be observed in operations where this chemical is mixed with other chemicals. Certain chemical mixtures may cause potential carcinogenic insoluble hexavalent chromium compounds. Hexavalent chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster

language. Employees can be notified by other equally effective means of the existence, location and of the dangers posed by the space.

Any conditions that would make it dangerous to remove the entrance cover will be eliminated before the cover removed. The space will then be guarded by railing, temporary cover, or other temporary barriers that will prevent an accidental fall through the area, or any foreign objects to enter the space. This would apply primarily to areas that are below the working area, i.e., manholes. Many spaces would be guarded by the authorized attendant to eliminate the potential of objects falling into the space. The permit space will need to be isolated, purged, flushed, etc., if possible, to eliminate or control any known hazards, prior to entry.

Before an employee is permitted to enter the confined space, the internal atmosphere must be tested with a calibrated, direct reading instrument. Testing will be performed on the following conditions in the order given:

- Oxygen content alarming will occur with concentrations below 19.5% or above 23%.
- Flammable gases and vapors alarming will occur with an excess of 10% of its lower flammable limit (LFL).
- Potential toxic air contaminants alarming will occur when the permissible expire limit (PEL) is exceeded. MES monitors have sensors for hydrogen sulfide, as a rule.

The entry supervisor will verify that the space is safe for employees entry through completion of the entry permit (see attached). The certificate will be completed prior to entry and made available for each employee, as well as remain on site until the job has been completed. At this time, any personal protective equipment (PPE) needed for safe entry will be provided to the employees. Each authorized entrant will use the PPE that the supervisor has determined to be needed. The permit will be authorized, only for the duration of the work to be performed, as designated on the permit. If it is determined that another task is identified, the permit will be terminated and a new permit will be authorized.

There may not be any hazardous atmosphere inside the space when an employee enters. Continuous forced ventilation can be used to eliminate the hazardous atmosphere prior to entry. It can also be directed to ventilate the immediate area that the employee will be working and continue until the space has been exited. At all times, the air supply for the ventilation system will be from a clean source so as not to increase the hazards in the space. The atmosphere in the space shall be periodically tested, as necessary, to ensure that forced air ventilation system is preventing an accumulation of a hazardous atmosphere. If isolation of the space is infusible because the space is large or is a part of a continuous system (such as a sewer), pre-entry testing shall be performed before entry is authorized and shall be continuously monitored in the areas where the entrants are working.

- Sample number;
- Signature of collector;
- Date and time of collection;
- Sample type (e.g., groundwater, soil, surface water, etc.);
- Identification of sampling point (e.g. well number, outfall location);
- Number of containers;
- Analyses requested;
- Preservatives used;
- Signature of persons involved in the chain of possession;
- Inclusive dates and times of possession;
- Internal temperature of shipping/transportation container when samples were sealed into the container for shipping/transporting;
- Internal temperature of container when opened at the laboratory; and
- Remarks section to identify potential hazards or to relay other information to the laboratory.

Sample Transportation

Samples should be transported to the receiving lab in clean coolers and in vehicles free of cigarette smoke and cross contamination from other sites. A trip blank will be used, which measures potential contamination from bottles, preservatives, sample handling and transportation procedures. Detection of target analytes in trip blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, sample transportation and laboratory practices. Detection of target analytes in the trip blank greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and/or re-sampling shall occur.

Detection of target analytes in the trip blank greater than an order of magnitude of the detection limit (in the absence of a MCL) or the field results for that parameter shall invalidate the results and re-sampling shall occur.

10.1.19 Sample Collection Quality Assurance and Quality Control

Sample collection and preservation shall be performed by the contract laboratory for the regulated wells. All other monitoring wells will be sampled by MES and analyzed by the contract laboratory.

Sample collection quality control shall be accomplished with trip blank, field blank, and duplicate samples. One trip blank and one field blank shall be prepared each sample day. One duplicate for every 10 samples shall be collected and analyzed. The trip blank measures potential contamination from bottles, preservative and sample handling procedures.

The field blank establishes quality control for transport, storage, and field handling. The duplicate establishes quality control forall steps after sample

TABLE 11.1
AREA 5 HAWKINS POINT HAZARDOUS WASTE LANDFILL
ANNUAL POST-CLOSURE CARE COST ON 2007 DOLLARS

CLOSURE of WWTP	UNIT	UNIT COST	QUANTITY	COST
I. Labor/Clerical Cost	LS	$ 50,000	1	$50,000
II. Removal, Transport, and Disposal Cost	LS	$ 100,000	1	$100,000
III. Site Remediation Cost	LS	$ 100,000	1	$100,000
Lump Sum Sub total of Closure Estimate				$250,000
Per Yr POST-CLOSURE of Land fill				
Facility Management	LS	$ 80,000	1	$80,000
Environmental Monitoring	YR	$ 60,000	1	$60,000
Leachate Handling		$120,000	1	$120,000
Facility Inspection	YR	20,000	1	$20,000
Erosion Repair	YR	$ 10,000	1	$10,000
Boundary Maintenance	YR	$ 10,000	1	$10,000
Routine Maintenance	YR	$ 25,000	1	$25,000
Security Measures	YR	$ 5,000	1	$5,000
Leachate Treatment	GAL	$ 0.30	1,600,000	$480,000
Facility Permit Fee		$ 42,000	1	$42,000
Other contracts		$220,000	1	$120,000
Per Yr Subtotal for Post-Closure				$972,000
Contingency (add 10%)				
Escalation				
18 yrs remaining 3% escalation py				$23,000,000

py: per year

12.0 EXPOSURE INFORMATION

Data and related information pertaining to site hydrology and aquifer usage presented in this Section is a synopsis of the 1985 document by Black & Veatch, Engineers-Architects, "Hydrogeologic Assessment - Area 5, Hawkins Point Hazardous Waste Landfill."

12.1 Potential for Human Exposure via the Groundwater Pathway

12.1.1 General Hydrogeology

12.1.1.1 Area 5 and 6

In summary, local groundwater contours indicate general flow across Area 5 and 6 from the south towards the north into Thoms Cove. This conforms to regional groundwater flow directions from the uplands west of the site toward Thoms Cove. A component of the local flow indicates some groundwater movement toward a trough at the southern end of Area 5. This may indicate flow through the thick post-Cretaceous sediments associated with Thoms Creek and toward Thoms Cove. Thus in the site area, the general flow direction for the near surface aquifer is toward Thoms Cove, away from any current or potential withdrawal locations.

The logs of borings in and around the site indicate distinct silt and/or clay layers, even in borings, which encounter primarily sand strata. As a consequence, vertical groundwater flow may be impeded, both during infiltration and during groundwater migration to deeper strata. Low conductivity inclusions can be responsible for locally-confined conditions, and significant vertical head gradients may be observed across such barriers to flow. On a regional level, much of the Patapsco Formation is reported to be under confined conditions. At the site, most of the field permeability test data conforms to the hypothesis of a confined aquifer. Hydraulic conductivity estimates were also developed from field test results. The hydraulic conductivity estimates in the vicinity of Area 5 generally range over more than 3 orders of magnitude, from 0.03 centimeters per second (cm/sec) to less than 0.00001 cm/sec.

12.1.1.2 Area 3

Groundwater contours across Area 3 indicate flow generally in a north-easterly direction toward Thoms Cove, although local groundwater contours indicate a mound in the surface water table beneath Cell No. 40 in Area 3. This local mounding is interpreted to be the result of precipitation draining from the increased storage capacity of fill place in the area, causing local flow to radiate

away from the center of the pile. This effect is attenuated by the regional flow gradients moving onto the site from the west toward Thoms Cove. Thus, any regional lateral movement of leachate from the cells would be expected to be toward the Patapsco River. In addition, a groundwater interceptor system in Areas 2 and 3 constructed in an "L" configuration along the western and southern boundaries of the MPA cells appears to be lowering water levels and creating a depression along the southern boundary of the cells.

The vertical (downward) movement of leachate is impeded in the area by lower permeability lenses and stratigraphic layers, including the Arundel Formation clay at an estimated depth of 200 feet below the tailings cells. Due to the probability of relatively greater lateral than vertical groundwater velocities, the regional groundwater gradients, and the proximity of the Patapsco River (approximately 600 feet from the MPA tailing cells), it is most likely that if contaminant movement occurred, it would be intercepted by the river and would not significantly impact the Patapsco or Patuxent aquifers. This would preclude any adverse impact on current or future areas of withdrawal by contaminants emanating from the Hawkins Point site.

The rate at which this movement occurs cannot be precisely determined due to the complex geologic stratigraphy characteristic of the site. In Areas 2 and 3, clays predominate but lenses of silt and sand have been documented. Soils onsite range from Post-Cretaceous sediments near the surface and are primarily silty clays with trace sands. This layer averages a depth of approximately ten (10) feet and has hydraulic conductivity values in the range of $1x10^{-4}$ (cm/sec). Below this layer, Cretaceous clay is encountered. This layer has an average depth of around 50 feet and previous geotechnical testing (Black & Veatch, 1985) has shown the layer to have a hydraulic conductivity of $1x10^{-6}$ (cm/sec). Varying from sixty to one hundred feet below mean sea level, and under the clay layer, is an equally thick deposit of Cretaceous sands. Hydraulic conductivity here is in the $1x10^{-2}$ (cm/sec) range (previous testing). Lateral velocities for groundwater in Area 3 have been estimated to range from 2 feet per day to less than 0.02 feet per day within clay-type soils.

12.1.2 Aquifer Usage

The Patapsco Formation comprises the most widely used aquifer in the Maryland Coastal Plain. The Patapsco aquifer is a source of groundwater for the towns of Annapolis, Glen Burnie, Odenton, Forest Heights, Indian Head and Bowie, all located south of the site. Many industries in the Baltimore area additionally utilize cooling water obtained from the Patapsco aquifer. A large, untapped supply of water is available for future development from this formation.

The Anne Arundel County, Department of Public Works - Glen Burnie System has the capability to operate approximately 20 large capacity wells within a 7-mile radius of the site, that utilize the Patapsco aquifer, it is considered unlikely that the Hawkins Point HWL site could have an averse effect on the quality of these wells.

Several other landfills (such as the BFI/Quarantine Road, SCM/Glidden, and the BFI/Solley Road facilities) are located closer to the Glen Burnie well system than the Hawkins Point facility.

Water quality in the Patapsco aquifer is generally good, however, localized degradation has been observed in the upper portion of the aquifer, particularly in the Hawkins Point area. Use of the aquifer at the Bethlehem Steel Sparrows Point Plant has been discontinued due to high chloride content. Water quality monitoring wells at the SCM/Glidden and BFI waste disposal facilities, located adjacent to and up-gradient of the Hawkins Point HWL, exhibit manganese, sulfate, iron and chromium concentrations which are several orders-of-magnitude higher than the EPA Drinking Water Standards. Due to regional gradients, the proximity of the Patapsco River and usage patterns, it does not appear likely that contaminants entering the aquifer in the Hawkins Point area would impact any current or future areas of withdrawal.

The Patuxent aquifer underlies the Patapsco aquifer, separated by the confining clays of the Arundel Formation. The Arundel Formation averages 100 feet in thickness in the Hawkins Point area and forms an aquiclude, or barrier separating the 2 aquifers. The formation forms an effective barrier both to hydraulic interconnection and to the spread of any contamination to the Patuxent aquifer from surficial sources.

The Patuxent Formation is used as a source for groundwater for drinking and industrial purposes in Charles, Prince Georges, Anne Arundel, Baltimore, Harford and Cecil Counties in Maryland. In the counties to the south and east, the surface of the Patuxent Formation is too deep (approximate elevation -1,000 msl) to be practically tapped. In locations where the Patuxent is easily tapped, it remains a significant source of potable groundwater supplies.

The groundwater obtained from the Patuxent aquifer in the Baltimore area requires treatment to reduce its acidity and to remove iron before distribution for municipal use. The hardness, dissolved solids and chloride content generally are reported to be within the Secondary Standards established by the EPA in 1979. In the Baltimore industrial area, it is of good general quality, although somewhat high in hardness.

12.1.3 Facility Location Assessment

Based on the general hydrogeology in the vicinity of the facility and aquifer usage patterns, the potential for human exposure from releases to groundwater is considered moderate due to groundwater flow patterns and rates, proximity of withdrawal wells, and low net precipitation (reported to be -4.88" for 1984). This assessment only considers facility location and does not consider design and operating features, which significantly decrease the potential for release.

12.1.4 Design and Operating Procedures

The Area 5 facility was constructed with an in-situ clay bottom, 2-1/2 to 3 feet of compacted clay on side slopes of Cells Nos. 5 through 11 and composite liner on the side slopes of Cells Nos. 5 and 6 including a 1-foot of compacted clay and an 80-mil thick HDPE synthetic membrane. Since this facility is an expansion of an existing chrome ore tailings disposal site (Cells Nos. 1, 2, and 3) beneath the ground surface underlying Cells Nos. 5 and 6, the existing in-situ clay comprises the bottom. This in-situ material consists of relatively impervious fine-grained soil. The synthetic membrane and clay layer on the side slopes of Cells Nos. 5 and 6, above the ground surface, are designed to prevent the potential lateral movement of contaminants from the cell and direct all percolation vertically to the underlying clay bottom which includes a leachate collection/underdrain system. The final closure cap which includes a capillary break layer, clay layer, 60-mil thick HDPE synthetic membrane, drainage layer and vegetative cover is designed to eliminate or minimize any infiltration of precipitation through the surface of closed Area 5 and promote efficient drainage while minimizing the effects of erosion of the final cover. Maintenance of the final cover is included in Section 4.2. A scaled drawing of the layout and profiles of these Cells can be seen in Figure 12.1.

12.1.5 Overall Area 5 Exposure Potential

Based on facility location and design, the overall human exposure potential from releases to the groundwater regime by Cell Nos. 1 through 11 is considered remote. This is due to the presence of the clay bottom and leachate collection system underlying Cell Nos. 1, 2, and 3, and the side slope and final closure cap system. It is possible that Cell Nos. 1, 2, and 3 present a higher exposure potential from groundwater releases due to the absence of a composite liner, but no evidence exists that such migration has occurred. In fact, the results of the "Hydrogeologic Assessment - Area 5" indicate that water quality down-gradient of Area 5 is comparable to or better than the quality of water which enters the site from up-gradient. It should be noted that the potential for human exposure from the contamination of food-chain cross is remote, due to both the low probability of groundwater contamination and the lack of agriculture in the area.

A leachate collection/underdrain system was installed in each of the existing base cells (nos. 1, 2, and 3) above the in-situ natural clay layer underlying Area 5 by either open-cut trenching or horizontally auguring 6-inch diameter polyvinyl chloride (PVC) pipe a distance approximately 200 feet into each base cell. The leachate collection system drains in a southerly direction toward a common header pipe, which transmits the collected leachate to the leachate holding and transfer area. Additionally, a trench drain consisting of coarse gravel wrapped in non-woven filter fabric connects the northern and southern sector of Cells Nos. 2. Groundwater monitoring is accomplished with seventeen (17) monitoring wells located around the

facility. These wells are monitored quarterly for the parameters specified in the Monitoring and Analysis Program in Section 10.

A system of open conveyance ditches and culverts are employed to convey run-on and run-off surface water flows through and around the facility to 2 sedimentation ponds and ultimately, Thoms Cove. These facilities have been designed to pass the 100-year, 24-hour recurrence interval storm event. All open channels are designed to safely convey storm flows with a minimum of 2 feet of freeboard.

12.1.6 Overall Area 3 Exposure Potential

The underlying MPA chrome tailings cells may present a slightly higher degree of exposure potential, as explained in Section 12.1.1.2. However, the data presented in the "Hydrogeologic Assessment" indicates a lack of chromium above detectable levels, implying that chromium derived from the MPA cells has not entered the groundwater sampled by monitoring wells down-gradient of the cells. In addition, the conclusions in the "Hydrogeologic Assessment" imply that the MPA cells have had no current impact of the Lower Patapsco aquifer. Groundwater samples obtained for the Lower Patapsco aquifer indicate the water quality is generally consistent with baseline values established during the performance of previous studies.

12.1.7 Leachate Collection System

In summary, Leachate draining through the Leachate collection system of Area 5 flows by gravity to a sump through the 6-inch diameter, non-perforated collection lines. Leachate from Area 3 flows to a separate section of the same sump specified for that system.

The leachate in each section of the sump is pumped to one 20,000 gallon above ground fiberglass holding tank through two separate 4-inch diameter PVC lines with flow meters to record the leachate quantity collected from Area 3 and Area 5. Wash water from the wash pad area drains through PVC lines to the Area 3 and Area 5 sumps and then is pumped to the 20,000-gallon holding tank.

In order to allow for periodic inspection, the system has been designed to be accessible from a series of manholes. Manholes are provided in the main collection header, at all bends and junctions, and at spacing no greater than 400 feet. This enables cleaning, and, to an extent physical repairs to be made to the collector without excavating. It also enables leachate samples to be obtained at various locations in the collection system.

Based on location and design, the overall human exposure potential from releases to groundwater is considered remote. This is particularly due to the fact that the system is essentially closed and a portion of the system was recently relined

with an HDPE liner. Routine maintenance and inspection, detailed in Section 4.2, provide for monitoring and early detection of potential leaks.

12.1.8 Wastewater Treatment Facility

The wastewater treatment facility was designed to house all treatment equipment within a pre-engineered building. All hazardous wastes are contained within this building. Waste that spills within the building will be contained by the reinforced concrete floor, thereby not allowing any contamination to reach the groundwater. Based on this design, the overall human exposure potential from releases to groundwater is considered remote.

12.2 Potential for Human exposure via the Surface Water Pathway

12.2.1 Facility Location Assessment

The only major surface water body near the facility is the lower Patapsco River and several of its tributaries. Thoms Cove is located adjacent to the site, and is tidal in nature. No drinking water intakes are located on the lower Patapsco River, including downstream of the site. The Patapsco River is characterized by weak estuarine circulation, with an order of 95 to 100 percent sediment trapping efficiency, which results in limited flow/flushing. The only actual mechanism for human exposure to the surface water would be via recreational boating since the river is not used for drinking water, swimming or as a food supply. In this light, the potential for human exposure from a surface water release would be high. However, it should be noted that the Patapsco River is classified as "severely polluted", and is one of the most degraded tributaries to the Chesapeake Bay in terms of nutrient concentrations, toxic organic and metallic compounds in water and sediments, dissolved oxygen levels, and populations of aquatic organisms. Overall, the facility location is considered to present moderate human exposure potential via the surface-water pathway.

12.2.2 Design and Operating Features

All design and operating features detailed in Section 12.1.4 are relevant to Area 5 operations. Additional information for Area 5 is presented below.

Run-off from the Cells Nos. 5 through 11 final closure cap is uncontaminated and is discharged in sheet flow down the side slopes, intercepted by benches and drained to Sedimentation Pond No. 1. Run-off from Areas 2 and 3 is also uncontaminated and is discharged in sheet flow to drainage ditches, which drain to Sedimentation Pond No. 2.

12.2.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to surface water from the Area 5 landfill after closure and the closed MPA Cells in Area 2 and 3 is considered remote. The monitoring of surface water in the sedimentation ponds and surface water areas serves as check points to prevent human exposure to contaminated surface water. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent near any point along the lower Patapsco River.

12.2.4 Leachate Collection System

The leachate collection system is described in Section 12.1.7. Since the system is completely underground, the potential for human exposure from releases to surface water from the system is considered remote.

12.2.5 Wastewater Treatment Facilities

Since this facility is within buildings with secondary containment, the potential for human exposure from releases to surface water from the system is considered remote.

12.3 POTENTIAL FOR HUMAN EXPOSURE VIA THE AIR PATHWAY

12.3.1 Facility Location Assessment

The area immediately surrounding the facility is industrial, unpopulated and regionally flat in topography. The prevailing wind direction is from the west, at a wind speed of between 0 and 3 miles per hour. The mean daily average for this time period was 55.0 F. with a maximum daily average of 65.0 F and a minimum daily average of 44.8 F.

Overall, the facility location presents a remote potential for human exposure via the air pathway. Although no great dispersions or high wind speeds are characteristic of the atmosphere, moderate temperatures and precipitation as well as relatively level topography balance the atmospheric ability to disperse air releases. In addition, the population density within 2 miles of the facility is very low, and no people live within 1 mile of the facility.

12.3.2 Design and Operating Features

No subsurface gas generation is expected to occur in the Cells in Areas 5 or 2 or 3. In addition, the only waste received in the cells is chromium and/or asbestos

contaminated, which is not reactive, ignitable or volatile. In order to preclude wind dispersal during the early stages of closure activities, chrome contaminated trash was covered with heavier chrome contaminated debris.

12.3.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to air from the Cells of Areas 5 and 2 and 3 is considered remote. The only potential for release is through wind dispersal of chrome ore tailings; however, these cells are now capped and are not exposed to wind. It should be noted that the potential for human exposure from the contamination of food chain crops is remote, since agriculture is not prevalent in the area and wind dispersal of waste at levels exceeding regulatory guidelines is nearly impossible.

12.3.4 Leachate Collection System

The leachate collection system is described in Section 12.1.7. Since the system is enclosed and underground, the potential for human exposure from releases to the air is considered nonexistent.

12.4 POTENTIAL FOR HUMAN EXPOSURE FROM SUBSURFACE GAS RELEASES

Since no municipal wastes have been disposed in any area of the facility the generation of subsurface gas is not likely to occur. However, an assessment of the facility is provided to assure regulatory compliance.

Three underground conduits are located on the facility property: 1) a buried electrical conduit; 2) an 8-inch diameter potable water line which follows the entrance road and branches to the area of the former scale plaza, compound area, and wash pads in 2-inch diameter lines; and 3) a 4-inch diameter PVC sewer pipe connecting a 2,000 gallon septic tank with a 10,000 gallon liquid holding tank (See Figure 3.3). The only structures located on the site are 2 trailers and corrugated metal roof structure over the wash pad and leachate collection areas. Overall, the potential for human exposure from subsurface gas releases is considered remote since the gas is not likely to be generated and there are no large conduits or structures at the facility, which would promote gas release.

12.5 POTENTIAL FOR HUMAN EXPOSURE FROM RELEASES TO SOIL

12.5.1 Facility Location Assessment

The potential for exposure from releases to surface water and air has been discussed previously. The proximity of the facility to a surface water body increases the potential for transport of contaminated soil to surface waters. In addition, the relatively level topography and amount of facility surface area increase the potential for the transport of contaminated soil to air. Based on facility location alone, the

potential for contaminated soil transport to other pathways is remote; however, the assessment of the other pathways revealed only remote exposure potential to humans from those pathways. There is a remote potential for direct human exposure to contaminated soil since the facility is not located in a densely populated area, and security procedures are employed to limit public access to the facility.

12.5.2 Design and Operating Procedures

Several precautions are taken to prevent the contamination of soils on and near the facility. To prevent the spillage of wastes, covers are required on all bulk waste hauling vehicles entering and leaving the facility. Special procedures are followed at the unloading areas to minimize contact of the waste with the truck under carriage. All waste-hauling vehicles whose exterior comes in contact with the waste are required to proceed through the truck washing facilities before leaving the site. Any in-place wastes, which could be dispersed off-site by wind erosion are covered. Any soils, which are contaminated from the operation of the facility are considered and handled as hazardous waste material. Soil will be properly treated and or disposed. Soil contamination is further minimized by the control of runoff and surface water, as discussed previously. Spill response procedures are included in the Contingency Plan as described in Section 6.0.

12.5.3 Overall Exposure Assessment

Based on the facility location and design, the overall human exposure potential from releases to soil from the Area 5 facility is considered remote. This is due to design and operating procedures, which are specifically intended to minimize soil contamination and to rectify any potential spill situation quickly and effectively. These procedures, coupled with surface water and wind dispersal management procedures, in addition to the fact that the landfill will be closed, essentially eliminate the possibility of contaminated soil transport to other pathways, and ultimate exposure to humans. It should be noted that agriculture is not practiced near the facility, thus eliminating the potential for food chain contamination.

12.5.4 Leachate Collection System

Since the system is regularly maintained and inspected, and just recently relined with an HDPE lining, the potential for soil contamination by the system is considered remote. If the soil was to be contaminated, the chances of direct human contact would be remote since contamination would be underground.

12.5.5 Wastewater Treatment Facilities

The wastewater treatment equipment and all treatment is performed within an enclosed building with secondary containment. If the hazardous waste would spill outside the building, contaminating the soil, the contaminated soil would be collected immediately and disposed of in accordance with hazardous waste

regulations. The potential for soil contamination by these facilities is considered remote, and therefore the overall human exposure from releases to the soil is considered remote.

12.6 POTENTIAL FOR HUMAN EXPOSURE FROM TRANSPORT RELATED RELEASES

Leachate will be transported from the facility on an intermittent basis through industrial areas in sealed tank trucks. Spill prevention programs are practiced by the haulers. In addition, off-site spill response procedures are included in the Contingency Plan in Section 6.0.

No spills or situations involving potential human exposure to waste by Hawkins Point HWL facility transportation vehicles have ever occurred. Therefore, the potential for human exposure from releases related to transportation accidents or spills is considered remote.

12.7 POTENTIAL FOR HUMAN EXPOSURE FROM WORKER MANAGEMENT PRACTICES

All Hawkins Point personnel are required to participate in safety training sessions and to abide by the site Health and Safety Plan, detailed in Section 9.0. Employees are equipped with high visibility headgear, gloves, safety shoes and tyvek coveralls, at a minimum; goggles, respirators and earplugs are available and are used as conditions dictate. All heavy equipment is equipped with audible back-up signals and fire extinguishers.

All employees are also required to participate in a training program, which includes both classroom and on-the-job training. A list of subject items included in the training for each job position is presented in Section 7.0. The training covers safety and first aid: office, operations, maintenance, and equipment operation procedures; and an environmental protection program.

A contingency and emergency plan is summarized in Section 6.0. The plan describes emergency coordination and designates coordination contacts; identifies limits of authority; designates emergency personnel and respective roles; provides decision making criteria for plan implementation; delineates emergency response procedures for spills, fires and explosion; outlines clean-up activities; lists emergency equipment and details evacuation procedures.

COEFFICIENTS (A(N-I+1)) FOR W TEST OF NORMALITY, FOR N=2(1)50

27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
0.4366	0.4328	0.4291	0.4254	0.4220	0.4188	0.4156	0.4127	0.4096	0.4068	0.4040	0.4015	0.3989	0.3964	0.3940	0.3917	0.3894	0.3872	0.3850	0.3830	0.3808	0.3789	0.3770	0.3751
0.3018	0.2992	0.2968	0.2944	0.2921	0.2898	0.2876	0.2854	0.2834	0.2813	0.2794	0.2774	0.2755	0.2737	0.2719	0.2701	0.2684	0.2667	0.2651	0.2635	0.2620	0.2604	0.2589	0.2574
0.2622	0.2610	0.2599	0.2487	0.2476	0.2463	0.2451	0.2439	0.2427	0.2415	0.2403	0.2391	0.2380	0.2368	0.2357	0.2345	0.2334	0.2323	0.2313	0.2302	0.2291	0.2281	0.2271	0.2260
0.2162	0.2151	0.2160	0.2148	0.2146	0.2141	0.2137	0.2132	0.2127	0.2121	0.2116	0.2110	0.2104	0.2098	0.2091	0.2086	0.2078	0.2072	0.2065	0.2058	0.2052	0.2046	0.2038	0.2032
0.1848	0.1857	0.1864	0.1870	0.1874	0.1878	0.1880	0.1882	0.1883	0.1883	0.1883	0.1881	0.1880	0.1878	0.1876	0.1874	0.1871	0.1868	0.1865	0.1862	0.1859	0.1855	0.1851	0.1847
0.1684	0.1601	0.1616	0.1630	0.1641	0.1651	0.1660	0.1667	0.1673	0.1678	0.1863	0.1686	0.1689	0.1691	0.1693	0.1694	0.1695	0.1695	0.1695	0.1695	0.1695	0.1693	0.1692	0.1691
0.1346	0.1372	0.1395	0.1415	0.1433	0.1449	0.1463	0.1475	0.1487	0.1496	0.1503	0.1513	0.1520	0.1526	0.1531	0.1535	0.1539	0.1542	0.1545	0.1548	0.1550	0.1551	0.1553	0.1554
0.1128	0.1162	0.1192	0.1219	0.1243	0.1265	0.1284	0.1301	0.1317	0.1331	0.1344	0.1356	0.1366	0.1376	0.1384	0.1392	0.1398	0.1405	0.1410	0.1416	0.1420	0.1423	0.1427	0.1430
0.0923	0.0965	0.1002	0.1036	0.1066	0.1093	0.1118	0.1140	0.1160	0.1179	0.1196	0.1211	0.1225	0.1237	0.1249	0.1259	0.1269	0.1278	0.1286	0.1293	0.1300	0.1306	0.1312	0.1317
0.0728	0.0778	0.0822	0.0862	0.0899	0.0931	0.0961	0.0988	0.1013	0.1036	0.1056	0.1075	0.1092	0.1108	0.1123	0.1136	0.1149	0.1160	0.1170	0.1180	0.1189	0.1197	0.1205	0.1210
0.0540	0.0598	0.0660	0.0697	0.0739	0.0777	0.0812	0.0844	0.0873	0.0900	0.0924	0.0947	0.0967	0.0986	0.1004	0.1020	0.1035	0.1049	0.1062	0.1073	0.1085	0.1096	0.1106	0.1113
0.0368	0.0424	0.0483	0.0537	0.0686	0.0629	0.0669	0.0706	0.0739	0.0770	0.0798	0.0824	0.0848	0.0870	0.0891	0.0909	0.0927	0.0943	0.0959	0.0972	0.0986	0.0998	0.1010	0.1020
0.0178	0.0263	0.0320	0.0381	0.0436	0.0486	0.0530	0.0572	0.0610	0.0645	0.0677	0.0706	0.0733	0.0769	0.0782	0.0804	0.0824	0.0842	0.0860	0.0876	0.0892	0.0906	0.0919	0.0932
0.0000	0.0084	0.0159	0.0227	0.0289	0.0344	0.0396	0.0441	0.0484	0.0573	0.0659	0.0592	0.0622	0.0651	0.0677	0.0701	0.0724	0.0746	0.0766	0.0786	0.0801	0.0817	0.0832	0.0846
		0.0000	0.0076	0.0144	0.0206	0.0262	0.0314	0.0361	0.0404	0.0444	0.0481	0.0615	0.0546	0.0576	0.0602	0.0628	0.0661	0.0673	0.0694	0.0713	0.0731	0.0748	0.0764
				0.0000	0.0068	0.0131	0.0187	0.0239	0.0287	0.0331	0.0372	0.0409	0.0444	0.0476	0.0506	0.0534	0.0560	0.0584	0.0607	0.0628	0.0648	0.0667	0.0685
						0.0000	0.0620	0.0119	0.0172	0.0220	0.0264	0.0305	0.0343	0.0379	0.0411	0.0442	0.0471	0.0497	0.0522	0.0546	0.0568	0.0588	0.0608
								0.0000	0.0057	0.0110	0.0158	0.0203	0.0244	0.0283	0.0318	0.0352	0.0383	0.0412	0.0439	0.0466	0.0489	0.0511	0.0532
										0.0000	0.0053	0.0101	0.0146	0.0188	0.0227	0.0263	0.0296	0.0328	0.0367	0.0386	0.0411	0.0436	0.0459
												0.0000	0.0049	0.0094	0.0136	0.0176	0.0211	0.0246	0.0277	0.0307	0.0336	0.0361	0.0386
														0.0000	0.0046	0.0087	0.0126	0.0163	0.0197	0.0229	0.0259	0.0288	0.0314
																0.0000	0.0042	0.0081	0.0118	0.0163	0.0186	0.0216	0.0244
																		0.0000	0.0039	0.0076	0.1110	0.0143	0.0174
																				0.0000	0.0037	0.0071	0.0104
																						0.0000	0.0036

April 2009

RCRA Operation and Maintenance Inspection

Maryland Department of the Environment
Waste Management Administration
Hazardous Waste Program

RCRA Operation and Maintenance Inspection of Maryland Environmental Service Hawkins Point Hazardous Waste Landfill Baltimore, Maryland

April 2009

Prepared for the
United States Environmental Protection Agency
Region III
Philadelphia, Pennsylvania

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Maryland Environmental Service
Hawkins Point Hazardous Waste Landfill
April 2009

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Executive Summary

The Maryland Department of the Environment (MDE) conducted an Environmental Protection Agency Operation and Maintenance Inspection (EPA-O&M) on the groundwater monitoring systems at the Maryland Environmental Service's (MES) Hawkins Point Hazardous Waste Landfill during a groundwater sampling event on April 30, 2009. Hawkins Point Hazardous Waste Landfill is located in the Curtis Bay industrial area adjacent to Thoms Cove, near the southern Baltimore City Limits, at the Francis Scott Key Bridge. The site is owned by the Maryland Port Administration (MPA), has a total area of 67 acres, and is permitted by the MDE and the EPA. MES designed, constructed, and operated the secured, controlled hazardous waste landfill from 1980 to 1994. MES completed closure activities for Area 5 on May 20, 1994. MDE issued Post-Closure Permit A-264 on October 15, 1995. The permit expired in 1998, but was renewed on January 28, 2002. Detection monitoring of three (3) wells is conducted quarterly for Area 5. MES also performs environmental monitoring and maintains the dewatered condition of the old chrome ore tailing cells in Areas 2 and 3 with a groundwater interceptor trench and leachate collection system.

This O&M Inspection addresses Area 5 of the landfill, which is regulated by CHS facility permit A-264. The operating record was reviewed and found to be complete. Operation and maintenance of the system was performed in acceptable manner. Monitoring wells

are sampled using disposable Teflon bailers.

Sampling personnel followed the sampling and analysis plan during the observed sampling events. The water level indicator and pH meters performed acceptably. Decontamination procedures were adequate. The groundwater monitoring system appears to be adequate to monitor any chromium releases from the landfill to the shallow aquifer.

Section 1 Introduction

1.1 Purpose

The objectives of this inspection were to determine whether the operator's personnel who collect groundwater samples were collecting them properly, that the operator's sampling devices were in working order and that the operator was abiding by maintenance provisions as outlined in MES's RCRA permit. Additionally, the OAM was intended to determine that individual monitoring wells within a groundwater monitoring system continue to yield representative and reliable groundwater samples and reliable hydrologic data; identify flagrant violations in operation and maintenance programs, and trigger a more thorough scrutiny of the operator's groundwater monitoring program; identify issues or concerns that the enforcement staff should assess in a future Comprehensive Groundwater Monitoring Evaluation; obtain groundwater elevation data; determine direction(s) of groundwater flow; and assess, generally the viability of past decisions made by the operator regarding the number and placement of monitoring wells. This Operation and Maintenance Inspection was conducted according to EPA guidelines as outlined in the "Operation and Maintenance Inspection Guide (RCRA Groundwater Monitoring Systems), 1988".

1.2 Site History

The Hawkins Point Hazardous Waste Landfill is located in the heavily developed Curtis Bay area of southern Baltimore City. The

Maryland Port Adminisration (MPA) obtained the 67 acre site in 1958 and developed it as a landfill for chrome-ore waste obtained from the Honeywell (formerly AlliedSignal, Inc.) Baltimore Works Plant. The site is divided into six areas. From 1975 to 1979, chrome-ore waste was disposed in three clay lined cells located in Site 1 (Area 2/3) (figure 2).

In 1979, the Maryland Environmental Service (MES) began operating the facility for the Maryland Port Authority (MPA). MES soon ceased disposal of chrome-ore tailings in Site 1 (Area 2/3), and began the construction of new disposal cells in Site 2 (Area 5). Chrome-ore tailings were deposited between 1980 to 1986, and contaminated construction debris was disposed between 1990 to 1993 in Area 5. In 1994, the final cover for Area 5 was completed. Post-Closure permit A-264 was issued by MDE on October 15, 1995. Area 1 is currently leased for use to EASTALCO Aluminum Company.

MES is also permitted to store and treat chromium contaminated wastes in tanks, and installed a treatment system in 1999 that failed to perform according to design requirements. This system was removed from site, and no new system had been installed.

1.3 History and Description of Solid Waste Management Units

The Hawkins Point Hazardous Waste Landfill was constructed in two units: Site 1 was constructed by the MPA between 1975 and 1979 and

contains approximately 267,718 tons of chromium ore tailings (D002, D007 waste codes). Quality control during construction was of dubious effectiveness and releases were a continuing problem until the area was retrofitted with a leachate collection system in 1983. There have been no documented releases since that time.

In 1980, MES began disposing of chrome ore tailing in Site 2. The construction was financed by AlliedSignal, Inc., and the overall quality of construction was much better than Site 1. The clay lined cells were reinforced by asphalt paving anyplace the quality of the clay liner was suspect. Originally the initial cells had leachate collection sumps but these were converted to horizontal drains to allow for vertical expansion of the landfill.

Maryland's Department of Health and Mental Hygiene (DHMH) issued Controlled Hazardous Substances Facility (CHS) Permit A-264 on November 30, 1982 for the expansions of Sites 1 and 2. Site 1 was renamed Area 2/3. Site 2 was renamed Area 5.

Prior to 1982, a groundwater interceptor trench was installed along the north, west, and east sides of Area 5 to divert groundwater flow around the cells. In the spring of 1982, cells 1, 2, and 3 of Area 5 were retrofitted with a leachate collection system and a leachate storage/transfer area was installed. The collection system consists of open-trenched and horizontally augured PVC

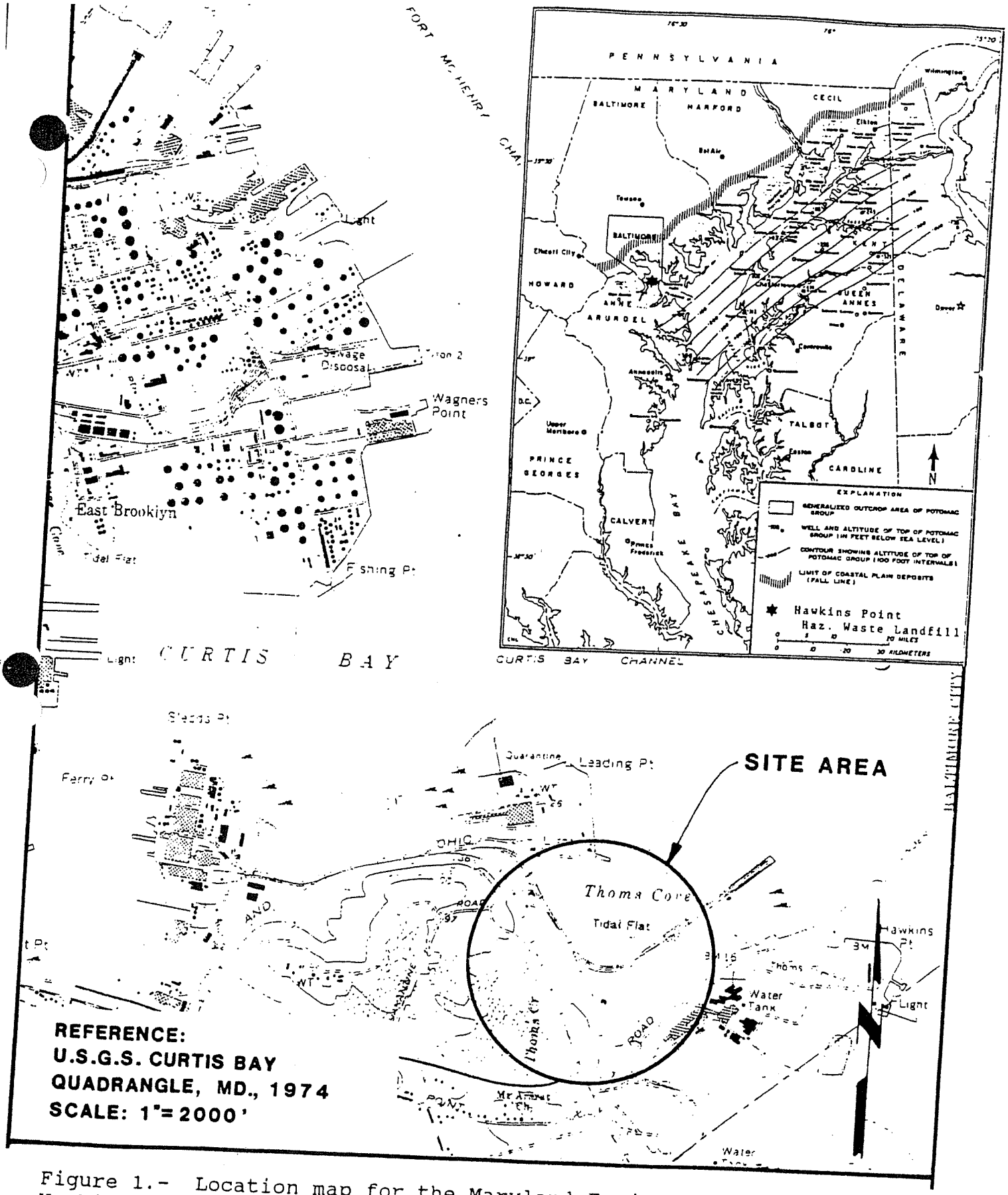


Figure 1.- Location map for the Maryland Environmental Service's Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland (taken from Black & Veatch, 1985(b))

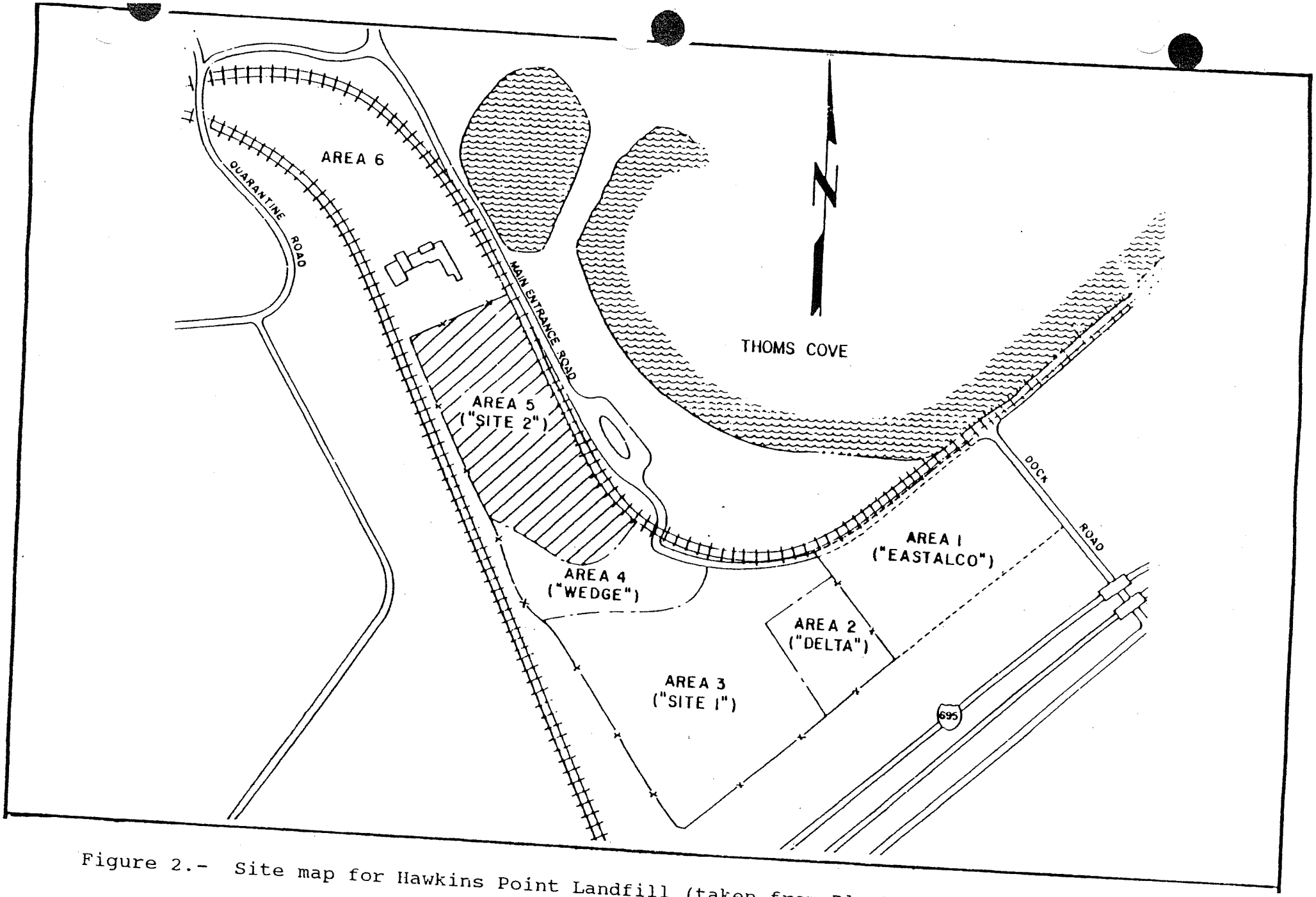


Figure 2.- Site map for Hawkins Point Landfill (taken from Black & Veatch, 1983).

piping which advanced 200 feet into the southern portion of the area, near the base of the original three cells (figures 3, 4).

In the spring of 1982, groundwater interceptor trenches were constructed along the western and southern sides of Area 3. Area 3 was retrofitted with a leachate collection system during the summer of 1983.

In January 1983, MES began accepting controlled hazardous substances in Cell 40 of Area 3, which was located above the older MPA chrome cells. MES operated Cell 40 for eleven months and then closed the cell due to economic reasons. Approximately 1,000 tons of waste in Cell 40 was removed and transported to Fondessy, Ohio for disposal. Cell 40 was clean closed and the liner was left in place to act as an infiltration barrier to the underlying MPA waste cells (MES, 1993).

On May 15, 1985, EPA issued a RCRA permit to MES for Area 5. DHMH reissued A-264 on May 10, 1985 for Area 5. MES currently operates under the permit issued on January 28, 2002.

Area 5 ceased accepting waste on October 25, 1993. A total of ten cells were constructed in Area 5 which contain approximately 462,894 tons of waste. Area 5 was covered with a capillary break layer consisting of 6" crushed stone, an 8" bedding layer, a

Map Compi... Photogrammetric Methods from Aerial Photography Dated April 1, 1983.

Grid Based on Maryland State Plane Coordinate System.

Elevations Based on Mean Sea Level 1929 Datum.

NOTES:

1. Ground-water elevation contours are as indicated by Harrington, Lacey & Associates, "Interim CHS Landfill Expansion", sheet 8 of 19, dated January 1982.

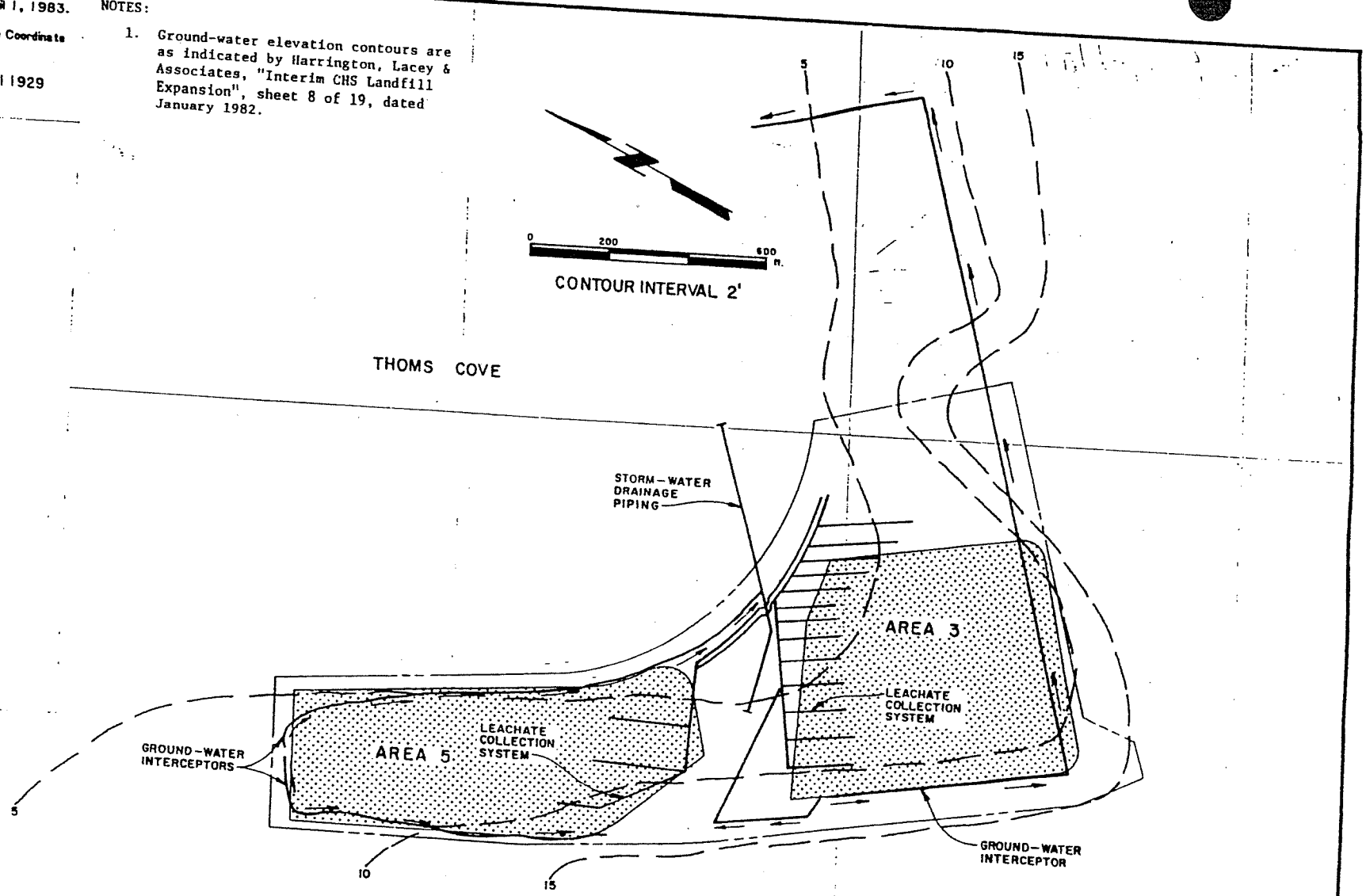
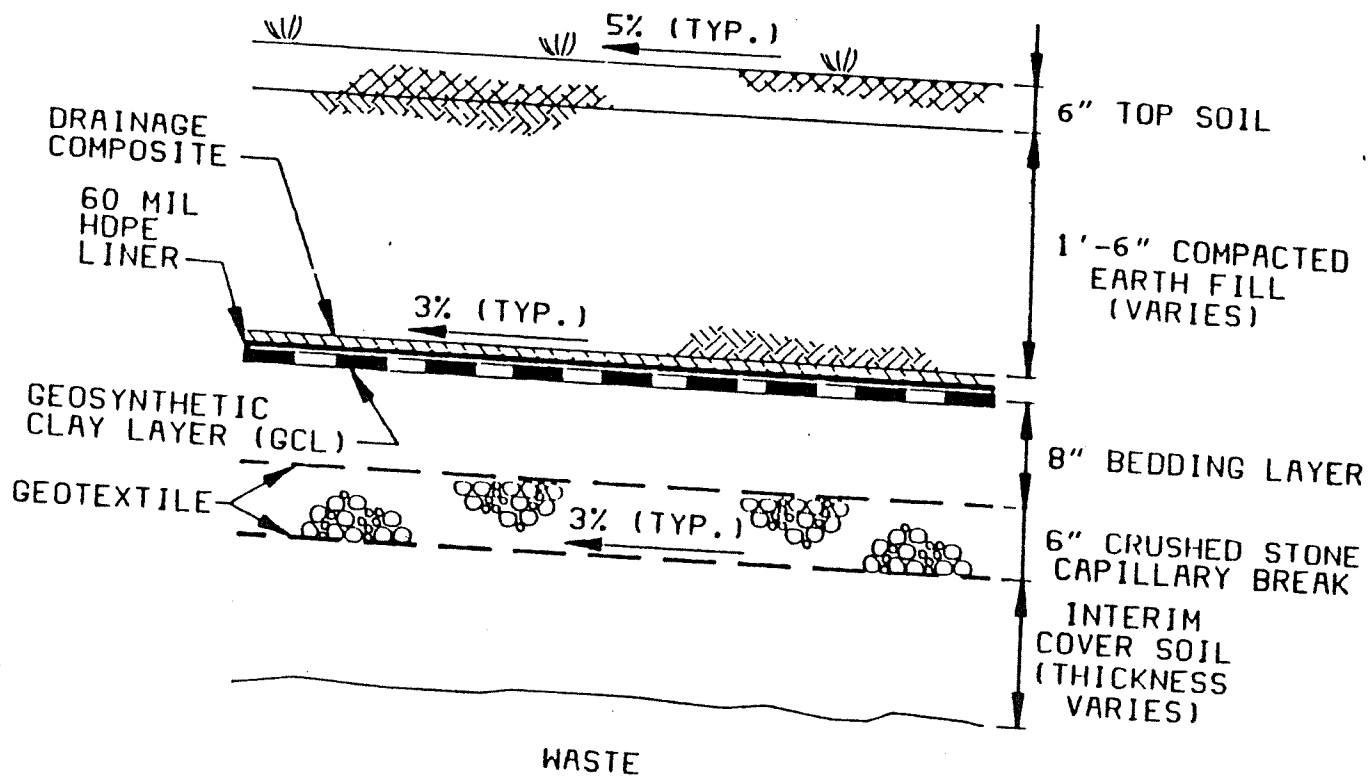


Figure 3.- Leachate and groundwater interceptor system (taken from Black & Veatch, 1983).



NOT TO SCALE

NOTES:

1. EARTH FILL, BEDDING LAYER AND INTERIM COVER SOIL TO BE CONSTRUCTED OF SUITABLE ON-SITE SOIL.

2. GCL SHALL HAVE A TYPICAL PERMEABILITY ON THE ORDER OF 1×10^{-9} CM/SEC.

Figure 5.- Schematic diagram of the Hawkins Point Landfill closure cap for Area 5 (taken from MES, 1993).

geosynthetic clay layer with a typical permeability in the order of 1×10^{-9} centimeters per second, a 60-mil thick synthetic membrane, drainage composite layer, and a minimum 2 feet of vegetative cover Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

1.4 Waste types and quantities

In Area 2/3, 267,718 tons of chrome ore tailings were deposited between 1975 and 1979. In Cell 40, 1000 tons of D005, D006, D007, D008, D101, and F006 wastes were deposited and later removed (MES, 1993).

Area 5 contains approximately 462,894 tons of chrome ore tailings and chromium contaminated soil and debris generated by AlliedSignal, Inc. The major components of the chrome ore tailings in Area 5 are shown on table 1. Chrome-ore tailings waste is a mixture of iron oxides, calcium, magnesium, and aluminum that contains ~0.2% water soluble hexavalent chromium and 1.3% acid-soluble chromium. The chrome-ore tailings generated by Allied vary in chemical composition in accordance with the operating mode. The first mode involves the use of lime as a sequestering agent for the removal of impurities in the chrome ore. The second mode requires no lime, with processing measures for removal of impurities from the crude product as additional manufacturing steps (MES, 1993).

Table 1.- Major components of chrome ore tailings in Area 5 (taken from MES, 1993).

Assay	Average % by dry weight
Calcium (as CaO)	36
Iron (as Fe_2O_3)	22
Moisture	17
Aluminum (as Al_2O_3)	11
Magnesium (as MgO)	9.6
Total Chromium (as Cr_2O_3)	5.2
Silica (as SiO_2)	4.0
Sodium (as Na_2O)	1.6
Hexavalent Chromium (Acid Soluble)	1.2
Hexavalent Chromium (Water Soluble)	0.32

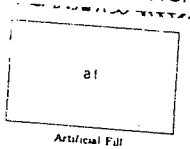
1.5 Geology

Sixty-five soil borings have been drilled at the Hawkins Points Landfill; however; a detailed geologic cross section for the site has not been constructed. The surface materials at Hawkins Point Landfill are part of the clay facies of the Potomac Group Patapsco Formation which was deposited during the Cretaceous Period. The clay facies contains varying amounts of interbedded fine sand and silt within the hard clay. The thickness of the clay at the site ranges from trace amounts at the north end to 100 feet at the south end. The average uninterrupted thickness of clay is interpreted to be 10- to 20-foot. Below the clay is a sand facies which consists of well-sorted, fine- to medium-grained quartz sand with local areas of abundant quartz gravel. The sand and gravel strata (upper Patapsco Formation) constitute the uppermost aquifer. The thickness of the sand and gravel strata is estimated to be 100 feet at the site. (Harrington, Lacey, & Associates, 1982)

1.6 Hydrogeology

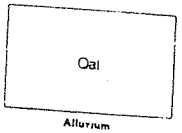
A perched water table was encountered on the northern part of Area 6 and Area 2/3. This condition occurs when water moving downward through the unsaturated zone is intercepted by a layer of low-permeability material and accumulates on top of the lens. A layer of saturated soil will form above the main water table. This is

SEDIMENTARY ROCKS



Artificial Fill

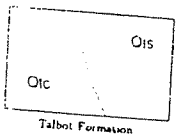
Composed of heterogeneous materials such as rock, unconsolidated sediment, slag, refuse, and dredge spoil. Only major areas of filled ground have been mapped and include areas such as former quarry sites, diked flood plains, low lying areas adjacent to streams and Chesapeake Bay shoreline, and transportation corridors across topographically low areas. Three meters or more thick.



Alluvium

Interbedded gravel, sand, silt, and clay of variable composition and sorting. Typically confined to flood plains of perennial streams, upland gathering areas, and marshes adjacent to estuaries. Sediment size, sorting, and mineralogy are strongly controlled by the source geology and geomorphic setting. The quartzose sands and polymict gravels are typically well-bedded and loosely compacted, the silts and clays are often water saturated and poorly bedded.

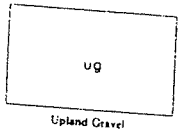
Minor amounts of colluvium (unmapped) may interfinger with alluvium at or near the base of slopes. In urban areas Qal cannot be adequately shown since it is summarily overlain by artificial-fill and/or has been extensively modified. Unit thickness is 0.5 to 5 meters.



Talbot Formation

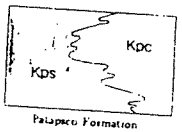
Qts clay facies. Typically buff to orange, poorly sorted, poorly bedded sediments with kaolinite, illite, and montmorillonite clays. Very sparse leaf and twig debris in bedded silts. In the Sparrows Point area, thick accumulations of gray to blue clays containing shell layers are documented by numerous test borings and water well logs. Silt and silty clays probably accumulated in alluvial flood plain open marsh environments. Clays probably accumulated in an estuarine environment.

Qts Sand facies. Well bedded, medium to coarse quartz sand, typically occurring near present shorelines. Low-angle, cross stratification and high degree of sorting suggest a beach or strandline as possible environment of deposition. The Talbot Formation varies from 0.5 to 10 meters in thickness.



Upland Gravel

Orange brown, poorly sorted, fine sand to boulder size particles commonly floating in a clay-silt matrix. Poorly bedded sediments show abrupt lateral and vertical sediment size changes with ferruginous cement along horizons of abrupt change. Deposits are occasionally well-bedded, fining-upward gravel and silt sequences (1.3 meters thick) are rare. Sparse to abundant gravel and large blocks of fresh to weathered mafic rock are diagnostic framework components. Thickness varies from 0.5 to 8 meters.



Patapsco Formation

Kpc (Kps) (0.5 to 8 meters thick). Typically buff, red yellow, and mottled kaolinitic clays. Variable amounts of quartz sand and silt as interbeds dispersed throughout the clay. Rare occurrences of [illegible] concretions and lignitized plant remains. Rare laminated [illegible] contain plant debris. Deposition in oxidized flood plain [illegible] environment is postulated.

Kps (Kpc) (0.5-30 meters thick). Well sorted, medium to fine grained [illegible] sand with locally abundant quartz gravel and clay clasts. Minimal [illegible] matrix [illegible] interstices. Sands are planar to high-angle cross [illegible] and [illegible] have fining upward sequences 13 to 5 meters thick.

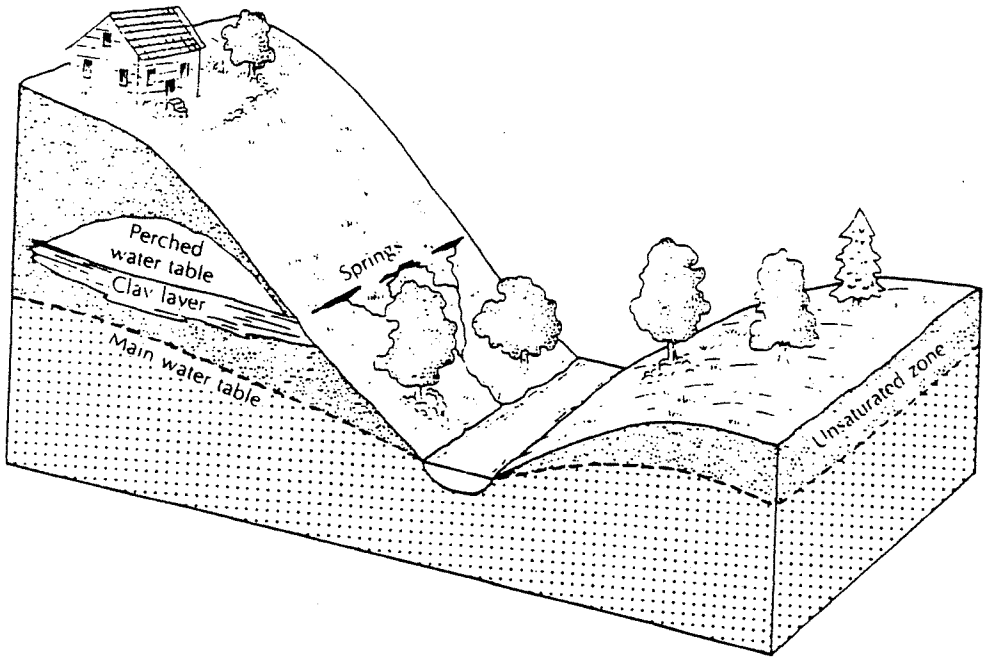


Figure 7.- Schematic diagram of a perched aquifer (taken from Fetter, 1994)

termed a perched aquifer (figure 7). Unconfined and confined groundwater conditions were found elsewhere at the site in the post-Cretaceous and Cretaceous sediments. (Dames & Moore, 1982) Shallow groundwater flows from the southwest along the B&O Railroad tracks to the northeast along Thoms Cove and the Patapsco River. Black & Veatch performed several slug tests on the monitoring wells located in Areas 4 and 5 in November of 1992. The first water bearing zone for Area 5 is described as an unconfined aquifer composed of post-Cretaceous sediments and the upper member of the Cretaceous deposits (Patapsco Formation). The base of the aquifer rests on top of approximately 100 feet of Arundel Clay. The estimated seepage velocity for area 5 was calculated to be 0.014 ft/day. Seepage velocity for Area 4 was calculated to be 0.136 ft/day. (MES, 1993)

1.7 Groundwater Quality

The groundwater quality at Area 5 has been monitored since July 31, 1980 in five observation wells (less than 60 feet deep). The July 1980 sampling event indicated that groundwater at Area 5 was contaminated by iron, manganese, sulfate, aluminum, and low pH. Also zinc, copper, lead, and several organics, such as methylene chloride, chloroform, 1,1,1-trichloroethane, trichloroethene, 1,1-dichloroethene, and dichloroethane appear in both upgradient and downgradient wells. Poor water quality is the result of previous

site activities and other industries and landfill practices in the surrounding area. (Dames & Moore, 1982)

Groundwater and surface water contamination due to the presence of the Area 5 landfill should be prevented by the clay liner, leachate collection system, clay berms, and the composite closure cap (MES, 1993). Constituents indicative of chrome ore tailing leachate, specifically hexavalent chromium and an elevated pH, have not been detected in the groundwater under Area 5.

Section 2 Office Preparation

2.1 Enforcement/Permitting Action

A violation was issued to MES on February 19, 1980 by the Maryland Department of Natural Resources based on an inspection conducted in January, 1980. It was noted that an unknown quantity of chromium contaminated waste was stockpiled at the site without proper permitting. Leachate from the pile had discharged to ground and surface water.

DHMH issued Controlled Hazardous Substances Facility (CHS) Permit A-264 on November 30, 1982 for the expansions of Sites 1 and 2. Site 1 was renamed Area 2/3. Site 2 was renamed Area 5. On May 15, 1985, EPA issued Final RCRA Permit Number MDD 000731356 to MES for Area 5. DHMH reissued A-264 on May 10, 1985 for Area 5. MES currently operates under the 2002 permit. Area 5 completed closure activities on May 20, 1994 and will remain in post-closure care until May 19, 2024.

2.2 Sampling and Analysis Program

Area 5 of the Hawkins Point Landfill is currently monitored for releases from the waste management units (10 cells) with three groundwater monitoring wells. Well 2B-2, an upgradient well

located on the southwestern boundary of Area 5, is 45 feet deep. Well 2D-2, a downgradient well located on the eastern boundary of Area 5, is 36 feet deep. Well 2F-2, a downgradient well located on the northern boundary of Area 5, is 30 feet deep. Groundwater monitoring well logs are attached in Appendix D. MES is required to monitor the above mentioned wells to determine the groundwater quality of the uppermost aquifer underlying the waste management area.

The water samples obtained from monitoring wells 2B-2, 2D-2, and 2F are analyzed for the following parameters:

Barium	Sodium
Chromium (total)	Sulfate
Hexavalent Chromium	pH
Chloride	Specific Conductivity
Iron	Total Organic Carbon
Manganese	Total Organic Halogen
Phenols	

The techniques and procedures used to obtain and analyze samples from the groundwater monitoring wells are described in the Sampling and Analysis Plan (Appendix C). MES determines the elevation of the groundwater surface at each well each time the groundwater is sampled. The groundwater flow rate and direction in the uppermost aquifer is determined annually.

MES determines the groundwater quality at each monitoring well at the compliance point quarterly during the active life of a regulated unit, including the closure period, and post-closure care period. MES will determine if a statistically significant increase has occurred at each monitoring well. The method of statistical analysis is the Analysis of Variance (ANOVA). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Should the requirements related to use of the ANOVA technique be violated (i.e., non-normal data of too many non-detects), MES uses non-parametric methods such as the Kruskal- Wallis Test to analyze the data.

2.3 Operation and Maintenance Program

Monitoring and maintenance of the closed facility is performed by MES, which will insure that all post-closure requirements are met. Each monitoring well will be thoroughly inspected and repaired as necessary during each sampling period. All groundwater monitoring wells and locks will be inspected for signs of corrosion, damage, and inaccessibility. The protective standpipe, locking cap mechanism and well pipe will be inspected for damage. If damaged, the standpipe will be realigned and re-grouted or replaced. The well pipe will be inspected for vertical alignment and replaced is misalignment is sufficiently severe to inhibit proper sampling.

Maintenance inspections will be performed monthly for the first year years and then decrease to semi-annual and continue for the next 24 years at a minimum.

Part 2

Section 3 Field Inspection

3.1 Review of Operating Record

MES shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports and records required by this permit, and records of all data used to complete the application for the RCRA permit for a period of at least three (3) years from the date of the sample, measurement, report, and record.

Records of monitoring information shall specify:

1. the dates, exact place, and times of sampling or measurements;
2. the individuals who performed the sampling or measurements;
3. the dates analyses were performed;
4. the individuals who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

MES's operating record was reviewed and was found to be complete and well organized.

EPA inspection forms are attached in Appendix A. MES submits quarterly groundwater elevation maps using the average groundwater

elevation for each well.

3.2 Groundwater monitoring well inspection

All Area 5 groundwater monitoring wells were inspected during a groundwater sampling event occurring on April 30, 2009. Monitoring wells were in good physical condition. All monitoring wells were secured. EPA monitoring well inspection forms were completed during the inspection and are attached in Appendix A.

3.3 Observations of groundwater sampling crew

WAS observed one groundwater sampling event in 2000 at the Hawkins Point Landfill. EPA field inspection forms were completed during these sampling events and are attached in Appendix A.

MES samples monitoring wells on a quarterly basis. At each well the depth to water and depth to well bottom are measured; depth to water is plunked using the water level probe. Minimal cleaning of the water level indicator is done and consists of spraying the entire instrument and cord with distilled water.

Static water levels used to construct the quarterly potentiometric map are measured prior to purging the well. Area 5 monitoring wells are purged and sampled on different dates. Groundwater

elevation data collected for these areas was combined from different dates and used to produce the average quarterly potentiometric surface map.

Field parameters (pH, temperature, and specific conductivity) were measured at the time of sampling, but not during purging activities. Teflon or stainless steel bladder pumps are used to purge the monitoring wells - samples wer obtained by using Teflon bailers. An Air-Mate, gasoline-
powered air compessor was used to supply compressed gas to the Well Wizard controller box that controls the gas pressure that inflates the bladder located in the submersible pump. A filter was not installed between the gasoline-powered air compressor and the controller box.

Area 5 monitoring wells were purged by MES employees. Artesian Laboratory and MES personnel sampled the wells the following day. Groundwater levels in the wells were measured prior to sampling. Quality assurance/quality control (QA/QC) included trip and field blanks.

Part 3

Section 4 Compliance Decision-Making

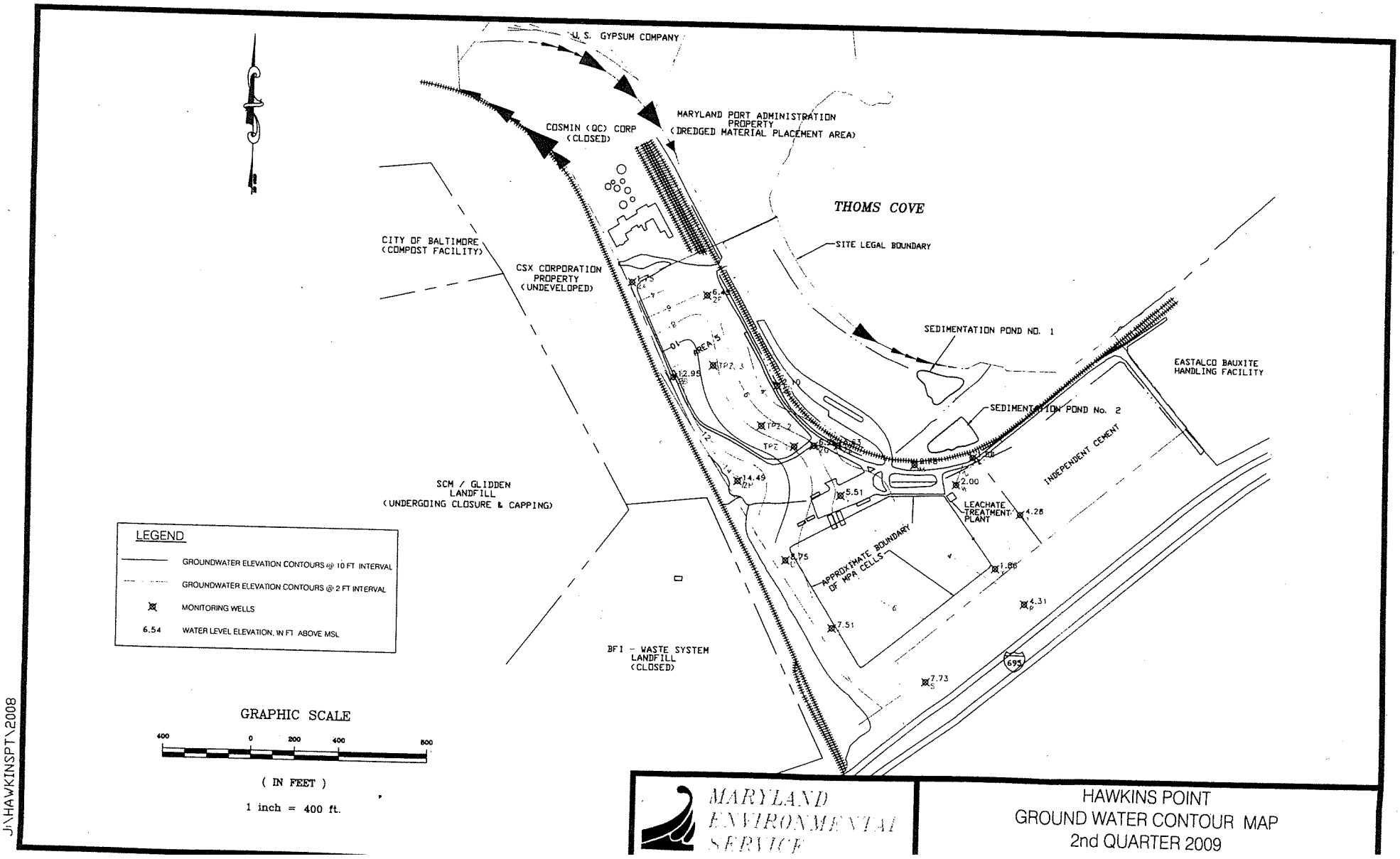
4.1 Potentiometric map

Included in this report is a potentiometric map from the 4th quarter 2008 groundwater monitoring report provided to MDE (figure 8). Shallow groundwater flows from the southwest to the northeast. The background monitoring well, 2B-2, was installed upgradient of the permitted waste disposal cells. Monitoring wells 2F-2 and 2D-2 were constructed directly downgradient of the chrome ore tailing cells.

MES has been inconsistent in describing the aquifer under the disposal cells at Area 5. The aquifer has been described as both an unconfined aquifer (MES, 1993, p. 10-12) and a confined aquifer (MES, 1993, p. 11-1). The MES has drilled over 85 borings, conducted several slug tests, and pump tests at the site. With the amount of data available for the site, the MES should be able to characterize the hydrogeology at the site.

4.2 Violations observed during the April 2009 sampling event

Sampling personnel were observed during the April 2009 sampling event. At all times the sampling crew followed the approved



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sampling plan. No violations of the plan were observed.

4.3 Enforcement action

EPA O&M Inspection Guide Table 3, Relationship of Technical Inadequacies to Ground-Water Standards, was used to determine if an enforcement action was warranted at the MES Hawkins Point Landfill (Appendix B). After reviewing these criteria, it was determined that no enforcement action was necessary at this time. In 1994, WAS requested that MES include well redevelopment in its maintenance activities. MDE added well redevelopment requirements to the groundwater monitoring system operation and maintenance section in MES's permit. Monitoring wells will be redeveloped when 20% or more of the screened interval is covered by silt.

4.4 Conclusion and Recommendations

The groundwater monitoring system in place at the MES Hawkins Point Landfill is adequate to detect releases from Area 5.

It is recommended that static water levels be measured prior to any purging activities. Groundwater elevation data used to generate the quarterly potentiometric map must be collected on the same day. It is recommended that groundwater samples are collected immediately after purging activities and the well has adequately recharged.

It is recommended that MES follow EPA decontamination protocol for groundwater monitoring equipment and any nondedicated sampling equipment.

Quality assurance/quality control (QA/QC) procedures should include obtaining duplicate samples labeled "Blind Duplicates"; these samples should have a different identification number than the well name.

4.5 References

Black & Veatch, 1985(a). Hydrogeologic Assessment, Hawkins Point Hazardous Waste Landfill, Area 3, with appendices.

Black & Veatch, 1985(b). Hydrogeologic Assessment, Hawkins Point Hazardous Waste Landfill, Area 5, with appendices.

Black & Veatch, 1983. Engineering Analyses and Design Documentation, Hawkins Point Hazardous Waste Landfill, Area 5, with appendices.

Dames & Moore, 1982. Environmental Effects Report for the Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland.

Fetter, C.W., 1994. Applied Hydrogeology, Third Edition, Macmillan College Publishing Company, New York, p. 111-113.

Harrington, Lacey & Associates, Inc., 1982. Hawkins Point CHS Disposal Facility Interim Expansion, Operating Plan & Procedures.

Maryland Environmental Service, 1994, Controlled Hazardous Substances Facility Permit.

Maryland Environmental Service, 1993, Permit Application for Closure/Post-Closure of Area 5, Hawkins Point Hazardous Waste Landfill, Baltimore, Maryland.

U.S. EPA, Office of Waste Programs Enforcement, 1988. Operation and Maintenance Inspection Guide (RCRA Ground-Water Monitoring Systems), 14p. and appendices.

Appendix A

Operation and Maintenance Worksheet

PART ONE

The field inspector and the enforcement official will meet and complete four tasks. Those tasks are: 1) review enforcement and permitting actions taken to date at the facility, 2) review the owner/operator's sampling and analysis program, 3) review the owner/operator's O&M program, and 4) prepare site-specific inspection objectives.

1. Facility identification number MDD 000 731 356

2. Name of facility contact EARTHA BALLARD
   phone number (443) 517 7492

3. Address of facility 5501 QUARANTINE ROAD
   BALTIMORE MD 21226

4. Does the facility have: NO
   Interim Status? (go to 5a)
   - detection monitoring
   - assessment monitoring
   - corrective action (§3008(h))

   Permit Status? (go to 5b) YES
   - detection monitoring ✓
   - compliance monitoring
   - corrective action

5a. Past actions taken at facility (interim status)

Type	Date(s)
Operation and Maintenance Inspection	
Comprehensive (Ground-Water)	
Monitoring Evaluation	
Case Development Inspection	
RCRA Facility Assessment	
Compliance Evaluation Inspection	
Ground-Water Task Force Investigation	

Complete the following questions in regard to the actions listed on the previous page:

- Do you have a copy of completed inspection reports or site studies? Yes ✓ No ___

- For each, summarize deficiencies identified in the owner/operator's sampling program and/or the owner/operator's operation and maintenance program. N/A

Go to 6a.

5b. Actions taken at the facility (permit status)

Type	Date
• Permit Issuance	012202
• Operation and Maintenance Inspection	SEPT. 2006
• Comprehensive (Ground-Water)	
• Monitoring Inspection	
• Case Development Inspection	
• Compliance Evaluation Inspection	07407
• Other	

Complete the following in regard to the actions listed above:

- Do you have a copy of the permit and copies of inspection reports completed after permit issuance? Yes ✓ No ___

- Summarize deficiencies identified after permit issuance regarding the owner/operator's operation and maintenance program. NA

Go to 6b

6b. Identify enforcement actions issued to the facility after the permit issuance date.

Action	Date(s)
• §3008(a) complaint/order	_____
• §3013 complaint/order	_____
• §3008(h) complaint/order	_____
• §7003 complaint/order	_____
• Referral for litigation	_____
• Other	_____

Complete the following regarding the actions listed above:

- For each, identify if the enforcement action focused on the owner/operator's sampling and analysis program and/or the owner/operator's operation and maintenance program. Summarize relevant requirements imposed on the owner/operator.

Go to 7

8. Complete the following table. Use a separate entry for each well and piezometer in the monitoring system:

Identification Number	Type of Well Sampling Equipment (pump or bailer)	Depth to Water Last Inspection (if available)	Depth to Bottom Last Inspection (if available)	Notes/Comments
1. 2-D-2	BAILER			
2. 2-B2	BAILER			
3. 2F	BAILER			
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				

7. Review and summarize the owner/operator's sampling and analysis plan. (Note: Revise or add to the table if permit conditions dictate a different requirement the owner/operator must follow.) Does the Sampling and Analysis Plan:	**Y/N**
Include provisions for the measurement of static water elevations in each well prior to each sampling event?	Y
Specify the device to be used for measuring water level elevations?	Y
Specify the procedure for measuring water levels?	Y
Provide for the measurement of depth to standing water and depth to the bottom of the well to 0.01 feet?	Y
Explain whether dedicated or non-dedicated sampling equipment is used and the type of sampling equipment?	Y
Describe procedures for evacuating wells?	Y
Provide for the use of sampling devices constructed of inert materials such as fluorocarbon resin or stainless steel?	Y
Provide for dedicated sampling devices for each well or alternately provide for decontamination of sampling devices and the collection of blanks between wells?	Y
Provide for the collection and containerization of samples in the order of volatilization potential?	Y
Identify the preservation methods and sample containers the owner/operator will use?	Y
Describe procedures for transferring samples to off-site laboratories?	Y
Describe a chain-of-custody program which includes the use of sample labels, sample seals, field logbooks, chain-of-custody records, sample analysis request sheets, and laboratory logbooks?	Y
Include provisions for collection of field, trip, and equipment blanks?	Y, Y, N
Include an inventory of sampling equipment and sampling devices used as part of the monitoring program?	Y
Include detailed operating, calibration, and maintenance procedures for each sampling device?	Y

(Continued)

(Continued from previous page)	Y/N
Include maintenance schedules for sampling equipment? (Refer to Appendix D for discussion of maintenance techniques for gas bladder pumps.)	Y
Include decision criteria to be used to replace or repair sampling equipment and/or monitoring wells?	Y
*Describe in detail sample handling procedures in place at the owner/operator's laboratory (refer to RCRA Laboratory Audit Inspection Guide for more detail)?	Y
*Describe in detail the procedures that will be used to perform analyses in the owner/operator's laboratory (refer to RCRA Laboratory Audit Inspection Guide for more detail)?	Y
*Describe in detail quality assurance/quality control procedures in place? (refer to RCRA Laboratory Audit Inspection Guide for more detail.)	Y

*NOTE: *The RCRA Laboratory Audit Inspection Guide (RCRA Ground-Water Monitoring Systems)* describes the information the owner/operator should include in the Sampling and Analysis Plan regarding the owner/operator's laboratory program. The inspector may want to supplement the checklist in this manual with the checklist in the *RCRA Laboratory Audit Inspection Guide* while planning an operation and maintenance inspection.

Go to 8

COMMENTS ON SAMPLING AND ANALYSIS PLAN

2. Visually inspect each well and piezometer and complete the table below (one line entry for each well or piezometer):

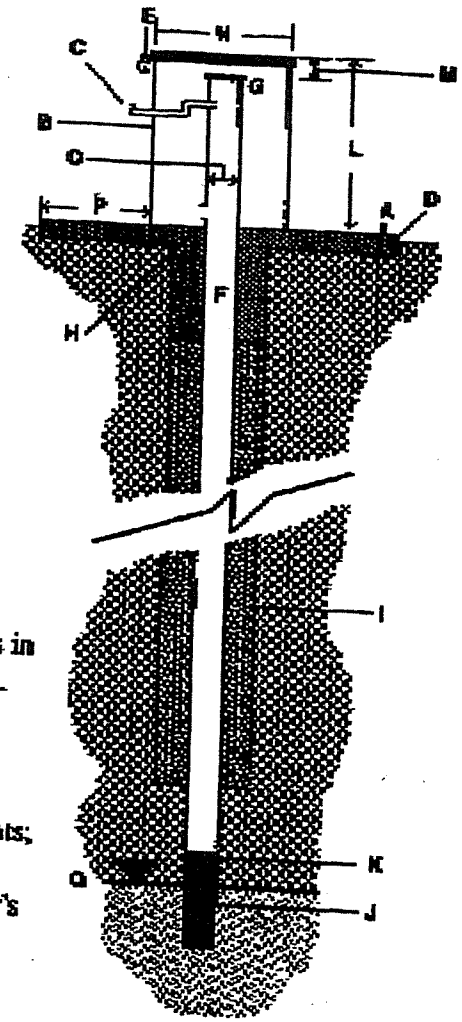
Well/ Piezometer	Survey Mark Present?	Standing or Ponded Water?	Evidence of Collision Damage?	Evidence of Frost Heaving?	Evidence of Casing Degradation?	Lock in Place?	Evidence of Well Subsidence?	Photograph Taken?
2D-2	N	N	N	N	N	Y	N	Y
2B-2	N	N	N	N	N	Y	N	Y
2F	N	N	N	N	N	Y	N	Y

3. Obtain data on depth to standing water and depth to the bottom of each monitoring well and piezometer in the owner/operator's monitoring system. Record depth measurements to the nearest 0.01 feet. Record the measurements

Date	Well/ Piezometer I.D. No.	Depth to Water (0.01')	Depth of Well/ Piezometer (0.01')
043009	2D	24.3	
"	2B	28.38	
"	2F	23.02	

Key:

A - survey elevation mark
B - protective outer casing
C - gas vent
D - concrete apron
E - fitted lock
F - primary casing material
G - cap for primary casing
H - bore hole seal
I - annular space seal
J - well screen
K - filter pack
L - height of riser
M - elevation difference
N - diameter of outer casing
O - diameter of primary casing
P - radius of apron
Q - water level below surface



1. The field inspector has several options in collecting ground water elevation data. The inspector may:
   a. obtain past data from the operating record;and/or
   b. take his/her own depth measurements; and/or
   c. obtain data from the owner/operator's sampling crew.

PART TWO

The field inspector will complete four tasks during the field inspection. They are: 1) review the operating record to identify evidence of deficiencies in the owner/operator's sampling and/or operation and maintenance programs; 2) visually inspect each well and piezometer for evidence of damage or deterioration; 3) obtain measurements from the operations record of depths of water levels and well depths for each well and piezometer; and 4) visually observe the owner/operator's field crew as they collect ground-water samples.

Name of inspector(s) JLEIZEAR

Date(s) of inspection 043009

1. Review the operating record of the facility. Does the operating record:	**Y/N**
Include annual reports of ground-water monitoring results including ground-water level data from each well and piezometer in the monitoring system?	Y
Include an inventory of all sampling devices and purging equipment in use at the facility and information on model number, serial number and manufacurers name?	Y
Include detailed operating, calibration and maintenance procedures for each sampling device?	Y
Describe decision criteria to be used to replace or repair sampling equipment and/or monitoring wells?	Y
Include schedules for performing operation and maintenance activities related to the ground-water monitoring system?	Y
Include records for ground-water monitoring which provide information on 1) the date, exact place and time of sampling or measurements; 2) the individual(s) who performed the sampling or measurements; 3) the date(s) analyses were performed; 4) the analytical techniques or methods used; and 5) the results of such analyses?	Y
Include records of all monitoring information including all calibration and maintenance records?	INSTRUMENTATION PROVIDED BY CONTRACTOR
Include records of monitoring information including determination of ground-water surface elevations?	Y
Include a determination of ground-water flow rate and direction(s) in the uppermost aquifier on an annual basis (e.g., prepare a potentiometric map annually using data collected during the year)?	Y
Provide for more frequent and intensive inspection of wells constructed of non-inert casing such as PVC? (Refer to Appendix A for permit example.)	N

COMMENTS ON OPERATING RECORD

4. Observe the owner/operator's staff as they collect ground-water samples at several wells. Complete the following table for each well (Note: revise or add to the table if permit conditions dictate a different requirement the owner/operator must follow):

Position/Title	Name	Sampling Experience (years and type)

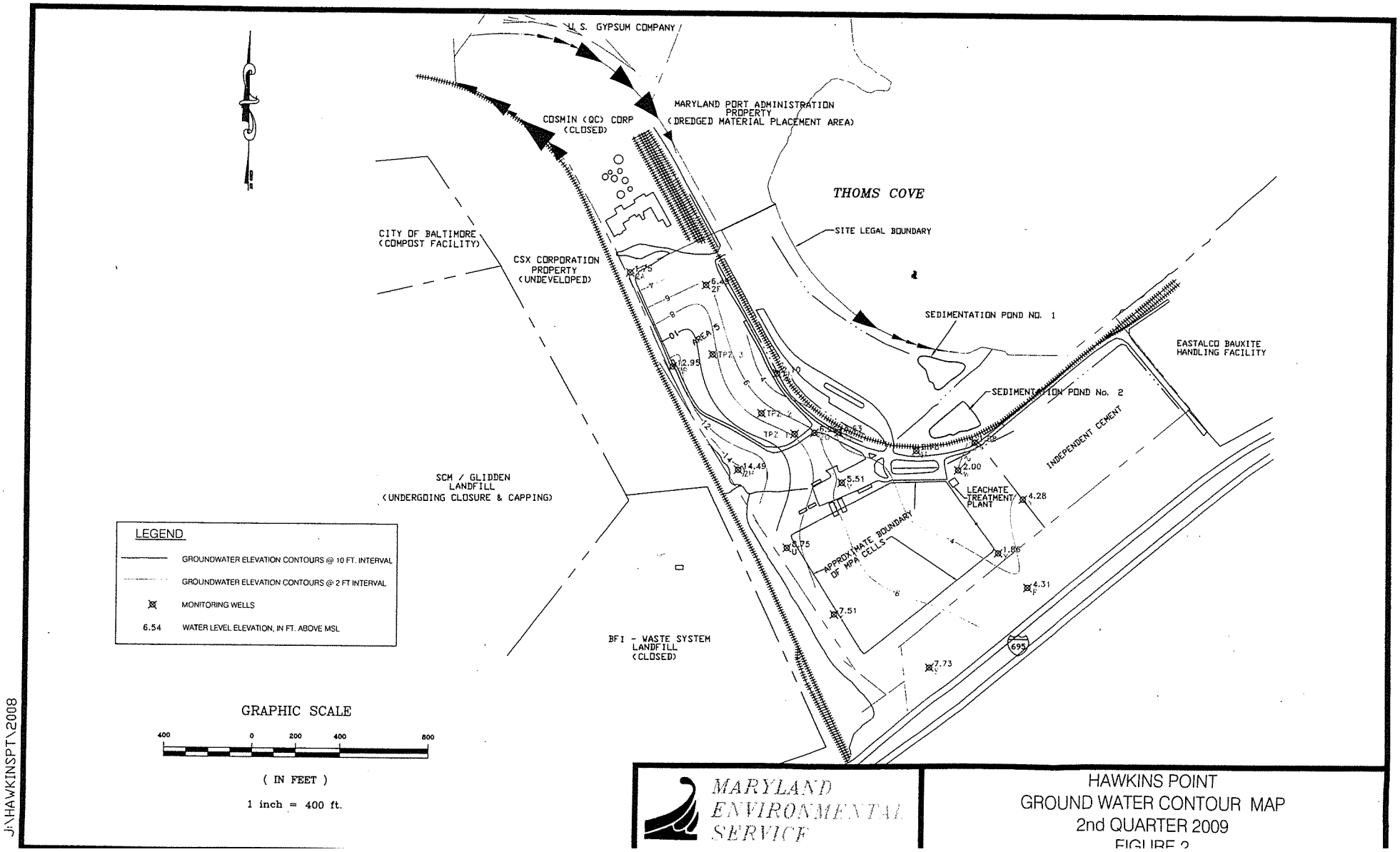
Well Identification Number 2D-2	Y/N	Photograph Taken Y/N
Did the sampling crew measure static water levels in the well and well depths prior to the sampling event?	Y	
Did the sampling crew use a steel tape or electronic device totake depth measurements?	Y	
Did the sampling crew record depths to +/– 0.01 feet?	Y	
Did the sampling crew follow these procedures: 1. remove locking and protective cap; 2. sample the air in the well head for organic vapors; 3. determine the static water level; and 4. lower an interface probe into the well to detect immiscible layers.	Y NA Y NA	
If immiscible samples were collected, were they collected prior to well purging?	NA	
Did the sampling crew evacuate low yielding wells to dryness prior to sampling?	NA	
Did sampling crew evacuate high yielding wells so that at least three casing volumes were removed?	Y	
Did the sampling crew collect the purge water for storage and analysis or for shipment off-site to a RCRA treatment facility?	Y	
Were sampling devices constructed of fluorocarbon resins or stainless steel?	Y	

(Continued)

Well Identification Number 2D-2	Y/N	Photograph Taken Y/N
If the sampling crew used dedicated samplers, did they disassemble and thoroughly clean the devices between samples?	NA	
If samples are collected for organic analyses, did the cleaning procedure include the following steps: 1. non phosphate detergent wash 2. tap water rinse 3. distilled/deionized water rinse 4. acetone rinse 5. pesticide-grade hexane rinse?	NA	
If samples are collected for inorganic analyses, does the cleaning procedure include the following steps: 1. dilute acid rinse (HNO_3 or HCL) 2. distilled/de-ionized water rinse?	NEW BAILERS USED	
Did the sampling crew take trip blanks, field blanks and equipment blanks?	Y	
If the sampling crew used bailers, were they bottom valve bailers?	N	
If the sampling crew used bailers, was "teflon" coated wire, single strand stainless steel wire or monofilament used to raise and lower the bailer?	N	
If the sampling crew used bailers, did they lower the bailer slowly to the well?	Y	
If the sampling crew used bailers, were the bailer contents transferred to the sample container to minimize agitation and aeration?	Y	
Did the sampling crew take care to avoid placing clean sampling equipment, hoses, and lines on the ground or other contaminated surfaces prior to insertion in the well?	Y	
If the sampling crew used dedicated bladder pumps: Was the compressed gas from an oilless compressor certified quality commercial compressed gas cylinder? If not, was a suitable oil removal purification system installed and maintained?	NA	
Was the bladder pump controller capable of throttling the bladder pump discharge flow to 100 mi/min or less for continuous periods of at least 20-30 seconds without restricting liquid discharge?	NA	

(Continued)

Well Identification Number _____	Y/N	Photograph Taken Y/N
Were samples taken from the bladder pump discharge tube, and not from any purge device discharge tube?	NA	
Was the bladder pump discharge flow checked for the presence of gas bubbles before each sample collection, as a test for bladder integrity?	NA	
Was bladder pump flow performance monitored regularly for dropoff in flow rate and discharge volume per cycle?	NA	
Was the bladder pump incorporated in a combination sample-purge pump design which can expose the bladder pump interior and discharge tubing to the pump drive gs? If so, were operating procedures established and followed to prevent at all times the entry of drive gas into the sample flow or into the bladder pump interior?	NA	
Did the sampling crew collect and containerize samples in the order of the volatilization sensitivity of the parameters?	NA	
Did the sampling crew measure the following parameters in the field: pH, temperature; specific conductane?	Y	
Did the sampling crew sample background wells before sampling downgradient wells?	N	
Did the sampling crew use fluorocarbon resin or polyethylene containers with polypropylene caps for samples requiring metals analysis?	Y	
Did the sampling crew use glass bottles with fluorocarbon resin-lined caps for samples requiring metals analysis?	N	
If metals were the analytes of concern, did the sampling crew use containers cleaned with nonphosphate detergent and water, and rinsed with nitric acid, tap water, hydrochloric acid, tap water and finally Type II water?	NEW CONTAINERS	
If organics were the analytes of concern, did the sampling crew use containers cleaned with nonphosphate detergent, rinsed with tap water, distilled water, acetone, and finally pesticide quaility hexane?	NA	
Did the sampling crew filter samples requiring analysis for organics?	NA	



HAWKINS POINT
GROUND WATER CONTOUR MAP
2nd QUARTER 2009
FIGURE 2

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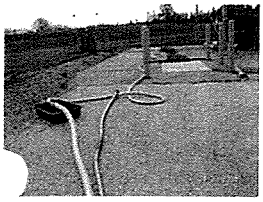
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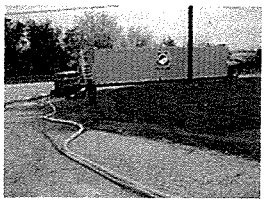
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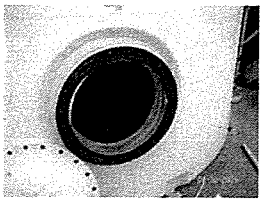
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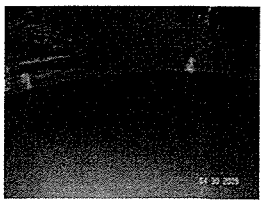
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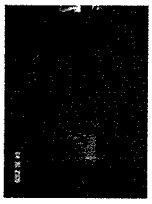
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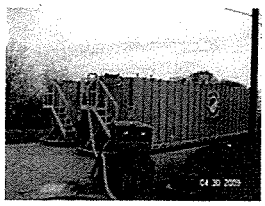
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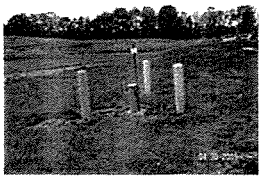
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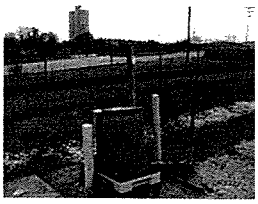
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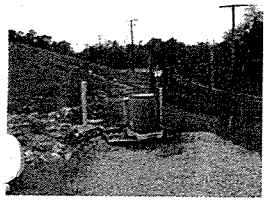
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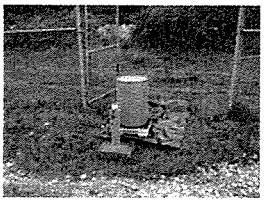
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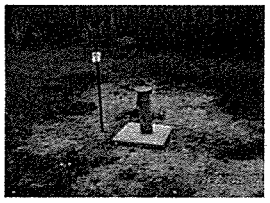
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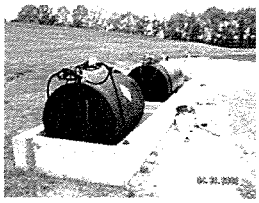
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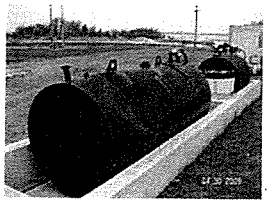
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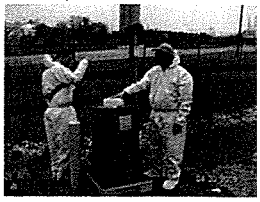
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Appendix B:

Relationship of Technical Inadequacies to Groundwater Standards

Table 3

Relationship of Technical Inadequacies to Ground-Water Standards

This table illustrates examples of situations which may constitute noncompliance on the part of the owner/operator. The enforcement official should apply this table in determining if an enforcement action is warranted on a site-specific basis.

Regulatory Objectives	Examples of Technical Inadequacies That May Constitute Violations	Regulatory Citations
1. Owner/Operator must follow specified procedures for collecting ground-water samples	• Failure of owner/operator's sampling crew to follow written sampling and analysis plan for collecting ground-water samples (interim status)	265.92(a)
	• Failure of owner/operator's sampling crew to follow permit conditions related to the collection of ground water samples (permit status)	264.97(d) 264.97(e) 264.98(f) 264.99(g)
2. Owner/Operator must maintain an operating record	• Failure of owner/operator to keep a written operating record	264.73(a) 265.73(a)
	• Failure of owner/operator to keep the operating record on- site	264.73(b) 265.73(b) 270.30(j)(2)
	• Failure of the owner/operator to maintain an operating record which covers all O&M activities for the prior three years (i.e., gaps in the operating record)	264.73(b) 265.73(b) 270.30(j)(2)
	• Inability of owner/operator to produce a complete operating record at the time of inspections	264.74(a) 265.74(a) 270.30(h) 270.30(i)(2)h
3. Owner/Operator must implement a suitable operation and maintenance program for ground-water monitoring systems	• Failure of owner/operator to develop an inventory of all sampling devices and purging equipment in use at the facility including information on model number, serial number and manufacturer's name	265.15(b)(1) 264.15(b)(1)
	• Failure of owner/operator to develop detailed operating, calibration and maintenance procedures for each sampling device	270.30(j)(2) 264.15(b) 265.15(b) 270.30(e)

(Continued)

TABLE 3

Regulatory Objectives	Examples of Technical Inadequacies that May Constitute Violations	Regulatory Citations
3. Owner/operator must implement a suitable operation and maintenance program for ground water monitoring systems (continued)	• Failure of owner/operator to describe decision criteria to be used to replace or repair sampling equipment and/or monitoring wells	270.30(e) 264.15(b)(3) 265.15(b)(3)
	• Failure of owner/operator to maintain schedules for performing operation and maintenance activities related to the ground-water monitoring system	264.15(b) 265.15(b)
	• Failure of the owner/operator to maintain records for ground-water monitoring which provide information on 1) the date, exact place, and time of sampling or measurement; 2) the individual(s) who performed the sampling or measurement; 3) the date(s) analyses were performed; 4) the analytical techniques or methods used; and 5) the results of such analyses	264.73(b)(6) 264.15(b)(2) 270.30(j)(2) 270.30(j)(3) 265.73(b)(5) 265.73(b)(6)
	• Failure of the owner/operator to maintain records of all monitoring information including all calibration and maintenance records	270.30(j)(2)
	• Failure of the owner/operator to maintain records of monitoring information including determination of ground-water surface elevations	270.30(j)(2) 265.73(b) 264.73(b)(6) 265.74(a) 264.74(a) 265.94(a)(1) 264.97(f)
	• Failure of the owner/operator to assess ground-water flow rate and direction(s) in the uppermost aquifer on an annual basis (e.g., each year draw potentiometric maps(s) using data collected during the year)	265.94(a)(1) 264.98(e) 264.99(e)
OK	• Failure of the owner/operator to develop procedures to assess degradation of well casing (refer to Appendix A and question #13 in Appendix D)	270.30(e) 264.15(b)(1) 265.15(b)(1) 264.15(b)(3) 265.15(b)(3) 264.15(b)(4) 265.15(b)(4)

(Continued)

TABLE 3

Regulatory Objectives	Examples of Technical Inadequacies that May	Regulatory Citations
4. Owner/Operator must ensure the continued integrity of individual wells in the monitoring system ok	• Wells in monitoring system are silted in • Wells in monitoring system are cracked, corroded, or degraded • Wells show high levels of pH • Wells show evidence of frost heaving, subsidence, or collision damage • Wells show evidence of biolgical fouling • The hydraulic performance characteristic(s) of wells changes • Ground-water elevation data collected by field inspector indicate wells are improperly placed • Owner/operator does not replace wells which have failed	265.91(a) 265.91(c) 264.97(a) 264.97(c)
5. Owner/Operator's ground-water monitoring system must continue to satisfy its design objectives ok	• Ground-water elevation data collected by field inspector indicate wells are improperly placed • Owner/operator does not replace wells which have failed	270.30(e) 265.91(a) 265.91(c) 264.97(a)
6. Owner/Operator must collect ground-water samples properly ok	• Failure to evacuate stagnant water from the well before sampling • Failure to sample wells within a reasonable amount of time after well evacuation • Improper decisions regarding iltering or non-filtering of samples prior to analysis (e.g., use of filtration on samples to be analyzed for volatile organics)	265.90(a) 265.92(a) 265.93(d)(4) 270.14(c)(4)

(Continued)

TABLE 3

Regulatory Objectives	Samples of Technical Inadequacies that May	Regulatory Citations
6. Owner/Operator must collect ground-water samples properly	• Use of an inappropriate sampling device • Use of improper sample preservation techniques • Samples collected with a device that is constructed of materials that interfere with sample integrity • Samples collected with a non-dedicated sampling device that is not cleaned between sampling events • Improper use of a sampling device such that sample quality is affected (e.g., degassing of sample caused by agitation of bailer) • Improper handling of samples (e.g., failure to eliminate headspace from containers of samples to be analyzed for volatiles) • Failure of the sampling plan to establish procedures for sampling immiscibles (i.e., "floaters" and "sinkers") • Failure to follow appropriate QA/QC procedures	(See previous page)

OK

(Continued) **TABLE 3**

Regulatory Objectives	Examples of Technical Inadequacies that May	Regulatory Citations
6. Owner/Operator must collect ground-water samples properly OK	• Failure to ensure sample integrity through the use of proper chain-of-custody procedures • Failure to demonstrate suitability of methods used for sample analysis other than those specified in SW-846 • Failure to perform analysis in the field on unstable parameters or constituents (e.g., pH, Eh, specific conductance, alkalinity, dissolved oxygen) • Use of sample containers that may interfere with sample quality (e.g., synthetic containers used with volatile samples) • Failure to make proper use of sample blanks	(See previous page)

Appendix C:

Groundwater Sampling and Analysis Plan

Permit Number: A-264

Attachment 8

GROUNDWATER MONITORING

(There are 39 pages in this attachment)

10.0 GROUNDWATER AND SURFACE WATER MONITORING PROGRAM

10.1 GENERAL SAMPLING AND ANALYSES PROTOCOL

The Maryland Environmental Service continues to be the consultant carrying out the groundwater and surface water monitoring plan.

10.1.1 Laboratory Capabilities

Any laboratory contracted to carry out the sampling and analysis will be a full-service wet chemistry, organic and metals analysis laboratory; equipped with all of the basic and specialized equipment required to perform analyses as required by the EPA and Maryland Department of the Environment. The laboratory should conduct its operations in such a way as to provide reliable information. The contracted laboratory may use a subcontractor for certain analyses. Currently, the contracted laboratory is:

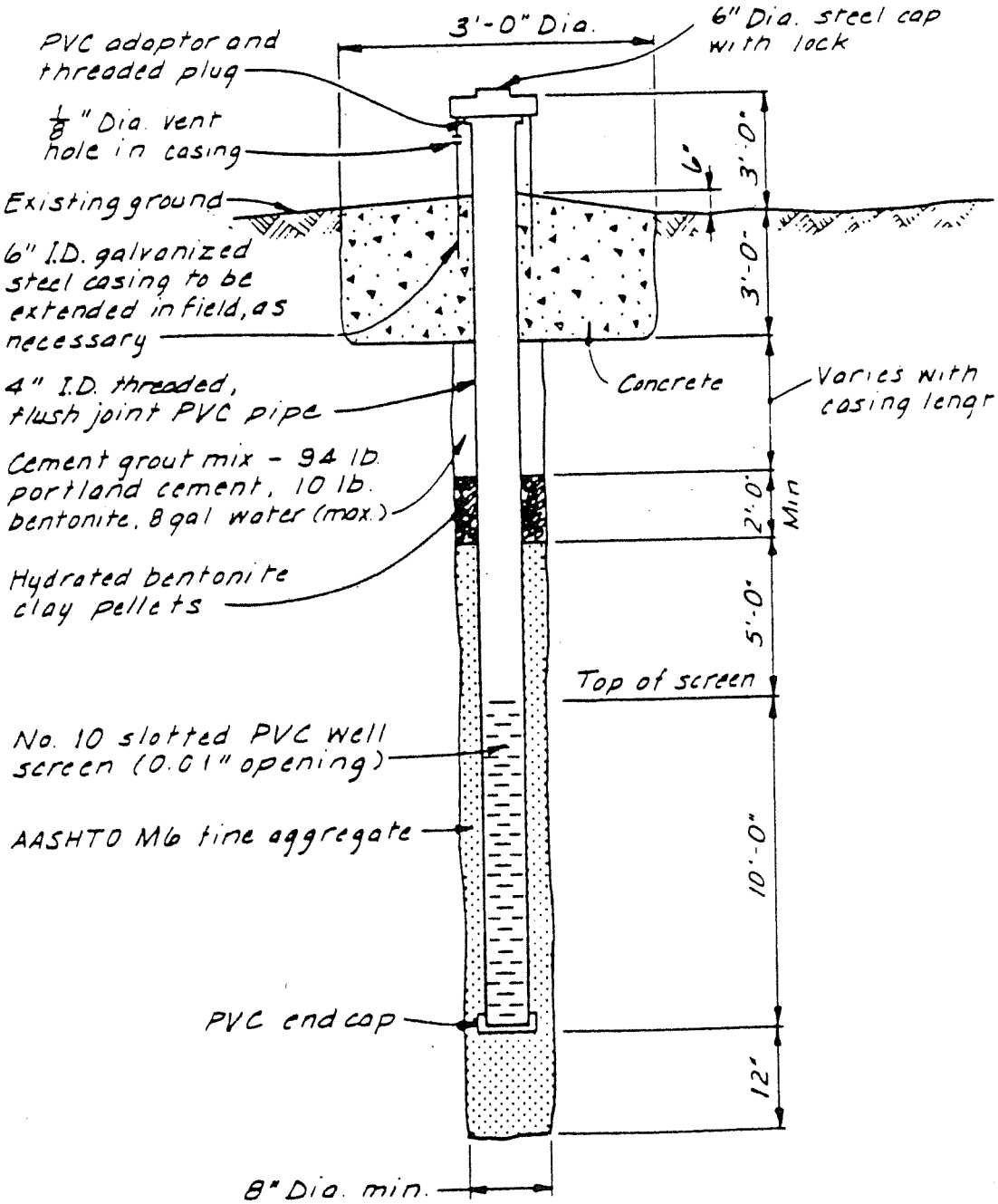
Atlantic Coast Laboratories, Inc.
(Artesian Laboratories)
630 Churchmans Road
Newark, Delaware 19702

10.1.2 Laboratory Certification

The contracted and/or Subcontracted Laboratories must have a Maryland Department of Health and Mental Hygiene Certification for drinking water analysis.

10.1.3 Well Installation And Maintenance

All monitoring wells are cased in a manner that the integrity of the well bore hole is maintained. Each well is provided with casings and locking caps for security. Each well is set in concrete. The casings are screened and packed at a minimum of ten feet with sand. The space between the bore hole and well casing above the sampling depth has been sealed with hydrated bentonite clay pellets (bentonite plug). Above the bentonite plug is a mixture of ten percent bentonite clay by weight and ninety percent cement. The depth of this mixture varies with the length of the casing. The installation of all wells are in accordance with 40 CFR Part 264.98. Figure 10.1 is a general diagram of the well installation used. Each monitoring well will be thoroughly inspected and repaired as necessary during each sampling period. The protective standpipe, locking cap mechanism and well pipe will be inspected for damage. If damaged, the standpipe will be re-aligned and re-grouted or replaced. The well pipe will be inspected for vertical alignment and replaced if misalignment is sufficiently severe to inhibit proper sampling. The actual well installation reports are located in Appendix A.



GROUND-WATER MONITORING WELL

MARYLAND	Hawkins Point Hazardous Waste Landfill	FIGURE IC-1

10.1.4 Well Evacuation Procedures

Before monitoring wells are purged, the water elevation is measured, by taking the known elevation at the top of the well casing and subtracting the depth of water plunked. After measuring the elevation of water, the depth to the bottom of the well is measured. The volume of water standing in the well is calculated using a conversion factor that converts the depth of water in a 4 inch diameter well into gallons. This volume (standing depth) is multiplied by three to determine total volume of water to be purged from the well.

The time required to purge this volume is determined using a 2.5 gallon bucket and a stop watch. The time required to fill the bucket is determined using the stop watch. This time is divided by the 2.5 gallon volume of the bucket to get gallons per second. This is multiplied by 60 seconds per minute to determine the pump rate in gallons per minute. Then the number of gallons is divided by the pump rate to determine the number of minutes required to purge three volumes from the well.

10.1.5 Measurement of Standing Water in Well

Water elevation is measured using a weighted tape measure which is marked to 0.1 foot. Water elevation is measured each time samples are collected. Depth to water and depth to the bottom of the casing is measured and recorded. Each well shall have a permanent reference point from which the initial measurement is taken.

The weighted tape measure shall be rinsed with deionized water before using in another well to avoid cross contamination between wells.

The measurement of the standing water will continue to be measured during each sampling event.

10.1.6 Determination of Volume to be Purged

The volume of three times the water in the casing shall be calculated per well. This is the volume of water which will be purged from each well. If the well purges to dryness before three volumes is obtained, this purged volume is sufficient.

Calculations: Conversion from depth to volume for a 4" well - 0.65 gallons/foot

A. Depth to Bottom - Depth to Water = Depth of Standing Water, in feet

B. Depth of Standing Water X 0.65 gallon/feet = Gallons of Standing Water

C. Gallons of Standing Water X 3 = Total Volume to be Purged

10.1.7 Determination of Time Required to Purge

The time required to purge three times the volume of water in the casing shall be calculated. This time must be calculated for each well because of the different well depths, which changes the amount of time required for the pump to lift the required volume of water.

The following are steps used to determine this time:

A. Measure Time to Fill a 2.5 gallon bucket, in seconds

B. Divide this time by 2.5 to get gallons/second

C. Gallons/second X Total Volume to be Purged = Total Time to Purge 3 volumes.

10.1.8 Purging Procedure

Each well is purged using a designated submersible well pump powered by a portable air compressor. The submersible well pumps are either stainless steel or Teflon sample pumps (each pump will contain a Teflon bladder). The type of tubing used with the pumps per well is polyethylene bonded twin tubing. A pump controller is used to regulate the compressed air needed to operate the air driven purge and sample pumps.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Once the air compressor is started, the air driven pump pumps groundwater through the uptake side of the twin tubing into 55 gallon polyethylene drums.

10.1.9 Handling Procedures for Purged Groundwater

During post-closure, all groundwater will be purged directly into polyethylene drums and disposed of in the leachate holding tanks and will be handled in the same manner as the leachate.

10.1.10 Safety

Occupational Safety and Health Administration's (OSHA) Forty-hour Health and Safety Training for Hazardous Waste Operations and Emergency Response is required of all personnel prior to groundwater monitoring of this site.

10.1.11 Determination of Rate and Direction of Groundwater Flow in Uppermost Aquifer

Rate and direction of groundwater flow shall be determined using measured water elevations, adjusted to mean sea level. The direction of flow shall be determined by comparing the height of groundwater (water elevation) in each well. Water elevations, groundwater contours and hydraulic gradient shall be used to calculate seepage velocity using Darcy's Equation. The seepage velocity shall be calculated annually. The frequency of determining the rate and direction of groundwater flow in the uppermost aquifer is also annually. Groundwater flow shall be measured quarterly to establish seasonal and temporal variations in flow velocity and direction.

10.1.12 Quarterly Preparation of Groundwater Contours

Groundwater contours shall be prepared quarterly and shall be compared to previous contours to detect changes. Tracking the changes in the quarterly contours shall determine if these changes are seasonal or spatial variations or if they are the result of groundwater contamination.

10.1.13 Sample Withdrawal Techniques

Sample withdrawal shall be accomplished with equipment and procedures selected to yield representative samples for all monitoring parameters.

The air compressor is attached to the pump controller, which is then attached to the intake side of the twin tubing. Upon starting the air compressor, groundwater will be pumped through the uptake side of the twin tubing into the appropriate sample bottle.

10.1.14 No Field Filtration of Samples

Samples shall not be field filtered prior to delivery to the laboratory as per 40 CFR Part 264.97.

10.1.15 Sampling Equipment and Materials

During the Post-closure period each well will continue to have a designated pump assigned to it. Depending on the pH of the groundwater in that well, the pump will be either a Teflon or stainless steel submersible pump. As stated by the Environmental Protection Agency (EPA), a pH < 5.0 or > 10.0 should not, but could possibly cause leaching of the stainless steel; therefore, all of the permitted wells, including wells 2E and 2H have designated Teflon submersible pumps. The following is a list of the remainder of the materials and equipment needed to purge and sample this site: portable air compressor, pump controllers, nylon rope, bonded twin tubing and plastic drums.

As previously stated each well pump and pump tubing is designated and will remain in that well for the life of the pump and/or pump tubing. Although the portable air compressor and pump controllers will be used to purge and sample all the wells, only the designated pump tubing will come in contact with any potentially contaminated groundwater. Therefore, decontamination is not necessary. All sampling equipment will be inspected during each quarterly sampling event and will be repaired and/or replaced on an as needed basis if found defective.

10.1.16 Sample Handling and Preservation Techniques

Sample preservation shall be according to 40 CFR Part 136 and SW-846, as shown on the following table. All samples shall be stored at 4°C after collection. The preservation of the parameters as listed in 40 CFR 264.93 and 264.98 (a) are as follows:

Metals		Container Preservation
1	Antimony	Plastic pH<2 w/ HNO_3
2	Arsenic	"
3	Barium	"
4	Beryllium	"
5	Cadmium	"
6	Chromium	"
7	Cobalt	"
8	Copper	"
9	Lead	"
10	Nickel	"
11	Selenium	"
12	Silver	"
13	Thallium	"
14	Vanadium	"
15	Zinc	"

EPA-Organic Constituents		Container Preservation
16	Acetone	Glass 4°C for all organic compounds
17	Acrylonitrile	"
18	Benzene	"
19	Bromochloromethane	"
20	Bromodichloromethane	"
21	Bromoform: Tribromomethane	"

CONTINUED,

	EPA-Organic Constituents	Container Preservation
22	Carbon disulfide	Glass 4°C for all organic compounds
23	Carbon tetrachloride	"
24	Chlorobenzene	"
25	Chloroethane: Ethyl chloride	"
26	Chloroform: Trichloromethane	"
27	Dibromochloromethane: Chlorodibromomethane	"
28	1,2-Dibromo-3-chloropropane: DBCP	"
29	1,2-Dibromomethane: Ethylene dibromide, EDB	"
30	1,2-Dichlorobenzene: 1,2-Dichlorobenzene	"
31	p-Dichlorobenzene: 1,4-Dichlorobenzene	"
32	trans-1,4-Dichloro-2-butane	"
33	1,1-Dichloroethane: Ethylene chloride	"
34	1,2-Dichloromethane: Ethylene dichloride	"
35	1,1-Dichloroethylene: 1,1-Dichloroethene: Vinylethylene Chloride	
36	cis-1,2-Dichloroethylene: cis-1,2-Dichloroethene	"
37	trans-1,2-Dichloroethyelene: trans-1,2-Dichloroethene	"
38	1,2-Dichloropropane	"
39	cis-1,3-Dichloropropane	"
40	trans-1,2-Dichloropropene	"
41	Ethylbenzene	"
42	2-Hexanone: Methyl butyl ketone	"
43	Methyl bromide: Bromomethane	"
44	Methyl chloride: Chloromethane	"
45	Methylene bromide: Dibromomethane	"
46	Methylene chloride: Dichloromethane	"
47	Methyl ethyl ketone: MEK: 2-Butanone	"
48	Methyl iodide: Iodomethane	"
49	4-Methyl-2-pentanone: Methyl isobutyl ketone	"
50	Styrene	"
51	1,1,1,2-Tetrachloroethane	"
52	1,1,2,2-Tetrachloroethylene:	"
53	Tetrachloroethylene: Tetrachloroethene: Perchloroethylene	
54	Toluene	"
55	1,1,1-Trichloroethane: Methylchloroform	"
56	1,1,2-Trichloroethane	"
57	Trichloroethylene: Trichloroethene	"
58	Trichlorofluoromethane: CFC-11	"
59	1,2,3-Trichloropropane	"
60	Vinyl acetate	"
61	Vinyl chloride	"
62	Xylenes	"

CONTINUED,

MDE-Other Constituents		Container Preservation
63	Alkalinity	P 4°C
64	Ammonia Nitrogen	P pH<2 H_2SO_4
65	Bicarbonates (by titration)	P 4°C
66	Biochemical Oxygen Demand	P 4°C
67	Calcium (by atomic absorption)	P pH<2 HNO_3
68	Chemical Oxygen Demand	P pH<2 H_2SO_4
69	Chloride	P 4°C
70	Cyanide (Total)	pH>12 NaOH, Ascorbic Acid
71	Hardness	P pH<2 HNO_3 or H_2SO_4
72	Iron	"
73	Magnesium	"
74	Mercury	P 4°C
75	Nitrate Nitrogen	P 4°C
76	pH	None, field test
76	Potassium	P pH<2 HNO_3
77	Sodium	P pH<2 HNO_3
78	Solids (dissolved)	P 4°C
79	Sulfate	P 4°C
80	Total Organic Carbon	P pH<2 H_2SO_4
81	Temperature	None, field test
82	Conductivity	None, field test
83	Acrolein	G 4°C for all organic compounds
84	4-Bromofluorobenzene	"
85	2-Chloroethyl vinyl ether	"
86	Chloromethane	"
87	Dichlorodifluoromethane	"
88	1,2 Dichloroethane	"
89	trans-1,2-Dichloroethane	"
90	cis-1,3-Dichloropropylene	"
91	trans-1,3-Dichloropropylene	"
92	1,4-Difluorobenzene	"
93	Ethanol	"
94	Ethyl methacrylate	"
95	Iodomethane	"

P - HDPE, High density polyethylene
G - Glass bottle with a Teflon lid

10.1.17 Sample Delivery to Laboratory

Samples shall be picked up by the contracted laboratory at MES headquarters or directly from the facility, unless sampling is being performed by the contracted laboratory in which case the samples will be taken directly from the site with the control of the sample delivery being the responsibility of the contracted laboratory. The samples shall be transported in such a manner that they meet all holding times and preservation requirements as per the methodologies detailed in SW-846.

a. Sample Labels

To prevent sample misidentification, the sampler shall affix a label to each sample container (bottle). Sample labels shall be sufficiently durable to remain legible even when wet. Sample labels shall contain, at a minimum, the following information:

- Sample identification number;
- Name and signature of collector;
- Date and time of collection;
- Place of collection; and
- Parameters requested (if space permits).

The samples shall be labeled by recording the above information directly on the sample containers. The descriptive information for the samples (referenced to the identification number) must be recorded in two places. One copy shall be kept in a separate file or logbook, and a second copy shall be shipped with the samples to the laboratory.

10.1.18 Chain of Custody Control

The tracing of sample possession shall be accomplished by use of a chain-of-custody record as described in Chapter One of SW-846. A chain of custody form shall be completed for all sample bottles which uniquely identifies each sample, the sample collection point, the person(s) performing the sample collection, time and date of sample collection and the analyses to be performed including the methodologies and detection limits. The chain of custody shall be signed whenever the sample changes hands and shall show that all required preservations were maintained and the samples at the time of delivery were chilled to $4^{\circ}C$. The contract laboratory must furnish a chain of custody for any samples they collect which includes all of the above. A chain-of-custody form shall be completed and shall accompany every sample shipment. The chain-of-custody shall contain enough copies so that each person possessing the shipment receives his/her own copy. At a minimum, the chain-of-custody shall contain the following information:

MARYLAND ENVIRONMENTAL SERVICE
SAMPLE CHAIN OF CUSTODY

PROJECT #: 32-0815
SAMPLE PURPOSE: QUARTERLY WELLS

PROJECT NAME: HAWKINS POINT
FORM: HPQTWELS, REV 12/18/92

SAMPLE NUMBER	SAMPLE LOCATION	DATE	TIME	SAMPLE TYPE	ANALYSIS REQUIRED	# OF CONT.
CHILLED TO 4 DEG C ? ___ YES ___ NO					TOTAL # CONTAINERS	

RELINQUISHED BY: ACCEPTED BY:
DATE: TIME: DATE: TIME:

RELINQUISHED BY: ACCEPTED BY:
DATE: TIME: DATE: TIME:

ANALYSIS:
1 UNPRES. LITER for CHLORIDE (EPA# 325.3), SULFATE (EPA#375.3) Cr+6(EPA# 218.4)
1 500 ML HNO3 for BARIUM (EPA# 200.7), TOTAL CHROMIUM (EPA# 218.2), IRON (EPA# 200.7), MANGANESE (EPA# 200.7), AND SODIUM (EPA# 273.1)
1 250 ML UNPRES. AMBER for TOXICITY (EPA# 9020)

FIELD PARAMETERS: pH (EPA# 150.1), SPECIFIC CONDUCTANCE (EPA# 120.1), AND TEMPERATURE

- Sample number;
- Signature of collector;
- Date and time of collection;
- Sample type (e.g., ground water, soil, surface water, etc.);
- Identification of sampling point (e.g. well number, outfall location);
- Number of containers;
- Analyses requested;
- Preservatives used;
- Signature of persons involved in the chain of possession;
- Inclusive dates and times of possession;
- Internal temperature of shipping/transportation container when samples were sealed into the container for shipping/transporting;
- Internal temperature of container when opened at the laboratory; and
- Remarks section to identify potential hazards or to relay other information to the laboratory.

Sample Transportation

Samples should be transported to the receiving lab in clean coolers and in vehicles free of cigarette smoke and cross contamination from other sites. A trip blank will be used, which measures potential contamination from bottles, preservatives, sample handling and transportation procedures. Detection of target analytes in trip blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, sample transportation and laboratory practices. Detection of target analytes in the trip blank greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and/or re-sampling shall occur.

Detection of target analytes in the trip blank greater than an order of magnitude of the detection limit (in the absence of a MCL) or the field results for that parameter shall invalidate the results and re-sampling shall occur.

10.1.19 Sample Collection Quality Assurance and Quality Control

Sample collection and preservation shall be performed by the contract laboratory for the regulated wells. [reference to sedimentation pond samples removed]. All other monitoring wells will be sampled by MES and analyzed by the contract laboratory.

Sample collection quality control shall be accomplished with a trip blank, a field blank and duplicate samples. One trip blank and one field blank shall be prepared each sample day. One duplicate for every 10 samples shall be collected and analyzed. The trip blank measures potential contamination from bottles, preservative and sample handling procedures.

The field blank establishes quality control for sample collection techniques. The duplicate establishes quality control for sample collection techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Detection of target analytes in field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. The concentrations of any contaminants found in field blanks should not be used to correct data. The contaminant concentration (target analytes) in these blanks should be documented. If the concentrations are more than an order of magnitude greater than the field sample results, this shall invalidate the results and re-sampling [word: payment removed] shall occur. Detection of target analytes in trip and field blanks greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-sampling shall occur.

Field Logbooks

When a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample collection, rather than a change in the ground-water quality, are responsible. Therefore, examination of the field logbook is critical in this process. A field log should be kept each time monitoring activities are conducted in the field. The field logbook should document the following:

- Sample location identification;
- Presence of debris and/or solids;
- Sample withdrawal procedure and equipment;
- Date and time of collection;
- Monitoring Well sampling sequence;
- Types of sample bottles used and sample identification number;
- Preservatives used;
- Parameters requested for analysis;
- Field observations of sampling event;
- Name of collector;
- Weather Conditions, including air temperature; and
- Internal temperature of field and shipping containers.

10.1.20 Laboratory Analytical Techniques

This section includes RCRA SW-846 analytical methods, quality assurance, and quality control procedures, for solid waste and wastewater. Where maximum contaminant level's (MCL's) have been finalized or where Primary or Secondary Drinking Water Standards exist, the analytical method used shall provide the detection limit required to determine compliance with the MCL or Standard.

10.1.21 Analytical Procedures

All Volatile Organic Compounds shall be analyzed using SW-846 Method 8240. All analytical procedures shall be methods approved or referenced in SW-846. The RCRA SW-846 method for the remainder of the parameters are listed as follows:

Metals	Method Number
Antimony	7040, 6020
Arsenic	7060A, 7061A, 6020
Barium	7080A, 6020
Beryllium	7090, 7091, 6020
Cadmium	7130, 7131A, 6020
Chromium	7190, 7191, 6020
Cobalt	7200, 7201, 6020
Copper	7210, 7211, 6020
Iron	7380, 6020
Lead	7421, 6020
Magnesium	7450, 6020
Nickel	7520, 6020
Selenium	7740, 7741A, 7742, 6020
Silver	7761, 6020
Thallium	7841, 6020
Vanadium	7910, 7911
Zinc	7950, 7951, 6020

Other Parameters

Alkalinity	EPA 310.1
Ammonia Nitrogen	EPA 350.1 or 350.2
Bicarbonates (by titration)	EPA 310.1
Biochemical Oxygen Demand	EPA 405.1
Calcium	7140, 6020
Chemical Oxygen Demand	EPA 410.4 or 410.1,2.3
Chloride	9056
Cyanide (Total)	9012A

CONTINUED,

Metals	Method Number
Hardness	EPA 130.2
Mercury	7470
Nitrate Nitrogen	EPA 352.1
pH	9040B
Potassium	7610, 6020
Sodium	7770, 6020
Solids (dissolved)	EPA 160.1
Sulfate	9056
Total Organic Carbon	9060
Temperature	EPA 170.1
Conductivity	EPA 120.1
Total Organic Halogens	9020B, 9022

10.1.22 Quality Assurance and Quality Control

Laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the SDWA, 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be available for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis. The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

The type, purpose, and frequency of QC samples to be analyzed in the laboratory and the acceptance criteria is specified below. Additional information has been detailed in the specific plans and include the applicability of the QC sample to the analytical process, the statistical treatment of the data, and the responsibility of laboratory staff and management in generating and using the data. The laboratory quality assurance and quality control procedures shall meet or exceed all requirements of the 40 CFR Part 136 and SW-846. Procedures include a minimum of one duplicate and one spike for every 10 samples. A complete quality assurance plan shall be made available by the laboratory for inspection which will cover all aspects of sample and analysis quality control, employee training, instrument maintenance and calibration, and specific control requirements for each analysis

The contracted laboratory shall participate in EPA Discharge Monitoring Report Quality Assurance Study Performance Evaluations, Water Pollution Study Performance Evaluations and Water Supply Study Performance Evaluations.

Cases when a sample analysis produces an unexpected or unexplainable result, it is necessary to determine if the circumstances of sample analyses, rather than a change in the water quality, are responsible. The laboratory duplicate establishes quality control for sample preparation and analytical techniques. Differences of +/- 10% on duplicates shall be investigated and invalidation of results shall be considered if this condition is encountered. Laboratory Blanks document contamination resulting from the analytical process. Detection of target analytes in laboratory blanks shall trigger investigation of potential sources of contamination in reagents, preservatives, sample preparation techniques, and laboratory practices.

A method blank will only be acceptable for use with the accompanying samples, when the concentration in the blank of any analyte of concern is not higher than the highest of either:

(1) The method detection limit, or
(2) Five percent (5%) of the regulatory limit for that analyte, or
(3) Five percent (5%) of the measured concentration in the sample.
(4) ½ of MDE's PQL

In addition to the above, detection of target analytes in laboratory blanks (method blanks) greater than or equal to the Maximum Contaminant Level (MCL) for that parameter shall invalidate the results and re-analyzing shall occur. Detection of target analytes in laboratory blanks equal to or greater than an order of magnitude of higher than the method detection limit for that parameter shall invalidate the results and re-analyses shall occur. The concentrations of any contaminants found in blank samples should not be used to correct the data.

Equipment and Instrumentation

Equipment and instrumentation should meet the requirements and specifications of the specific test methods and other procedures as specified in the SW-846 and this permit. The laboratory should maintain an equipment/instrument description list that includes the manufacturer, model number, year of purchase, accessories, and any modifications, updates, or upgrades that have been made.

Corrective Action

All laboratory control samples, matrix spike, surrogate spike and matrix duplicate samples must be within the acceptable range given in the specific EPA method used. In the event that the percent recovery is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as follows:

1. Submit in writing to MES the procedures describing how to identify and correct deficiencies in the analytical process.

2. These procedures must include specific steps to take in correcting deficiencies such as preparation of new standards and reagents, re-calibration and re-standardization of equipment, re-analysis of samples, or additional training of laboratory personnel in methods and procedures.
3. The procedures should specify that each corrective action has been documented with a description of the deficiency and the corrective action taken, and must include the person(s) responsible for implementing the corrective action.

Data Reduction and Validation

All data for this facility will be reviewed by the MES contract manager prior to being entered into the existing databases. The trip blanks, field blanks, duplicates, and surrogate spikes (volatile organic compounds only) will be reviewed for the presence of targeted compounds. As stated above, detection of target analytes in trip and field blanks shall trigger investigation of potential sources of contamination in preservatives, sample collection techniques, and laboratory practices. Upon verification from laboratory and/or corrective actions taken by the laboratory, MES will implement the procedures as described. In the event that the percent recovery for the surrogate spike is not within an acceptable range as specified in the EPA method used, then the laboratory must take actions as described in above sections, Quality Assurance and Quality Control & Corrective Action.

Before data is validated and entered into the database, MES' reporting staff will compute and interpret the results from all QC samples to verify that the analytical results are reported correctly. In addition, precision and bias, including evaluations of reagent, equipment rinsate, trip blanks, calibration standards, control samples, duplicate and matrix spike samples, and surrogate recovery, will routinely be monitored by periodically requesting daily QC/QA runs. The sole purpose of these procedures is to assure that the contracted laboratory has in place and is implementing corrective actions when necessary before submitting data to MES.

10.2 GENERAL GROUNDWATER AND SURFACE WATER MONITORING

The post-closure environmental monitoring program will continue for a period of thirty years with sampling and analyses of the indicator and groundwater quality parameters performed on a quarterly basis. Although barium and pH have been removed from the list of indicator parameters, they will continue to be monitored on a quarterly basis. All other parameters, (those characterizing the suitability of the ground water as a drinking water supply as listed in Section 10.1.21) will be analyzed annually. This additional monitoring as stated in COMAR 26.13.05.06J, shall determine whether additional hazardous constituents are present in the uppermost aquifer.

10.2.1 Indicator and Groundwater Quality Parameters

The preservation of the quarterly indicator and groundwater quality parameters as listed in 40 CFR Part 264.93 and 264.98(a) are as follows:

EPA/MDE Site Specific	Container Preservation
1 Chromium	P pH<2 HNO_3
2 Hexavalent Chromium	P 4°C

EPA General Constituents	Container Preservation
3 Chloride	P 4°C
4 Iron	P pH<2 HNO_3
5 Manganese	" "
6 Phenols	A/G H_3PO_4 & $CuSO_4$
7 Sodium	P pH<2 HNO_3
8 Sulfate	P 4°C

EPA General Constituents	Container Preservation
9 Specific Conductivity	None, field test
10 Total Organic Carbon	A/G Unpreserved
11 Total Organic Halogens	A/G Unpreserved

Note: P - HDPE, High density polyethylene A/G - Amber Glass bottle with a Teflon lid

10.2.2 Analytical Procedures for Indicator and Groundwater Quality Parameters

Parameter	Method Number
Chromium	7190, 7191, 6020
Hexavalent Chromium	7196
Chloride	9056
Iron	7421, 6020
Manganese	7450, 6020
Phenols	8040
Sodium	7770, 6020
Sulfate	9056
Specific Conductivity	120.1
Total Organic Carbon	9060
Total Organic Halogen	9020B, 9022

10.2.3 Type, Quantities, Concentrations Expected in Wastes

During post-closure, the indicator parameter of specific conductivity, and the waste constituent parameter of total chromium, will continue to be utilized as the basis for the detection monitoring for the Area 5 facility. Monitoring and analysis of these parameters provides the data base necessary to determine if any leakage from the Area 5 regulated unit occurs.

As outlined in Appendix B, entitled "Soils and Chrome Ore Tailings Chemical Analyses: Laboratory Reports", the content of chromium in the waste material was significantly greater than any other hazardous constituent, and thus should continue to be a representative indicator parameter of any heavy metal migrating from the cells containing chromium ore tailings. Barium will no longer be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the Hawkins Point facility. Barium would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells indicate that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. Barium will however continue to be monitored on a quarterly basis.

All other parameters listed in section 10.2.2 will continue to be utilized in establishing groundwater quality and as additional indicators of groundwater contamination.

10.2.4 Identification of Uppermost Aquifer

As outlined in the November 1992 Slug test, performed by Black & Veatch (See Appendix F), the upper aquifer under-lying Area 5 is an unconfined aquifer composed of post-cretaceous sediments and the upper member of the cretaceous deposits known as the Patapsco Formation. The base of this aquifer rests on the top of approximately 100 feet of Arundel Clay.

The Patapsco Formation consists of interbeded, banded silts and clays with clayey sands. Water-bearing sands of the Patapsco aquifer occur as irregularly bounded sheets to isolated ribbons, separated by layered silts and clays. Arundel Formation underlying the Patapsco Formation primarily consists of silts and clays. This layer has a low hydraulic conductivity and forms a no flow boundary under the Patapsco Aquifer.

10.2.5 Mobility And Stability In The Unsaturated Zone

The mobility and stability of Area 5 leachate depends on the physical and chemical behavior of each constituent as well as the different properties of the soils (those soils associate with the Patapsco Formation). Each constituent has a different solubility, adsorption, and migration rate that varies with soil pH, temperature and saturation. These factors alone have made, and will continue to make, determining the mobility and stability of the constituents of the leachate from Area 5 complex; therefore only general statements about mobility and stability will be made.

Heavy metal cations such as chromium, much like the chlorides and sulfates anions, are not highly responsive to attenuation in the saturated or unsaturated zone. In a high pH environment many metallic ions precipitate out of solution as insoluble oxides, hydroxides, phosphates, and sulfides. However, with a drop in pH and reducing soil conditions, these same insoluble metal compounds can once again dissolve and become mobile.

Trivalent chromium may adsorb or exchange on clays in fluids with a pH between 5 and 6. Attenuation at higher pH levels has been reported to occur by precipitation into hydroxides and carbonates. Trivalent chromium is typically slowly mobile in aerobic, unsaturated conditions (Reports indicate increased mobility has been attributed to anaerobic conditions, low clay content and low iron, manganese and aluminum hydroxyl oxide contents). Hexavalent chromium usually does not precipitate in significant amounts; however it's mobility does increases between pH levels of 7 and 8.

Since attenuation properties depend on both the nature of the waste and the subsurface environment one can conservatively assume, over the active life of the facility, the non-reactive components of the leachate have traveled through the groundwater at a rate equal to the seepage velocity of Area 5. However, hydrodynamic dispersion (mixing) and molecular diffusion (spreading) may or may not

cause some components to travel faster than, or in different directions from, the flow of groundwater. In addition the density differences in some ions (chrome in particular) may cause some leachate components to sink rather than flow with the advective forces, or may slow down their migration rate.

Again, one may conservatively assume that during the closure and post-closure period, the stabilization and migration of the constituents of the leachate from Area 5 will continue in the same manner as described above.

The actual monitoring protocol is divided into three sub- sections. The first section addresses the monitoring of the groundwater surrounding Area 5 including Sedimentation Pond No 1 (stormwater runoff from Area 5). The second section addresses the monitoring of the observation wells surrounding the old MPA cell. The third section addresses the monitoring of the surface water outfalls throughout the facility.

10.3 GROUNDWATER MONITORING OF AREA 5

The effectiveness of the leachate collection system will be determined by statistically evaluating the groundwater in the upper most aquifer surrounding Area 5 and by monitoring the surface water of Sedimentation Pond No. 1, for the indicator parameters. The indicator parameters are outlined in section 10.2.2, as being characteristic of the leachate and/or contaminated groundwater from Area 5.

10.3.1 Proposed Monitoring Of Regulated Wells

It is proposed that monitoring for Area 5 continue to be performed as two different statistical evaluations to match the two different hydrogeologic formations that have been identified. This will continue to more accurately represent the groundwater quality of and around Area 5 by allowing an accurate evaluation of potential contamination caused by Area 5 in the one formation, while evaluating the degree of off-site contamination in the other formation (Trough Area).

In the first evaluation, monitoring Well 2B-1 shall continue to be designated as the up-gradient well for Area 5, with monitoring Wells 2D and 2F remaining the down-gradient wells. In this evaluation, Well 2G would no longer be used in the statistical analyses of this portion of Area 5.

In the second evaluation, monitoring well 2H shall continue to be designated as the up-gradient monitoring well for the area west of Area 5 known as the "Trough Area". Wells 2E and 2G would be the down-gradient monitoring wells for this evaluation.

Well 2A will continue to be monitored in quadruplicate for possible future use. All data received from quadruplicate monitoring will be compiled into a data base for possible future use.

Barium and pH will be monitoring quarterly along with the indicator parameters, but will not be included in the quarterly statistical analysis. The barium and pH data will be used to run quarterly trends analyses.

10.3.2 Justification for Proposed Monitoring

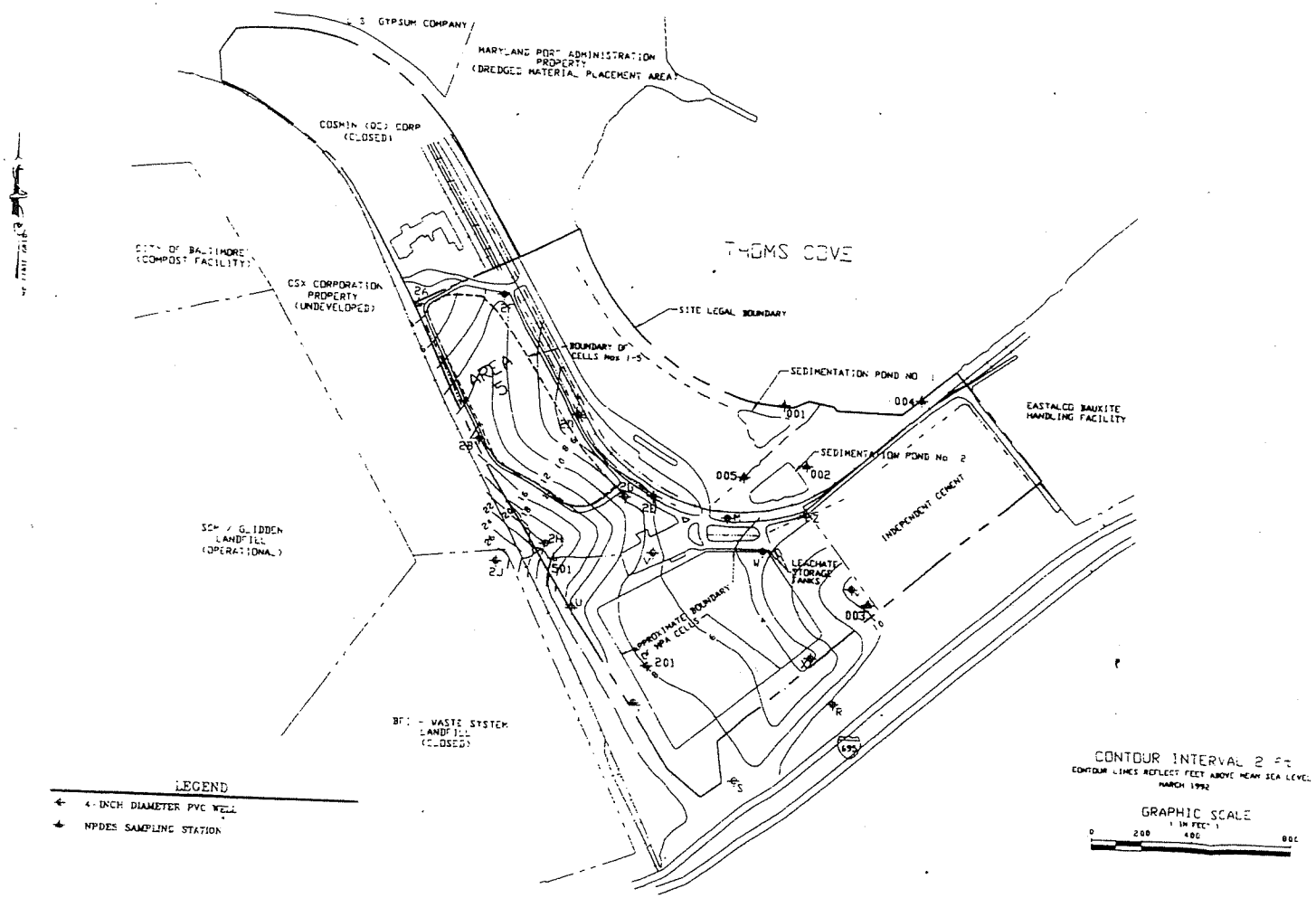
This proposal is requested because Wells 2G, 2E and 2H are not in the same hydrogeologic formation as the other three compliance wells. Monitoring of these wells continue to reveal the presence of contaminants which are not characteristic of the chromium ore tailing disposed of in the Area 5 facility, indicating that this well is contaminated from a source other than Area 5.

In 1985, a hydrogeologic assessment of the site by Black and Veatch identified a "trough" of less dense post-Cretaceous age sediments running across the southern end of Area 5 which allows groundwater to move more rapidly down-gradient across the southern end of Area 5 toward Wells 2G and 2E. Well 2H lies within the trough as it enters the property and is up-gradient from Wells 2G and 2E.

MES has tabulated pH data from December 1993 to present for monitoring wells 2B, 2D, 2F, 2E, 2G and 2H, the wells in question. Historically, the pH coming on-site through the up-gradient wells 2B & 2H are consistently less than the pH in the down-gradient wells 2D, 2F, 2E & 2G. This pH data was graphed; as shown, the pH of wells 2H and 2D are consistently lower then the pH of wells 2D & 2F; 2G & 2H, respectively.

The methods of statistical analyses used are the Parametric and Non-Parametric Analysis of Variance (ANOVA). These analyses are used to determine if there is a difference between the up-gradient well mean and the two down-gradient well means at a given point in time. These methods, like other methods, assume that a significant increase in the tested parameter indicates that the numbers down-gradient are higher than the numbers up-gradient. However, this is not the case at Hawkins Point with respect to pH. At the Hawkins Point facility, the quality of water coming on-site, through the Trough Area as well as beneath Area 5, has been shown through years of testing to be deteriorated due to high concentrations of Chloride, Iron, Manganese, Sodium, Sulfate, Barium, and low pH (the pH averages 3.4 for well 2H and 3.5 for well 2D since December 1993).

Prior to 1993, pH was not statistically analyzed at the site. The original permit did not require such testing. MES began statistically analyzing pH at the site in 1993. Inclusion of pH as an indicator parameter at the site became effective after renewal of CHA Permit A-264, which was issued on October 15, 1995. Since 1993, each quarterly analysis has determined that statistically significant increases in pH has occurred in down-gradient wells 2D, 2F, 2E and 2G intermittently. MES has consistently responded that pH differences are indicative of off-site contamination



MARYLAND ENVIRONMENTAL

HAWKINS POINT HAZARDOUS

FIGURE 10.3

This off-site contamination is causing a false positive in the statistical analyses, erroneously indicating an increase in pH in down-gradient wells

MES' response to this observation has consistently been that pH differences are indicative of off-site contamination moving onto the Hawkins Point property. This off-site contamination is causing a false positive in the statistical analysis, erroneously indicating an increase in pH in down-gradient wells when in fact the pH of the up-gradient well has consistently been well below that of the down-gradient wells.

MES continues to believe that pH in the down-gradient wells are not increasing and that the statistically significant increase in pH is a false positive because the ground water coming on-site (through up-gradient wells 2H and 2B) has an extremely low pH which at times does decrease. The former landfills immediately up-gradient of Hawkins Point are positioned as potential cause of the decreased pH of the ground water entering the site and result in a false positive for a statistically significant increase in pH in the wells down-gradient to 2H and 2B. MES believes that the data clearly supports the position that the regulated unit in Area 5 is not the cause of this statistical increase.

Barium will not be utilized for the detection monitoring of the Area 5 facility since barium concentrations naturally occur in groundwater in the vicinity of the facility and therefore would not be a good indicator parameter to determine if any leakage from the Area 5 regulated unit occurs. In addition, historical data obtained from all three Area 5 monitoring wells are normally less than 100 ppb, indicating that barium concentrations in the groundwater at the landfill do not appear to be a human health hazard. The maximum contaminant limit of barium in drinking water is 2000 ppb.

10.3.3 Designated Wells

Area 5 will be monitored by three groundwater monitoring wells 2B (upgradient), 2D, and 2F (points of compliance) which will continue to be statistically evaluated on a quarterly basis. Groundwater monitoring wells 2A, 2B, 2D, 2F, 2E, 2G and 2H will continue to be designated as regulated wells for the facility. The installation, location and depths of these wells are also in accordance with 40 CFR Part 264.97.

10.3.4 Background and Regulated Wells

In the first evaluation Monitoring Well 2B continues to be designated as the background well as defined in 40 CFR Part 264.97, it represents the quality of background water that has not been affected by leakage from Area 5. Down-gradient monitoring wells 2D and 2F will continue to represent the quality of groundwater passing through Area 5.

In the second evaluation, Monitoring Well 2H continues to be designated as the background well for the area west of Area 5 known as the "trough area". As defined in

40 CFR Part 264.97, background quality may be based on sampling of wells that are not up-gradient from the waste management area when: sampling at other wells will provide an indication of back-ground groundwater quality that is as representative or more representative than that provided by the up-gradient wells. Wells 2E and 2G will continue to be designated as the down-gradient monitoring wells for the Trough Area.

10.3.5 Use of Well Data

Historical data from the up-gradient wells will continue to be used to establish background data for the statistical evaluations. The historical data from the remainder of the compliance wells listed in this section has been compiled into a groundwater data base and will continue to be used to determine seasonal trends, potential contamination and/or any other possible future uses. The four quarterly replicates from each down-gradient well shall be compared to the combined pool of current and historical replicates from the background well. This historical data used shall not exceed two years.

The amount of historical replicates to be used shall be specified in the permit. In addition, the historical replicates from the background well shall not be averaged prior to use in the ANOVA procedure. The total sample size is twenty-four (24) data points:

- Up-gradient (Background) data consist of four (4) data points from the current quarterly monitoring and the data points from the three most previous quarterly monitoring events

- Down-gradient data consist of four (4) data point from the current quarterly monitoring of each of the two down-gradient wells.

10.3.5.1 Historical Data Spreadsheets

In addition to statistical evaluations, the data collected from the quarterly groundwater monitoring will continue to be compiled into a groundwater database for that particular well. This will be used to help determine seasonal trends if necessary. Appendix C contains historical groundwater monitoring data from 1994-1998.

10.3.5.2 Comparison of Each Constituent in the Compliance Wells to the Background Wells.

Once the quarterly analyses are completed, each constituent is compared to the same constituent in the background data. A quarterly statistical evaluation per constituent is performed following the procedures outlined in section 10.4.

10.4 STATISTICAL EVALUATION

This section contains procedures for performing a comparison of up-gradient and down-gradient groundwater analytical results to determine whether contamination has occurred. The procedures include:

10.4.1 A Proposed Statistical Method That Complies With 40CFR PART 264.97.

The proposed method of statistical analysis is the Parametric Analysis of Variance (ANOVA), an EPA approved statistical method under 40CFR PART 258.53(h) and (i). ANOVA is based on a direct comparison of the background well mean and each compliance well mean at a given time. Using ANOVA followed by a pos hoc comparison determines if an actual difference in groundwater quality exists for a given sampling period among a group of wells. For Area 5 wells, this analysis will determine if there is a difference between the background well mean and the two down-gradient well means at a given point in time for each monitoring parameter. The parametric ANOVA assumes that the data are normally distributed and have equal variances.
Two tests will determine if the data follow those assumptions. If not, the data will be statistically evaluated using a non-parametric ANOVA.

10.4.2 Evaluation of Non-Detected Parameters

If less than fifteen percent (15%) of the data points are below the laboratory detection limit, each data point that is below detection will be replaced by one half of its Practical Quantification Limit (PQL/2). All data shall then be evaluated by the parametric ANOVA.

However, if greater than fifteen (15%) of the data points are below the laboratory detection limit, a non-parametric ANOVA method shall be used to statistically evaluate the data. In the non-parametric ANOVA, all data points are ordered and replaced by their numeric rank. Those data points below detection are tied and equal to the average of the ranks as if they were slightly different.

10.4.3 Normal and Log-Normal Distribution

The EPA has reversed its previous guidance on the distribution of groundwater data according to the "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Draft, Addendum to Interim Final Guidance", dated July 1992. The EPA has indicated that ground water concentration data usually follow a log-normal distribution as opposed to a normal distribution. Therefore, all data points shall be logged prior to checking the distribution.

The Shapiro-Wilk Test shall be used to determine whether the data points follow the log-normal distribution. If the test statistic is greater than a critical value, the

data are log-normal, however, if the test rejects the logged-data, the data shall be unlogged and retested for a normal distribution.

10.4.4 Equality of Variances

To determine if the different wells have similar variances, The Levine Test shall be used. In this analysis, each data point is replaced by the absolute value of its respective residual:

$$z_{ij} = x_{ij}^{3} - x_{i}^{3}$$

10.4.5 ANOVA Procedures

1. Arrange the data (or the natural log of data) in a table using the number of wells and the number of replicates,

Well No.	R1	R2	R3	R4	
1	1	2	3	4	BACKGR. CURRENT
2	1	2	3	4	BACKGR. PREQRT
3	1	2	3	4	BACKGR. PREQRT
4	1	2	3	4	BACKGR. PREQRT
5	1	2	3	4	DOWNGR. CURRENT
6	1	2	3	4	DOWNGR. CURRENT

2. Record the number of observations n,
   n = (#wells) * (# replicates)
   here n = 6 X 4 = 24

3. Sum the readings (replicates) per well, from i to m number of wells

$$S\,X_i = (R1_i+R2_i+R3_i+R4_i)$$

4. Calculate the mean (average) of the replicates per well, $X_i..X_m$, where m is the total number of wells.

   $\overline{X} = S\,X_i\,/N$, where N is the number of readings per well.

5. Expand the table to include the sum of each well and the well mean. (See Figure 10.4)

6. Add all the sums together to get the sum of sums (SSUM) and take the average of all the means to get the mean of means (MMEAN). Numerically the,

\2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

STATISTICAL ANALYSIS FOR HAWKINS POINT HAZARDOUS WASTE LANDFILL
ANALYSIS OF VARIANCE (ANOVA) REPORT DATE: 15-Jun-92
MARCH 1992 TOTAL BARIUM DATA FROM THE CONTRACT LABORATORY (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4
BACKGR 2H	50.0	50.0	90.0	600.0 *
2H	40.0	40.0	40.0	40.0
2E	230.0	230.0	240.0	220.0
2G	20.0	20.0	20.0	20.0

*MATRIX INTERFEREN
CONTRACT LABORAT

NATURAL LOG OF TOTAL BARIUM (UG/L)

WELL NO.	REPL 1	REPL 2	REPL 3	REPL 4	SUM_X	MEAN	BACKGR ME
BACKGR 2H	3.912	3.912	4.500	6.397	18.72	4.68	4.68
2H	3.689	3.689	3.689	3.689	14.76	3.69	
2E	5.438	5.438	5.481	5.394	21.75	5.44	
2G	2.996	2.996	2.996	2.996	11.98	3.00	

READINGS (N)

****SQUARE OF SAMPLE CONCENTRATION DATA********

					SUM OF SUMS	MEAN OF MEANS
BACKGR 2H	15.30	15.30	20.25	40.92	67.21	4.20
2H	13.61	13.61	13.61	13.61		
2E	29.57	29.57	30.04	29.09		
2G	8.97	8.97	8.97	8.97		

****SUM OF SQUARES SCRATCH-PAD****

WELL NO.	SUM_X	SUM(_X_SQR)	READINGS (N)	(SUM_X)^2	(SUM_X)^2/n	MEAN
BACKGR 2H	18.72	91.78	4	350.47	87.62	4.68
2H	14.76	54.43	4	217.73	54.43	3.69
2E	21.75	118.27	4	473.08	118.27	5.44
2G	11.98	35.90	4	143.59	35.90	3.00

****(ONE WAY) ANALYSIS OF VARIANCE TABLE****

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	ESTIMATE OF STD	CALCULATED F RATIO	TABLED F RATIO
BETWEEN WELLS	13.90	3	4.63	13.349	3.49
SAMP. ERROR	4.16	12	0.347		
TOTAL	18.06	15			

IF THE CALCULATED F RATIO IS GREATER THEN (>) THE TABLED F RATIO, THEN
pos hoc COMPARISONS ARE NECESSARY.

BACKGROUND DATA FOR WELL 2H CONSIST OF DATA FROM 1988-1991.

$$SSUM = (S\ X_i + S\ X_j + \ldots S\ X_m) \text{ and the,}$$

$$MMEAN = (\bar{X}_i + \bar{X}_j + \ldots \bar{X}_m)/m \text{ (\# of wells)}$$

7. Square the Sum of each well and arrange in a table along with the SSUM and MMEAN, SUMSQ

$$SUMSQ = (S\ X_i)^2$$

8. Calculate the sum of squares between the wells, SS_{well}

$$SS_{well} = [(S\ X_i)^2 + (S\ X_j)^2 + \ldots (S\ X_m)^2] - 1/N^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with m number of wells-1 being the degree of freedom for between wells.

9. Calculate the corrected total sum of squares, SS_{total}

$$SS_{total} = (R1_i^2 + R2_i^2 + \ldots + R3_j^2 + R4_j^2 + \ldots$$

$$R4_m^2) - 1/n^*(S\ X_i + S\ X_j + \ldots S\ X_m)^2$$

with n number of readings-1 being the degree of freedom for between observations.

10. Find the error within the wells, SS_{error}

$SS_{error} = SS_{total} - SS_{well}$, with n(# of observations)-m(# of wells) being the degree of freedom for the error.

11. Arrange the calculations in a table using the number of wells by the calculations. (See Figure 10.4)

12. Calculate the mean squares between the wells and within the wells MSBW and MSWW.

$$MSBW = SS_{well}/m\text{-}1 \text{ and } MSWW = SS_{error}/n\text{-}1$$

13. Now divide MSBW by MSWW to obtain the calculated F statistic, F_{cal}.

14. Using Table 1, of Appendix D, m-1 degrees of freedom, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated F can be found, F_{tab}.

15. Using the above calculations the one-way ANOVA table should be set up as shown in the attached example (Figure 10.4).

16. If and only if the calculated F ratio exceeds the tabulated F ratio should pos hoc comparisons be made, otherwise can conclude that there is no significant statistical difference (well means are the same) among the wells at the given time period.

10.4.6 Procedures For pos hoc Comparison

1. To compute the pos hoc comparisons (Bonferroni t-statistics), let M=the # of compliance wells, which will also be the number of comparisons to be made.

2. Sum the total number of observations in the background well nb.

3. From ANOVA worksheet list the average

concentration of the background well, $\bar{X}b$.

4. Calculate the difference between the average concentration of each compliance well and the average of the background well.

$$DIFF=\bar{X}i-\bar{X}b.$$

5. Calculate the standard error of each difference (SE), however, if the number of observations is the same for all the compliance wells then the standard error for each well will be equal.

$$SE = [MSWW*(1/nb+1/M)^{1/2}]$$

6. Using Table 2 (Bonferroni's t Table) of Appendix D, # of compliance wells M, n-m degrees of freedom and an alpha(a) level of 0.05, the tabulated Critical t value can be found, crit. t.

Crit.t value obtained from Table 2, Appendix D

7. Multiply the Critical t value by the Standard error to obtain the D quantities for each well, once again if the number of observations is the same for all the compliance wells then the D quantity for each compliance well is equal.
D = Crit. t * SE

8. Compare the difference $\bar{X}i$ - $\bar{X}b$ to the value D, if the difference exceeds the D value, conclude that compliance well has significantly higher concentrations than the average background wells. Otherwise conclude that the well is not contaminated. This must be performed per compliance well.

9. Finally, calculate the residuals $R1_i$, which are the differences between each observation and its predicted value (in this case, the mean of that particular well X_i). The residuals can be used to check for departures from normality.

$$R1_i = X1_i - \bar{X}_i$$

10. Using the above calculations for pos hoc comparisons, set up table along with an interpretation of the data and calculations as shown in the attached example (See Figure 10.5).

Appendix E is a working example of the ANOVA statistical analysis using actual data from a groundwater monitoring event of both Area 5 and the Trough Area.

10.4.7 Non-Parametric ANOVA

The non-parametric ANOVA procedure shall be used when: 1) the data does not follow a normal or log-normal distribution, 2) the data has unequal variances between wells, or 3) greater than fifteen percent (15%) of the data points are below laboratory detection. Under this procedure, the Kruskal-Wallis Test is used to determine if there is a statistically significant increase among the wells.

10.4.7.1 Kruskal-Wallis Procedures

The procedures for the Kruskal-Wallis Test is as follows:

1) Rank all observations (N) from least to greatest,

2) Calculate the sum of the ranks of observations in each well (RK_i) and the average of the ranks for each well.

3) Calculate H,

$$H = [\, 12/N(N+1)^{*}S\ R_i^2/N_i \,]-3(N+1)$$

where N, is the number of data points for each well.

4) If there are ties among the ranks, then the adjusted Kruskal-Wasllis statistics must be calculated as follows:

$$H' = H/1 - (\sum_{i=1}^{g} t_i^3 - t_i / N^3 - N)$$

where, g is the number of groups of distinct tied observations and t_i is the number of observations in the tied group i.

a:\2HONLY\BA92.WK1 DATE: 22-Jun-92 STATISTICAL ANALYSIS, TOTAL BARIUM FOR MARCH 1992.

DEGF. = DEGREES OF FREEDOM
M = # OF COMPLIANCE WELLS (ALSO # OF COMPARISONS TO BE MADE)
nb = TOTAL # OF SAMPLES IN BACKGROUND WELLS
Xb= AVERAGE CONCENTRATION OF BACKGROUND WELLS

DEGF=	12
M=	3
nb=	4
Xb=	4.68

The difference between the mean of the five compliance wells
and the mean of the background well.

meanXi - meanXb = difference

2H=	-0.99
2E=	0.76
2G=	-1.68

SE = STANDARD ERROR OF EACH DIFFERENCE.
Since the # of observations is the same for all compliance wells, the
standard errors for the four differences will be equal.
Di = COMPUTE THE QUANTITIES Di FOR EACH DIFFERENCE
Once again since the # of observations are the same, D1=D2=D3...
CRT. t = CRITICAL t, CONSTANT FROM TABLE 2
D = SE*CRT. t

SE=	0.450
CRT. t=	2.45
D=	1.102

Since calculate F was > tabled F the Bonferroni multiple comparisons
procedure was used to determine for which wells there was statistically
significant evidence of contamination.

Of the three comparisons, none exceeded the critical value D,
it can be concluded that there was no statistical difference
among the camparisons.

COMPUTING THE RESIDUALS USING ln DATA

WELL NO.	RPL 1	RPL 2	RPL 3	RPL 4
2H=	0.00	0.00	0.00	0.00
2E=	0.00	0.00	0.04	-0.04
2G=	0.00	0.00	0.00	0.00

5) If H or H' is less than the tabulated chi-squared value with (k-q) degrees of freedom, where k is the number of groups, then one can conclude that there is no significant statistical increase (no contamination present). However, if H or H' is greater, then one must proceed with step 6.

6) Compute the critical difference C_i, for each well:

$$C_i = Z_{(a/(k-1))} * \text{ÖN}(N+1)/12*(1/n_b+1/n_i)$$

where n_b, is the number of data points in the background well, here n_b=16, and $Z_{(a/(k-1))}$ is the upper (a/(k1)) percentile from the standard normal distribution.

7) Compute the differences between each down-gradient well's average among the ranks and the background (up-gradient) well rank average. If this value for any well exceed C_i, then one can conclude that there is a significant statistical increase and therefore evidence of contamination in that particular well.

10.4.8 Statistically Significant Evidence of Contamination

Within one month after receiving the analytical results from the last replica taken for that quarter, it will be determined whether there is a statistically significant increase in contaminates per detection monitoring point using the procedures outlined in Sections 10.4.1-10.4.7.

If it is determined that there is statistically significant evidence of contamination for chemical parameters or hazardous constituents as specified in 40 CFR Part 264.98, then the following procedures will be followed:

1. The Regional Administrator (EPA) and the Regulatory Agency (MDE) will receive written notification within seven days. This notification will specify which chemical parameters or hazardous constituents have shown statistically significant evidence of contamination.

2. All monitoring wells shall immediately be sampled to determine the presence and concentration of any constituents listed in Appendix IX of 40 CFR Part 264.

3. Should any of the constituents listed in Appendix IX of CFR Part 264 be found present, then that well will be re-sampled and analyzed within one month of receiving the initial analytical results. Both sets of results will be submitted to MDE within a timely manner of receiving the second results.

4. Should the results from the second set of analyses confirm the finding of the first set of analyses, then the results of both sets of analyses along with an application for permit modification to establish a compliance monitoring

program will be submitted to MDE. The submission of this finding shall occur within ninety days of receiving the second set of analytical results. The permit modification application shall follow the guidelines outlined in 40 CFR Part 264.98

10.5 DETERMINING THE SAMPLING INTERVAL

In no instance are any of the sampling events allowed to exceed ninety calendar days from the initiation of sampling. To determine the sampling interval, hydrogeologic conditions of the regulated unit were evaluated to determine the groundwater flow velocity. Using the calculated seepage velocity, the sampling interval is generated.

10.5.1 Hydrogeologic Conditions

Slug tests were performed on the existing and proposed compliance wells by Black and Veatch in November 1992. A copy of the report can be found in appendix F.

The data from this report was used to estimate the minimum time interval between sampling per event that would allow four independent samples per well of the groundwater surrounding both Area 5 and the Trough Area.

The following calculations were used to determine the minimum time required to obtain an independent sample from each compliance well:

Vh=(Kh)(i)/Ne, where

Vh = Horizontal component of the average linear velocity, (seepage velocity)

Kh = Horizontal hydraulic conductivity,

Ne = Effective porosity and

i = Hydraulic gradient.

D = Well Diameter

D/Vh = minimum time required for an independent sample of groundwater to pass through the diameter of the well.

These calculations are based on Darcy's Equation, and follow the guidelines given in the EPA document, "Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities", April 1989.

10.5.2 Estimated Seepage Velocity and Time Required to Pass Through a Four-Inch Well Diameter

According to the Slug Test Report referenced above, the estimated seepage velocity was calculated as 0.014 feet/day (0.168 inches/day) for Area 5 and 0.136 ft/day (1.632 inches/day) for the Trough Area. Therefore the average minimum time required for an independent sample of groundwater to pass through the four inch diameter well is as follows:

Minimal time required for Area 5 is D/Vh = (4 inches/0.168 inches/day) = 23.8 days

Minimal time required for Trough Area is D/Vh=(4 inches/1.632 inches/day) = 2.5 days

10.6 SAMPLING INTERVAL

Based on the information from Section 10.5.2 and to assure that all samples are taken within the ninety (90) day window (21 days between replicates), the suggested sampling interval for Area 5 is once every 21 days. The suggested sampling interval for the Trough Area is once every 3 days (3 days between replicates until all four replicates are taken). Procedures for the suggested sampling interval are outlined below. Each sampling interval assures that the replicates are taken far enough apart in time to prevent any type of auto correlation.

10.6.1 Sampling Interval Procedures

On Day One of the sampling event purge each well following the procedures outlined in Sections 10.1.5 through 10.1.11. All field information including depth to water, volume of water purged, date, time and samplers initials shall be documented in a field notebook.

On Day Two, sample each of the wells using the sampling procedures outlined in sections 10.1.14 through 10.1.16. All field information such as pH readings, specific conductivity readings, temperature, date/time and sampler initials shall be recorded in a field notebook. This set of samples will be the first replicate.

Twenty-one days (three for the Trough Area) after the wells were initially sampled, sample each again (without purging). This set of samples will be the second replicate.

Twenty-one days (three for the Trough Area) after the second replicate, sample each of wells (without purging). This set of samples will be the third replicate.

Finally twenty-one days (three for the Trough Area) after the third replicate, sample each of the wells again (without purging). This set of samples will be the

fourth and final replicate of the sampling event. Below are examples of the proposed sampling Intervals:

Sampling Interval For Area 5

Date	Replicate No.
June 1	Purge Only
June 2	1
June 23	2
July 13	3
August 3	4

Sampling Interval For Trough Area

Date	Replicate No.
June 1	Purge Only
June 2	1
June 5	2
June 8	3
June 11	4

10.6.2 Sampling Frequency

The sampling frequency shall remain quarterly for at least 30 years, with yearly analysis being performed on those parameters outlined in section 10.1.16..

10.7 PROPOSED METHOD FOR DATA ORGANIZATION AND PRESENTATION

10.7.1 Data Organization

Upon receiving the data from the contract laboratory, it will be checked against the chain of custody. This will assure the samples were analyzed for the proper group of parameters. The blanks, Trip Blanks, Duplicates and when applicable surrogates will be reviewed. Data will then be entered into a groundwater computer database. The first spreadsheet will consist of data for all wells sampled during that particular sampling event. The second spreadsheet will consist of all data from historical and current sampling events per well. e.g., if there are six wells then, there will be six different spreadsheets (Shown in Figures 10.6 and 10.7). The four independent samples (replicates) will be used to establish a statistical profile of the groundwater surrounding Area 5 and the trough Area for that given time as shown in Figures 10.4 and 10.5.

Indicator parameters are those parameters that are characteristic of landfill leachate and could indicate leakage from the landfill. Each indicator parameter will be statistically evaluated according to procedures outlined Section 10.4.

HAWKINS POINT GROUNDWATER QUALITY MONITORING

DATE 03/11/92

		SAMPLING POINT 2A					2B1					2D2					2E				
	UNITS	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	AVERAGE	REP 1	REP 2	REP 3	REP 4	AVE
pH	UNITS	4.7	4.6	4.7	4.7	4.7	4.5	4.5	4.5	4.5	4.5	5.9	5.8	5.8	5.8	5.8	4.7	4.7	4.7	4.7	
SP CONC.	UMHOS/CM	100	100	100	100	100	2500	2350	2500	2500	2463	520	520	520	520	520	10320	9030	10320	10320	
TOX	MG/L	0.012	0.013	0.025	0.010 L	0.015	0.010	0.054	0.013	0.011	0.023	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.010 L	0.030	0.010 L	0.018	
CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.01	0.01 L	0.01 L	0.01	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.155	0.155	0.160	0.155	
HEX CHROMIUM	MG/L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	
CHLORI.	MG/L	0	7	7	7	7	34	33	34	33	34	20	20	20	20	20	350	360	350	350	
SULFATE	MG/L	31	29	29	30	29.8	3400	3300	3200	3300	3300	250	250	250	250	250	19000	19000	19000	19000	
BARIUM	MG/L	0.16	0.19	0.17	0.17	0.17	0.05 L	0.05 L	0.05 L	0.05 L	0.05 L	0.16	0.16	0.16	0.17	0.16	0.23	0.23	0.24	0.22	
IRON	MG/L	1.30	1.40	1.40	1.40	1.38	1100.0	1100.0	1100.0	1000.0	1075.0	13.00	13.00	13.00	13.00	13.00	6900	7000	6900	6900	
MANGANESE	MG/L	0.07	0.06	0.06	0.06	0.06	28.0	28.0	28.0	28.0	28.0	0.81	0.81	0.83	0.80	0.81	270	270	270	270	
SODIUM	MG/L	5.3	5.3	5.2	5.2	5.25	21.0	11.0	21.0	21.0	18.5	10.00	11.00	11.00	11.00	10.75	310	310	310	310	
DEPTH WATER	FEET	41.4					27.8					23.2					18.2				
DATUM		64.5					47					37.5					42.2				

THE VALUE OBTAINED FOR THAT PARAMETER WAS LESS THAN THE DETECTION LIMIT TO THE LEFT. SRM. 21-May-92

44.48

:UKINS POINT HAZARDOUS WASTE LANDFILL
:A Identification No. MDD 00 073 1356

JUND WATER MONITORING WELL 2A
Permit No. BC 81-0102

F OF STEEL CASING ELEVATION + 44.48
:ION OF SCREEN ELEVATION - 21.7

	STANDARD/UNITS	DET.LIMIT	3/23/89	6/22/89	9/28/89	12/21/89	3/22/90	6/21/90	9/20/90	12/06/90	03/21/91	06/20/91	09/19/91	12/12/91	03/11/92	06/19/92
.IER ELEVATION (MSL DATUM)			1.98	1.78	2.98	2.18	2.48	3.28	3.48	2.78	3.58	3.38	3.08	2.68	3.08	1.94
.ARIUM	1.0 mg/l	0.010	0.050 L	0.06	0.09	0.05 L	0.05 L	0.11	0.05 L	0.05 L	0.05 L	0.07	0.05 L	0.050 L	0.017	0.060
.HROMIUM(TOTAL)	.05 mg/l	0.001	0.004	0.005 L	0.005 L	0.01 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.005 L	0.003	0.005 L	0.010 L	0.005 L
.HLORIDE	250 mg/l	0.100	10.0	10	7	10	8	10	7	8	8	9	8	6	7	8.000
.OPPER	0.3 mg/l	0.001	1.70	3.50	0.16	0.02 L	0.24	0.50	0.30	0.48	0.73	0.49	4.75	1.28	1.38	4.700
.NGANESE	0.05 mg/l	0.001	0.05	0.09	0.03	0.05 L	0.06	0.09	0.06	0.06	0.06	7.1	0.19	0.04	0.06	0.180
.ODIUM	20.0 mg/l	0.100	3.4	5.3	5.0	5.4	4.85	7.15	5.73	4.85	5.45	6.85	4.41	4.630	5.250	4.980
.LFATE	250 mg/l	0.10	25	38	25	43	56	34	23	41	35	41.3	14.5	11.50	29.80	8.80
.H	6.5-8.5 units	0.1	4.93	4.0	4.3	4.8	4.0	5.3	4.5	4.8	6.5	4.9	4.4	4.1	4.7	4.1
PEC. CONDUCT	umhos/cm	1	1470	150	57	80	90	97	71	69	130	74	105	50	100	78
3X	mg/l	0.01	0.010 L	0.02	0.02	0.04	0.04	0.1	0.0225	0.01 L	0.28	0.01 L	0.011	0.03	0.02	0.06
HROMIUM (HEX)	0.05 mg/l	0.010	0.010 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.01 L	0.010 L	0.010 L	0.010 L

NOTE: PQL-Below Detection Limit
NOTE: An "L" indicates a less than value
NOTE: IN SEPT AND DEC OF 1990, THE CONTRACT LABORATORY EXPERIENCED MATRIX INTERFERENCES AND ONLY REPORTED ONE OR TWO VALUES FOR EACH OF THE TOX SAMPLE SETS.

25

Other parameters outlined in Section 10.1.16 will be monitored annually but will not be statistically evaluated unless there is a specific reason for concern, or specific guidance from the regulatory agency (Maryland Department of the Environment (MDE)). There will be no statistical evaluation of the Volatile Organic Compounds (VOC's). Instead, the procedures outlined in Section 10.7.2 shall be followed for reporting VOC concentrations to MDE.

10.7.2 Reporting the Presence of Volatile Organic Compounds (VOC)

If any of the organic compounds described in Section 10.1.16 are present, a report shall be submitted to MDE following the procedures described below:

1. Each VOC that is present will be compared to the Maximum Contaminant Level (MCL) for that compound, as listed in the EPA document titled "Drinking Water Regulations and Health Advisories", April 1992. (see Appendix G.) The MCL is the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

2. If any VOC is present, but is less than the MCL for that compound, then a letter and a copy of the data report will be submitted to MDE within one month of receiving the data. The well will continue to be closely monitored for VOC levels (VOC's will be monitored semi-annually as opposed to annually for that year).

3. If the concentration of any VOC is greater than the listed MCL for that compound, the monitoring well will be immediately re-sampled, using the procedures in Section 10.1.21. A letter and the data reports from both sampling events will be submitted to MDE within one month of receiving the second data report.

10.7.3 Schedule For The Submission Of Data Collected

All data collected for the previous quarter shall be submitted to MDE one month after receiving data from contract laboratory.

10.7.4 Quarterly Data Submission Package

A copy of the data as received from the contract laboratory, individual well spreadsheets, statistical evaluations for sampling event and a summary or interpretation of the data will be submitted to MDE one month after receiving the final data report from laboratory. A copy of this data package will also be filed on site.

10.7.5 Submission of Letters Documenting Presence of VOC's or Exceedance of VOC MCL's

Within one month of receiving the yearly data analyses from the contract laboratory, if any volatile organic compounds are present, a letter stating such shall be submitted to MDE.

If a VOC MCL is exceeded, a letter and data report will be sent to MDE within one month of receiving the data report from the second sampling event.

10.8 SURFACE WATER MONITORING

During post-closure all surface water monitoring will continue to be performed in accordance with the National Pollution Discharge Elimination System (NPDES) permit. A NPDES permit renewal was submitted to the regulatory agency (MDE) in July of 1990. Monitoring will be performed in accordance with the new permit when received. A copy of the permit renewal application is enclosed in Appendix H.

Appendix D:

Well Construction Diagrams and Logs

REPORT ON HAWKINS POINT

Area 5 Slug Test

In accordance with the Work Plan to estimate aquifer hydraulic conductivity, B&V Waste Science and Technology Inc. (BVWST) performed slug tests at six monitoring wells in Area 5 at the Hawkins Point Landfill. All six monitoring wells (2B, 2D-2, 2E, 2F, 2G, and 2H) were tested at least once on November 10, 1992. Since the aquifer testing was accomplished ahead of schedule, BVWST field personnel were able to conduct additional slug tests at monitoring wells 2F and 2G.

Monitoring wells were slugged by approximately 10 gallons of water during each test. A Hermit 1000 data logger was used to monitor and record water levels. Field measured data were downloaded to a computer for analysis. A computer program, AQTESOLV, was used to analyze the data using the Bower and Rice method for unconfined aquifers.

Results of the slug tests are listed in Table 1 and are also shown on the attached graphs.

TABLE 1 - Hydraulic Conductivity Results

Monitoring Well	Hydraulic Conductivity (ft/day)	(cm/sec)
2B	0.28	9.88×10^{-5}
2D-2	0.09	3.17×10^{-5}
2E	0.19	6.70×10^{-5}
2F*	0.04, 0.06	1.41×10^{-5}, 2.11×10^{-5}
2G*	0.82, 1.03	2.89×10^{-4}, 3.63×10^{-4}
2H	2.97	1.05×10^{-3}

* Two slug tests were performed.

A summary of the slug test input and output data are presented in Appendix A. Appendix B contains a copy of the work plan.

Area 5 Seepage Velocity

Table 2 shows measured ground water levels at the six text wells.

TABLE 2 - Measured Ground Water Levels

Monitoring Well	EL (MSL) Top of Casing (ft)	Depth to Water Level (ft) 11/10/92	11/10/92 Water Level Elevation (ft)
2B	42.38	28.90	13.48
2D-2	27.09	24.25	2.84
2E	24.07	19.30	4.77
2F	30.97	20.65	10.32
2G	22.76	19.70	3.06
2H	26.38	10.40	15.98

- The 11/10/92 Measured water levels at the six test wells are in good agreement with the July, 1990 - June, 1991 ground water contour lines for the upper most aquifer.
- Ground water flow from Area 5 is towards Thoms Cove with an average hydraulic gradient of 0.03 ft/ft.
- The previous estimated value of 0.3 for effective porosity is reasonable.
- The mean hydraulic conductivity of the eight slug test results is 0.69 ft/day.
- Using the relationship of $V = \frac{ki}{n}$

  where:

  V = Seepage Velocity (ft/day)
  k = hydraulic conductivity (ft/day)
  i = hydraulic gradient (ft/ft)
  n = effective porosity

  the estimated average seepage velocity is 0.07 ft/day.

ENVIRONMENTAL AGENCY. RETURN ALL OTHER PARTS TO DEPARTMENT OF ENVIRONMENT, 2500 BROENI
HIGHWAY, BALTIMORE, MARYLAND 21224.

28-1

C 1 — SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED W
45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER

CO USE ONLY
E Received

DATE WELL COMPLETED: 08 03 90

Depth of Well: 45 (TO NEAREST FOOT)

PERMIT NO. FROM PERMIT TO DRILL: BC-88-08

OWNER MARYLAND ENVIRONMENTAL SERVICE
STREET OR RFD _____ last name _____ first name _____ TOWN ANNAPOLIS
SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
BROWN SILTY SAND	0	14	
MULTICOLORED SILTY CLAY	14	25	
TAN CLAYEY SILT	25	29	
TAN BROWN SILTY SAND	29	34	
GRAY SAND TRACE OF SILT	34	46	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes: Y no: N
TYPE OF GROUTING MATERIAL
CEMENT CM — BENTONITE CLAY BC
NO. OF BAGS 9 — NO. OF POUNDS 900
GALLONS OF WATER 56
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. (TOP) to 30 ft. (BOTTOM)
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL — CO CONCRETE — PL PLASTIC — OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	35

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
ST STEEL — BR BRASS BRONZE — HO OPEN HOLE — PL PLASTIC — OT OTHER

C 2

EACH SCREEN

	DEPTH (nearest ft.)	
PL	35	45

SLOT SIZE 0 1 0
DIAMETER OF SCREEN 4 (NEAREST INCH)

GRAVEL PACK from 30 to 45
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W.O.

C 3

PUMPING TEST
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min. to nearest gal.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface
BEFORE PUMPING
WHEN PUMPING
TYPE OF PUMP USED (for test)
A air — P piston — T tur
C centrifugal — R rotary — O oth
J jet — S submersible

MONITORIN G

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above — − below — LAND SURFACE 02 (near foot

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED NA
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 WELL CONSTRUCTION AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO. 336
Michael W. Haber
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH BUILDING, SEPTIC TANKS AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

1582 (DEP USE ONLY)

NUMBER IS TO BE PUNCHED OLS 34 ON ALL CARDS.

Received P use only)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER

DATE WELL COMPLETED: 283

Depth of Well: 47 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": BC-81-0049

NER: Maryland Environmental ~~Survey~~ Service (last name / first name)

IEET OR RFD: 60 West St. TOWN: Annapolis, Md. 21401

DIVISION: Hawkins Point SECTION: LOT:

WELL LOG (No required for driven wells)

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

SCRIPTION (Use ional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
own sand clayish	0	11	
Red clay	11	19	
Brown clay	19	26	
ed + white clay	26	33	
and clayish	33	38	
andish clay	38	40	
SAND	40	47	

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): Y N

TYPE OF GROUTING MATERIAL: CEMENT CM BENTONITE CLAY BC

NO. OF BAGS: 12 NO. OF POUNDS: 94

GALLONS OF WATER: 72

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. to 34 ft. (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL — Nominal diameter (nearest inch): 4 — Total depth of main casing (nearest foot): 37

OTHER CASING (if used): diameter inch, depth (feet) from, to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS, BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

DEPTH (nearest ft.): PL 37 47

SLOT SIZE: 0 1 0

DIAMETER OF SCREEN: 4 (NEAREST INCH)

GRAVEL PACK: from 34 to 47

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX: F

DEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W O

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C 3

PUMPING TEST

HOURS PUMPED (nearest hour): 2

PUMPING RATE (gal. per min. to nearest gal.): 1

METHOD USED TO MEASURE PUMPING RATE:

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 28

WHEN PUMPING:

TYPE OF PUMP USED (for test): A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES Y NO N

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height): + above, − below — LAND SURFACE: 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

MES. DESIGNATION - WELL 2B

NOTE: CEMENT GROUT CONTAINS 10% BENTONITE BY WEIGHT

CIRCLE APPROPRIATE BOX

A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E — ELECTRIC LOG OBTAINED

P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO: 291

DRILLERS SIGNATURE

MUST MATCH SIGNATURE ON APPLICATION

SITE SUPERVISOR - sign of driller or journeyman responsible for sitework if different from permittee

BALTIMORE, MARYLAND 21201 ... OTHER PARTS TO DEPARTMENT OF ENVIRONMENT, 201 W. PRES

Well 2I

C 1 3547 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITT... 45 DAYS AFTER WELL IS COMPLE...

COUNTY NUMBER

DATE Received

DATE WELL COMPLETED 0 6 0 8 9 0

Depth of Well 3 6 (TO NEAREST FOOT)

PERMIT N... FROM "PERMIT TO B C - 8 8 -

OWNER MARYLAND ENVIRONMENTAL SERVICE
last name first name

STREET OR RFD

SUBDIVISION TOWN ANNAPOLIS

SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
BROWN SILTY SAND	0'	12'	
MULTICOLORED SILTY CLAY	12'	23'	
TAN, CLAYEY SILT	23'	28'	
TAN, BROWN, SILTY SAND	28'	32'	
GRAY, SAND, TR SILT	32'	36'	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT C M BENTONITE CLAY B C

NO. OF BAGS 8 NO. OF POUNDS 800

GALLONS OF WATER 56

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 2 4 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

S T STEEL C O CONCRETE P L PLASTIC O T OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
P L	4	2 6

OTHER CASING (if used) EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

S T STEEL B R BRASS BRONZE H O OPEN HOLE P L PLASTIC O T OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN			
1	P L	2 6	3 6
2			
3			

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 4 (NEAREST INCH)

GRAVEL PACK from 24 to 36

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W.Q.

C 3

PUMPING TEST
HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min. to nearest gal.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land su...

BEFORE PUMPING

WHEN PUMPING

TYPE OF PUMP USED (for test)

A air P piston T

C centrifugal R rotary O

J jet S submersible

MONITORING

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES

IF DRILLER INSTALLS PUMP, THIS SECT... MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / − below LAND SURFACE 0 2 (nea... fo...

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED N/A

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

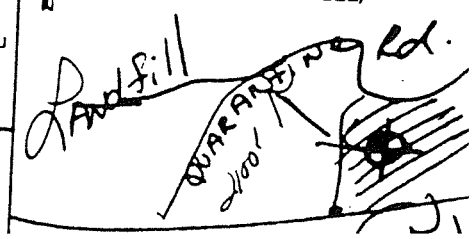
DRILLERS IDENT. NO. 336

Michael W. Huber

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUC... BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LES... THAN TWO DISTANCES (MEASUREMENTS TO WELL)



1010 (DEP USE ONLY)

NUMBER IS TO BE PUNCHED
OLS 3-6 ON ALL CARDS)

Received
P use only)

WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER

PERMIT NO.
FROM "PERMIT TO DRILL WELL"
BC-81-0103

DATE WELL COMPLETED: 12883

Depth of Well: 39 (TO NEAREST FOOT)

NER: Maryland Environmental ~~Service~~ Service
(last name) (first name)

IEET OR RFD: 60 West St. TOWN: Annapolis, Md. 21401

IDIVISION: Hawkins Point SECTION: LOT:

Well Log
(not required for driven wells)

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

SCRIPTION (Use ational sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Fill	0	7	
clay	7	16	
silt	16	23	
clay	23	31	
silty sand	31	35	
sand	35	40	
clay	40	41	

CIRCLE APPROPRIATE BOX

- [A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- [E] ELECTRIC LOG OBTAINED
- [P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO: 291

[signature]
DRILLERS SIGNATURE
MUST MATCH SIGNATURE ON APPLICATION

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): YES [Y] NO [N]

TYPE OF GROUTING MATERIAL
CEMENT [CM] BENTONITE CLAY [BC]
NO. OF BAGS 8 NO. OF POUNDS 44
GALLONS OF WATER 48
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 26 ft.
(enter 0 if from surface)

CASING RECORD

casing types (insert appropriate code below): [ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter (to main casing) (nearest inch)	Total depth of main casing (nearest foot)
PL	4	29

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole (insert appropriate code below): [ST] STEEL [BR] BRASS, BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (seq. no.)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	29	39
2			
3			

SLOT SIZE: 0 1 0

DIAMETER OF SCREEN: 4 (NEAREST INCH)

GRAVEL PACK from 26 to 39

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

DEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.D.S.) W D

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C 3 (seq. no.)

PUMPING TEST

HOURS PUMPED (nearest hour): 2

PUMPING RATE (gal. per min. to nearest gal.): 10

METHOD USED TO MEASURE PUMPING RATE:

WATER LEVEL (distance from land surface)
BEFORE PUMPING: 16'8"
WHEN PUMPING:

TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES [Y] NO [N]

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)

CAPACITY:
GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above [−] below LAND SURFACE 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

MES DESIGNATION - WELL 2E

NOTE: CEMENT GROUT CONTAINS 10% BENTONITE BY WEIGHT

LOG of BORING No. 2F

DATE July 31, 1984 SURFACE ELEV. 29 feet LOCATION See Figure

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0		12	Loose to medium dense, brown and red silty fine SAND, trace organics, dry					
5		8	-silt lense with trace mica, slightly damp	22.0				
10		8	Firm mottled gray brown silty CLAY slightly moist					
15		7		13.5				
			Loose tan brown silty fine SAND with trace fine gravel and organics, very moist					
20		22	Firm red to light brown-brown silty CLAY, trace medium to coarse sand, very moist	9.0				
		7		6.0				
25		7	Loose to medium dense tan to gray silty fine-coarse SAND, wet					
		16						
		21	-clay lense (1-2" thick) -trace gravel					
30		19	-tan to white clayey silty fine-medium SAND					
			Stiff mottled tan to light gray silty CLAY, moist	-2 -3				
35								

NOTE: Well installed, screened from 20 to 30 feet

COMPLETION DEPTH 32' WATER DEPTH 18.9' from TOC DATE Aug. 10, 84

SAMPLER: 2" O.D. SPLIT BARREL SAMPLER

PROJECT ALLIED/AREA 5

LOCATION Hawkins Point, Baltimore, Maryland

Date Completed August 8, 1984 Original Depth 32 ft.

Inspected By Gower/GAmble Date August 8, 1984

Checked By _____ Date _____

Page 1 of 1

Well No. BC-81-0197

Aquifer N/A

Depth Interval N/A

Generalized Stratigraphy and Water Level

Ground Elevation 29.0

0-8' Brown and red silty SAND

8-16' Mottled gray-brown silty CLAY

16-20' Tan brown silty SAND

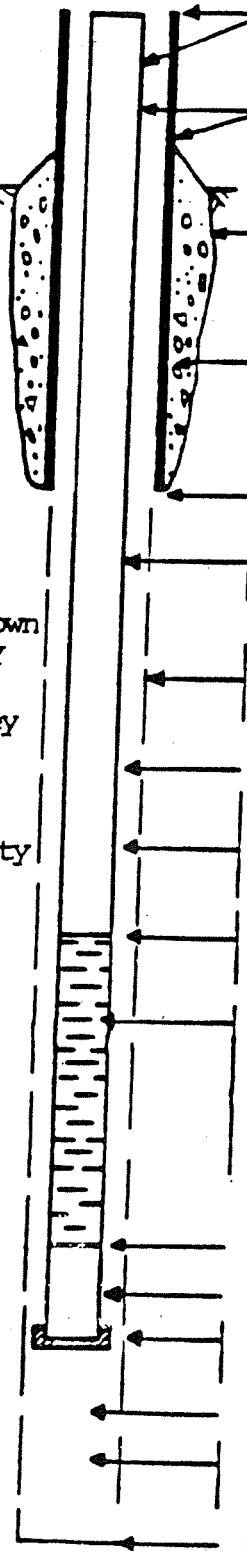
20-23' Red to brown sandy, silty CLAY

23-31' Tan to grey silty SAND

31-32 Mottled tan to light grey silty CLAY

G.W.T. @ El. 10.9 on 03 OCT 84

WCC Boring 2F



Elevation of top of surface casing / riser pipe.	32.40/
Height of top of surface casing / riser pipe above ground surface	3.42/
Depth of surface seal below ground surface	16.5'
Type of surface seal: grout mix of 90% cement & 10% bentonite	
I.D of surface casing.	6"
Type of surface casing: steel pipe with locking cover	
Depth of surface casing below ground	±2'
I. D. of riser pipe.	4"
Type of riser pipe: sch 40 PVC pipe	
Diameter of borehole	12"
Depth of borehole	32'
Type of backfill: grout mix of 90% cement 10% bentonite	
Elev./depth top of seal.	/16.5
Type of seal: bentonite	
Elev./depth bottom of seal.	/18'
Type of sand pack.	
Depth of top of sand pack.	/18'
Elev./depth top of screened section.	/20.25'
Type of screened section: slotted	
Discribe openings .010 inch wide, 1 inch long	
I.D. of screened section.	4"
Elev /depth bottom of screened section.	/29.66'
Length of blank section.	4"
Elev. / depth bottom of plugged blank section.	/30'
Elev. / depth bottom of sand column.	/31.5'
Type of backfill below observation pipe sand	
Elev /depth of hole	/32'

Woodward-Clyde Consultants

May 7, 2009

Correspondence Regarding NOV-09-017

MARYLAND DEPARTMENT OF THE ENVIRONMENT
MDE 1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

May 7, 2009

CERTIFIED MAIL

Mr. James Harkins, Director
Maryland Environmental Service
259 Najoles Road
Millersville, MD 21108

RE: MES Hawkins Point Landfill
Proposed Settlement of Notice of Violation NOV-09-017

Dear Mr. Harkins:

The Waste Management Administration (Administration) is in receipt of and has reviewed your letter dated April 13, 2009, regarding your proposed settlement offer for the Administration's Notice of Violation, NOV-09-017, dated April 7, 2009.

Accordingly, based on the information provided and MES' compliance history, and in an effort to bring resolution to this matter, the Administration is willing to accept $4,000.00 to settle the NOV penalty assessment. The Administration acknowledges that MES submitted the required demonstration on February 2, 2009; the Hazardous Waste Program will respond to that letter once this matter is settled. If you elect to settle this matter, you will not be admitting to any of the allegations stated in the NOV. You may settle this case by sending a check within the next twenty (20) days to:

Maryland Department of the Environment
P.O. Box 1417
Baltimore, MD 21203-1417

The check should be made payable to the Maryland Hazardous Substance Control Fund. For proper credit, please record the following codes on you check: **PCA** 13703, **Object** 7548, **Suffix** 613, and **return a copy of this letter with your payment.**

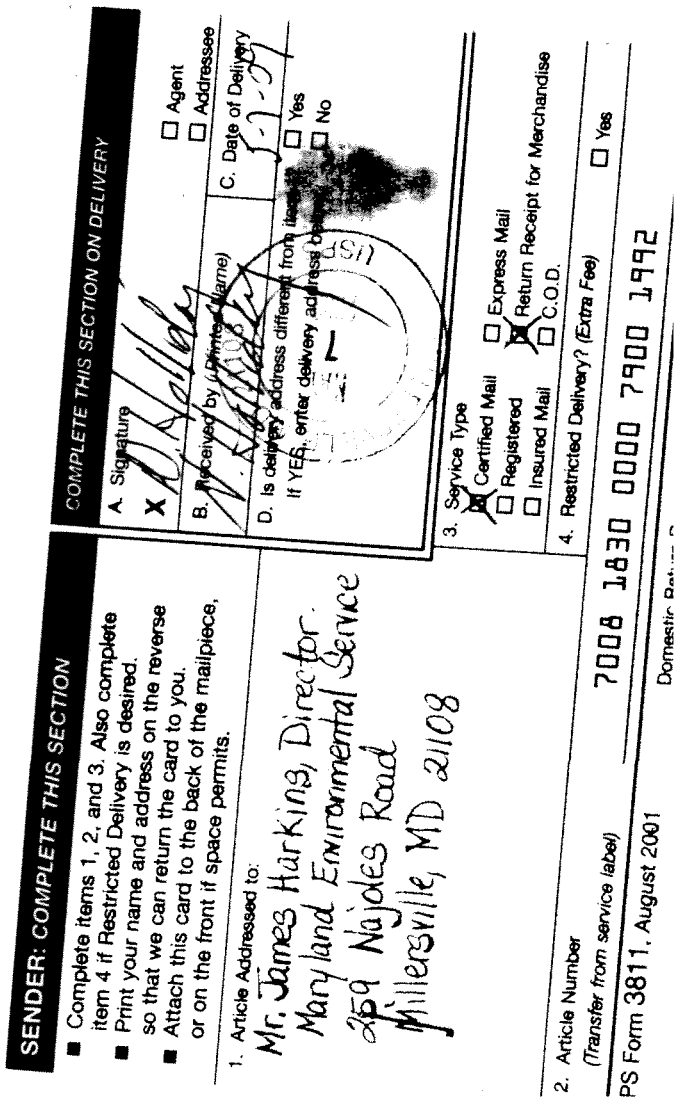
If you have any questions in this matter, please contact Mr. Richard Johnson, Chief, Hazardous Waste Enforcement Division, at (410)537-3400.

Sincerely,

Horacio Tablada, Director
Waste Management Administration

HT:st

cc: Mr. Harold L. Dye, Jr.
Mr. Richard A. Johnson



MARYLAND ENVIRONMENTAL SERVICE

COPY

Martin O'Malley, Governor

James M. Harkins, Director

April 13, 2009

RECEIVED
APR 15 2009
By

Mr. Horatio Tablada
Director, Waste Management Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230-1719

Re: MES Hawkins Point (HP) Landfill
Notice of Violation NOV – 09 - 017

Dear Mr. Tablada:

We are in receipt of the referenced Notice of Violation (NOV) dated April 7, 2009 regarding the 3rd Quarter 2008 Groundwater Monitoring Report for the Hawkins Point Landfill.

There were three issues raised in your NOV, which include:

1) **Issue:** MES failed to determine that a statistically significant increase (SSI) occurred in well 2D within one month of receiving the last replicate result. MDE states that the reporting deadline passed on November 4, 2008, but that MES did not report the apparent SSI until November 20, 2008.

   MES Response: MES identified the unusual reading for well 2D in our November 4, 2008 Quarterly report. We performed the required statistical analysis on the data, but at the time of the report submittal, our statistical analysis did not indicate an SSI. Follow-up conversations with Mr. Jim Leizear on November 10, 2008 raised the possibility that an SSI had occurred. MES investigated those concerns in a timely manner and by November 20, 2008, MES reported back to Mr. Leizear that an SSI had occurred based on a revised analysis of the data.

   In retrospect, a more accurate response on November 20, 2008 should have stated that an SSI was merely apparent based on our revised analysis and that a detailed follow-up investigation would be conducted in compliance with the RCRA permit. In addition, the November 20, 2008 communication should not have definitively stated that an SSI had occurred as our subsequent investigation confirmed that the unusual reading was an anomaly. The possibility that the data was an anomaly was mentioned by MDE as early as November 24, 2008.

   Nonetheless, MES does acknowledge that we should have more clearly communicated the potential for an SSI in our November 4, 2008 report and more clearly indicated that the data

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phone 410-729-8200 • fax 410-729-8220 • www.menv.com

point would be investigated. Subsequent quarterly reports will contain such analysis as necessary.

2) **Issue:** MES failed to notify the MDE in writing within 7 days of a determination that an SSI had occurred of our intention to make a demonstration that the SSI was anomalous. MDE states the notification deadline passed on December 1, 2008 and MES did not submit the notification until December 5, 2008.

   MES Response: As discussed above, MES identified the apparent SSI on November 20, 2008. On November 24, 2008, MES indicated, via e-mail, that we intended to submit the required notifications. By that date, MDE had also recognized the possibility that the data, which produced the SSI in the statistical software, was an anomaly. MES would like to respectfully suggest that the spirit of the intended notification was accomplished in our November 24, 2008 e-mail correspondence with MDE.

3) **Issue:** MDE noted that MES was required to submit the demonstration that the SSI was anomalous by February 18, 2009.

   MES Response: MES would like to note that the required report was submitted to Mr. Jim Leizear on February 2, 2009. Mr. Leizear acknowledged receipt of the document on February 3, 2009.

There are three potential violations contained in your April 7, 2009 NOV. MES feels that two of the three reports were made in a timely manner. We would respectfully request that MDE reduce the proposed settlement amount and dismiss points (2) and (3) above. MES would then be prepared to pay a fine totaling one-third (1/3) of the proposed amount.

We believe that this settlement addresses all the issues of your April 7, 2009 NOV. We respectfully request a response from your department regarding our proposed resolution of the matter. We would also be pleased to meet with you at your convenience to discuss the matter if you would like.

Sincerely,

James M. Harkins

James Harkins
Director,
Maryland Environmental Service

cc: Mark Kreafle, MPA
Harold Dye, MDE
Jim Leizear, MDE
Bernard Penner, MES
David Ferguson, MES
Chris French, HW

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MARYLAND DEPARTMENT OF THE ENVIRONMENT
MDE 1800 Washington Boulevard • Baltimore MD 21230
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Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

April 7, 2009

CERTIFIED MAIL

Mr. James M. Harkins, Director
Maryland Environmental Service
259 Najoles Road
Millersville, MD 21108

RE: MES Hawkins Point Landfill
Notice of Violation NOV-09-017

Dear Mr. Harkins:

On November 5, 2008, the Maryland Department of the Environment (MDE) received the Third Quarter 2008 Groundwater Monitoring Report ("Report") for the MES Hawkins Point Landfill. The Report's cover letter was dated November 4, 2008, and indicated that a sample obtained from groundwater monitoring well 2D on July 3, 2008 exhibited a total chromium concentration of 1.43 mg/L, exceeding its MCL. The letter did not state that, for the third quarter 2008, well 2D also exhibited a statistically significant increase (SSI).

Following review of the report by MDE, a Department representative requested clarification of information regarding the statistical analysis performed on data obtained from well 2D for the third quarter. Specifically, the information provided in the report was ambiguous concerning whether an SSI had actually occurred during the 3rd quarter at well 2D. On November 20, 2008, an email from MES indicated that review of the data by MES' contractor indicated that an SSI had occurred at well 2D.

CHS Facility Permit A-264, page 19, PART IV.G.4 and Appendix 8, section 10.4.8, require MES to perform a statistical evaluation of groundwater data within one month after receiving analytical results from the last replicate for that quarter. The last replicate from well 2D was obtained on September 4, 2008. It is unclear from the MES report when MES received the data, although page 7 of 15 of the Atlantic Coast Laboratories report notes that the data was "reported" on 092508. Based on these dates, MDE believes that a reasonable date to determine the SSI would have been November 4, 2008, the date of the cover letter to the report. MES failed to determine the SSI in well 2D by November 4, 2008, in violation of Permit conditions IV.G.4. As noted above, notification occurred on November 20, 2008.

CHS Facility Permit A-264, page 20, PART IV.H.3.a. requires MES to notify MDE in writing within 7 days of determination by MES that an SSI has occurred. Permit condition PART IV.H.4.a. requires that, should MES choose to demonstrate that the SSI was caused by a source other than the

regulated unit, MES must notify MDE in writing, within 7 days of determination that an SSI has occurred, that MES intends to make the demonstration. Using November 20, 2008 as the date upon which MES determined that an SSI had occurred, the two required notifications should have been submitted to MDE by December 1, 2008 at the latest. However, the notifications were not received by MDE until December 5, 2008, in violation of the two permit conditions cited above.

State law permits MDE to seek civil penalties of $25,000.00 per day per violation for the violations cited above. MDE has determined that a penalty of $5,000.00 is appropriate. If you decline to settle this matter, the case will be referred to the Office of the Attorney General for possible action. Any subsequent violations at this facility may subject you to separate civil penalties. Therefore, MES is advised to maintain the facility in compliance with applicable Maryland laws and regulations, and CHS Facility Permit A-264. In particular please note that the Permit, page 21, PART IV.H.4.b.requires MES to provide a report making the demonstration within 90 days of determination of the SSI, which in this case would be February 18, 2009.

If you decide to settle this case, you will not be admitting to any of the allegations stated herein. You may settle this case by sending a check for $5,000.00 within the next twenty (20) days to:

Maryland Department of the Environment
P.O. Box 1417
Baltimore, MD 21203-1417

The check should be made payable to the Maryland Hazardous Substances Control Fund. For proper credit, please record the following codes on your check: **PCA** 13701, **Object** 7548, **Suffix** 613, and **return a copy of this letter with your payment**.

If you have any questions in this matter, please refer them to Mr. Richard Johnson, Chief, Hazardous Waste Enforcement Division, at (410) 537-3400.

Sincerely,

Horacio Tablada, Director
Waste Management Administration

HT:st

cc: Mr. David Ferguson
Mr. Harold L. Dye, Jr.
Mr. Richard A. Johnson
Ms. Cindy Keller
EPA
File

RECEIVED
APR - 9 2009

U0005367

NOTIFICATION FOR UNDERGROUND STORAGE TANKS

Return completed form to:

Maryland Department of the Environment
Oil Control Program
2500 Broening Highway
Baltimore MD 21224

****

State Use Only

Facility ID Number 0006130

Alt ID Number 3-003186 BC

Date Entered into Computer 5/13/98

Data Clerk's Initials bw

Owner Contacted to Clarify Response _____

Comments _____

TYPE OF NOTIFICATION: (check one)

☐ New Facility ☒ Amended ☐ Closure

3 Number of tanks at facility
0 Number of continuation sheets attached

I. OWNERSHIP INFORMATION:

Owner ID: 00456

Owner Name: MARYLAND ENVIRONMENTAL SERVICE

Street Address: 2011 COMMERCE PARK DRIVE

Mailing Address (if different from above): _____

ANNAPOLIS MD 21401
City State Zip Code

ANNE ARUNDEL
County:

(410) 974-7295
Phone Number:

Contact Person: MR. ROBERT M TENANTY

TYPE OF OWNER: (check one)

Government
- ___ Federal
- X State
- ___ Local

Commercial
- ___ Corporation
- ___ Company
- ___ Partnership
- ___ Individual

Non-Commercial
- ___ Residential
- ___ Agricultural
- ___ Non-Profit Agency

II. LOCATION OF TANK(S)

Facility Name or Company Site Identifier as applicable: HAWKINS POINT HAZARDOUS WASTE LANDFILL

Street Address: 5501 QUARANTINE ROAD

Mailing Address (if different from above): _____

BALTIMORE MD 21206 BALTIMORE CITY
City State Zip Code County

Phone Number: ( ) SAME

Facility Operator: SAME

MDE 231 (rev. 12/96)

III. TYPE OF FACILITY: (check one)

___ Federal Non-Military	___ Gas Station	___ Private Home
___ Federal Military	___ Petroleum Distributor	___ Apt. / Condo
___ Educational	___ Trucking / Transport	___ Farm / Nursery
___ Fire/Rescue/Ambulance	___ Industrial	___ Marina
___ Public Service	___ Contractor	___ Store
___ Utilities	___ Airline	___ Office
___ Railroad	___ Auto Deale	X Other LANDFILL

IV. CONTACT PERSON IN CHARGE OF TANKS

Name: MR. ROBERT M. TENANTY Job Title: SR. PROJECT MANAGER

Address: 2011 COMMERCE PARK DRIVE ANNAPOLIS MD 21401 Phone Number: (410) 974-7295

V. FINANCIAL RESPONSIBILITY (if applicable - see instruction sheet)

I have met the financial responsibility requirements in accordance with 40 CFR Part 280, Subpart H

☐ YES ☐ No NOT APPLICABLE

___ Commercial Insurance		
Policy # ___	___ Self Insurance	___ Letter of Credit
Insurer ___	___ Insurance Pool	___ Surety Bond
Agent/Broker ___	___ Risk Retention Group	___ Other method allowed
Phone No. ___	___ Guarantee	(specify) ___

VI. CERTIFICATION (to be completed by owner or owner's representative)

I certify, under penalty of law, that I have personally examined, and am familiar with, the information submitted in this and all attached documents, and that the information provided is in compliance with COMAR 26.10.03, and is true, accurate, and complete.

Name (print/type): ROBERT M. TENANTY Title (print/type): SR. PROJECT MANAGER

Signature: Robert M Tenanty Date Signed: 6/11/97

VII. DESCRIPTION OF UNDERGROUND STORAGE TANKS (complete for each tank at this facility)

Tank Identification Number	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
Alt. Tank ID Number	Tank No 001	Tank No 002	Tank No 003	Tank No	Tank No
1. Status of Tank (Mark only one)					
Currently in Use	X	X	X		
Temporarily Out of Use					
Permanently Out of Use					
2. Date of Installation (mo/yr)	6/83	6/83	6/83		
3. Total Capacity (gallons)	30,000	30,000	600		
4. Material of Construction (mark all that apply)					
Asphalt Coated or Bare Steel					
Cathodically Protected Steel					
Composite (Steel w/ Fiberglass)					
Concrete					
Fiberglass Reinforced Plastic	X	X	X		
Polyethylene Tank Jacket					
Unknown					
Other (specify)					
Has tank been repaired?	Yes___ No X	Yes___ No X	Yes___ No X	Yes___ No___	Yes___ No___
Double-walled					
Excavation Liner					
Lined Interior					
5. Piping (material) (mark all that apply)					
Bare Steel					
Galvanized Steel					
Fiberglass Reinforced Plastic					
Copper					
Flexible Plastic					
Unknown					
Other (specify)	PVC	PVC	PVC		
Cathodically Protected					
Double-walled					
Secondary Containment					

VII. DESCRIPTION OF UNDERGROUND STORAGE TANKS (complete for each tank at this facility)

Tank Identification Number	Tank No.____	Tank No.____	Tank No.____	Tank No.____	Tank No.____
Alt. Tank ID Number	Tank No 001	Tank No 002	Tank No 003	Tank No.____	Tank No.____
6. Piping (Type) (mark all that apply)					
Pressure	X	X			
Gravity Feed	X	X	X		
Suction: no valve at tank (Safe Suction)					
Suction: valve at tank (U.S. Suction)					
Has piping been repaired?	Yes___ No X	Yes___ No X	Yes___ No X	Yes___ No___	Yes___ No___
7. Substance Currently or Last Stored					
Gasoline					
Diesel					
Gasohol					
Kerosene					
Heating Oil					
Used Oil					
Hazardous Substance CERCLA name and/or CAS #	Chrome Leachate	Chrome Leachate	Chrome Contaminated Wash Water		
Other, please specify					
Mixture of Substances Please specify					
8. Closing of Tank NA					
Estimated date last used (mo/day/yr)	/ /	/ /	/ /	/ /	/ /
Date tank closed (mo/day/yr)	/ /	/ /	/ /	/ /	/ /
Tank was removed from ground	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
Tank filled with inert material	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
List material used					
Change in service to non-regulated substance	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___
9. Site Assessment Completed?	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___	Yes___ No___

VII. DESCRIPTION OF UNDERGROUND STORAGE TANKS (complete for each tank at this facility)

Tank Identification Number	Tank No.____		Tank No.____		Tank No.____		Tank No.____		Tank No.____	
Alt. Tank ID Number	Tank No. 001		Tank No. 002		Tank No. 003		Tank No.____		Tank No.____	
10. Release Detection (mark all that apply)	TANK	PIPING	TANK	PIPING	TANK	PIPING	TANK	PIPING	TANK	PIPING
Manual tank gauging	X		X		X					
Tank tightness testing	X		X							
Inventory controls	X		X							
Automatic tank gauging										
Vapor monitoring										
Groundwater monitoring										
Interstitial monitoring double-walled tank/piping										
Statistical Inventory Reconciliation (SIR)										
Automatic line leak detection										
Line tightness testing										
Other method allowed (specify)	____	____	____	____	____	____	____	____	____	____
11. Spill and Overfill Protection										
Overfill device installed										
Spill catch basin										
12. Stage I Vapor Recovery	Yes___ No___		Yes___ No___		Yes___ No___		Yes___ No___		Yes___ No___	
13. Stage II Vapor Recovery	Yes___ No___		Yes___ No___		Yes___ No___		Yes___ No___		Yes___ No___	

VIII. CERTIFICATION OF COMPLIANCE (complete for all new and upgraded tanks at this location)

NA

INSTALLER CERTIFICATION

I certify that the underground storage system installed, upgraded, or repaired at this facility is in compliance with all applicable regulations.

Installer:_____ _____

Print Name Signature

MDIC-_____ _____ _____

State ID Number Date Company

MARYLAND
ENVIRONMENTAL
SERVICE

Parris N. Glendening
Governor

James W. Peck
Director

June 11, 1997

Ms. Cynthia Keller, Chief
Office of Resource Management
Oil Control Program
Maryland Department of the Environment
2500 Broening Highway
Baltimore, MD 21224

Dear Ms. Keller:

Enclosed is the completed Notification for Underground Storage Tanks form for the three tanks located at our Hawkins Point Hazardous Waste Landfill in Baltimore. These tanks have been in service and were reported to your Agency several years ago. It is planned to abandon these tanks under current COMAR regulations within the next year.

If you have any questions or require additional information, please contact me a (410) 974-7295.

Sincerely,

Robert M Tenanty

Robert M. Tenanty, P.E.
Chief, Waste Remediation

enclosures

cc: Tarsem Thohan

RECEIVED
JUN 16 1997

2011 Commerce Park Drive • Annapolis, Maryland 21401 • 410/974/7281 • Fax 410/974/7267

August 5, 2009

Correspondence Containing Groundwater Monitoring Report

MARYLAND
ENVIRONMENTAL
SERVICE

Martin O'Malley, Governor **James M. Harkins, Director**

August 5, 2009

Mr. James Leizear
Hazardous Waste Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 650
Baltimore, Maryland 21230

RECEIVED
ERRP

RE: Permit No.: A-264 Hawkins Point Hazardous Waste Facility
Second Quarter 2009 Groundwater Monitoring Report

Dear Mr. Leizear:

Enclosed, please find the laboratory data reports and statistical analyses for the groundwater-monitoring event at the referenced landfill during the monitoring period of April 1, 2009 through June 30, 2009. The six (6) compliance wells, three (3) upgradient non-compliance wells (R, S, Y) and three (3) downgradient non-compliance wells (M, Z, W) as well as 2A were sampled during this quarter for the same parameters as the compliance wells. The data was statistically evaluated using both the One-Way ANOVA and the Non-Parametric ANOVA procedures. The analytical results for the Second Quarter 2009 Groundwater Monitoring Event yielded no analytes that exceeded the MCL.

Groundwater monitoring wells 2D and 2F displayed statistically significant increases (SSI's) for barium, pH, and temperature. Additionally, groundwater monitoring wells 2E and 2G displayed SSI's for pH and turbidity. Based on the results of this quarter's statistical analysis and previous correspondence, the facility will continue to remain in detection monitoring in accordance with our existing RCRA permit #A-264.

If you have any questions concerning this report, please do not hesitate to contact me at (410) 729-8367 or by email: hbenn@menv.com.

Sincerely,

Horace Bennett, Environmental Specialist
Technical & Environmental Service

cc: David Ferguson
Mark Kreafle
Chris French
Kenneth Biles
Bernard Penner (cover letter only)

259 Najoles Road • Millersville, Maryland • 21108
phone 410-729-8200 • fax 410-729-8220 • www.menv.com

SECOND QUARTER 2009

GROUNDWATER MONITORING REPORT

RECEIVED
5 2009
ERRP

HAWKINS POINT
HAZARDOUS WASTE FACILITY
RCRA Permit #A-264

FOR THE PERIOD OF
April 1, 2009 – June 30, 2009

MARYLAND
ENVIRONMENTAL
SERVICE

PREPARED BY:

Maryland Environmental Service
259 Najoles Road
Millersville, Maryland 21108

August 2009

HAWKINS POINT HAZARDOUS WASTE FACILITY
Second Quarter 2009 Groundwater Monitoring Report

Table of Contents

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2.0 Site Background Information..... pg. 1
3.0 General Site Conditions..... pg. 2
4.0 Quarterly Sampling Event..... pg. 2
5.0 Field Logs..... pg. 2
6.0 Quality Assurance / Quality Control..... pg. 2
7.0 Chain of Custody..... pg. 3
8.0 Groundwater Elevation Contour Map and Velocity Calculations..... pg. 3
9.0 Statistical Analysis..... pg. 5
10.0 Conclusion ..... pg. 6

FIGURES

Figure 1. Site Vicinity Map

TABLES

Table 1. Comparison of Analysis – Sample vs. Duplicate

Table 2. Depth to Water / Water Table Elevations 2nd Quarter 2009

APPENDICES

A. Field Logs and Chain of Custody Forms

B. Event Summary by Sampling Date

C. Historical Data

D. Analytical Results and Laboratory Data

E. Groundwater Elevation Contour Map

F. Statistical Analysis

Hawkins Point Hazardous Waste Facility

1.0 Introduction

This report compiles the data from the groundwater monitoring events during the second quarter of 2009 (March 1, 2009 through June 30, 2009) at the Hawkins Point Hazardous Waste Facility. The data was statistically evaluated using both the One-Way ANOVA and the Non-Parametric ANOVA procedures, as required by the RCRA Permit #A-264.

2.0 Site Background Information

The Hawkins Point Hazardous Waste Landfill, located at 5501 Quarantine Road, Baltimore, Maryland 21226 comprises ten (10) waste cells containing historical chrome ore tailings, chrome process waste, chrome contaminated soil, trash, and debris from the former Allied Corporation, Baltimore Works. The landfill stopped accepting waste when it reached capacity in 1993. As an operational function of the landfill, leachate flow is collected in underground storage tanks (USTs) from each cell and then combined in a 21,573 gallon aboveground tank. Collected leachate is then transported offsite by a licensed hauler (Envirite of Pennsylvania, Inc.) for treatment and disposal. A Site Vicinity Map is enclosed as Figure 1.

Soils onsite range from Post-Cretaceous sediments near the surface and are primarily silty clays with trace sands. This second layer averages a depth of approximately ten (10) feet and has hydraulic conductivity values in the range of $1x10^{-4}$cm/s. Below this layer, Cretaceous clay is encountered. This layer has an average depth of around 50 feet and previous geotechnical testing (Black & Veatch, 1986) has shown the layer to have a hydraulic conductivity of $1x10^{-6}$cm/s. Varying from sixty to one hundred feet below mean sea level, and under the clay layer, is an equally thick deposit of Cretaceous sands. Hydraulic conductivity here is in the $1x10^{-2}$cm/s range (Black & Veatch, 1986). Groundwater flow is generally from west to east, towards Thoms Cove. Seventeen (17) monitoring wells are located along the site perimeter and three (3) piezometers (TPZ 1, 2 & 3) are located within Area 5. The piezometers were installed as part of the landfill repair in 2005. By design, the piezometers did not penetrate below the fill into the natural water table and are therefore indicative only of the perched water table within the fill. These piezometers are not used in generating the Groundwater Contour Map (Appendix E). There are no other known wells within the limits of the landfill.

The site is divided into three (3) basic areas: Area 5 comprising of compliance wells 2D, 2F, and 2B; the "Trough Area" with compliance wells 2E, 2G, and 2H; and the MPA area with non-compliance wells M, R, S, T, U, V, W, X, Y, Z, and 2A.

The depth to water is measured in all wells on a quarterly basis. The three (3) upgradient non-compliance wells (R, S, Y) and three (3) downgradient non-compliance wells (M, Z, W), as well as 2A, are sampled during the first and third quarter event of each year. The locations of all wells are shown on the Groundwater Elevation Contour Map in Appendix E.

3.0 General Site Conditions

Each well on-site is inspected monthly by the facility operators for integrity and any physical damage or tampering. Prior to purging, the Maryland Environmental Service (MES) inspects the wells again for any damage. As a result, no damage was observed during the Second Quarter 2009 monitoring event.

4.0 Quarterly Sampling Event

Groundwater samples were collected from compliance wells 2D, 2F, 2B (Area 5) and 2E, 2G and 2H ("Trough" Area) during this quarterly sampling event and analyzed by Atlantic Coast Laboratories. During the quarterly monitoring period, all of the wells in Area 5 and the "Trough" Area were sampled in quadruplicate as per the RCRA Controlled Hazardous Substances Permit number A-264 for this site. The compliance wells sampled during the second quarter sampling events were analyzed for the list of metals and indicator parameters established in the MDE approved Sampling and Analysis Plan. None of the wells had constituents above their respective MCLs during this quarterly event.

Completed field data notes from this monitoring event are included in Appendix A. Sampling event summaries are enclosed in Appendix B. Historical groundwater quality data for the last seven (7) years for all compliance and non-compliance wells are enclosed in Appendix C. The raw laboratory results are included in Appendix D.

5.0 Field Logs

Prior to the purging event, the depth to water and the depth to the bottom of each well was measured by Maryland Environmental Service (MES) staff and recorded in the field logbook. Three (3) well volumes were calculated and subsequently purged using dedicated submersible bladder pumps. The purged water was collected in a drum and discharged into the on-site leachate collection tank. Field measurements including pH, specific conductivity and temperature were recorded in the field book during the sample collection. Copies of the field logs from the Second Quarter 2009 monitoring event are included in Appendix A for review.

6.0 Quality Assurance / Quality Control

In addition to the Quality Assurance / Quality Control (QA/QC) performed by the laboratory, one (1) field blank sample was collected and analyzed during each day of sampling to establish quality control for sample collection techniques. Field blanks were prepared on-site with deionized water and handled using the same sampling protocol as the groundwater samples. Trip blanks were prepared in the MES lab for each of the sampling events. At least one (1) duplicate was collected for every ten (10) samples, or once per day in accordance with the Sampling and Analysis Plan.

There were a total of ten (10) trace detections (three (3) of sodium, two (2) of sulfate, two (2) of iron, two (2) of total organic halogen, and one (1) of turbidity) determined by the laboratory analysis of the trip blanks. The detections were reported from the results of five (5) different sampling events. The laboratory analytical results from several of the duplicate samples throughout the Second Quarter sampling event varied from analytical results of the initial well sample. A chart comparing samples and duplicates (Table 1.0) can be found, along with the sample event summaries, in Appendix B. It should be noted that the duplicate samples are collected immediately after the original sample collection. Additionally, Table 1.0 notes variation in the turbidity between the original samples and the duplicate samples. The differences in turbidity readings are believed to potentially be a result of sampling techniques, such as releasing the bailer too rapidly in the well during the event.

7.0 Chain of Custody

Each groundwater sample bottle was marked using unique sample identification and documented on a Chain of Custody form. Additionally, the sample location, date, and collection time, were recorded on the Chain of Custody. Each sample was preserved as required by the test method and relinquished to the laboratory for analysis. Copies of the Chain of Custody forms from the Second Quarter 2009 monitoring event are included in Appendix A.

8.0 Groundwater Elevation Contour Map and Velocity Calculations

A Groundwater Elevation Contour Map and spreadsheet showing water levels and elevations are both included in Appendix E. The Groundwater Elevation Contour Map was constructed using the depths to water measured during the second quarter and recorded on the field logs. The water table elevations were then determined by subtracting the depth to water from the casing reference elevation. The groundwater elevation contours do not indicate any significant changes in the hydrogeologic conditions of the site since the last quarterly sampling event. Direction of groundwater flow is towards the east in the "Trough Area" and towards the northeast in Area 5.

Table 2
Depth to Water / Water Table Elevation 2nd Quarter 09
2nd Quarter 2009

ID #	Northing	Easting	Top PVC	DTW	Depth	GW Elev
TPZ 1	562016.6	1439830.4	39.89	13.50	16.90	26.39
TPZ 2	562108.5	1439678.3	65.83	38.90	42.18	26.93
TPZ 3	562373.4	1439455.6	78.40	53.60	58.20	24.80
2A	562741.1	1439074.9	43.50	41.75	64.60	1.75
2B	562317.7	1439272.6	41.50	28.55	47.74	12.95
2D	562289.3	1439749.1	27.30	24.90	38.30	2.40
2E	562025.5	1440032.1	22.83	19.20	42.10	3.63
2F	562686.7	1439423.0	29.94	23.45	31.95	6.49
2G	562021.9	1439921.0	24.86	18.60	37.60	6.26
2H*	561853.5	1439574.4	--	--	--	--
M	561944.1	1440383.4	20.78	18.00	41.40	2.78
R	561320.3	1440895.5	28.71	24.40	63.55	4.31
S	560957.0	1440448.4	38.67	31.30	62.60	7.37
T	561196.6	1440015.4	38.16	30.65	54.54	7.51
U	561497.7	1439798.0	33.55	24.80	64.00	8.75
V	561796.9	1440046.9	28.71	23.20	49.31	5.51
W	561856.2	1440574.7	23.10	21.10	32.30	2.00
X	561477.6	1440760.7	28.86	27.00	47.60	1.86
Y	561725.3	1440872.1	26.08	21.80	43.40	4.28
Z	561981.9	1440649.3	17.39	15.51	31.35	1.88

*Well 2H lid was not able to be opened on the date elevation readings were collected for the 2nd Quarter 2009.

As dictated by the controlled hazardous waste substance permit, the calculation of the groundwater velocity was performed using the following formula and assumptions:

$V = Ki / n_e$
V = velocity (feet per day)
K = hydraulic conductivity (0.34 ft/day)
i = hydraulic gradient (dh/dl)
n_e = effective porosity (0.30)

The calculated velocities are illustrated in the following table:

Wells	2B → 2D	2B → 2F	2B → 2G
	i=(12.95-2.40)/422 i= 0.025 V=((0.34'/day)(.025)) 0.3 V = 0.028 ft/day	i=(12.95-6.49)/582 i= 0.011 V=((0.34'/day)(.011)) 0.3 V = 0.012 ft/day	i=(12.95-6.26)/635 i= 0.010 V=((0.34'/day)(.010)) 0.3 V=0.011 ft/day

Note: The n_e and k values are obtained from 1986 Black and Veatch Hydrogeologic Assessment and slug test data.

9.0 Statistical Analysis

Downgradient wells 2D and 2F were statistically compared to the upgradient monitoring well 2B to determine if there is a significant change in groundwater chemistry as groundwater migrates below the fill. Based on the hydrogeologic location of these wells, the groundwater flow is typically directed from the upgradient well (2B) towards the downgradient wells (2D and 2F). These three (3) wells have previously been denoted as the Area 5 wells. Additionally, "Trough Area" wells 2E and 2G were statistically compared to upgradient well 2H. The hydrogeology and direction of the groundwater flow in this area is different from the hydrogeology in Area 5; therefore, "Trough Area" wells are statistically analyzed separately from Area 5 wells. The Statistical evaluation was based on the comparisons between the upgradient and downgradient wells in each denoted area. As required by the regulatory requirements, a background pool was compiled using the data from all four (4) replicates from this sampling event for the downgradient wells and the last five (5) years of sampling events for the upgradient wells. A commercially available software package (*ChemStat*) was utilized to statistically evaluate all downgradient wells for possible contamination. The complete statistical analysis calculations are included in Appendix D.

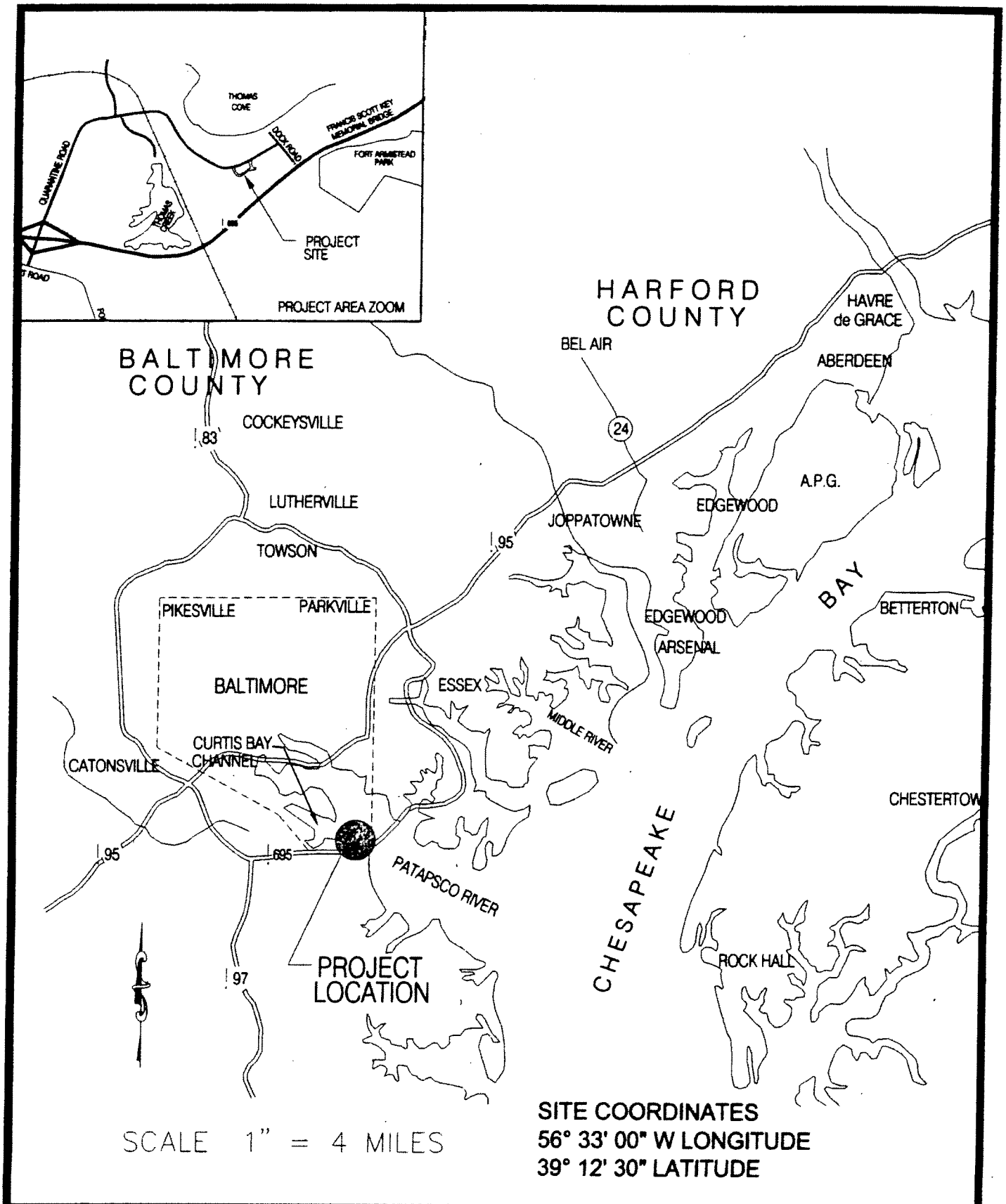
All of the quarterly indicator and groundwater quality parameters were statistically analyzed. The analyses were in accordance with the RCRA Controlled Hazardous Substance Permit number A-264 in order to determine if the downgradient wells have been affected by landfill leachate.

As per the EPA's "Interim Final Guidance Document on the Statistical Analysis of Groundwater Monitoring Data of RCRA Facilities" (1989) and "Addendum to Interim Final Guidance" (1992), the number of samples below the detection limit (non-detects) was determined. The statistical analysis for both areas (Area 5 and Trough Area) were run using the Kruskal-Wallis Non-Parametric Test because the data for all parameters was either not normal, did not have equal variance, or had greater than fifteen percent (>15%) non-detects.

When the Non-Parametric ANOVA procedure is used, all non-detectable data is replaced by half the value of the minimum Practical Quantitation Level (PQL/2). If the minimum PQL is not available, the Laboratory Detection Limit (LDL) was used. When the non-parametric procedure is used, the non-detects are replaced by the ranked values by treating all the non-detects as tied values.

10.0 Conclusion

The analytical results for the Second Quarter 2009 Groundwater Monitoring Event yielded that none of the wells had constituents exceeding the MCL. Groundwater monitoring well 2F displayed a statistically significant increase (SSI) for barium, and 2D and 2F displayed SSIs for pH, and temperature. Additionally, groundwater monitoring wells 2E and 2G displayed SSI's for pH and turbidity. SSIs for pH have occurred in previous quarterly sampling events. Due to naturally acidic conditions in the site area, an increase in pH towards a neutral value shows a reduction of the acidity of the groundwater indicating an improvement in groundwater quality across the site. Based on the results of this quarter's analytical data and statistical analysis and previous correspondence the facility will continue to remain in detection monitoring.



MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT HAZARDOUS WASTE FACILITY VICINITY MAP

Appendix A

Field Logs and Chain of Custody Forms

EMR FIELDBOOK SHEET

PROJECT NAME: Hawkins Pt. Landfill-Compliance

SAMPLER NAME(S): [illegible]

WEATHER CONDITIONS: [illegible]

PURGE DATE: 4-[illegible]-09

Well ID #	Depth to Water	Depth to Bottom	Feet of Water	Multiplier	Volume to be Purged	Flow Rate ~~1Liter/sec~~ gal	55% Drum	% of Drum	NOTES:
2B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
2D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
2E	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
2F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
2G	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
2H	[illegible]	[illegible]	[illegible]	~~[illegible]~~	49.37	[illegible]	[illegible]		[illegible]

All wells were in good condition
2H - strong smell

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 4-9-08

1ST DAY REP SJ / Bernie (ACL) Clear 60's

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2E First	18.90	1137	3.58	14	7070			
2E Second			3.58	14	7080			
2E Third			3.54	14	7150			Nothing of
2E Composite			3.54	14	7230			note on site
2H First	8.04	1115	3.97	11	15610			
2H Second			3.96	11	15700			
2H Third			3.94	12	15890			
2H Composite			3.96	12	15870			
2G First	18.02	1152	5.51	14	6750			
2G Second			5.54	14	6720			
2G Third			5.57	14	6730			
2G Composite			5.73	15	6750			
2B First	28.34	1240	3.75	15	4460			
2B Second			3.73	14	4410			
2B Third			3.70	15	4490			
2B Composite			3.70	15	4500			
2D First	24.78	1207	6.15	15	936			
2D Second			6.17	15	941			
2D Third			6.17	15	943			
2D Composite			6.29	15	938			
2F First	24.34	1222	4.53	15	766			
2F Second			4.46	15	783			
2F Third			4.42	15	851			
2F Composite			4.47	15	762			
2H Dup. First		1125	3.96	11	15810			
Dup. Second			3.98	11	15920			
Dup. Third			3.96	11	15960			
Dup. Composite			3.98	12	16040			
Blank		1055	7.17	11.2	2			
TRIP		1050	7.17	11.9	1			

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 7/13/09

4TH DAY REP T. Peyton / Bernie (ACL)

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2E First	18.70	12:05	3.54	14	7460			
2E Second			3.51	13	7420			
2E Third			3.48	13	7460			
2E Composite			3.49	13	7420			
2H First	7.95	11.28	3.97	10	16500			
2H Second			3.92	10	16520			
2H Third			3.90	10	16600			
2H Composite			3.92	11	16630			
2G First	7.8[illegible]	11.30	5.53	13	7070			
2G Second			5.57	14	7010			
2G Third			5.59	13	7000			
2G Composite			5.67	14	7050			
2H Dup. First	7.95	11.37	3.92	10	16520			
2H Dup. Second			3.91	10	16500			
2H Dup. Third			3.89	11	16650			
2H Dup. Composite			3.91	11	16720			
Blank	—	11.15	6.51	7	1			
Trip	—	11.10	6.55	7	2			

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 4-17-09

4TH DAY REP S. Johnson / Bernie (ACL)

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2E First	18.22	1220	3.43	14	7110			
2E Second	↓	↓	3.43	14	7110			
2E Third	↓	↓	3.42	14	7050			Nothing of
2E Composite	↓	↓	3.42	14	7300			note on site
2H First	7.74	1142	4.01	11	16390			
2H Second	↓	↓	3.90	11	16240			
2H Third	↓	↓	3.89	11	16350			
2H Composite	↓	↓	3.91	12	16160			
2G First	17.48	1207	5.59	14	6790			
2G Second	↓	↓	5.56	14	6750			
2G Third	↓	↓	5.52	14	6740			
2G Composite	↓	↓	5.58	15	6740			
2H Dup. First		1149	3.87	11	16230			
2H Dup. Second		↓	3.88	11	16220			
2H Dup. Third		↓	3.88	11	16220			
2H Dup. Composite		↓	3.88	11	16260			
Blank			6.52	13	1			
Trip			6.45	12	1			

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 4/21/09

4TH DAY REP

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2E First	17.6	11:53	3.39	14°	7240			
2E Second	—	—	3.38	13°	7360			
2E Third	—	—	3.34	13°	7390			
2E Composite	—	—	3.34	13°	7450			
2H First	6.8	11:25	3.88	11°	16310			
2H Second	—	—	3.85	11°	16240			
2H Third	—	—	3.83	11°	16190			
2H Composite	—	—	3.83	12°	16480			
2G First	16.8	12:18	5.51	14°	6450			
2G Second	—	—	5.52	14°	6680			
2G Third	—	—	5.55	14°	6630			
2G Composite	—	—	5.62	14°	6710			
2H Dup. First	—	11:35	3.87	12°	16250			
Dup. Second	—	—	3.86	11°	16380			
Dup. Third	—	—	3.86	12°	16590			
Dup. Composite	—	—	3.86	12°	16200			
Blank	—	10:55	7.60	14°	1			
Trip	—	10:50	7.56	14	2			
	—	—	—	—	—	—	—	—

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 4-30-09

21ST DAY REP 60's, cloudy S. Johnson / Bernie (ACL)

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2B First	28.38	1332	3.07	14	4140			MDE inspector present
2B Second	↓	↓	3.07	14	4150			
2B Third	↓	↓	3.09	14	4150			first bailer broke
2B Composite	↓	↓	3.09	14	4170			out 2D
2D First	24.30	1229	6.69	15	818			
2D Second	↓	↓	6.53	15	822			Hornets' nest found
2D Third	↓	↓	6.38	15	819			and destroyed in
2D Composite	↓	↓	6.34	15	826			~~inner~~ outer casing of
2F First	23.02	1305	3.96	14	225			2B
2F Second	↓	↓	3.81	14	271			
2F Third	↓	↓	3.70	14	376			
2F Composite	↓	↓	3.75	15	270			
2D Dup. First		1245	6.09	15	817			
2D Dup. Second		↓	6.07	15	817			
2D Dup. Third		↓	6.04	15	814			
2D Dup. Composite		↓	6.07	15	821			
Blank		1205	6.94	16	1			
Trip		1200	7.03	16	2			

2nd 3rd Rep

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 5/21/09

21ST DAY REP HSimmons ~~Sett~~ /ACL Bernie High 80°

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2B First	28.75	12:13	3.40	15°	4090			
2B Second			3.36	15°	3990			
2B Third			3.36	15°	3980			
2B Composite			3.36	16°	4100			
2D First	24.95	11:43	6.29	16°	825			
2D Second			6.34	16°	827			
2D Third			6.29	16°	835			
2D Composite			6.43	16°	820			
2F First	23.20	11:25	4.04	16°	206			
2F Second			3.94	16°	292			
2F Third			3.82	15°	381			
2F Composite			3.93	15°	273			
2D Dup. First	—	11:53	6.36	16°	820			
Dup. Second			6.40	16°	813			
Dup. Third			6.41	16°	817			
Dup. Composite			6.41	16°	815			
Blank	—	11:00	5.77	19°	2			
Trip	—	11:05	5.83	19°	1			

PROJECT NAME: Hawkins Pt. Landfill-Compliance **SAMPLE DATE:** 6.11.09

21ST DAY REP SLINDEL

Well ID #	Depth to Water	Time	pH	Temp oC	Cond. us or ms			NOTES:
2B First	27.67	1255	3.44	15	3980			
2B Second	↓	↓	3.39	15	3970			
2B Third	↓	↓	3.39	15	3990			
2B Composite	↓	↓	3.37	15	4070			
2D First	23.73	1232	6.39	16	777			
2D Second	↓	↓	6.40	16	771			
2D Third	↓	↓	6.44	16	776			
2D Composite	↓	↓	6.46	16	784			
2F First	22.0	1218	3.71	15	1469			
2F Second	↓	↓	3.60	15	1660			
2F Third	↓	↓	3.42	15	2470			
2F Composite	↓	↓	3.60	15	1564			
2D Dup. First	—	1240	6.39	16	770			
↓ Dup. Second	↓	↓	6.38	16	769			
↓ Dup. Third	↓	↓	6.41	16	776			
↓ Dup. Composite	↓	↓	6.42	16	783			
Blank	—	1135	5.95	22	1			
Trip	—	1130	5.95	22	2			

CHAIN OF CUSTODY RECORD

Atlantic Coast Laboratories, Inc.
833 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Client Code: M-SJ
Client Name: MES
Address: 250 Naples Rd
Millersville, MD 21108
Phone: 410-374-7388
Work ID: Hawkins Point Stby Well Sampling

Sample ID	Date Sampled	Time	Size	Container	#	Preservative	Sample Matrix	Preservative	Analysis	pH	Cond	Temp
Well TB	4/9/09	1050	250	G	1	GW	H2SO4		X	a 7.17	1	12
			250	P	1	GW	Chill		X	b		
			500	P	1	GW	HNO3		X	c		
			1000	P	1	GW	H2SO4		X	d		
Well FB		1055	250	G	1	GW	H2SO4		X	a 7.17	2	12
			250	P	1	GW	Chill		X	b		
			500	P	1	GW	HNO3		X	c		
			1000	P	1	GW	H2SO4		X	d		
Well 2H		1115	250	G	1	GW	H2SO4		X	a 3.97	15610	11
			250	P	1	GW	Chill		X	b 3.96	15700	11
			500	P	1	GW	HNO3		X	c 3.94	15890	12
			1000	P	1	GW	H2SO4		X	d 3.96	15820	12
Well 2H dup		1125	250	G	1	GW	H2SO4		X	a 3.96	15810	11
			250	P	1	GW	Chill		X	b 3.98	15920	11
			500	P	1	GW	HNO3		X	c 3.96	15960	11
			1000	P	1	GW	H2SO4		X	d 3.98	16040	12
Well 2E		1137	250	G	1	GW	H2SO4		X	a 3.55	7070	14
			250	P	1	GW	Chill		X	b 3.58	7080	14
			500	P	1	GW	HNO3		X	c 3.54	7150	14
			1000	P	1	GW	H2SO4		X	d 3.54	7230	14
Well 2G		1152	250	G	1	GW	H2SO4		X	a 5.51	6750	14
			250	P	1	GW	Chill		X	b 5.54	6720	14
			500	P	1	GW	HNO3		X	c 5.57	6730	14
			1000	P	1	GW	H2SO4		X	d 5.73	6750	15
Well 2D		1207	250	G	1	GW	H2SO4		X	a 6.15	936	15
			250	P	1	GW	Chill		X	b 6.17	941	15
			500	P	1	GW	HNO3		X	c 6.17	943	15
			1000	P	1	GW	H2SO4		X	d 6.29	934	15
Well 2F		1222	250	G	1	GW	H2SO4		X	a 4.53	766	15
			250	P	1	GW	Chill		X	b 4.46	783	15
			500	P	1	GW	HNO3		X	c 4.42	851	15
			1000	P	1	GW	H2SO4		X	d 4.47	762	15
Well 2B		1240	250	G	1	GW	H2SO4		X	a 3.75	4460	15
			250	P	1	GW	Chill		X	b 3.73	4410	14
			500	P	1	GW	HNO3		X	c 3.70	4490	15
			1000	P	1	GW	H2SO4		X	d 3.70	4500	15
Well			250	G	1	GW	H2SO4		X	a		
			250	P	1	GW	Chill		X	b		
			500	P	1	GW	HNO3		X	c		
			1000	P	1	GW	H2SO4		X	d		

Relinquished by: [signature] 4/9/09
Received by: [signature] 4/9/9 16:50

Samples Used: 3.2
Samples Left:

Order ID: A09040600

A090406 00

CHAIN OF CUSTODY RECORD

Client code: MES_
Client name: MES
Address: 254 Najoe Ave Inc
Mt Holly NJ 21108
Phone: 410 974-7258
Work ID: Hawkins Point Qtrly Well Compliance

Sampling: 5/13/09

Atlantic Coast Laboratories, Inc
630 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Sample ID	Date Sampled	Time	Size	Qty	Type	Sample Matrix	Preservative	VOC	GC	BA_ml	OC_4	pH	Cond	Temp
Well TB	4/13/09	1110	250	G	X	1	GW	H2SO4	X			a 6.55	2	7
"			250	F	X	1	GW	Chill		X		b		
"			500	P	X	1	GW	HNO3			X	c		
"			1000	P	X	1	GW	H2SO4			X	c		
Well EB		1115	250	G	X	1	GW	H2SO4	X			a 6.51	1	7
"			250	F	X	1	GW	Chill		X		b		
"			500	P	X	1	GW	HNO3			X	c		
"			1000	P	X	1	GW	H2SO4			X	d		
Well 2H		1128	250	G	X	1	GW	H2SO4	X			a 3.97	16500	10
"			250	F	X	1	GW	Chill		X		b 3.92	16500	10
"			500	P	X	1	GW	HNO3			X	c 3.50	16600	10
"			1000	P	X	1	GW	H2SO4			X	d 3.92	16630	10
Well 2H dup		1132	250	G	X	1	GW	H2SO4	X			a 3.92	16530	10
"			250	F	X	1	GW	Chill		X		b 3.91	16500	10
"			500	P	X	1	GW	HNO3			X	c 3.89	16650	10
"			1000	P	X	1	GW	H2SO4			X	d 3.91	16720	10
Well 2G		1150	250	G	X	1	GW	H2SO4	X			a 5.53	7020	13
"			250	F	X	1	GW	Chill		X		b 5.52	7010	14
"			500	P	X	1	GW	HNO3			X	c 5.52	7005	13
"			1000	P	X	1	GW	H2SO4			X	d 5.62	7050	14
Well 2E		1205	250	G	X	1	GW	H2SO4	X			a 3.54	7460	14
"			250		X	1	GW	Chill		X		b 3.51	7420	13
"			500	P	X	1	GW	HNO3			X	c 3.48	7460	13
"			1000	P	X	1	GW	H2SO4			X	d 3.49	7430	13
Well			250	G	X	1	GW	H2SO4	X			a		
"			250	P	X	1	GW	Chill		X		b		
"			500	P	X	1	GW	HNO3			X	c		
"											X	d		
Well												a		
"												b		
"												c		
"											X	d		
Well			250	G	X	1	GW	H2SO4	X			a		
"			250	P	X	1	GW	Chill		X		b		
"			500	P	X	1	GW	HNO3			X	c		
"			1000	P	X	1	GW	H2SO4			X	d		
Well			250	G	X	1	GW	H2SO4	X			a		
"			250	P	X	1	GW	Chill		X		b		
"			500		X	1	GW	HNO3			X	c		
"			1000	P	X	1	GW	H2SO4			X	d		

Order ID: A09040682

A 0 9 0 4 0 6 8 2

Relinquished by: 4/13/09 1635
Received by: 4/13/9 1635
Samples Sent: Yes No
Samples Pickup:

2.9

CHAIN OF CUSTODY RECORD

Client Name: MES, LLC
Contact Name: MES
Address: 256 Kaiplex Rd
Millersville, MD 21108
Phone: 410-974-7258
Work ID: Hawkins Point CDF Wells Compliance

Billing: Standing 3120.00

Atlantic Coast Laboratories, Inc
630 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Sample ID	Date Sampled	Time	Container Size	G/P	# of Ctr	Sample Matrix	Preservative	FTOX	CLP	SO4	NO3	PH	Cond	Temp
Well TB	4/17/09	1120	250	G	X	1	GW	H2SO4	X				a 6.45 1	12
"			250	P	X	1	GW	CHill		X			b	
"			500	P	X	1	GW	HNO3			X		c	
"			1000	P	X	1	GW	H2SO4				X	d	
Well FB		1125	250	G	X	1	GW	H2SO4	X				a 6.52 1	13
"			250	P	X	1	GW	CHILL		X			b	
"			500	P	X	1	GW	HNO3			X		c	
"			1000	P	X	1	GW	H2SO4				X	d	
Well OH		1142	250	G	X	1	GW	H2SO4	X				a 4.01 16390	11
"			250	P	X	1	GW	Chill		X			b 3.90 16240	11
"			500	P	X	1	GW	HNO3			X		c 3.89 16350	11
"			1000	P	X	1	GW	H2SO4				X	d 3.91 16160	12
Well OH dup		1149	250	G	X	1	GW	H2SO4	X				a 3.87 16230	11
"			250	P	X	1	GW	CHill		X			b 3.88 16220	11
"			500	P	X	1	GW	HNO3			X		c 3.88 16220	11
"			1000	P	X	1	GW	H2SO4				X	d 3.88 16260	11
Well 2G		1207	250	G	X	1	GW	H2SO4	X				a 5.59 6740	14
"			250	P	X	1	GW	Chi		X			b 5.56 6750	14
"			500	P	X	1	GW	HNO3			X		c 5.52 6740	14
"			1000	P	X	1	GW	H2SO4				X	d 5.58 6740	15
Well 2E		1220	250	G	X	1	GW	H2SO4	X				a 3.43 7110	14
"			250	P	X	1	GW	Chill		X			b 3.43 7110	14
"			500	P	X	1	GW	HNO3			X		c 3.42 7050	14
"			1000	P	X	1	GW	H2SO4				X	d 3.42 7300	14
Well			250	G	X	1	GW	H2SO4	X				a	
"			250	P	X	1	GW	Chi		X			b	
"			500	P	X	1	GW	HNO3			X		c	
"													d	
Well														
"														
"														
"														
Well														
"														
"														
"														
Well														
"														
"														
"														
Well														
"														
"														
"														
Well			500	P	X	1	GW	HNO3			X		c	
"			1000	P	X	1	GW	H2SO4				X	c	

Order ID: A09040989

A09040989

Relinquished by: [signature] Date: 4/17/09 Time: 1410
Received by: [signature] Date: 4/17/09 Time: 1410
Relinquished by: [signature] Date: 4/17/09 Time: 1410
Received by: [signature] Date: 4/17/9 Time: 1645
Samples Intact
Samples Preserved

7.2 7.2

CHAIN OF CUSTODY RECORD

Client Code: WCP B
Client Name: WCS
Address: 259 Najoles Rd, Millersville, MD 21108
Phone: 410 974 7285
Work ID: Hawkins Point Qtrly Water Compliance

Atlantic Coast Laboratories, Inc
635 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Sample ID	Date Sampled	Time	Container Size	Cont.	Filtered	Preserv.	Sample Matrix	Analysis	Bottles Qty	TPP TP_low TP_hi	Metals Pb_low Pb_hi	Metals Fe_low Fe_hi	Metals Mn_low Mn_hi	Metals Phenol	pH_f	Cond_f	Temp
Well T3	4/21/04	1050	250	G	X	1	GW	H2SO4	X						a 7.56	2	14
"			250	P	X	1	GW	Chill		X					b		
"			500	P	X	1	GW	HNO3				X			c		
"			1000	P	X	1	GW	H2SO4						X	d		
Well F3		1055	250	G	X	1	GW	H2SO4	X						a 7.60	1	14
"			250	P	X	1	GW	CHILL		X					b		
"			500	P	X	1	GW	HNO3				X			c		
"			1000	P	X	1	GW	H2SO4						X	c		
Well 2H		1125	250	G	X	1	GW	H2SO4	X						a 3.83	16310	11
"			250	P	X	1	GW	Chill		X					b 3.85	16340	11
"			500	P	X	1	GW	HNO3				X			c 3.83	16190	11
"			1000	P	X	1	GW	H2SO4						X	d 3.83	16480	12
Well 2H dup		1135	250	G	X	1	GW	H2SO4	X						a 3.81	16250	12
"			250		X	1	GW	Chill		X					b 3.80	16380	11
"			500	P	X	1	GW	HNO3				X			c 3.86	16590	12
"			1000		X	1	GW	H2SO4						X	d 3.86	16700	12
Well 2E		1153	250	G	X	1	GW	H2SO4	X						a 3.29	7240	14
"			250	P	X	1	GW	Chill		X					b 3.38	7360	13
"			500	P	X	1	GW	HNO3				X			c 3.34	7390	11
"			1000	P	X	1	GW	H2SO4						X	d 3.34	7450	13
Well 2G		1218	250	G	X	1	GW	H2SO4	X						a 5.51	6450	14
"			250	P	X	1	GW	Chill		X					b 5.52	6650	14
"			500	P	X	1	GW	HNO3				X			c 5.55	6630	14
"			1000	P	X	1	GW	H2SO4						X	d 5.62	6710	14
We			250	G	X	1	GW	H2SO4	X						a		
"			250	P	X	1	GW	Chill		X					b		
"			500	P	X	1	GW	HNO3				X			c		
"			1000	P	X	1	GW	H2SO4						X	d		
Well			2[illegible]														
"			2[illegible]														
"			[illegible]														
"			10[illegible]														
Well			2[illegible]														
"			2[illegible]														
"			5[illegible]														
"			10[illegible]														
We			2[illegible]														
"			2[illegible]														
"			50[illegible]														
"			1000	P	X	1	GW	H2SO4						X	d		

Order ID: A09041131

A09041131

Relinquished by: [signature] Date/Time: 4/21/04 17:15
Received by: [signature] Date/Time: 4/21/04 17:15

Samples Rec: ✓
Samples Preserv: ✓

5.6

CHAIN OF CUSTODY RECORD

Client name: MES
Client name: MES
Address: 259 Naples Rd
Millersville, MD 21108
Phone: 410 974 7288
Work ID: Hawkins Point Qtrly Wells Compliance

Mean sampling: 5:20:00

Atlantic Coast Laboratories, Inc
630 Churchmans Road
Newark, Delaware 19702
*(302)266-9121 * 454-8720 (FAX)*

Sample ID	Date Sampled	Time	Container Size	C/P	#	Sample Matrix	Preservative	TOX	TURB CR_tot A_Cyn SO4_to CLR	Diss DISC MA_tot NA_tot FE_tot OR_tot BA_tot	TH_tot nen a TOT_P	pH_to	Cond_t	Temp
Well TB	4/30/09	1200	250	G	1	GW	H2SO4	X				a 7.03	2	16
"			250	P	1	GW	Chill		X			b		
"			500	P	1	GW	HNO3			X		c		
"			1000	P	1	GW	H2SO4				X	d		
Wel FB		1205	250	G	1	GW	H2SO4	X				a 6.94	1	16
"			250	P	1	GW	Chill		X			b		
"			500	P	1	GW	HNO3			X		c		
"			1000	P	1	GW	H2SO4				X	d		
Well 2D		1224	250	G	1	GW	H2SO4	X				a 6.69	813	15
"			250	P	1	GW	Chill		X			b 6.53	800	15
"			500	P	1	GW	HNO3			X		c 6.38	815	15
"			1000	P	1	GW	H2SO4				X	d 6.34	816	15
Well 2D dup		1245	250	G	1	GW	H2SO4	X				a 6.09	817	15
"			250	P	1	GW	Chill		X			b 6.02	817	15
"			500	P	1	GW	HNO3			X		c 6.04	814	15
"			1000	P	1	GW	H2SO4				X	d 6.07	821	15
Well 2F		1305	250	G	1	GW	H2SO4	X				a 3.96	225	14
"			250	P	1	GW	Chill		X			b 3.81	271	14
"			500	P	1	GW	HNO3			X		c 3.70	376	14
"			1000	P	1	GW	H2SO4				X	d 3.75	270	15
Well 2B		1322	250	G	1	GW	H2SO4	X				a 3.07	4140	14
"			250	P	1	GW	Chill		X			b 3.07	4150	14
"			500	P	1	GW	HNO3			X		c 3.09	4150	14
"			1000	P	1	GW	H2SO4				X	d 3.09	4150	14
Wel			250	G	1	GW	H2SO4	X				a		
"			250	P	1	GW	Chill		X			b		
"			500	P	1	GW	HNO3			X		c		
"			1000	P	1	GW	[illegible]							
Well			25											
"			25											
"			50											
"			10											
Well			25											
"			25											
"			50											
"			10											
Well			25											
"			25											
"			500	P	1	GW	HNO3			X		c		
"			1000	P	1	GW	H2SO4				X	d		

Order ID: A09041695

A 9 9 2 4 1 6 9 5

Relinquished by	Date/Time	Received by	Date/Time
[signature]	4/30/09 16:20	[signature]	4/30/9 16:20

Lab use only	Yes	No	Comments
Samples cool	✓		4.4°
Samples intact	✓		

CHAIN OF CUSTODY RECORD

Atlantic Coast Laboratories, Inc
630 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Client Code: MLS_B
Client Name: MLS
Address: 259 Knights Rd
Millersville, MD 21108
Phone: 410-574-7288
Work ID: Hawkins Point Qtrly Wells Compliance

Mode: Sampling

Sample ID	Date Sampled	Time	Size	G/P	Sample Matrix	Preservative						pH_Id	Cond_f	Temp
Well TB	5/21/09	1100	250	G	X	1	GW	H2SO4	X			a 5.77	2	19
			250	P	X	1	GW	Chl		X		b		
			500	P	X	1	GW	HNO3			X	c		
			1000	P	X	1	GW	H2SO4			X	d		
Well FB		1105	250	G	X	1	GW	H2SO4	X			a 5.83	1	19
			250	P	X	1	GW	Chl		X		b		
			500	P	X	1	GW	HNO3			X	c		
			1000	P	X	1	GW	H2SO4			X	d		
Well 2F		1125	250	G	X	1	GW	H2SO4	X			a 4.04	206	16
			250	P	X	1	GW	Chl		X		b 3.94	292	16
			500	P	X	1	GW	HNO3			X	c 3.82	281	15
			1000	P	X	1	GW	H2SO4			X	d 3.83	276	15
Well 2D		1143	250	G	X	1	GW	H2SO4	X			a 6.29	826	16
			250	P	X	1	GW	Chl		X		b 6.34	805	16
			500		X	1	GW	HNO3			X	c 6.29	827	16
			1000	P	X	1	GW	H2SO4			X	d 6.43	835	16
Well 2Ddup		1153	250	G	X	1	GW	H2SO4	X			a 6.36	820	16
			250	P	X	1	GW	Chl		X		b 6.40	813	16
			500	P	X	1	GW	HNO3			X	c 6.41	817	16
			1000	P	X	1	GW	H2SO4			X	d 6.41	815	16
Well 2B		1213	250	G	X	1	GW	H2SO4	X			a 3.40	4090	15
			250	P	X	1	GW	Chl		X		b 3.36	3970	15
			500	P	X	1	GW	HNO3			X	c 3.36	3980	15
			1000	P	X	1	GW	H2SO4			X	d 3.36	4100	16
Well			250	G	X	1	GW	H2SO4	X			a		
			250	P	X	1	GW	Chl		X		b		
			500	P	X	1	GW	HNO3			X	c		
												d		
Well												a		
												b		
												c		
												d		
Well												a		
												b		
												c		
												d		
Well												a		
												b		
												c		
												d		
			500	P	X	1	GW	HNO3			X	c		
			1000	P	X	1	GW	H2SO4			X	d		

Order ID: A09051171

A 0 9 0 5 1 1 7 1

Signature: [signature] Date/Time: 5/21/09 16:30 Signature: [signature] Date/Time: 5/21/9 16:30

Sample Cond: ✓
Sample Cond: ✓

6.8°

CHAIN OF CUSTODY RECORD

Client code: MES_B
Client name: MES
Address: 200 Naples Rd
Millersville, MD 21108
Phone: 410-674-7285
Work ID: Hawkins Point Qtrly Wells Compliance

Atlantic Coast Laboratories, Inc
630 Churchmans Road
Newark, Delaware 19702
(302)266-9121 * 454-8720 (FAX)

Sample ID	Date Sampled	Time	Container Size	G/P	#	Sample Matrix	Preservative	SHOX	VOC 25_brx AIC_wet SO4_c	Cl_prep D2002 MN_ccp NO_ccp	PH_c Phenol TOC_A		pH Ltd	Conc	Temp
Well TB	6/11/09	1130	250	G	X 1	GW	H2SO4	X				a	5.95	2	22
"			250	P	X 1	GW	Chill		X			b			
"			500	P	X 1	GW	HNO3			X		c			
"			1000	P	X 1	GW	H2SO4				X	d			
Well FB		1135	250	G	X 1	GW	H2SO4	X				a	5.95	1	22
"			250	P	X 1	GW	Chill		X			b			
"			500	P	X 1	GW	HNO3			X		c			
"			1000	P	X 1	GW	H2SO4				X	d			
Well 2F		1218	250	G	X 1	GW	H2SO4	X				a	3.71	1469	15
"			250	P	X 1	GW	Chill		X			b	3.60	1663	15
"			500	P	X 1	GW	HNO3			X		c	3.42	2170	15
"			1000	P	X 1	GW	H2SO4				X	d	3.60	1566	15
Well 2D		1232	250	G	X 1	GW	H2SO4	X				a	6.39	777	16
"			250	P	X 1	GW	Chill		X			b	6.40	771	16
"			500	P	X 1	GW	HNO3			X		c	6.44	776	16
"			1000	P	X 1	GW	H2SO4				X	c	6.46	784	16
Wel 2D dup		1240	250	G	X 1	GW	H2SO4	X				a	6.39	770	16
"			250	P	X 1	GW	Chill		X			b	6.38	769	16
"			500	P	X 1	GW	HNO3			X		c	6.41	776	16
"			1000	P	X 1	GW	H2SO4				X	c	6.42	753	16
Well 2B		1255	250	G	X 1	GW	H2SO4	X				a	3.44	3960	15
"			250	P	X 1	GW	Chill		X			b	3.39	3976	15
"			500	P	X 1	GW	HNO3			X		c	3.39	3990	15
"			1000	P	X 1	GW	H2SO4				X	d	3.37	4070	15
Well			250	G	X 1	GW	H2SO4	X				a			
"			250	P	X 1	GW	Chill		X			b			
"			500	P	X 1	GW	HNO2			X		c			
"											X	d			
Well												a			
"												b			
"												c			
"											X	d			
Well												a			
"												b			
"												c			
"											X	d			
Well												a			
"												b			
"			500	P	X	GW	HNO3			X		c			
"			1000	P	X 1	GW	H2SO4				X	c			

Order ID: A09060746

A09060746

Relinquished by: Date/Time 6/11/09 16:15
Received by: Date/Time 6/11/9 16:15

Lab Use Only: Yes / No / Number
Received Intact: /
Samples Filtered: / 7.3

Appendix B

Event Summary by Sampling Date

Sampling Event:			4/9/2009								
Number of Sampling Locations:			9								
Parameter Name	**Units**	**Compliance Limit**	**2E**	**2H**	**2G**	**2B**	**2D**	**2F**	**2HDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	179	744	256	145	37.1	33.5	703	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	221	729	274	134	79.7	77.6	655	ND	ND
Sulfate, Ion Chrome	mg/L	-	7433	15326	5569	4386	356	406	16980	ND	3.35
Temperature	C	-	14.0	11.5	14.25	14.75	15.0	15.0	11.25	12.0	12.0
Total Organic Carbon, Aq	mg/L	-	3.3	5.1	14	8.8	3.7	1.7	5.4	ND	ND
Total Organic Halogen	mg/L	-	0.08	0.23	0.20	0.28	0.07	0.08	0.49	0.01	0.01
Turbidity	NTU	-	74	38	376	16	31	49	42	ND	ND
pH, Field	pH	-	3.56	3.96	5.59	3.72	6.20	4.47	3.97	7.17	7.17
Specific Conductance, Field	umhos	-	7132.5	15767.5	6442.25	4465	939.5	790.5	15912.5	2	1
Barium, ICP	mg/L	2.0	0.011	0.022	0.020	0.016	0.023	0.053	0.021	ND	ND
Chromium, ICP	mg/L	0.1	0.019	0.032	0.008	0.017	0.048	ND	0.032	ND	ND
Iron,ICP	mg/L	-	2202	4968	1250	1276	3.47	6.91	4448	ND	ND
Manganese, ICP	mg/L	-	82.7	151	43.4	30.9	0.213	0.531	138	ND	ND

Sampling Event:			4/13/2009					
Number of Sampling Locations:			6					
Parameter Name	**Units**	**Compliance Limit**	**2H**	**2G**	**2E**	**2HDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	793	265	190	789	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	874	297	215	840	ND	ND
Sulfate, Ion Chrome	mg/L	-	16263	5973	7731	17698	ND	1.73
Temperature	C	-	10.0	13.5	13.25	10.0	7.0	7.0
Total Organic Carbon, Aq	mg/L	-	30	14	7.1	32	ND	ND
Total Organic Halogen	mg/L	-	0.59	0.16	0.23	0.65	0.02	0.01
Turbidity	NTU	-	35	352	38	27	ND	ND
pH, Field	pH	-	3.93	5.59	3.51	3.91	6.51	6.55
Specific Conductance, Field	umhos	-	16562.5	7032.5	7440	16600	1	2
Barium, ICP	mg/L	2.0	0.020	0.021	0.008	0.023	ND	ND
Chromium, ICP	mg/L	0.1	0.029	0.007	0.019	0.039	ND	ND
Iron,ICP	mg/L	-	5662	1312	2020	4993	ND	ND
Manganese, ICP	mg/L	-	189	53.5	90.6	189	ND	ND

Sampling Event:			4/17/2009					
Number of Sampling Locations:			6					
Parameter Name	**Units**	**Compliance Limit**	**2H**	**2G**	**2E**	**2HDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	610	234	169	594	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	841	262	178	879	ND	ND
Sulfate, Ion Chrome	mg/L	-	16932	6166	8304	16820	ND	ND
Temperature	C	-	11.25	14.25	14.0	11.0	13	12
Total Organic Carbon, Aq	mg/L	-	27	12	6.5	29	ND	ND
Total Organic Halogen	mg/L	-	ND	ND	ND	ND	ND	ND
Turbidity	NTU	-	16	138	6.0	17	ND	ND
pH, Field	pH	-	3.93	5.56	3.43	3.88	6.52	6.45
Specific Conductance, Field	umhos	-	16285	6755	7142.5	16232.5	1	1
Barium, ICP	mg/L	2.0	0.021	0.020	0.006	0.022	ND	ND
Chromium, ICP	mg/L	0.1	0.038	ND	0.011	0.033	ND	ND
Iron,ICP	mg/L	-	5881	1254	1721	6087	ND	ND
Manganese, ICP	mg/L	-	189	47.9	71.3	196	ND	ND

Sampling Event:			4/21/2009					
Number of Sampling Locations:			6					
Parameter Name	**Units**	**Compliance Limit**	**2H**	**2E**	**2G**	**2HDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	674	198	263	716	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	744	180	245	687	0.090	0.125
Sulfate, Ion Chrome	mg/L	-	19069	8177	6901	19443	ND	ND
Temperature	C	-	11.25	13.25	14.0	11.75	14.0	14.0
Total Organic Carbon, Aq	mg/L	-	29.7	1.97	10.8	26.2	ND	ND
Total Organic Halogen	mg/L	-	0.064	ND	ND	0.133	ND	ND
Turbidity	NTU	-	40	55	386	37	ND	ND
pH, Field	pH	-	3.85	3.36	5.55	3.86	7.60	7.56
Specific Conductance, Field	umhos	-	16305	7360	6617.5	16480	1	2
Barium, ICP	mg/L	2.0	0.021	0.005	0.021	0.021	ND	ND
Chromium, ICP	mg/L	0.1	0.026	0.025	0.011	0.023	ND	ND
Iron,ICP	mg/L	-	5927	1792	1266	5156	ND	0.066
Manganese, ICP	mg/L	-	188	81.0	51.0	170	ND	ND

Sampling Event:			4/30/2009					
Number of Sampling Locations:			6					
Parameter Name	**Units**	**Compliance Limit**	**2D**	**2F**	**2B**	**2DDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	31.8	21.6	136	29.8	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND'	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	68.1	17.5	105	67.4	ND	ND
Sulfate, Ion Chrome	mg/L	-	314	83.7	4001	292	ND	ND
Temperature	C	-	15.0	14.25	14.0	15.0	16.0	16.0
Total Organic Carbon, Aq	mg/L	-	3.88	ND	5.12	4.74	ND	ND
Total Organic Halogen	mg/L	-	ND	ND	ND	ND	ND	ND
Turbidity	NTU	-	16	1.9	8.7	35	ND	ND
pH, Field	pH	-	6.49	3.81	3.08	6.07	6.94	7.03
Specific Conductance, Field	umhos	-	821.25	285.5	4152.5	817.25	1	2
Barium, ICP	mg/L	2.0	0.023	0.028	0.020	0.023	ND	ND
Chromium, ICP	mg/L	0.1	ND	ND	0.017	0.006	ND	ND
Iron,ICP	mg/L	-	1.53	0.859	1049	3.56	ND	ND
Manganese, ICP	mg/L	-	0.089	0.145	29.0	0.120	ND	ND

Sampling Event:			5/21/2009					
Number of Sampling Locations:			6					
Parameter Name	**Units**	**Compliance Limit**	**2F**	**2D**	**2B**	**2DDUP**	**Blank**	**Trip**
Chloride, Ion Chrome	mg/L	-	20.3	28.9	140	28.1	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	14.6	56.7	95.8	58.3	0.031	ND
Sulfate, Ion Chrome	mg/L	-	90.6	274	3789	264	ND	ND
Temperature	C	-	15.5	16.0	15.25	16.0	19.0	19.0
Total Organic Carbon, Aq	mg/L	-	ND	4.6	6.8	5.3	ND	ND
Total Organic Halogen	mg/L	-	ND	ND	ND	ND	ND	ND
Turbidity	NTU	-	0.69	7.8	7.5	19.5	0.02	0.05
pH, Field	pH	-	3.91	6.34	3.37	6.40	5.83	5.77
Specific Conductance, Field	umhos	-	263.75	828.25	4040	816.25	1	2
Barium, ICP	mg/L	2.0	0.026	0.023	0.017	0.025	ND	ND
Chromium, ICP	mg/L	0.1	ND	ND	0.015	0.006	ND	ND
Iron,ICP	mg/L	-	0.435	0.905	966	1.84	ND	ND
Manganese, ICP	mg/L	-	0.134	0.060	29.0	0.092	ND	ND

Sampling Event: 6/11/2009
Number of Sampling Locations: 6

Parameter Name	Units	Compliance Limit	2B	2D	2F	2DDUP	Blank	Trip
Chloride, Ion Chrome	mg/L	-	130	25.6	45.9	26.2	ND	ND
Chromium, hexavalent	mg/L	-	ND	ND	ND	ND	ND	ND
Phenols, Total, 4-AAP	mg/L	-	ND	ND	ND	ND	ND	ND
Sodium, ICP	mg/L	-	96.2	47.7	138	47.0	0.084	0.133
Sulfate, Ion Chrome	mg/L	-	3679	227	903	231	ND	ND
Temperature	C	-	15	16	15	16	22	22
Total Organic Carbon, Aq	mg/L	-	7.7	4.7	3.0	5.9	ND	ND
Total Organic Halogen	mg/L	-	ND	ND	ND	ND	ND	ND
Turbidity	NTU	-	3.7	5.0	2.6	24	ND	ND
pH, Field	pH	-	3.40	6.42	3.46	6.40	5.95	ND
Specific Conductance, Field	umhos	-	4002.5	777	1716.25	774.5	1	2
Barium, ICP	mg/L	2.0	0.021	0.031	0.029	0.031	ND	ND
Chromium, ICP	mg/L	0.1	0.012	ND	ND	ND	ND	ND
Iron,ICP	mg/L	-	889	0.558	29.9	2.14	0.060	0.056
Manganese, ICP	mg/L	-	24.6	0.058	1.45	0.119	ND	ND

Table 1
2nd Quarter 2009 Comparison of Analysis - Sample vs. Duplicate

DATE	ANALYTE	SAMPLE a	DUPLICATE b	DIFFERENCE a-b	% CHANGE a-b / a
04/09/09 2H	Chloride	744	703	41.00	6%
04/09/09 2H	Sulfate	15326	16040	-714.00	-5%
04/09/09 2H	Turbidity	38	42	-4.00	-11%
04/09/09 2H	Iron	4968	4448	520.00	10%
04/09/09 2H	Manganese	151	138	13.00	9%
04/09/09 2H	Sodium	729	655	74.00	10%
04/09/09 2H	Total Organic Halogen	0.23	0.49	-0.26	-113%
04/13/09 2H	Sulfate	16263	17698	-1435.00	-9%
04/13/09 2H	Turbidity	35	27	8.00	23%
04/13/09 2H	Choromium	0.029	0.039	-0.01	-34%
04/13/09 2H	Iron	5662	4993	669.00	12%
04/13/09 2H	Total Organic Halogen	0.59	0.65	-0.06	-10%
04/17/09 2H	Turbidity	16	17	-1.00	-6%
04/17/09 2H	Chromium	0.038	0.033	0.01	13%
04/17/09 2H	Iron	5881	6087	-206.00	-4%
04/17/09 2H	Manganese	189	196	-7.00	-4%
04/17/09 2H	Sodium	841	879	-38.00	-5%

Table 1
2nd Quarter 2009 Comparison of Analysis - Sample vs. Duplicate

DATE	ANALYTE	SAMPLE a	DUPLICATE b	DIFFERENCE a-b	% CHANGE a-b / a
04/21/09 2H	Chloride	674	716	-42.00	-6%
04/21/09 2H	Turbidity	40	37	3.00	8%
04/21/09 2H	Iron	5927	5156	771.00	13%
04/21/09 2H	Manganese	183	170	13.00	7%
04/21/09 2H	Sodium	744	687	57.00	8%
04/21/09 2H	Total Organic Carbon	29.7	26.2	3.50	12%
04/21/09 2H	Total Organic Halogen	0.064	0.133	-0.07	-108%
04/30/09 2D	Chloride	31.8	29.8	2.00	6%
04/30/09 2D	pH	6.49	6.07	0.42	6%
04/30/09 2D	Sulfate	314	292	22.00	7%
04/30/09 2D	Turbidity	16	35	-19.00	-119%
04/30/09 2D	Iron	1.53	3.56	-2.03	-133%
04/30/09 2D	Manganese	0.089	0.12	-0.03	-35%
04/30/09 2D	Total Organic Carbon	3.88	4.74	-0.86	-22%
05/21/09 2D	Sulfate	274	264	10.00	4%
05/21/09 2D	Turbidity	7.8	19.5	-11.70	-150%
05/21/09 2D	Iron	0.905	1.84	-0.94	-103%

Table 1

2nd Quarter 2009 Comparison of Analysis - Sample vs. Duplicate

DATE	ANALYTE	SAMPLE a	DUPLICATE b	DIFFERENCE a-b	% CHANGE a-b / a
05/21/09 2D	Manganese	0.06	0.092	-0.03	-53%
05/21/09 2D	Total Organic Carbon	4.6	5.3	-0.70	-15%
06/11/09 2D	Chloride	25.6	26.1	-0.50	-2%
06/11/09 2D	Iron	0.558	2.14	-1.58	-284%
06/11/09 2D	Manganese	0.058	0.119	-0.06	-105%
06/11/09 2D	Total Organic Carbon	4.7	5.9	-1.20	-26%
06/11/09	Turbidity	5	24	-19.00	-380%

Appendix C

Historic Data

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		**2A**		
Number of Sampling Dates:		**6**		
7/22/2005	2A	Barium	mg/L	0.028
3/23/2006	2A	Barium	mg/L	0.058
8/31/2006	2A	Barium	mg/L	0.029
2/1/2007	2A	Barium	mg/L	0.07
7/26/2007	2A	Barium	mg/L	0.032
7/10/2008	2A	Barium	mg/L	0.029
3/24/2009	2A	Barium	mg/L	0.048
2/8/2008	2A	Barium	mg/L	0.040
7/22/2005	2A	Chloride	mg/L	14
3/23/2006	2A	Chloride	mg/L	16.4
8/31/2006	2A	Chloride	mg/L	16.4
2/1/2007	2A	Chloride	mg/L	16.4
7/26/2007	2A	Chloride	mg/L	12.5
7/10/2008	2A	Chloride	mg/L	12.4
3/24/2009	2A	Chloride	mg/L	15.7
2/8/2008	2A	Chloride	mg/L	14.3
7/22/2005	2A	Chromium	mg/L	ND
3/23/2006	2A	Chromium	mg/L	ND
8/31/2006	2A	Chromium	mg/L	ND
2/1/2007	2A	Chromium	mg/L	0.058
7/26/2007	2A	Chromium	mg/L	ND
7/10/2008	2A	Chromium	mg/L	ND
3/24/2009	2A	Chromium	mg/L	0.023
2/8/2008	2A	Chromium	mg/L	ND
7/22/2005	2A	Chromium, hexavalent	mg/l	ND
3/23/2006	2A	Chromium, hexavalent	mg/l	ND
8/31/2006	2A	Chromium, hexavalent	mg/l	ND
2/1/2007	2A	Chromium, hexavalent	mg/l	ND
7/26/2007	2A	Chromium, hexavalent	mg/L	ND
7/10/2008	2A	Chromium, Hexavalent	mg/L	ND
3/24/2009	2A	Chromium, hexavalent	mg/L	ND
2/8/2008	2A	Chromium, hexavalent	mg/L	ND
7/22/2005	2A	Iron	mg/L	0.284
7/22/2005	2A	Iron	mg/L	0.284
3/23/2006	2A	Iron	mg/L	21.1
8/31/2006	2A	Iron	mg/L	0.416
2/1/2007	2A	Iron	mg/L	24.4
7/26/2007	2A	Iron	mg/L	ND
7/10/2008	2A	Iron	mg/L	9.45
3/24/2009	2A	Iron	mg/L	10.2
2/8/2008	2A	Iron	mg/L	0.938
7/22/2005	2A	Manganese	mg/L	0.086
3/23/2006	2A	Manganese	mg/L	0.831
8/31/2006	2A	Manganese	mg/L	0.109
2/1/2007	2A	Manganese	mg/L	0.946
7/26/2007	2A	Manganese	mg/L	0.086
7/10/2008	2A	Manganese	mg/L	0.383
3/24/2009	2A	Manganese	mg/L	0.114
2/8/2008	2A	Manganese	mg/L	0.112
7/22/2005	2A	Phenols	mg/L	ND
7/22/2005	2A	Phenols	mg/L	ND
3/23/2006	2A	Phenols	mg/L	ND
8/31/2006	2A	Phenols	mg/L	ND
7/10/2008	2A	Phenols, Total	mg/L	ND
3/24/2009	2A	Phenols, Total	mg/L	ND
7/22/2005	2A	Sodium	mg/L	6.56
3/23/2006	2A	Sodium	mg/L	7.06
8/31/2006	2A	Sodium	mg/L	6.59
2/1/2007	2A	Sodium	mg/L	9.75
7/26/2007	2A	Sodium	mg/L	6.55
7/10/2008	2A	Sodium	mg/L	6.72
3/24/2009	2A	Sodium	mg/L	6.73
2/8/2008	2A	Sodium	mg/L	7.32
7/26/2007	2A	Sulfate	mg/L	25.1
7/10/2008	2A	Sulfate	mg/L	28.9
3/24/2009	2A	Sulfate	mg/L	37
2/8/2008	2A	Sulfate	mg/L	31.4
7/22/2005	2A	Sulfate	mg/L	56.7
3/23/2006	2A	Sulfate	mg/L	69.3
8/31/2006	2A	Sulfate	mg/L	36
2/1/2007	2A	Sulfate	mg/L	62.2
7/26/2007	2A	Total Organic Carbon	mg/L	ND
3/24/2009	2A	Total Organic Carbon	mg/L	2.0
2/8/2008	2A	Total Organic Carbon	mg/L	ND
7/22/2005	2A	Total Organic Carbon	mg/L	ND
3/23/2006	2A	Total Organic Carbon	mg/L	ND
8/31/2006	2A	Total Organic Carbon	mg/L	ND
2/1/2007	2A	Total Organic Carbon	mg/L	ND
7/10/2008	2A	Total Organic Carbon	mg/L	ND
7/22/2005	2A	Total Organic Halogen	mg/L	ND
3/23/2006	2A	Total Organic Halogen	mg/L	ND
8/31/2006	2A	Total Organic Halogen	mg/L	ND
2/1/2007	2A	Total Organic Halogen	mg/L	0.03

Sampling Date	Location ID	Analyte	Unit	Concentration
7/26/2007	2A	Total Organic Halogen	mg/L	ND
7/10/2008	2A	Total Organic Halogen	mg/L	ND
2/8/2008	2A	Total Organic Halogen	mg/L	ND
3/24/2009	2A	Total Organic Halogen	mg/L	0.03
7/10/2008	2A	Turbidity	NTU	24
Location ID:		**2ADUP**		
Number of Sampling Dates:		**2**		
8/31/2006	2ADUP	Barium	mg/L	0.032
2/8/2008	2ADUP	Barium	mg/L	0.039
8/31/2006	2ADUP	Chloride	mg/L	16.9
2/8/2008	2ADUP	Chloride	mg/L	15.3
8/31/2006	2ADUP	Chromium	mg/L	ND
2/8/2008	2ADUP	Chromium	mg/L	ND
8/31/2006	2ADUP	Chromium, hexavalent	mg/l	ND
2/8/2008	2ADUP	Chromium, hexavalent	mg/L	ND
8/31/2006	2ADUP	Iron	mg/L	0.44
2/8/2008	2ADUP	Iron	mg/L	0.832
8/31/2006	2ADUP	Manganese	mg/L	0.119
2/8/2008	2ADUP	Manganese	mg/L	0.104
8/31/2006	2ADUP	Phenols	mg/L	ND
8/31/2006	2ADUP	Sodium	mg/L	6.9
2/8/2008	2ADUP	Sodium	mg/L	7.15
2/8/2008	2ADUP	Sulfate	mg/L	560
8/31/2006	2ADUP	Sulfate	mg/L	47.3
2/8/2008	2ADUP	Total Organic Carbon	mg/L	ND
8/31/2006	2ADUP	Total Organic Carbon	mg/L	ND
8/31/2006	2ADUP	Total Organic Halogen	mg/L	ND
2/8/2008	2ADUP	Total Organic Halogen	mg/L	ND
Location ID:		**2B**		
Number of Sampling Dates:		**101**		
7/12/2007	2B	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2B	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2B	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2B	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2B	1,1-Dichloroethane	ug/L	55
7/12/2007	2B	1,1-Dichloroethene	ug/L	8.3
7/12/2007	2B	1,1-Dichloropropene	ug/L	ND
7/12/2007	2B	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2B	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2B	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2B	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	2B	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2B	1,2-Dibromoethane	ug/L	ND
7/12/2007	2B	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2B	1,2-Dichloroethane	ug/L	ND
7/12/2007	2B	1,2-Dichloropropane	ug/L	ND
7/12/2007	2B	1,3,5-Trimethylbenzene	ug/L	2.1
7/12/2007	2B	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2B	1,3-Dichloropropane	ug/L	ND
7/12/2007	2B	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2B	2,2-Dichloropropane	ug/L	ND
7/12/2007	2B	2-Butanone (MEK)	ug/L	ND
7/12/2007	2B	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2B	2-Chlorotoluene	ug/L	ND
7/12/2007	2B	2-Hexanone	ug/L	ND
7/12/2007	2B	3-Chloro-1-propene	ug/L	ND
7/12/2007	2B	4-Chlorotoluene	ug/L	ND
7/12/2007	2B	4-Isopropyltoluene	ug/L	ND
7/12/2007	2B	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	2B	Acetone	ug/L	ND
7/12/2007	2B	Acetone	ug/L	ND
7/12/2007	2B	Acrolein	ug/L	ND
7/12/2007	2B	Acrylonitrile	ug/L	ND
7/12/2007	2B	Alkalinity, Bicarbonate	mg/L	ND
7/12/2007	2B	Ammonia	mg/L	6.67
7/12/2007	2B	Antimony	mg/L	ND
7/12/2007	2B	Arsenic	mg/L	ND
1/16/2002	2B	Barium	mg/L	0.028
1/24/2002	2B	Barium	mg/L	0.029
2/14/2002	2B	Barium	mg/L	0.029
3/7/2002	2B	Barium	mg/L	0.028
3/28/2002	2B	Barium	mg/L	0.028
3/28/2002	2B	Barium	mg/L	0.028
4/4/2002	2B	Barium	mg/L	0.032
4/25/2002	2B	Barium	mg/L	0.028
5/16/2002	2B	Barium	mg/L	0.028
6/6/2002	2B	Barium	mg/L	0.025
7/18/2002	2B	Barium	mg/L	0.029
8/8/2002	2B	Barium	mg/L	0.029
8/29/2002	2B	Barium	mg/L	0.024
9/19/2002	2B	Barium	mg/L	0.027
10/3/2002	2B	Barium	mg/L	0.026
10/24/2002	2B	Barium	mg/L	0.027

Sampling Date	Location ID	Analyte	Unit	Concentration
11/14/2002	2B	Barium	mg/L	0.023
12/13/2002	2B	Barium	mg/L	0.026
2/6/2003	2B	Barium	mg/L	0.027
2/27/2003	2B	Barium	mg/L	0.026
3/20/2003	2B	Barium	mg/L	0.25
4/3/2003	2B	Barium	mg/L	0.025
4/24/2003	2B	Barium	mg/L	0.025
5/15/2003	2B	Barium	mg/L	0.027
6/5/2003	2B	Barium	mg/L	0.027
7/3/2003	2B	Barium	mg/L	0.028
7/24/2003	2B	Barium	mg/L	0.026
8/14/2003	2B	Barium	mg/L	0.054
9/4/2003	2B	Barium	mg/L	0.043
10/2/2003	2B	Barium	mg/L	0.031
10/23/2003	2B	Barium	mg/L	0.032
11/13/2003	2B	Barium	mg/L	0.034
12/4/2003	2B	Barium	mg/L	0.028
1/8/2004	2B	Barium	mg/L	0.026
1/29/2004	2B	Barium	mg/L	0.024
2/19/2004	2B	Barium	mg/L	0.022
3/11/2004	2B	Barium	mg/L	0.022
4/8/2004	2B	Barium	mg/L	0.022
4/29/2004	2B	Barium	mg/L	0.025
5/20/2004	2B	Barium	mg/L	0.023
6/10/2004	2B	Barium	mg/L	0.023
7/15/2004	2B	Barium	mg/L	0.034
8/5/2004	2B	Barium	mg/L	0.026
8/26/2004	2B	Barium	mg/L	0.027
9/16/2004	2B	Barium	mg/L	0.022
1/6/2005	2B	Barium	mg/L	0.027
1/27/2005	2B	Barium	mg/L	0.025
2/17/2005	2B	Barium	mg/L	0.023
4/7/2005	2B	Barium	mg/L	0.026
4/28/2005	2B	Barium	mg/L	0.022
5/19/2005	2B	Barium	mg/L	0.022
6/9/2005	2B	Barium	mg/L	0.021
7/7/2005	2B	Barium	mg/L	0.033
7/28/2005	2B	Barium	mg/L	0.026
8/18/2005	2B	Barium	mg/L	0.018
9/8/2005	2B	Barium	mg/L	0.024
10/13/2005	2B	Barium	mg/L	0.023
11/3/2005	2B	Barium	mg/L	1.19
11/23/2005	2B	Barium	mg/L	0.021
12/15/2005	2B	Barium	mg/L	0.015
1/5/2006	2B	Barium	mg/L	0.017
1/26/2006	2B	Barium	mg/L	0.016
2/16/2006	2B	Barium	mg/L	0.014
3/9/2006	2B	Barium	mg/L	0.014
4/6/2006	2B	Barium	mg/L	0.021
4/27/2006	2B	Barium	mg/L	0.018
5/18/2006	2B	Barium	mg/L	0.02
6/8/2006	2B	Barium	mg/L	0.01
7/6/2006	2B	Barium	mg/L	ND
7/27/2006	2B	Barium	mg/L	0.013
8/17/2006	2B	Barium	mg/L	0.013
9/7/2006	2B	Barium	mg/L	0.013
10/19/2006	2B	Barium	mg/L	0.024
11/9/2006	2B	Barium	mg/L	0.013
11/30/2006	2B	Barium	mg/L	0.013
12/21/2006	2B	Barium	mg/L	0.015
1/4/2007	2B	Barium	mg/L	0.018
1/25/2007	2B	Barium	mg/L	0.014
2/15/2007	2B	Barium	mg/L	0.018
3/8/2007	2B	Barium	mg/L	0.012
4/19/2007	2B	Barium	mg/L	0.033
5/10/2007	2B	Barium	mg/L	0.032
5/31/2007	2B	Barium	mg/L	0.04
6/21/2007	2B	Barium	mg/L	0.024
7/12/2007	2B	Barium	mg/L	ND
8/2/2007	2B	Barium	mg/L	0.015
8/23/2007	2B	Barium	mg/L	0.016
9/13/2007	2B	Barium	mg/L	0.015
4/3/2008	2B	Barium	mg/L	0.111
4/3/2008	2B	Barium	mg/L	0.111
4/24/2008	2B	Barium	mg/L	0.016
4/24/2008	2B	Barium	mg/L	0.017
4/24/2008	2B	Barium	mg/L	0.017
5/15/2008	2B	Barium	mg/L	0.014
5/15/2008	2B	Barium	mg/L	0.014
6/5/2008	2B	Barium	mg/L	0.015
6/5/2008	2B	Barium	mg/L	0.015
7/3/2008	2B	Barium	mg/L	0.017
7/3/2008	2B	Barium	mg/L	0.017
7/24/2008	2B	Barium	mg/L	0.017
8/14/2008	2B	Barium	mg/L	0.015

Sampling Date	Location ID	Analyte	Unit	Concentration
9/4/2008	2B	Barium	mg/L	0.016
10/9/2008	2B	Barium	mg/L	0.017
10/30/2008	2B	Barium	mg/L	0.018
11/20/2008	2B	Barium	mg/L	0.017
12/11/2008	2B	Barium	mg/L	0.014
1/8/2009	2B	Barium	mg/L	0.017
1/29/2009	2B	Barium	mg/L	0.022
2/19/2009	2B	Barium	mg/L	0.027
3/12/2009	2B	Barium	mg/L	0.024
4/9/2009	2B	Barium	mg/L	0.016
4/30/2009	2B	Barium	mg/L	0.020
5/21/2009	2B	Barium	mg/L	0.017
1/24/2008	2B	Barium	mg/L	0.021
1/3/2008	2B	Barium	mg/L	0.017
10/18/2007	2B	Barium	mg/L	0.014
11/29/2007	2B	Barium	mg/L	0.016
11/8/2007	2B	Barium	mg/L	0.013
12/20/2007	2B	Barium	mg/L	0.017
2/14/2008	2B	Barium	mg/L	0.026
2/14/2008	2B	Barium	mg/L	0.027
3/6/2008	2B	Barium	mg/L	0.024
6/11/2009	2B	Barium	mg/L	0.021
7/12/2007	2B	Benzene	ug/L	7.1
7/12/2007	2B	Beryllium	mg/L	0.033
7/12/2007	2B	BOD	mg/L	42
7/12/2007	2B	Bromobenzene	ug/L	ND
7/12/2007	2B	Bromochloromethane	ug/L	ND
7/12/2007	2B	Bromodichloromethane	ug/L	ND
7/12/2007	2B	Bromoform	ug/L	ND
7/12/2007	2B	Bromomethane	ug/L	ND
7/12/2007	2B	Cadmium	mg/L	ND
7/12/2007	2B	Calcium	mg/L	67.6
7/12/2007	2B	Carbon Disulfide	ug/L	ND
7/12/2007	2B	Carbon Tetrachloride	ug/L	ND
7/12/2007	2B	Chemical Oxygen Demand	mg/L	222
1/16/2002	2B	Chloride	mg/L	131
1/24/2002	2B	Chloride	mg/L	130
2/14/2002	2B	Chloride	mg/L	95.87
3/7/2002	2B	Chloride	mg/L	121
3/28/2002	2B	Chloride	mg/L	326
4/4/2002	2B	Chloride	mg/L	11.4
4/25/2002	2B	Chloride	mg/L	143
5/16/2002	2B	Chloride	mg/L	197
6/6/2002	2B	Chloride	mg/L	160
7/18/2002	2B	Chloride	mg/L	74.1
8/8/2002	2B	Chloride	mg/L	130
8/29/2002	2B	Chloride	mg/L	156
9/19/2002	2B	Chloride	mg/L	121
10/3/2002	2B	Chloride	mg/L	141
10/24/2002	2B	Chloride	mg/L	119
11/14/2002	2B	Chloride	mg/L	87.7
12/13/2002	2B	Chloride	mg/L	102
2/6/2003	2B	Chloride	mg/L	91.9
2/27/2003	2B	Chloride	mg/L	112
3/20/2003	2B	Chloride	mg/L	142
4/3/2003	2B	Chloride	mg/L	142
4/24/2003	2B	Chloride	mg/L	166
5/15/2003	2B	Chloride	mg/L	104
6/5/2003	2B	Chloride	mg/L	116
7/3/2003	2B	Chloride	mg/L	47.9
7/24/2003	2B	Chloride	mg/L	158
8/14/2003	2B	Chloride	mg/L	148
9/4/2003	2B	Chloride	mg/L	114
10/2/2003	2B	Chloride	mg/L	120
10/23/2003	2B	Chloride	mg/L	112
11/13/2003	2B	Chloride	mg/L	96.4
12/4/2003	2B	Chloride	mg/L	114
1/8/2004	2B	Chloride	mg/L	95.7
1/29/2004	2B	Chloride	mg/L	101
2/19/2004	2B	Chloride	mg/L	109
3/11/2004	2B	Chloride	mg/L	98.3
4/8/2004	2B	Chloride	mg/L	118
4/29/2004	2B	Chloride	mg/L	93.7
5/20/2004	2B	Chloride	mg/L	83.2
6/10/2004	2B	Chloride	mg/L	104
7/15/2004	2B	Chloride	mg/L	94.8
8/5/2004	2B	Chloride	mg/L	116
8/26/2004	2B	Chloride	mg/L	115
9/16/2004	2B	Chloride	mg/L	111
1/6/2005	2B	Chloride	mg/L	125
1/27/2005	2B	Chloride	mg/L	110
2/17/2005	2B	Chloride	mg/L	120
4/7/2005	2B	Chloride	mg/L	125
4/28/2005	2B	Chloride	mg/L	117
5/19/2005	2B	Chloride	mg/L	123

Sampling Date	Location ID	Analyte	Unit	Concentration
6/9/2005	2B	Chloride	mg/L	120
6/9/2005	2B	Chloride	mg/L	120
7/7/2005	2B	Chloride	mg/L	168
7/28/2005	2B	Chloride	mg/L	120
8/18/2005	2B	Chloride	mg/L	126
9/8/2005	2B	Chloride	mg/L	134
10/13/2005	2B	Chloride	mg/L	113
11/3/2005	2B	Chloride	mg/L	107
11/23/2005	2B	Chloride	mg/L	125
12/15/2005	2B	Chloride	mg/L	116
1/5/2006	2B	Chloride	mg/L	160
1/26/2006	2B	Chloride	mg/L	186
2/16/2006	2B	Chloride	mg/L	137
3/9/2006	2B	Chloride	mg/L	158
4/6/2006	2B	Chloride	mg/L	139
4/27/2006	2B	Chloride	mg/L	133
5/18/2006	2B	Chloride	mg/L	130
6/8/2006	2B	Chloride	mg/L	120
7/6/2006	2B	Chloride	mg/L	107
7/27/2006	2B	Chloride	mg/L	109
8/17/2006	2B	Chloride	mg/L	121
9/7/2006	2B	Chloride	mg/L	111
10/19/2006	2B	Chloride	mg/L	129
11/9/2006	2B	Chloride	mg/L	163
11/30/2006	2B	Chloride	mg/L	114
12/21/2006	2B	Chloride	mg/L	119
1/4/2007	2B	Chloride	mg/L	159
1/25/2007	2B	Chloride	mg/L	148
2/15/2007	2B	Chloride	mg/L	131
3/8/2007	2B	Chloride	mg/L	104
4/19/2007	2B	Chloride	mg/L	129
5/10/2007	2B	Chloride	mg/L	135
5/31/2007	2B	Chloride	mg/L	126
6/21/2007	2B	Chloride	mg/L	108
7/12/2007	2B	Chloride	mg/L	143
8/2/2007	2B	Chloride	mg/L	143
8/23/2007	2B	Chloride	mg/L	129
9/13/2007	2B	Chloride	mg/L	118
4/3/2008	2B	Chloride	mg/L	170
4/3/2008	2B	Chloride	mg/L	170
4/24/2008	2B	Chloride	mg/L	144
4/24/2008	2B	Chloride	mg/L	145
4/24/2008	2B	Chloride	mg/L	145
5/15/2008	2B	Chloride	mg/L	135
5/15/2008	2B	Chloride	mg/L	135
6/5/2008	2B	Chloride	mg/L	124
6/5/2008	2B	Chloride	mg/L	124
7/3/2008	2B	Chloride	mg/L	126
7/3/2008	2B	Chloride	mg/L	126
7/24/2008	2B	Chloride	mg/L	124
8/14/2008	2B	Chloride	mg/L	124
9/4/2008	2B	Chloride	mg/L	121
10/9/2008	2B	Chloride	mg/L	121
10/30/2008	2B	Chloride	mg/L	128
11/20/2008	2B	Chloride	mg/L	120
12/11/2008	2B	Chloride	mg/L	119
1/8/2009	2B	Chloride	mg/L	147
1/29/2009	2B	Chloride	mg/L	144
2/19/2009	2B	Chloride	mg/L	49.0
3/12/2009	2B	Chloride	mg/L	128
4/9/2009	2B	Chloride	mg/L	145
4/30/2009	2B	Chloride	mg/L	136
5/21/2009	2B	Chloride	mg/L	140
1/24/2008	2B	Chloride	mg/L	105
1/3/2008	2B	Chloride	mg/L	109
10/18/2007	2B	Chloride	mg/L	132
11/29/2007	2B	Chloride	mg/L	120
11/8/2007	2B	Chloride	mg/L	129
12/20/2007	2B	Chloride	mg/L	127
2/14/2008	2B	Chloride	mg/L	118
2/14/2008	2B	Chloride	mg/L	127
3/6/2008	2B	Chloride	mg/L	112
6/11/2009	2B	Chloride	mg/L	130
7/12/2007	2B	Chlorobenzene	ug/L	ND
7/12/2007	2B	Chloroethane	ug/L	4.5
7/12/2007	2B	Chloroform	ug/L	ND
7/12/2007	2B	Chloromethane	ug/L	ND
1/16/2002	2B	Chromium	mg/L	0.038
1/24/2002	2B	Chromium	mg/L	0.031
2/14/2002	2B	Chromium	mg/L	0.039
3/7/2002	2B	Chromium	mg/L	0.046
3/28/2002	2B	Chromium	mg/L	0.037
4/4/2002	2B	Chromium	mg/L	0.037
4/25/2002	2B	Chromium	mg/L	0.23
5/16/2002	2B	Chromium	mg/L	0.044

Sampling Date	Location ID	Analyte	Unit	Concentration
6/6/2002	2B	Chromium	mg/L	0.04
7/18/2002	2B	Chromium	mg/L	0.053
8/8/2002	2B	Chromium	mg/L	0.071
8/29/2002	2B	Chromium	mg/L	0.041
9/19/2002	2B	Chromium	mg/L	0.041
10/3/2002	2B	Chromium	mg/L	0.025
10/24/2002	2B	Chromium	mg/L	0.046
11/14/2002	2B	Chromium	mg/L	ND
12/13/2002	2B	Chromium	mg/L	0.05
2/6/2003	2B	Chromium	mg/L	0.038
2/27/2003	2B	Chromium	mg/L	0.048
3/20/2003	2B	Chromium	mg/L	0.058
4/3/2003	2B	Chromium	mg/L	0.034
4/24/2003	2B	Chromium	mg/L	0.04
5/15/2003	2B	Chromium	mg/L	0.048
6/5/2003	2B	Chromium	mg/L	0.039
7/3/2003	2B	Chromium	mg/L	0.029
7/24/2003	2B	Chromium	mg/L	0.024
8/14/2003	2B	Chromium	mg/L	0.031
9/4/2003	2B	Chromium	mg/L	0.024
10/2/2003	2B	Chromium	mg/L	0.039
10/23/2003	2B	Chromium	mg/L	0.027
11/13/2003	2B	Chromium	mg/L	0.025
12/4/2003	2B	Chromium	mg/L	0.036
1/8/2004	2B	Chromium	mg/L	0.03
1/29/2004	2B	Chromium	mg/L	0.018
2/19/2004	2B	Chromium	mg/L	0.017
3/11/2004	2B	Chromium	mg/L	0.016
4/8/2004	2B	Chromium	mg/L	0.021
4/29/2004	2B	Chromium	mg/L	0.016
5/20/2004	2B	Chromium	mg/L	0.019
6/10/2004	2B	Chromium	mg/L	0.017
7/15/2004	2B	Chromium	mg/L	0.027
8/5/2004	2B	Chromium	mg/L	0.23
8/26/2004	2B	Chromium	mg/L	0.019
9/16/2004	2B	Chromium	mg/L	0.016
1/6/2005	2B	Chromium	mg/L	0.021
1/27/2005	2B	Chromium	mg/L	ND
2/17/2005	2B	Chromium	mg/L	ND
4/7/2005	2B	Chromium	mg/L	ND
4/28/2005	2B	Chromium	mg/L	ND
5/19/2005	2B	Chromium	mg/L	0.013
6/9/2005	2B	Chromium	mg/L	0.011
7/7/2005	2B	Chromium	mg/L	0.014
7/28/2005	2B	Chromium	mg/L	0.016
8/18/2005	2B	Chromium	mg/L	ND
9/8/2005	2B	Chromium	mg/L	0.011
10/13/2005	2B	Chromium	mg/L	0.011
11/3/2005	2B	Chromium	mg/L	0.076
11/23/2005	2B	Chromium	mg/L	0.011
12/15/2005	2B	Chromium	mg/L	ND
1/5/2006	2B	Chromium	mg/L	0.013
1/26/2006	2B	Chromium	mg/L	ND
2/16/2006	2B	Chromium	mg/L	0.009
3/9/2006	2B	Chromium	mg/L	ND
4/6/2006	2B	Chromium	mg/L	0.012
4/27/2006	2B	Chromium	mg/L	0.015
5/18/2006	2B	Chromium	mg/L	0.01
6/8/2006	2B	Chromium	mg/L	ND
7/6/2006	2B	Chromium	mg/L	ND
7/27/2006	2B	Chromium	mg/L	0.009
8/17/2006	2B	Chromium	mg/L	0.01
9/7/2006	2B	Chromium	mg/L	ND
10/19/2006	2B	Chromium	mg/L	0.018
11/9/2006	2B	Chromium	mg/L	0.013
11/30/2006	2B	Chromium	mg/L	0.013
12/21/2006	2B	Chromium	mg/L	0.01
1/4/2007	2B	Chromium	mg/L	0.021
1/25/2007	2B	Chromium	mg/L	0.01
2/15/2007	2B	Chromium	mg/L	0.014
3/8/2007	2B	Chromium	mg/L	0.007
4/19/2007	2B	Chromium	mg/L	0.008
5/10/2007	2B	Chromium	mg/L	0.009
5/31/2007	2B	Chromium	mg/L	ND
6/21/2007	2B	Chromium	mg/L	0.008
7/12/2007	2B	Chromium	mg/L	ND
8/2/2007	2B	Chromium	mg/L	0.01
8/23/2007	2B	Chromium	mg/L	0.012
9/13/2007	2B	Chromium	mg/L	0.01
9/13/2007	2B	Chromium	mg/L	0.01
4/3/2008	2B	Chromium	mg/L	0.213
4/3/2008	2B	Chromium	mg/L	ND
4/24/2008	2B	Chromium	mg/L	0.018
4/24/2008	2B	Chromium	mg/L	0.018
4/24/2008	2B	Chromium	mg/L	0.018

Sampling Date	Location ID	Analyte	Unit	Concentration
5/15/2008	2B	Chromium	mg/L	ND
5/15/2008	2B	Chromium	mg/L	ND
6/5/2008	2B	Chromium	mg/L	0.012
6/5/2008	2B	Chromium	mg/L	0.012
7/3/2008	2B	Chromium	mg/L	0.021
7/3/2008	2B	Chromium	mg/L	0.021
7/24/2008	2B	Chromium	mg/L	0.022
8/14/2008	2B	Chromium	mg/L	0.01
9/4/2008	2B	Chromium	mg/L	ND
10/9/2008	2B	Chromium	mg/L	0.010
10/30/2008	2B	Chromium	mg/L	0.014
11/20/2008	2B	Chromium	mg/L	0.013
12/11/2008	2B	Chromium	mg/L	0.008
1/8/2009	2B	Chromium	mg/L	0.017
1/29/2009	2B	Chromium	mg/L	0.007
2/19/2009	2B	Chromium	mg/L	0.008
3/12/2009	2B	Chromium	mg/L	0.012
4/9/2009	2B	Chromium	mg/L	0.017
4/30/2009	2B	Chromium	mg/L	0.017
5/21/2009	2B	Chromium	mg/L	0.015
1/24/2008	2B	Chromium	mg/L	0.011
1/3/2008	2B	Chromium	mg/L	0.007
2/14/2008	2B	Chromium	mg/L	0.010
2/14/2008	2B	Chromium	mg/L	0.010
3/6/2008	2B	Chromium	mg/L	0.009
6/11/2009	2B	Chromium	mg/L	0.012
1/16/2002	2B	Chromium, hexavalent	mg/l	ND
1/24/2002	2B	Chromium, hexavalent	mg/l	ND
2/14/2002	2B	Chromium, hexavalent	mg/l	ND
3/7/2002	2B	Chromium, hexavalent	mg/l	ND
3/28/2002	2B	Chromium, hexavalent	mg/l	ND
4/4/2002	2B	Chromium, hexavalent	mg/l	ND
4/25/2002	2B	Chromium, hexavalent	mg/l	ND
5/16/2002	2B	Chromium, hexavalent	mg/l	ND
6/6/2002	2B	Chromium, hexavalent	mg/l	ND
7/18/2002	2B	Chromium, hexavalent	mg/l	ND
8/8/2002	2B	Chromium, hexavalent	mg/l	ND
8/29/2002	2B	Chromium, hexavalent	mg/l	ND
9/19/2002	2B	Chromium, hexavalent	mg/l	ND
10/3/2002	2B	Chromium, hexavalent	mg/l	ND
10/24/2002	2B	Chromium, hexavalent	mg/l	ND
11/14/2002	2B	Chromium, hexavalent	mg/l	ND
12/13/2002	2B	Chromium, hexavalent	mg/l	ND
2/6/2003	2B	Chromium, hexavalent	mg/l	ND
2/27/2003	2B	Chromium, hexavalent	mg/l	ND
3/20/2003	2B	Chromium, hexavalent	mg/l	ND
4/3/2003	2B	Chromium, hexavalent	mg/l	ND
4/24/2003	2B	Chromium, hexavalent	mg/l	ND
5/15/2003	2B	Chromium, hexavalent	mg/l	ND
6/5/2003	2B	Chromium, hexavalent	mg/l	ND
7/3/2003	2B	Chromium, hexavalent	mg/l	ND
7/24/2003	2B	Chromium, hexavalent	mg/l	ND
8/14/2003	2B	Chromium, hexavalent	mg/l	ND
9/4/2003	2B	Chromium, hexavalent	mg/l	ND
10/2/2003	2B	Chromium, hexavalent	mg/l	ND
10/23/2003	2B	Chromium, hexavalent	mg/l	ND
11/13/2003	2B	Chromium, hexavalent	mg/l	ND
12/4/2003	2B	Chromium, hexavalent	mg/l	ND
1/8/2004	2B	Chromium, hexavalent	mg/l	ND
1/29/2004	2B	Chromium, hexavalent	mg/l	ND
2/19/2004	2B	Chromium, hexavalent	mg/l	ND
3/11/2004	2B	Chromium, hexavalent	mg/l	ND
4/8/2004	2B	Chromium, hexavalent	mg/l	ND
4/29/2004	2B	Chromium, hexavalent	mg/l	ND
5/20/2004	2B	Chromium, hexavalent	mg/l	ND
6/10/2004	2B	Chromium, hexavalent	mg/l	ND
7/15/2004	2B	Chromium, hexavalent	mg/l	ND
8/5/2004	2B	Chromium, hexavalent	mg/l	ND
8/26/2004	2B	Chromium, hexavalent	mg/l	ND
9/16/2004	2B	Chromium, hexavalent	mg/l	ND
1/6/2005	2B	Chromium, hexavalent	mg/l	ND
1/27/2005	2B	Chromium, hexavalent	mg/l	ND
2/17/2005	2B	Chromium, hexavalent	mg/l	ND
4/7/2005	2B	Chromium, hexavalent	mg/l	ND
4/28/2005	2B	Chromium, hexavalent	mg/l	ND
5/19/2005	2B	Chromium, hexavalent	mg/l	ND
6/9/2005	2B	Chromium, hexavalent	mg/l	ND
7/7/2005	2B	Chromium, hexavalent	mg/l	ND
7/28/2005	2B	Chromium, hexavalent	mg/l	ND
8/18/2005	2B	Chromium, hexavalent	mg/l	ND
9/8/2005	2B	Chromium, hexavalent	mg/l	ND
10/13/2005	2B	Chromium, hexavalent	mg/l	ND
11/3/2005	2B	Chromium, hexavalent	mg/l	ND
11/23/2005	2B	Chromium, hexavalent	mg/l	ND
12/15/2005	2B	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/5/2006	2B	Chromium, hexavalent	mg/l	ND
1/26/2006	2B	Chromium, hexavalent	mg/l	ND
2/16/2006	2B	Chromium, hexavalent	mg/l	ND
3/9/2006	2B	Chromium, hexavalent	mg/l	ND
4/6/2006	2B	Chromium, hexavalent	mg/l	ND
4/27/2006	2B	Chromium, hexavalent	mg/l	ND
5/18/2006	2B	Chromium, hexavalent	mg/l	ND
6/8/2006	2B	Chromium, hexavalent	mg/l	ND
7/6/2006	2B	Chromium, hexavalent	mg/l	ND
7/27/2006	2B	Chromium, hexavalent	mg/l	ND
8/17/2006	2B	Chromium, hexavalent	mg/l	ND
9/7/2006	2B	Chromium, hexavalent	mg/l	ND
10/19/2006	2B	Chromium, hexavalent	mg/l	ND
11/9/2006	2B	Chromium, hexavalent	mg/l	ND
11/30/2006	2B	Chromium, hexavalent	mg/l	ND
12/21/2006	2B	Chromium, hexavalent	mg/l	ND
1/4/2007	2B	Chromium, hexavalent	mg/l	ND
1/25/2007	2B	Chromium, hexavalent	mg/l	ND
2/15/2007	2B	Chromium, hexavalent	mg/l	ND
3/8/2007	2B	Chromium, hexavalent	mg/l	ND
4/19/2007	2B	Chromium, hexavalent	mg/l	ND
5/10/2007	2B	Chromium, hexavalent	mg/l	ND
5/31/2007	2B	Chromium, hexavalent	mg/l	ND
6/21/2007	2B	Chromium, hexavalent	mg/l	ND
7/12/2007	2B	Chromium, hexavalent	mg/L	ND
8/2/2007	2B	Chromium, hexavalent	mg/L	ND
8/23/2007	2B	Chromium, hexavalent	mg/L	0.02
4/3/2008	2B	Chromium, hexavalent	mg/L	ND
4/3/2008	2B	Chromium, Hexavalent	mg/L	ND
4/24/2008	2B	Chromium, hexavalent	mg/L	ND
4/24/2008	2B	Chromium, hexavalent	mg/L	ND
4/24/2008	2B	Chromium, hexavalent	mg/L	ND
5/15/2008	2B	Chromium, hexavalent	mg/L	ND
5/15/2008	2B	Chromium, hexavalent	mg/L	ND
6/5/2008	2B	Chromium, hexavalent	mg/L	ND
6/5/2008	2B	Chromium, hexavalent	mg/L	ND
7/3/2008	2B	Chromium, Hexavalent	mg/L	ND
7/3/2008	2B	Chromium, Hexavalent	mg/L	ND
7/24/2008	2B	Chromium, Hexavalent	mg/L	ND
8/14/2008	2B	Chromium, Hexavalent	mg/L	ND
9/4/2008	2B	Chromium, Hexavalent	mg/L	ND
10/9/2008	2B	Chromium, hexavalent	mg/L	ND
10/30/2008	2B	Chromium, hexavalent	mg/L	ND
11/20/2008	2B	Chromium, hexavalent	mg/L	ND
12/11/2008	2B	Chromium, hexavalent	mg/L	ND
1/8/2009	2B	Chromium, hexavalent	mg/L	ND
1/29/2009	2B	Chromium, hexavalent	mg/L	ND
2/19/2009	2B	Chromium, hexavalent	mg/L	ND
3/12/2009	2B	Chromium, hexavalent	mg/L	ND
4/9/2009	2B	Chromium, hexavalent	mg/L	ND
4/30/2009	2B	Chromium, hexavalent	mg/L	ND
5/21/2009	2B	Chromium, hexavalent	mg/L	ND
1/24/2008	2B	Chromium, hexavalent	mg/L	ND
1/3/2008	2B	Chromium, hexavalent	mg/L	ND
10/18/2007	2B	Chromium, hexavalent	mg/L	ND
11/29/2007	2B	Chromium, hexavalent	mg/L	ND
11/8/2007	2B	Chromium, hexavalent	mg/L	ND
12/20/2007	2B	Chromium, hexavalent	mg/L	ND
2/14/2008	2B	Chromium, hexavalent	mg/L	ND
2/14/2008	2B	Chromium, hexavalent	mg/L	ND
3/6/2008	2B	Chromium, hexavalent	mg/L	0.01
6/11/2009	2B	Chromium, Hexavalent	mg/L	ND
10/18/2007	2B	Chromium, ICP	mg/L	0.016
11/29/2007	2B	Chromium, ICP	mg/L	0.011
11/8/2007	2B	Chromium, ICP	mg/L	0.014
12/20/2007	2B	Chromium, ICP	mg/L	0.01
7/12/2007	2B	cis-1,2-Dichloroethene	ug/L	2.1
7/12/2007	2B	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2B	Cobalt	mg/L	0.241
7/12/2007	2B	Copper	mg/L	ND
7/12/2007	2B	Cyanide	mg/L	ND
7/12/2007	2B	Dibromochloromethane	ug/L	ND
7/12/2007	2B	Dibromomethane	ug/L	ND
7/12/2007	2B	Dichlorodifluoromethane	ug/L	1.2
7/12/2007	2B	Dichloromethane (MeCl2)	ug/L	27.2
7/12/2007	2B	Ethylbenzene	ug/L	4.2
7/12/2007	2B	Hexachlorobutadiene	ug/L	ND
1/16/2002	2B	Iron	mg/L	1729
1/24/2002	2B	Iron	mg/L	1740
2/14/2002	2B	Iron	mg/L	2114
3/7/2002	2B	Iron	mg/L	2077
3/28/2002	2B	Iron	mg/L	1765
4/4/2002	2B	Iron	mg/L	1646
4/25/2002	2B	Iron	mg/L	1924
5/16/2002	2B	Iron	mg/L	2074

Sampling Date	Location ID	Analyte	Unit	Concentration
6/6/2002	2B	Iron	mg/L	1891
7/18/2002	2B	Iron	mg/L	1790
8/8/2002	2B	Iron	mg/L	2238
8/29/2002	2B	Iron	mg/L	1836
9/19/2002	2B	Iron	mg/L	1870
10/3/2002	2B	Iron	mg/L	1371
10/24/2002	2B	Iron	mg/L	1704
11/14/2002	2B	Iron	mg/L	1072
12/13/2002	2B	Iron	mg/L	1840
2/6/2003	2B	Iron	mg/L	1682
2/27/2003	2B	Iron	mg/L	1843
3/20/2003	2B	Iron	mg/L	2092
4/3/2003	2B	Iron	mg/L	14484
4/24/2003	2B	Iron	mg/L	1573
5/15/2003	2B	Iron	mg/L	2137
6/5/2003	2B	Iron	mg/L	1581
7/3/2003	2B	Iron	mg/L	1674
7/24/2003	2B	Iron	mg/L	1229
8/14/2003	2B	Iron	mg/L	1333
9/4/2003	2B	Iron	mg/L	1247
10/2/2003	2B	Iron	mg/L	1417
10/23/2003	2B	Iron	mg/L	1376
11/13/2003	2B	Iron	mg/L	1429
12/4/2003	2B	Iron	mg/L	1030
1/8/2004	2B	Iron	mg/L	1344
1/29/2004	2B	Iron	mg/L	1285
2/19/2004	2B	Iron	mg/L	1190
3/11/2004	2B	Iron	mg/L	978
4/8/2004	2B	Iron	mg/L	1256
4/29/2004	2B	Iron	mg/L	1250
5/20/2004	2B	Iron	mg/L	1207
6/10/2004	2B	Iron	mg/L	1050
7/15/2004	2B	Iron	mg/L	1617
8/5/2004	2B	Iron	mg/L	1394
8/26/2004	2B	Iron	mg/L	1241
9/16/2004	2B	Iron	mg/L	1287
1/6/2005	2B	Iron	mg/L	1338
1/27/2005	2B	Iron	mg/L	1350
2/17/2005	2B	Iron	mg/L	1249
4/7/2005	2B	Iron	mg/L	1024
4/28/2005	2B	Iron	mg/L	985
5/19/2005	2B	Iron	mg/L	1061
6/9/2005	2B	Iron	mg/L	1054
7/7/2005	2B	Iron	mg/L	1484
7/28/2005	2B	Iron	mg/L	1376
7/28/2005	2B	Iron	mg/L	1376
8/18/2005	2B	Iron	mg/L	1255
8/18/2005	2B	Iron	mg/L	1255
9/8/2005	2B	Iron	mg/L	1078
10/13/2005	2B	Iron	mg/L	1029
11/3/2005	2B	Iron	mg/L	1146
11/23/2005	2B	Iron	mg/L	1206
12/15/2005	2B	Iron	mg/L	1036
1/5/2006	2B	Iron	mg/L	1394
1/26/2006	2B	Iron	mg/L	1348
2/16/2006	2B	Iron	mg/L	1170
3/9/2006	2B	Iron	mg/L	1135
4/6/2006	2B	Iron	mg/L	999
4/27/2006	2B	Iron	mg/L	1041
5/18/2006	2B	Iron	mg/L	1046
6/8/2006	2B	Iron	mg/L	972
7/6/2006	2B	Iron	mg/L	727
7/6/2006	2B	Iron	mg/L	727
7/27/2006	2B	Iron	mg/L	980
8/17/2006	2B	Iron	mg/L	940
9/7/2006	2B	Iron	mg/L	866
10/19/2006	2B	Iron	mg/L	1186
11/9/2006	2B	Iron	mg/L	1266
11/30/2006	2B	Iron	mg/L	1241
12/21/2006	2B	Iron	mg/L	1254
1/4/2007	2B	Iron	mg/L	1695
1/25/2007	2B	Iron	mg/L	1149
2/15/2007	2B	Iron	mg/L	1345
3/8/2007	2B	Iron	mg/L	794
4/19/2007	2B	Iron	mg/L	877
5/10/2007	2B	Iron	mg/L	928
5/31/2007	2B	Iron	mg/L	970
6/21/2007	2B	Iron	mg/L	997
7/12/2007	2B	Iron	mg/L	1328
8/2/2007	2B	Iron	mg/L	1082
8/23/2007	2B	Iron	mg/L	1065
9/13/2007	2B	Iron	mg/L	9911
4/3/2008	2B	Iron	mg/L	1457
4/3/2008	2B	Iron	mg/L	1457
4/24/2008	2B	Iron	mg/L	1358

Sampling Date	Location ID	Analyte	Unit	Concentration
4/24/2008	2B	Iron	mg/L	1382
4/24/2008	2B	Iron	mg/L	1382
5/15/2008	2B	Iron	mg/L	953
5/15/2008	2B	Iron	mg/L	953
6/5/2008	2B	Iron	mg/L	1169
6/5/2008	2B	Iron	mg/L	1169
7/3/2008	2B	Iron	mg/L	804
7/3/2008	2B	Iron	mg/L	804
7/24/2008	2B	Iron	mg/L	889
8/14/2008	2B	Iron	mg/L	844
9/4/2008	2B	Iron	mg/L	922
10/9/2008	2B	Iron	mg/L	863
10/30/2008	2B	Iron	mg/L	987
11/20/2008	2B	Iron	mg/L	923
12/11/2008	2B	Iron	mg/L	917
1/8/2009	2B	Iron	mg/L	1318
1/29/2009	2B	Iron	mg/L	1204
2/19/2009	2B	Iron	mg/L	0.547
3/12/2009	2B	Iron	mg/L	884
4/9/2009	2B	Iron	mg/L	1276
4/30/2009	2B	Iron	mg/L	1049
5/21/2009	2B	Iron	mg/L	966
1/24/2008	2B	Iron	mg/L	662
1/3/2008	2B	Iron	mg/L	834
10/18/2007	2B	Iron	mg/L	1411
11/29/2007	2B	Iron	mg/L	1222
11/8/2007	2B	Iron	mg/L	1414
12/20/2007	2B	Iron	mg/L	1128
2/14/2008	2B	Iron	mg/L	774
2/14/2008	2B	Iron	mg/L	799
3/6/2008	2B	Iron	mg/L	ND
6/11/2009	2B	Iron	mg/L	889
7/12/2007	2B	Isopropylbenzene	ug/L	2.5
7/12/2007	2B	Lead	mg/L	ND
7/12/2007	2B	m,p-Xylene	ug/L	2.9
7/12/2007	2B	Magnesium	mg/L	75.8
1/16/2002	2B	Manganese	mg/L	40
1/24/2002	2B	Manganese	mg/L	39.3
2/14/2002	2B	Manganese	mg/L	49.3
3/7/2002	2B	Manganese	mg/L	45.5
3/28/2002	2B	Manganese	mg/L	39.8
4/4/2002	2B	Manganese	mg/L	38.6
4/25/2002	2B	Manganese	mg/L	40.2
5/16/2002	2B	Manganese	mg/L	41.4
6/6/2002	2B	Manganese	mg/L	42.8
7/18/2002	2B	Manganese	mg/L	43
8/8/2002	2B	Manganese	mg/L	47.7
8/29/2002	2B	Manganese	mg/L	40.5
9/19/2002	2B	Manganese	mg/L	44.8
10/3/2002	2B	Manganese	mg/L	31.7
10/24/2002	2B	Manganese	mg/L	40.8
11/14/2002	2B	Manganese	mg/L	25.6
12/13/2002	2B	Manganese	mg/L	40.5
2/6/2003	2B	Manganese	mg/L	39.1
2/27/2003	2B	Manganese	mg/L	39
3/20/2003	2B	Manganese	mg/L	41.6
4/3/2003	2B	Manganese	mg/L	33.9
4/24/2003	2B	Manganese	mg/L	34.7
5/15/2003	2B	Manganese	mg/L	45.3
6/5/2003	2B	Manganese	mg/L	38.7
7/3/2003	2B	Manganese	mg/L	35.1
7/24/2003	2B	Manganese	mg/L	28.4
8/14/2003	2B	Manganese	mg/L	31.8
9/4/2003	2B	Manganese	mg/L	30.7
10/2/2003	2B	Manganese	mg/L	29.9
10/23/2003	2B	Manganese	mg/L	34.4
11/13/2003	2B	Manganese	mg/L	35.4
12/4/2003	2B	Manganese	mg/L	23.4
1/8/2004	2B	Manganese	mg/L	32.1
1/29/2004	2B	Manganese	mg/L	28.2
2/19/2004	2B	Manganese	mg/L	26.8
3/11/2004	2B	Manganese	mg/L	24.2
4/8/2004	2B	Manganese	mg/L	27.7
4/29/2004	2B	Manganese	mg/L	28.7
5/20/2004	2B	Manganese	mg/L	25.7
6/10/2004	2B	Manganese	mg/L	25.6
7/15/2004	2B	Manganese	mg/L	35.3
8/5/2004	2B	Manganese	mg/L	34.4
8/26/2004	2B	Manganese	mg/L	28.2
9/16/2004	2B	Manganese	mg/L	24.8
1/6/2005	2B	Manganese	mg/L	32
1/27/2005	2B	Manganese	mg/L	30.4
2/17/2005	2B	Manganese	mg/L	28
4/7/2005	2B	Manganese	mg/L	25.6
4/28/2005	2B	Manganese	mg/L	25.4

Sampling Date	Location ID	Analyte	Unit	Concentration
5/19/2005	2B	Manganese	mg/L	25.9
6/9/2005	2B	Manganese	mg/L	22.7
7/7/2005	2B	Manganese	mg/L	37.7
7/28/2005	2B	Manganese	mg/L	31
8/18/2005	2B	Manganese	mg/L	37.3
9/8/2005	2B	Manganese	mg/L	25.9
10/13/2005	2B	Manganese	mg/L	22.9
11/3/2005	2B	Manganese	mg/L	1.76
11/23/2005	2B	Manganese	mg/L	53.2
12/15/2005	2B	Manganese	mg/L	20
1/5/2006	2B	Manganese	mg/L	27.4
1/26/2006	2B	Manganese	mg/L	25.1
2/16/2006	2B	Manganese	mg/L	36.6
3/9/2006	2B	Manganese	mg/L	32.2
4/6/2006	2B	Manganese	mg/L	21.9
4/27/2006	2B	Manganese	mg/L	21.1
5/18/2006	2B	Manganese	mg/L	23.5
6/8/2006	2B	Manganese	mg/L	35.3
7/6/2006	2B	Manganese	mg/L	14.8
7/27/2006	2B	Manganese	mg/L	30.1
8/17/2006	2B	Manganese	mg/L	29.7
9/7/2006	2B	Manganese	mg/L	28
10/19/2006	2B	Manganese	mg/L	23.6
11/9/2006	2B	Manganese	mg/L	32.3
11/30/2006	2B	Manganese	mg/L	33.1
12/21/2006	2B	Manganese	mg/L	21.3
1/4/2007	2B	Manganese	mg/L	26.2
1/25/2007	2B	Manganese	mg/L	30.8
2/15/2007	2B	Manganese	mg/L	34.4
3/8/2007	2B	Manganese	mg/L	19.3
4/19/2007	2B	Manganese	mg/L	17.3
5/10/2007	2B	Manganese	mg/L	26.4
5/31/2007	2B	Manganese	mg/L	23.4
6/21/2007	2B	Manganese	mg/L	25.4
7/12/2007	2B	Manganese	mg/L	33.1
8/2/2007	2B	Manganese	mg/L	29.1
8/23/2007	2B	Manganese	mg/L	28
9/13/2007	2B	Manganese	mg/L	264
4/3/2008	2B	Manganese	mg/L	35.9
4/3/2008	2B	Manganese	mg/L	35.9
4/24/2008	2B	Manganese	mg/L	31.5
4/24/2008	2B	Manganese	mg/L	32.1
4/24/2008	2B	Manganese	mg/L	32.1
5/15/2008	2B	Manganese	mg/L	23.8
5/15/2008	2B	Manganese	mg/L	23.8
6/5/2008	2B	Manganese	mg/L	27.8
6/5/2008	2B	Manganese	mg/L	27.8
7/3/2008	2B	Manganese	mg/L	19.9
7/3/2008	2B	Manganese	mg/L	19.9
7/24/2008	2B	Manganese	mg/L	22.3
8/14/2008	2B	Manganese	mg/L	21.2
9/4/2008	2B	Manganese	mg/L	21.9
10/9/2008	2B	Manganese	mg/L	22.4
10/30/2008	2B	Manganese	mg/L	24.6
11/20/2008	2B	Manganese	mg/L	23.4
12/11/2008	2B	Manganese	mg/L	23.3
1/8/2009	2B	Manganese	mg/L	35.6
1/29/2009	2B	Manganese	mg/L	33.5
2/19/2009	2B	Manganese	mg/L	0.062
3/12/2009	2B	Manganese	mg/L	24.4
4/9/2009	2B	Manganese	mg/L	30.9
4/30/2009	2B	Manganese	mg/L	29.0
5/21/2009	2B	Manganese	mg/L	29.0
1/24/2008	2B	Manganese	mg/L	16.9
1/3/2008	2B	Manganese	mg/L	23.6
10/18/2007	2B	Manganese	mg/L	42.2
11/29/2007	2B	Manganese	mg/L	32.8
11/8/2007	2B	Manganese	mg/L	33.3
12/20/2007	2B	Manganese	mg/L	27.7
2/14/2008	2B	Manganese	mg/L	20.8
2/14/2008	2B	Manganese	mg/L	21.6
3/6/2008	2B	Manganese	mg/L	15.3
6/11/2009	2B	Manganese	mg/L	24.6
7/12/2007	2B	Mercury	mg/L	ND
7/12/2007	2B	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2B	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2B	Naphthalene	ug/L	ND
7/12/2007	2B	n-Butylbenzene	ug/L	ND
7/12/2007	2B	Nickel	mg/L	0.373
7/12/2007	2B	Nitrate	mg/L	ND
7/12/2007	2B	Nitrate/Nitrite	mg/L	ND
7/12/2007	2B	Nitrite	mg/L	ND
7/12/2007	2B	n-Propylbenzene	ug/L	ND
7/12/2007	2B	o-Xylene	ug/L	3.8
1/16/2002	2B	pH	pH Units	3.8

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2002	2B	pH	pH Units	3.62
2/14/2002	2B	pH	pH Units	3.4
3/7/2002	2B	pH	pH Units	4.58
3/28/2002	2B	pH	pH Units	4.65
4/4/2002	2B	pH	pH Units	3.58
4/25/2002	2B	pH	pH Units	3.59
5/16/2002	2B	pH	pH Units	3.75
6/6/2002	2B	pH	pH Units	3.76
7/18/2002	2B	pH	pH Units	3.73
8/8/2002	2B	pH	pH Units	3.69
8/29/2002	2B	pH	pH Units	3.82
9/19/2002	2B	pH	pH Units	0.115
10/3/2002	2B	pH	pH Units	3.6
10/24/2002	2B	pH	pH Units	3.7
11/14/2002	2B	pH	pH Units	3.29
12/13/2002	2B	pH	pH Units	4.03
2/6/2003	2B	pH	pH Units	3.44
2/27/2003	2B	pH	pH Units	3.66
3/20/2003	2B	pH	pH Units	3.5
4/3/2003	2B	pH	pH Units	3.74
4/24/2003	2B	pH	pH Units	3.73
5/15/2003	2B	pH	pH Units	3.81
6/5/2003	2B	pH	pH Units	3.63
7/3/2003	2B	pH	pH Units	3.63
7/24/2003	2B	pH	pH Units	3.45
8/14/2003	2B	pH	pH Units	3.76
9/4/2003	2B	pH	pH Units	3.35
10/2/2003	2B	pH	pH Units	3.6
10/23/2003	2B	pH	pH Units	2.93
11/13/2003	2B	pH	pH Units	3.33
12/4/2003	2B	pH	pH Units	3.47
1/8/2004	2B	pH	pH Units	3.37
1/29/2004	2B	pH	pH Units	3.4
2/19/2004	2B	pH	pH Units	3.32
3/11/2004	2B	pH	pH Units	3.22
4/8/2004	2B	pH	pH Units	3.41
4/29/2004	2B	pH	pH Units	3.28
5/20/2004	2B	pH	pH Units	3.42
6/10/2004	2B	pH	pH Units	3.12
7/15/2004	2B	pH	pH Units	3.14
8/5/2004	2B	pH	pH Units	3.05
8/26/2004	2B	pH	pH Units	3.4
9/16/2004	2B	pH	pH Units	3.3
1/6/2005	2B	pH	pH Units	3.29
1/27/2005	2B	pH	pH Units	3.39
2/17/2005	2B	pH	pH Units	3.31
4/7/2005	2B	pH	pH Units	3.38
4/28/2005	2B	pH	pH Units	3.22
5/19/2005	2B	pH	pH Units	3.37
6/9/2005	2B	pH	pH Units	3.42
7/7/2005	2B	pH	pH Units	3.54
7/28/2005	2B	pH	pH Units	3.33
8/18/2005	2B	pH	pH Units	3.29
9/8/2005	2B	pH	pH Units	3.14
10/13/2005	2B	pH	pH Units	2.99
11/3/2005	2B	pH	pH Units	3.46
11/23/2005	2B	pH	pH Units	3.3
12/15/2005	2B	pH	pH Units	3.46
1/5/2006	2B	pH	pH Units	3.46
1/26/2006	2B	pH	pH Units	3.25
2/16/2006	2B	pH	pH Units	3.41
3/9/2006	2B	pH	pH Units	3.37
4/6/2006	2B	pH	pH Units	3.15
4/27/2006	2B	pH	pH Units	3.07
5/18/2006	2B	pH	pH Units	3.37
6/8/2006	2B	pH	pH Units	3.28
7/6/2006	2B	pH	pH Units	3.25
7/27/2006	2B	pH	pH Units	2.95
8/17/2006	2B	pH	pH Units	3.13
9/7/2006	2B	pH	pH Units	3.4
10/19/2006	2B	pH	pH Units	3.54
11/9/2006	2B	pH	pH Units	3.2
11/30/2006	2B	pH	pH Units	3.35
12/21/2006	2B	pH	pH Units	3.26
1/4/2007	2B	pH	pH Units	3.75
1/25/2007	2B	pH	pH Units	3.64
2/15/2007	2B	pH	pH Units	3.49
3/8/2007	2B	pH	pH Units	3.36
4/19/2007	2B	pH	pH Units	3.34
5/10/2007	2B	pH	pH Units	3.17
5/31/2007	2B	pH	pH Units	3.37
6/21/2007	2B	pH	pH Units	2.98
7/12/2007	2B	pH	pH	3.71
7/12/2007	2B	pH	pH	3.71
7/12/2007	2B	pH	pH	3.71

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2B	pH	pH	3.7
8/2/2007	2B	pH	pH	3.45
8/2/2007	2B	pH	pH	3.44
8/2/2007	2B	pH	pH	3.45
8/2/2007	2B	pH	pH	3.46
8/23/2007	2B	pH	pH	3.4
8/23/2007	2B	pH	pH	3.31
8/23/2007	2B	pH	pH	3.36
8/23/2007	2B	pH	pH	3.32
9/13/2007	2B	pH	pH	3.15
9/13/2007	2B	pH	pH	3.13
9/13/2007	2B	pH	pH	3.17
9/13/2007	2B	pH	pH	3.13
4/3/2008	2B	pH	pH	3.80
4/3/2008	2B	pH	pH	3.82
4/3/2008	2B	pH	pH	3.84
4/3/2008	2B	pH	pH	3.84
4/3/2008	2B	pH	pH	3.80
4/3/2008	2B	pH	pH	3.82
4/3/2008	2B	pH	pH	3.84
4/3/2008	2B	pH	pH	3.84
4/24/2008	2B	pH	pH	3.63
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.66
4/24/2008	2B	pH	pH	3.66
4/24/2008	2B	pH	pH	3.67
4/24/2008	2B	pH	pH	3.63
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.65
4/24/2008	2B	pH	pH	3.66
5/15/2008	2B	pH	pH	3.46
5/15/2008	2B	pH	pH	3.48
5/15/2008	2B	pH	pH	3.48
5/15/2008	2B	pH	pH	3.48
5/15/2008	2B	pH	pH	3.46
5/15/2008	2B	pH	pH	3.48
5/15/2008	2B	pH	pH	3.48
5/15/2008	2B	pH	pH	3.48
6/5/2008	2B	pH	pH	3.44
6/5/2008	2B	pH	pH	3.47
6/5/2008	2B	pH	pH	3.53
6/5/2008	2B	pH	pH	3.63
6/5/2008	2B	pH	pH	3.44
6/5/2008	2B	pH	pH	3.47
6/5/2008	2B	pH	pH	3.53
6/5/2008	2B	pH	pH	3.63
7/3/2008	2B	pH	pH	3.62
7/3/2008	2B	pH	pH	3.56
7/3/2008	2B	pH	pH	3.62
7/3/2008	2B	pH	pH	3.62
7/3/2008	2B	pH	pH	3.56
7/3/2008	2B	pH	pH	3.62
7/3/2008	2B	pH	pH	3.62
7/3/2008	2B	pH	pH	3.62
7/24/2008	2B	pH	pH	2.71
7/24/2008	2B	pH	pH	2.82
7/24/2008	2B	pH	pH	2.84
7/24/2008	2B	pH	pH	2.85
8/14/2008	2B	pH	pH	3.29
8/14/2008	2B	pH	pH	3.34
8/14/2008	2B	pH	pH	3.35
8/14/2008	2B	pH	pH	3.35
9/4/2008	2B	pH	pH	3.48
9/4/2008	2B	pH	pH	3.51
9/4/2008	2B	pH	pH	3.57
9/4/2008	2B	pH	pH	3.68
10/9/2008	2B	pH	pH	3.31
10/9/2008	2B	pH	pH	3.32
10/9/2008	2B	pH	pH	3.34
10/9/2008	2B	pH	pH	3.36
10/30/2008	2B	pH	pH	3.14
10/30/2008	2B	pH	pH	3.19
10/30/2008	2B	pH	pH	3.27
10/30/2008	2B	pH	pH	3.35
11/20/2008	2B	pH	pH	3.1
11/20/2008	2B	pH	pH	3.15
11/20/2008	2B	pH	pH	3.18
11/20/2008	2B	pH	pH	3.29
12/11/2008	2B	pH	pH	3.34
12/11/2008	2B	pH	pH	3.38
12/11/2008	2B	pH	pH	3.4
12/11/2008	2B	pH	pH	3.44

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2009	2B	pH	pH	3.80
1/8/2009	2B	pH	pH	3.80
1/8/2009	2B	pH	pH	3.82
1/8/2009	2B	pH	pH	3.82
1/29/2009	2B	pH	pH	3.63
1/29/2009	2B	pH	pH	3.63
1/29/2009	2B	pH	pH	3.65
1/29/2009	2B	pH	pH	3.65
2/19/2009	2B	pH	pH	3.49
2/19/2009	2B	pH	pH	3.50
2/19/2009	2B	pH	pH	3.52
2/19/2009	2B	pH	pH	3.55
3/12/2009	2B	pH	pH	3.53
3/12/2009	2B	pH	pH	3.55
3/12/2009	2B	pH	pH	3.55
3/12/2009	2B	pH	pH	3.60
4/9/2009	2B	pH	pH	3.75
4/9/2009	2B	pH	pH	3.73
4/9/2009	2B	pH	pH	3.70
4/9/2009	2B	pH	pH	3.70
4/30/2009	2B	pH	pH	3.07
4/30/2009	2B	pH	pH	3.07
4/30/2009	2B	pH	pH	3.09
4/30/2009	2B	pH	pH	3.09
5/21/2009	2B	pH	pH	3.40
5/21/2009	2B	pH	pH	3.36
5/21/2009	2B	pH	pH	3.36
5/21/2009	2B	pH	pH	3.36
1/24/2008	2B	pH	pH	3.18
1/24/2008	2B	pH	pH	3.09
1/24/2008	2B	pH	pH	3.26
1/24/2008	2B	pH	pH	3.12
1/3/2008	2B	pH	pH	2.65
1/3/2008	2B	pH	pH	2.68
1/3/2008	2B	pH	pH	2.68
1/3/2008	2B	pH	pH	2.71
10/18/2007	2B	pH	pH Units	3.4
10/18/2007	2B	pH	pH Units	3.4
10/18/2007	2B	pH	pH Units	3.35
10/18/2007	2B	pH	pH Units	3.39
11/29/2007	2B	pH	pH Units	2.97
11/29/2007	2B	pH	pH Units	2.94
11/29/2007	2B	pH	pH Units	2.94
11/29/2007	2B	pH	pH Units	2.98
11/8/2007	2B	pH	pH Units	3.25
11/8/2007	2B	pH	pH Units	3.31
11/8/2007	2B	pH	pH Units	3.21
11/8/2007	2B	pH	pH Units	3.24
12/20/2007	2B	pH	pH Units	2.8
12/20/2007	2B	pH	pH Units	2.77
12/20/2007	2B	pH	pH Units	2.81
12/20/2007	2B	pH	pH Units	2.74
2/14/2008	2B	pH	pH	3.12
2/14/2008	2B	pH	pH	3.17
2/14/2008	2B	pH	pH	3.23
2/14/2008	2B	pH	pH	3.30
2/14/2008	2B	pH	pH	3.31
2/14/2008	2B	pH	pH	3.36
2/14/2008	2B	pH	pH	3.37
2/14/2008	2B	pH	pH	3.44
3/6/2008	2B	pH	pH	3.18
3/6/2008	2B	pH	pH	3.03
3/6/2008	2B	pH	pH	3.07
3/6/2008	2B	pH	pH	3.19
6/11/2009	2B	pH	pH	3.37
6/11/2009	2B	pH	pH	3.39
6/11/2009	2B	pH	pH	3.39
6/11/2009	2B	pH	pH	3.44
8/2/2007	2B	Phenols	mg/L	ND
8/23/2007	2B	Phenols	mg/L	ND
9/13/2007	2B	Phenols	mg/L	ND
1/16/2002	2B	Phenols	mg/L	ND
1/24/2002	2B	Phenols	mg/L	ND
2/14/2002	2B	Phenols	mg/L	0.007
3/7/2002	2B	Phenols	mg/L	ND
3/28/2002	2B	Phenols	mg/L	ND
4/4/2002	2B	Phenols	mg/L	0.002
4/25/2002	2B	Phenols	mg/L	ND
5/16/2002	2B	Phenols	mg/L	ND
6/6/2002	2B	Phenols	mg/L	ND
7/18/2002	2B	Phenols	mg/L	ND
8/8/2002	2B	Phenols	mg/L	0.08
8/29/2002	2B	Phenols	mg/L	0.002
9/19/2002	2B	Phenols	mg/L	ND
10/3/2002	2B	Phenols	mg/L	0.006

Sampling Date	Location ID	Analyte	Unit	Concentration
10/24/2002	2B	Phenols	mg/L	0.22
11/14/2002	2B	Phenols	mg/L	ND
12/13/2002	2B	Phenols	mg/L	12.6
2/6/2003	2B	Phenols	mg/L	ND
2/27/2003	2B	Phenols	mg/L	ND
3/20/2003	2B	Phenols	mg/L	ND
4/3/2003	2B	Phenols	mg/L	ND
4/24/2003	2B	Phenols	mg/L	ND
5/15/2003	2B	Phenols	mg/L	0.8
6/5/2003	2B	Phenols	mg/L	ND
7/3/2003	2B	Phenols	mg/L	ND
7/24/2003	2B	Phenols	mg/L	0.1
8/14/2003	2B	Phenols	mg/L	ND
9/4/2003	2B	Phenols	mg/L	ND
10/2/2003	2B	Phenols	mg/L	ND
10/23/2003	2B	Phenols	mg/L	ND
11/13/2003	2B	Phenols	mg/L	ND
12/4/2003	2B	Phenols	mg/L	ND
1/8/2004	2B	Phenols	mg/L	ND
1/29/2004	2B	Phenols	mg/L	ND
2/19/2004	2B	Phenols	mg/L	ND
3/11/2004	2B	Phenols	mg/L	ND
4/8/2004	2B	Phenols	mg/L	ND
4/29/2004	2B	Phenols	mg/L	ND
5/20/2004	2B	Phenols	mg/L	ND
6/10/2004	2B	Phenols	mg/L	ND
7/15/2004	2B	Phenols	mg/L	ND
8/5/2004	2B	Phenols	mg/L	ND
8/26/2004	2B	Phenols	mg/L	ND
9/16/2004	2B	Phenols	mg/L	ND
1/6/2005	2B	Phenols	mg/L	ND
1/27/2005	2B	Phenols	mg/L	ND
2/17/2005	2B	Phenols	mg/L	ND
4/7/2005	2B	Phenols	mg/L	ND
4/28/2005	2B	Phenols	mg/L	ND
5/19/2005	2B	Phenols	mg/L	ND
6/9/2005	2B	Phenols	mg/L	ND
6/9/2005	2B	Phenols	mg/L	ND
7/7/2005	2B	Phenols	mg/L	ND
7/7/2005	2B	Phenols	mg/L	ND
7/28/2005	2B	Phenols	mg/L	ND
7/28/2005	2B	Phenols	mg/L	ND
8/18/2005	2B	Phenols	mg/L	0.05
8/18/2005	2B	Phenols	mg/L	0.05
9/8/2005	2B	Phenols	mg/L	ND
9/8/2005	2B	Phenols	mg/L	ND
10/13/2005	2B	Phenols	mg/L	ND
11/3/2005	2B	Phenols	mg/L	ND
11/23/2005	2B	Phenols	mg/L	ND
12/15/2005	2B	Phenols	mg/L	ND
1/5/2006	2B	Phenols	mg/L	ND
1/26/2006	2B	Phenols	mg/L	ND
2/16/2006	2B	Phenols	mg/L	ND
3/9/2006	2B	Phenols	mg/L	ND
4/6/2006	2B	Phenols	mg/L	0.08
4/27/2006	2B	Phenols	mg/L	ND
5/18/2006	2B	Phenols	mg/L	ND
6/8/2006	2B	Phenols	mg/L	ND
7/6/2006	2B	Phenols	mg/L	ND
7/27/2006	2B	Phenols	mg/L	ND
8/17/2006	2B	Phenols	mg/L	ND
9/7/2006	2B	Phenols	mg/L	ND
10/19/2006	2B	Phenols	mg/L	ND
11/9/2006	2B	Phenols	mg/L	ND
11/30/2006	2B	Phenols	mg/L	ND
12/21/2006	2B	Phenols	mg/L	ND
1/4/2007	2B	Phenols	mg/L	ND
1/25/2007	2B	Phenols	mg/L	ND
2/15/2007	2B	Phenols	mg/L	ND
3/8/2007	2B	Phenols	mg/L	ND
4/19/2007	2B	Phenols	mg/L	ND
5/10/2007	2B	Phenols	mg/L	1.26
5/31/2007	2B	Phenols	mg/L	ND
6/21/2007	2B	Phenols	mg/L	ND
7/12/2007	2B	Phenols	mg/L	ND
10/18/2007	2B	Phenols	mg/L	6.12
11/29/2007	2B	Phenols	mg/L	0.16
11/8/2007	2B	Phenols	mg/L	ND
12/20/2007	2B	Phenols	mg/L	0.1
4/3/2008	2B	Phenols, Total	mg/L	ND
4/3/2008	2B	Phenols, Total	mg/L	ND
4/24/2008	2B	Phenols, Total	mg/L	0.011
4/24/2008	2B	Phenols, Total	mg/L	0.0902
4/24/2008	2B	Phenols, Total	mg/L	0.0902
5/15/2008	2B	Phenols, Total	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
5/15/2008	2B	Phenols, Total	mg/L	ND
6/5/2008	2B	Phenols, Total	mg/L	ND
6/5/2008	2B	Phenols, Total	mg/L	ND
7/3/2008	2B	Phenols, Total	mg/L	ND
7/3/2008	2B	Phenols, Total	mg/L	ND
7/24/2008	2B	Phenols, Total	mg/L	ND
8/14/2008	2B	Phenols, Total	mg/L	ND
9/4/2008	2B	Phenols, Total	mg/L	ND
10/9/2008	2B	Phenols, Total	mg/L	ND
10/30/2008	2B	Phenols, Total	mg/L	ND
11/20/2008	2B	Phenols, Total	mg/L	ND
12/11/2008	2B	Phenols, Total	mg/L	ND
1/8/2009	2B	Phenols, Total	mg/L	ND
1/29/2009	2B	Phenols, Total	mg/L	ND
2/19/2009	2B	Phenols, Total	mg/L	ND
3/12/2009	2B	Phenols, Total	mg/L	8.61
4/9/2009	2B	Phenols, Total	mg/L	ND
4/30/2009	2B	Phenols, Total	mg/L	ND
5/21/2009	2B	Phenols, Total	mg/L	ND
1/24/2008	2B	Phenols, Total	mg/L	ND
1/3/2008	2B	Phenols, Total	mg/L	ND
2/14/2008	2B	Phenols, Total	mg/L	ND
2/14/2008	2B	Phenols, Total	mg/L	ND
3/6/2008	2B	Phenols, Total	mg/L	ND
6/11/2009	2B	Phenols, Total	mg/L	ND
7/12/2007	2B	Potassium	mg/L	7.95
7/12/2007	2B	sec-Butylbenzene	ug/L	ND
7/12/2007	2B	Selenium	mg/L	0.029
7/12/2007	2B	Silver	mg/L	ND
1/16/2002	2B	Sodium	mg/L	109
1/24/2002	2B	Sodium	mg/L	92.5
2/14/2002	2B	Sodium	mg/L	95.7
3/7/2002	2B	Sodium	mg/L	92.6
3/28/2002	2B	Sodium	mg/L	92
4/4/2002	2B	Sodium	mg/L	94.1
4/25/2002	2B	Sodium	mg/L	94.5
5/16/2002	2B	Sodium	mg/L	103
6/6/2002	2B	Sodium	mg/L	93.2
7/18/2002	2B	Sodium	mg/L	104
8/8/2002	2B	Sodium	mg/L	106
8/29/2002	2B	Sodium	mg/L	98.6
9/19/2002	2B	Sodium	mg/L	175
10/3/2002	2B	Sodium	mg/L	86.1
10/24/2002	2B	Sodium	mg/L	104
11/14/2002	2B	Sodium	mg/L	127
12/13/2002	2B	Sodium	mg/L	100
2/6/2003	2B	Sodium	mg/L	112
2/27/2003	2B	Sodium	mg/L	123
3/20/2003	2B	Sodium	mg/L	120
4/3/2003	2B	Sodium	mg/L	90.9
4/24/2003	2B	Sodium	mg/L	567
5/15/2003	2B	Sodium	mg/L	129
6/5/2003	2B	Sodium	mg/L	111
7/3/2003	2B	Sodium	mg/L	127
7/24/2003	2B	Sodium	mg/L	90.9
8/14/2003	2B	Sodium	mg/L	121
9/4/2003	2B	Sodium	mg/L	95.8
10/2/2003	2B	Sodium	mg/L	103
10/23/2003	2B	Sodium	mg/L	106
11/13/2003	2B	Sodium	mg/L	112
12/4/2003	2B	Sodium	mg/L	84.7
1/8/2004	2B	Sodium	mg/L	102
1/29/2004	2B	Sodium	mg/L	91.9
2/19/2004	2B	Sodium	mg/L	92.3
3/11/2004	2B	Sodium	mg/L	83.9
4/8/2004	2B	Sodium	mg/L	93.5
4/29/2004	2B	Sodium	mg/L	89.8
5/20/2004	2B	Sodium	mg/L	81.6
6/10/2004	2B	Sodium	mg/L	86.8
7/15/2004	2B	Sodium	mg/L	130
8/5/2004	2B	Sodium	mg/L	109
8/26/2004	2B	Sodium	mg/L	97.7
9/16/2004	2B	Sodium	mg/L	107
1/6/2005	2B	Sodium	mg/L	109
1/27/2005	2B	Sodium	mg/L	105
2/17/2005	2B	Sodium	mg/L	103
4/7/2005	2B	Sodium	mg/L	87.3
4/28/2005	2B	Sodium	mg/L	90
5/19/2005	2B	Sodium	mg/L	92.7
6/9/2005	2B	Sodium	mg/L	87
7/7/2005	2B	Sodium	mg/L	94.6
7/28/2005	2B	Sodium	mg/L	95.5
8/18/2005	2B	Sodium	mg/L	80.8
9/8/2005	2B	Sodium	mg/L	92
10/13/2005	2B	Sodium	mg/L	85.3

Sampling Date	Location ID	Analyte	Unit	Concentration
11/3/2005	2B	Sodium	mg/L	104
11/23/2005	2B	Sodium	mg/L	132
12/15/2005	2B	Sodium	mg/L	87.8
1/5/2006	2B	Sodium	mg/L	131
1/26/2006	2B	Sodium	mg/L	107
2/16/2006	2B	Sodium	mg/L	91.4
3/9/2006	2B	Sodium	mg/L	90
4/6/2006	2B	Sodium	mg/L	89
4/27/2006	2B	Sodium	mg/L	90.3
5/18/2006	2B	Sodium	mg/L	82.3
6/8/2006	2B	Sodium	mg/L	73.3
7/6/2006	2B	Sodium	mg/L	65.5
7/27/2006	2B	Sodium	mg/L	80.1
8/17/2006	2B	Sodium	mg/L	79.2
9/7/2006	2B	Sodium	mg/L	75
10/19/2006	2B	Sodium	mg/L	130
11/9/2006	2B	Sodium	mg/L	97.3
11/30/2006	2B	Sodium	mg/L	99.2
12/21/2006	2B	Sodium	mg/L	105
1/4/2007	2B	Sodium	mg/L	126
1/25/2007	2B	Sodium	mg/L	108
2/15/2007	2B	Sodium	mg/L	125
3/8/2007	2B	Sodium	mg/L	88.2
4/19/2007	2B	Sodium	mg/L	80.3
5/10/2007	2B	Sodium	mg/L	81.4
5/31/2007	2B	Sodium	mg/L	129
6/21/2007	2B	Sodium	mg/L	84.7
7/12/2007	2B	Sodium	mg/L	118
8/2/2007	2B	Sodium	mg/L	100
8/23/2007	2B	Sodium	mg/L	105
9/13/2007	2B	Sodium	mg/L	940
4/3/2008	2B	Sodium	mg/L	123
4/3/2008	2B	Sodium	mg/L	123
4/24/2008	2B	Sodium	mg/L	105
4/24/2008	2B	Sodium	mg/L	111
4/24/2008	2B	Sodium	mg/L	111
5/15/2008	2B	Sodium	mg/L	93.8
5/15/2008	2B	Sodium	mg/L	93.8
6/5/2008	2B	Sodium	mg/L	110
6/5/2008	2B	Sodium	mg/L	110
7/3/2008	2B	Sodium	mg/L	83.4
7/3/2008	2B	Sodium	mg/L	83.4
7/24/2008	2B	Sodium	mg/L	89.6
8/14/2008	2B	Sodium	mg/L	85.1
9/4/2008	2B	Sodium	mg/L	89.8
10/9/2008	2B	Sodium	mg/L	114
10/30/2008	2B	Sodium	mg/L	93.5
11/20/2008	2B	Sodium	mg/L	87.2
12/11/2008	2B	Sodium	mg/L	87.1
1/8/2009	2B	Sodium	mg/L	123
1/29/2009	2B	Sodium	mg/L	116
2/19/2009	2B	Sodium	mg/L	68.2
3/12/2009	2B	Sodium	mg/L	91.9
4/9/2009	2B	Sodium	mg/L	134
4/30/2009	2B	Sodium	mg/L	105
5/21/2009	2B	Sodium	mg/L	95.8
1/24/2008	2B	Sodium	mg/L	77.8
1/3/2008	2B	Sodium	mg/L	78.5
10/18/2007	2B	Sodium	mg/L	144
11/29/2007	2B	Sodium	mg/L	115
11/8/2007	2B	Sodium	mg/L	112
12/20/2007	2B	Sodium	mg/L	104
2/14/2008	2B	Sodium	mg/L	80.2
2/14/2008	2B	Sodium	mg/L	83.0
3/6/2008	2B	Sodium	mg/L	90.6
6/11/2009	2B	Sodium	mg/L	96.2
7/12/2007	2B	Solids, Total Dissolved	mg/L	5587
7/12/2007	2B	Solids, Total Suspended	mg/L	22
1/16/2002	2B	Specific Conductance	umhos	4830
1/24/2002	2B	Specific Conductance	umhos	4190
2/14/2002	2B	Specific Conductance	umhos	4010
3/7/2002	2B	Specific Conductance	umhos	114
3/28/2002	2B	Specific Conductance	umhos	142
4/4/2002	2B	Specific Conductance	umhos	4600
4/25/2002	2B	Specific Conductance	umhos	3380
5/16/2002	2B	Specific Conductance	umhos	3090
6/6/2002	2B	Specific Conductance	umhos	2940
7/18/2002	2B	Specific Conductance	umhos	4160
8/8/2002	2B	Specific Conductance	umhos	6050
8/29/2002	2B	Specific Conductance	umhos	4560
9/19/2002	2B	Specific Conductance	umhos	5460
10/3/2002	2B	Specific Conductance	umhos	4250
10/24/2002	2B	Specific Conductance	umhos	4690
11/14/2002	2B	Specific Conductance	umhos	3130
12/13/2002	2B	Specific Conductance	umhos	5260

Sampling Date	Location ID	Analyte	Unit	Concentration
2/6/2003	2B	Specific Conductance	umhos	4290
2/27/2003	2B	Specific Conductance	umhos	4700
3/20/2003	2B	Specific Conductance	umhos	6000
4/3/2003	2B	Specific Conductance	umhos	4060
4/24/2003	2B	Specific Conductance	umhos	4430
5/15/2003	2B	Specific Conductance	umhos	4750
6/5/2003	2B	Specific Conductance	umhos	3750
7/3/2003	2B	Specific Conductance	umhos	4450
7/24/2003	2B	Specific Conductance	umhos	3800
8/14/2003	2B	Specific Conductance	umhos	3520
9/4/2003	2B	Specific Conductance	umhos	3800
10/2/2003	2B	Specific Conductance	umhos	3900
10/23/2003	2B	Specific Conductance	umhos	3790
11/13/2003	2B	Specific Conductance	umhos	3640
12/4/2003	2B	Specific Conductance	umhos	3390
1/8/2004	2B	Specific Conductance	umhos	3820
1/29/2004	2B	Specific Conductance	umhos	3200
2/19/2004	2B	Specific Conductance	umhos	4050
3/11/2004	2B	Specific Conductance	umhos	3570
4/8/2004	2B	Specific Conductance	umhos	3000
4/29/2004	2B	Specific Conductance	umhos	3050
5/20/2004	2B	Specific Conductance	umhos	2720
6/10/2004	2B	Specific Conductance	umhos	2160
7/15/2004	2B	Specific Conductance	umhos	4320
8/5/2004	2B	Specific Conductance	umhos	3190
8/26/2004	2B	Specific Conductance	umhos	3340
9/16/2004	2B	Specific Conductance	umhos	2830
1/6/2005	2B	Specific Conductance	umhos	3680
1/27/2005	2B	Specific Conductance	umhos	3070
2/17/2005	2B	Specific Conductance	umhos	2660
4/7/2005	2B	Specific Conductance	umhos	2700
4/28/2005	2B	Specific Conductance	umhos	2250
5/19/2005	2B	Specific Conductance	umhos	3780
6/9/2005	2B	Specific Conductance	umhos	3560
7/7/2005	2B	Specific Conductance	umhos	3970
7/28/2005	2B	Specific Conductance	umhos	3630
8/18/2005	2B	Specific Conductance	umhos	3400
9/8/2005	2B	Specific Conductance	umhos	3330
10/13/2005	2B	Specific Conductance	umhos	2730
11/3/2005	2B	Specific Conductance	umhos	3380
11/23/2005	2B	Specific Conductance	umhos	3090
12/15/2005	2B	Specific Conductance	umhos	2890
1/5/2006	2B	Specific Conductance	umhos	3620
1/26/2006	2B	Specific Conductance	umhos	2750
2/16/2006	2B	Specific Conductance	umhos	3010
3/9/2006	2B	Specific Conductance	umhos	2770
4/6/2006	2B	Specific Conductance	umhos	3220
4/27/2006	2B	Specific Conductance	umhos	354
5/18/2006	2B	Specific Conductance	umhos	3630
6/8/2006	2B	Specific Conductance	umhos	3680
7/6/2006	2B	Specific Conductance	umhos	3320
7/27/2006	2B	Specific Conductance	umhos	3300
8/17/2006	2B	Specific Conductance	umhos	3220
9/7/2006	2B	Specific Conductance	umhos	3090
10/19/2006	2B	Specific Conductance	umhos	3740
11/9/2006	2B	Specific Conductance	umhos	3410
11/30/2006	2B	Specific Conductance	umhos	3240
12/21/2006	2B	Specific Conductance	umhos	3320
1/4/2007	2B	Specific Conductance	umhos	5030
1/25/2007	2B	Specific Conductance	umhos	2240
2/15/2007	2B	Specific Conductance	umhos	1933
3/8/2007	2B	Specific Conductance	umhos	1895
4/19/2007	2B	Specific Conductance	umhos	2090
5/10/2007	2B	Specific Conductance	umhos	1622
5/31/2007	2B	Specific Conductance	umhos	1492
6/21/2007	2B	Specific Conductance	umhos	1286
7/12/2007	2B	Specific Conductance	umhos	1468
7/12/2007	2B	Specific Conductance	umhos	1478
7/12/2007	2B	Specific Conductance	umhos	1494
7/12/2007	2B	Specific Conductance	umhos	1535
8/2/2007	2B	Specific Conductance	umhos	2650
8/2/2007	2B	Specific Conductance	umhos	2670
8/2/2007	2B	Specific Conductance	umhos	2680
8/2/2007	2B	Specific Conductance	umhos	2680
8/23/2007	2B	Specific Conductance	umhos	3440
8/23/2007	2B	Specific Conductance	umhos	3470
8/23/2007	2B	Specific Conductance	umhos	3490
8/23/2007	2B	Specific Conductance	umhos	3460
9/13/2007	2B	Specific Conductance	umhos	3270
9/13/2007	2B	Specific Conductance	umhos	3210
9/13/2007	2B	Specific Conductance	umhos	3240
9/13/2007	2B	Specific Conductance	umhos	3250
4/3/2008	2B	Specific Conductance	umhos	4110
4/3/2008	2B	Specific Conductance	umhos	4120
4/3/2008	2B	Specific Conductance	umhos	4130

Sampling Date	Location ID	Analyte	Unit	Concentration
4/3/2008	2B	Specific Conductance	umhos	4170
4/3/2008	2B	Specific Conductance	umhos	4110
4/3/2008	2B	Specific Conductance	umhos	4120
4/3/2008	2B	Specific Conductance	umhos	4130
4/3/2008	2B	Specific Conductance	umhos	4170
4/24/2008	2B	Specific Conductance	umhos	3870
4/24/2008	2B	Specific Conductance	umhos	3900
4/24/2008	2B	Specific Conductance	umhos	3930
4/24/2008	2B	Specific Conductance	umhos	3940
4/24/2008	2B	Specific Conductance	umhos	3950
4/24/2008	2B	Specific Conductance	umhos	3950
4/24/2008	2B	Specific Conductance	umhos	3960
4/24/2008	2B	Specific Conductance	umhos	4000
4/24/2008	2B	Specific Conductance	umhos	3870
4/24/2008	2B	Specific Conductance	umhos	3950
4/24/2008	2B	Specific Conductance	umhos	3960
4/24/2008	2B	Specific Conductance	umhos	4000
5/15/2008	2B	Specific Conductance	umhos	3520
5/15/2008	2B	Specific Conductance	umhos	3540
5/15/2008	2B	Specific Conductance	umhos	3580
5/15/2008	2B	Specific Conductance	umhos	3610
5/15/2008	2B	Specific Conductance	umhos	3520
5/15/2008	2B	Specific Conductance	umhos	3540
5/15/2008	2B	Specific Conductance	umhos	3580
5/15/2008	2B	Specific Conductance	umhos	3610
6/5/2008	2B	Specific Conductance	umhos	3460
6/5/2008	2B	Specific Conductance	umhos	3490
6/5/2008	2B	Specific Conductance	umhos	3510
6/5/2008	2B	Specific Conductance	umhos	3550
6/5/2008	2B	Specific Conductance	umhos	3460
6/5/2008	2B	Specific Conductance	umhos	3490
6/5/2008	2B	Specific Conductance	umhos	3510
6/5/2008	2B	Specific Conductance	umhos	3550
7/3/2008	2B	Specific Conductance	umhos	3250
7/3/2008	2B	Specific Conductance	umhos	3160
7/3/2008	2B	Specific Conductance	umhos	3150
7/3/2008	2B	Specific Conductance	umhos	3150
7/3/2008	2B	Specific Conductance	umhos	3150
7/3/2008	2B	Specific Conductance	umhos	3150
7/3/2008	2B	Specific Conductance	umhos	3160
7/3/2008	2B	Specific Conductance	umhos	3250
7/24/2008	2B	Specific Conductance	umhos	3030
7/24/2008	2B	Specific Conductance	umhos	3040
7/24/2008	2B	Specific Conductance	umhos	3050
7/24/2008	2B	Specific Conductance	umhos	3070
8/14/2008	2B	Specific Conductance	umhos	2970
8/14/2008	2B	Specific Conductance	umhos	2970
8/14/2008	2B	Specific Conductance	umhos	2980
8/14/2008	2B	Specific Conductance	umhos	2990
9/4/2008	2B	Specific Conductance	umhos	2910
9/4/2008	2B	Specific Conductance	umhos	2930
9/4/2008	2B	Specific Conductance	umhos	2990
9/4/2008	2B	Specific Conductance	umhos	3050
10/9/2008	2B	Specific Conductance	umhos	2890
10/9/2008	2B	Specific Conductance	umhos	2920
10/9/2008	2B	Specific Conductance	umhos	2970
10/9/2008	2B	Specific Conductance	umhos	2970
10/30/2008	2B	Specific Conductance	umhos	3130
10/30/2008	2B	Specific Conductance	umhos	3150
10/30/2008	2B	Specific Conductance	umhos	3190
10/30/2008	2B	Specific Conductance	umhos	3220
11/20/2008	2B	Specific Conductance	umhos	3000
11/20/2008	2B	Specific Conductance	umhos	3020
11/20/2008	2B	Specific Conductance	umhos	3030
11/20/2008	2B	Specific Conductance	umhos	3050
12/11/2008	2B	Specific Conductance	umhos	3440
12/11/2008	2B	Specific Conductance	umhos	3457
12/11/2008	2B	Specific Conductance	umhos	3514
12/11/2008	2B	Specific Conductance	umhos	3518
1/8/2009	2B	Specific Conductance	umhos	4690
1/8/2009	2B	Specific Conductance	umhos	4770
1/8/2009	2B	Specific Conductance	umhos	4775
1/8/2009	2B	Specific Conductance	umhos	4806
1/29/2009	2B	Specific Conductance	umhos	3970
1/29/2009	2B	Specific Conductance	umhos	3990
1/29/2009	2B	Specific Conductance	umhos	3990
1/29/2009	2B	Specific Conductance	umhos	4120
2/19/2009	2B	Specific Conductance	umhos	3770
2/19/2009	2B	Specific Conductance	umhos	3770
2/19/2009	2B	Specific Conductance	umhos	3800
2/19/2009	2B	Specific Conductance	umhos	3800
3/12/2009	2B	Specific Conductance	umhos	3650
3/12/2009	2B	Specific Conductance	umhos	3650
3/12/2009	2B	Specific Conductance	umhos	3680
3/12/2009	2B	Specific Conductance	umhos	3690

Sampling Date	Location ID	Analyte	Unit	Concentration
4/9/2009	2B	Specific Conductance	umhos	4460
4/9/2009	2B	Specific Conductance	umhos	4410
4/9/2009	2B	Specific Conductance	umhos	4490
4/9/2009	2B	Specific Conductance	umhos	4500
4/30/2009	2B	Specific Conductance	umhos	4140
4/30/2009	2B	Specific Conductance	umhos	4150
4/30/2009	2B	Specific Conductance	umhos	4150
4/30/2009	2B	Specific Conductance	umhos	4170
5/21/2009	2B	Specific Conductance	umhos	4090
5/21/2009	2B	Specific Conductance	umhos	3990
5/21/2009	2B	Specific Conductance	umhos	3980
5/21/2009	2B	Specific Conductance	umhos	4100
1/24/2008	2B	Specific Conductance	umhos	2330
1/24/2008	2B	Specific Conductance	umhos	2410
1/24/2008	2B	Specific Conductance	umhos	2450
1/24/2008	2B	Specific Conductance	umhos	2450
1/3/2008	2B	Specific Conductance	umhos	1435
1/3/2008	2B	Specific Conductance	umhos	1480
1/3/2008	2B	Specific Conductance	umhos	1579
1/3/2008	2B	Specific Conductance	umhos	1612
10/18/2007	2B	Specific Conductance	umhos	3190
10/18/2007	2B	Specific Conductance	umhos	3190
10/18/2007	2B	Specific Conductance	umhos	3180
10/18/2007	2B	Specific Conductance	umhos	3200
11/29/2007	2B	Specific Conductance	umhos	2010
11/29/2007	2B	Specific Conductance	umhos	2010
11/29/2007	2B	Specific Conductance	umhos	2010
11/29/2007	2B	Specific Conductance	umhos	2010
11/8/2007	2B	Specific Conductance	umhos	2530
11/8/2007	2B	Specific Conductance	umhos	2590
11/8/2007	2B	Specific Conductance	umhos	2620
11/8/2007	2B	Specific Conductance	umhos	2640
12/20/2007	2B	Specific Conductance	umhos	1858
12/20/2007	2B	Specific Conductance	umhos	1894
12/20/2007	2B	Specific Conductance	umhos	1896
12/20/2007	2B	Specific Conductance	umhos	1890
2/14/2008	2B	Specific Conductance	umhos	2940
2/14/2008	2B	Specific Conductance	umhos	2900
2/14/2008	2B	Specific Conductance	umhos	2950
2/14/2008	2B	Specific Conductance	umhos	2960
2/14/2008	2B	Specific Conductance	umhos	2970
2/14/2008	2B	Specific Conductance	umhos	2970
2/14/2008	2B	Specific Conductance	umhos	2990
2/14/2008	2B	Specific Conductance	umhos	3010
3/6/2008	2B	Specific Conductance	umhos	3010
3/6/2008	2B	Specific Conductance	umhos	3030
3/6/2008	2B	Specific Conductance	umhos	3060
3/6/2008	2B	Specific Conductance	umhos	3090
6/11/2009	2B	Specific Conductance	umhos	3970
6/11/2009	2B	Specific Conductance	umhos	3980
6/11/2009	2B	Specific Conductance	umhos	3990
6/11/2009	2B	Specific Conductance	umhos	4070
7/12/2007	2B	Styrene	ug/L	ND
8/2/2007	2B	Sulfate	mg/L	3638
8/23/2007	2B	Sulfate	mg/L	3013
9/13/2007	2B	Sulfate	mg/L	2827
4/3/2008	2B	Sulfate	mg/L	4042
4/3/2008	2B	Sulfate	mg/L	4042
4/24/2008	2B	Sulfate	mg/L	3317
4/24/2008	2B	Sulfate	mg/L	3469
4/24/2008	2B	Sulfate	mg/L	3317
5/15/2008	2B	Sulfate	mg/L	3595
5/15/2008	2B	Sulfate	mg/L	3595
6/5/2008	2B	Sulfate	mg/L	3292
6/5/2008	2B	Sulfate	mg/L	3292
7/3/2008	2B	Sulfate	mg/L	3259
7/3/2008	2B	Sulfate	mg/L	3259
7/24/2008	2B	Sulfate	mg/L	3315
8/14/2008	2B	Sulfate	mg/L	2750
9/4/2008	2B	Sulfate	mg/L	2953
10/9/2008	2B	Sulfate	mg/L	2883
10/30/2008	2B	Sulfate	mg/L	3221
11/20/2008	2B	Sulfate	mg/L	3326
12/11/2008	2B	Sulfate	mg/L	3156
1/8/2009	2B	Sulfate	mg/L	4442
1/29/2009	2B	Sulfate	mg/L	4492
2/19/2009	2B	Sulfate	mg/L	342
3/12/2009	2B	Sulfate	mg/L	3413
4/9/2009	2B	Sulfate	mg/L	4386
4/30/2009	2B	Sulfate	mg/L	4001
5/21/2009	2B	Sulfate	mg/L	3789
1/24/2008	2B	Sulfate	mg/L	2581
1/3/2008	2B	Sulfate	mg/L	2965
2/14/2008	2B	Sulfate	mg/L	2361
2/14/2008	2B	Sulfate	mg/L	2514

Sampling Date	Location ID	Analyte	Unit	Concentration
3/6/2008	2B	Sulfate	mg/L	2164
1/16/2002	2B	Sulfate	mg/L	4680
1/24/2002	2B	Sulfate	mg/L	4510
2/14/2002	2B	Sulfate	mg/L	4410
3/7/2002	2B	Sulfate	mg/L	4381
3/28/2002	2B	Sulfate	mg/L	7788
4/4/2002	2B	Sulfate	mg/L	20
4/25/2002	2B	Sulfate	mg/L	4292
5/16/2002	2B	Sulfate	mg/L	4709
6/6/2002	2B	Sulfate	mg/L	234
7/18/2002	2B	Sulfate	mg/L	5154
8/8/2002	2B	Sulfate	mg/L	5376
8/29/2002	2B	Sulfate	mg/L	14700
9/19/2002	2B	Sulfate	mg/L	ND
10/3/2002	2B	Sulfate	mg/L	3450
10/24/2002	2B	Sulfate	mg/L	4160
11/14/2002	2B	Sulfate	mg/L	3040
12/13/2002	2B	Sulfate	mg/L	4660
2/6/2003	2B	Sulfate	mg/L	33.2
2/27/2003	2B	Sulfate	mg/L	6830
3/20/2003	2B	Sulfate	mg/L	4010
4/3/2003	2B	Sulfate	mg/L	3620
4/24/2003	2B	Sulfate	mg/L	3690
5/15/2003	2B	Sulfate	mg/L	4920
6/5/2003	2B	Sulfate	mg/L	3590
7/3/2003	2B	Sulfate	mg/L	1570
7/24/2003	2B	Sulfate	mg/L	2710
8/14/2003	2B	Sulfate	mg/L	3480
9/4/2003	2B	Sulfate	mg/L	4170
10/2/2003	2B	Sulfate	mg/L	3600
10/23/2003	2B	Sulfate	mg/L	3255
11/13/2003	2B	Sulfate	mg/L	2590
12/4/2003	2B	Sulfate	mg/L	3420
1/8/2004	2B	Sulfate	mg/L	2700
1/29/2004	2B	Sulfate	mg/L	3610
2/19/2004	2B	Sulfate	mg/L	3100
3/11/2004	2B	Sulfate	mg/L	2680
4/8/2004	2B	Sulfate	mg/L	3374
4/29/2004	2B	Sulfate	mg/L	2069
5/20/2004	2B	Sulfate	mg/L	2715
6/10/2004	2B	Sulfate	mg/L	2621
7/15/2004	2B	Sulfate	mg/L	2370
8/5/2004	2B	Sulfate	mg/L	3160
8/26/2004	2B	Sulfate	mg/L	3115
9/16/2004	2B	Sulfate	mg/L	2849
1/6/2005	2B	Sulfate	mg/L	3966
1/27/2005	2B	Sulfate	mg/L	3256
2/17/2005	2B	Sulfate	mg/L	3531
4/7/2005	2B	Sulfate	mg/L	3432
4/28/2005	2B	Sulfate	mg/L	3470
5/19/2005	2B	Sulfate	mg/L	3995
6/9/2005	2B	Sulfate	mg/L	3614
7/7/2005	2B	Sulfate	mg/L	4511
7/28/2005	2B	Sulfate	mg/L	4460
8/18/2005	2B	Sulfate	mg/L	4027
9/8/2005	2B	Sulfate	mg/L	4210
10/13/2005	2B	Sulfate	mg/L	3006
11/3/2005	2B	Sulfate	mg/L	3237
11/23/2005	2B	Sulfate	mg/L	3950
12/15/2005	2B	Sulfate	mg/L	3369
1/5/2006	2B	Sulfate	mg/L	4788
1/26/2006	2B	Sulfate	mg/L	4061
2/16/2006	2B	Sulfate	mg/L	4230
3/9/2006	2B	Sulfate	mg/L	3284
4/6/2006	2B	Sulfate	mg/L	4131
4/27/2006	2B	Sulfate	mg/L	3560
5/18/2006	2B	Sulfate	mg/L	3455
6/8/2006	2B	Sulfate	mg/L	2900
7/6/2006	2B	Sulfate	mg/L	3040
7/27/2006	2B	Sulfate	mg/L	2956
8/17/2006	2B	Sulfate	mg/L	3180
9/7/2006	2B	Sulfate	mg/L	2940
10/19/2006	2B	Sulfate	mg/L	3849
11/9/2006	2B	Sulfate	mg/L	4297
11/30/2006	2B	Sulfate	mg/L	3475
12/21/2006	2B	Sulfate	mg/L	2891
1/4/2007	2B	Sulfate	mg/L	4882
1/25/2007	2B	Sulfate	mg/L	3935
2/15/2007	2B	Sulfate	mg/L	3042
3/8/2007	2B	Sulfate	mg/L	2141
4/19/2007	2B	Sulfate	mg/L	3017
5/10/2007	2B	Sulfate	mg/L	3306
5/31/2007	2B	Sulfate	mg/L	3098
6/21/2007	2B	Sulfate	mg/L	3670
7/12/2007	2B	Sulfate	mg/L	3924

Sampling Date	Location ID	Analyte	Unit	Concentration
10/18/2007	2B	Sulfate	mg/L	3579
11/29/2007	2B	Sulfate	mg/L	3075
11/8/2007	2B	Sulfate	mg/L	3403
12/20/2007	2B	Sulfate	mg/L	3068
6/11/2009	2B	Sulfate	mg/L	3679
1/16/2002	2B	Temperature	C	14
1/24/2002	2B	Temperature	C	14
2/14/2002	2B	Temperature	C	14
3/7/2002	2B	Temperature	C	14
3/28/2002	2B	Temperature	C	14
4/4/2002	2B	Temperature	C	14
4/25/2002	2B	Temperature	C	14
5/16/2002	2B	Temperature	C	15
6/6/2002	2B	Temperature	C	16
7/18/2002	2B	Temperature	C	18
8/8/2002	2B	Temperature	C	15
8/29/2002	2B	Temperature	C	15
9/19/2002	2B	Temperature	C	16
10/3/2002	2B	Temperature	C	16
10/24/2002	2B	Temperature	C	14
11/14/2002	2B	Temperature	C	15
12/13/2002	2B	Temperature	C	14
2/6/2003	2B	Temperature	C	14
2/27/2003	2B	Temperature	C	14
3/20/2003	2B	Temperature	C	14
4/3/2003	2B	Temperature	C	18
4/24/2003	2B	Temperature	C	14
5/15/2003	2B	Temperature	C	15
6/5/2003	2B	Temperature	C	16.7
7/3/2003	2B	Temperature	C	15
7/24/2003	2B	Temperature	C	15
8/14/2003	2B	Temperature	C	17
9/4/2003	2B	Temperature	C	15
10/2/2003	2B	Temperature	C	14
10/23/2003	2B	Temperature	C	14
11/13/2003	2B	Temperature	C	14
12/4/2003	2B	Temperature	C	14
1/8/2004	2B	Temperature	C	13
1/29/2004	2B	Temperature	C	14
2/19/2004	2B	Temperature	C	14
3/11/2004	2B	Temperature	C	15
4/8/2004	2B	Temperature	C	13
4/29/2004	2B	Temperature	C	15
5/20/2004	2B	Temperature	C	14
6/10/2004	2B	Temperature	C	20
7/15/2004	2B	Temperature	C	15
8/5/2004	2B	Temperature	C	14
8/26/2004	2B	Temperature	C	16
9/16/2004	2B	Temperature	C	15
1/6/2005	2B	Temperature	C	14
1/27/2005	2B	Temperature	C	13
2/17/2005	2B	Temperature	C	1
4/7/2005	2B	Temperature	C	15
4/28/2005	2B	Temperature	C	14
5/19/2005	2B	Temperature	C	14
6/9/2005	2B	Temperature	C	16
7/7/2005	2B	Temperature	C	15
7/28/2005	2B	Temperature	C	14
8/18/2005	2B	Temperature	C	15
9/8/2005	2B	Temperature	C	14
10/13/2005	2B	Temperature	C	14
11/3/2005	2B	Temperature	C	14
11/23/2005	2B	Temperature	C	13
12/15/2005	2B	Temperature	C	13
1/5/2006	2B	Temperature	C	14
1/26/2006	2B	Temperature	C	13
2/16/2006	2B	Temperature	C	14
3/9/2006	2B	Temperature	C	14
4/6/2006	2B	Temperature	C	13
4/27/2006	2B	Temperature	C	15
5/18/2006	2B	Temperature	C	14
6/8/2006	2B	Temperature	C	14
7/6/2006	2B	Temperature	C	15
7/27/2006	2B	Temperature	C	16
8/17/2006	2B	Temperature	C	14
9/7/2006	2B	Temperature	C	15
10/19/2006	2B	Temperature	C	16
11/9/2006	2B	Temperature	C	16
11/30/2006	2B	Temperature	C	15
12/21/2006	2B	Temperature	C	14
1/4/2007	2B	Temperature	C	15
1/25/2007	2B	Temperature	C	14
2/15/2007	2B	Temperature	C	13
3/8/2007	2B	Temperature	C	13
4/19/2007	2B	Temperature	C	14

Sampling Date	Location ID	Analyte	Unit	Concentration
5/10/2007	2B	Temperature	C	15
5/31/2007	2B	Temperature	C	16
6/21/2007	2B	Temperature	C	15
7/12/2007	2B	Temperature	C	16
7/12/2007	2B	Temperature	C	15
7/12/2007	2B	Temperature	C	15
7/12/2007	2B	Temperature	C	16
8/2/2007	2B	Temperature	C	15
8/2/2007	2B	Temperature	C	15
8/2/2007	2B	Temperature	C	16
8/2/2007	2B	Temperature	C	16
8/23/2007	2B	Temperature	C	15
8/23/2007	2B	Temperature	C	15
8/23/2007	2B	Temperature	C	15
8/23/2007	2B	Temperature	C	15
9/13/2007	2B	Temperature	C	15
9/13/2007	2B	Temperature	C	15
9/13/2007	2B	Temperature	C	15
9/13/2007	2B	Temperature	C	15
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/3/2008	2B	Temperature	C	14
4/24/2008	2B	Temperature	C	15
4/24/2008	2B	Temperature	C	15
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
4/24/2008	2B	Temperature	C	16
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	16
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	15
5/15/2008	2B	Temperature	C	16
6/5/2008	2B	Temperature	C	15
6/5/2008	2B	Temperature	C	15
6/5/2008	2B	Temperature	C	16
6/5/2008	2B	Temperature	C	16
6/5/2008	2B	Temperature	C	15
6/5/2008	2B	Temperature	C	15
6/5/2008	2B	Temperature	C	16
6/5/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	17
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	16
7/3/2008	2B	Temperature	C	17
7/24/2008	2B	Temperature	C	15
7/24/2008	2B	Temperature	C	15
7/24/2008	2B	Temperature	C	16
7/24/2008	2B	Temperature	C	16
8/14/2008	2B	Temperature	C	15
8/14/2008	2B	Temperature	C	16
8/14/2008	2B	Temperature	C	16
8/14/2008	2B	Temperature	C	16
9/4/2008	2B	Temperature	C	16
9/4/2008	2B	Temperature	C	16
9/4/2008	2B	Temperature	C	16
9/4/2008	2B	Temperature	C	17
10/9/2008	2B	Temperature	C	16
10/9/2008	2B	Temperature	C	16
10/9/2008	2B	Temperature	C	16
10/9/2008	2B	Temperature	C	16
10/30/2008	2B	Temperature	C	14
10/30/2008	2B	Temperature	C	14
10/30/2008	2B	Temperature	C	14
10/30/2008	2B	Temperature	C	14
11/20/2008	2B	Temperature	C	14
11/20/2008	2B	Temperature	C	14

Sampling Date	Location ID	Analyte	Unit	Concentration
11/20/2008	2B	Temperature	C	14
11/20/2008	2B	Temperature	C	14
12/11/2008	2B	Temperature	C	13
12/11/2008	2B	Temperature	C	14
12/11/2008	2B	Temperature	C	14
12/11/2008	2B	Temperature	C	14
1/8/2009	2B	Temperature	C	14
1/8/2009	2B	Temperature	C	14
1/8/2009	2B	Temperature	C	14
1/8/2009	2B	Temperature	C	14
1/29/2009	2B	Temperature	C	14
1/29/2009	2B	Temperature	C	14
1/29/2009	2B	Temperature	C	14
1/29/2009	2B	Temperature	C	14
2/19/2009	2B	Temperature	C	14
2/19/2009	2B	Temperature	C	14
2/19/2009	2B	Temperature	C	14
2/19/2009	2B	Temperature	C	14
3/12/2009	2B	Temperature	C	14
3/12/2009	2B	Temperature	C	14
3/12/2009	2B	Temperature	C	14
3/12/2009	2B	Temperature	C	14
4/9/2009	2B	Temperature	C	15
4/9/2009	2B	Temperature	C	14
4/9/2009	2B	Temperature	C	15
4/9/2009	2B	Temperature	C	15
4/30/2009	2B	Temperature	C	14
4/30/2009	2B	Temperature	C	14
4/30/2009	2B	Temperature	C	14
4/30/2009	2B	Temperature	C	14
5/21/2009	2B	Temperature	C	15
5/21/2009	2B	Temperature	C	15
5/21/2009	2B	Temperature	C	15
5/21/2009	2B	Temperature	C	16
1/24/2008	2B	Temperature	C	14
1/24/2008	2B	Temperature	C	14
1/24/2008	2B	Temperature	C	14
1/24/2008	2B	Temperature	C	14
1/3/2008	2B	Temperature	C	13
1/3/2008	2B	Temperature	C	13
1/3/2008	2B	Temperature	C	13
1/3/2008	2B	Temperature	C	12
10/18/2007	2B	Temperature	C	17.9
10/18/2007	2B	Temperature	C	16.6
10/18/2007	2B	Temperature	C	15.6
10/18/2007	2B	Temperature	C	17.1
11/29/2007	2B	Temperature	C	14
11/29/2007	2B	Temperature	C	14
11/29/2007	2B	Temperature	C	14
11/29/2007	2B	Temperature	C	14
11/8/2007	2B	Temperature	C	14
11/8/2007	2B	Temperature	C	14
11/8/2007	2B	Temperature	C	14
11/8/2007	2B	Temperature	C	14
12/20/2007	2B	Temperature	C	14
12/20/2007	2B	Temperature	C	14
12/20/2007	2B	Temperature	C	14
12/20/2007	2B	Temperature	C	14
2/14/2008	2B	Temperature	C	12.4
2/14/2008	2B	Temperature	C	12.6
2/14/2008	2B	Temperature	C	12.6
2/14/2008	2B	Temperature	C	12.8
2/14/2008	2B	Temperature	C	12.7
2/14/2008	2B	Temperature	C	12.4
2/14/2008	2B	Temperature	C	12.6
2/14/2008	2B	Temperature	C	12.8
3/6/2008	2B	Temperature	C	14
3/6/2008	2B	Temperature	C	14
3/6/2008	2B	Temperature	C	14
3/6/2008	2B	Temperature	C	14
6/11/2009	2B	Temperature	C	15
6/11/2009	2B	Temperature	C	15
6/11/2009	2B	Temperature	C	15
6/11/2009	2B	Temperature	C	15
7/12/2007	2B	tert-Butylbenzene	ug/L	ND
7/12/2007	2B	Tetrachloroethene	ug/L	ND
7/12/2007	2B	Thallium	mg/L	ND
7/12/2007	2B	Toluene	ug/L	ND
7/12/2007	2B	Total Alkalinity	mg/L	ND
7/12/2007	2B	Total Hardness,Calculation	mg/L	481
7/12/2007	2B	Total Organic Carbon	mg/L	8.1
8/2/2007	2B	Total Organic Carbon	mg/L	7.9
8/23/2007	2B	Total Organic Carbon	mg/L	11.2
9/13/2007	2B	Total Organic Carbon	mg/L	6.8
4/3/2008	2B	Total Organic Carbon	mg/L	9.6

Sampling Date	Location ID	Analyte	Unit	Concentration
4/24/2008	2B	Total Organic Carbon	mg/L	7.4
4/24/2008	2B	Total Organic Carbon	mg/L	7.6
4/24/2008	2B	Total Organic Carbon	mg/L	7.6
5/15/2008	2B	Total Organic Carbon	mg/L	7.3
5/15/2008	2B	Total Organic Carbon	mg/L	7.3
6/5/2008	2B	Total Organic Carbon	mg/L	7.0
6/5/2008	2B	Total Organic Carbon	mg/L	7.0
7/3/2008	2B	Total Organic Carbon	mg/L	6.2
7/3/2008	2B	Total Organic Carbon	mg/L	6.2
10/9/2008	2B	Total Organic Carbon	mg/L	6.1
10/30/2008	2B	Total Organic Carbon	mg/L	6.5
11/20/2008	2B	Total Organic Carbon	mg/L	7.4
12/11/2008	2B	Total Organic Carbon	mg/L	6.7
1/8/2009	2B	Total Organic Carbon	mg/L	9.0
1/29/2009	2B	Total Organic Carbon	mg/L	8.0
2/19/2009	2B	Total Organic Carbon	mg/L	3.3
3/12/2009	2B	Total Organic Carbon	mg/L	5.6
1/24/2008	2B	Total Organic Carbon	mg/L	5.2
1/3/2008	2B	Total Organic Carbon	mg/L	5.3
2/14/2008	2B	Total Organic Carbon	mg/L	6.7
2/14/2008	2B	Total Organic Carbon	mg/L	6.7
3/6/2008	2B	Total Organic Carbon	mg/L	5.6
1/16/2002	2B	Total Organic Carbon	mg/L	2
1/24/2002	2B	Total Organic Carbon	mg/L	5.2
2/14/2002	2B	Total Organic Carbon	mg/L	5.7
3/7/2002	2B	Total Organic Carbon	mg/L	5.8
3/28/2002	2B	Total Organic Carbon	mg/L	5.3
4/4/2002	2B	Total Organic Carbon	mg/L	5.4
4/25/2002	2B	Total Organic Carbon	mg/L	4.9
5/16/2002	2B	Total Organic Carbon	mg/L	5.9
6/6/2002	2B	Total Organic Carbon	mg/L	5.8
7/18/2002	2B	Total Organic Carbon	mg/L	ND
8/8/2002	2B	Total Organic Carbon	mg/L	8.5
8/29/2002	2B	Total Organic Carbon	mg/L	6.2
9/19/2002	2B	Total Organic Carbon	mg/L	6.4
10/3/2002	2B	Total Organic Carbon	mg/L	5.4
10/24/2002	2B	Total Organic Carbon	mg/L	5.4
11/14/2002	2B	Total Organic Carbon	mg/L	3.2
12/13/2002	2B	Total Organic Carbon	mg/L	6.3
2/6/2003	2B	Total Organic Carbon	mg/L	6.4
2/27/2003	2B	Total Organic Carbon	mg/L	ND
3/20/2003	2B	Total Organic Carbon	mg/L	8
4/3/2003	2B	Total Organic Carbon	mg/L	5.6
4/24/2003	2B	Total Organic Carbon	mg/L	5.5
5/15/2003	2B	Total Organic Carbon	mg/L	7.6
6/5/2003	2B	Total Organic Carbon	mg/L	5.4
7/3/2003	2B	Total Organic Carbon	mg/L	5.5
7/24/2003	2B	Total Organic Carbon	mg/L	4.8
8/14/2003	2B	Total Organic Carbon	mg/L	5.3
9/4/2003	2B	Total Organic Carbon	mg/L	5.7
10/2/2003	2B	Total Organic Carbon	mg/L	6.6
10/23/2003	2B	Total Organic Carbon	mg/L	5.4
11/13/2003	2B	Total Organic Carbon	mg/L	5.4
12/4/2003	2B	Total Organic Carbon	mg/L	4.5
1/8/2004	2B	Total Organic Carbon	mg/L	6
1/29/2004	2B	Total Organic Carbon	mg/L	5.6
2/19/2004	2B	Total Organic Carbon	mg/L	4.6
3/11/2004	2B	Total Organic Carbon	mg/L	4.3
4/8/2004	2B	Total Organic Carbon	mg/L	4.8
4/29/2004	2B	Total Organic Carbon	mg/L	5.7
5/20/2004	2B	Total Organic Carbon	mg/L	4.8
6/10/2004	2B	Total Organic Carbon	mg/L	4.5
7/15/2004	2B	Total Organic Carbon	mg/L	8.5
8/5/2004	2B	Total Organic Carbon	mg/L	6.2
8/26/2004	2B	Total Organic Carbon	mg/L	1.9
9/16/2004	2B	Total Organic Carbon	mg/L	5.1
1/6/2005	2B	Total Organic Carbon	mg/L	6.8
1/27/2005	2B	Total Organic Carbon	mg/L	6.4
2/17/2005	2B	Total Organic Carbon	mg/L	5.2
4/7/2005	2B	Total Organic Carbon	mg/L	4.8
4/28/2005	2B	Total Organic Carbon	mg/L	5.1
5/19/2005	2B	Total Organic Carbon	mg/L	5.4
6/9/2005	2B	Total Organic Carbon	mg/L	2.5
7/7/2005	2B	Total Organic Carbon	mg/L	3
7/28/2005	2B	Total Organic Carbon	mg/L	5.9
8/18/2005	2B	Total Organic Carbon	mg/L	4.7
9/8/2005	2B	Total Organic Carbon	mg/L	4.7
10/13/2005	2B	Total Organic Carbon	mg/L	4.8
11/3/2005	2B	Total Organic Carbon	mg/L	7.1
11/23/2005	2B	Total Organic Carbon	mg/L	6.8
12/15/2005	2B	Total Organic Carbon	mg/L	7.2
1/5/2006	2B	Total Organic Carbon	mg/L	6.8
1/26/2006	2B	Total Organic Carbon	mg/L	7
2/16/2006	2B	Total Organic Carbon	mg/L	7.6
3/9/2006	2B	Total Organic Carbon	mg/L	6.1

Sampling Date	Location ID	Analyte	Unit	Concentration
4/6/2006	2B	Total Organic Carbon	mg/L	5.6
4/27/2006	2B	Total Organic Carbon	mg/L	6.1
5/18/2006	2B	Total Organic Carbon	mg/L	6.5
6/8/2006	2B	Total Organic Carbon	mg/L	6.3
7/6/2006	2B	Total Organic Carbon	mg/L	4.2
7/27/2006	2B	Total Organic Carbon	mg/L	4.8
8/17/2006	2B	Total Organic Carbon	mg/L	5.7
9/7/2006	2B	Total Organic Carbon	mg/L	3.8
10/19/2006	2B	Total Organic Carbon	mg/L	6.6
11/9/2006	2B	Total Organic Carbon	mg/L	5.5
11/30/2006	2B	Total Organic Carbon	mg/L	5.7
12/21/2006	2B	Total Organic Carbon	mg/L	5.2
1/4/2007	2B	Total Organic Carbon	mg/L	7.4
1/25/2007	2B	Total Organic Carbon	mg/L	5.7
2/15/2007	2B	Total Organic Carbon	mg/L	5.5
3/8/2007	2B	Total Organic Carbon	mg/L	4.2
4/19/2007	2B	Total Organic Carbon	mg/L	7.2
5/10/2007	2B	Total Organic Carbon	mg/L	6
5/31/2007	2B	Total Organic Carbon	mg/L	5.8
6/21/2007	2B	Total Organic Carbon	mg/L	5.2
4/3/2008	2B	Total Organic Carbon	mg/L	9.6
7/24/2008	2B	Total Organic Carbon	mg/L	5.8
8/14/2008	2B	Total Organic Carbon	mg/L	7.3
9/4/2008	2B	Total Organic Carbon	mg/L	6
4/9/2009	2B	Total Organic Carbon	mg/L	8.8
4/30/2009	2B	Total Organic Carbon	mg/L	5.12
5/21/2009	2B	Total Organic Carbon	mg/L	6.8
10/18/2007	2B	Total Organic Carbon	mg/L	9.5
11/29/2007	2B	Total Organic Carbon	mg/L	6.8
11/8/2007	2B	Total Organic Carbon	mg/L	7.3
12/20/2007	2B	Total Organic Carbon	mg/L	6.4
6/11/2009	2B	Total Organic Carbon	mg/L	7.7
1/16/2002	2B	Total Organic Halogen	mg/L	0.088
1/24/2002	2B	Total Organic Halogen	mg/L	0.137
2/14/2002	2B	Total Organic Halogen	mg/L	0.105
3/7/2002	2B	Total Organic Halogen	mg/L	0.104
3/28/2002	2B	Total Organic Halogen	mg/L	0.104
4/4/2002	2B	Total Organic Halogen	mg/L	0.09
4/25/2002	2B	Total Organic Halogen	mg/L	0.101
4/25/2002	2B	Total Organic Halogen	mg/L	0.101
5/16/2002	2B	Total Organic Halogen	mg/L	ND
6/6/2002	2B	Total Organic Halogen	mg/L	0.165
7/18/2002	2B	Total Organic Halogen	mg/L	ND
7/18/2002	2B	Total Organic Halogen	mg/L	ND
8/8/2002	2B	Total Organic Halogen	mg/L	0.186
8/29/2002	2B	Total Organic Halogen	mg/L	0.126
9/19/2002	2B	Total Organic Halogen	mg/L	ND
10/3/2002	2B	Total Organic Halogen	mg/L	0.094
10/24/2002	2B	Total Organic Halogen	mg/L	0.092
11/14/2002	2B	Total Organic Halogen	mg/L	0.085
12/13/2002	2B	Total Organic Halogen	mg/L	0.012
2/6/2003	2B	Total Organic Halogen	mg/L	0.108
2/27/2003	2B	Total Organic Halogen	mg/L	0.111
3/20/2003	2B	Total Organic Halogen	mg/L	0.117
4/3/2003	2B	Total Organic Halogen	mg/L	0.098
4/24/2003	2B	Total Organic Halogen	mg/L	0.099
5/15/2003	2B	Total Organic Halogen	mg/L	0.117
6/5/2003	2B	Total Organic Halogen	mg/L	0.094
7/3/2003	2B	Total Organic Halogen	mg/L	0.015
7/24/2003	2B	Total Organic Halogen	mg/L	0.142
8/14/2003	2B	Total Organic Halogen	mg/L	0.148
9/4/2003	2B	Total Organic Halogen	mg/L	0.105
10/2/2003	2B	Total Organic Halogen	mg/L	0.085
10/23/2003	2B	Total Organic Halogen	mg/L	0.143
11/13/2003	2B	Total Organic Halogen	mg/L	0.093
12/4/2003	2B	Total Organic Halogen	mg/L	0.124
1/8/2004	2B	Total Organic Halogen	mg/L	0.115
1/29/2004	2B	Total Organic Halogen	mg/L	0.142
2/19/2004	2B	Total Organic Halogen	mg/L	0.112
3/11/2004	2B	Total Organic Halogen	mg/L	0.111
4/8/2004	2B	Total Organic Halogen	mg/L	109
4/29/2004	2B	Total Organic Halogen	mg/L	0.12
5/20/2004	2B	Total Organic Halogen	mg/L	ND
6/10/2004	2B	Total Organic Halogen	mg/L	0.068
7/15/2004	2B	Total Organic Halogen	mg/L	0.096
8/5/2004	2B	Total Organic Halogen	mg/L	0.114
8/26/2004	2B	Total Organic Halogen	mg/L	0.132
9/16/2004	2B	Total Organic Halogen	mg/L	0.109
1/6/2005	2B	Total Organic Halogen	mg/L	0.099
1/27/2005	2B	Total Organic Halogen	mg/L	0.13
2/17/2005	2B	Total Organic Halogen	mg/L	0.098
4/7/2005	2B	Total Organic Halogen	mg/L	0.115
4/28/2005	2B	Total Organic Halogen	mg/L	0.12
5/19/2005	2B	Total Organic Halogen	mg/L	0.09
6/9/2005	2B	Total Organic Halogen	mg/L	0.13

Sampling Date	Location ID	Analyte	Unit	Concentration
7/7/2005	2B	Total Organic Halogen	mg/L	0.06
7/28/2005	2B	Total Organic Halogen	mg/L	0.105
8/18/2005	2B	Total Organic Halogen	mg/L	0.134
9/8/2005	2B	Total Organic Halogen	mg/L	0.108
10/13/2005	2B	Total Organic Halogen	mg/L	0.121
11/3/2005	2B	Total Organic Halogen	mg/L	0.125
11/23/2005	2B	Total Organic Halogen	mg/L	0.127
12/15/2005	2B	Total Organic Halogen	mg/L	0.107
1/5/2006	2B	Total Organic Halogen	mg/L	0.114
1/26/2006	2B	Total Organic Halogen	mg/L	0.129
2/16/2006	2B	Total Organic Halogen	mg/L	0.092
3/9/2006	2B	Total Organic Halogen	mg/L	0.112
4/6/2006	2B	Total Organic Halogen	mg/L	0.056
4/27/2006	2B	Total Organic Halogen	mg/L	0.094
5/18/2006	2B	Total Organic Halogen	mg/L	0.092
6/8/2006	2B	Total Organic Halogen	mg/L	0.091
7/6/2006	2B	Total Organic Halogen	mg/L	0.118
7/27/2006	2B	Total Organic Halogen	mg/L	0.029
8/17/2006	2B	Total Organic Halogen	mg/L	ND
9/7/2006	2B	Total Organic Halogen	mg/L	0.041
10/19/2006	2B	Total Organic Halogen	mg/L	0.058
11/9/2006	2B	Total Organic Halogen	mg/L	0.068
11/30/2006	2B	Total Organic Halogen	mg/L	0.052
12/21/2006	2B	Total Organic Halogen	mg/L	0.086
1/4/2007	2B	Total Organic Halogen	mg/L	0.077
2/15/2007	2B	Total Organic Halogen	mg/L	0.1
3/8/2007	2B	Total Organic Halogen	mg/L	0.09
4/19/2007	2B	Total Organic Halogen	mg/L	0.1
5/10/2007	2B	Total Organic Halogen	mg/L	0.15
5/31/2007	2B	Total Organic Halogen	mg/L	0.27
6/21/2007	2B	Total Organic Halogen	mg/L	ND
7/12/2007	2B	Total Organic Halogen	mg/L	0.3
8/2/2007	2B	Total Organic Halogen	mg/L	0.16
8/23/2007	2B	Total Organic Halogen	mg/L	0.26
9/13/2007	2B	Total Organic Halogen	mg/L	0.09
4/3/2008	2B	Total Organic Halogen	mg/L	0.07
4/3/2008	2B	Total Organic Halogen	mg/L	0.07
4/24/2008	2B	Total Organic Halogen	mg/L	0.1
4/24/2008	2B	Total Organic Halogen	mg/L	0.1
4/24/2008	2B	Total Organic Halogen	mg/L	0.1
5/15/2008	2B	Total Organic Halogen	mg/L	0.05
5/15/2008	2B	Total Organic Halogen	mg/L	0.05
6/5/2008	2B	Total Organic Halogen	mg/L	0.05
6/5/2008	2B	Total Organic Halogen	mg/L	0.05
7/3/2008	2B	Total Organic Halogen	mg/L	0.05
7/3/2008	2B	Total Organic Halogen	mg/L	0.05
7/24/2008	2B	Total Organic Halogen	mg/L	ND
8/14/2008	2B	Total Organic Halogen	mg/L	0.06
9/4/2008	2B	Total Organic Halogen	mg/L	0.1
10/9/2008	2B	Total Organic Halogen	mg/L	0.06
10/30/2008	2B	Total Organic Halogen	mg/L	0.1
11/20/2008	2B	Total Organic Halogen	mg/L	0.1
12/11/2008	2B	Total Organic Halogen	mg/L	0.14
1/8/2009	2B	Total Organic Halogen	mg/L	0.21
1/29/2009	2B	Total Organic Halogen	mg/L	0.09
2/19/2009	2B	Total Organic Halogen	mg/L	0.07
3/12/2009	2B	Total Organic Halogen	mg/L	0.2
1/24/2008	2B	Total Organic Halogen	mg/L	0.11
1/3/2008	2B	Total Organic Halogen	mg/L	0.08
10/18/2007	2B	Total Organic Halogen	mg/L	ND
11/29/2007	2B	Total Organic Halogen	mg/L	0.09
11/8/2007	2B	Total Organic Halogen	mg/L	0.11
12/20/2007	2B	Total Organic Halogen	mg/L	0.09
2/14/2008	2B	Total Organic Halogen	mg/L	0.07
2/14/2008	2B	Total Organic Halogen	mg/L	0.04
3/6/2008	2B	Total Organic Halogen	mg/L	0.09
4/9/2009	2B	Total Organic Halogen	mg/L	0.28
4/30/2009	2B	Total Organic Halogen	mg/L	ND
5/21/2009	2B	Total Organic Halogen	mg/L	ND
6/11/2009	2B	Total Organic Halogen	mg/L	ND
7/12/2007	2B	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2B	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2B	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2B	Trichloroethene	ug/L	ND
7/12/2007	2B	Trichlorofluoromethane	ug/L	ND
1/16/2002	2B	Turbidity	NTU	16
1/24/2002	2B	Turbidity	NTU	4.4
2/14/2002	2B	Turbidity	NTU	16
3/7/2002	2B	Turbidity	NTU	12
3/28/2002	2B	Turbidity	NTU	3.2
4/4/2002	2B	Turbidity	NTU	110
4/25/2002	2B	Turbidity	NTU	65
5/16/2002	2B	Turbidity	NTU	54
6/6/2002	2B	Turbidity	NTU	48
7/18/2002	2B	Turbidity	NTU	14

Sampling Date	Location ID	Analyte	Unit	Concentration
8/8/2002	2B	Turbidity	NTU	23
8/29/2002	2B	Turbidity	NTU	23
9/19/2002	2B	Turbidity	NTU	18
10/3/2002	2B	Turbidity	NTU	14
10/24/2002	2B	Turbidity	NTU	6.1
11/14/2002	2B	Turbidity	NTU	19
12/13/2002	2B	Turbidity	NTU	6.1
2/6/2003	2B	Turbidity	NTU	6.2
2/27/2003	2B	Turbidity	NTU	4.9
3/20/2003	2B	Turbidity	NTU	4.6
4/3/2003	2B	Turbidity	NTU	4.4
4/24/2003	2B	Turbidity	NTU	31
5/15/2003	2B	Turbidity	NTU	42
6/5/2003	2B	Turbidity	NTU	16
7/3/2003	2B	Turbidity	NTU	12
7/24/2003	2B	Turbidity	NTU	3.8
8/14/2003	2B	Turbidity	NTU	38
9/4/2003	2B	Turbidity	NTU	8.3
10/2/2003	2B	Turbidity	NTU	10
10/23/2003	2B	Turbidity	NTU	15
11/13/2003	2B	Turbidity	NTU	20
12/4/2003	2B	Turbidity	NTU	26
1/8/2004	2B	Turbidity	NTU	16
1/29/2004	2B	Turbidity	NTU	3.2
2/19/2004	2B	Turbidity	NTU	4
3/11/2004	2B	Turbidity	NTU	4
4/8/2004	2B	Turbidity	NTU	19
4/29/2004	2B	Turbidity	NTU	14
5/20/2004	2B	Turbidity	NTU	8
6/10/2004	2B	Turbidity	NTU	6.2
7/15/2004	2B	Turbidity	NTU	50
8/5/2004	2B	Turbidity	NTU	7.1
8/26/2004	2B	Turbidity	NTU	8.4
9/16/2004	2B	Turbidity	NTU	20
1/6/2005	2B	Turbidity	NTU	4
1/27/2005	2B	Turbidity	NTU	2.4
2/17/2005	2B	Turbidity	NTU	4.3
4/7/2005	2B	Turbidity	NTU	7.7
4/28/2005	2B	Turbidity	NTU	11
5/19/2005	2B	Turbidity	NTU	8.7
6/9/2005	2B	Turbidity	NTU	3.5
7/7/2005	2B	Turbidity	NTU	9.7
7/28/2005	2B	Turbidity	NTU	37
8/18/2005	2B	Turbidity	NTU	19
9/8/2005	2B	Turbidity	NTU	14
10/13/2005	2B	Turbidity	NTU	39
11/3/2005	2B	Turbidity	NTU	19
11/23/2005	2B	Turbidity	NTU	9.5
12/15/2005	2B	Turbidity	NTU	29
1/5/2006	2B	Turbidity	NTU	17
1/26/2006	2B	Turbidity	NTU	7.2
2/16/2006	2B	Turbidity	NTU	3.9
3/9/2006	2B	Turbidity	NTU	11
4/6/2006	2B	Turbidity	NTU	14
4/27/2006	2B	Turbidity	NTU	7.2
5/18/2006	2B	Turbidity	NTU	9.6
6/8/2006	2B	Turbidity	NTU	6.8
7/6/2006	2B	Turbidity	NTU	23
7/27/2006	2B	Turbidity	NTU	18
8/17/2006	2B	Turbidity	NTU	13
9/7/2006	2B	Turbidity	NTU	18
10/19/2006	2B	Turbidity	NTU	17
11/9/2006	2B	Turbidity	NTU	11
11/30/2006	2B	Turbidity	NTU	13
12/21/2006	2B	Turbidity	NTU	11
1/4/2007	2B	Turbidity	NTU	71
1/25/2007	2B	Turbidity	NTU	5.7
2/15/2007	2B	Turbidity	NTU	11
3/8/2007	2B	Turbidity	NTU	7.8
4/19/2007	2B	Turbidity	NTU	12
5/10/2007	2B	Turbidity	NTU	29.3
5/31/2007	2B	Turbidity	NTU	21
6/21/2007	2B	Turbidity	NTU	11
7/12/2007	2B	Turbidity	NTU	9.2
8/2/2007	2B	Turbidity	NTU	15
8/23/2007	2B	Turbidity	NTU	55.3
9/13/2007	2B	Turbidity	NTU	34
4/3/2008	2B	Turbidity	NTU	17
4/3/2008	2B	Turbidity	NTU	17
4/24/2008	2B	Turbidity	NTU	1.6
4/24/2008	2B	Turbidity	NTU	3.0
4/24/2008	2B	Turbidity	NTU	1.6
5/15/2008	2B	Turbidity	NTU	3.3
5/15/2008	2B	Turbidity	NTU	3.3
6/5/2008	2B	Turbidity	NTU	1.68

Sampling Date	Location ID	Analyte	Unit	Concentration
6/5/2008	2B	Turbidity	NTU	1.68
7/3/2008	2B	Turbidity	NTU	6.7
7/3/2008	2B	Turbidity	NTU	6.7
7/24/2008	2B	Turbidity	NTU	9.6
8/14/2008	2B	Turbidity	NTU	35
9/4/2008	2B	Turbidity	NTU	15
10/9/2008	2B	Turbidity	NTU	39
10/30/2008	2B	Turbidity	NTU	42
11/20/2008	2B	Turbidity	NTU	17
12/11/2008	2B	Turbidity	NTU	44
1/8/2009	2B	Turbidity	NTU	8.8
1/29/2009	2B	Turbidity	NTU	3.9
2/19/2009	2B	Turbidity	NTU	4.4
3/12/2009	2B	Turbidity	NTU	6.9
4/9/2009	2B	Turbidity	NTU	16
4/30/2009	2B	Turbidity	NTU	8.7
5/21/2009	2B	Turbidity	NTU	7.5
1/24/2008	2B	Turbidity	NTU	12
1/3/2008	2B	Turbidity	NTU	3.3
10/18/2007	2B	Turbidity	NTU	1.1
11/29/2007	2B	Turbidity	NTU	0.72
11/8/2007	2B	Turbidity	NTU	1.7
12/20/2007	2B	Turbidity	NTU	1.6
2/14/2008	2B	Turbidity	NTU	5.4
2/14/2008	2B	Turbidity	NTU	8.8
3/6/2008	2B	Turbidity	NTU	4.0
6/11/2009	2B	Turbidity	NTU	3.7
7/12/2007	2B	Vanadium	mg/L	0.165
7/12/2007	2B	Vinyl Acetate	ug/L	ND
7/12/2007	2B	Vinyl Chloride	ug/L	2.1
7/12/2007	2B	Xylenes, Total	ug/L	6.7
7/12/2007	2B	Zinc	mg/L	1.02
Location ID:		**2BDUP**		
Number of Sampling Dates:		**13**		
1/27/2005	2BDUP	Barium	mg/L	0.023
4/28/2005	2BDUP	Barium	mg/L	0.023
7/28/2005	2BDUP	Barium	mg/L	0.026
9/8/2005	2BDUP	Barium	mg/L	0.024
11/23/2005	2BDUP	Barium	mg/L	0.021
12/15/2005	2BDUP	Barium	mg/L	0.027
1/26/2006	2BDUP	Barium	mg/L	0.016
9/7/2006	2BDUP	Barium	mg/L	0.013
11/30/2006	2BDUP	Barium	mg/L	0.013
12/21/2006	2BDUP	Barium	mg/L	0.015
5/10/2007	2BDUP	Barium	mg/L	0.024
8/2/2007	2BDUP	Barium	mg/L	0.016
4/24/2008	2BDUP	Barium	mg/L	0.016
6/5/2008	2BDUP	Barium	mg/L	0.014
9/4/2008	2BDUP	Barium	mg/L	0.015
10/18/2007	2BDUP	Barium	mg/L	0.014
1/27/2005	2BDUP	Chloride	mg/L	98.7
1/27/2005	2BDUP	Chloride	mg/L	98.7
4/28/2005	2BDUP	Chloride	mg/L	114
7/28/2005	2BDUP	Chloride	mg/L	149
9/8/2005	2BDUP	Chloride	mg/L	105
11/23/2005	2BDUP	Chloride	mg/L	118
12/15/2005	2BDUP	Chloride	mg/L	35.1
1/26/2006	2BDUP	Chloride	mg/L	179
9/7/2006	2BDUP	Chloride	mg/L	115
11/30/2006	2BDUP	Chloride	mg/L	130
12/21/2006	2BDUP	Chloride	mg/L	124
5/10/2007	2BDUP	Chloride	mg/L	642
8/2/2007	2BDUP	Chloride	mg/L	133
4/24/2008	2BDUP	Chloride	mg/L	144
6/5/2008	2BDUP	Chloride	mg/L	121
9/4/2008	2BDUP	Chloride	mg/L	120
10/18/2007	2BDUP	Chloride	mg/L	136
1/27/2005	2BDUP	Chromium	mg/L	ND
4/28/2005	2BDUP	Chromium	mg/L	ND
7/28/2005	2BDUP	Chromium	mg/L	0.018
9/8/2005	2BDUP	Chromium	mg/L	0.012
11/23/2005	2BDUP	Chromium	mg/L	0.008
12/15/2005	2BDUP	Chromium	mg/L	ND
1/26/2006	2BDUP	Chromium	mg/L	ND
9/7/2006	2BDUP	Chromium	mg/L	ND
11/30/2006	2BDUP	Chromium	mg/L	0.012
12/21/2006	2BDUP	Chromium	mg/L	0.01
5/10/2007	2BDUP	Chromium	mg/L	0.009
8/2/2007	2BDUP	Chromium	mg/L	0.01
4/24/2008	2BDUP	Chromium	mg/L	0.018
6/5/2008	2BDUP	Chromium	mg/L	0.012
9/4/2008	2BDUP	Chromium	mg/L	ND
1/27/2005	2BDUP	Chromium, hexavalent	mg/l	ND
4/28/2005	2BDUP	Chromium, hexavalent	mg/l	ND
7/28/2005	2BDUP	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
9/8/2005	2BDUP	Chromium, hexavalent	mg/l	ND
11/23/2005	2BDUP	Chromium, hexavalent	mg/l	ND
12/15/2005	2BDUP	Chromium, hexavalent	mg/l	ND
1/26/2006	2BDUP	Chromium, hexavalent	mg/l	ND
9/7/2006	2BDUP	Chromium, hexavalent	mg/l	ND
11/30/2006	2BDUP	Chromium, hexavalent	mg/l	ND
12/21/2006	2BDUP	Chromium, hexavalent	mg/l	ND
5/10/2007	2BDUP	Chromium, hexavalent	mg/l	ND
8/2/2007	2BDUP	Chromium, hexavalent	mg/L	ND
4/24/2008	2BDUP	Chromium, hexavalent	mg/L	ND
6/5/2008	2BDUP	Chromium, hexavalent	mg/L	ND
9/4/2008	2BDUP	Chromium, Hexavalent	mg/L	ND
10/18/2007	2BDUP	Chromium, hexavalent	mg/L	ND
10/18/2007	2BDUP	Chromium, ICP	mg/L	0.015
1/27/2005	2BDUP	Iron	mg/L	1155
4/28/2005	2BDUP	Iron	mg/L	1031
7/28/2005	2BDUP	Iron	mg/L	1386
9/8/2005	2BDUP	Iron	mg/L	1063
11/23/2005	2BDUP	Iron	mg/L	1011
12/15/2005	2BDUP	Iron	mg/L	38
1/26/2006	2BDUP	Iron	mg/L	1356
9/7/2006	2BDUP	Iron	mg/L	906
11/30/2006	2BDUP	Iron	mg/L	1207
12/21/2006	2BDUP	Iron	mg/L	1253
5/10/2007	2BDUP	Iron	mg/L	1008
8/2/2007	2BDUP	Iron	mg/L	1015
4/24/2008	2BDUP	Iron	mg/L	1358
6/5/2008	2BDUP	Iron	mg/L	1113
9/4/2008	2BDUP	Iron	mg/L	925
10/18/2007	2BDUP	Iron	mg/L	1378
1/27/2005	2BDUP	Manganese	mg/L	27.1
4/28/2005	2BDUP	Manganese	mg/L	24.4
7/28/2005	2BDUP	Manganese	mg/L	30.8
9/8/2005	2BDUP	Manganese	mg/L	26
11/23/2005	2BDUP	Manganese	mg/L	25.7
12/15/2005	2BDUP	Manganese	mg/L	0.85
1/26/2006	2BDUP	Manganese	mg/L	25.1
9/7/2006	2BDUP	Manganese	mg/L	28.9
11/30/2006	2BDUP	Manganese	mg/L	38.9
12/21/2006	2BDUP	Manganese	mg/L	20.9
5/10/2007	2BDUP	Manganese	mg/L	28.1
8/2/2007	2BDUP	Manganese	mg/L	30
4/24/2008	2BDUP	Manganese	mg/L	31.5
6/5/2008	2BDUP	Manganese	mg/L	26.3
9/4/2008	2BDUP	Manganese	mg/L	21.8
10/18/2007	2BDUP	Manganese	mg/L	34.5
1/27/2005	2BDUP	pH	pH Units	3.38
4/28/2005	2BDUP	pH	pH Units	3.21
7/28/2005	2BDUP	pH	pH Units	3.55
9/8/2005	2BDUP	pH	pH Units	3.18
11/23/2005	2BDUP	pH	pH Units	3.48
12/15/2005	2BDUP	pH	pH Units	6.83
1/26/2006	2BDUP	pH	pH Units	3.36
9/7/2006	2BDUP	pH	pH Units	3.42
11/30/2006	2BDUP	pH	pH Units	3.3
12/21/2006	2BDUP	pH	pH Units	3.24
5/10/2007	2BDUP	pH	pH Units	3.24
8/2/2007	2BDUP	pH	pH	3.48
8/2/2007	2BDUP	pH	pH	3.47
8/2/2007	2BDUP	pH	pH	3.46
8/2/2007	2BDUP	pH	pH	3.47
4/24/2008	2BDUP	pH	pH	3.65
4/24/2008	2BDUP	pH	pH	3.65
4/24/2008	2BDUP	pH	pH	3.66
4/24/2008	2BDUP	pH	pH	3.67
6/5/2008	2BDUP	pH	pH	3.49
6/5/2008	2BDUP	pH	pH	3.49
6/5/2008	2BDUP	pH	pH	3.49
6/5/2008	2BDUP	pH	pH	3.49
9/4/2008	2BDUP	pH	pH	3.57
9/4/2008	2BDUP	pH	pH	3.59
9/4/2008	2BDUP	pH	pH	3.62
9/4/2008	2BDUP	pH	pH	3.62
10/18/2007	2BDUP	pH	pH Units	3.39
10/18/2007	2BDUP	pH	pH Units	3.36
10/18/2007	2BDUP	pH	pH Units	3.38
10/18/2007	2BDUP	pH	pH Units	3.39
8/2/2007	2BDUP	Phenols	mg/L	ND
1/27/2005	2BDUP	Phenols	mg/L	ND
4/28/2005	2BDUP	Phenols	mg/L	ND
7/28/2005	2BDUP	Phenols	mg/L	ND
7/28/2005	2BDUP	Phenols	mg/L	ND
9/8/2005	2BDUP	Phenols	mg/L	ND
9/8/2005	2BDUP	Phenols	mg/L	ND
11/23/2005	2BDUP	Phenols	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
12/15/2005	2BDUP	Phenols	mg/L	ND
1/26/2006	2BDUP	Phenols	mg/L	ND
9/7/2006	2BDUP	Phenols	mg/L	ND
11/30/2006	2BDUP	Phenols	mg/L	ND
12/21/2006	2BDUP	Phenols	mg/L	ND
5/10/2007	2BDUP	Phenols	mg/L	ND
10/18/2007	2BDUP	Phenols	mg/L	11.3
4/24/2008	2BDUP	Phenols, Total	mg/L	0.011
6/5/2008	2BDUP	Phenols, Total	mg/L	Nd
9/4/2008	2BDUP	Phenols, Total	mg/L	ND
1/27/2005	2BDUP	Sodium	mg/L	96.1
4/28/2005	2BDUP	Sodium	mg/L	78.9
7/28/2005	2BDUP	Sodium	mg/L	92.3
9/8/2005	2BDUP	Sodium	mg/L	92.5
11/23/2005	2BDUP	Sodium	mg/L	75
12/15/2005	2BDUP	Sodium	mg/L	8.79
1/26/2006	2BDUP	Sodium	mg/L	106
9/7/2006	2BDUP	Sodium	mg/L	77.1
11/30/2006	2BDUP	Sodium	mg/L	109
12/21/2006	2BDUP	Sodium	mg/L	102
5/10/2007	2BDUP	Sodium	mg/L	90.2
8/2/2007	2BDUP	Sodium	mg/L	107
4/24/2008	2BDUP	Sodium	mg/L	105
6/5/2008	2BDUP	Sodium	mg/L	101
9/4/2008	2BDUP	Sodium	mg/L	89.6
10/18/2007	2BDUP	Sodium	mg/L	126
1/27/2005	2BDUP	Specific Conductance	umhos	3070
4/28/2005	2BDUP	Specific Conductance	umhos	2240
7/28/2005	2BDUP	Specific Conductance	umhos	3590
9/8/2005	2BDUP	Specific Conductance	umhos	3510
11/23/2005	2BDUP	Specific Conductance	umhos	3050
12/15/2005	2BDUP	Specific Conductance	umhos	638
1/26/2006	2BDUP	Specific Conductance	umhos	3020
9/7/2006	2BDUP	Specific Conductance	umhos	3090
11/30/2006	2BDUP	Specific Conductance	umhos	3220
12/21/2006	2BDUP	Specific Conductance	umhos	3080
5/10/2007	2BDUP	Specific Conductance	umhos	1630
8/2/2007	2BDUP	Specific Conductance	umhos	2760
8/2/2007	2BDUP	Specific Conductance	umhos	2690
8/2/2007	2BDUP	Specific Conductance	umhos	2770
8/2/2007	2BDUP	Specific Conductance	umhos	2730
4/24/2008	2BDUP	Specific Conductance	umhos	3900
4/24/2008	2BDUP	Specific Conductance	umhos	3930
4/24/2008	2BDUP	Specific Conductance	umhos	3940
4/24/2008	2BDUP	Specific Conductance	umhos	3950
6/5/2008	2BDUP	Specific Conductance	umhos	3500
6/5/2008	2BDUP	Specific Conductance	umhos	3500
6/5/2008	2BDUP	Specific Conductance	umhos	3530
6/5/2008	2BDUP	Specific Conductance	umhos	3530
9/4/2008	2BDUP	Specific Conductance	umhos	2910
9/4/2008	2BDUP	Specific Conductance	umhos	2910
9/4/2008	2BDUP	Specific Conductance	umhos	2910
9/4/2008	2BDUP	Specific Conductance	umhos	2950
10/18/2007	2BDUP	Specific Conductance	umhos	3200
10/18/2007	2BDUP	Specific Conductance	umhos	3160
10/18/2007	2BDUP	Specific Conductance	umhos	3150
10/18/2007	2BDUP	Specific Conductance	umhos	3190
8/2/2007	2BDUP	Sulfate	mg/L	3353
4/24/2008	2BDUP	Sulfate	mg/L	3469
6/5/2008	2BDUP	Sulfate	mg/L	3267
9/4/2008	2BDUP	Sulfate	mg/L	2987
1/27/2005	2BDUP	Sulfate	mg/L	3701
4/28/2005	2BDUP	Sulfate	mg/L	3551
7/28/2005	2BDUP	Sulfate	mg/L	4849
9/8/2005	2BDUP	Sulfate	mg/L	3742
11/23/2005	2BDUP	Sulfate	mg/L	3727
12/15/2005	2BDUP	Sulfate	mg/L	272
1/26/2006	2BDUP	Sulfate	mg/L	4337
9/7/2006	2BDUP	Sulfate	mg/L	2970
11/30/2006	2BDUP	Sulfate	mg/L	3528
12/21/2006	2BDUP	Sulfate	mg/L	3191
5/10/2007	2BDUP	Sulfate	mg/L	3720
10/18/2007	2BDUP	Sulfate	mg/L	3779
1/27/2005	2BDUP	Temperature	C	13
4/28/2005	2BDUP	Temperature	C	14
7/28/2005	2BDUP	Temperature	C	15
9/8/2005	2BDUP	Temperature	C	15
11/23/2005	2BDUP	Temperature	C	13
12/15/2005	2BDUP	Temperature	C	11
1/26/2006	2BDUP	Temperature	C	13
9/7/2006	2BDUP	Temperature	C	15
11/30/2006	2BDUP	Temperature	C	15
12/21/2006	2BDUP	Temperature	C	14
5/10/2007	2BDUP	Temperature	C	15
8/2/2007	2BDUP	Temperature	C	16

Sampling Date	Location ID	Analyte	Unit	Concentration
8/2/2007	2BDUP	Temperature	C	15
8/2/2007	2BDUP	Temperature	C	16
8/2/2007	2BDUP	Temperature	C	16
4/24/2008	2BDUP	Temperature	C	15
4/24/2008	2BDUP	Temperature	C	15
4/24/2008	2BDUP	Temperature	C	16
4/24/2008	2BDUP	Temperature	C	16
6/5/2008	2BDUP	Temperature	C	15
6/5/2008	2BDUP	Temperature	C	15
6/5/2008	2BDUP	Temperature	C	15
6/5/2008	2BDUP	Temperature	C	16
9/4/2008	2BDUP	Temperature	C	16
9/4/2008	2BDUP	Temperature	C	16
9/4/2008	2BDUP	Temperature	C	16
9/4/2008	2BDUP	Temperature	C	17
10/18/2007	2BDUP	Temperature	C	16.6
10/18/2007	2BDUP	Temperature	C	15.7
10/18/2007	2BDUP	Temperature	C	15.4
10/18/2007	2BDUP	Temperature	C	16.1
8/2/2007	2BDUP	Total Organic Carbon	mg/L	7.7
4/24/2008	2BDUP	Total Organic Carbon	mg/L	7.4
6/5/2008	2BDUP	Total Organic Carbon	mg/L	7.5
1/27/2005	2BDUP	Total Organic Carbon	mg/L	6.9
4/28/2005	2BDUP	Total Organic Carbon	mg/L	6.1
7/28/2005	2BDUP	Total Organic Carbon	mg/L	6.1
9/8/2005	2BDUP	Total Organic Carbon	mg/L	4.9
11/23/2005	2BDUP	Total Organic Carbon	mg/L	7
12/15/2005	2BDUP	Total Organic Carbon	mg/L	8.8
1/26/2006	2BDUP	Total Organic Carbon	mg/L	8.9
9/7/2006	2BDUP	Total Organic Carbon	mg/L	3.5
11/30/2006	2BDUP	Total Organic Carbon	mg/L	6.6
12/21/2006	2BDUP	Total Organic Carbon	mg/L	6
5/10/2007	2BDUP	Total Organic Carbon	mg/L	6.3
9/4/2008	2BDUP	Total Organic Carbon	mg/L	5.6
10/18/2007	2BDUP	Total Organic Carbon	mg/L	8.9
1/27/2005	2BDUP	Total Organic Halogen	mg/L	0.124
4/28/2005	2BDUP	Total Organic Halogen	mg/L	0.114
7/28/2005	2BDUP	Total Organic Halogen	mg/L	1.04
9/8/2005	2BDUP	Total Organic Halogen	mg/L	0.084
11/23/2005	2BDUP	Total Organic Halogen	mg/L	0.13
12/15/2005	2BDUP	Total Organic Halogen	mg/L	0.024
1/26/2006	2BDUP	Total Organic Halogen	mg/L	0.095
9/7/2006	2BDUP	Total Organic Halogen	mg/L	0.062
11/30/2006	2BDUP	Total Organic Halogen	mg/L	0.077
12/21/2006	2BDUP	Total Organic Halogen	mg/L	0.088
5/10/2007	2BDUP	Total Organic Halogen	mg/L	0.018
8/2/2007	2BDUP	Total Organic Halogen	mg/L	0.15
4/24/2008	2BDUP	Total Organic Halogen	mg/L	0.1
6/5/2008	2BDUP	Total Organic Halogen	mg/L	0.04
9/4/2008	2BDUP	Total Organic Halogen	mg/L	0.1
10/18/2007	2BDUP	Total Organic Halogen	mg/L	0.25
1/27/2005	2BDUP	Turbidity	NTU	1.9
4/28/2005	2BDUP	Turbidity	NTU	14
7/28/2005	2BDUP	Turbidity	NTU	21
9/8/2005	2BDUP	Turbidity	NTU	7.5
11/23/2005	2BDUP	Turbidity	NTU	12
12/15/2005	2BDUP	Turbidity	NTU	110
1/26/2006	2BDUP	Turbidity	NTU	12
9/7/2006	2BDUP	Turbidity	NTU	9.6
11/30/2006	2BDUP	Turbidity	NTU	2.7
12/21/2006	2BDUP	Turbidity	NTU	11
5/10/2007	2BDUP	Turbidity	NTU	11
8/2/2007	2BDUP	Turbidity	NTU	13
4/24/2008	2BDUP	Turbidity	NTU	3.0
6/5/2008	2BDUP	Turbidity	NTU	7.22
9/4/2008	2BDUP	Turbidity	NTU	8.5
10/18/2007	2BDUP	Turbidity	NTU	10
Location ID:		**2D**		
Number of Sampling Dates:		**34**		
7/12/2007	2D	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2D	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2D	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2D	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2D	1,1-Dichloroethane	ug/L	ND
7/12/2007	2D	1,1-Dichloroethene	ug/L	ND
7/12/2007	2D	1,1-Dichloropropene	ug/L	ND
7/12/2007	2D	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2D	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2D	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2D	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	2D	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2D	1,2-Dibromoethane	ug/L	ND
7/12/2007	2D	1,2-Dichlorobenzene	ug/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2D	1,2-Dichloroethane	ug/L	ND
7/12/2007	2D	1,2-Dichloropropane	ug/L	ND
7/12/2007	2D	1,3,5-Trimethylbenzene	ug/L	ND
7/12/2007	2D	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2D	1,3-Dichloropropane	ug/L	ND
7/12/2007	2D	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2D	2,2-Dichloropropane	ug/L	ND
7/12/2007	2D	2-Butanone (MEK)	ug/L	ND
7/12/2007	2D	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2D	2-Chlorotoluene	ug/L	ND
7/12/2007	2D	2-Hexanone	ug/L	ND
7/12/2007	2D	3-Chloro-1-propene	ug/L	ND
7/12/2007	2D	4-Chlorotoluene	ug/L	ND
7/12/2007	2D	4-Isopropyltoluene	ug/L	ND
7/12/2007	2D	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	2D	Acrolein	ug/L	ND
7/12/2007	2D	Acrylonitrile	ug/L	ND
7/12/2007	2D	Alkalinity	mg/L	27
7/12/2007	2D	Ammonia	mg/L	ND
7/12/2007	2D	Antimony	mg/L	ND
7/12/2007	2D	Arsenic	mg/L	ND
6/8/2006	2D	Barium	mg/L	0.029
7/6/2006	2D	Barium	mg/L	ND
7/27/2006	2D	Barium	mg/L	0.034
8/17/2006	2D	Barium	mg/L	0.032
9/7/2006	2D	Barium	mg/L	0.03
10/19/2006	2D	Barium	mg/L	0.026
11/9/2006	2D	Barium	mg/L	0.022
11/30/2006	2D	Barium	mg/L	0.02
12/21/2006	2D	Barium	mg/L	0.021
1/4/2007	2D	Barium	mg/L	0.025
1/25/2007	2D	Barium	mg/L	0.02
2/15/2007	2D	Barium	mg/L	0.02
3/8/2007	2D	Barium	mg/L	0.019
4/19/2007	2D	Barium	mg/L	0.026
5/10/2007	2D	Barium	mg/L	0.024
5/31/2007	2D	Barium	mg/L	0.033
6/21/2007	2D	Barium	mg/L	0.029
7/12/2007	2D	Barium	mg/L	0.071
8/2/2007	2D	Barium	mg/L	0.073
8/23/2007	2D	Barium	mg/L	0.064
9/13/2007	2D	Barium	mg/L	0.032
4/3/2008	2D	Barium	mg/L	0.037
4/24/2008	2D	Barium	mg/L	0.018
5/15/2008	2D	Barium	mg/L	0.017
6/5/2008	2D	Barium	mg/L	0.021
7/3/2008	2D	Barium	mg/L	0.051
7/3/2008	2D	Barium	mg/L	0.051
7/24/2008	2D	Barium	mg/L	0.035
8/14/2008	2D	Barium	mg/L	0.032
9/4/2008	2D	Barium	mg/L	0.036
10/9/2008	2D	Barium	mg/L	0.033
10/30/2008	2D	Barium	mg/L	0.037
11/20/2008	2D	Barium	mg/L	0.029
12/11/2008	2D	Barium	mg/L	0.025
1/8/2009	2D	Barium	mg/L	0.025
1/29/2009	2D	Barium	mg/L	0.019
2/19/2009	2D	Barium	mg/L	0.023
3/12/2009	2D	Barium	mg/L	0.037
4/9/2009	2D	Barium	mg/L	0.023
4/30/2009	2D	Barium	mg/L	0.023
5/21/2009	2D	Barium	mg/L	0.023
1/24/2008	2D	Barium	mg/L	0.032
1/3/2008	2D	Barium	mg/L	0.034
10/18/2007	2D	Barium	mg/L	0.055
11/29/2007	2D	Barium	mg/L	0.03
11/8/2007	2D	Barium	mg/L	0.022
12/20/2007	2D	Barium	mg/L	0.022
2/14/2008	2D	Barium	mg/L	0.031
3/6/2008	2D	Barium	mg/L	0.021
6/11/2009	2D	Barium	mg/L	0.031
7/12/2007	2D	Benzene	ug/L	ND
7/12/2007	2D	Beryllium	mg/L	0.005
7/12/2007	2D	BOD	mg/L	ND
7/12/2007	2D	Bromobenzene	ug/L	ND
7/12/2007	2D	Bromochloromethane	ug/L	ND
7/12/2007	2D	Bromodichloromethane	ug/L	ND
7/12/2007	2D	Bromoform	ug/L	ND
7/12/2007	2D	Bromomethane	ug/L	ND
7/12/2007	2D	Cadmium	mg/L	ND
7/12/2007	2D	Calcium	mg/L	171
7/12/2007	2D	Carbon Disulfide	ug/L	ND
7/12/2007	2D	Carbon Tetrachloride	ug/L	ND
7/12/2007	2D	Chemical Oxygen Demand	mg/L	ND
6/8/2006	2D	Chloride	mg/L	24.7

Sampling Date	Location ID	Analyte	Unit	Concentration
7/6/2006	2D	Chloride	mg/L	20.9
7/27/2006	2D	Chloride	mg/L	27.8
8/17/2006	2D	Chloride	mg/L	22.3
9/7/2006	2D	Chloride	mg/L	30
10/19/2006	2D	Chloride	mg/L	22.3
11/9/2006	2D	Chloride	mg/L	22.7
11/30/2006	2D	Chloride	mg/L	20.5
12/21/2006	2D	Chloride	mg/L	21.1
1/4/2007	2D	Chloride	mg/L	22.6
1/25/2007	2D	Chloride	mg/L	12
2/15/2007	2D	Chloride	mg/L	22.6
3/8/2007	2D	Chloride	mg/L	24.2
4/19/2007	2D	Chloride	mg/L	29.3
5/10/2007	2D	Chloride	mg/L	24.4
5/31/2007	2D	Chloride	mg/L	21.8
6/21/2007	2D	Chloride	mg/L	22.8
7/12/2007	2D	Chloride	mg/L	62.4
8/2/2007	2D	Chloride	mg/L	82.8
8/23/2007	2D	Chloride	mg/L	22.6
9/13/2007	2D	Chloride	mg/L	19.1
4/3/2008	2D	Chloride	mg/L	31.9
4/24/2008	2D	Chloride	mg/L	23.2
5/15/2008	2D	Chloride	mg/L	18.0
6/5/2008	2D	Chloride	mg/L	16.4
7/3/2008	2D	Chloride	mg/L	66.7
7/3/2008	2D	Chloride	mg/L	66.7
7/24/2008	2D	Chloride	mg/L	25.8
8/14/2008	2D	Chloride	mg/L	24.5
9/4/2008	2D	Chloride	mg/L	22
10/9/2008	2D	Chloride	mg/L	36.1
10/30/2008	2D	Chloride	mg/L	49.9
11/20/2008	2D	Chloride	mg/L	40.8
12/11/2008	2D	Chloride	mg/L	43.1
1/8/2009	2D	Chloride	mg/L	28.5
1/29/2009	2D	Chloride	mg/L	35.6
2/19/2009	2D	Chloride	mg/L	124
3/12/2009	2D	Chloride	mg/L	38.6
4/9/2009	2D	Chloride	mg/L	37.1
4/30/2009	2D	Chloride	mg/L	31.8
5/21/2009	2D	Chloride	mg/L	28.9
1/24/2008	2D	Chloride	mg/L	20
1/3/2008	2D	Chloride	mg/L	42.6
10/18/2007	2D	Chloride	mg/L	68.3
11/29/2007	2D	Chloride	mg/L	27.3
11/8/2007	2D	Chloride	mg/L	25.5
12/20/2007	2D	Chloride	mg/L	26.6
2/14/2008	2D	Chloride	mg/L	21.3
3/6/2008	2D	Chloride	mg/L	19.3
6/11/2009	2D	Chloride	mg/L	25.6
7/12/2007	2D	Chlorobenzene	ug/L	ND
7/12/2007	2D	Chloroethane	ug/L	ND
7/12/2007	2D	Chloroform	ug/L	ND
7/12/2007	2D	Chloromethane	ug/L	ND
6/8/2006	2D	Chromium	mg/L	ND
7/6/2006	2D	Chromium	mg/L	ND
7/27/2006	2D	Chromium	mg/L	ND
8/17/2006	2D	Chromium	mg/L	ND
9/7/2006	2D	Chromium	mg/L	ND
10/19/2006	2D	Chromium	mg/L	ND
11/9/2006	2D	Chromium	mg/L	ND
11/30/2006	2D	Chromium	mg/L	ND
12/21/2006	2D	Chromium	mg/L	ND
1/4/2007	2D	Chromium	mg/L	0.016
1/25/2007	2D	Chromium	mg/L	ND
2/15/2007	2D	Chromium	mg/L	ND
3/8/2007	2D	Chromium	mg/L	ND
4/19/2007	2D	Chromium	mg/L	ND
5/10/2007	2D	Chromium	mg/L	ND
5/31/2007	2D	Chromium	mg/L	ND
6/21/2007	2D	Chromium	mg/L	ND
7/12/2007	2D	Chromium	mg/L	0.011
7/12/2007	2D	Chromium	mg/L	ND
8/2/2007	2D	Chromium	mg/L	ND
8/2/2007	2D	Chromium	mg/L	0.007
8/23/2007	2D	Chromium	mg/L	0.005
9/13/2007	2D	Chromium	mg/L	ND
9/13/2007	2D	Chromium	mg/L	ND
4/3/2008	2D	Chromium	mg/L	0.041
4/24/2008	2D	Chromium	mg/L	0.008
5/15/2008	2D	Chromium	mg/L	ND
6/5/2008	2D	Chromium	mg/L	0.005
7/3/2008	2D	Chromium	mg/L	1.43
7/3/2008	2D	Chromium	mg/L	1.43
7/24/2008	2D	Chromium	mg/L	0.037
8/14/2008	2D	Chromium	mg/L	0.012

Sampling Date	Location ID	Analyte	Unit	Concentration
9/4/2008	2D	Chromium	mg/L	0.016
10/9/2008	2D	Chromium	mg/L	0.040
10/30/2008	2D	Chromium	mg/L	0.013
11/20/2008	2D	Chromium	mg/L	0.008
12/11/2008	2D	Chromium	mg/L	0.005
1/8/2009	2D	Chromium	mg/L	0.068
1/29/2009	2D	Chromium	mg/L	0.007
2/19/2009	2D	Chromium	mg/L	0.012
3/12/2009	2D	Chromium	mg/L	0.010
4/9/2009	2D	Chromium	mg/L	0.048
4/30/2009	2D	Chromium	mg/L	ND
5/21/2009	2D	Chromium	mg/L	ND
1/24/2008	2D	Chromium	mg/L	ND
1/3/2008	2D	Chromium	mg/L	0.081
2/14/2008	2D	Chromium	mg/L	ND
3/6/2008	2D	Chromium	mg/L	ND
6/11/2009	2D	Chromium	mg/L	ND
6/8/2006	2D	Chromium, hexavalent	mg/l	ND
7/6/2006	2D	Chromium, hexavalent	mg/l	ND
7/27/2006	2D	Chromium, hexavalent	mg/l	ND
8/17/2006	2D	Chromium, hexavalent	mg/l	ND
9/7/2006	2D	Chromium, hexavalent	mg/l	ND
10/19/2006	2D	Chromium, hexavalent	mg/l	ND
11/9/2006	2D	Chromium, hexavalent	mg/l	ND
11/30/2006	2D	Chromium, hexavalent	mg/l	ND
12/21/2006	2D	Chromium, hexavalent	mg/l	ND
1/4/2007	2D	Chromium, hexavalent	mg/l	ND
1/25/2007	2D	Chromium, hexavalent	mg/l	ND
2/15/2007	2D	Chromium, hexavalent	mg/l	ND
3/8/2007	2D	Chromium, hexavalent	mg/l	ND
4/19/2007	2D	Chromium, hexavalent	mg/l	ND
5/10/2007	2D	Chromium, hexavalent	mg/l	ND
5/31/2007	2D	Chromium, hexavalent	mg/l	ND
6/21/2007	2D	Chromium, hexavalent	mg/l	ND
8/23/2007	2D	Chromium, hexavalent	mg/L	ND
4/3/2008	2D	Chromium, Hexavalent	mg/L	ND
4/24/2008	2D	Chromium, hexavalent	mg/L	ND
5/15/2008	2D	Chromium, hexavalent	mg/L	ND
6/5/2008	2D	Chromium, hexavalent	mg/L	ND
7/3/2008	2D	Chromium, Hexavalent	mg/L	1.5
7/3/2008	2D	Chromium, Hexavalent	mg/L	1.5
7/24/2008	2D	Chromium, Hexavalent	mg/L	ND
8/14/2008	2D	Chromium, Hexavalent	mg/L	0.01
9/4/2008	2D	Chromium, Hexavalent	mg/L	0.01
10/9/2008	2D	Chromium, hexavalent	mg/L	0.02
10/30/2008	2D	Chromium, hexavalent	mg/L	ND
11/20/2008	2D	Chromium, hexavalent	mg/L	ND
12/11/2008	2D	Chromium, hexavalent	mg/L	ND
1/8/2009	2D	Chromium, hexavalent	mg/L	ND
1/29/2009	2D	Chromium, hexavalent	mg/L	ND
2/19/2009	2D	Chromium, hexavalent	mg/L	ND
3/12/2009	2D	Chromium, hexavalent	mg/L	ND
4/9/2009	2D	Chromium, hexavalent	mg/L	ND
4/30/2009	2D	Chromium, hexavalent	mg/L	ND
5/21/2009	2D	Chromium, hexavalent	mg/L	ND
1/24/2008	2D	Chromium, hexavalent	mg/L	ND
1/3/2008	2D	Chromium, hexavalent	mg/L	ND
10/18/2007	2D	Chromium, hexavalent	mg/L	ND
11/29/2007	2D	Chromium, hexavalent	mg/L	ND
11/8/2007	2D	Chromium, hexavalent	mg/L	ND
12/20/2007	2D	Chromium, hexavalent	mg/L	ND
2/14/2008	2D	Chromium, hexavalent	mg/L	ND
3/6/2008	2D	Chromium, hexavalent	mg/L	ND
6/11/2009	2D	Chromium, hexavalent	mg/L	ND
10/18/2007	2D	Chromium, ICP	mg/L	0.064
11/29/2007	2D	Chromium, ICP	mg/L	ND
11/8/2007	2D	Chromium, ICP	mg/L	0.011
12/20/2007	2D	Chromium, ICP	mg/L	ND
7/12/2007	2D	cis-1,2-Dichloroethene	ug/L	ND
7/12/2007	2D	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2D	Cobalt	mg/L	0.628
7/12/2007	2D	Copper	mg/L	ND
7/12/2007	2D	Cyanide	mg/L	ND
7/12/2007	2D	Dibromochloromethane	ug/L	ND
7/12/2007	2D	Dibromomethane	ug/L	ND
7/12/2007	2D	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2D	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	2D	Ethylbenzene	ug/L	ND
7/12/2007	2D	Hexachlorobutadiene	ug/L	ND
6/8/2006	2D	Iron	mg/L	1.55
7/6/2006	2D	Iron	mg/L	2.94
7/27/2006	2D	Iron	mg/L	0.461
8/17/2006	2D	Iron	mg/L	0.207
9/7/2006	2D	Iron	mg/L	0.307
10/19/2006	2D	Iron	mg/L	0.337

Sampling Date	Location ID	Analyte	Unit	Concentration
11/9/2006	2D	Iron	mg/L	0.666
11/30/2006	2D	Iron	mg/L	0.478
12/21/2006	2D	Iron	mg/L	0.306
1/4/2007	2D	Iron	mg/L	3.69
1/25/2007	2D	Iron	mg/L	0.389
2/15/2007	2D	Iron	mg/L	0.804
3/8/2007	2D	Iron	mg/L	0.27
4/19/2007	2D	Iron	mg/L	0.515
5/10/2007	2D	Iron	mg/L	0.739
5/31/2007	2D	Iron	mg/L	0.629
6/21/2007	2D	Iron	mg/L	1.55
7/12/2007	2D	Iron	mg/L	8.04
8/2/2007	2D	Iron	mg/L	1.51
8/23/2007	2D	Iron	mg/L	2.43
9/13/2007	2D	Iron	mg/L	2.06
4/3/2008	2D	Iron	mg/L	1.17
4/24/2008	2D	Iron	mg/L	0.217
5/15/2008	2D	Iron	mg/L	0.173
6/5/2008	2D	Iron	mg/L	0.237
7/3/2008	2D	Iron	mg/L	0.785
7/3/2008	2D	Iron	mg/L	0.785
7/24/2008	2D	Iron	mg/L	0.441
8/14/2008	2D	Iron	mg/L	0.189
9/4/2008	2D	Iron	mg/L	0.159
10/9/2008	2D	Iron	mg/L	0.468
10/30/2008	2D	Iron	mg/L	0.312
11/20/2008	2D	Iron	mg/L	0.313
12/11/2008	2D	Iron	mg/L	1.7
1/8/2009	2D	Iron	mg/L	0.929
1/29/2009	2D	Iron	mg/L	0.378
2/19/2009	2D	Iron	mg/L	1014
3/12/2009	2D	Iron	mg/L	0.872
4/9/2009	2D	Iron	mg/L	3.47
4/30/2009	2D	Iron	mg/L	1.53
5/21/2009	2D	Iron	mg/L	0.905
1/24/2008	2D	Iron	mg/L	0.335
1/3/2008	2D	Iron	mg/L	1.16
10/18/2007	2D	Iron	mg/L	18.2
11/29/2007	2D	Iron	mg/L	0.754
11/8/2007	2D	Iron	mg/L	1.65
12/20/2007	2D	Iron	mg/L	0.842
2/14/2008	2D	Iron	mg/L	0.165
3/6/2008	2D	Iron	mg/L	0.270
6/11/2009	2D	Iron	mg/L	0.588
7/12/2007	2D	Isopropylbenzene	ug/L	ND
7/12/2007	2D	Lead	mg/L	ND
7/12/2007	2D	m,p-Xylene	ug/L	ND
7/12/2007	2D	Magnesium	mg/L	27.7
6/8/2006	2D	Manganese	mg/L	0.047
7/6/2006	2D	Manganese	mg/L	0.286
7/27/2006	2D	Manganese	mg/L	0.041
8/17/2006	2D	Manganese	mg/L	0.013
9/7/2006	2D	Manganese	mg/L	0.068
10/19/2006	2D	Manganese	mg/L	0.057
11/9/2006	2D	Manganese	mg/L	0.107
11/30/2006	2D	Manganese	mg/L	0.134
12/21/2006	2D	Manganese	mg/L	0.04
1/4/2007	2D	Manganese	mg/L	0.443
1/25/2007	2D	Manganese	mg/L	0.047
2/15/2007	2D	Manganese	mg/L	0.148
3/8/2007	2D	Manganese	mg/L	ND
4/19/2007	2D	Manganese	mg/L	0.329
5/10/2007	2D	Manganese	mg/L	0.025
5/31/2007	2D	Manganese	mg/L	ND
6/21/2007	2D	Manganese	mg/L	0.11
7/12/2007	2D	Manganese	mg/L	9.12
8/2/2007	2D	Manganese	mg/L	4.9
8/23/2007	2D	Manganese	mg/L	3.021
9/13/2007	2D	Manganese	mg/L	0.621
4/3/2008	2D	Manganese	mg/L	0.784
4/24/2008	2D	Manganese	mg/L	0.045
5/15/2008	2D	Manganese	mg/L	0.108
6/5/2008	2D	Manganese	mg/L	0.064
7/3/2008	2D	Manganese	mg/L	0.53
7/3/2008	2D	Manganese	mg/L	0.53
7/24/2008	2D	Manganese	mg/L	0.167
8/14/2008	2D	Manganese	mg/L	0.052
9/4/2008	2D	Manganese	mg/L	0.029
10/9/2008	2D	Manganese	mg/L	0.079
10/30/2008	2D	Manganese	mg/L	0.059
11/20/2008	2D	Manganese	mg/L	0.107
12/11/2008	2D	Manganese	mg/L	0.197
1/8/2009	2D	Manganese	mg/L	0.149
1/29/2009	2D	Manganese	mg/L	0.066
2/19/2009	2D	Manganese	mg/L	26.3

Sampling Date	Location ID	Analyte	Unit	Concentration
3/12/2009	2D	Manganese	mg/L	0.076
4/9/2009	2D	Manganese	mg/L	0.213
4/30/2009	2D	Manganese	mg/L	0.089
5/21/2009	2D	Manganese	mg/L	0.060
1/24/2008	2D	Manganese	mg/L	0.089
1/3/2008	2D	Manganese	mg/L	0.792
10/18/2007	2D	Manganese	mg/L	8.88
11/29/2007	2D	Manganese	mg/L	0.023
11/8/2007	2D	Manganese	mg/L	0.029
12/20/2007	2D	Manganese	mg/L	0.103
2/14/2008	2D	Manganese	mg/L	0.073
3/6/2008	2D	Manganese	mg/L	0.026
6/11/2009	2D	Manganese	mg/L	0.058
7/12/2007	2D	Mercury	mg/L	ND
7/12/2007	2D	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2D	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2D	Naphthalene	ug/L	ND
7/12/2007	2D	n-Butylbenzene	ug/L	ND
7/12/2007	2D	Nickel	mg/L	0.55
7/12/2007	2D	Nitrate	mg/L	0.97
7/12/2007	2D	Nitrate/Nitrite	mg/L	0.97
7/12/2007	2D	Nitrite	mg/L	ND
7/12/2007	2D	n-Propylbenzene	ug/L	ND
7/12/2007	2D	o-Xylene	ug/L	ND
6/8/2006	2D	pH	pH Units	6.59
7/6/2006	2D	pH	pH Units	6.38
7/27/2006	2D	pH	pH Units	6.29
8/17/2006	2D	pH	pH Units	6.7
9/7/2006	2D	pH	pH Units	6.44
10/19/2006	2D	pH	pH Units	6.34
11/9/2006	2D	pH	pH Units	6.08
11/30/2006	2D	pH	pH Units	6.36
12/21/2006	2D	pH	pH Units	7.26
1/4/2007	2D	pH	pH Units	6.93
1/25/2007	2D	pH	pH Units	6.92
2/15/2007	2D	pH	pH Units	7.26
3/8/2007	2D	pH	pH Units	6.9
4/19/2007	2D	pH	pH Units	6.84
5/10/2007	2D	pH	pH Units	6.17
5/31/2007	2D	pH	pH Units	6.32
6/21/2007	2D	pH	pH Units	5.69
7/12/2007	2D	pH	pH	5.65
7/12/2007	2D	pH	pH	5.67
7/12/2007	2D	pH	pH	5.65
7/12/2007	2D	pH	pH	5.67
8/2/2007	2D	pH	pH	5
8/2/2007	2D	pH	pH	5
8/2/2007	2D	pH	pH	5.04
8/2/2007	2D	pH	pH	5.04
8/23/2007	2D	pH	pH	4.23
8/23/2007	2D	pH	pH	4.24
8/23/2007	2D	pH	pH	4.28
8/23/2007	2D	pH	pH	4.2
9/13/2007	2D	pH	pH	5.24
9/13/2007	2D	pH	pH	5.27
9/13/2007	2D	pH	pH	5.24
9/13/2007	2D	pH	pH	5.24
4/3/2008	2D	pH	pH	6.19
4/3/2008	2D	pH	pH	6.25
4/3/2008	2D	pH	pH	6.27
4/3/2008	2D	pH	pH	6.31
4/24/2008	2D	pH	pH	6.49
4/24/2008	2D	pH	pH	6.53
4/24/2008	2D	pH	pH	6.56
4/24/2008	2D	pH	pH	6.60
5/15/2008	2D	pH	pH	6.24
5/15/2008	2D	pH	pH	6.28
5/15/2008	2D	pH	pH	6.28
5/15/2008	2D	pH	pH	6.34
6/5/2008	2D	pH	pH	6.24
6/5/2008	2D	pH	pH	6.24
6/5/2008	2D	pH	pH	6.28
6/5/2008	2D	pH	pH	6.32
7/3/2008	2D	pH	pH	6.15
7/3/2008	2D	pH	pH	6.09
7/3/2008	2D	pH	pH	6.06
7/3/2008	2D	pH	pH	6.11
7/3/2008	2D	pH	pH	6.06
7/3/2008	2D	pH	pH	6.09
7/3/2008	2D	pH	pH	6.11
7/3/2008	2D	pH	pH	6.15
7/24/2008	2D	pH	pH	5.88
7/24/2008	2D	pH	pH	5.91
7/24/2008	2D	pH	pH	5.92
7/24/2008	2D	pH	pH	5.98

Sampling Date	Location ID	Analyte	Unit	Concentration
8/14/2008	2D	pH	pH	6.32
8/14/2008	2D	pH	pH	6.34
8/14/2008	2D	pH	pH	6.35
8/14/2008	2D	pH	pH	6.37
9/4/2008	2D	pH	pH	6.16
9/4/2008	2D	pH	pH	6.18
9/4/2008	2D	pH	pH	6.21
9/4/2008	2D	pH	pH	6.21
10/9/2008	2D	pH	pH	6.46
10/9/2008	2D	pH	pH	6.48
10/9/2008	2D	pH	pH	6.49
10/9/2008	2D	pH	pH	6.52
10/30/2008	2D	pH	pH	6.39
10/30/2008	2D	pH	pH	6.42
10/30/2008	2D	pH	pH	6.48
10/30/2008	2D	pH	pH	6.56
11/20/2008	2D	pH	pH	6.06
11/20/2008	2D	pH	pH	6.12
11/20/2008	2D	pH	pH	6.15
11/20/2008	2D	pH	pH	6.21
12/11/2008	2D	pH	pH	6.24
12/11/2008	2D	pH	pH	6.26
12/11/2008	2D	pH	pH	6.28
12/11/2008	2D	pH	pH	6.37
1/8/2009	2D	pH	pH	6.40
1/8/2009	2D	pH	pH	6.41
1/8/2009	2D	pH	pH	6.43
1/8/2009	2D	pH	pH	6.49
1/29/2009	2D	pH	pH	6.26
1/29/2009	2D	pH	pH	6.35
1/29/2009	2D	pH	pH	6.42
1/29/2009	2D	pH	pH	6.51
2/19/2009	2D	pH	pH	6.83
2/19/2009	2D	pH	pH	6.85
2/19/2009	2D	pH	pH	6.88
2/19/2009	2D	pH	pH	6.93
3/12/2009	2D	pH	pH	6.17
3/12/2009	2D	pH	pH	6.25
3/12/2009	2D	pH	pH	6.25
3/12/2009	2D	pH	pH	6.33
4/9/2009	2D	pH	pH	6.15
4/9/2009	2D	pH	pH	6.17
4/9/2009	2D	pH	pH	6.17
4/9/2009	2D	pH	pH	6.29
4/30/2009	2D	pH	pH	6.69
4/30/2009	2D	pH	pH	6.53
4/30/2009	2D	pH	pH	6.38
4/30/2009	2D	pH	pH	6.34
5/21/2009	2D	pH	pH	6.29
5/21/2009	2D	pH	pH	6.34
5/21/2009	2D	pH	pH	6.29
5/21/2009	2D	pH	pH	6.43
1/24/2008	2D	pH	pH	3.23
1/24/2008	2D	pH	pH	6.23
1/24/2008	2D	pH	pH	6.26
1/24/2008	2D	pH	pH	6.33
1/3/2008	2D	pH	pH	5.58
1/3/2008	2D	pH	pH	5.65
1/3/2008	2D	pH	pH	5.74
1/3/2008	2D	pH	pH	5.68
10/18/2007	2D	pH	pH	4.97
10/18/2007	2D	pH	pH	5.12
10/18/2007	2D	pH	pH	5.09
10/18/2007	2D	pH	pH	5.08
11/29/2007	2D	pH	pH	5.87
11/29/2007	2D	pH	pH	5.93
11/29/2007	2D	pH	pH	5.93
11/29/2007	2D	pH	pH	6
11/8/2007	2D	pH	pH	6.12
11/8/2007	2D	pH	pH	6.2
11/8/2007	2D	pH	pH	6.2
11/8/2007	2D	pH	pH	6.29
12/20/2007	2D	pH	pH	5.7
12/20/2007	2D	pH	pH	5.78
12/20/2007	2D	pH	pH	5.82
12/20/2007	2D	pH	pH	5.88
2/14/2008	2D	pH	pH	5.74
2/14/2008	2D	pH	pH	5.88
2/14/2008	2D	pH	pH	6.01
2/14/2008	2D	pH	pH	6.13
3/6/2008	2D	pH	pH	6.36
3/6/2008	2D	pH	pH	6.41
3/6/2008	2D	pH	pH	6.38
3/6/2008	2D	pH	pH	6.43
6/11/2009	2D	pH	pH	6.39

Sampling Date	Location ID	Analyte	Unit	Concentration
6/11/2009	2D	pH	pH	6.4
6/11/2009	2D	pH	pH	6.44
6/11/2009	2D	pH	pH	6.46
7/12/2007	2D	Phenols	mg/L	ND
8/2/2007	2D	Phenols	mg/L	ND
8/23/2007	2D	Phenols	mg/L	ND
9/13/2007	2D	Phenols	mg/L	ND
6/8/2006	2D	Phenols	mg/L	ND
7/6/2006	2D	Phenols	mg/L	ND
7/27/2006	2D	Phenols	mg/L	ND
8/17/2006	2D	Phenols	mg/L	ND
9/7/2006	2D	Phenols	mg/L	ND
10/19/2006	2D	Phenols	mg/L	ND
11/9/2006	2D	Phenols	mg/L	ND
11/30/2006	2D	Phenols	mg/L	ND
12/21/2006	2D	Phenols	mg/L	ND
1/4/2007	2D	Phenols	mg/L	ND
1/25/2007	2D	Phenols	mg/L	ND
2/15/2007	2D	Phenols	mg/L	ND
3/8/2007	2D	Phenols	mg/L	ND
4/19/2007	2D	Phenols	mg/L	ND
5/10/2007	2D	Phenols	mg/L	ND
5/31/2007	2D	Phenols	mg/L	ND
6/21/2007	2D	Phenols	mg/L	ND
10/18/2007	2D	Phenols	mg/L	ND
11/29/2007	2D	Phenols	mg/L	0.12
11/8/2007	2D	Phenols	mg/L	ND
12/20/2007	2D	Phenols	mg/L	ND
4/3/2008	2D	Phenols, Total	mg/L	ND
4/24/2008	2D	Phenols, Total	mg/L	0.022
5/15/2008	2D	Phenols, Total	mg/L	ND
6/5/2008	2D	Phenols, Total	mg/L	ND
7/3/2008	2D	Phenols, Total	mg/L	ND
7/3/2008	2D	Phenols, Total	mg/L	ND
7/24/2008	2D	Phenols, Total	mg/L	ND
8/14/2008	2D	Phenols, Total	mg/L	ND
9/4/2008	2D	Phenols, Total	mg/L	ND
10/9/2008	2D	Phenols, Total	mg/L	ND
10/30/2008	2D	Phenols, Total	mg/L	ND
11/20/2008	2D	Phenols, Total	mg/L	ND
12/11/2008	2D	Phenols, Total	mg/L	ND
1/8/2009	2D	Phenols, Total	mg/L	ND
1/29/2009	2D	Phenols, Total	mg/L	ND
2/19/2009	2D	Phenols, Total	mg/L	ND
3/12/2009	2D	Phenols, Total	mg/L	ND
4/9/2009	2D	Phenols, Total	mg/L	ND
4/30/2009	2D	Phenols, Total	mg/L	ND
5/21/2009	2D	Phenols, Total	mg/L	ND
1/24/2008	2D	Phenols, Total	mg/L	ND
1/3/2008	2D	Phenols, Total	mg/L	ND
2/14/2008	2D	Phenols, Total	mg/L	ND
3/6/2008	2D	Phenols, Total	mg/L	ND
6/11/2009	2D	Phenols, Total	mg/L	ND
7/12/2007	2D	Potassium	mg/L	5.67
7/12/2007	2D	sec-Butylbenzene	ug/L	ND
7/12/2007	2D	Selenium	mg/L	0.004
7/12/2007	2D	Silver	mg/L	ND
6/8/2006	2D	Sodium	mg/L	33
7/6/2006	2D	Sodium	mg/L	23.6
7/27/2006	2D	Sodium	mg/L	44
8/17/2006	2D	Sodium	mg/L	28.3
9/7/2006	2D	Sodium	mg/L	50
10/19/2006	2D	Sodium	mg/L	26.3
11/9/2006	2D	Sodium	mg/L	33.3
11/30/2006	2D	Sodium	mg/L	29.7
12/21/2006	2D	Sodium	mg/L	38.1
1/4/2007	2D	Sodium	mg/L	31
1/25/2007	2D	Sodium	mg/L	28.3
2/15/2007	2D	Sodium	mg/L	36.1
3/8/2007	2D	Sodium	mg/L	36.5
4/19/2007	2D	Sodium	mg/L	42.7
5/10/2007	2D	Sodium	mg/L	32.3
5/31/2007	2D	Sodium	mg/L	31.3
6/21/2007	2D	Sodium	mg/L	29.6
7/12/2007	2D	Sodium	mg/L	75.7
8/2/2007	2D	Sodium	mg/L	38.8
8/23/2007	2D	Sodium	mg/L	24
9/13/2007	2D	Sodium	mg/L	21.3
4/3/2008	2D	Sodium	mg/L	46.8
4/24/2008	2D	Sodium	mg/L	36.9
5/15/2008	2D	Sodium	mg/L	30.2
6/5/2008	2D	Sodium	mg/L	31.9
7/3/2008	2D	Sodium	mg/L	97.8
7/3/2008	2D	Sodium	mg/L	97.8
7/24/2008	2D	Sodium	mg/L	62.7

Sampling Date	Location ID	Analyte	Unit	Concentration
8/14/2008	2D	Sodium	mg/L	50.2
9/4/2008	2D	Sodium	mg/L	41.7
10/9/2008	2D	Sodium	mg/L	92.3
10/30/2008	2D	Sodium	mg/L	111
11/20/2008	2D	Sodium	mg/L	84.7
12/11/2008	2D	Sodium	mg/L	105
1/8/2009	2D	Sodium	mg/L	59.0
1/29/2009	2D	Sodium	mg/L	72.2
2/19/2009	2D	Sodium	mg/L	106
3/12/2009	2D	Sodium	mg/L	78.5
4/9/2009	2D	Sodium	mg/L	79.7
4/30/2009	2D	Sodium	mg/L	68.1
5/21/2009	2D	Sodium	mg/L	56.7
1/24/2008	2D	Sodium	mg/L	39.9
1/3/2008	2D	Sodium	mg/L	75.9
10/18/2007	2D	Sodium	mg/L	87.3
11/29/2007	2D	Sodium	mg/L	61.5
11/8/2007	2D	Sodium	mg/L	47.7
12/20/2007	2D	Sodium	mg/L	48.4
2/14/2008	2D	Sodium	mg/L	37.0
3/6/2008	2D	Sodium	mg/L	38.3
6/11/2009	2D	Sodium	mg/L	47.7
7/12/2007	2D	Solids, Total Dissolved	mg/L	1125
7/12/2007	2D	Solids, Total Suspended	mg/L	34
6/8/2006	2D	Specific Conductance	umhos	880
7/6/2006	2D	Specific Conductance	umhos	797
7/27/2006	2D	Specific Conductance	umhos	943
8/17/2006	2D	Specific Conductance	umhos	840
9/7/2006	2D	Specific Conductance	umhos	924
10/19/2006	2D	Specific Conductance	umhos	887
11/9/2006	2D	Specific Conductance	umhos	746
11/30/2006	2D	Specific Conductance	umhos	744
12/21/2006	2D	Specific Conductance	umhos	895
1/4/2007	2D	Specific Conductance	umhos	846
1/25/2007	2D	Specific Conductance	umhos	577
2/15/2007	2D	Specific Conductance	umhos	824
3/8/2007	2D	Specific Conductance	umhos	582
4/19/2007	2D	Specific Conductance	umhos	713
5/10/2007	2D	Specific Conductance	umhos	575
5/31/2007	2D	Specific Conductance	umhos	545
6/21/2007	2D	Specific Conductance	umhos	471
7/12/2007	2D	Specific Conductance	umhos	880
7/12/2007	2D	Specific Conductance	umhos	903
7/12/2007	2D	Specific Conductance	umhos	890
7/12/2007	2D	Specific Conductance	umhos	895
8/2/2007	2D	Specific Conductance	umhos	740
8/2/2007	2D	Specific Conductance	umhos	732
8/2/2007	2D	Specific Conductance	umhos	751
8/2/2007	2D	Specific Conductance	umhos	729
8/23/2007	2D	Specific Conductance	umhos	504
8/23/2007	2D	Specific Conductance	umhos	506
8/23/2007	2D	Specific Conductance	umhos	514
8/23/2007	2D	Specific Conductance	umhos	512
9/13/2007	2D	Specific Conductance	umhos	492
9/13/2007	2D	Specific Conductance	umhos	485
9/13/2007	2D	Specific Conductance	umhos	491
9/13/2007	2D	Specific Conductance	umhos	490
4/3/2008	2D	Specific Conductance	umhos	835
4/3/2008	2D	Specific Conductance	umhos	848
4/3/2008	2D	Specific Conductance	umhos	877
4/3/2008	2D	Specific Conductance	umhos	915
4/24/2008	2D	Specific Conductance	umhos	800
4/24/2008	2D	Specific Conductance	umhos	808
4/24/2008	2D	Specific Conductance	umhos	813
4/24/2008	2D	Specific Conductance	umhos	824
5/15/2008	2D	Specific Conductance	umhos	692
5/15/2008	2D	Specific Conductance	umhos	697
5/15/2008	2D	Specific Conductance	umhos	698
5/15/2008	2D	Specific Conductance	umhos	721
6/5/2008	2D	Specific Conductance	umhos	694
6/5/2008	2D	Specific Conductance	umhos	697
6/5/2008	2D	Specific Conductance	umhos	698
6/5/2008	2D	Specific Conductance	umhos	706
7/3/2008	2D	Specific Conductance	umhos	1232
7/3/2008	2D	Specific Conductance	umhos	1199
7/3/2008	2D	Specific Conductance	umhos	1243
7/3/2008	2D	Specific Conductance	umhos	1269
7/3/2008	2D	Specific Conductance	umhos	1199
7/3/2008	2D	Specific Conductance	umhos	1232
7/3/2008	2D	Specific Conductance	umhos	1243
7/3/2008	2D	Specific Conductance	umhos	1269
7/24/2008	2D	Specific Conductance	umhos	808
7/24/2008	2D	Specific Conductance	umhos	814
7/24/2008	2D	Specific Conductance	umhos	815
7/24/2008	2D	Specific Conductance	umhos	836

Sampling Date	Location ID	Analyte	Unit	Concentration
8/14/2008	2D	Specific Conductance	umhos	782
8/14/2008	2D	Specific Conductance	umhos	791
8/14/2008	2D	Specific Conductance	umhos	799
8/14/2008	2D	Specific Conductance	umhos	817
9/4/2008	2D	Specific Conductance	umhos	622
9/4/2008	2D	Specific Conductance	umhos	623
9/4/2008	2D	Specific Conductance	umhos	624
9/4/2008	2D	Specific Conductance	umhos	626
10/9/2008	2D	Specific Conductance	umhos	1003
10/9/2008	2D	Specific Conductance	umhos	937
10/9/2008	2D	Specific Conductance	umhos	942
10/9/2008	2D	Specific Conductance	umhos	944
10/30/2008	2D	Specific Conductance	umhos	1020
10/30/2008	2D	Specific Conductance	umhos	1024
10/30/2008	2D	Specific Conductance	umhos	1042
10/30/2008	2D	Specific Conductance	umhos	1047
11/20/2008	2D	Specific Conductance	umhos	919
11/20/2008	2D	Specific Conductance	umhos	920
11/20/2008	2D	Specific Conductance	umhos	931
11/20/2008	2D	Specific Conductance	umhos	933
12/11/2008	2D	Specific Conductance	umhos	1061
12/11/2008	2D	Specific Conductance	umhos	1080
12/11/2008	2D	Specific Conductance	umhos	1080
12/11/2008	2D	Specific Conductance	umhos	1111
1/8/2009	2D	Specific Conductance	umhos	802
1/8/2009	2D	Specific Conductance	umhos	817
1/8/2009	2D	Specific Conductance	umhos	825
1/8/2009	2D	Specific Conductance	umhos	900
1/29/2009	2D	Specific Conductance	umhos	823
1/29/2009	2D	Specific Conductance	umhos	854
1/29/2009	2D	Specific Conductance	umhos	864
1/29/2009	2D	Specific Conductance	umhos	873
2/19/2009	2D	Specific Conductance	umhos	858
2/19/2009	2D	Specific Conductance	umhos	863
2/19/2009	2D	Specific Conductance	umhos	867
2/19/2009	2D	Specific Conductance	umhos	868
3/12/2009	2D	Specific Conductance	umhos	9.63
3/12/2009	2D	Specific Conductance	umhos	949
3/12/2009	2D	Specific Conductance	umhos	960
3/12/2009	2D	Specific Conductance	umhos	964
4/9/2009	2D	Specific Conductance	umhos	936
4/9/2009	2D	Specific Conductance	umhos	941
4/9/2009	2D	Specific Conductance	umhos	943
4/9/2009	2D	Specific Conductance	umhos	938
4/30/2009	2D	Specific Conductance	umhos	818
4/30/2009	2D	Specific Conductance	umhos	822
4/30/2009	2D	Specific Conductance	umhos	819
4/30/2009	2D	Specific Conductance	umhos	826
5/21/2009	2D	Specific Conductance	umhos	826
5/21/2009	2D	Specific Conductance	umhos	825
5/21/2009	2D	Specific Conductance	umhos	827
5/21/2009	2D	Specific Conductance	umhos	835
1/24/2008	2D	Specific Conductance	umhos	675
1/24/2008	2D	Specific Conductance	umhos	680
1/24/2008	2D	Specific Conductance	umhos	668
1/24/2008	2D	Specific Conductance	umhos	678
1/3/2008	2D	Specific Conductance	umhos	712
1/3/2008	2D	Specific Conductance	umhos	695
1/3/2008	2D	Specific Conductance	umhos	699
1/3/2008	2D	Specific Conductance	umhos	698
10/18/2007	2D	Specific Conductance	umhos	1034
10/18/2007	2D	Specific Conductance	umhos	1071
10/18/2007	2D	Specific Conductance	umhos	1084
10/18/2007	2D	Specific Conductance	umhos	1070
11/29/2007	2D	Specific Conductance	umhos	630
11/29/2007	2D	Specific Conductance	umhos	634
11/29/2007	2D	Specific Conductance	umhos	654
11/29/2007	2D	Specific Conductance	umhos	652
11/8/2007	2D	Specific Conductance	umhos	671
11/8/2007	2D	Specific Conductance	umhos	671
11/8/2007	2D	Specific Conductance	umhos	667
11/8/2007	2D	Specific Conductance	umhos	660
12/20/2007	2D	Specific Conductance	umhos	605
12/20/2007	2D	Specific Conductance	umhos	606
12/20/2007	2D	Specific Conductance	umhos	598
12/20/2007	2D	Specific Conductance	umhos	608
2/14/2008	2D	Specific Conductance	umhos	730
2/14/2008	2D	Specific Conductance	umhos	732
2/14/2008	2D	Specific Conductance	umhos	740
2/14/2008	2D	Specific Conductance	umhos	733
3/6/2008	2D	Specific Conductance	umhos	7.49
3/6/2008	2D	Specific Conductance	umhos	741
3/6/2008	2D	Specific Conductance	umhos	744
3/6/2008	2D	Specific Conductance	umhos	751
6/11/2009	2D	Specific Conductance	umhos	771

Sampling Date	Location ID	Analyte	Unit	Concentration
6/11/2009	2D	Specific Conductance	umhos	776
6/11/2009	2D	Specific Conductance	umhos	777
6/11/2009	2D	Specific Conductance	umhos	784
7/12/2007	2D	Styrene	ug/L	ND
7/12/2007	2D	Sulfate	mg/L	632
8/2/2007	2D	Sulfate	mg/L	307
8/23/2007	2D	Sulfate	mg/L	198
9/13/2007	2D	Sulfate	mg/L	169
4/3/2008	2D	Sulfate	mg/L	337
4/24/2008	2D	Sulfate	mg/L	306
5/15/2008	2D	Sulfate	mg/L	225
6/5/2008	2D	Sulfate	mg/L	207
7/3/2008	2D	Sulfate	mg/L	498
7/3/2008	2D	Sulfate	mg/L	498
7/24/2008	2D	Sulfate	mg/L	266
8/14/2008	2D	Sulfate	mg/L	256
9/4/2008	2D	Sulfate	mg/L	210
10/9/2008	2D	Sulfate	mg/L	307
10/30/2008	2D	Sulfate	mg/L	396
11/20/2008	2D	Sulfate	mg/L	377
12/11/2008	2D	Sulfate	mg/L	371
1/8/2009	2D	Sulfate	mg/L	292
1/29/2009	2D	Sulfate	mg/L	344
2/19/2009	2D	Sulfate	mg/L	3632
3/12/2009	2D	Sulfate	mg/L	369
39912.61794	2D	Sulfate	mg/L	356
39933.64233	2D	Sulfate	mg/L	314
39954.62452	2D	Sulfate	mg/L	274
1/24/2008	2D	Sulfate	mg/L	281
1/3/2008	2D	Sulfate	mg/L	424
2/14/2008	2D	Sulfate	mg/L	286
3/6/2008	2D	Sulfate	mg/L	276
6/8/2006	2D	Sulfate	mg/L	326
7/6/2006	2D	Sulfate	mg/L	280
7/27/2006	2D	Sulfate	mg/L	312
8/17/2006	2D	Sulfate	mg/L	245
9/7/2006	2D	Sulfate	mg/L	357
10/19/2006	2D	Sulfate	mg/L	301
11/9/2006	2D	Sulfate	mg/L	303
11/30/2006	2D	Sulfate	mg/L	305
12/21/2006	2D	Sulfate	mg/L	295
1/4/2007	2D	Sulfate	mg/L	341
1/25/2007	2D	Sulfate	mg/L	134
2/15/2007	2D	Sulfate	mg/L	260
3/8/2007	2D	Sulfate	mg/L	324
4/19/2007	2D	Sulfate	mg/L	344
5/10/2007	2D	Sulfate	mg/L	296
5/31/2007	2D	Sulfate	mg/L	238
6/21/2007	2D	Sulfate	mg/L	249
10/18/2007	2D	Sulfate	mg/L	671
11/29/2007	2D	Sulfate	mg/L	301
11/8/2007	2D	Sulfate	mg/L	271
12/20/2007	2D	Sulfate	mg/L	293
6/11/2009	2D	Sulfate	mg/L	227
6/8/2006	2D	Temperature	C	15
7/6/2006	2D	Temperature	C	17
7/27/2006	2D	Temperature	C	17
8/17/2006	2D	Temperature	C	15
9/7/2006	2D	Temperature	C	17
10/19/2006	2D	Temperature	C	17
11/9/2006	2D	Temperature	C	17
11/30/2006	2D	Temperature	C	18
12/21/2006	2D	Temperature	C	16
1/4/2007	2D	Temperature	C	16
1/25/2007	2D	Temperature	C	14
2/15/2007	2D	Temperature	C	14
3/8/2007	2D	Temperature	C	14
4/19/2007	2D	Temperature	C	14
5/10/2007	2D	Temperature	C	16
5/31/2007	2D	Temperature	C	16
6/21/2007	2D	Temperature	C	16
7/12/2007	2D	Temperature	C	17
7/12/2007	2D	Temperature	C	17
7/12/2007	2D	Temperature	C	17
7/12/2007	2D	Temperature	C	17
8/2/2007	2D	Temperature	C	17
8/2/2007	2D	Temperature	C	17
8/2/2007	2D	Temperature	C	17
8/2/2007	2D	Temperature	C	18
8/23/2007	2D	Temperature	C	16
8/23/2007	2D	Temperature	C	16
8/23/2007	2D	Temperature	C	17
8/23/2007	2D	Temperature	C	17
9/13/2007	2D	Temperature	C	16
9/13/2007	2D	Temperature	C	16

Sampling Date	Location ID	Analyte	Unit	Concentration
9/13/2007	2D	Temperature	C	16
9/13/2007	2D	Temperature	C	17
4/3/2008	2D	Temperature	C	15
4/3/2008	2D	Temperature	C	15
4/3/2008	2D	Temperature	C	15
4/3/2008	2D	Temperature	C	15
4/24/2008	2D	Temperature	C	17
4/24/2008	2D	Temperature	C	17
4/24/2008	2D	Temperature	C	17
4/24/2008	2D	Temperature	C	17
5/15/2008	2D	Temperature	C	16
5/15/2008	2D	Temperature	C	16
5/15/2008	2D	Temperature	C	16
5/15/2008	2D	Temperature	C	16
6/5/2008	2D	Temperature	C	17
6/5/2008	2D	Temperature	C	17
6/5/2008	2D	Temperature	C	17
6/5/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/3/2008	2D	Temperature	C	17
7/24/2008	2D	Temperature	C	16
7/24/2008	2D	Temperature	C	16
7/24/2008	2D	Temperature	C	16
7/24/2008	2D	Temperature	C	17
8/14/2008	2D	Temperature	C	17
8/14/2008	2D	Temperature	C	17
8/14/2008	2D	Temperature	C	17
8/14/2008	2D	Temperature	C	17
9/4/2008	2D	Temperature	C	18
9/4/2008	2D	Temperature	C	18
9/4/2008	2D	Temperature	C	18
9/4/2008	2D	Temperature	C	19
10/9/2008	2D	Temperature	C	18
10/9/2008	2D	Temperature	C	18
10/9/2008	2D	Temperature	C	18
10/9/2008	2D	Temperature	C	18
10/30/2008	2D	Temperature	C	16
10/30/2008	2D	Temperature	C	16
10/30/2008	2D	Temperature	C	16
10/30/2008	2D	Temperature	C	16
11/20/2008	2D	Temperature	C	16
11/20/2008	2D	Temperature	C	16
11/20/2008	2D	Temperature	C	16
11/20/2008	2D	Temperature	C	16
12/11/2008	2D	Temperature	C	15
12/11/2008	2D	Temperature	C	15
12/11/2008	2D	Temperature	C	15
12/11/2008	2D	Temperature	C	16
1/8/2009	2D	Temperature	C	15
1/8/2009	2D	Temperature	C	15
1/8/2009	2D	Temperature	C	15
1/8/2009	2D	Temperature	C	15
1/29/2009	2D	Temperature	C	15
1/29/2009	2D	Temperature	C	15
1/29/2009	2D	Temperature	C	15
1/29/2009	2D	Temperature	C	15
2/19/2009	2D	Temperature	C	15
2/19/2009	2D	Temperature	C	15
2/19/2009	2D	Temperature	C	15
2/19/2009	2D	Temperature	C	15
3/12/2009	2D	Temperature	C	14
3/12/2009	2D	Temperature	C	15
3/12/2009	2D	Temperature	C	15
3/12/2009	2D	Temperature	C	15
4/9/2009	2D	Temperature	C	15
4/9/2009	2D	Temperature	C	15
4/9/2009	2D	Temperature	C	15
4/9/2009	2D	Temperature	C	15
4/30/2009	2D	Temperature	C	15
4/30/2009	2D	Temperature	C	15
4/30/2009	2D	Temperature	C	15
4/30/2009	2D	Temperature	C	15
5/21/2009	2D	Temperature	C	16
5/21/2009	2D	Temperature	C	16
5/21/2009	2D	Temperature	C	16
5/21/2009	2D	Temperature	C	16
1/24/2008	2D	Temperature	C	15
1/24/2008	2D	Temperature	C	15
1/24/2008	2D	Temperature	C	15

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2008	2D	Temperature	C	15
1/3/2008	2D	Temperature	C	15
1/3/2008	2D	Temperature	C	15
1/3/2008	2D	Temperature	C	14
1/3/2008	2D	Temperature	C	13
10/18/2007	2D	Temperature	C	18.4
10/18/2007	2D	Temperature	C	17.7
10/18/2007	2D	Temperature	C	17.1
10/18/2007	2D	Temperature	C	17.7
11/29/2007	2D	Temperature	C	16
11/29/2007	2D	Temperature	C	15
11/29/2007	2D	Temperature	C	16
11/29/2007	2D	Temperature	C	16
11/8/2007	2D	Temperature	C	16
11/8/2007	2D	Temperature	C	16
11/8/2007	2D	Temperature	C	16
11/8/2007	2D	Temperature	C	16
12/20/2007	2D	Temperature	C	16
12/20/2007	2D	Temperature	C	16
12/20/2007	2D	Temperature	C	16
12/20/2007	2D	Temperature	C	16
2/14/2008	2D	Temperature	C	14.7
2/14/2008	2D	Temperature	C	14.5
2/14/2008	2D	Temperature	C	15.0
2/14/2008	2D	Temperature	C	15.1
3/6/2008	2D	Temperature	C	15
3/6/2008	2D	Temperature	C	15
3/6/2008	2D	Temperature	C	15
3/6/2008	2D	Temperature	C	15
6/11/2009	2D	Temperature	C	16
6/11/2009	2D	Temperature	C	16
6/11/2009	2D	Temperature	C	16
6/11/2009	2D	Temperature	C	16
7/12/2007	2D	tert-Butylbenzene	ug/L	ND
7/12/2007	2D	Tetrachloroethene	ug/L	ND
7/12/2007	2D	Thallium	mg/L	ND
7/12/2007	2D	Toluene	ug/L	ND
7/12/2007	2D	Total Alkalinity	mg/L	27
7/12/2007	2D	Total Hardness,Calculation	mg/L	541
7/12/2007	2D	Total Organic Carbon	mg/L	1
8/2/2007	2D	Total Organic Carbon	mg/L	1.2
8/23/2007	2D	Total Organic Carbon	mg/L	5.3
9/13/2007	2D	Total Organic Carbon	mg/L	1.6
4/3/2008	2D	Total Organic Carbon	mg/L	2.7
4/24/2008	2D	Total Organic Carbon	mg/L	3.1
5/15/2008	2D	Total Organic Carbon	mg/L	3.5
6/5/2008	2D	Total Organic Carbon	mg/L	3.6
7/3/2008	2D	Total Organic Carbon	mg/L	2.9
7/3/2008	2D	Total Organic Carbon	mg/L	2.9
10/9/2008	2D	Total Organic Carbon	mg/L	4.6
10/30/2008	2D	Total Organic Carbon	mg/L	4.3
11/20/2008	2D	Total Organic Carbon	mg/L	4
12/11/2008	2D	Total Organic Carbon	mg/L	4.5
1/8/2009	2D	Total Organic Carbon	mg/L	3.9
1/29/2009	2D	Total Organic Carbon	mg/L	3.2
2/19/2009	2D	Total Organic Carbon	mg/L	5.9
3/12/2009	2D	Total Organic Carbon	mg/L	3.3
1/24/2008	2D	Total Organic Carbon	mg/L	3.1
1/3/2008	2D	Total Organic Carbon	mg/L	2.9
2/14/2008	2D	Total Organic Carbon	mg/L	3.8
3/6/2008	2D	Total Organic Carbon	mg/L	2.9
6/8/2006	2D	Total Organic Carbon	mg/L	3
7/6/2006	2D	Total Organic Carbon	mg/L	3.8
7/27/2006	2D	Total Organic Carbon	mg/L	3.4
8/17/2006	2D	Total Organic Carbon	mg/L	2.5
9/7/2006	2D	Total Organic Carbon	mg/L	3.6
10/19/2006	2D	Total Organic Carbon	mg/L	3.4
11/9/2006	2D	Total Organic Carbon	mg/L	3.7
11/30/2006	2D	Total Organic Carbon	mg/L	3.2
12/21/2006	2D	Total Organic Carbon	mg/L	3.2
1/4/2007	2D	Total Organic Carbon	mg/L	3.9
1/25/2007	2D	Total Organic Carbon	mg/L	2.5
2/15/2007	2D	Total Organic Carbon	mg/L	2.9
3/8/2007	2D	Total Organic Carbon	mg/L	2.5
4/19/2007	2D	Total Organic Carbon	mg/L	4.5
5/10/2007	2D	Total Organic Carbon	mg/L	2.4
5/31/2007	2D	Total Organic Carbon	mg/L	2
6/21/2007	2D	Total Organic Carbon	mg/L	2.7
7/24/2008	2D	Total Organic Carbon	mg/L	3.8
8/14/2008	2D	Total Organic Carbon	mg/L	4.1
9/4/2008	2D	Total Organic Carbon	mg/L	2.4
4/9/2009	2D	Total Organic Carbon	mg/L	3.7
4/30/2009	2D	Total Organic Carbon	mg/L	3.88
5/21/2009	2D	Total Organic Carbon	mg/L	4.6
10/18/2007	2D	Total Organic Carbon	mg/L	1.5

Sampling Date	Location ID	Analyte	Unit	Concentration
11/29/2007	2D	Total Organic Carbon	mg/L	3
11/8/2007	2D	Total Organic Carbon	mg/L	3
12/20/2007	2D	Total Organic Carbon	mg/L	3.9
6/11/2009	2D	Total Organic Carbon	mg/L	4.7
6/8/2006	2D	Total Organic Halogen	mg/L	ND
7/6/2006	2D	Total Organic Halogen	mg/L	0.012
7/27/2006	2D	Total Organic Halogen	mg/L	0.041
8/17/2006	2D	Total Organic Halogen	mg/L	0.282
9/7/2006	2D	Total Organic Halogen	mg/L	ND
10/19/2006	2D	Total Organic Halogen	mg/L	ND
11/9/2006	2D	Total Organic Halogen	mg/L	0.016
11/30/2006	2D	Total Organic Halogen	mg/L	ND
12/21/2006	2D	Total Organic Halogen	mg/L	0.022
1/4/2007	2D	Total Organic Halogen	mg/L	0.012
2/15/2007	2D	Total Organic Halogen	mg/L	0.05
3/8/2007	2D	Total Organic Halogen	mg/L	0.04
4/19/2007	2D	Total Organic Halogen	mg/L	0.01
5/10/2007	2D	Total Organic Halogen	mg/L	0.01
5/31/2007	2D	Total Organic Halogen	mg/L	0.05
6/21/2007	2D	Total Organic Halogen	mg/L	0.043
7/12/2007	2D	Total Organic Halogen	mg/L	0.03
8/2/2007	2D	Total Organic Halogen	mg/L	0.038
8/23/2007	2D	Total Organic Halogen	mg/L	0.06
9/13/2007	2D	Total Organic Halogen	mg/L	ND
4/3/2008	2D	Total Organic Halogen	mg/L	ND
4/24/2008	2D	Total Organic Halogen	mg/L	0.06
5/15/2008	2D	Total Organic Halogen	mg/L	ND
6/5/2008	2D	Total Organic Halogen	mg/L	ND
7/3/2008	2D	Total Organic Halogen	mg/L	0.01
7/3/2008	2D	Total Organic Halogen	mg/L	0.01
7/24/2008	2D	Total Organic Halogen	mg/L	ND
8/14/2008	2D	Total Organic Halogen	mg/L	ND
9/4/2008	2D	Total Organic Halogen	mg/L	0.1
10/9/2008	2D	Total Organic Halogen	mg/L	ND
10/30/2008	2D	Total Organic Halogen	mg/L	0.05
11/20/2008	2D	Total Organic Halogen	mg/L	0.04
12/11/2008	2D	Total Organic Halogen	mg/L	0.01
1/8/2009	2D	Total Organic Halogen	mg/L	0.07
1/29/2009	2D	Total Organic Halogen	mg/L	0.06
2/19/2009	2D	Total Organic Halogen	mg/L	0.10
3/12/2009	2D	Total Organic Halogen	mg/L	0.05
1/24/2008	2D	Total Organic Halogen	mg/L	0.05
1/3/2008	2D	Total Organic Halogen	mg/L	0.02
10/18/2007	2D	Total Organic Halogen	mg/L	0.03
11/29/2007	2D	Total Organic Halogen	mg/L	0.06
11/8/2007	2D	Total Organic Halogen	mg/L	0.02
12/20/2007	2D	Total Organic Halogen	mg/L	ND
2/14/2008	2D	Total Organic Halogen	mg/L	0.08
3/6/2008	2D	Total Organic Halogen	mg/L	0.03
4/9/2009	2D	Total Organic Halogen	mg/L	0.07
4/30/2009	2D	Total Organic Halogen	mg/L	ND
5/21/2009	2D	Total Organic Halogen	mg/L	ND
6/11/2009	2D	Total Organic Halogen	mg/L	ND
7/12/2007	2D	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2D	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2D	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2D	Trichloroethene	ug/L	ND
7/12/2007	2D	Trichlorofluoromethane	ug/L	ND
6/8/2006	2D	Turbidity	NTU	22
7/6/2006	2D	Turbidity	NTU	25
7/27/2006	2D	Turbidity	NTU	6.3
8/17/2006	2D	Turbidity	NTU	2
9/7/2006	2D	Turbidity	NTU	3.7
10/19/2006	2D	Turbidity	NTU	10
11/9/2006	2D	Turbidity	NTU	9.6
11/30/2006	2D	Turbidity	NTU	17
12/21/2006	2D	Turbidity	NTU	2.5
1/4/2007	2D	Turbidity	NTU	146
1/25/2007	2D	Turbidity	NTU	4.3
2/15/2007	2D	Turbidity	NTU	8.5
3/8/2007	2D	Turbidity	NTU	4
4/19/2007	2D	Turbidity	NTU	13
5/10/2007	2D	Turbidity	NTU	8.4
5/31/2007	2D	Turbidity	NTU	16
6/21/2007	2D	Turbidity	NTU	15
7/12/2007	2D	Turbidity	NTU	27
8/2/2007	2D	Turbidity	NTU	4.9
8/23/2007	2D	Turbidity	NTU	24.2
9/13/2007	2D	Turbidity	NTU	31
4/3/2008	2D	Turbidity	NTU	34
4/24/2008	2D	Turbidity	NTU	3.0
5/15/2008	2D	Turbidity	NTU	1.6
6/5/2008	2D	Turbidity	NTU	3.35
7/3/2008	2D	Turbidity	NTU	15
7/3/2008	2D	Turbidity	NTU	15

Sampling Date	Location ID	Analyte	Unit	Concentration
7/24/2008	2D	Turbidity	NTU	4.6
8/14/2008	2D	Turbidity	NTU	2
9/4/2008	2D	Turbidity	NTU	1.4
10/9/2008	2D	Turbidity	NTU	12
10/30/2008	2D	Turbidity	NTU	4.9
11/20/2008	2D	Turbidity	NTU	3.3
12/11/2008	2D	Turbidity	NTU	15
1/8/2009	2D	Turbidity	NTU	29
1/29/2009	2D	Turbidity	NTU	3.3
2/19/2009	2D	Turbidity	NTU	4.8
3/12/2009	2D	Turbidity	NTU	9.7
4/9/2009	2D	Turbidity	NTU	31
4/30/2009	2D	Turbidity	NTU	16
5/21/2009	2D	Turbidity	NTU	7.8
1/24/2008	2D	Turbidity	NTU	2.3
1/3/2008	2D	Turbidity	NTU	12
10/18/2007	2D	Turbidity	NTU	11
11/29/2007	2D	Turbidity	NTU	1.4
11/8/2007	2D	Turbidity	NTU	1.8
12/20/2007	2D	Turbidity	NTU	1.9
2/14/2008	2D	Turbidity	NTU	0.87
3/6/2008	2D	Turbidity	NTU	2.0
6/11/2009	2D	Turbidity	NTU	5
7/12/2007	2D	Vanadium	mg/L	ND
7/12/2007	2D	Vinyl Acetate	ug/L	ND
7/12/2007	2D	Vinyl Chloride	ug/L	ND
7/12/2007	2D	Xylenes, Total	ug/L	ND
7/12/2007	2D	Zinc	mg/L	1.5
Location ID:		**2DDUP**		
Number of Sampling Dates:		**13**		
6/9/2005	2DDUP	Barium	mg/L	0.034
11/3/2005	2DDUP	Barium	mg/L	0.034
3/9/2006	2DDUP	Barium	mg/L	0.028
4/27/2006	2DDUP	Barium	mg/L	0.042
6/8/2006	2DDUP	Barium	mg/L	0.03
8/17/2006	2DDUP	Barium	mg/L	0.033
11/9/2006	2DDUP	Barium	mg/L	0.024
1/25/2007	2DDUP	Barium	mg/L	0.021
2/15/2007	2DDUP	Barium	mg/L	0.024
6/21/2007	2DDUP	Barium	mg/L	0.029
9/13/2007	2DDUP	Barium	mg/L	0.032
8/14/2008	2DDUP	Barium	mg/L	0.032
11/20/2008	2DDUP	Barium	mg/L	0.029
12/11/2008	2DDUP	Barium	mg/L	0.026
1/29/2009	2DDUP	Barium	mg/L	0.019
2/19/2009	2DDUP	Barium	mg/L	0.028
3/12/2009	2DDUP	Barium	mg/L	0.035
4/30/2009	2DDUP	Barium	mg/L	0.023
5/21/2009	2DDUP	Barium	mg/L	0.025
6/11/2009	2DDUP	Barium	mg/L	0.031
12/20/2007	2DDUP	Barium	mg/L	0.022
6/9/2005	2DDUP	Chloride	mg/L	11.6
11/3/2005	2DDUP	Chloride	mg/L	8.65
3/9/2006	2DDUP	Chloride	mg/L	17.1
4/27/2006	2DDUP	Chloride	mg/L	20.9
6/8/2006	2DDUP	Chloride	mg/L	25.1
8/17/2006	2DDUP	Chloride	mg/L	22.4
11/9/2006	2DDUP	Chloride	mg/L	22.5
1/25/2007	2DDUP	Chloride	mg/L	19
2/15/2007	2DDUP	Chloride	mg/L	32.7
6/21/2007	2DDUP	Chloride	mg/L	20.6
9/13/2007	2DDUP	Chloride	mg/L	19.5
8/14/2008	2DDUP	Chloride	mg/L	25
11/20/2008	2DDUP	Chloride	mg/L	41.7
12/11/2008	2DDUP	Chloride	mg/L	41.1
1/29/2009	2DDUP	Chloride	mg/L	34.6
2/19/2009	2DDUP	Chloride	mg/L	33.3
3/12/2009	2DDUP	Chloride	mg/L	38.0
4/30/2009	2DDUP	Chloride	mg/L	29.8
5/21/2009	2DDUP	Chloride	mg/L	28.1
12/20/2007	2DDUP	Chloride	mg/L	27.3
6/11/2009	2DDUP	Chloride	mg/L	26.2
6/9/2005	2DDUP	Chromium	mg/L	ND
11/3/2005	2DDUP	Chromium	mg/L	ND
3/9/2006	2DDUP	Chromium	mg/L	ND
4/27/2006	2DDUP	Chromium	mg/L	ND
6/8/2006	2DDUP	Chromium	mg/L	ND
8/17/2006	2DDUP	Chromium	mg/L	ND
11/9/2006	2DDUP	Chromium	mg/L	ND
1/25/2007	2DDUP	Chromium	mg/L	ND
2/15/2007	2DDUP	Chromium	mg/L	0.005
6/21/2007	2DDUP	Chromium	mg/L	ND
9/13/2007	2DDUP	Chromium	mg/L	ND
8/14/2008	2DDUP	Chromium	mg/L	0.015
11/20/2008	2DDUP	Chromium	mg/L	0.009

Sampling Date	Location ID	Analyte	Unit	Concentration
12/11/2008	2DDUP	Chromium	mg/L	0.013
1/29/2009	2DDUP	Chromium	mg/L	0.013
2/19/2009	2DDUP	Chromium	mg/L	0.009
3/12/2009	2DDUP	Chromium	mg/L	0.014
4/30/2009	2DDUP	Chromium	mg/L	0.006
5/21/2009	2DDUP	Chromium	mg/L	0.006
6/11/2009	2DDUP	Chromium	mg/L	ND
6/9/2005	2DDUP	Chromium, hexavalent	mg/l	ND
11/3/2005	2DDUP	Chromium, hexavalent	mg/l	ND
3/9/2006	2DDUP	Chromium, hexavalent	mg/l	ND
4/27/2006	2DDUP	Chromium, hexavalent	mg/l	ND
6/8/2006	2DDUP	Chromium, hexavalent	mg/l	ND
8/17/2006	2DDUP	Chromium, hexavalent	mg/l	ND
11/9/2006	2DDUP	Chromium, hexavalent	mg/l	ND
1/25/2007	2DDUP	Chromium, hexavalent	mg/l	ND
2/15/2007	2DDUP	Chromium, hexavalent	mg/l	ND
6/21/2007	2DDUP	Chromium, hexavalent	mg/l	ND
9/13/2007	2DDUP	Chromium, hexavalent	mg/L	ND
8/14/2008	2DDUP	Chromium, Hexavalent	mg/L	0.01
11/20/2008	2DDUP	Chromium, hexavalent	mg/L	ND
12/11/2008	2DDUP	Chromium, hexavalent	mg/L	ND
1/29/2009	2DDUP	Chromium, hexavalent	mg/L	ND
2/19/2009	2DDUP	Chromium, hexavalent	mg/L	ND
3/12/2009	2DDUP	Chromium, hexavalent	mg/L	ND
4/30/2009	2DDUP	Chromium, hexavalent	mg/L	ND
5/21/2009	2DDUP	Chromium, hexavalent	mg/L	ND
12/20/2007	2DDUP	Chromium, hexavalent	mg/L	ND
6/11/2009	2DDUP	Chromium, hexavalent	mg/L	ND
12/20/2007	2DDUP	Chromium, ICP	mg/L	ND
6/9/2005	2DDUP	Iron	mg/L	5.35
11/3/2005	2DDUP	Iron	mg/L	16.8
3/9/2006	2DDUP	Iron	mg/L	39.2
4/27/2006	2DDUP	Iron	mg/L	18.4
6/8/2006	2DDUP	Iron	mg/L	2.41
8/17/2006	2DDUP	Iron	mg/L	0.321
11/9/2006	2DDUP	Iron	mg/L	1.69
1/25/2007	2DDUP	Iron	mg/L	0.696
2/15/2007	2DDUP	Iron	mg/L	1.88
6/21/2007	2DDUP	Iron	mg/L	1
9/13/2007	2DDUP	Iron	mg/L	2.19
8/14/2008	2DDUP	Iron	mg/L	0.294
11/20/2008	2DDUP	Iron	mg/L	0.485
12/11/2008	2DDUP	Iron	mg/L	2.28
1/29/2009	2DDUP	Iron	mg/L	0.939
2/19/2009	2DDUP	Iron	mg/L	0.734
3/12/2009	2DDUP	Iron	mg/L	1.57
4/30/2009	2DDUP	Iron	mg/L	3.56
5/21/2009	2DDUP	Iron	mg/L	1.84
12/20/2007	2DDUP	Iron	mg/L	0.938
6/11/2009	2DDUP	Iron	mg/L	2.14
6/9/2005	2DDUP	Manganese	mg/L	0.479
11/3/2005	2DDUP	Manganese	mg/L	1.71
3/9/2006	2DDUP	Manganese	mg/L	1.07
4/27/2006	2DDUP	Manganese	mg/L	0.609
6/8/2006	2DDUP	Manganese	mg/L	0.075
8/17/2006	2DDUP	Manganese	mg/L	0.021
11/9/2006	2DDUP	Manganese	mg/L	0.209
1/25/2007	2DDUP	Manganese	mg/L	0.088
2/15/2007	2DDUP	Manganese	mg/L	0.399
6/21/2007	2DDUP	Manganese	mg/L	0.037
9/13/2007	2DDUP	Manganese	mg/L	0.622
8/14/2008	2DDUP	Manganese	mg/L	0.074
11/20/2008	2DDUP	Manganese	mg/L	0.116
12/11/2008	2DDUP	Manganese	mg/L	0.25
1/29/2009	2DDUP	Manganese	mg/L	0.131
2/19/2009	2DDUP	Manganese	mg/L	0.079
3/12/2009	2DDUP	Manganese	mg/L	0.184
4/30/2009	2DDUP	Manganese	mg/L	0.120
5/21/2009	2DDUP	Manganese	mg/L	0.092
12/20/2007	2DDUP	Manganese	mg/L	0.131
6/11/2009	2DDUP	Manganese	mg/L	0.119
6/9/2005	2DDUP	pH	pH Units	6.61
11/3/2005	2DDUP	pH	pH Units	7.28
3/9/2006	2DDUP	pH	pH Units	6.37
4/27/2006	2DDUP	pH	pH Units	6.34
6/8/2006	2DDUP	pH	pH Units	6.57
8/17/2006	2DDUP	pH	pH Units	6.63
11/9/2006	2DDUP	pH	pH Units	6.22
1/25/2007	2DDUP	pH	pH Units	7.02
2/15/2007	2DDUP	pH	pH Units	7.57
6/21/2007	2DDUP	pH	pH Units	5.78
9/13/2007	2DDUP	pH	pH	5.28
9/13/2007	2DDUP	pH	pH	5.27
9/13/2007	2DDUP	pH	pH	5.27
9/13/2007	2DDUP	pH	pH	5.29

Sampling Date	Location ID	Analyte	Unit	Concentration
8/14/2008	2DDUP	pH	pH	6.31
8/14/2008	2DDUP	pH	pH	6.34
8/14/2008	2DDUP	pH	pH	6.34
8/14/2008	2DDUP	pH	pH	6.37
11/20/2008	2DDUP	pH	pH	6.17
11/20/2008	2DDUP	pH	pH	6.17
11/20/2008	2DDUP	pH	pH	6.19
11/20/2008	2DDUP	pH	pH	6.22
12/11/2008	2DDUP	pH	pH	6.27
12/11/2008	2DDUP	pH	pH	6.28
12/11/2008	2DDUP	pH	pH	6.29
12/11/2008	2DDUP	pH	pH	6.33
1/29/2009	2DDUP	pH	pH	6.46
1/29/2009	2DDUP	pH	pH	6.54
1/29/2009	2DDUP	pH	pH	6.56
1/29/2009	2DDUP	pH	pH	6.63
2/19/2009	2DDUP	pH	pH	6.78
2/19/2009	2DDUP	pH	pH	6.80
2/19/2009	2DDUP	pH	pH	6.80
2/19/2009	2DDUP	pH	pH	6.82
3/12/2009	2DDUP	pH	pH	6.33
3/12/2009	2DDUP	pH	pH	6.35
3/12/2009	2DDUP	pH	pH	6.42
3/12/2009	2DDUP	pH	pH	6.46
4/30/2009	2DDUP	pH	pH	6.09
4/30/2009	2DDUP	pH	pH	6.07
4/30/2009	2DDUP	pH	pH	6.04
4/30/2009	2DDUP	pH	pH	6.07
5/21/2009	2DDUP	pH	pH	6.36
5/21/2009	2DDUP	pH	pH	6.40
5/21/2009	2DDUP	pH	pH	6.41
5/21/2009	2DDUP	pH	pH	6.41
12/20/2007	2DDUP	pH	pH	5.86
12/20/2007	2DDUP	pH	pH	5.88
12/20/2007	2DDUP	pH	pH	5.91
12/20/2007	2DDUP	pH	pH	5.96
6/11/2009	2DDUP	pH	pH	6.38
6/11/2009	2DDUP	pH	pH	6.39
6/11/2009	2DDUP	pH	pH	6.41
6/11/2009	2DDUP	pH	pH	6.42
9/13/2007	2DDUP	Phenols	mg/L	ND
6/9/2005	2DDUP	Phenols	mg/L	ND
11/3/2005	2DDUP	Phenols	mg/L	0.07
3/9/2006	2DDUP	Phenols	mg/L	ND
4/27/2006	2DDUP	Phenols	mg/L	ND
6/8/2006	2DDUP	Phenols	mg/L	ND
8/17/2006	2DDUP	Phenols	mg/L	ND
11/9/2006	2DDUP	Phenols	mg/L	ND
1/25/2007	2DDUP	Phenols	mg/L	ND
2/15/2007	2DDUP	Phenols	mg/L	ND
6/21/2007	2DDUP	Phenols	mg/L	ND
12/20/2007	2DDUP	Phenols	mg/L	ND
8/14/2008	2DDUP	Phenols, Total	mg/L	ND
11/20/2008	2DDUP	Phenols, Total	mg/L	ND
12/11/2008	2DDUP	Phenols, Total	mg/L	ND
1/29/2009	2DDUP	Phenols, Total	mg/L	ND
2/19/2009	2DDUP	Phenols, Total	mg/L	ND
3/12/2009	2DDUP	Phenols, Total	mg/L	0.06
4/30/2009	2DDUP	Phenols, Total	mg/L	ND
5/21/2009	2DDUP	Phenols, Total	mg/L	ND
6/11/2009	2DDUP	Phenols, Total	mg/L	ND
6/9/2005	2DDUP	Sodium	mg/L	7.85
11/3/2005	2DDUP	Sodium	mg/L	7.62
3/9/2006	2DDUP	Sodium	mg/L	14.7
4/27/2006	2DDUP	Sodium	mg/L	24.8
6/8/2006	2DDUP	Sodium	mg/L	34.2
8/17/2006	2DDUP	Sodium	mg/L	29.1
11/9/2006	2DDUP	Sodium	mg/L	34.1
1/25/2007	2DDUP	Sodium	mg/L	28.3
2/15/2007	2DDUP	Sodium	mg/L	38.5
6/21/2007	2DDUP	Sodium	mg/L	29.5
9/13/2007	2DDUP	Sodium	mg/L	21.3
8/14/2008	2DDUP	Sodium	mg/L	49.3
11/20/2008	2DDUP	Sodium	mg/L	85.9
12/11/2008	2DDUP	Sodium	mg/L	99.3
1/29/2009	2DDUP	Sodium	mg/L	67.6
2/19/2009	2DDUP	Sodium	mg/L	68.9
3/12/2009	2DDUP	Sodium	mg/L	71.2
4/30/2009	2DDUP	Sodium	mg/L	67.4
5/21/2009	2DDUP	Sodium	mg/L	58.3
12/20/2007	2DDUP	Sodium	mg/L	47.6
6/11/2009	2DDUP	Sodium	mg/L	47
6/9/2005	2DDUP	Specific Conductance	umhos	760
11/3/2005	2DDUP	Specific Conductance	umhos	705
3/9/2006	2DDUP	Specific Conductance	umhos	728

Sampling Date	Location ID	Analyte	Unit	Concentration
4/27/2006	2DDUP	Specific Conductance	umhos	827
6/8/2006	2DDUP	Specific Conductance	umhos	881
8/17/2006	2DDUP	Specific Conductance	umhos	727
11/9/2006	2DDUP	Specific Conductance	umhos	738
1/25/2007	2DDUP	Specific Conductance	umhos	602
2/15/2007	2DDUP	Specific Conductance	umhos	626
6/21/2007	2DDUP	Specific Conductance	umhos	468
9/13/2007	2DDUP	Specific Conductance	umhos	483
9/13/2007	2DDUP	Specific Conductance	umhos	482
9/13/2007	2DDUP	Specific Conductance	umhos	487
9/13/2007	2DDUP	Specific Conductance	umhos	487
8/14/2008	2DDUP	Specific Conductance	umhos	787
8/14/2008	2DDUP	Specific Conductance	umhos	796
8/14/2008	2DDUP	Specific Conductance	umhos	798
8/14/2008	2DDUP	Specific Conductance	umhos	809
11/20/2008	2DDUP	Specific Conductance	umhos	926
11/20/2008	2DDUP	Specific Conductance	umhos	927
11/20/2008	2DDUP	Specific Conductance	umhos	928
11/20/2008	2DDUP	Specific Conductance	umhos	937
12/11/2008	2DDUP	Specific Conductance	umhos	1070
12/11/2008	2DDUP	Specific Conductance	umhos	1075
12/11/2008	2DDUP	Specific Conductance	umhos	1079
12/11/2008	2DDUP	Specific Conductance	umhos	1080
1/29/2009	2DDUP	Specific Conductance	umhos	847
1/29/2009	2DDUP	Specific Conductance	umhos	849
1/29/2009	2DDUP	Specific Conductance	umhos	861
1/29/2009	2DDUP	Specific Conductance	umhos	881
2/19/2009	2DDUP	Specific Conductance	umhos	851
2/19/2009	2DDUP	Specific Conductance	umhos	857
2/19/2009	2DDUP	Specific Conductance	umhos	858
2/19/2009	2DDUP	Specific Conductance	umhos	858
3/12/2009	2DDUP	Specific Conductance	umhos	962
3/12/2009	2DDUP	Specific Conductance	umhos	964
3/12/2009	2DDUP	Specific Conductance	umhos	965
3/12/2009	2DDUP	Specific Conductance	umhos	968
4/30/2009	2DDUP	Specific Conductance	umhos	817
4/30/2009	2DDUP	Specific Conductance	umhos	817
4/30/2009	2DDUP	Specific Conductance	umhos	814
4/30/2009	2DDUP	Specific Conductance	umhos	821
5/21/2009	2DDUP	Specific Conductance	umhos	820
5/21/2009	2DDUP	Specific Conductance	umhos	813
5/21/2009	2DDUP	Specific Conductance	umhos	817
5/21/2009	2DDUP	Specific Conductance	umhos	815
12/20/2007	2DDUP	Specific Conductance	umhos	607
12/20/2007	2DDUP	Specific Conductance	umhos	605
12/20/2007	2DDUP	Specific Conductance	umhos	602
12/20/2007	2DDUP	Specific Conductance	umhos	607
6/11/2009	2DDUP	Specific Conductance	umhos	769
6/11/2009	2DDUP	Specific Conductance	umhos	770
6/11/2009	2DDUP	Specific Conductance	umhos	776
6/11/2009	2DDUP	Specific Conductance	umhos	783
9/13/2007	2DDUP	Sulfate	mg/L	170
8/14/2008	2DDUP	Sulfate	mg/L	260
11/20/2008	2DDUP	Sulfate	mg/L	379
12/11/2008	2DDUP	Sulfate	mg/L	349
1/29/2009	2DDUP	Sulfate	mg/L	341
2/19/2009	2DDUP	Sulfate	mg/L	368
3/12/2009	2DDUP	Sulfate	mg/L	360
4/30/2009	2DDUP	Sulfate	mg/L	292
5/21/2009	2DDUP	Sulfate	mg/L	264
6/9/2005	2DDUP	Sulfate	mg/L	259
11/3/2005	2DDUP	Sulfate	mg/L	206
3/9/2006	2DDUP	Sulfate	mg/L	289
4/27/2006	2DDUP	Sulfate	mg/L	357
6/8/2006	2DDUP	Sulfate	mg/L	328
8/17/2006	2DDUP	Sulfate	mg/L	235
11/9/2006	2DDUP	Sulfate	mg/L	296
1/25/2007	2DDUP	Sulfate	mg/L	293
2/15/2007	2DDUP	Sulfate	mg/L	458
6/21/2007	2DDUP	Sulfate	mg/L	276
12/20/2007	2DDUP	Sulfate	mg/L	314
6/11/2009	2DDUP	Sulfate	mg/L	231
6/9/2005	2DDUP	Temperature	C	16
11/3/2005	2DDUP	Temperature	C	16
3/9/2006	2DDUP	Temperature	C	15
4/27/2006	2DDUP	Temperature	C	13
6/8/2006	2DDUP	Temperature	C	15
8/17/2006	2DDUP	Temperature	C	15
11/9/2006	2DDUP	Temperature	C	17
1/25/2007	2DDUP	Temperature	C	14
2/15/2007	2DDUP	Temperature	C	13
6/21/2007	2DDUP	Temperature	C	16
9/13/2007	2DDUP	Temperature	C	16
9/13/2007	2DDUP	Temperature	C	16
9/13/2007	2DDUP	Temperature	C	16

Sampling Date	Location ID	Analyte	Unit	Concentration
9/13/2007	2DDUP	Temperature	C	16
8/14/2008	2DDUP	Temperature	C	17
8/14/2008	2DDUP	Temperature	C	17
8/14/2008	2DDUP	Temperature	C	17
8/14/2008	2DDUP	Temperature	C	17
11/20/2008	2DDUP	Temperature	C	15
11/20/2008	2DDUP	Temperature	C	16
11/20/2008	2DDUP	Temperature	C	16
11/20/2008	2DDUP	Temperature	C	16
12/11/2008	2DDUP	Temperature	C	15
12/11/2008	2DDUP	Temperature	C	15
12/11/2008	2DDUP	Temperature	C	15
12/11/2008	2DDUP	Temperature	C	15
1/29/2009	2DDUP	Temperature	C	15
1/29/2009	2DDUP	Temperature	C	15
1/29/2009	2DDUP	Temperature	C	15
1/29/2009	2DDUP	Temperature	C	15
2/19/2009	2DDUP	Temperature	C	15
2/19/2009	2DDUP	Temperature	C	15
2/19/2009	2DDUP	Temperature	C	15
2/19/2009	2DDUP	Temperature	C	15
3/12/2009	2DDUP	Temperature	C	14
3/12/2009	2DDUP	Temperature	C	14
3/12/2009	2DDUP	Temperature	C	15
3/12/2009	2DDUP	Temperature	C	15
4/30/2009	2DDUP	Temperature	C	15
4/30/2009	2DDUP	Temperature	C	15
4/30/2009	2DDUP	Temperature	C	15
4/30/2009	2DDUP	Temperature	C	15
5/21/2009	2DDUP	Temperature	C	16
5/21/2009	2DDUP	Temperature	C	16
5/21/2009	2DDUP	Temperature	C	16
5/21/2009	2DDUP	Temperature	C	16
12/20/2007	2DDUP	Temperature	C	16
12/20/2007	2DDUP	Temperature	C	16
12/20/2007	2DDUP	Temperature	C	16
12/20/2007	2DDUP	Temperature	C	10
6/11/2009	2DDUP	Temperature	C	16
6/11/2009	2DDUP	Temperature	C	16
6/11/2009	2DDUP	Temperature	C	16
6/11/2009	2DDUP	Temperature	C	16
9/13/2007	2DDUP	Total Organic Carbon	mg/L	ND
11/20/2008	2DDUP	Total Organic Carbon	mg/L	6.5
12/11/2008	2DDUP	Total Organic Carbon	mg/L	4.7
1/29/2009	2DDUP	Total Organic Carbon	mg/L	4.0
2/19/2009	2DDUP	Total Organic Carbon	mg/L	3.8
3/12/2009	2DDUP	Total Organic Carbon	mg/L	4.1
6/9/2005	2DDUP	Total Organic Carbon	mg/L	2.1
6/9/2005	2DDUP	Total Organic Carbon	mg/L	2.1
11/3/2005	2DDUP	Total Organic Carbon	mg/L	4.9
3/9/2006	2DDUP	Total Organic Carbon	mg/L	4.9
4/27/2006	2DDUP	Total Organic Carbon	mg/L	7.6
6/8/2006	2DDUP	Total Organic Carbon	mg/L	3.1
8/17/2006	2DDUP	Total Organic Carbon	mg/L	2.1
11/9/2006	2DDUP	Total Organic Carbon	mg/L	4
1/25/2007	2DDUP	Total Organic Carbon	mg/L	2.4
2/15/2007	2DDUP	Total Organic Carbon	mg/L	3.4
6/21/2007	2DDUP	Total Organic Carbon	mg/L	1.4
8/14/2008	2DDUP	Total Organic Carbon	mg/L	7.7
4/30/2009	2DDUP	Total Organic Carbon	mg/L	4.74
5/21/2009	2DDUP	Total Organic Carbon	mg/L	5.3
12/20/2007	2DDUP	Total Organic Carbon	mg/L	5
6/11/2009	2DDUP	Total Organic Carbon	mg/L	5.9
6/9/2005	2DDUP	Total Organic Halogen	mg/L	0.013
11/3/2005	2DDUP	Total Organic Halogen	mg/L	0.013
3/9/2006	2DDUP	Total Organic Halogen	mg/L	0.016
4/27/2006	2DDUP	Total Organic Halogen	mg/L	0.018
6/8/2006	2DDUP	Total Organic Halogen	mg/L	ND
8/17/2006	2DDUP	Total Organic Halogen	mg/L	ND
11/9/2006	2DDUP	Total Organic Halogen	mg/L	ND
2/15/2007	2DDUP	Total Organic Halogen	mg/L	0.02
6/21/2007	2DDUP	Total Organic Halogen	mg/L	ND
9/13/2007	2DDUP	Total Organic Halogen	mg/L	0.02
8/14/2008	2DDUP	Total Organic Halogen	mg/L	ND
11/20/2008	2DDUP	Total Organic Halogen	mg/L	0.03
12/11/2008	2DDUP	Total Organic Halogen	mg/L	ND
1/29/2009	2DDUP	Total Organic Halogen	mg/L	0.01
2/19/2009	2DDUP	Total Organic Halogen	mg/L	0.09
3/12/2009	2DDUP	Total Organic Halogen	mg/L	0.2
12/20/2007	2DDUP	Total Organic Halogen	mg/L	0.03
4/30/2009	2DDUP	Total Organic Halogen	mg/L	ND
5/21/2009	2DDUP	Total Organic Halogen	mg/L	ND
6/11/2009	2DDUP	Total Organic Halogen	mg/L	ND
6/9/2005	2DDUP	Turbidity	NTU	33
11/3/2005	2DDUP	Turbidity	NTU	208

Sampling Date	Location ID	Analyte	Unit	Concentration
3/9/2006	2DDUP	Turbidity	NTU	508
4/27/2006	2DDUP	Turbidity	NTU	193
6/8/2006	2DDUP	Turbidity	NTU	38
8/17/2006	2DDUP	Turbidity	NTU	2.7
11/9/2006	2DDUP	Turbidity	NTU	18
1/25/2007	2DDUP	Turbidity	NTU	9.3
2/15/2007	2DDUP	Turbidity	NTU	24
6/21/2007	2DDUP	Turbidity	NTU	8.5
9/13/2007	2DDUP	Turbidity	NTU	47
8/14/2008	2DDUP	Turbidity	NTU	3.5
11/20/2008	2DDUP	Turbidity	NTU	7.2
12/11/2008	2DDUP	Turbidity	NTU	39
1/29/2009	2DDUP	Turbidity	NTU	11
2/19/2009	2DDUP	Turbidity	NTU	7.0
3/12/2009	2DDUP	Turbidity	NTU	19
4/30/2009	2DDUP	Turbidity	NTU	35
5/21/2009	2DDUP	Turbidity	NTU	19.5
12/20/2007	2DDUP	Turbidity	NTU	3.1
6/11/2009	2DDUP	Turbidity	NTU	24
Location ID:		**2E**		
Number of Sampling Dates:		**99**		
7/12/2007	2E	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2E	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2E	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2E	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2E	1,1-Dichloroethane	ug/L	ND
7/12/2007	2E	1,1-Dichloroethene	ug/L	ND
7/12/2007	2E	1,1-Dichloropropene	ug/L	ND
7/12/2007	2E	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2E	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2E	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2E	1,2,4-Trimethylbenzene	ug/L	9.4
7/12/2007	2E	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2E	1,2-Dibromoethane	ug/L	ND
7/12/2007	2E	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2E	1,2-Dichloroethane	ug/L	ND
7/12/2007	2E	1,2-Dichloropropane	ug/L	ND
7/12/2007	2E	1,3,5-Trimethylbenzene	ug/L	5.2
7/12/2007	2E	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2E	1,3-Dichloropropane	ug/L	ND
7/12/2007	2E	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2E	2,2-Dichloropropane	ug/L	ND
7/12/2007	2E	2-Butanone (MEK)	ug/L	ND
7/12/2007	2E	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2E	2-Chlorotoluene	ug/L	ND
7/12/2007	2E	2-Hexanone	ug/L	ND
7/12/2007	2E	3-Chloro-1-propene	ug/L	ND
7/12/2007	2E	4-Chlorotoluene	ug/L	ND
7/12/2007	2E	4-Isopropyltoluene	ug/L	3.1
7/12/2007	2E	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	2E	Acetone	ug/L	ND
7/12/2007	2E	Acrolein	ug/L	ND
7/12/2007	2E	Acrylonitrile	ug/L	ND
7/12/2007	2E	Alkalinity	mg/L	14
7/12/2007	2E	Ammonia	mg/L	28.9
7/12/2007	2E	Antimony	mg/L	ND
7/12/2007	2E	Arsenic	mg/L	ND
1/24/2002	2E	Barium	mg/L	0.041
1/28/2002	2E	Barium	mg/L	0.062
2/1/2002	2E	Barium	mg/L	0.066
2/5/2002	2E	Barium	mg/L	0.052
4/4/2002	2E	Barium	mg/L	0.048
4/8/2002	2E	Barium	mg/L	0.061
4/12/2002	2E	Barium	mg/L	0.066
4/16/2002	2E	Barium	mg/L	0.069
7/18/2002	2E	Barium	mg/L	0.052
7/22/2002	2E	Barium	mg/L	0.048
7/26/2002	2E	Barium	mg/L	0.051
7/30/2002	2E	Barium	mg/L	0.053
10/3/2002	2E	Barium	mg/L	0.035
10/7/2002	2E	Barium	mg/L	0.053
10/11/2002	2E	Barium	mg/L	0.108
10/15/2002	2E	Barium	mg/L	0.064
1/16/2003	2E	Barium	mg/L	0.046
1/21/2003	2E	Barium	mg/L	0.043
1/24/2003	2E	Barium	mg/L	0.05
1/28/2003	2E	Barium	mg/L	0.061
4/3/2003	2E	Barium	mg/L	0.025
4/7/2003	2E	Barium	mg/L	0.037
4/11/2003	2E	Barium	mg/L	0.022
4/15/2003	2E	Barium	mg/L	0.031
7/3/2003	2E	Barium	mg/L	0.032
7/7/2003	2E	Barium	mg/L	0.028
7/11/2003	2E	Barium	mg/L	0.017
7/11/2003	2E	Barium	mg/L	0.017
7/15/2003	2E	Barium	mg/L	0.068

Sampling Date	Location ID	Analyte	Unit	Concentration
10/2/2003	2E	Barium	mg/L	0.038
10/6/2003	2E	Barium	mg/L	0.037
10/10/2003	2E	Barium	mg/L	0.042
10/14/2003	2E	Barium	mg/L	0.039
1/8/2004	2E	Barium	mg/L	0.028
1/12/2004	2E	Barium	mg/L	0.035
1/16/2004	2E	Barium	mg/L	0.032
1/20/2004	2E	Barium	mg/L	0.033
4/8/2004	2E	Barium	mg/L	0.019
4/12/2004	2E	Barium	mg/L	ND
4/16/2004	2E	Barium	mg/L	0.025
5/20/2004	2E	Barium	mg/L	0.025
7/15/2004	2E	Barium	mg/L	0.029
7/19/2004	2E	Barium	mg/L	0.031
7/23/2004	2E	Barium	mg/L	0.03
7/27/2004	2E	Barium	mg/L	0.032
1/6/2005	2E	Barium	mg/L	0.037
1/10/2005	2E	Barium	mg/L	0.041
1/14/2005	2E	Barium	mg/L	0.036
1/18/2005	2E	Barium	mg/L	0.04
4/11/2005	2E	Barium	mg/L	0.031
4/15/2005	2E	Barium	mg/L	0.026
4/19/2005	2E	Barium	mg/L	0.027
7/7/2005	2E	Barium	mg/L	0.018
7/11/2005	2E	Barium	mg/L	0.027
7/15/2005	2E	Barium	mg/L	0.03
7/19/2005	2E	Barium	mg/L	0.031
10/13/2005	2E	Barium	mg/L	0.029
10/17/2005	2E	Barium	mg/L	0.026
10/21/2005	2E	Barium	mg/L	0.026
10/25/2005	2E	Barium	mg/L	0.025
1/5/2006	2E	Barium	mg/L	0.011
1/9/2006	2E	Barium	mg/L	0.01
1/13/2006	2E	Barium	mg/L	0.009
1/17/2006	2E	Barium	mg/L	0.02
4/6/2006	2E	Barium	mg/L	0.032
4/10/2006	2E	Barium	mg/L	0.031
4/14/2006	2E	Barium	mg/L	0.028
4/18/2006	2E	Barium	mg/L	0.029
7/6/2006	2E	Barium	mg/L	ND
7/10/2006	2E	Barium	mg/L	0.013
7/14/2006	2E	Barium	mg/L	ND
7/18/2006	2E	Barium	mg/L	0.006
10/19/2006	2E	Barium	mg/L	0.048
10/23/2006	2E	Barium	mg/L	0.012
10/27/2006	2E	Barium	mg/L	0.011
10/31/2006	2E	Barium	mg/L	0.011
1/4/2007	2E	Barium	mg/L	0.012
1/8/2007	2E	Barium	mg/L	0.01
1/11/2007	2E	Barium	mg/L	0.011
1/16/2007	2E	Barium	mg/L	0.011
4/19/2007	2E	Barium	mg/L	ND
4/23/2007	2E	Barium	mg/L	ND
4/27/2007	2E	Barium	mg/L	ND
5/1/2007	2E	Barium	mg/L	0.007
7/12/2007	2E	Barium	mg/L	ND
7/16/2007	2E	Barium	mg/L	0.014
7/20/2007	2E	Barium	mg/L	0.015
7/24/2007	2E	Barium	mg/L	0.015
4/3/2008	2E	Barium	mg/L	0.111
4/7/2008	2E	Barium	mg/L	0.008
4/11/2008	2E	Barium	mg/L	ND
4/15/2008	2E	Barium	mg/L	ND
7/3/2008	2E	Barium	mg/L	0.022
7/3/2008	2E	Barium	mg/L	0.022
7/7/2008	2E	Barium	mg/L	ND
7/11/2008	2E	Barium	mg/L	ND
7/15/2008	2E	Barium	mg/L	0.022
10/9/2008	2E	Barium	mg/L	0.020
10/13/2008	2E	Barium	mg/L	0.020
10/17/2008	2E	Barium	mg/L	0.036
10/21/2008	2E	Barium	mg/L	0.044
1/8/2009	2E	Barium	mg/L	0.017
1/12/2009	2E	Barium	mg/L	0.007
1/16/2009	2E	Barium	mg/L	0.008
1/20/2009	2E	Barium	mg/L	0.017
4/9/2009	2E	Barium	mg/L	0.011
4/13/2009	2E	Barium	mg/L	0.008
4/17/2009	2E	Barium	mg/L	0.006
4/21/2009	2E	Barium	mg/L	0.005
1/11/2008	2E	Barium	mg/L	0.012
1/15/2008	2E	Barium	mg/L	0.035
1/3/2008	2E	Barium	mg/L	0.015
1/7/2008	2E	Barium	mg/L	0.006
10/18/2007	2E	Barium	mg/L	ND
10/22/2007	2E	Barium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/26/2007	2E	Barium	mg/L	0.04
10/30/2007	2E	Barium	mg/L	0.007
7/12/2007	2E	Benzene	ug/L	5.2
7/12/2007	2E	Beryllium	mg/L	ND
7/12/2007	2E	BOD	mg/L	62
7/12/2007	2E	Bromobenzene	ug/L	ND
7/12/2007	2E	Bromochloromethane	ug/L	ND
7/12/2007	2E	Bromodichloromethane	ug/L	ND
7/12/2007	2E	Bromoform	ug/L	ND
7/12/2007	2E	Bromomethane	ug/L	ND
7/12/2007	2E	Cadmium	mg/L	ND
7/12/2007	2E	Calcium	mg/L	214
7/12/2007	2E	Carbon Disulfide	ug/L	ND
7/12/2007	2E	Carbon Tetrachloride	ug/L	ND
7/12/2007	2E	Chemical Oxygen Demand	mg/L	403
1/24/2002	2E	Chloride	mg/L	273
1/28/2002	2E	Chloride	mg/L	395
2/1/2002	2E	Chloride	mg/L	455
2/5/2002	2E	Chloride	mg/L	46.4
4/4/2002	2E	Chloride	mg/L	350
4/8/2002	2E	Chloride	mg/L	406
4/12/2002	2E	Chloride	mg/L	396
4/16/2002	2E	Chloride	mg/L	361
7/18/2002	2E	Chloride	mg/L	223
7/22/2002	2E	Chloride	mg/L	258
7/26/2002	2E	Chloride	mg/L	484
7/30/2002	2E	Chloride	mg/L	323
10/3/2002	2E	Chloride	mg/L	155
10/7/2002	2E	Chloride	mg/L	355
10/11/2002	2E	Chloride	mg/L	200
10/15/2002	2E	Chloride	mg/L	82
1/16/2003	2E	Chloride	mg/L	203
1/21/2003	2E	Chloride	mg/L	217
1/24/2003	2E	Chloride	mg/L	269
1/28/2003	2E	Chloride	mg/L	282
4/3/2003	2E	Chloride	mg/L	175
4/7/2003	2E	Chloride	mg/L	155
4/11/2003	2E	Chloride	mg/L	131
4/15/2003	2E	Chloride	mg/L	170
7/3/2003	2E	Chloride	mg/L	128
7/7/2003	2E	Chloride	mg/L	162
7/11/2003	2E	Chloride	mg/L	438
7/15/2003	2E	Chloride	mg/L	142
10/2/2003	2E	Chloride	mg/L	139
10/6/2003	2E	Chloride	mg/L	162
10/10/2003	2E	Chloride	mg/L	176
10/14/2003	2E	Chloride	mg/L	131
1/8/2004	2E	Chloride	mg/L	126
1/12/2004	2E	Chloride	mg/L	145
1/16/2004	2E	Chloride	mg/L	136
1/20/2004	2E	Chloride	mg/L	150
4/8/2004	2E	Chloride	mg/L	173
4/12/2004	2E	Chloride	mg/L	165
4/16/2004	2E	Chloride	mg/L	163
5/20/2004	2E	Chloride	mg/L	195
7/15/2004	2E	Chloride	mg/L	167
7/19/2004	2E	Chloride	mg/L	174
7/23/2004	2E	Chloride	mg/L	175
7/27/2004	2E	Chloride	mg/L	178
1/6/2005	2E	Chloride	mg/L	158
1/10/2005	2E	Chloride	mg/L	15.9
1/14/2005	2E	Chloride	mg/L	192
1/14/2005	2E	Chloride	mg/L	192
1/18/2005	2E	Chloride	mg/L	192
4/11/2005	2E	Chloride	mg/L	145
4/15/2005	2E	Chloride	mg/L	56.8
4/19/2005	2E	Chloride	mg/L	194
7/7/2005	2E	Chloride	mg/L	173
7/11/2005	2E	Chloride	mg/L	196
7/15/2005	2E	Chloride	mg/L	179
7/19/2005	2E	Chloride	mg/L	184
10/13/2005	2E	Chloride	mg/L	172
10/17/2005	2E	Chloride	mg/L	176
10/21/2005	2E	Chloride	mg/L	167
10/25/2005	2E	Chloride	mg/L	163
1/5/2006	2E	Chloride	mg/L	177
1/9/2006	2E	Chloride	mg/L	177
1/13/2006	2E	Chloride	mg/L	172
1/17/2006	2E	Chloride	mg/L	191
4/6/2006	2E	Chloride	mg/L	213
4/10/2006	2E	Chloride	mg/L	209
4/14/2006	2E	Chloride	mg/L	193
4/18/2006	2E	Chloride	mg/L	179
7/6/2006	2E	Chloride	mg/L	189
7/10/2006	2E	Chloride	mg/L	198

Sampling Date	Location ID	Analyte	Unit	Concentration
7/14/2006	2E	Chloride	mg/L	199
7/18/2006	2E	Chloride	mg/L	216
10/19/2006	2E	Chloride	mg/L	167
10/23/2006	2E	Chloride	mg/L	168
10/27/2006	2E	Chloride	mg/L	142
10/31/2006	2E	Chloride	mg/L	169
1/4/2007	2E	Chloride	mg/L	421
1/8/2007	2E	Chloride	mg/L	289
1/11/2007	2E	Chloride	mg/L	282
1/16/2007	2E	Chloride	mg/L	418
4/19/2007	2E	Chloride	mg/L	210
4/23/2007	2E	Chloride	mg/L	227
4/27/2007	2E	Chloride	mg/L	196
5/1/2007	2E	Chloride	mg/L	188
7/12/2007	2E	Chloride	mg/L	161
7/16/2007	2E	Chloride	mg/L	166
7/20/2007	2E	Chloride	mg/L	169
7/24/2007	2E	Chloride	mg/L	165
4/3/2008	2E	Chloride	mg/L	184
4/7/2008	2E	Chloride	mg/L	161
4/11/2008	2E	Chloride	mg/L	186
4/15/2008	2E	Chloride	mg/L	352
7/3/2008	2E	Chloride	mg/L	189
7/3/2008	2E	Chloride	mg/L	189
7/7/2008	2E	Chloride	mg/L	175
7/11/2008	2E	Chloride	mg/L	133
7/15/2008	2E	Chloride	mg/L	188
10/9/2008	2E	Chloride	mg/L	200
10/13/2008	2E	Chloride	mg/L	206
10/17/2008	2E	Chloride	mg/L	192
10/21/2008	2E	Chloride	mg/L	212
1/8/2009	2E	Chloride	mg/L	183
1/12/2009	2E	Chloride	mg/L	191
1/16/2009	2E	Chloride	mg/L	185
1/20/2009	2E	Chloride	mg/L	202
4/9/2009	2E	Chloride	mg/L	179
4/13/2009	2E	Chloride	mg/L	190
4/17/2009	2E	Chloride	mg/L	169
4/21/2009	2E	Chloride	mg/L	198
1/11/2008	2E	Chloride	mg/L	155
1/15/2008	2E	Chloride	mg/L	172
1/3/2008	2E	Chloride	mg/L	146
1/7/2008	2E	Chloride	mg/L	162
10/18/2007	2E	Chloride	mg/L	175
10/22/2007	2E	Chloride	mg/L	163
10/26/2007	2E	Chloride	mg/L	188
10/30/2007	2E	Chloride	mg/L	196
7/12/2007	2E	Chlorobenzene	ug/L	ND
7/12/2007	2E	Chloroethane	ug/L	ND
7/12/2007	2E	Chloroform	ug/L	ND
7/12/2007	2E	Chloromethane	ug/L	ND
1/24/2002	2E	Chromium	mg/L	0.042
1/28/2002	2E	Chromium	mg/L	0.034
2/1/2002	2E	Chromium	mg/L	0.102
2/5/2002	2E	Chromium	mg/L	0.046
4/4/2002	2E	Chromium	mg/L	0.031
4/8/2002	2E	Chromium	mg/L	0.072
4/12/2002	2E	Chromium	mg/L	0.047
4/16/2002	2E	Chromium	mg/L	0.6
7/18/2002	2E	Chromium	mg/L	0.063
7/22/2002	2E	Chromium	mg/L	0.051
7/26/2002	2E	Chromium	mg/L	0.075
7/30/2002	2E	Chromium	mg/L	0.084
10/3/2002	2E	Chromium	mg/L	0.038
10/7/2002	2E	Chromium	mg/L	0.071
10/11/2002	2E	Chromium	mg/L	0.116
10/15/2002	2E	Chromium	mg/L	0.09
1/16/2003	2E	Chromium	mg/L	0.073
1/21/2003	2E	Chromium	mg/L	0.063
1/24/2003	2E	Chromium	mg/L	0.049
1/28/2003	2E	Chromium	mg/L	0.115
4/3/2003	2E	Chromium	mg/L	0.031
4/7/2003	2E	Chromium	mg/L	0.032
4/11/2003	2E	Chromium	mg/L	0.028
4/15/2003	2E	Chromium	mg/L	0.036
7/3/2003	2E	Chromium	mg/L	0.038
7/7/2003	2E	Chromium	mg/L	0.03
7/11/2003	2E	Chromium	mg/L	0.012
7/15/2003	2E	Chromium	mg/L	0.121
10/2/2003	2E	Chromium	mg/L	0.058
10/6/2003	2E	Chromium	mg/L	ND
10/14/2003	2E	Chromium	mg/L	0.037
1/8/2004	2E	Chromium	mg/L	0.031
1/12/2004	2E	Chromium	mg/L	0.023
1/16/2004	2E	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/20/2004	2E	Chromium	mg/L	ND
4/8/2004	2E	Chromium	mg/L	0.019
4/12/2004	2E	Chromium	mg/L	0.029
4/16/2004	2E	Chromium	mg/L	0.02
5/20/2004	2E	Chromium	mg/L	0.017
7/15/2004	2E	Chromium	mg/L	0.024
7/19/2004	2E	Chromium	mg/L	0.017
7/23/2004	2E	Chromium	mg/L	0.018
7/27/2004	2E	Chromium	mg/L	0.014
1/6/2005	2E	Chromium	mg/L	0.02
1/10/2005	2E	Chromium	mg/L	ND
1/14/2005	2E	Chromium	mg/L	ND
1/18/2005	2E	Chromium	mg/L	ND
4/11/2005	2E	Chromium	mg/L	ND
4/15/2005	2E	Chromium	mg/L	ND
4/19/2005	2E	Chromium	mg/L	ND
7/7/2005	2E	Chromium	mg/L	0.023
7/11/2005	2E	Chromium	mg/L	ND
7/15/2005	2E	Chromium	mg/L	ND
7/19/2005	2E	Chromium	mg/L	ND
10/13/2005	2E	Chromium	mg/L	ND
10/17/2005	2E	Chromium	mg/L	ND
10/21/2005	2E	Chromium	mg/L	ND
10/25/2005	2E	Chromium	mg/L	ND
1/5/2006	2E	Chromium	mg/L	ND
1/9/2006	2E	Chromium	mg/L	ND
1/13/2006	2E	Chromium	mg/L	0.016
1/17/2006	2E	Chromium	mg/L	ND
4/6/2006	2E	Chromium	mg/L	0.022
4/10/2006	2E	Chromium	mg/L	0.013
4/14/2006	2E	Chromium	mg/L	0.011
4/18/2006	2E	Chromium	mg/L	0.009
7/6/2006	2E	Chromium	mg/L	ND
7/10/2006	2E	Chromium	mg/L	0.01
7/14/2006	2E	Chromium	mg/L	0.009
7/18/2006	2E	Chromium	mg/L	ND
10/19/2006	2E	Chromium	mg/L	0.026
10/23/2006	2E	Chromium	mg/L	0.013
10/27/2006	2E	Chromium	mg/L	0.011
10/31/2006	2E	Chromium	mg/L	0.011
1/4/2007	2E	Chromium	mg/L	0.028
1/8/2007	2E	Chromium	mg/L	0.017
1/11/2007	2E	Chromium	mg/L	0.013
1/16/2007	2E	Chromium	mg/L	ND
4/19/2007	2E	Chromium	mg/L	0.015
4/23/2007	2E	Chromium	mg/L	0.015
4/27/2007	2E	Chromium	mg/L	0.011
5/1/2007	2E	Chromium	mg/L	0.013
7/12/2007	2E	Chromium	mg/L	ND
7/12/2007	2E	Chromium	mg/L	ND
7/16/2007	2E	Chromium	mg/L	0.018
7/20/2007	2E	Chromium	mg/L	0.015
7/24/2007	2E	Chromium	mg/L	0.014
4/3/2008	2E	Chromium	mg/L	ND
4/7/2008	2E	Chromium	mg/L	ND
4/11/2008	2E	Chromium	mg/L	0.015
4/15/2008	2E	Chromium	mg/L	0.012
7/3/2008	2E	Chromium	mg/L	0.023
7/3/2008	2E	Chromium	mg/L	0.023
7/7/2008	2E	Chromium	mg/L	ND
7/11/2008	2E	Chromium	mg/L	ND
7/15/2008	2E	Chromium	mg/L	0.019
10/9/2008	2E	Chromium	mg/L	0.007
10/13/2008	2E	Chromium	mg/L	-0.005
10/17/2008	2E	Chromium	mg/L	0.012
10/21/2008	2E	Chromium	mg/L	0.010
1/8/2009	2E	Chromium	mg/L	ND
1/12/2009	2E	Chromium	mg/L	0.005
1/16/2009	2E	Chromium	mg/L	ND
1/20/2009	2E	Chromium	mg/L	ND
4/9/2009	2E	Chromium	mg/L	0.019
4/13/2009	2E	Chromium	mg/L	0.019
4/17/2009	2E	Chromium	mg/L	0.011
4/21/2009	2E	Chromium	mg/L	0.025
1/11/2008	2E	Chromium	mg/L	0.008
1/15/2008	2E	Chromium	mg/L	0.008
1/3/2008	2E	Chromium	mg/L	0.015
1/7/2008	2E	Chromium	mg/L	0.009
1/24/2002	2E	Chromium, hexavalent	mg/l	ND
1/28/2002	2E	Chromium, hexavalent	mg/l	ND
2/1/2002	2E	Chromium, hexavalent	mg/l	ND
2/5/2002	2E	Chromium, hexavalent	mg/l	ND
4/4/2002	2E	Chromium, hexavalent	mg/l	0.01
4/8/2002	2E	Chromium, hexavalent	mg/l	ND
4/12/2002	2E	Chromium, hexavalent	mg/l	ND
4/16/2002	2E	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/18/2002	2E	Chromium, hexavalent	mg/l	ND
7/22/2002	2E	Chromium, hexavalent	mg/l	ND
7/26/2002	2E	Chromium, hexavalent	mg/l	ND
7/30/2002	2E	Chromium, hexavalent	mg/l	ND
10/3/2002	2E	Chromium, hexavalent	mg/l	ND
10/7/2002	2E	Chromium, hexavalent	mg/l	ND
10/11/2002	2E	Chromium, hexavalent	mg/l	ND
10/15/2002	2E	Chromium, hexavalent	mg/l	ND
1/16/2003	2E	Chromium, hexavalent	mg/l	ND
1/21/2003	2E	Chromium, hexavalent	mg/l	ND
1/24/2003	2E	Chromium, hexavalent	mg/l	ND
1/28/2003	2E	Chromium, hexavalent	mg/l	ND
4/3/2003	2E	Chromium, hexavalent	mg/l	ND
4/7/2003	2E	Chromium, hexavalent	mg/l	ND
4/11/2003	2E	Chromium, hexavalent	mg/l	ND
4/15/2003	2E	Chromium, hexavalent	mg/l	ND
7/3/2003	2E	Chromium, hexavalent	mg/l	ND
7/7/2003	2E	Chromium, hexavalent	mg/l	ND
7/11/2003	2E	Chromium, hexavalent	mg/l	ND
7/15/2003	2E	Chromium, hexavalent	mg/l	ND
10/2/2003	2E	Chromium, hexavalent	mg/l	ND
10/6/2003	2E	Chromium, hexavalent	mg/l	ND
10/10/2003	2E	Chromium, hexavalent	mg/l	ND
10/14/2003	2E	Chromium, hexavalent	mg/l	ND
1/8/2004	2E	Chromium, hexavalent	mg/l	ND
1/12/2004	2E	Chromium, hexavalent	mg/l	ND
1/16/2004	2E	Chromium, hexavalent	mg/l	ND
1/20/2004	2E	Chromium, hexavalent	mg/l	ND
4/8/2004	2E	Chromium, hexavalent	mg/l	ND
4/12/2004	2E	Chromium, hexavalent	mg/l	ND
4/16/2004	2E	Chromium, hexavalent	mg/l	ND
5/20/2004	2E	Chromium, hexavalent	mg/l	ND
7/15/2004	2E	Chromium, hexavalent	mg/l	ND
7/19/2004	2E	Chromium, hexavalent	mg/l	ND
7/23/2004	2E	Chromium, hexavalent	mg/l	ND
7/27/2004	2E	Chromium, hexavalent	mg/l	ND
1/6/2005	2E	Chromium, hexavalent	mg/l	ND
1/10/2005	2E	Chromium, hexavalent	mg/l	ND
1/14/2005	2E	Chromium, hexavalent	mg/l	ND
1/18/2005	2E	Chromium, hexavalent	mg/l	ND
4/11/2005	2E	Chromium, hexavalent	mg/l	ND
4/15/2005	2E	Chromium, hexavalent	mg/l	ND
4/19/2005	2E	Chromium, hexavalent	mg/l	ND
7/7/2005	2E	Chromium, hexavalent	mg/l	ND
7/11/2005	2E	Chromium, hexavalent	mg/l	ND
7/15/2005	2E	Chromium, hexavalent	mg/l	ND
7/19/2005	2E	Chromium, hexavalent	mg/l	ND
10/13/2005	2E	Chromium, hexavalent	mg/l	ND
10/17/2005	2E	Chromium, hexavalent	mg/l	ND
10/21/2005	2E	Chromium, hexavalent	mg/l	ND
10/25/2005	2E	Chromium, hexavalent	mg/l	ND
1/5/2006	2E	Chromium, hexavalent	mg/l	ND
1/9/2006	2E	Chromium, hexavalent	mg/l	ND
1/13/2006	2E	Chromium, hexavalent	mg/l	ND
1/17/2006	2E	Chromium, hexavalent	mg/l	ND
4/6/2006	2E	Chromium, hexavalent	mg/l	ND
4/10/2006	2E	Chromium, hexavalent	mg/l	ND
4/14/2006	2E	Chromium, hexavalent	mg/l	ND
4/18/2006	2E	Chromium, hexavalent	mg/l	ND
7/6/2006	2E	Chromium, hexavalent	mg/l	ND
7/10/2006	2E	Chromium, hexavalent	mg/l	ND
7/14/2006	2E	Chromium, hexavalent	mg/l	ND
7/18/2006	2E	Chromium, hexavalent	mg/l	ND
10/19/2006	2E	Chromium, hexavalent	mg/l	ND
10/23/2006	2E	Chromium, hexavalent	mg/l	ND
10/27/2006	2E	Chromium, hexavalent	mg/l	ND
10/31/2006	2E	Chromium, hexavalent	mg/l	ND
1/4/2007	2E	Chromium, hexavalent	mg/l	ND
1/8/2007	2E	Chromium, hexavalent	mg/l	ND
1/11/2007	2E	Chromium, hexavalent	mg/l	ND
1/16/2007	2E	Chromium, hexavalent	mg/l	ND
4/19/2007	2E	Chromium, hexavalent	mg/l	ND
4/23/2007	2E	Chromium, hexavalent	mg/l	ND
4/27/2007	2E	Chromium, hexavalent	mg/l	0.01
5/1/2007	2E	Chromium, hexavalent	mg/l	0.16
7/16/2007	2E	Chromium, hexavalent	mg/L	ND
7/20/2007	2E	Chromium, hexavalent	mg/L	ND
7/24/2007	2E	Chromium, hexavalent	mg/L	ND
4/3/2008	2E	Chromium, Hexavalent	mg/L	ND
4/7/2008	2E	Chromium, hexavalent	mg/L	ND
4/11/2008	2E	Chromium, hexavalent	mg/L	ND
4/15/2008	2E	Chromium, hexavalent	mg/L	ND
7/3/2008	2E	Chromium, Hexavalent	mg/L	ND
7/3/2008	2E	Chromium, Hexavalent	mg/L	ND
7/7/2008	2E	Chromium, Hexavalent	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/11/2008	2E	Chromium, Hexavalent	mg/L	ND
7/15/2008	2E	Chromium, Hexavalent	mg/L	ND
10/9/2008	2E	Chromium, hexavalent	mg/L	ND
10/13/2008	2E	Chromium, hexavalent	mg/L	ND
10/17/2008	2E	Chromium, hexavalent	mg/L	ND
10/21/2008	2E	Chromium, hexavalent	mg/L	ND
1/8/2009	2E	Chromium, hexavalent	mg/L	ND
1/12/2009	2E	Chromium, hexavalent	mg/L	ND
1/16/2009	2E	Chromium, hexavalent	mg/L	ND
1/20/2009	2E	Chromium, hexavalent	mg/L	ND
4/9/2009	2E	Chromium, hexavalent	mg/L	ND
4/13/2009	2E	Chromium, hexavalent	mg/L	ND
4/17/2009	2E	Chromium, hexavalent	mg/L	ND
4/21/2009	2E	Chromium, hexavalent	mg/L	ND
1/11/2008	2E	Chromium, hexavalent	mg/L	ND
1/15/2008	2E	Chromium, hexavalent	mg/L	ND
1/3/2008	2E	Chromium, hexavalent	mg/L	ND
1/7/2008	2E	Chromium, hexavalent	mg/L	ND
10/18/2007	2E	Chromium, hexavalent	mg/L	ND
10/22/2007	2E	Chromium, hexavalent	mg/L	ND
10/26/2007	2E	Chromium, hexavalent	mg/L	ND
10/30/2007	2E	Chromium, hexavalent	mg/L	ND
10/18/2007	2E	Chromium, ICP	mg/L	0.01
10/22/2007	2E	Chromium, ICP	mg/L	0.01
10/26/2007	2E	Chromium, ICP	mg/L	0.019
10/30/2007	2E	Chromium, ICP	mg/L	0.014
7/12/2007	2E	cis-1,2-Dichloroethene	ug/L	ND
7/12/2007	2E	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2E	Cobalt	mg/L	ND
7/12/2007	2E	Copper	mg/L	ND
7/12/2007	2E	Cyanide	mg/L	ND
7/12/2007	2E	Dibromochloromethane	ug/L	ND
7/12/2007	2E	Dibromomethane	ug/L	ND
7/12/2007	2E	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2E	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	2E	Ethylbenzene	ug/L	13.1
7/12/2007	2E	Hexachlorobutadiene	ug/L	ND
1/24/2002	2E	Iron	mg/L	3561
1/28/2002	2E	Iron	mg/L	6540
2/1/2002	2E	Iron	mg/L	7303
2/5/2002	2E	Iron	mg/L	6659
4/4/2002	2E	Iron	mg/L	3645
4/8/2002	2E	Iron	mg/L	5741
4/12/2002	2E	Iron	mg/L	6978
4/16/2002	2E	Iron	mg/L	6590
7/18/2002	2E	Iron	mg/L	3993
7/22/2002	2E	Iron	mg/L	5103
7/26/2002	2E	Iron	mg/L	6210
7/30/2002	2E	Iron	mg/L	6570
10/3/2002	2E	Iron	mg/L	3079
10/7/2002	2E	Iron	mg/L	6162
10/11/2002	2E	Iron	mg/L	6479
10/15/2002	2E	Iron	mg/L	6919
1/16/2003	2E	Iron	mg/L	5019
1/21/2003	2E	Iron	mg/L	5071
1/24/2003	2E	Iron	mg/L	5644
1/28/2003	2E	Iron	mg/L	7350
4/3/2003	2E	Iron	mg/L	3060
4/7/2003	2E	Iron	mg/L	2934
4/11/2003	2E	Iron	mg/L	2901
4/15/2003	2E	Iron	mg/L	4162
7/3/2003	2E	Iron	mg/L	3398
7/7/2003	2E	Iron	mg/L	3502
7/11/2003	2E	Iron	mg/L	778
7/15/2003	2E	Iron	mg/L	3027
10/2/2003	2E	Iron	mg/L	2967
10/6/2003	2E	Iron	mg/L	3124
10/14/2003	2E	Iron	mg/L	3120
1/8/2004	2E	Iron	mg/L	2563
1/12/2004	2E	Iron	mg/L	2539
1/16/2004	2E	Iron	mg/L	2516
1/20/2004	2E	Iron	mg/L	2396
4/8/2004	2E	Iron	mg/L	2987
4/12/2004	2E	Iron	mg/L	3053
4/16/2004	2E	Iron	mg/L	3001
5/20/2004	2E	Iron	mg/L	3175
7/15/2004	2E	Iron	mg/L	2815
7/19/2004	2E	Iron	mg/L	2260
7/23/2004	2E	Iron	mg/L	3068
7/27/2004	2E	Iron	mg/L	2844
1/6/2005	2E	Iron	mg/L	3270
1/10/2005	2E	Iron	mg/L	3761
1/14/2005	2E	Iron	mg/L	3465
1/18/2005	2E	Iron	mg/L	3448
4/11/2005	2E	Iron	mg/L	2914

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2005	2E	Iron	mg/L	3158
4/19/2005	2E	Iron	mg/L	3100
7/7/2005	2E	Iron	mg/L	2965
7/11/2005	2E	Iron	mg/L	2743
7/15/2005	2E	Iron	mg/L	2480
7/19/2005	2E	Iron	mg/L	2876
10/13/2005	2E	Iron	mg/L	2359
10/17/2005	2E	Iron	mg/L	2120
10/21/2005	2E	Iron	mg/L	2153
10/25/2005	2E	Iron	mg/L	2048
1/5/2006	2E	Iron	mg/L	2467
1/9/2006	2E	Iron	mg/L	2467
1/13/2006	2E	Iron	mg/L	2328
1/17/2006	2E	Iron	mg/L	2579
4/6/2006	2E	Iron	mg/L	1151
4/10/2006	2E	Iron	mg/L	2786
4/14/2006	2E	Iron	mg/L	2796
4/18/2006	2E	Iron	mg/L	2758
7/6/2006	2E	Iron	mg/L	1986
7/6/2006	2E	Iron	mg/L	1986
7/10/2006	2E	Iron	mg/L	2917
7/14/2006	2E	Iron	mg/L	3205
7/18/2006	2E	Iron	mg/L	3150
10/19/2006	2E	Iron	mg/L	2729
10/23/2006	2E	Iron	mg/L	2242
10/27/2006	2E	Iron	mg/L	2340
10/31/2006	2E	Iron	mg/L	2270
1/4/2007	2E	Iron	mg/L	4550
1/8/2007	2E	Iron	mg/L	4646
1/11/2007	2E	Iron	mg/L	4705
1/16/2007	2E	Iron	mg/L	4748
4/19/2007	2E	Iron	mg/L	2746
4/23/2007	2E	Iron	mg/L	2808
4/27/2007	2E	Iron	mg/L	2863
5/1/2007	2E	Iron	mg/L	3107
7/12/2007	2E	Iron	mg/L	2334
7/16/2007	2E	Iron	mg/L	2043
7/20/2007	2E	Iron	mg/L	2279
7/24/2007	2E	Iron	mg/L	2385
4/3/2008	2E	Iron	mg/L	2186
4/7/2008	2E	Iron	mg/L	2096
4/11/2008	2E	Iron	mg/L	2225
4/15/2008	2E	Iron	mg/L	1914
7/3/2008	2E	Iron	mg/L	1968
7/3/2008	2E	Iron	mg/L	1968
7/7/2008	2E	Iron	mg/L	23.7
7/11/2008	2E	Iron	mg/L	1983
7/15/2008	2E	Iron	mg/L	2055
10/9/2008	2E	Iron	mg/L	2161
10/13/2008	2E	Iron	mg/L	2621
10/17/2008	2E	Iron	mg/L	2360
10/21/2008	2E	Iron	mg/L	2607
1/8/2009	2E	Iron	mg/L	2064
1/12/2009	2E	Iron	mg/L	2609
1/16/2009	2E	Iron	mg/L	2369
1/20/2009	2E	Iron	mg/L	2079
4/9/2009	2E	Iron	mg/L	2202
4/13/2009	2E	Iron	mg/L	2020
4/17/2009	2E	Iron	mg/L	1721
4/21/2009	2E	Iron	mg/L	1792
1/11/2008	2E	Iron	mg/L	2040
1/15/2008	2E	Iron	mg/L	1941
1/3/2008	2E	Iron	mg/L	2130
1/7/2008	2E	Iron	mg/L	1950
10/18/2007	2E	Iron	mg/L	2428
10/22/2007	2E	Iron	mg/L	2403
10/26/2007	2E	Iron	mg/L	2476
10/30/2007	2E	Iron	mg/L	2989
7/12/2007	2E	Isopropylbenzene	ug/L	5
7/12/2007	2E	Lead	mg/L	ND
7/12/2007	2E	m,p-Xylene	ug/L	3.7
7/12/2007	2E	Magnesium	mg/L	180
1/24/2002	2E	Manganese	mg/L	121
1/28/2002	2E	Manganese	mg/L	219
2/1/2002	2E	Manganese	mg/L	248
2/5/2002	2E	Manganese	mg/L	224
4/4/2002	2E	Manganese	mg/L	122
4/8/2002	2E	Manganese	mg/L	192
4/12/2002	2E	Manganese	mg/L	233
4/16/2002	2E	Manganese	mg/L	220
7/18/2002	2E	Manganese	mg/L	134
7/22/2002	2E	Manganese	mg/L	170
7/26/2002	2E	Manganese	mg/L	206
7/30/2002	2E	Manganese	mg/L	219
10/3/2002	2E	Manganese	mg/L	94.5

Sampling Date	Location ID	Analyte	Unit	Concentration
10/7/2002	2E	Manganese	mg/L	205
10/11/2002	2E	Manganese	mg/L	215
10/15/2002	2E	Manganese	mg/L	229
1/16/2003	2E	Manganese	mg/L	170
1/21/2003	2E	Manganese	mg/L	175
1/24/2003	2E	Manganese	mg/L	196
1/28/2003	2E	Manganese	mg/L	248
4/3/2003	2E	Manganese	mg/L	96.9
4/7/2003	2E	Manganese	mg/L	104
4/11/2003	2E	Manganese	mg/L	100
4/15/2003	2E	Manganese	mg/L	145
7/3/2003	2E	Manganese	mg/L	93.4
7/7/2003	2E	Manganese	mg/L	124
7/11/2003	2E	Manganese	mg/L	27.7
7/15/2003	2E	Manganese	mg/L	105
10/2/2003	2E	Manganese	mg/L	101
10/6/2003	2E	Manganese	mg/L	86.5
10/10/2003	2E	Manganese	mg/L	112
10/14/2003	2E	Manganese	mg/L	107
1/8/2004	2E	Manganese	mg/L	76.4
1/12/2004	2E	Manganese	mg/L	80.7
1/16/2004	2E	Manganese	mg/L	82.7
1/20/2004	2E	Manganese	mg/L	85.3
4/8/2004	2E	Manganese	mg/L	107
4/12/2004	2E	Manganese	mg/L	106
4/16/2004	2E	Manganese	mg/L	104
5/20/2004	2E	Manganese	mg/L	118
7/15/2004	2E	Manganese	mg/L	80.9
7/15/2004	2E	Manganese	mg/L	80.9
7/19/2004	2E	Manganese	mg/L	88.5
7/23/2004	2E	Manganese	mg/L	104
7/27/2004	2E	Manganese	mg/L	97.1
1/6/2005	2E	Manganese	mg/L	109
1/10/2005	2E	Manganese	mg/L	129
1/14/2005	2E	Manganese	mg/L	123
1/18/2005	2E	Manganese	mg/L	117
4/11/2005	2E	Manganese	mg/L	101
4/15/2005	2E	Manganese	mg/L	112
4/19/2005	2E	Manganese	mg/L	110
7/7/2005	2E	Manganese	mg/L	119
7/11/2005	2E	Manganese	mg/L	75.1
7/15/2005	2E	Manganese	mg/L	107
7/19/2005	2E	Manganese	mg/L	92.3
10/13/2005	2E	Manganese	mg/L	67.1
10/17/2005	2E	Manganese	mg/L	68.7
10/21/2005	2E	Manganese	mg/L	73.4
10/25/2005	2E	Manganese	mg/L	80.7
1/5/2006	2E	Manganese	mg/L	49.9
1/9/2006	2E	Manganese	mg/L	6.87
1/13/2006	2E	Manganese	mg/L	ND
1/17/2006	2E	Manganese	mg/L	ND
4/6/2006	2E	Manganese	mg/L	89.5
4/10/2006	2E	Manganese	mg/L	91
4/14/2006	2E	Manganese	mg/L	97
4/18/2006	2E	Manganese	mg/L	96.7
7/6/2006	2E	Manganese	mg/L	39.4
7/10/2006	2E	Manganese	mg/L	10.1
7/14/2006	2E	Manganese	mg/L	110
7/18/2006	2E	Manganese	mg/L	109
10/19/2006	2E	Manganese	mg/L	5.5
10/23/2006	2E	Manganese	mg/L	44.8
10/27/2006	2E	Manganese	mg/L	5.35
10/31/2006	2E	Manganese	mg/L	121
1/4/2007	2E	Manganese	mg/L	147
1/8/2007	2E	Manganese	mg/L	150
1/11/2007	2E	Manganese	mg/L	152
1/16/2007	2E	Manganese	mg/L	158
4/19/2007	2E	Manganese	mg/L	ND
4/23/2007	2E	Manganese	mg/L	ND
4/27/2007	2E	Manganese	mg/L	ND
5/1/2007	2E	Manganese	mg/L	ND
7/12/2007	2E	Manganese	mg/L	80.5
7/16/2007	2E	Manganese	mg/L	74.7
7/20/2007	2E	Manganese	mg/L	77.9
7/24/2007	2E	Manganese	mg/L	83.4
4/3/2008	2E	Manganese	mg/L	77.1
4/7/2008	2E	Manganese	mg/L	ND
4/11/2008	2E	Manganese	mg/L	91.9
4/15/2008	2E	Manganese	mg/L	80.4
7/3/2008	2E	Manganese	mg/L	69.1
7/3/2008	2E	Manganese	mg/L	69.1
7/7/2008	2E	Manganese	mg/L	0.813
7/11/2008	2E	Manganese	mg/L	83.9
7/15/2008	2E	Manganese	mg/L	73.3
10/9/2008	2E	Manganese	mg/L	81.3

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2008	2E	Manganese	mg/L	112
10/17/2008	2E	Manganese	mg/L	85.9
10/21/2008	2E	Manganese	mg/L	104
1/8/2009	2E	Manganese	mg/L	81.8
1/12/2009	2E	Manganese	mg/L	101
1/16/2009	2E	Manganese	mg/L	82.4
1/20/2009	2E	Manganese	mg/L	91.4
4/9/2009	2E	Manganese	mg/L	82.7
4/13/2009	2E	Manganese	mg/L	90.6
4/17/2009	2E	Manganese	mg/L	71.3
4/21/2009	2E	Manganese	mg/L	81.0
1/11/2008	2E	Manganese	mg/L	73.8
1/15/2008	2E	Manganese	mg/L	70.8
1/3/2008	2E	Manganese	mg/L	80.5
1/7/2008	2E	Manganese	mg/L	80.7
10/18/2007	2E	Manganese	mg/L	ND
10/22/2007	2E	Manganese	mg/L	ND
10/26/2007	2E	Manganese	mg/L	93.4
10/30/2007	2E	Manganese	mg/L	105
7/12/2007	2E	Mercury	mg/L	ND
7/12/2007	2E	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2E	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2E	Naphthalene	ug/L	155
7/12/2007	2E	n-Butylbenzene	ug/L	10.5
7/12/2007	2E	Nickel	mg/L	ND
7/12/2007	2E	Nitrate	mg/L	ND
7/12/2007	2E	Nitrate/Nitrite	mg/L	ND
7/12/2007	2E	Nitrite	mg/L	ND
7/12/2007	2E	n-Propylbenzene	ug/L	ND
7/12/2007	2E	o-Xylene	ug/L	8.3
1/24/2002	2E	pH	pH Units	4.68
1/28/2002	2E	pH	pH Units	4.65
2/1/2002	2E	pH	pH Units	4.56
2/5/2002	2E	pH	pH Units	4.7
4/4/2002	2E	pH	pH Units	4.86
4/8/2002	2E	pH	pH Units	4.71
4/12/2002	2E	pH	pH Units	4.67
4/16/2002	2E	pH	pH Units	4.67
7/18/2002	2E	pH	pH Units	4.83
7/22/2002	2E	pH	pH Units	4.8
7/26/2002	2E	pH	pH Units	4.6
7/30/2002	2E	pH	pH Units	4.68
10/3/2002	2E	pH	pH Units	4.73
10/7/2002	2E	pH	pH Units	4.68
10/11/2002	2E	pH	pH Units	4.84
10/15/2002	2E	pH	pH Units	4.68
1/16/2003	2E	pH	pH Units	3.58
1/21/2003	2E	pH	pH Units	4.65
1/24/2003	2E	pH	pH Units	4.58
1/28/2003	2E	pH	pH Units	4.66
4/3/2003	2E	pH	pH Units	4.67
4/7/2003	2E	pH	pH Units	3.99
4/11/2003	2E	pH	pH Units	3.78
4/15/2003	2E	pH	pH Units	4.45
7/3/2003	2E	pH	pH Units	4.49
7/7/2003	2E	pH	pH Units	4.89
7/11/2003	2E	pH	pH Units	4.85
7/15/2003	2E	pH	pH Units	4.74
10/2/2003	2E	pH	pH Units	5
10/6/2003	2E	pH	pH Units	4.92
10/10/2003	2E	pH	pH Units	4.87
10/14/2003	2E	pH	pH Units	4.94
1/8/2004	2E	pH	pH Units	4.85
1/12/2004	2E	pH	pH Units	5.05
1/16/2004	2E	pH	pH Units	4.95
1/20/2004	2E	pH	pH Units	4.84
4/8/2004	2E	pH	pH Units	3.56
4/12/2004	2E	pH	pH Units	3.4
4/16/2004	2E	pH	pH Units	3.56
5/20/2004	2E	pH	pH Units	4.27
7/15/2004	2E	pH	pH Units	4.74
7/19/2004	2E	pH	pH Units	4.75
7/23/2004	2E	pH	pH Units	4.63
7/27/2004	2E	pH	pH Units	4.65
1/6/2005	2E	pH	pH Units	4.71
1/10/2005	2E	pH	pH Units	4.9
1/14/2005	2E	pH	pH Units	4.74
1/18/2005	2E	pH	pH Units	4.55
4/11/2005	2E	pH	pH Units	4.04
4/15/2005	2E	pH	pH Units	3.93
4/19/2005	2E	pH	pH Units	3.84
7/7/2005	2E	pH	pH Units	4.88
7/11/2005	2E	pH	pH Units	4.45
7/15/2005	2E	pH	pH Units	4.52
7/19/2005	2E	pH	pH Units	4.64

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2005	2E	pH	pH Units	4.27
10/17/2005	2E	pH	pH Units	3.88
10/21/2005	2E	pH	pH Units	4.06
10/25/2005	2E	pH	pH Units	4.11
1/5/2006	2E	pH	pH Units	4.82
1/9/2006	2E	pH	pH Units	4.82
1/13/2006	2E	pH	pH Units	4.57
1/17/2006	2E	pH	pH Units	4.45
4/6/2006	2E	pH	pH Units	4.67
4/10/2006	2E	pH	pH Units	4.68
4/14/2006	2E	pH	pH Units	3.98
4/18/2006	2E	pH	pH Units	4.68
7/6/2006	2E	pH	pH Units	3.45
7/10/2006	2E	pH	pH Units	4.32
7/14/2006	2E	pH	pH Units	4.75
7/18/2006	2E	pH	pH Units	4.22
10/19/2006	2E	pH	pH Units	4.78
10/23/2006	2E	pH	pH Units	4.57
10/27/2006	2E	pH	pH Units	4.64
10/31/2006	2E	pH	pH Units	4.77
1/4/2007	2E	pH	pH Units	4.81
1/8/2007	2E	pH	pH Units	4.74
1/11/2007	2E	pH	pH Units	4.77
1/16/2007	2E	pH	pH Units	4.72
4/19/2007	2E	pH	pH Units	3.89
4/23/2007	2E	pH	pH Units	3.62
4/27/2007	2E	pH	pH Units	4.74
5/1/2007	2E	pH	pH Units	5.01
7/12/2007	2E	pH	pH	5.03
7/12/2007	2E	pH	pH	5.03
7/12/2007	2E	pH	pH	5.06
7/12/2007	2E	pH	pH	5.08
7/16/2007	2E	pH	pH	4.91
7/16/2007	2E	pH	pH	4.89
7/16/2007	2E	pH	pH	4.92
7/16/2007	2E	pH	pH	4.92
7/20/2007	2E	pH	pH	4.52
7/20/2007	2E	pH	pH	4.51
7/20/2007	2E	pH	pH	4.57
7/20/2007	2E	pH	pH	4.54
7/24/2007	2E	pH	pH	4.64
7/24/2007	2E	pH	pH	4.66
7/24/2007	2E	pH	pH	4.63
7/24/2007	2E	pH	pH	4.7
4/3/2008	2E	pH	pH	4.90
4/3/2008	2E	pH	pH	4.90
4/3/2008	2E	pH	pH	4.92
4/3/2008	2E	pH	pH	4.92
4/7/2008	2E	pH	pH	4.59
4/7/2008	2E	pH	pH	4.61
4/7/2008	2E	pH	pH	4.63
4/7/2008	2E	pH	pH	4.66
4/11/2008	2E	pH	pH	4.51
4/11/2008	2E	pH	pH	4.51
4/11/2008	2E	pH	pH	4.53
4/11/2008	2E	pH	pH	4.56
4/15/2008	2E	pH	pH	4.40
4/15/2008	2E	pH	pH	4.40
4/15/2008	2E	pH	pH	4.42
4/15/2008	2E	pH	pH	4.42
7/3/2008	2E	pH	pH	4.99
7/3/2008	2E	pH	pH	5.01
7/3/2008	2E	pH	pH	5.01
7/3/2008	2E	pH	pH	5.04
7/3/2008	2E	pH	pH	4.99
7/3/2008	2E	pH	pH	5.01
7/3/2008	2E	pH	pH	5.01
7/3/2008	2E	pH	pH	5.04
7/7/2008	2E	pH	pH	4.8
7/7/2008	2E	pH	pH	4.82
7/7/2008	2E	pH	pH	4.89
7/7/2008	2E	pH	pH	4.89
7/11/2008	2E	pH	pH	4.86
7/11/2008	2E	pH	pH	4.89
7/11/2008	2E	pH	pH	4.89
7/11/2008	2E	pH	pH	4.92
7/15/2008	2E	pH	pH	4.43
7/15/2008	2E	pH	pH	4.45
7/15/2008	2E	pH	pH	4.47
7/15/2008	2E	pH	pH	4.48
10/9/2008	2E	pH	pH	3.94
10/9/2008	2E	pH	pH	4.21
10/9/2008	2E	pH	pH	4.29
10/9/2008	2E	pH	pH	4.45
10/13/2008	2E	pH	pH	4.53

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2008	2E	pH	pH	4.70
10/13/2008	2E	pH	pH	4.75
10/13/2008	2E	pH	pH	5.23
10/17/2008	2E	pH	pH	4.16
10/17/2008	2E	pH	pH	4.23
10/17/2008	2E	pH	pH	4.38
10/17/2008	2E	pH	pH	4.49
10/21/2008	2E	pH	pH	4.36
10/21/2008	2E	pH	pH	4.51
10/21/2008	2E	pH	pH	4.56
10/21/2008	2E	pH	pH	4.65
1/8/2009	2E	pH	pH	4.76
1/8/2009	2E	pH	pH	4.77
1/8/2009	2E	pH	pH	4.77
1/8/2009	2E	pH	pH	4.77
1/12/2009	2E	pH	pH	4.64
1/12/2009	2E	pH	pH	4.64
1/12/2009	2E	pH	pH	4.68
1/12/2009	2E	pH	pH	4.86
1/16/2009	2E	pH	pH	4.57
1/16/2009	2E	pH	pH	4.60
1/16/2009	2E	pH	pH	4.64
1/16/2009	2E	pH	pH	4.64
1/20/2009	2E	pH	pH	4.45
1/20/2009	2E	pH	pH	4.46
1/20/2009	2E	pH	pH	4.46
1/20/2009	2E	pH	pH	4.46
4/9/2009	2E	pH	pH	3.58
4/9/2009	2E	pH	pH	3.58
4/9/2009	2E	pH	pH	3.54
4/9/2009	2E	pH	pH	3.54
4/13/2009	2E	pH	pH	3.54
4/13/2009	2E	pH	pH	3.51
4/13/2009	2E	pH	pH	3.48
4/13/2009	2E	pH	pH	3.49
4/17/2009	2E	pH	pH	3.43
4/17/2009	2E	pH	pH	3.43
4/17/2009	2E	pH	pH	3.42
4/17/2009	2E	pH	pH	3.42
4/21/2009	2E	pH	pH	3.39
4/21/2009	2E	pH	pH	3.38
4/21/2009	2E	pH	pH	3.34
4/21/2009	2E	pH	pH	3.34
1/11/2008	2E	pH	pH	4.62
1/11/2008	2E	pH	pH	4.65
1/11/2008	2E	pH	pH	4.64
1/11/2008	2E	pH	pH	4.69
1/15/2008	2E	pH	pH	4.78
1/15/2008	2E	pH	pH	4.83
1/15/2008	2E	pH	pH	4.81
1/15/2008	2E	pH	pH	4.84
1/3/2008	2E	pH	pH	4.37
1/3/2008	2E	pH	pH	4.36
1/3/2008	2E	pH	pH	4.45
1/3/2008	2E	pH	pH	4.4
1/7/2008	2E	pH	pH	4.77
1/7/2008	2E	pH	pH	4.75
1/7/2008	2E	pH	pH	4.77
1/7/2008	2E	pH	pH	4.77
10/18/2007	2E	pH	pH	3.69
10/18/2007	2E	pH	pH	3.94
10/18/2007	2E	pH	pH	4.34
10/18/2007	2E	pH	pH	4.6
10/22/2007	2E	pH	pH	4.87
10/22/2007	2E	pH	pH	4.66
10/22/2007	2E	pH	pH	4.86
10/22/2007	2E	pH	pH	4.78
10/26/2007	2E	pH	pH	4.53
10/26/2007	2E	pH	pH	4.45
10/26/2007	2E	pH	pH	4.58
10/26/2007	2E	pH	pH	4.64
10/30/2007	2E	pH	pH	4.27
10/30/2007	2E	pH	pH	4.6
10/30/2007	2E	pH	pH	4.72
10/30/2007	2E	pH	pH	4.72
7/12/2007	2E	Phenols	mg/L	ND
7/16/2007	2E	Phenols	mg/L	ND
7/20/2007	2E	Phenols	mg/L	ND
1/24/2002	2E	Phenols	mg/L	ND
1/28/2002	2E	Phenols	mg/L	0.041
2/1/2002	2E	Phenols	mg/L	0.038
2/5/2002	2E	Phenols	mg/L	0.028
4/4/2002	2E	Phenols	mg/L	0.016
4/8/2002	2E	Phenols	mg/L	0.008
4/12/2002	2E	Phenols	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/16/2002	2E	Phenols	mg/L	0.57
7/18/2002	2E	Phenols	mg/L	ND
7/22/2002	2E	Phenols	mg/L	0.034
7/26/2002	2E	Phenols	mg/L	0.07
7/30/2002	2E	Phenols	mg/L	0.05
10/3/2002	2E	Phenols	mg/L	0.008
10/7/2002	2E	Phenols	mg/L	ND
10/11/2002	2E	Phenols	mg/L	0.15
10/15/2002	2E	Phenols	mg/L	0.119
1/16/2003	2E	Phenols	mg/L	ND
1/21/2003	2E	Phenols	mg/L	0.1
1/24/2003	2E	Phenols	mg/L	ND
1/28/2003	2E	Phenols	mg/L	0.042
4/3/2003	2E	Phenols	mg/L	ND
4/7/2003	2E	Phenols	mg/L	ND
4/11/2003	2E	Phenols	mg/L	ND
4/15/2003	2E	Phenols	mg/L	0.083
7/3/2003	2E	Phenols	mg/L	ND
7/7/2003	2E	Phenols	mg/L	ND
7/11/2003	2E	Phenols	mg/L	0.12
7/15/2003	2E	Phenols	mg/L	0.126
10/2/2003	2E	Phenols	mg/L	ND
10/2/2003	2E	Phenols	mg/L	ND
10/6/2003	2E	Phenols	mg/L	ND
10/10/2003	2E	Phenols	mg/L	ND
10/14/2003	2E	Phenols	mg/L	0.05
1/8/2004	2E	Phenols	mg/L	ND
1/12/2004	2E	Phenols	mg/L	ND
1/16/2004	2E	Phenols	mg/L	ND
1/20/2004	2E	Phenols	mg/L	ND
4/8/2004	2E	Phenols	mg/L	ND
4/12/2004	2E	Phenols	mg/L	ND
4/16/2004	2E	Phenols	mg/L	ND
5/20/2004	2E	Phenols	mg/L	ND
7/15/2004	2E	Phenols	mg/L	ND
7/19/2004	2E	Phenols	mg/L	ND
7/23/2004	2E	Phenols	mg/L	ND
7/27/2004	2E	Phenols	mg/L	0.06
1/6/2005	2E	Phenols	mg/L	ND
1/10/2005	2E	Phenols	mg/L	ND
1/14/2005	2E	Phenols	mg/L	ND
1/18/2005	2E	Phenols	mg/L	ND
4/11/2005	2E	Phenols	mg/L	ND
4/15/2005	2E	Phenols	mg/L	ND
4/19/2005	2E	Phenols	mg/L	ND
7/7/2005	2E	Phenols	mg/L	ND
7/7/2005	2E	Phenols	mg/L	ND
7/11/2005	2E	Phenols	mg/L	0.08
7/11/2005	2E	Phenols	mg/L	0.08
7/15/2005	2E	Phenols	mg/L	0.11
7/19/2005	2E	Phenols	mg/L	0.26
10/13/2005	2E	Phenols	mg/L	0.09
10/17/2005	2E	Phenols	mg/L	0.12
10/21/2005	2E	Phenols	mg/L	0.13
10/25/2005	2E	Phenols	mg/L	0.1
1/5/2006	2E	Phenols	mg/L	ND
1/9/2006	2E	Phenols	mg/L	ND
1/13/2006	2E	Phenols	mg/L	ND
1/17/2006	2E	Phenols	mg/L	ND
4/6/2006	2E	Phenols	mg/L	ND
4/10/2006	2E	Phenols	mg/L	ND
4/14/2006	2E	Phenols	mg/L	ND
4/18/2006	2E	Phenols	mg/L	ND
7/6/2006	2E	Phenols	mg/L	0.28
7/10/2006	2E	Phenols	mg/L	0.18
7/14/2006	2E	Phenols	mg/L	0.18
7/18/2006	2E	Phenols	mg/L	0.12
10/19/2006	2E	Phenols	mg/L	ND
10/23/2006	2E	Phenols	mg/L	ND
10/27/2006	2E	Phenols	mg/L	0.06
10/31/2006	2E	Phenols	mg/L	ND
1/4/2007	2E	Phenols	mg/L	ND
1/8/2007	2E	Phenols	mg/L	ND
1/11/2007	2E	Phenols	mg/L	ND
1/16/2007	2E	Phenols	mg/L	ND
4/19/2007	2E	Phenols	mg/L	ND
4/23/2007	2E	Phenols	mg/L	ND
4/27/2007	2E	Phenols	mg/L	0.07
5/1/2007	2E	Phenols	mg/L	ND
7/24/2007	2E	Phenols	mg/L	41.1
10/18/2007	2E	Phenols	mg/L	ND
10/22/2007	2E	Phenols	mg/L	ND
10/26/2007	2E	Phenols	mg/L	19.9
10/30/2007	2E	Phenols	mg/L	ND
4/3/2008	2E	Phenols, Total	mg/L	0.06

Sampling Date	Location ID	Analyte	Unit	Concentration
4/7/2008	2E	Phenols, Total	mg/L	ND
4/11/2008	2E	Phenols, Total	mg/L	0.09
4/15/2008	2E	Phenols, Total	mg/L	ND
7/3/2008	2E	Phenols, Total	mg/L	ND
7/3/2008	2E	Phenols, Total	mg/L	ND
7/7/2008	2E	Phenols, Total	mg/L	ND
7/11/2008	2E	Phenols, Total	mg/L	0.06
7/15/2008	2E	Phenols, Total	mg/L	ND
10/9/2008	2E	Phenols, Total	mg/L	0.15
10/13/2008	2E	Phenols, Total	mg/L	0.10
10/17/2008	2E	Phenols, Total	mg/L	0.05
10/21/2008	2E	Phenols, Total	mg/L	ND
1/8/2009	2E	Phenols, Total	mg/L	ND
1/12/2009	2E	Phenols, Total	mg/L	ND
1/16/2009	2E	Phenols, Total	mg/L	ND
1/20/2009	2E	Phenols, Total	mg/L	ND
4/9/2009	2E	Phenols, Total	mg/L	ND
4/13/2009	2E	Phenols, Total	mg/L	ND
4/17/2009	2E	Phenols, Total	mg/L	ND
4/21/2009	2E	Phenols, Total	mg/L	ND
1/11/2008	2E	Phenols, Total	mg/L	ND
1/15/2008	2E	Phenols, Total	mg/L	ND
1/3/2008	2E	Phenols, Total	mg/L	ND
1/7/2008	2E	Phenols, Total	mg/L	ND
7/12/2007	2E	Potassium	mg/L	43.2
7/12/2007	2E	sec-Butylbenzene	ug/L	ND
7/12/2007	2E	Selenium	mg/L	0.011
7/12/2007	2E	Silver	mg/L	ND
1/24/2002	2E	Sodium	mg/L	232
1/28/2002	2E	Sodium	mg/L	354
2/1/2002	2E	Sodium	mg/L	394
2/5/2002	2E	Sodium	mg/L	381
4/4/2002	2E	Sodium	mg/L	245
4/8/2002	2E	Sodium	mg/L	325
4/12/2002	2E	Sodium	mg/L	395
4/16/2002	2E	Sodium	mg/L	397
7/18/2002	2E	Sodium	mg/L	259
7/22/2002	2E	Sodium	mg/L	307
7/26/2002	2E	Sodium	mg/L	371
7/30/2002	2E	Sodium	mg/L	404
10/3/2002	2E	Sodium	mg/L	200
10/7/2002	2E	Sodium	mg/L	328
10/11/2002	2E	Sodium	mg/L	358
10/15/2002	2E	Sodium	mg/L	388
1/16/2003	2E	Sodium	mg/L	318
1/21/2003	2E	Sodium	mg/L	336
1/24/2003	2E	Sodium	mg/L	365
1/28/2003	2E	Sodium	mg/L	442
4/3/2003	2E	Sodium	mg/L	190
4/7/2003	2E	Sodium	mg/L	199
4/11/2003	2E	Sodium	mg/L	194
4/15/2003	2E	Sodium	mg/L	255
7/3/2003	2E	Sodium	mg/L	234
7/7/2003	2E	Sodium	mg/L	242
7/11/2003	2E	Sodium	mg/L	155
7/15/2003	2E	Sodium	mg/L	195
10/2/2003	2E	Sodium	mg/L	199
10/6/2003	2E	Sodium	mg/L	216
10/10/2003	2E	Sodium	mg/L	237
10/14/2003	2E	Sodium	mg/L	235
1/8/2004	2E	Sodium	mg/L	174
1/12/2004	2E	Sodium	mg/L	180
1/16/2004	2E	Sodium	mg/L	501
1/20/2004	2E	Sodium	mg/L	200
4/8/2004	2E	Sodium	mg/L	212
4/12/2004	2E	Sodium	mg/L	ND
4/16/2004	2E	Sodium	mg/L	218
5/20/2004	2E	Sodium	mg/L	245
7/15/2004	2E	Sodium	mg/L	229
7/19/2004	2E	Sodium	mg/L	204
7/23/2004	2E	Sodium	mg/L	226
7/27/2004	2E	Sodium	mg/L	203
1/6/2005	2E	Sodium	mg/L	225
1/10/2005	2E	Sodium	mg/L	256
1/14/2005	2E	Sodium	mg/L	239
1/18/2005	2E	Sodium	mg/L	248
4/11/2005	2E	Sodium	mg/L	237
4/15/2005	2E	Sodium	mg/L	246
4/19/2005	2E	Sodium	mg/L	245
7/7/2005	2E	Sodium	mg/L	196
7/11/2005	2E	Sodium	mg/L	228
7/15/2005	2E	Sodium	mg/L	211
7/19/2005	2E	Sodium	mg/L	224
10/13/2005	2E	Sodium	mg/L	192
10/17/2005	2E	Sodium	mg/L	169

Sampling Date	Location ID	Analyte	Unit	Concentration
10/21/2005	2E	Sodium	mg/L	189
10/25/2005	2E	Sodium	mg/L	178
1/5/2006	2E	Sodium	mg/L	219
1/9/2006	2E	Sodium	mg/L	199
1/13/2006	2E	Sodium	mg/L	187
1/17/2006	2E	Sodium	mg/L	205
4/6/2006	2E	Sodium	mg/L	250
4/10/2006	2E	Sodium	mg/L	201
4/14/2006	2E	Sodium	mg/L	216
4/18/2006	2E	Sodium	mg/L	258
7/6/2006	2E	Sodium	mg/L	ND
7/10/2006	2E	Sodium	mg/L	152
7/14/2006	2E	Sodium	mg/L	240
7/18/2006	2E	Sodium	mg/L	233
10/19/2006	2E	Sodium	mg/L	230
10/23/2006	2E	Sodium	mg/L	197
10/27/2006	2E	Sodium	mg/L	195
10/31/2006	2E	Sodium	mg/L	181
1/4/2007	2E	Sodium	mg/L	308
1/8/2007	2E	Sodium	mg/L	334
1/11/2007	2E	Sodium	mg/L	339
1/16/2007	2E	Sodium	mg/L	350
4/19/2007	2E	Sodium	mg/L	213
4/23/2007	2E	Sodium	mg/L	222
4/27/2007	2E	Sodium	mg/L	207
5/1/2007	2E	Sodium	mg/L	212
7/12/2007	2E	Sodium	mg/L	175
7/16/2007	2E	Sodium	mg/L	184
7/20/2007	2E	Sodium	mg/L	185
7/24/2007	2E	Sodium	mg/L	215
4/3/2008	2E	Sodium	mg/L	181
4/7/2008	2E	Sodium	mg/L	195
4/11/2008	2E	Sodium	mg/L	219
4/15/2008	2E	Sodium	mg/L	190
7/3/2008	2E	Sodium	mg/L	199
7/3/2008	2E	Sodium	mg/L	199
7/7/2008	2E	Sodium	mg/L	2.12
7/11/2008	2E	Sodium	mg/L	208
7/15/2008	2E	Sodium	mg/L	183
10/9/2008	2E	Sodium	mg/L	239
10/13/2008	2E	Sodium	mg/L	263
10/17/2008	2E	Sodium	mg/L	218
10/21/2008	2E	Sodium	mg/L	236
1/8/2009	2E	Sodium	mg/L	208
1/12/2009	2E	Sodium	mg/L	243
1/16/2009	2E	Sodium	mg/L	224
1/20/2009	2E	Sodium	mg/L	210
4/9/2009	2E	Sodium	mg/L	221
4/13/2009	2E	Sodium	mg/L	215
4/17/2009	2E	Sodium	mg/L	178
4/21/2009	2E	Sodium	mg/L	180
1/11/2008	2E	Sodium	mg/L	170
1/15/2008	2E	Sodium	mg/L	165
1/3/2008	2E	Sodium	mg/L	204
1/7/2008	2E	Sodium	mg/L	211
10/18/2007	2E	Sodium	mg/L	229
10/22/2007	2E	Sodium	mg/L	252
10/26/2007	2E	Sodium	mg/L	214
10/30/2007	2E	Sodium	mg/L	242
7/12/2007	2E	Solids, Total Dissolved	mg/L	8300
7/12/2007	2E	Solids, Total Suspended	mg/L	53
1/24/2002	2E	Specific Conductance	umhos	7400
1/28/2002	2E	Specific Conductance	umhos	9650
2/1/2002	2E	Specific Conductance	umhos	8350
2/5/2002	2E	Specific Conductance	umhos	7980
4/4/2002	2E	Specific Conductance	umhos	7860
4/8/2002	2E	Specific Conductance	umhos	9360
4/12/2002	2E	Specific Conductance	umhos	8110
4/16/2002	2E	Specific Conductance	umhos	7730
7/18/2002	2E	Specific Conductance	umhos	4650
7/22/2002	2E	Specific Conductance	umhos	3850
7/26/2002	2E	Specific Conductance	umhos	2460
7/30/2002	2E	Specific Conductance	umhos	12860
10/3/2002	2E	Specific Conductance	umhos	8420
10/7/2002	2E	Specific Conductance	umhos	11150
10/11/2002	2E	Specific Conductance	umhos	9650
10/15/2002	2E	Specific Conductance	umhos	9250
1/16/2003	2E	Specific Conductance	umhos	15780
1/21/2003	2E	Specific Conductance	umhos	9770
1/24/2003	2E	Specific Conductance	umhos	10640
1/28/2003	2E	Specific Conductance	umhos	12270
4/3/2003	2E	Specific Conductance	umhos	6600
4/7/2003	2E	Specific Conductance	umhos	5900
4/11/2003	2E	Specific Conductance	umhos	6150
4/15/2003	2E	Specific Conductance	umhos	6760

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2003	2E	Specific Conductance	umhos	7600
7/7/2003	2E	Specific Conductance	umhos	7550
7/11/2003	2E	Specific Conductance	umhos	6810
7/15/2003	2E	Specific Conductance	umhos	6860
10/2/2003	2E	Specific Conductance	umhos	7110
10/6/2003	2E	Specific Conductance	umhos	6800
10/10/2003	2E	Specific Conductance	umhos	6350
10/14/2003	2E	Specific Conductance	umhos	7620
1/8/2004	2E	Specific Conductance	umhos	5830
1/12/2004	2E	Specific Conductance	umhos	5650
1/16/2004	2E	Specific Conductance	umhos	5120
1/20/2004	2E	Specific Conductance	umhos	5890
4/8/2004	2E	Specific Conductance	umhos	6200
4/12/2004	2E	Specific Conductance	umhos	5890
4/16/2004	2E	Specific Conductance	umhos	7260
5/20/2004	2E	Specific Conductance	umhos	14
7/15/2004	2E	Specific Conductance	umhos	6860
7/19/2004	2E	Specific Conductance	umhos	6800
7/23/2004	2E	Specific Conductance	umhos	5220
7/27/2004	2E	Specific Conductance	umhos	5510
1/6/2005	2E	Specific Conductance	umhos	6760
1/10/2005	2E	Specific Conductance	umhos	6270
1/14/2005	2E	Specific Conductance	umhos	5800
1/18/2005	2E	Specific Conductance	umhos	6040
4/11/2005	2E	Specific Conductance	umhos	4060
4/15/2005	2E	Specific Conductance	umhos	4310
4/19/2005	2E	Specific Conductance	umhos	2570
7/7/2005	2E	Specific Conductance	umhos	7230
7/11/2005	2E	Specific Conductance	umhos	6880
7/15/2005	2E	Specific Conductance	umhos	6500
7/19/2005	2E	Specific Conductance	umhos	6530
10/13/2005	2E	Specific Conductance	umhos	4760
10/17/2005	2E	Specific Conductance	umhos	5950
10/21/2005	2E	Specific Conductance	umhos	5550
10/25/2005	2E	Specific Conductance	umhos	5560
1/5/2006	2E	Specific Conductance	umhos	5340
1/9/2006	2E	Specific Conductance	umhos	4620
1/13/2006	2E	Specific Conductance	umhos	4220
1/17/2006	2E	Specific Conductance	umhos	5740
4/6/2006	2E	Specific Conductance	umhos	6850
4/10/2006	2E	Specific Conductance	umhos	5030
4/14/2006	2E	Specific Conductance	umhos	7670
4/18/2006	2E	Specific Conductance	umhos	7690
7/6/2006	2E	Specific Conductance	umhos	18280
7/10/2006	2E	Specific Conductance	umhos	7380
7/14/2006	2E	Specific Conductance	umhos	6810
7/18/2006	2E	Specific Conductance	umhos	7050
10/19/2006	2E	Specific Conductance	umhos	6220
10/23/2006	2E	Specific Conductance	umhos	5260
10/27/2006	2E	Specific Conductance	umhos	4760
10/31/2006	2E	Specific Conductance	umhos	6190
1/4/2007	2E	Specific Conductance	umhos	6300
1/8/2007	2E	Specific Conductance	umhos	4660
1/11/2007	2E	Specific Conductance	umhos	5690
1/16/2007	2E	Specific Conductance	umhos	3310
4/19/2007	2E	Specific Conductance	umhos	3760
4/23/2007	2E	Specific Conductance	umhos	3310
4/27/2007	2E	Specific Conductance	umhos	2120
5/1/2007	2E	Specific Conductance	umhos	1870
7/12/2007	2E	Specific Conductance	umhos	5000
7/12/2007	2E	Specific Conductance	umhos	4620
7/12/2007	2E	Specific Conductance	umhos	4450
7/12/2007	2E	Specific Conductance	umhos	4370
7/16/2007	2E	Specific Conductance	umhos	1073
7/16/2007	2E	Specific Conductance	umhos	1108
7/16/2007	2E	Specific Conductance	umhos	1120
7/16/2007	2E	Specific Conductance	umhos	1132
7/20/2007	2E	Specific Conductance	umhos	4730
7/20/2007	2E	Specific Conductance	umhos	4590
7/20/2007	2E	Specific Conductance	umhos	4660
7/20/2007	2E	Specific Conductance	umhos	4610
7/24/2007	2E	Specific Conductance	umhos	4720
7/24/2007	2E	Specific Conductance	umhos	4610
7/24/2007	2E	Specific Conductance	umhos	4380
7/24/2007	2E	Specific Conductance	umhos	4490
4/3/2008	2E	Specific Conductance	umhos	6270
4/3/2008	2E	Specific Conductance	umhos	6280
4/3/2008	2E	Specific Conductance	umhos	6320
4/3/2008	2E	Specific Conductance	umhos	6480
4/7/2008	2E	Specific Conductance	umhos	6060
4/7/2008	2E	Specific Conductance	umhos	6110
4/7/2008	2E	Specific Conductance	umhos	6130
4/7/2008	2E	Specific Conductance	umhos	6150
4/11/2008	2E	Specific Conductance	umhos	6340
4/11/2008	2E	Specific Conductance	umhos	6340

Sampling Date	Location ID	Analyte	Unit	Concentration
4/11/2008	2E	Specific Conductance	umhos	6360
4/11/2008	2E	Specific Conductance	umhos	6710
4/15/2008	2E	Specific Conductance	umhos	5780
4/15/2008	2E	Specific Conductance	umhos	5790
4/15/2008	2E	Specific Conductance	umhos	5870
4/15/2008	2E	Specific Conductance	umhos	5910
7/3/2008	2E	Specific Conductance	umhos	6170
7/3/2008	2E	Specific Conductance	umhos	5930
7/3/2008	2E	Specific Conductance	umhos	6100
7/3/2008	2E	Specific Conductance	umhos	6030
7/3/2008	2E	Specific Conductance	umhos	5930
7/3/2008	2E	Specific Conductance	umhos	6030
7/3/2008	2E	Specific Conductance	umhos	6100
7/3/2008	2E	Specific Conductance	umhos	6170
7/7/2008	2E	Specific Conductance	umhos	5370
7/7/2008	2E	Specific Conductance	umhos	5370
7/7/2008	2E	Specific Conductance	umhos	5370
7/7/2008	2E	Specific Conductance	umhos	5380
7/11/2008	2E	Specific Conductance	umhos	6130
7/11/2008	2E	Specific Conductance	umhos	6130
7/11/2008	2E	Specific Conductance	umhos	6140
7/11/2008	2E	Specific Conductance	umhos	6160
7/15/2008	2E	Specific Conductance	umhos	5950
7/15/2008	2E	Specific Conductance	umhos	5950
7/15/2008	2E	Specific Conductance	umhos	5990
7/15/2008	2E	Specific Conductance	umhos	6110
10/9/2008	2E	Specific Conductance	umhos	6400
10/9/2008	2E	Specific Conductance	umhos	6410
10/9/2008	2E	Specific Conductance	umhos	6420
10/9/2008	2E	Specific Conductance	umhos	6570
10/13/2008	2E	Specific Conductance	umhos	5220
10/13/2008	2E	Specific Conductance	umhos	5410
10/13/2008	2E	Specific Conductance	umhos	5490
10/13/2008	2E	Specific Conductance	umhos	5570
10/17/2008	2E	Specific Conductance	umhos	6820
10/17/2008	2E	Specific Conductance	umhos	6840
10/17/2008	2E	Specific Conductance	umhos	6870
10/17/2008	2E	Specific Conductance	umhos	7070
10/21/2008	2E	Specific Conductance	umhos	6060
10/21/2008	2E	Specific Conductance	umhos	6070
10/21/2008	2E	Specific Conductance	umhos	6100
10/21/2008	2E	Specific Conductance	umhos	6340
1/8/2009	2E	Specific Conductance	umhos	7330
1/8/2009	2E	Specific Conductance	umhos	7350
1/8/2009	2E	Specific Conductance	umhos	7350
1/8/2009	2E	Specific Conductance	umhos	7480
1/12/2009	2E	Specific Conductance	umhos	7120
1/12/2009	2E	Specific Conductance	umhos	7190
1/12/2009	2E	Specific Conductance	umhos	7230
1/12/2009	2E	Specific Conductance	umhos	7240
1/16/2009	2E	Specific Conductance	umhos	7500
1/16/2009	2E	Specific Conductance	umhos	7550
1/16/2009	2E	Specific Conductance	umhos	7670
1/16/2009	2E	Specific Conductance	umhos	7760
1/20/2009	2E	Specific Conductance	umhos	7590
1/20/2009	2E	Specific Conductance	umhos	7620
1/20/2009	2E	Specific Conductance	umhos	7660
1/20/2009	2E	Specific Conductance	umhos	7700
4/9/2009	2E	Specific Conductance	umhos	7070
4/9/2009	2E	Specific Conductance	umhos	7080
4/9/2009	2E	Specific Conductance	umhos	7150
4/9/2009	2E	Specific Conductance	umhos	7230
4/13/2009	2E	Specific Conductance	umhos	7460
4/13/2009	2E	Specific Conductance	umhos	7420
4/13/2009	2E	Specific Conductance	umhos	7460
4/13/2009	2E	Specific Conductance	umhos	7420
4/17/2009	2E	Specific Conductance	umhos	7110
4/17/2009	2E	Specific Conductance	umhos	7110
4/17/2009	2E	Specific Conductance	umhos	7050
4/17/2009	2E	Specific Conductance	umhos	7300
4/21/2009	2E	Specific Conductance	umhos	7240
4/21/2009	2E	Specific Conductance	umhos	7360
4/21/2009	2E	Specific Conductance	umhos	7390
4/21/2009	2E	Specific Conductance	umhos	7450
1/11/2008	2E	Specific Conductance	umhos	1040
1/11/2008	2E	Specific Conductance	umhos	1050
1/11/2008	2E	Specific Conductance	umhos	1050
1/11/2008	2E	Specific Conductance	umhos	1060
1/15/2008	2E	Specific Conductance	umhos	1050
1/15/2008	2E	Specific Conductance	umhos	1050
1/15/2008	2E	Specific Conductance	umhos	1040
1/15/2008	2E	Specific Conductance	umhos	1110
1/3/2008	2E	Specific Conductance	umhos	2950
1/3/2008	2E	Specific Conductance	umhos	2650
1/3/2008	2E	Specific Conductance	umhos	2680

Sampling Date	Location ID	Analyte	Unit	Concentration
1/3/2008	2E	Specific Conductance	umhos	2670
1/7/2008	2E	Specific Conductance	umhos	1870
1/7/2008	2E	Specific Conductance	umhos	1840
1/7/2008	2E	Specific Conductance	umhos	1820
1/7/2008	2E	Specific Conductance	umhos	1820
10/18/2007	2E	Specific Conductance	umhos	4980
10/18/2007	2E	Specific Conductance	umhos	4990
10/18/2007	2E	Specific Conductance	umhos	5030
10/18/2007	2E	Specific Conductance	umhos	5120
10/22/2007	2E	Specific Conductance	umhos	3800
10/22/2007	2E	Specific Conductance	umhos	3780
10/22/2007	2E	Specific Conductance	umhos	3820
10/22/2007	2E	Specific Conductance	umhos	3840
10/26/2007	2E	Specific Conductance	umhos	2340
10/26/2007	2E	Specific Conductance	umhos	2260
10/26/2007	2E	Specific Conductance	umhos	2280
10/26/2007	2E	Specific Conductance	umhos	2270
10/30/2007	2E	Specific Conductance	umhos	2890
10/30/2007	2E	Specific Conductance	umhos	2880
10/30/2007	2E	Specific Conductance	umhos	2860
10/30/2007	2E	Specific Conductance	umhos	2890
7/12/2007	2E	Styrene	ug/L	ND
7/12/2007	2E	Sulfate	mg/L	5885
7/16/2007	2E	Sulfate	mg/L	5686
7/20/2007	2E	Sulfate	mg/L	6330
7/24/2007	2E	Sulfate	mg/L	5912
4/3/2008	2E	Sulfate	mg/L	5748
4/7/2008	2E	Sulfate	mg/L	5171
4/11/2008	2E	Sulfate	mg/L	6333
4/15/2008	2E	Sulfate	mg/L	8475
7/3/2008	2E	Sulfate	mg/L	6768
7/3/2008	2E	Sulfate	mg/L	6768
7/7/2008	2E	Sulfate	mg/L	5936
7/11/2008	2E	Sulfate	mg/L	5697
7/15/2008	2E	Sulfate	mg/L	6972
10/9/2008	2E	Sulfate	mg/L	6912
10/13/2008	2E	Sulfate	mg/L	7861
10/17/2008	2E	Sulfate	mg/L	8847
10/21/2008	2E	Sulfate	mg/L	8429
1/8/2009	2E	Sulfate	mg/L	7357
1/12/2009	2E	Sulfate	mg/L	7222
1/16/2009	2E	Sulfate	mg/L	8334
1/20/2009	2E	Sulfate	mg/L	6404
4/9/2009	2E	Sulfate	mg/L	7433
4/13/2009	2E	Sulfate	mg/L	7731
4/17/2009	2E	Sulfate	mg/L	8304
4/21/2009	2E	Sulfate	mg/L	8177
1/11/2008	2E	Sulfate	mg/L	5976
1/15/2008	2E	Sulfate	mg/L	5875
1/3/2008	2E	Sulfate	mg/L	6297
1/7/2008	2E	Sulfate	mg/L	5121
1/24/2002	2E	Sulfate	mg/L	7363
1/28/2002	2E	Sulfate	mg/L	10904
2/1/2002	2E	Sulfate	mg/L	11896
2/5/2002	2E	Sulfate	mg/L	15727
4/4/2002	2E	Sulfate	mg/L	13178
4/8/2002	2E	Sulfate	mg/L	15896
4/12/2002	2E	Sulfate	mg/L	18365
4/16/2002	2E	Sulfate	mg/L	13856
7/18/2002	2E	Sulfate	mg/L	9660
7/22/2002	2E	Sulfate	mg/L	10736
7/26/2002	2E	Sulfate	mg/L	11757
7/30/2002	2E	Sulfate	mg/L	12930
10/3/2002	2E	Sulfate	mg/L	7220
10/7/2002	2E	Sulfate	mg/L	17575
10/11/2002	2E	Sulfate	mg/L	15450
10/15/2002	2E	Sulfate	mg/L	7135
1/16/2003	2E	Sulfate	mg/L	7790
1/21/2003	2E	Sulfate	mg/L	9370
1/24/2003	2E	Sulfate	mg/L	13934
1/28/2003	2E	Sulfate	mg/L	16800
4/3/2003	2E	Sulfate	mg/L	7400
4/7/2003	2E	Sulfate	mg/L	7850
4/11/2003	2E	Sulfate	mg/L	8340
4/15/2003	2E	Sulfate	mg/L	8800
7/3/2003	2E	Sulfate	mg/L	7210
7/7/2003	2E	Sulfate	mg/L	7480
7/11/2003	2E	Sulfate	mg/L	7850
7/15/2003	2E	Sulfate	mg/L	7359
10/2/2003	2E	Sulfate	mg/L	6360
10/6/2003	2E	Sulfate	mg/L	6720
10/10/2003	2E	Sulfate	mg/L	7550
10/14/2003	2E	Sulfate	mg/L	4190
1/8/2004	2E	Sulfate	mg/L	4260
1/12/2004	2E	Sulfate	mg/L	5880

Sampling Date	Location ID	Analyte	Unit	Concentration
1/16/2004	2E	Sulfate	mg/L	4820
1/20/2004	2E	Sulfate	mg/L	5530
4/8/2004	2E	Sulfate	mg/L	6323
4/12/2004	2E	Sulfate	mg/L	7685
4/16/2004	2E	Sulfate	mg/L	7185
5/20/2004	2E	Sulfate	mg/L	8161
7/15/2004	2E	Sulfate	mg/L	6647
7/19/2004	2E	Sulfate	mg/L	6640
7/23/2004	2E	Sulfate	mg/L	6729
7/27/2004	2E	Sulfate	mg/L	6737
1/6/2005	2E	Sulfate	mg/L	7362
1/10/2005	2E	Sulfate	mg/L	723
1/14/2005	2E	Sulfate	mg/L	8320
1/18/2005	2E	Sulfate	mg/L	8566
4/11/2005	2E	Sulfate	mg/L	6885
4/15/2005	2E	Sulfate	mg/L	2480
4/19/2005	2E	Sulfate	mg/L	8230
7/7/2005	2E	Sulfate	mg/L	7079
7/11/2005	2E	Sulfate	mg/L	8896
7/15/2005	2E	Sulfate	mg/L	8081
7/19/2005	2E	Sulfate	mg/L	8369
10/13/2005	2E	Sulfate	mg/L	6498
10/17/2005	2E	Sulfate	mg/L	6867
10/21/2005	2E	Sulfate	mg/L	6281
10/25/2005	2E	Sulfate	mg/L	6470
1/5/2006	2E	Sulfate	mg/L	7597
1/9/2006	2E	Sulfate	mg/L	7597
1/13/2006	2E	Sulfate	mg/L	7639
1/17/2006	2E	Sulfate	mg/L	7948
4/6/2006	2E	Sulfate	mg/L	9028
4/10/2006	2E	Sulfate	mg/L	9365
4/14/2006	2E	Sulfate	mg/L	9184
4/18/2006	2E	Sulfate	mg/L	8715
7/6/2006	2E	Sulfate	mg/L	8684
7/10/2006	2E	Sulfate	mg/L	8598
7/14/2006	2E	Sulfate	mg/L	8684
7/18/2006	2E	Sulfate	mg/L	9015
10/19/2006	2E	Sulfate	mg/L	8452
10/23/2006	2E	Sulfate	mg/L	8466
10/27/2006	2E	Sulfate	mg/L	6770
10/31/2006	2E	Sulfate	mg/L	9188
1/4/2007	2E	Sulfate	mg/L	12729
1/8/2007	2E	Sulfate	mg/L	11271
1/11/2007	2E	Sulfate	mg/L	11600
1/16/2007	2E	Sulfate	mg/L	11300
4/19/2007	2E	Sulfate	mg/L	8372
4/23/2007	2E	Sulfate	mg/L	8920
4/27/2007	2E	Sulfate	mg/L	7470
5/1/2007	2E	Sulfate	mg/L	7238
10/18/2007	2E	Sulfate	mg/L	6747
10/22/2007	2E	Sulfate	mg/L	750
10/26/2007	2E	Sulfate	mg/L	6137
10/30/2007	2E	Sulfate	mg/L	7431
1/24/2002	2E	Temperature	C	14
1/28/2002	2E	Temperature	C	15
2/1/2002	2E	Temperature	C	16
2/5/2002	2E	Temperature	C	14
4/4/2002	2E	Temperature	C	14
4/8/2002	2E	Temperature	C	15
4/12/2002	2E	Temperature	C	14
4/16/2002	2E	Temperature	C	16
7/18/2002	2E	Temperature	C	17
7/22/2002	2E	Temperature	C	17
7/26/2002	2E	Temperature	C	15
7/30/2002	2E	Temperature	C	17
10/3/2002	2E	Temperature	C	17
10/7/2002	2E	Temperature	C	16
10/11/2002	2E	Temperature	C	16
10/15/2002	2E	Temperature	C	15
1/16/2003	2E	Temperature	C	14
1/21/2003	2E	Temperature	C	14
1/24/2003	2E	Temperature	C	14
1/28/2003	2E	Temperature	C	14
4/3/2003	2E	Temperature	C	13
4/7/2003	2E	Temperature	C	11
4/11/2003	2E	Temperature	C	11
4/15/2003	2E	Temperature	C	13
7/3/2003	2E	Temperature	C	15
7/7/2003	2E	Temperature	C	17
7/11/2003	2E	Temperature	C	17
7/15/2003	2E	Temperature	C	16
10/2/2003	2E	Temperature	C	17
10/6/2003	2E	Temperature	C	17
10/10/2003	2E	Temperature	C	17
10/14/2003	2E	Temperature	C	17.5

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2004	2E	Temperature	C	14
1/12/2004	2E	Temperature	C	14
1/16/2004	2E	Temperature	C	13
1/20/2004	2E	Temperature	C	14
4/8/2004	2E	Temperature	C	12
4/12/2004	2E	Temperature	C	12
4/16/2004	2E	Temperature	C	12
5/20/2004	2E	Temperature	C	4980
7/15/2004	2E	Temperature	C	16
7/19/2004	2E	Temperature	C	16
7/23/2004	2E	Temperature	C	16
7/27/2004	2E	Temperature	C	17
1/6/2005	2E	Temperature	C	15
1/10/2005	2E	Temperature	C	15
1/14/2005	2E	Temperature	C	15
1/18/2005	2E	Temperature	C	13
4/11/2005	2E	Temperature	C	13
4/15/2005	2E	Temperature	C	13
4/19/2005	2E	Temperature	C	13
7/7/2005	2E	Temperature	C	15
7/11/2005	2E	Temperature	C	14
7/15/2005	2E	Temperature	C	15
7/19/2005	2E	Temperature	C	15
10/13/2005	2E	Temperature	C	16
10/17/2005	2E	Temperature	C	16
10/21/2005	2E	Temperature	C	16
10/25/2005	2E	Temperature	C	15
1/5/2006	2E	Temperature	C	15
1/9/2006	2E	Temperature	C	15
1/13/2006	2E	Temperature	C	14
1/17/2006	2E	Temperature	C	13
4/6/2006	2E	Temperature	C	13
4/10/2006	2E	Temperature	C	13
4/14/2006	2E	Temperature	C	14.6
4/18/2006	2E	Temperature	C	13
7/6/2006	2E	Temperature	C	17
7/10/2006	2E	Temperature	C	16
7/14/2006	2E	Temperature	C	16
7/18/2006	2E	Temperature	C	17
10/19/2006	2E	Temperature	C	16
10/23/2006	2E	Temperature	C	16
10/27/2006	2E	Temperature	C	17
10/31/2006	2E	Temperature	C	17
1/4/2007	2E	Temperature	C	15
1/8/2007	2E	Temperature	C	15
1/11/2007	2E	Temperature	C	15
1/16/2007	2E	Temperature	C	14
4/19/2007	2E	Temperature	C	13
4/23/2007	2E	Temperature	C	13
4/27/2007	2E	Temperature	C	13
5/1/2007	2E	Temperature	C	14
7/12/2007	2E	Temperature	C	16
7/12/2007	2E	Temperature	C	15
7/12/2007	2E	Temperature	C	16
7/12/2007	2E	Temperature	C	16
7/16/2007	2E	Temperature	C	16
7/16/2007	2E	Temperature	C	15
7/16/2007	2E	Temperature	C	16
7/16/2007	2E	Temperature	C	10
7/20/2007	2E	Temperature	C	16
7/20/2007	2E	Temperature	C	15
7/20/2007	2E	Temperature	C	15
7/20/2007	2E	Temperature	C	16
7/24/2007	2E	Temperature	C	16
7/24/2007	2E	Temperature	C	16
7/24/2007	2E	Temperature	C	16
7/24/2007	2E	Temperature	C	16
4/3/2008	2E	Temperature	C	13
4/3/2008	2E	Temperature	C	13
4/3/2008	2E	Temperature	C	13
4/3/2008	2E	Temperature	C	13
4/7/2008	2E	Temperature	C	13
4/7/2008	2E	Temperature	C	13
4/7/2008	2E	Temperature	C	13
4/7/2008	2E	Temperature	C	13
4/11/2008	2E	Temperature	C	14
4/11/2008	2E	Temperature	C	14
4/11/2008	2E	Temperature	C	14
4/11/2008	2E	Temperature	C	14
4/15/2008	2E	Temperature	C	13
4/15/2008	2E	Temperature	C	14
4/15/2008	2E	Temperature	C	14
4/15/2008	2E	Temperature	C	14
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16
7/3/2008	2E	Temperature	C	16
7/7/2008	2E	Temperature	C	16
7/7/2008	2E	Temperature	C	16
7/7/2008	2E	Temperature	C	16
7/7/2008	2E	Temperature	C	17
7/11/2008	2E	Temperature	C	16
7/11/2008	2E	Temperature	C	16
7/11/2008	2E	Temperature	C	17
7/11/2008	2E	Temperature	C	17
7/15/2008	2E	Temperature	C	16
7/15/2008	2E	Temperature	C	16
7/15/2008	2E	Temperature	C	16
7/15/2008	2E	Temperature	C	17
10/9/2008	2E	Temperature	C	18
10/9/2008	2E	Temperature	C	18
10/9/2008	2E	Temperature	C	18
10/9/2008	2E	Temperature	C	18
10/13/2008	2E	Temperature	C	18
10/13/2008	2E	Temperature	C	18
10/13/2008	2E	Temperature	C	18
10/13/2008	2E	Temperature	C	18
10/17/2008	2E	Temperature	C	17
10/17/2008	2E	Temperature	C	17
10/17/2008	2E	Temperature	C	17
10/17/2008	2E	Temperature	C	17
10/21/2008	2E	Temperature	C	17
10/21/2008	2E	Temperature	C	17
10/21/2008	2E	Temperature	C	17
10/21/2008	2E	Temperature	C	17
1/8/2009	2E	Temperature	C	14
1/8/2009	2E	Temperature	C	15
1/8/2009	2E	Temperature	C	15
1/8/2009	2E	Temperature	C	15
1/12/2009	2E	Temperature	C	14
1/12/2009	2E	Temperature	C	14
1/12/2009	2E	Temperature	C	14
1/12/2009	2E	Temperature	C	14
1/16/2009	2E	Temperature	C	11
1/16/2009	2E	Temperature	C	12
1/16/2009	2E	Temperature	C	12
1/16/2009	2E	Temperature	C	12
1/20/2009	2E	Temperature	C	13
1/20/2009	2E	Temperature	C	13
1/20/2009	2E	Temperature	C	13
1/20/2009	2E	Temperature	C	13
4/9/2009	2E	Temperature	C	14
4/9/2009	2E	Temperature	C	14
4/9/2009	2E	Temperature	C	14
4/9/2009	2E	Temperature	C	14
4/13/2009	2E	Temperature	C	14
4/13/2009	2E	Temperature	C	13
4/13/2009	2E	Temperature	C	13
4/13/2009	2E	Temperature	C	13
4/17/2009	2E	Temperature	C	14
4/17/2009	2E	Temperature	C	14
4/17/2009	2E	Temperature	C	14
4/17/2009	2E	Temperature	C	14
4/21/2009	2E	Temperature	C	14
4/21/2009	2E	Temperature	C	13
4/21/2009	2E	Temperature	C	13
4/21/2009	2E	Temperature	C	13
1/11/2008	2E	Temperature	C	15
1/11/2008	2E	Temperature	C	16
1/11/2008	2E	Temperature	C	15
1/11/2008	2E	Temperature	C	15
1/15/2008	2E	Temperature	C	14
1/15/2008	2E	Temperature	C	14
1/15/2008	2E	Temperature	C	14
1/15/2008	2E	Temperature	C	13
1/3/2008	2E	Temperature	C	14
1/3/2008	2E	Temperature	C	14
1/3/2008	2E	Temperature	C	13
1/3/2008	2E	Temperature	C	13
1/7/2008	2E	Temperature	C	16
1/7/2008	2E	Temperature	C	16
1/7/2008	2E	Temperature	C	16
1/7/2008	2E	Temperature	C	16
10/18/2007	2E	Temperature	C	18.5
10/18/2007	2E	Temperature	C	17.6
10/18/2007	2E	Temperature	C	17.4

Sampling Date	Location ID	Analyte	Unit	Concentration
10/18/2007	2E	Temperature	C	18
10/22/2007	2E	Temperature	C	17
10/22/2007	2E	Temperature	C	17
10/22/2007	2E	Temperature	C	17
10/22/2007	2E	Temperature	C	17
10/26/2007	2E	Temperature	C	16
10/26/2007	2E	Temperature	C	16
10/26/2007	2E	Temperature	C	16
10/26/2007	2E	Temperature	C	16
10/30/2007	2E	Temperature	C	17
10/30/2007	2E	Temperature	C	17
10/30/2007	2E	Temperature	C	17
10/30/2007	2E	Temperature	C	17
7/12/2007	2E	tert-Butylbenzene	ug/L	ND
7/12/2007	2E	Tetrachloroethene	ug/L	ND
7/12/2007	2E	Thallium	mg/L	ND
7/12/2007	2E	Toluene	ug/L	ND
7/12/2007	2E	Total Alkalinity	mg/L	14
7/12/2007	2E	Total Hardness,Calculation	mg/L	1275
1/24/2002	2E	Total Organic Carbon	mg/L	5.5
1/28/2002	2E	Total Organic Carbon	mg/L	7.8
2/1/2002	2E	Total Organic Carbon	mg/L	9.1
2/5/2002	2E	Total Organic Carbon	mg/L	9.9
4/4/2002	2E	Total Organic Carbon	mg/L	6.2
4/8/2002	2E	Total Organic Carbon	mg/L	7.8
4/12/2002	2E	Total Organic Carbon	mg/L	8.4
4/16/2002	2E	Total Organic Carbon	mg/L	8
7/18/2002	2E	Total Organic Carbon	mg/L	5.4
7/22/2002	2E	Total Organic Carbon	mg/L	5.9
7/26/2002	2E	Total Organic Carbon	mg/L	7.6
7/30/2002	2E	Total Organic Carbon	mg/L	8.8
10/3/2002	2E	Total Organic Carbon	mg/L	5.6
10/7/2002	2E	Total Organic Carbon	mg/L	9.8
10/11/2002	2E	Total Organic Carbon	mg/L	14
10/15/2002	2E	Total Organic Carbon	mg/L	10
1/16/2003	2E	Total Organic Carbon	mg/L	ND
1/21/2003	2E	Total Organic Carbon	mg/L	11
1/24/2003	2E	Total Organic Carbon	mg/L	9.6
1/28/2003	2E	Total Organic Carbon	mg/L	11.6
4/3/2003	2E	Total Organic Carbon	mg/L	5.4
4/7/2003	2E	Total Organic Carbon	mg/L	5.4
4/11/2003	2E	Total Organic Carbon	mg/L	5.7
4/15/2003	2E	Total Organic Carbon	mg/L	6.5
7/3/2003	2E	Total Organic Carbon	mg/L	5
7/7/2003	2E	Total Organic Carbon	mg/L	4.4
7/11/2003	2E	Total Organic Carbon	mg/L	6.8
7/15/2003	2E	Total Organic Carbon	mg/L	5.7
10/2/2003	2E	Total Organic Carbon	mg/L	4.9
10/6/2003	2E	Total Organic Carbon	mg/L	5.7
10/10/2003	2E	Total Organic Carbon	mg/L	5.6
10/14/2003	2E	Total Organic Carbon	mg/L	5.3
1/8/2004	2E	Total Organic Carbon	mg/L	4.8
1/12/2004	2E	Total Organic Carbon	mg/L	4.7
1/16/2004	2E	Total Organic Carbon	mg/L	4.6
1/20/2004	2E	Total Organic Carbon	mg/L	4.9
4/8/2004	2E	Total Organic Carbon	mg/L	6.9
4/12/2004	2E	Total Organic Carbon	mg/L	7.8
4/16/2004	2E	Total Organic Carbon	mg/L	7.6
5/20/2004	2E	Total Organic Carbon	mg/L	6.6
7/15/2004	2E	Total Organic Carbon	mg/L	6.3
7/19/2004	2E	Total Organic Carbon	mg/L	6.3
7/23/2004	2E	Total Organic Carbon	mg/L	6.3
7/27/2004	2E	Total Organic Carbon	mg/L	6.3
1/6/2005	2E	Total Organic Carbon	mg/L	6.7
1/10/2005	2E	Total Organic Carbon	mg/L	7.4
1/14/2005	2E	Total Organic Carbon	mg/L	6.2
1/18/2005	2E	Total Organic Carbon	mg/L	5.3
4/11/2005	2E	Total Organic Carbon	mg/L	6.1
4/15/2005	2E	Total Organic Carbon	mg/L	6.6
4/19/2005	2E	Total Organic Carbon	mg/L	6.9
7/7/2005	2E	Total Organic Carbon	mg/L	1.6
7/11/2005	2E	Total Organic Carbon	mg/L	6
7/15/2005	2E	Total Organic Carbon	mg/L	6.5
7/19/2005	2E	Total Organic Carbon	mg/L	7.3
10/13/2005	2E	Total Organic Carbon	mg/L	4.6
10/17/2005	2E	Total Organic Carbon	mg/L	5.9
10/21/2005	2E	Total Organic Carbon	mg/L	6.8
10/25/2005	2E	Total Organic Carbon	mg/L	5.2
1/5/2006	2E	Total Organic Carbon	mg/L	5.5
1/9/2006	2E	Total Organic Carbon	mg/L	4.5
1/13/2006	2E	Total Organic Carbon	mg/L	7.3
1/17/2006	2E	Total Organic Carbon	mg/L	8.6
4/6/2006	2E	Total Organic Carbon	mg/L	5.7
4/10/2006	2E	Total Organic Carbon	mg/L	5.8
4/14/2006	2E	Total Organic Carbon	mg/L	7.2

Sampling Date	Location ID	Analyte	Unit	Concentration
4/18/2006	2E	Total Organic Carbon	mg/L	6.6
7/6/2006	2E	Total Organic Carbon	mg/L	7.8
7/10/2006	2E	Total Organic Carbon	mg/L	6.6
7/14/2006	2E	Total Organic Carbon	mg/L	7.2
7/18/2006	2E	Total Organic Carbon	mg/L	7.3
10/19/2006	2E	Total Organic Carbon	mg/L	5.3
10/23/2006	2E	Total Organic Carbon	mg/L	5.6
10/27/2006	2E	Total Organic Carbon	mg/L	5.6
10/31/2006	2E	Total Organic Carbon	mg/L	4.9
1/4/2007	2E	Total Organic Carbon	mg/L	7.4
1/8/2007	2E	Total Organic Carbon	mg/L	6.4
1/11/2007	2E	Total Organic Carbon	mg/L	6.6
1/16/2007	2E	Total Organic Carbon	mg/L	8
4/19/2007	2E	Total Organic Carbon	mg/L	9.7
4/23/2007	2E	Total Organic Carbon	mg/L	13
4/27/2007	2E	Total Organic Carbon	mg/L	8.4
5/1/2007	2E	Total Organic Carbon	mg/L	11
7/12/2007	2E	Total Organic Carbon	mg/L	7.1
7/16/2007	2E	Total Organic Carbon	mg/L	7.2
7/20/2007	2E	Total Organic Carbon	mg/L	7.6
7/24/2007	2E	Total Organic Carbon	mg/L	7.2
4/3/2008	2E	Total Organic Carbon	mg/L	7.2
4/7/2008	2E	Total Organic Carbon	mg/L	7.1
4/11/2008	2E	Total Organic Carbon	mg/L	7.1
4/15/2008	2E	Total Organic Carbon	mg/L	6.6
7/3/2008	2E	Total Organic Carbon	mg/L	6.8
7/3/2008	2E	Total Organic Carbon	mg/L	6.8
7/7/2008	2E	Total Organic Carbon	mg/L	6.8
7/11/2008	2E	Total Organic Carbon	mg/L	7.4
7/15/2008	2E	Total Organic Carbon	mg/L	6.55
10/9/2008	2E	Total Organic Carbon	mg/L	8.4
10/13/2008	2E	Total Organic Carbon	mg/L	7.6
10/17/2008	2E	Total Organic Carbon	mg/L	8.5
10/21/2008	2E	Total Organic Carbon	mg/L	8.7
1/8/2009	2E	Total Organic Carbon	mg/L	7.4
1/12/2009	2E	Total Organic Carbon	mg/L	7.6
1/16/2009	2E	Total Organic Carbon	mg/L	7.5
1/20/2009	2E	Total Organic Carbon	mg/L	7.2
4/9/2009	2E	Total Organic Carbon	mg/L	3.3
4/13/2009	2E	Total Organic Carbon	mg/L	7.1
4/17/2009	2E	Total Organic Carbon	mg/L	6.5
4/21/2009	2E	Total Organic Carbon	mg/L	1.97
1/11/2008	2E	Total Organic Carbon	mg/L	7
1/15/2008	2E	Total Organic Carbon	mg/L	7.1
1/3/2008	2E	Total Organic Carbon	mg/L	6.7
1/7/2008	2E	Total Organic Carbon	mg/L	6.7
10/18/2007	2E	Total Organic Carbon	mg/L	9.6
10/22/2007	2E	Total Organic Carbon	mg/L	9.6
10/26/2007	2E	Total Organic Carbon	mg/L	6.9
10/30/2007	2E	Total Organic Carbon	mg/L	7.4
1/24/2002	2E	Total Organic Halogen	mg/L	0.033
1/28/2002	2E	Total Organic Halogen	mg/L	0.044
2/1/2002	2E	Total Organic Halogen	mg/L	0.039
2/5/2002	2E	Total Organic Halogen	mg/L	0.036
4/4/2002	2E	Total Organic Halogen	mg/L	0.03
4/8/2002	2E	Total Organic Halogen	mg/L	0.133
4/12/2002	2E	Total Organic Halogen	mg/L	ND
4/16/2002	2E	Total Organic Halogen	mg/L	36
7/18/2002	2E	Total Organic Halogen	mg/L	ND
7/22/2002	2E	Total Organic Halogen	mg/L	0.034
7/26/2002	2E	Total Organic Halogen	mg/L	0.056
7/30/2002	2E	Total Organic Halogen	mg/L	0.05
10/3/2002	2E	Total Organic Halogen	mg/L	0.028
10/7/2002	2E	Total Organic Halogen	mg/L	0.024
10/11/2002	2E	Total Organic Halogen	mg/L	0.54
10/15/2002	2E	Total Organic Halogen	mg/L	0.04
1/16/2003	2E	Total Organic Halogen	mg/L	0.032
1/21/2003	2E	Total Organic Halogen	mg/L	0.033
1/24/2003	2E	Total Organic Halogen	mg/L	0.36
1/28/2003	2E	Total Organic Halogen	mg/L	ND
4/3/2003	2E	Total Organic Halogen	mg/L	0.03
4/7/2003	2E	Total Organic Halogen	mg/L	0.037
4/11/2003	2E	Total Organic Halogen	mg/L	0.027
4/15/2003	2E	Total Organic Halogen	mg/L	0.032
7/3/2003	2E	Total Organic Halogen	mg/L	0.037
7/7/2003	2E	Total Organic Halogen	mg/L	0.026
7/11/2003	2E	Total Organic Halogen	mg/L	0.084
7/15/2003	2E	Total Organic Halogen	mg/L	0.033
10/2/2003	2E	Total Organic Halogen	mg/L	0.019
10/6/2003	2E	Total Organic Halogen	mg/L	0.026
10/10/2003	2E	Total Organic Halogen	mg/L	0.017
10/14/2003	2E	Total Organic Halogen	mg/L	0.027
1/8/2004	2E	Total Organic Halogen	mg/L	0.022
1/12/2004	2E	Total Organic Halogen	mg/L	0.027
1/16/2004	2E	Total Organic Halogen	mg/L	0.018

Sampling Date	Location ID	Analyte	Unit	Concentration
1/20/2004	2E	Total Organic Halogen	mg/L	0.021
4/8/2004	2E	Total Organic Halogen	mg/L	106
4/12/2004	2E	Total Organic Halogen	mg/L	57
4/16/2004	2E	Total Organic Halogen	mg/L	34
5/20/2004	2E	Total Organic Halogen	mg/L	46
7/15/2004	2E	Total Organic Halogen	mg/L	0.038
7/19/2004	2E	Total Organic Halogen	mg/L	0.019
7/23/2004	2E	Total Organic Halogen	mg/L	0.023
7/27/2004	2E	Total Organic Halogen	mg/L	0.046
1/6/2005	2E	Total Organic Halogen	mg/L	0.039
1/10/2005	2E	Total Organic Halogen	mg/L	0.041
1/14/2005	2E	Total Organic Halogen	mg/L	0.041
1/18/2005	2E	Total Organic Halogen	mg/L	0.033
4/11/2005	2E	Total Organic Halogen	mg/L	0.073
4/15/2005	2E	Total Organic Halogen	mg/L	0.052
4/19/2005	2E	Total Organic Halogen	mg/L	0.044
7/7/2005	2E	Total Organic Halogen	mg/L	0.029
7/11/2005	2E	Total Organic Halogen	mg/L	ND
7/15/2005	2E	Total Organic Halogen	mg/L	0.044
7/19/2005	2E	Total Organic Halogen	mg/L	0.044
10/13/2005	2E	Total Organic Halogen	mg/L	0.038
10/17/2005	2E	Total Organic Halogen	mg/L	0.06
10/21/2005	2E	Total Organic Halogen	mg/L	0.053
10/25/2005	2E	Total Organic Halogen	mg/L	0.046
1/5/2006	2E	Total Organic Halogen	mg/L	0.29
1/9/2006	2E	Total Organic Halogen	mg/L	0.038
1/13/2006	2E	Total Organic Halogen	mg/L	0.04
1/17/2006	2E	Total Organic Halogen	mg/L	0.329
4/6/2006	2E	Total Organic Halogen	mg/L	0.03
4/10/2006	2E	Total Organic Halogen	mg/L	0.054
4/14/2006	2E	Total Organic Halogen	mg/L	0.067
4/18/2006	2E	Total Organic Halogen	mg/L	0.045
7/6/2006	2E	Total Organic Halogen	mg/L	0.028
7/10/2006	2E	Total Organic Halogen	mg/L	0.041
7/14/2006	2E	Total Organic Halogen	mg/L	0.04
7/18/2006	2E	Total Organic Halogen	mg/L	0.037
10/19/2006	2E	Total Organic Halogen	mg/L	0.016
10/23/2006	2E	Total Organic Halogen	mg/L	0.015
10/27/2006	2E	Total Organic Halogen	mg/L	0.022
10/31/2006	2E	Total Organic Halogen	mg/L	0.015
1/4/2007	2E	Total Organic Halogen	mg/L	0.021
1/8/2007	2E	Total Organic Halogen	mg/L	0.033
1/11/2007	2E	Total Organic Halogen	mg/L	0.025
1/16/2007	2E	Total Organic Halogen	mg/L	0.053
4/19/2007	2E	Total Organic Halogen	mg/L	0.06
4/23/2007	2E	Total Organic Halogen	mg/L	0.05
4/27/2007	2E	Total Organic Halogen	mg/L	0.09
5/1/2007	2E	Total Organic Halogen	mg/L	0.09
7/12/2007	2E	Total Organic Halogen	mg/L	0.08
7/16/2007	2E	Total Organic Halogen	mg/L	0.05
7/20/2007	2E	Total Organic Halogen	mg/L	0.03
7/24/2007	2E	Total Organic Halogen	mg/L	0.13
4/7/2008	2E	Total Organic Halogen	mg/L	0.01
4/11/2008	2E	Total Organic Halogen	mg/L	0.05
4/15/2008	2E	Total Organic Halogen	mg/L	0.03
7/3/2008	2E	Total Organic Halogen	mg/L	0.02
7/3/2008	2E	Total Organic Halogen	mg/L	0.02
7/7/2008	2E	Total Organic Halogen	mg/L	0.02
7/11/2008	2E	Total Organic Halogen	mg/L	0.03
7/15/2008	2E	Total Organic Halogen	mg/L	0.05
10/9/2008	2E	Total Organic Halogen	mg/L	0.08
10/13/2008	2E	Total Organic Halogen	mg/L	0.06
10/17/2008	2E	Total Organic Halogen	mg/L	0.07
10/21/2008	2E	Total Organic Halogen	mg/L	0.3
1/8/2009	2E	Total Organic Halogen	mg/L	0.05
1/12/2009	2E	Total Organic Halogen	mg/L	0.14
1/16/2009	2E	Total Organic Halogen	mg/L	0.20
1/20/2009	2E	Total Organic Halogen	mg/L	0.09
1/11/2008	2E	Total Organic Halogen	mg/L	0.04
1/15/2008	2E	Total Organic Halogen	mg/L	0.023
1/3/2008	2E	Total Organic Halogen	mg/L	0.06
1/7/2008	2E	Total Organic Halogen	mg/L	ND
10/18/2007	2E	Total Organic Halogen	mg/L	0.07
10/22/2007	2E	Total Organic Halogen	mg/L	0.03
10/26/2007	2E	Total Organic Halogen	mg/L	0.04
10/30/2007	2E	Total Organic Halogen	mg/L	0.08
4/3/2008	2E	Total Organic Halogen	mg/L	0.03
4/9/2009	2E	Total Organic Halogen	mg/L	0.08
4/13/2009	2E	Total Organic Halogen	mg/L	0.23
4/17/2009	2E	Total Organic Halogen	mg/L	ND
4/21/2009	2E	Total Organic Halogen	mg/L	ND
7/12/2007	2E	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2E	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2E	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2E	Trichloroethene	ug/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2E	Trichlorofluoromethane	ug/L	ND
1/24/2002	2E	Turbidity	NTU	230
1/28/2002	2E	Turbidity	NTU	205
2/1/2002	2E	Turbidity	NTU	324
2/5/2002	2E	Turbidity	NTU	231
4/4/2002	2E	Turbidity	NTU	260
4/8/2002	2E	Turbidity	NTU	200
4/12/2002	2E	Turbidity	NTU	305
4/16/2002	2E	Turbidity	NTU	333
7/18/2002	2E	Turbidity	NTU	225
7/22/2002	2E	Turbidity	NTU	212
7/26/2002	2E	Turbidity	NTU	202
7/30/2002	2E	Turbidity	NTU	310
10/3/2002	2E	Turbidity	NTU	209
10/7/2002	2E	Turbidity	NTU	277
10/11/2002	2E	Turbidity	NTU	228
10/15/2002	2E	Turbidity	NTU	206
1/16/2003	2E	Turbidity	NTU	301
1/21/2003	2E	Turbidity	NTU	218
1/24/2003	2E	Turbidity	NTU	200
1/28/2003	2E	Turbidity	NTU	213
4/3/2003	2E	Turbidity	NTU	210
4/7/2003	2E	Turbidity	NTU	99
4/11/2003	2E	Turbidity	NTU	5.5
4/15/2003	2E	Turbidity	NTU	194
7/3/2003	2E	Turbidity	NTU	94
7/7/2003	2E	Turbidity	NTU	227
7/11/2003	2E	Turbidity	NTU	239
7/15/2003	2E	Turbidity	NTU	182
10/2/2003	2E	Turbidity	NTU	218
10/6/2003	2E	Turbidity	NTU	236
10/10/2003	2E	Turbidity	NTU	45
10/14/2003	2E	Turbidity	NTU	72
1/8/2004	2E	Turbidity	NTU	209
1/12/2004	2E	Turbidity	NTU	152
1/16/2004	2E	Turbidity	NTU	35
1/20/2004	2E	Turbidity	NTU	83
4/8/2004	2E	Turbidity	NTU	170
4/12/2004	2E	Turbidity	NTU	56
4/16/2004	2E	Turbidity	NTU	25
5/20/2004	2E	Turbidity	NTU	70
7/15/2004	2E	Turbidity	NTU	194
7/19/2004	2E	Turbidity	NTU	188
7/23/2004	2E	Turbidity	NTU	63
7/27/2004	2E	Turbidity	NTU	41
1/6/2005	2E	Turbidity	NTU	189
1/10/2005	2E	Turbidity	NTU	157
1/14/2005	2E	Turbidity	NTU	36
1/18/2005	2E	Turbidity	NTU	33
4/11/2005	2E	Turbidity	NTU	21
4/15/2005	2E	Turbidity	NTU	18
4/19/2005	2E	Turbidity	NTU	34
7/7/2005	2E	Turbidity	NTU	178
7/11/2005	2E	Turbidity	NTU	161
7/15/2005	2E	Turbidity	NTU	29
7/19/2005	2E	Turbidity	NTU	134
10/13/2005	2E	Turbidity	NTU	100
10/17/2005	2E	Turbidity	NTU	83
10/21/2005	2E	Turbidity	NTU	35
10/25/2005	2E	Turbidity	NTU	95
1/5/2006	2E	Turbidity	NTU	187
1/9/2006	2E	Turbidity	NTU	135
1/13/2006	2E	Turbidity	NTU	24
1/17/2006	2E	Turbidity	NTU	106
4/6/2006	2E	Turbidity	NTU	176
4/10/2006	2E	Turbidity	NTU	184
4/14/2006	2E	Turbidity	NTU	77
4/18/2006	2E	Turbidity	NTU	135
7/6/2006	2E	Turbidity	NTU	96
7/10/2006	2E	Turbidity	NTU	115
7/14/2006	2E	Turbidity	NTU	60
7/18/2006	2E	Turbidity	NTU	54
10/19/2006	2E	Turbidity	NTU	205
10/23/2006	2E	Turbidity	NTU	159
10/27/2006	2E	Turbidity	NTU	63
10/31/2006	2E	Turbidity	NTU	163
1/4/2007	2E	Turbidity	NTU	282
1/8/2007	2E	Turbidity	NTU	183
1/11/2007	2E	Turbidity	NTU	269
1/16/2007	2E	Turbidity	NTU	161
4/19/2007	2E	Turbidity	NTU	14
4/23/2007	2E	Turbidity	NTU	12
4/27/2007	2E	Turbidity	NTU	33
5/1/2007	2E	Turbidity	NTU	205
7/12/2007	2E	Turbidity	NTU	50

Sampling Date	Location ID	Analyte	Unit	Concentration
7/16/2007	2E	Turbidity	NTU	233
7/20/2007	2E	Turbidity	NTU	98
7/24/2007	2E	Turbidity	NTU	145
4/3/2008	2E	Turbidity	NTU	166
4/7/2008	2E	Turbidity	NTU	118
4/11/2008	2E	Turbidity	NTU	24
4/15/2008	2E	Turbidity	NTU	52
7/3/2008	2E	Turbidity	NTU	48
7/3/2008	2E	Turbidity	NTU	48
7/7/2008	2E	Turbidity	NTU	138
7/11/2008	2E	Turbidity	NTU	164
7/15/2008	2E	Turbidity	NTU	160
10/9/2008	2E	Turbidity	NTU	102
10/13/2008	2E	Turbidity	NTU	35
10/17/2008	2E	Turbidity	NTU	48
10/21/2008	2E	Turbidity	NTU	30
1/8/2009	2E	Turbidity	NTU	150
1/12/2009	2E	Turbidity	NTU	25
1/16/2009	2E	Turbidity	NTU	28
1/20/2009	2E	Turbidity	NTU	18
4/9/2009	2E	Turbidity	NTU	74
4/13/2009	2E	Turbidity	NTU	38
4/17/2009	2E	Turbidity	NTU	6.0
4/21/2009	2E	Turbidity	NTU	55
1/11/2008	2E	Turbidity	NTU	19
1/15/2008	2E	Turbidity	NTU	101
1/3/2008	2E	Turbidity	NTU	91
1/7/2008	2E	Turbidity	NTU	95
10/18/2007	2E	Turbidity	NTU	47
10/22/2007	2E	Turbidity	NTU	85
10/26/2007	2E	Turbidity	NTU	23
10/30/2007	2E	Turbidity	NTU	46
7/12/2007	2E	Vanadium	mg/L	ND
7/12/2007	2E	Vinyl Acetate	ug/L	ND
7/12/2007	2E	Vinyl Chloride	ug/L	ND
7/12/2007	2E	Xylenes, Total	ug/L	12
7/12/2007	2E	Zinc	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		**2EDUP**		
Number of Sampling Dates:		**11**		
1/14/2005	2EDUP	Barium	mg/L	0.04
4/15/2005	2EDUP	Barium	mg/L	0.024
7/15/2005	2EDUP	Barium	mg/L	0.027
1/9/2006	2EDUP	Barium	mg/L	0.01
4/18/2006	2EDUP	Barium	mg/L	0.029
7/14/2006	2EDUP	Barium	mg/L	0.018
10/31/2006	2EDUP	Barium	mg/L	0.011
1/8/2007	2EDUP	Barium	mg/L	0.011
4/23/2007	2EDUP	Barium	mg/L	ND
7/20/2007	2EDUP	Barium	mg/L	0.014
4/11/2008	2EDUP	Barium	mg/L	ND
7/15/2008	2EDUP	Barium	mg/L	0.023
1/11/2008	2EDUP	Barium	mg/L	0.013
1/14/2005	2EDUP	Chloride	mg/L	128
4/15/2005	2EDUP	Chloride	mg/L	53.4
7/15/2005	2EDUP	Chloride	mg/L	191
1/9/2006	2EDUP	Chloride	mg/L	110
4/18/2006	2EDUP	Chloride	mg/L	212
7/14/2006	2EDUP	Chloride	mg/L	204
10/31/2006	2EDUP	Chloride	mg/L	171
1/8/2007	2EDUP	Chloride	mg/L	266
4/23/2007	2EDUP	Chloride	mg/L	222
7/20/2007	2EDUP	Chloride	mg/L	16.9
4/11/2008	2EDUP	Chloride	mg/L	195
7/15/2008	2EDUP	Chloride	mg/L	189
1/11/2008	2EDUP	Chloride	mg/L	157
1/14/2005	2EDUP	Chromium	mg/L	ND
4/15/2005	2EDUP	Chromium	mg/L	ND
7/15/2005	2EDUP	Chromium	mg/L	ND
1/9/2006	2EDUP	Chromium	mg/L	ND
4/18/2006	2EDUP	Chromium	mg/L	ND
7/14/2006	2EDUP	Chromium	mg/L	ND
10/31/2006	2EDUP	Chromium	mg/L	0.012
1/8/2007	2EDUP	Chromium	mg/L	0.019
4/23/2007	2EDUP	Chromium	mg/L	0.02
7/20/2007	2EDUP	Chromium	mg/L	0.016
4/11/2008	2EDUP	Chromium	mg/L	0.013
7/15/2008	2EDUP	Chromium	mg/L	0.014
1/11/2008	2EDUP	Chromium	mg/L	0.009
1/14/2005	2EDUP	Chromium, hexavalent	mg/l	ND
4/15/2005	2EDUP	Chromium, hexavalent	mg/l	ND
7/15/2005	2EDUP	Chromium, hexavalent	mg/l	ND
1/9/2006	2EDUP	Chromium, hexavalent	mg/l	ND
4/18/2006	2EDUP	Chromium, hexavalent	mg/l	ND
7/14/2006	2EDUP	Chromium, hexavalent	mg/l	ND
10/31/2006	2EDUP	Chromium, hexavalent	mg/l	ND
1/8/2007	2EDUP	Chromium, hexavalent	mg/l	ND
4/23/2007	2EDUP	Chromium, hexavalent	mg/l	ND
7/20/2007	2EDUP	Chromium, hexavalent	mg/L	ND
4/11/2008	2EDUP	Chromium, hexavalent	mg/L	ND
7/15/2008	2EDUP	Chromium, Hexavalent	mg/L	ND
1/11/2008	2EDUP	Chromium, hexavalent	mg/L	ND
1/14/2005	2EDUP	Iron	mg/L	4487
4/15/2005	2EDUP	Iron	mg/L	3030
7/15/2005	2EDUP	Iron	mg/L	2502
7/15/2005	2EDUP	Iron	mg/L	2502
1/9/2006	2EDUP	Iron	mg/L	2304
4/18/2006	2EDUP	Iron	mg/L	2889
7/14/2006	2EDUP	Iron	mg/L	3550
10/31/2006	2EDUP	Iron	mg/L	2182
1/8/2007	2EDUP	Iron	mg/L	4596
4/23/2007	2EDUP	Iron	mg/L	2952
7/20/2007	2EDUP	Iron	mg/L	2220
4/11/2008	2EDUP	Iron	mg/L	2224
7/15/2008	2EDUP	Iron	mg/L	2205
1/11/2008	2EDUP	Iron	mg/L	2382
1/14/2005	2EDUP	Manganese	mg/L	124
4/15/2005	2EDUP	Manganese	mg/L	108
7/15/2005	2EDUP	Manganese	mg/L	106
1/9/2006	2EDUP	Manganese	mg/L	6.72
4/18/2006	2EDUP	Manganese	mg/L	102
7/14/2006	2EDUP	Manganese	mg/L	5.55
10/31/2006	2EDUP	Manganese	mg/L	118
1/8/2007	2EDUP	Manganese	mg/L	148
4/23/2007	2EDUP	Manganese	mg/L	99
7/20/2007	2EDUP	Manganese	mg/L	76.1
4/11/2008	2EDUP	Manganese	mg/L	96.2
7/15/2008	2EDUP	Manganese	mg/L	78.2
1/11/2008	2EDUP	Manganese	mg/L	85.5
1/14/2005	2EDUP	pH	pH Units	4.7
4/15/2005	2EDUP	pH	pH Units	3.91
7/15/2005	2EDUP	pH	pH Units	4.67
1/9/2006	2EDUP	pH	pH Units	4.85

Sampling Date	Location ID	Analyte	Unit	Concentration
4/18/2006	2EDUP	pH	pH Units	4.65
7/14/2006	2EDUP	pH	pH Units	4.7
10/31/2006	2EDUP	pH	pH Units	4.84
1/8/2007	2EDUP	pH	pH Units	4.81
4/23/2007	2EDUP	pH	pH Units	3.9
7/20/2007	2EDUP	pH	pH	4.5
7/20/2007	2EDUP	pH	pH	4.51
7/20/2007	2EDUP	pH	pH	4.54
7/20/2007	2EDUP	pH	pH	4.56
4/11/2008	2EDUP	pH	pH	4.53
4/11/2008	2EDUP	pH	pH	4.54
4/11/2008	2EDUP	pH	pH	4.56
4/11/2008	2EDUP	pH	pH	4.56
7/15/2008	2EDUP	pH	pH	4.49
7/15/2008	2EDUP	pH	pH	4.51
7/15/2008	2EDUP	pH	pH	4.52
7/15/2008	2EDUP	pH	pH	4.54
1/11/2008	2EDUP	pH	pH	4.67
1/11/2008	2EDUP	pH	pH	4.67
1/11/2008	2EDUP	pH	pH	4.71
1/11/2008	2EDUP	pH	pH	4.74
7/20/2007	2EDUP	Phenols	mg/L	ND
1/14/2005	2EDUP	Phenols	mg/L	ND
4/15/2005	2EDUP	Phenols	mg/L	ND
7/15/2005	2EDUP	Phenols	mg/L	0.09
7/15/2005	2EDUP	Phenols	mg/L	0.09
1/9/2006	2EDUP	Phenols	mg/L	ND
4/18/2006	2EDUP	Phenols	mg/L	ND
7/14/2006	2EDUP	Phenols	mg/L	0.51
10/31/2006	2EDUP	Phenols	mg/L	0.06
1/8/2007	2EDUP	Phenols	mg/L	ND
4/23/2007	2EDUP	Phenols	mg/L	ND
4/11/2008	2EDUP	Phenols, Total	mg/L	0.14
7/15/2008	2EDUP	Phenols, Total	mg/L	ND
1/11/2008	2EDUP	Phenols, Total	mg/L	ND
1/14/2005	2EDUP	Sodium	mg/L	237
4/15/2005	2EDUP	Sodium	mg/L	232
7/15/2005	2EDUP	Sodium	mg/L	208
1/9/2006	2EDUP	Sodium	mg/L	175
4/18/2006	2EDUP	Sodium	mg/L	239
7/14/2006	2EDUP	Sodium	mg/L	261
10/31/2006	2EDUP	Sodium	mg/L	171
1/8/2007	2EDUP	Sodium	mg/L	318
4/23/2007	2EDUP	Sodium	mg/L	231
7/20/2007	2EDUP	Sodium	mg/L	182
4/11/2008	2EDUP	Sodium	mg/L	217
7/15/2008	2EDUP	Sodium	mg/L	208
1/11/2008	2EDUP	Sodium	mg/L	198
1/14/2005	2EDUP	Specific Conductance	umhos	5460
4/15/2005	2EDUP	Specific Conductance	umhos	4280
7/15/2005	2EDUP	Specific Conductance	umhos	6560
1/9/2006	2EDUP	Specific Conductance	umhos	4560
4/18/2006	2EDUP	Specific Conductance	umhos	7530
7/14/2006	2EDUP	Specific Conductance	umhos	6860
10/31/2006	2EDUP	Specific Conductance	umhos	6170
1/8/2007	2EDUP	Specific Conductance	umhos	4520
4/23/2007	2EDUP	Specific Conductance	umhos	3370
7/20/2007	2EDUP	Specific Conductance	umhos	4460
7/20/2007	2EDUP	Specific Conductance	umhos	4420
7/20/2007	2EDUP	Specific Conductance	umhos	4470
7/20/2007	2EDUP	Specific Conductance	umhos	4440
4/11/2008	2EDUP	Specific Conductance	umhos	6320
4/11/2008	2EDUP	Specific Conductance	umhos	6390
4/11/2008	2EDUP	Specific Conductance	umhos	6400
4/11/2008	2EDUP	Specific Conductance	umhos	6440
7/15/2008	2EDUP	Specific Conductance	umhos	5930
7/15/2008	2EDUP	Specific Conductance	umhos	5970
7/15/2008	2EDUP	Specific Conductance	umhos	5980
7/15/2008	2EDUP	Specific Conductance	umhos	5990
1/11/2008	2EDUP	Specific Conductance	umhos	1030
1/11/2008	2EDUP	Specific Conductance	umhos	1030
1/11/2008	2EDUP	Specific Conductance	umhos	1020
1/11/2008	2EDUP	Specific Conductance	umhos	1040
7/20/2007	2EDUP	Sulfate	mg/L	599
4/11/2008	2EDUP	Sulfate	mg/L	6813
7/15/2008	2EDUP	Sulfate	mg/L	6594
1/11/2008	2EDUP	Sulfate	mg/L	5980
1/14/2005	2EDUP	Sulfate	mg/L	5040
4/15/2005	2EDUP	Sulfate	mg/L	2130
7/15/2005	2EDUP	Sulfate	mg/L	8364
1/9/2006	2EDUP	Sulfate	mg/L	3544
4/18/2006	2EDUP	Sulfate	mg/L	9793
7/14/2006	2EDUP	Sulfate	mg/L	9199
10/31/2006	2EDUP	Sulfate	mg/L	9229
1/8/2007	2EDUP	Sulfate	mg/L	11460

Sampling Date	Location ID	Analyte	Unit	Concentration
4/23/2007	2EDUP	Sulfate	mg/L	8701
1/14/2005	2EDUP	Temperature	C	15
4/15/2005	2EDUP	Temperature	C	13
7/15/2005	2EDUP	Temperature	C	15
1/9/2006	2EDUP	Temperature	C	15
4/18/2006	2EDUP	Temperature	C	13
7/14/2006	2EDUP	Temperature	C	16
10/31/2006	2EDUP	Temperature	C	17
1/8/2007	2EDUP	Temperature	C	14
4/23/2007	2EDUP	Temperature	C	13
7/20/2007	2EDUP	Temperature	C	15
7/20/2007	2EDUP	Temperature	C	15
7/20/2007	2EDUP	Temperature	C	15
7/20/2007	2EDUP	Temperature	C	16
4/11/2008	2EDUP	Temperature	C	14
4/11/2008	2EDUP	Temperature	C	14
4/11/2008	2EDUP	Temperature	C	14
4/11/2008	2EDUP	Temperature	C	14
7/15/2008	2EDUP	Temperature	C	16
7/15/2008	2EDUP	Temperature	C	16
7/15/2008	2EDUP	Temperature	C	16
7/15/2008	2EDUP	Temperature	C	17
1/11/2008	2EDUP	Temperature	C	15
1/11/2008	2EDUP	Temperature	C	15
1/11/2008	2EDUP	Temperature	C	15
1/11/2008	2EDUP	Temperature	C	15
7/20/2007	2EDUP	Total Organic Carbon	mg/L	8
4/11/2008	2EDUP	Total Organic Carbon	mg/L	7.1
1/11/2008	2EDUP	Total Organic Carbon	mg/L	6.9
1/14/2005	2EDUP	Total Organic Carbon	mg/L	5.9
4/15/2005	2EDUP	Total Organic Carbon	mg/L	6.2
7/15/2005	2EDUP	Total Organic Carbon	mg/L	5.3
1/9/2006	2EDUP	Total Organic Carbon	mg/L	5.1
4/18/2006	2EDUP	Total Organic Carbon	mg/L	7.2
7/14/2006	2EDUP	Total Organic Carbon	mg/L	7.2
10/31/2006	2EDUP	Total Organic Carbon	mg/L	5.1
1/8/2007	2EDUP	Total Organic Carbon	mg/L	6.5
4/23/2007	2EDUP	Total Organic Carbon	mg/L	13
7/15/2008	2EDUP	Total Organic Carbon	mg/L	6.69
1/14/2005	2EDUP	Total Organic Halogen	mg/L	0.043
4/15/2005	2EDUP	Total Organic Halogen	mg/L	0.045
7/15/2005	2EDUP	Total Organic Halogen	mg/L	0.074
1/9/2006	2EDUP	Total Organic Halogen	mg/L	0.028
4/18/2006	2EDUP	Total Organic Halogen	mg/L	0.029
7/14/2006	2EDUP	Total Organic Halogen	mg/L	0.031
10/31/2006	2EDUP	Total Organic Halogen	mg/L	0.022
1/8/2007	2EDUP	Total Organic Halogen	mg/L	0.023
4/23/2007	2EDUP	Total Organic Halogen	mg/L	0.08
7/20/2007	2EDUP	Total Organic Halogen	mg/L	ND
4/11/2008	2EDUP	Total Organic Halogen	mg/L	0.04
7/15/2008	2EDUP	Total Organic Halogen	mg/L	0.05
1/11/2008	2EDUP	Total Organic Halogen	mg/L	0.04
1/14/2005	2EDUP	Turbidity	NTU	29
4/15/2005	2EDUP	Turbidity	NTU	22
7/15/2005	2EDUP	Turbidity	NTU	44
1/9/2006	2EDUP	Turbidity	NTU	153
4/18/2006	2EDUP	Turbidity	NTU	162
7/14/2006	2EDUP	Turbidity	NTU	90
10/31/2006	2EDUP	Turbidity	NTU	65
1/8/2007	2EDUP	Turbidity	NTU	188
4/23/2007	2EDUP	Turbidity	NTU	27
7/20/2007	2EDUP	Turbidity	NTU	124
4/11/2008	2EDUP	Turbidity	NTU	27
7/15/2008	2EDUP	Turbidity	NTU	163
1/11/2008	2EDUP	Turbidity	NTU	18
Location ID:		**2F**		
Number of Sampling Dates:		**32**		
7/12/2007	2F	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2F	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2F	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2F	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2F	1,1-Dichloroethane	ug/L	ND
7/12/2007	2F	1,1-Dichloroethene	ug/L	ND
7/12/2007	2F	1,1-Dichloropropene	ug/L	ND
7/12/2007	2F	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2F	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2F	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2F	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	2F	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2F	1,2-Dibromoethane	ug/L	ND
7/12/2007	2F	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2F	1,2-Dichloroethane	ug/L	ND
7/12/2007	2F	1,2-Dichloropropane	ug/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2F	1,3,5-Trimethylbenzene	ug/L	ND
7/12/2007	2F	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2F	1,3-Dichloropropane	ug/L	ND
7/12/2007	2F	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2F	2,2-Dichloropropane	ug/L	ND
7/12/2007	2F	2-Butanone (MEK)	ug/L	ND
7/12/2007	2F	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2F	2-Chlorotoluene	ug/L	ND
7/12/2007	2F	2-Hexanone	ug/L	ND
7/12/2007	2F	3-Chloro-1-propene	ug/L	ND
7/12/2007	2F	4-Chlorotoluene	ug/L	ND
7/12/2007	2F	4-Isopropyltoluene	ug/L	ND
7/12/2007	2F	4-Methyl-2-Pentanone (MIBK)	ug/L	5.3
7/12/2007	2F	Acetone	ug/L	ND
7/12/2007	2F	Acrolein	ug/L	ND
7/12/2007	2F	Acrylonitrile	ug/L	ND
7/12/2007	2F	Alkalinity	mg/L	ND
7/12/2007	2F	Ammonia	mg/L	2.11
7/12/2007	2F	Antimony	mg/L	ND
7/12/2007	2F	Arsenic	mg/L	ND
6/8/2006	2F	Barium	mg/L	0.03
7/6/2006	2F	Barium	mg/L	ND
7/27/2006	2F	Barium	mg/L	0.033
8/17/2006	2F	Barium	mg/L	0.033
9/7/2006	2F	Barium	mg/L	0.029
10/19/2006	2F	Barium	mg/L	0.054
11/9/2006	2F	Barium	mg/L	0.03
11/30/2006	2F	Barium	mg/L	0.029
12/21/2006	2F	Barium	mg/L	0.033
1/4/2007	2F	Barium	mg/L	0.037
1/25/2007	2F	Barium	mg/L	0.031
2/15/2007	2F	Barium	mg/L	0.033
3/8/2007	2F	Barium	mg/L	0.029
4/19/2007	2F	Barium	mg/L	0.03
5/10/2007	2F	Barium	mg/L	0.025
5/31/2007	2F	Barium	mg/L	0.047
6/21/2007	2F	Barium	mg/L	0.033
7/12/2007	2F	Barium	mg/L	0.029
8/2/2007	2F	Barium	mg/L	0.031
8/23/2007	2F	Barium	mg/L	0.031
9/13/2007	2F	Barium	mg/L	0.029
4/3/2008	2F	Barium	mg/L	0.055
4/24/2008	2F	Barium	mg/L	0.028
5/15/2008	2F	Barium	mg/L	0.026
6/5/2008	2F	Barium	mg/L	0.028
7/3/2008	2F	Barium	mg/L	0.044
7/3/2008	2F	Barium	mg/L	0.044
7/24/2008	2F	Barium	mg/L	0.028
8/14/2008	2F	Barium	mg/L	0.028
9/4/2008	2F	Barium	mg/L	0.032
10/9/2008	2F	Barium	mg/L	0.044
10/30/2008	2F	Barium	mg/L	0.033
11/20/2008	2F	Barium	mg/L	0.031
12/11/2008	2F	Barium	mg/L	0.03
1/8/2009	2F	Barium	mg/L	0.044
1/29/2009	2F	Barium	mg/L	0.029
2/19/2009	2F	Barium	mg/L	0.030
3/12/2009	2F	Barium	mg/L	0.029
4/9/2009	2F	Barium	mg/L	0.053
4/30/2009	2F	Barium	mg/L	0.028
5/21/2009	2F	Barium	mg/L	0.026
1/24/2008	2F	Barium	mg/L	0.033
1/3/2008	2F	Barium	mg/L	0.069
10/18/2007	2F	Barium	mg/L	0.036
11/29/2007	2F	Barium	mg/L	0.034
11/8/2007	2F	Barium	mg/L	0.027
12/20/2007	2F	Barium	mg/L	0.032
2/14/2008	2F	Barium	mg/L	0.033
3/6/2008	2F	Barium	mg/L	0.031
3/6/2008	2F	Barium	mg/L	ND
6/11/2009	2F	Barium	mg/L	0.029
7/12/2007	2F	Benzene	ug/L	ND
7/12/2007	2F	Beryllium	mg/L	ND
7/12/2007	2F	BOD	mg/L	ND
7/12/2007	2F	Bromobenzene	ug/L	ND
7/12/2007	2F	Bromochloromethane	ug/L	ND
7/12/2007	2F	Bromodichloromethane	ug/L	ND
7/12/2007	2F	Bromoform	ug/L	ND
7/12/2007	2F	Bromomethane	ug/L	ND
7/12/2007	2F	Cadmium	mg/L	ND
7/12/2007	2F	Calcium	mg/L	155
7/12/2007	2F	Carbon Disulfide	ug/L	ND
7/12/2007	2F	Carbon Tetrachloride	ug/L	ND
7/12/2007	2F	Chemical Oxygen Demand	mg/L	10
6/8/2006	2F	Chloride	mg/L	23.7

Sampling Date	Location ID	Analyte	Unit	Concentration
7/6/2006	2F	Chloride	mg/L	47.8
7/27/2006	2F	Chloride	mg/L	21.2
8/17/2006	2F	Chloride	mg/L	23.2
9/7/2006	2F	Chloride	mg/L	23.9
10/19/2006	2F	Chloride	mg/L	53.6
11/9/2006	2F	Chloride	mg/L	28.3
11/30/2006	2F	Chloride	mg/L	25.5
12/21/2006	2F	Chloride	mg/L	22
1/4/2007	2F	Chloride	mg/L	63
1/25/2007	2F	Chloride	mg/L	24.5
2/15/2007	2F	Chloride	mg/L	23.2
3/8/2007	2F	Chloride	mg/L	21
4/19/2007	2F	Chloride	mg/L	70.5
5/10/2007	2F	Chloride	mg/L	66.9
5/31/2007	2F	Chloride	mg/L	61
6/21/2007	2F	Chloride	mg/L	64.6
7/12/2007	2F	Chloride	mg/L	48.2
8/2/2007	2F	Chloride	mg/L	68.4
9/13/2007	2F	Chloride	mg/L	18
4/3/2008	2F	Chloride	mg/L	35.3
4/24/2008	2F	Chloride	mg/L	21.6
5/15/2008	2F	Chloride	mg/L	24.4
6/5/2008	2F	Chloride	mg/L	20.1
7/3/2008	2F	Chloride	mg/L	32.3
7/3/2008	2F	Chloride	mg/L	32.3
7/24/2008	2F	Chloride	mg/L	20.2
8/14/2008	2F	Chloride	mg/L	21.8
9/4/2008	2F	Chloride	mg/L	22.8
10/9/2008	2F	Chloride	mg/L	29.0
10/30/2008	2F	Chloride	mg/L	20.9
11/20/2008	2F	Chloride	mg/L	19.4
12/11/2008	2F	Chloride	mg/L	20.3
1/8/2009	2F	Chloride	mg/L	34.1
1/29/2009	2F	Chloride	mg/L	21.4
2/19/2009	2F	Chloride	mg/L	19.9
3/12/2009	2F	Chloride	mg/L	21.6
4/9/2009	2F	Chloride	mg/L	33.5
4/30/2009	2F	Chloride	mg/L	21.6
5/21/2009	2F	Chloride	mg/L	20.3
1/24/2008	2F	Chloride	mg/L	17.3
1/3/2008	2F	Chloride	mg/L	30.4
10/18/2007	2F	Chloride	mg/L	20.2
11/29/2007	2F	Chloride	mg/L	17.6
11/8/2007	2F	Chloride	mg/L	17
12/20/2007	2F	Chloride	mg/L	19.8
2/14/2008	2F	Chloride	mg/L	18.5
3/6/2008	2F	Chloride	mg/L	23.8
3/6/2008	2F	Chloride	mg/L	16.9
6/11/2009	2F	Chloride	mg/L	45.9
7/12/2007	2F	Chlorobenzene	ug/L	ND
7/12/2007	2F	Chloroethane	ug/L	ND
7/12/2007	2F	Chloroform	ug/L	ND
7/12/2007	2F	Chloromethane	ug/L	ND
6/8/2006	2F	Chromium	mg/L	ND
7/6/2006	2F	Chromium	mg/L	ND
7/27/2006	2F	Chromium	mg/L	ND
8/17/2006	2F	Chromium	mg/L	ND
9/7/2006	2F	Chromium	mg/L	ND
10/19/2006	2F	Chromium	mg/L	ND
11/9/2006	2F	Chromium	mg/L	ND
11/30/2006	2F	Chromium	mg/L	ND
12/21/2006	2F	Chromium	mg/L	ND
1/4/2007	2F	Chromium	mg/L	ND
1/25/2007	2F	Chromium	mg/L	ND
2/15/2007	2F	Chromium	mg/L	ND
3/8/2007	2F	Chromium	mg/L	ND
4/19/2007	2F	Chromium	mg/L	ND
5/10/2007	2F	Chromium	mg/L	ND
5/31/2007	2F	Chromium	mg/L	ND
6/21/2007	2F	Chromium	mg/L	ND
7/12/2007	2F	Chromium	mg/L	ND
7/12/2007	2F	Chromium	mg/L	ND
8/2/2007	2F	Chromium	mg/L	ND
8/23/2007	2F	Chromium	mg/L	ND
9/13/2007	2F	Chromium	mg/L	ND
4/3/2008	2F	Chromium	mg/L	0.010
4/24/2008	2F	Chromium	mg/L	ND
5/15/2008	2F	Chromium	mg/L	ND
6/5/2008	2F	Chromium	mg/L	ND
7/3/2008	2F	Chromium	mg/L	ND
7/3/2008	2F	Chromium	mg/L	ND
7/24/2008	2F	Chromium	mg/L	0.007
8/14/2008	2F	Chromium	mg/L	ND
9/4/2008	2F	Chromium	mg/L	ND
10/9/2008	2F	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/30/2008	2F	Chromium	mg/L	0.007
11/20/2008	2F	Chromium	mg/L	0.007
12/11/2008	2F	Chromium	mg/L	ND
1/8/2009	2F	Chromium	mg/L	0.010
1/29/2009	2F	Chromium	mg/L	ND
2/19/2009	2F	Chromium	mg/L	ND
3/12/2009	2F	Chromium	mg/L	ND
4/9/2009	2F	Chromium	mg/L	ND
4/30/2009	2F	Chromium	mg/L	ND
5/21/2009	2F	Chromium	mg/L	ND
1/24/2008	2F	Chromium	mg/L	ND
1/3/2008	2F	Chromium	mg/L	ND
2/14/2008	2F	Chromium	mg/L	ND
3/6/2008	2F	Chromium	mg/L	ND
3/6/2008	2F	Chromium	mg/L	ND
6/11/2009	2F	Chromium	mg/L	ND
6/8/2006	2F	Chromium, hexavalent	mg/l	ND
7/6/2006	2F	Chromium, hexavalent	mg/l	ND
7/27/2006	2F	Chromium, hexavalent	mg/l	ND
8/17/2006	2F	Chromium, hexavalent	mg/l	ND
9/7/2006	2F	Chromium, hexavalent	mg/l	ND
10/19/2006	2F	Chromium, hexavalent	mg/l	ND
11/9/2006	2F	Chromium, hexavalent	mg/l	ND
11/30/2006	2F	Chromium, hexavalent	mg/l	ND
12/21/2006	2F	Chromium, hexavalent	mg/l	ND
1/4/2007	2F	Chromium, hexavalent	mg/l	ND
1/25/2007	2F	Chromium, hexavalent	mg/l	ND
2/15/2007	2F	Chromium, hexavalent	mg/l	ND
3/8/2007	2F	Chromium, hexavalent	mg/l	ND
4/19/2007	2F	Chromium, hexavalent	mg/l	ND
5/10/2007	2F	Chromium, hexavalent	mg/l	ND
5/31/2007	2F	Chromium, hexavalent	mg/l	ND
6/21/2007	2F	Chromium, hexavalent	mg/l	ND
8/2/2007	2F	Chromium, hexavalent	mg/L	ND
8/23/2007	2F	Chromium, hexavalent	mg/L	ND
9/13/2007	2F	Chromium, hexavalent	mg/L	ND
4/3/2008	2F	Chromium, Hexavalent	mg/L	ND
4/24/2008	2F	Chromium, hexavalent	mg/L	ND
5/15/2008	2F	Chromium, hexavalent	mg/L	ND
6/5/2008	2F	Chromium, hexavalent	mg/L	ND
7/3/2008	2F	Chromium, Hexavalent	mg/L	ND
7/3/2008	2F	Chromium, Hexavalent	mg/L	ND
7/24/2008	2F	Chromium, Hexavalent	mg/L	ND
8/14/2008	2F	Chromium, Hexavalent	mg/L	ND
9/4/2008	2F	Chromium, Hexavalent	mg/L	ND
10/9/2008	2F	Chromium, hexavalent	mg/L	ND
10/30/2008	2F	Chromium, hexavalent	mg/L	ND
11/20/2008	2F	Chromium, hexavalent	mg/L	ND
12/11/2008	2F	Chromium, hexavalent	mg/L	ND
1/8/2009	2F	Chromium, hexavalent	mg/L	ND
1/29/2009	2F	Chromium, hexavalent	mg/L	ND
2/19/2009	2F	Chromium, hexavalent	mg/L	ND
3/12/2009	2F	Chromium, hexavalent	mg/L	ND
4/9/2009	2F	Chromium, hexavalent	mg/L	ND
4/30/2009	2F	Chromium, hexavalent	mg/L	ND
5/21/2009	2F	Chromium, hexavalent	mg/L	ND
1/24/2008	2F	Chromium, hexavalent	mg/L	ND
1/3/2008	2F	Chromium, hexavalent	mg/L	ND
10/18/2007	2F	Chromium, hexavalent	mg/L	ND
11/29/2007	2F	Chromium, hexavalent	mg/L	ND
11/8/2007	2F	Chromium, hexavalent	mg/L	ND
12/20/2007	2F	Chromium, hexavalent	mg/L	ND
2/14/2008	2F	Chromium, hexavalent	mg/L	ND
3/6/2008	2F	Chromium, hexavalent	mg/L	ND
3/6/2008	2F	Chromium, hexavalent	mg/L	0.01
6/11/2009	2F	Chromium, hexavalent	mg/L	ND
10/18/2007	2F	Chromium, ICP	mg/L	ND
11/29/2007	2F	Chromium, ICP	mg/L	ND
11/8/2007	2F	Chromium, ICP	mg/L	ND
12/20/2007	2F	Chromium, ICP	mg/L	ND
7/12/2007	2F	cis-1,2-Dichloroethene	ug/L	ND
7/12/2007	2F	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2F	Cobalt	mg/L	0.018
7/12/2007	2F	Copper	mg/L	ND
7/12/2007	2F	Cyanide	mg/L	ND
7/12/2007	2F	Dibromochloromethane	ug/L	ND
7/12/2007	2F	Dibromomethane	ug/L	ND
7/12/2007	2F	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2F	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	2F	Ethylbenzene	ug/L	ND
7/12/2007	2F	Hexachlorobutadiene	ug/L	ND
6/8/2006	2F	Iron	mg/L	1.21
7/6/2006	2F	Iron	mg/L	47
7/6/2006	2F	Iron	mg/L	47
7/27/2006	2F	Iron	mg/L	3.58

Sampling Date	Location ID	Analyte	Unit	Concentration
8/17/2006	2F	Iron	mg/L	3.75
9/7/2006	2F	Iron	mg/L	3.13
10/19/2006	2F	Iron	mg/L	36.5
11/9/2006	2F	Iron	mg/L	6.68
11/30/2006	2F	Iron	mg/L	6.52
12/21/2006	2F	Iron	mg/L	9.79
1/4/2007	2F	Iron	mg/L	78.9
1/25/2007	2F	Iron	mg/L	8.11
2/15/2007	2F	Iron	mg/L	2.43
3/8/2007	2F	Iron	mg/L	0.635
4/19/2007	2F	Iron	mg/L	379
5/10/2007	2F	Iron	mg/L	143
5/31/2007	2F	Iron	mg/L	130
6/21/2007	2F	Iron	mg/L	124
7/12/2007	2F	Iron	mg/L	54.9
8/2/2007	2F	Iron	mg/L	1.4
8/23/2007	2F	Iron	mg/L	1.18
9/13/2007	2F	Iron	mg/L	1.61
4/3/2008	2F	Iron	mg/L	6.67
4/24/2008	2F	Iron	mg/L	2.11
5/15/2008	2F	Iron	mg/L	0.559
6/5/2008	2F	Iron	mg/L	1.30
7/3/2008	2F	Iron	mg/L	2.23
7/3/2008	2F	Iron	mg/L	2.23
7/24/2008	2F	Iron	mg/L	0.667
8/14/2008	2F	Iron	mg/L	0.494
9/4/2008	2F	Iron	mg/L	0.705
10/9/2008	2F	Iron	mg/L	6.76
10/30/2008	2F	Iron	mg/L	1.77
11/20/2008	2F	Iron	mg/L	1.7
12/11/2008	2F	Iron	mg/L	1.25
1/8/2009	2F	Iron	mg/L	28.9
1/29/2009	2F	Iron	mg/L	1.26
2/19/2009	2F	Iron	mg/L	1.16
3/12/2009	2F	Iron	mg/L	1.41
4/9/2009	2F	Iron	mg/L	6.91
4/30/2009	2F	Iron	mg/L	0.859
5/21/2009	2F	Iron	mg/L	0.435
1/24/2008	2F	Iron	mg/L	2.01
1/3/2008	2F	Iron	mg/L	19.6
10/18/2007	2F	Iron	mg/L	8.08
11/29/2007	2F	Iron	mg/L	1.87
11/8/2007	2F	Iron	mg/L	1.88
12/20/2007	2F	Iron	mg/L	1.93
2/14/2008	2F	Iron	mg/L	1.48
3/6/2008	2F	Iron	mg/L	5.21
3/6/2008	2F	Iron	mg/L	ND
6/11/2009	2F	Iron	mg/L	29.9
7/12/2007	2F	Isopropylbenzene	ug/L	ND
7/12/2007	2F	Lead	mg/L	ND
7/12/2007	2F	m,p-Xylene	ug/L	ND
7/12/2007	2F	Magnesium	mg/L	23.5
6/8/2006	2F	Manganese	mg/L	0.323
7/6/2006	2F	Manganese	mg/L	1.43
7/27/2006	2F	Manganese	mg/L	0.221
8/17/2006	2F	Manganese	mg/L	0.194
9/7/2006	2F	Manganese	mg/L	0.172
10/19/2006	2F	Manganese	mg/L	1.17
11/9/2006	2F	Manganese	mg/L	0.29
11/30/2006	2F	Manganese	mg/L	0.232
12/21/2006	2F	Manganese	mg/L	0.234
1/4/2007	2F	Manganese	mg/L	1.83
1/25/2007	2F	Manganese	mg/L	0.302
2/15/2007	2F	Manganese	mg/L	0.151
3/8/2007	2F	Manganese	mg/L	0.083
4/19/2007	2F	Manganese	mg/L	247
5/10/2007	2F	Manganese	mg/L	3.1
5/31/2007	2F	Manganese	mg/L	3.1
6/21/2007	2F	Manganese	mg/L	2.8
7/12/2007	2F	Manganese	mg/L	1.67
8/2/2007	2F	Manganese	mg/L	0.246
8/23/2007	2F	Manganese	mg/L	0.163
9/13/2007	2F	Manganese	mg/L	0.122
4/3/2008	2F	Manganese	mg/L	0.677
4/24/2008	2F	Manganese	mg/L	0.139
5/15/2008	2F	Manganese	mg/L	0.110
6/5/2008	2F	Manganese	mg/L	0.183
7/3/2008	2F	Manganese	mg/L	0.514
7/3/2008	2F	Manganese	mg/L	0.514
7/24/2008	2F	Manganese	mg/L	0.131
8/14/2008	2F	Manganese	mg/L	0.121
9/4/2008	2F	Manganese	mg/L	0.109
10/9/2008	2F	Manganese	mg/L	0.440
10/30/2008	2F	Manganese	mg/L	0.130
11/20/2008	2F	Manganese	mg/L	0.112

Sampling Date	Location ID	Analyte	Unit	Concentration
12/11/2008	2F	Manganese	mg/L	0.079
1/8/2009	2F	Manganese	mg/L	1.84
1/29/2009	2F	Manganese	mg/L	0.188
2/19/2009	2F	Manganese	mg/L	0.101
3/12/2009	2F	Manganese	mg/L	0.106
4/9/2009	2F	Manganese	mg/L	0.531
4/30/2009	2F	Manganese	mg/L	0.145
5/21/2009	2F	Manganese	mg/L	0.134
1/24/2008	2F	Manganese	mg/L	0.127
1/3/2008	2F	Manganese	mg/L	0.748
10/18/2007	2F	Manganese	mg/L	0.378
11/29/2007	2F	Manganese	mg/L	0.101
11/8/2007	2F	Manganese	mg/L	0.091
12/20/2007	2F	Manganese	mg/L	0.113
2/14/2008	2F	Manganese	mg/L	0.099
3/6/2008	2F	Manganese	mg/L	0.397
3/6/2008	2F	Manganese	mg/L	0.111
6/11/2009	2F	Manganese	mg/L	1.45
7/12/2007	2F	Mercury	mg/L	ND
7/12/2007	2F	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2F	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2F	Naphthalene	ug/L	155
7/12/2007	2F	n-Butylbenzene	ug/L	ND
7/12/2007	2F	Nickel	mg/L	0.028
7/12/2007	2F	Nitrate	mg/L	ND
7/12/2007	2F	Nitrate/Nitrite	mg/L	ND
7/12/2007	2F	Nitrite	mg/L	ND
7/12/2007	2F	n-Propylbenzene	ug/L	ND
7/12/2007	2F	o-Xylene	ug/L	ND
6/8/2006	2F	pH	pH Units	3.76
7/6/2006	2F	pH	pH Units	3.92
7/27/2006	2F	pH	pH Units	3.73
8/17/2006	2F	pH	pH Units	3.84
9/7/2006	2F	pH	pH Units	3.92
10/19/2006	2F	pH	pH Units	4.1
11/9/2006	2F	pH	pH Units	3.73
11/30/2006	2F	pH	pH Units	3.96
12/21/2006	2F	pH	pH Units	4.03
1/4/2007	2F	pH	pH Units	4.23
1/25/2007	2F	pH	pH Units	4.09
2/15/2007	2F	pH	pH Units	4.47
3/8/2007	2F	pH	pH Units	3.98
4/19/2007	2F	pH	pH Units	3.88
5/10/2007	2F	pH	pH Units	3.65
5/31/2007	2F	pH	pH Units	4.03
6/21/2007	2F	pH	pH Units	3.92
7/12/2007	2F	pH	pH	3.57
7/12/2007	2F	pH	pH	3.56
7/12/2007	2F	pH	pH	3.58
7/12/2007	2F	pH	pH	3.6
8/2/2007	2F	pH	pH	3.69
8/2/2007	2F	pH	pH	3.68
8/2/2007	2F	pH	pH	3.61
8/2/2007	2F	pH	pH	3.69
8/23/2007	2F	pH	pH	3.86
8/23/2007	2F	pH	pH	3.73
8/23/2007	2F	pH	pH	3.71
8/23/2007	2F	pH	pH	3.76
9/13/2007	2F	pH	pH	3.76
9/13/2007	2F	pH	pH	3.77
9/13/2007	2F	pH	pH	3.74
9/13/2007	2F	pH	pH	3.72
4/3/2008	2F	pH	pH	4.29
4/3/2008	2F	pH	pH	4.36
4/3/2008	2F	pH	pH	4.39
4/3/2008	2F	pH	pH	4.36
4/24/2008	2F	pH	pH	4.19
4/24/2008	2F	pH	pH	4.19
4/24/2008	2F	pH	pH	4.25
4/24/2008	2F	pH	pH	4.32
5/15/2008	2F	pH	pH	3.89
5/15/2008	2F	pH	pH	3.96
5/15/2008	2F	pH	pH	3.98
5/15/2008	2F	pH	pH	4.00
6/5/2008	2F	pH	pH	3.76
6/5/2008	2F	pH	pH	3.84
6/5/2008	2F	pH	pH	3.87
6/5/2008	2F	pH	pH	3.91
7/3/2008	2F	pH	pH	4.13
7/3/2008	2F	pH	pH	4.07
7/3/2008	2F	pH	pH	3.82
7/3/2008	2F	pH	pH	3.98
7/3/2008	2F	pH	pH	3.82
7/3/2008	2F	pH	pH	3.98
7/3/2008	2F	pH	pH	4.07

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2F	pH	pH	4.13
7/24/2008	2F	pH	pH	3.36
7/24/2008	2F	pH	pH	3.46
7/24/2008	2F	pH	pH	3.51
7/24/2008	2F	pH	pH	3.6
8/14/2008	2F	pH	pH	3.7
8/14/2008	2F	pH	pH	3.85
8/14/2008	2F	pH	pH	3.9
8/14/2008	2F	pH	pH	3.92
9/4/2008	2F	pH	pH	3.83
9/4/2008	2F	pH	pH	3.95
9/4/2008	2F	pH	pH	3.95
9/4/2008	2F	pH	pH	3.99
10/9/2008	2F	pH	pH	4.17
10/9/2008	2F	pH	pH	4.37
10/9/2008	2F	pH	pH	4.37
10/9/2008	2F	pH	pH	4.41
10/30/2008	2F	pH	pH	3.81
10/30/2008	2F	pH	pH	3.81
10/30/2008	2F	pH	pH	3.83
10/30/2008	2F	pH	pH	3.91
11/20/2008	2F	pH	pH	3.94
11/20/2008	2F	pH	pH	3.95
11/20/2008	2F	pH	pH	3.99
11/20/2008	2F	pH	pH	4.01
12/11/2008	2F	pH	pH	3.89
12/11/2008	2F	pH	pH	3.94
12/11/2008	2F	pH	pH	3.98
12/11/2008	2F	pH	pH	3.98
1/8/2009	2F	pH	pH	3.68
1/8/2009	2F	pH	pH	3.70
1/8/2009	2F	pH	pH	3.71
1/8/2009	2F	pH	pH	3.73
1/29/2009	2F	pH	pH	3.92
1/29/2009	2F	pH	pH	3.95
1/29/2009	2F	pH	pH	4.01
1/29/2009	2F	pH	pH	4.07
2/19/2009	2F	pH	pH	4.04
2/19/2009	2F	pH	pH	4.06
2/19/2009	2F	pH	pH	4.10
2/19/2009	2F	pH	pH	4.14
3/12/2009	2F	pH	pH	4.04
3/12/2009	2F	pH	pH	4.08
3/12/2009	2F	pH	pH	4.10
3/12/2009	2F	pH	pH	4.12
4/9/2009	2F	pH	pH	4.53
4/9/2009	2F	pH	pH	4.46
4/9/2009	2F	pH	pH	4.42
4/9/2009	2F	pH	pH	4.47
4/30/2009	2F	pH	pH	3.97
4/30/2009	2F	pH	pH	3.81
4/30/2009	2F	pH	pH	3.70
4/30/2009	2F	pH	pH	3.75
5/21/2009	2F	pH	pH	4.04
5/21/2009	2F	pH	pH	3.94
5/21/2009	2F	pH	pH	3.82
5/21/2009	2F	pH	pH	3.83
1/24/2008	2F	pH	pH	3.81
1/24/2008	2F	pH	pH	3.83
1/24/2008	2F	pH	pH	3.84
1/24/2008	2F	pH	pH	3.84
1/3/2008	2F	pH	pH	3.85
1/3/2008	2F	pH	pH	3.75
1/3/2008	2F	pH	pH	3.66
1/3/2008	2F	pH	pH	3.93
10/18/2007	2F	pH	pH Units	4.44
10/18/2007	2F	pH	pH Units	4.39
10/18/2007	2F	pH	pH Units	4.23
10/18/2007	2F	pH	pH Units	4.37
11/29/2007	2F	pH	pH Units	3.6
11/29/2007	2F	pH	pH Units	3.61
11/29/2007	2F	pH	pH Units	3.61
11/29/2007	2F	pH	pH Units	3.64
11/8/2007	2F	pH	pH Units	3.9
11/8/2007	2F	pH	pH Units	3.89
11/8/2007	2F	pH	pH Units	3.9
11/8/2007	2F	pH	pH Units	3.93
12/20/2007	2F	pH	pH Units	3.67
12/20/2007	2F	pH	pH Units	3.64
12/20/2007	2F	pH	pH Units	3.6
12/20/2007	2F	pH	pH Units	3.67
2/14/2008	2F	pH	pH	4.30
2/14/2008	2F	pH	pH	4.27
2/14/2008	2F	pH	pH	4.28
2/14/2008	2F	pH	pH	4.23

Sampling Date	Location ID	Analyte	Unit	Concentration
3/6/2008	2F	pH	pH	3.93
3/6/2008	2F	pH	pH	3.91
3/6/2008	2F	pH	pH	3.91
3/6/2008	2F	pH	pH	3.98
3/6/2008	2F	pH	pH	4.02
3/6/2008	2F	pH	pH	4.01
3/6/2008	2F	pH	pH	3.93
3/6/2008	2F	pH	pH	4.05
6/11/2009	2F	pH	pH	3.21
6/11/2009	2F	pH	pH	3.42
6/11/2009	2F	pH	pH	3.6
6/11/2009	2F	pH	pH	3.6
7/12/2007	2F	Phenols	mg/L	ND
8/2/2007	2F	Phenols	mg/L	ND
8/23/2007	2F	Phenols	mg/L	ND
6/8/2006	2F	Phenols	mg/L	ND
7/6/2006	2F	Phenols	mg/L	ND
7/27/2006	2F	Phenols	mg/L	ND
8/17/2006	2F	Phenols	mg/L	ND
9/7/2006	2F	Phenols	mg/L	ND
10/19/2006	2F	Phenols	mg/L	ND
11/9/2006	2F	Phenols	mg/L	ND
11/30/2006	2F	Phenols	mg/L	ND
12/21/2006	2F	Phenols	mg/L	ND
1/4/2007	2F	Phenols	mg/L	ND
1/25/2007	2F	Phenols	mg/L	ND
2/15/2007	2F	Phenols	mg/L	ND
3/8/2007	2F	Phenols	mg/L	ND
4/19/2007	2F	Phenols	mg/L	ND
5/10/2007	2F	Phenols	mg/L	0.68
5/31/2007	2F	Phenols	mg/L	ND
6/21/2007	2F	Phenols	mg/L	ND
9/13/2007	2F	Phenols	mg/L	ND
10/18/2007	2F	Phenols	mg/L	0.07
11/29/2007	2F	Phenols	mg/L	0.09
11/8/2007	2F	Phenols	mg/L	ND
12/20/2007	2F	Phenols	mg/L	0.2
4/3/2008	2F	Phenols, Total	mg/L	ND
4/24/2008	2F	Phenols, Total	mg/L	ND
5/15/2008	2F	Phenols, Total	mg/L	ND
6/5/2008	2F	Phenols, Total	mg/L	ND
7/3/2008	2F	Phenols, Total	mg/L	ND
7/3/2008	2F	Phenols, Total	mg/L	ND
7/24/2008	2F	Phenols, Total	mg/L	ND
8/14/2008	2F	Phenols, Total	mg/L	ND
9/4/2008	2F	Phenols, Total	mg/L	ND
10/9/2008	2F	Phenols, Total	mg/L	ND
10/30/2008	2F	Phenols, Total	mg/L	ND
11/20/2008	2F	Phenols, Total	mg/L	ND
12/11/2008	2F	Phenols, Total	mg/L	ND
1/8/2009	2F	Phenols, Total	mg/L	ND
1/29/2009	2F	Phenols, Total	mg/L	ND
2/19/2009	2F	Phenols, Total	mg/L	ND
3/12/2009	2F	Phenols, Total	mg/L	ND
4/9/2009	2F	Phenols, Total	mg/L	ND
4/30/2009	2F	Phenols, Total	mg/L	ND
5/21/2009	2F	Phenols, Total	mg/L	ND
1/24/2008	2F	Phenols, Total	mg/L	ND
1/3/2008	2F	Phenols, Total	mg/L	ND
2/14/2008	2F	Phenols, Total	mg/L	ND
3/6/2008	2F	Phenols, Total	mg/L	ND
3/6/2008	2F	Phenols, Total	mg/L	ND
6/11/2009	2F	Phenols, Total	mg/L	ND
7/12/2007	2F	Potassium	mg/L	7.54
7/12/2007	2F	sec-Butylbenzene	ug/L	ND
7/12/2007	2F	Selenium	mg/L	0.004
7/12/2007	2F	Silver	mg/L	ND
6/8/2006	2F	Sodium	mg/L	27
7/6/2006	2F	Sodium	mg/L	73.2
7/27/2006	2F	Sodium	mg/L	20.1
8/17/2006	2F	Sodium	mg/L	23.7
9/7/2006	2F	Sodium	mg/L	22.2
10/19/2006	2F	Sodium	mg/L	138
11/9/2006	2F	Sodium	mg/L	37.4
11/30/2006	2F	Sodium	mg/L	32.3
12/21/2006	2F	Sodium	mg/L	32.5
1/4/2007	2F	Sodium	mg/L	123
1/25/2007	2F	Sodium	mg/L	30.6
2/15/2007	2F	Sodium	mg/L	16.2
3/8/2007	2F	Sodium	mg/L	11.5
4/19/2007	2F	Sodium	mg/L	484
5/10/2007	2F	Sodium	mg/L	249
5/31/2007	2F	Sodium	mg/L	203
6/21/2007	2F	Sodium	mg/L	222
7/12/2007	2F	Sodium	mg/L	159

Sampling Date	Location ID	Analyte	Unit	Concentration
8/2/2007	2F	Sodium	mg/L	26.4
8/23/2007	2F	Sodium	mg/L	17.5
9/13/2007	2F	Sodium	mg/L	12.2
4/3/2008	2F	Sodium	mg/L	72.9
4/24/2008	2F	Sodium	mg/L	14.8
5/15/2008	2F	Sodium	mg/L	14.6
6/5/2008	2F	Sodium	mg/L	27.4
7/3/2008	2F	Sodium	mg/L	75
7/3/2008	2F	Sodium	mg/L	75
7/24/2008	2F	Sodium	mg/L	17
8/14/2008	2F	Sodium	mg/L	15.9
9/4/2008	2F	Sodium	mg/L	16.4
10/9/2008	2F	Sodium	mg/L	60.5
10/30/2008	2F	Sodium	mg/L	17.2
11/20/2008	2F	Sodium	mg/L	14.8
12/11/2008	2F	Sodium	mg/L	13.3
1/8/2009	2F	Sodium	mg/L	66.2
1/29/2009	2F	Sodium	mg/L	16.3
2/19/2009	2F	Sodium	mg/L	14.1
3/12/2009	2F	Sodium	mg/L	15.5
4/9/2009	2F	Sodium	mg/L	77.6
4/30/2009	2F	Sodium	mg/L	17.5
5/21/2009	2F	Sodium	mg/L	14.6
1/24/2008	2F	Sodium	mg/L	14.1
1/3/2008	2F	Sodium	mg/L	69.8
10/18/2007	2F	Sodium	mg/L	28.9
11/29/2007	2F	Sodium	mg/L	10.9
11/8/2007	2F	Sodium	mg/L	9.65
12/20/2007	2F	Sodium	mg/L	12.1
2/14/2008	2F	Sodium	mg/L	10.3
3/6/2008	2F	Sodium	mg/L	39.3
3/6/2008	2F	Sodium	mg/L	14.8
6/11/2009	2F	Sodium	mg/L	138
7/12/2007	2F	Solids, Total Dissolved	mg/L	1458
7/12/2007	2F	Solids, Total Suspended	mg/L	8
6/8/2006	2F	Specific Conductance	umhos	488
7/6/2006	2F	Specific Conductance	umhos	1289
7/27/2006	2F	Specific Conductance	umhos	332
8/17/2006	2F	Specific Conductance	umhos	331
9/7/2006	2F	Specific Conductance	umhos	270
10/19/2006	2F	Specific Conductance	umhos	1416
11/9/2006	2F	Specific Conductance	umhos	430
11/30/2006	2F	Specific Conductance	umhos	404
12/21/2006	2F	Specific Conductance	umhos	329
1/4/2007	2F	Specific Conductance	umhos	2220
1/25/2007	2F	Specific Conductance	umhos	344
2/15/2007	2F	Specific Conductance	umhos	273
3/8/2007	2F	Specific Conductance	umhos	146
4/19/2007	2F	Specific Conductance	umhos	1725
5/10/2007	2F	Specific Conductance	umhos	1333
5/31/2007	2F	Specific Conductance	umhos	1194
6/21/2007	2F	Specific Conductance	umhos	936
7/12/2007	2F	Specific Conductance	umhos	973
7/12/2007	2F	Specific Conductance	umhos	997
7/12/2007	2F	Specific Conductance	umhos	1015
7/12/2007	2F	Specific Conductance	umhos	1000
8/2/2007	2F	Specific Conductance	umhos	345
8/2/2007	2F	Specific Conductance	umhos	407
8/2/2007	2F	Specific Conductance	umhos	566
8/2/2007	2F	Specific Conductance	umhos	425
8/23/2007	2F	Specific Conductance	umhos	212
8/23/2007	2F	Specific Conductance	umhos	212
8/23/2007	2F	Specific Conductance	umhos	366
8/23/2007	2F	Specific Conductance	umhos	368
8/23/2007	2F	Specific Conductance	umhos	303
9/13/2007	2F	Specific Conductance	umhos	236
9/13/2007	2F	Specific Conductance	umhos	213
9/13/2007	2F	Specific Conductance	umhos	252
9/13/2007	2F	Specific Conductance	umhos	311
4/3/2008	2F	Specific Conductance	umhos	825
4/3/2008	2F	Specific Conductance	umhos	843
4/3/2008	2F	Specific Conductance	umhos	859
4/3/2008	2F	Specific Conductance	umhos	922
4/24/2008	2F	Specific Conductance	umhos	226
4/24/2008	2F	Specific Conductance	umhos	280
4/24/2008	2F	Specific Conductance	umhos	304
4/24/2008	2F	Specific Conductance	umhos	363
5/15/2008	2F	Specific Conductance	umhos	174
5/15/2008	2F	Specific Conductance	umhos	199
5/15/2008	2F	Specific Conductance	umhos	244
5/15/2008	2F	Specific Conductance	umhos	298
6/5/2008	2F	Specific Conductance	umhos	284
6/5/2008	2F	Specific Conductance	umhos	305
6/5/2008	2F	Specific Conductance	umhos	345
6/5/2008	2F	Specific Conductance	umhos	415

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2F	Specific Conductance	umhos	765
7/3/2008	2F	Specific Conductance	umhos	742
7/3/2008	2F	Specific Conductance	umhos	928
7/3/2008	2F	Specific Conductance	umhos	803
7/3/2008	2F	Specific Conductance	umhos	742
7/3/2008	2F	Specific Conductance	umhos	765
7/3/2008	2F	Specific Conductance	umhos	803
7/3/2008	2F	Specific Conductance	umhos	928
7/24/2008	2F	Specific Conductance	umhos	231
7/24/2008	2F	Specific Conductance	umhos	243
7/24/2008	2F	Specific Conductance	umhos	267
7/24/2008	2F	Specific Conductance	umhos	272
8/14/2008	2F	Specific Conductance	umhos	226
8/14/2008	2F	Specific Conductance	umhos	256
8/14/2008	2F	Specific Conductance	umhos	276
8/14/2008	2F	Specific Conductance	umhos	446
9/4/2008	2F	Specific Conductance	umhos	177
9/4/2008	2F	Specific Conductance	umhos	230
9/4/2008	2F	Specific Conductance	umhos	246
9/4/2008	2F	Specific Conductance	umhos	365
10/9/2008	2F	Specific Conductance	umhos	605
10/9/2008	2F	Specific Conductance	umhos	614
10/9/2008	2F	Specific Conductance	umhos	620
10/9/2008	2F	Specific Conductance	umhos	733
10/30/2008	2F	Specific Conductance	umhos	225
10/30/2008	2F	Specific Conductance	umhos	253
10/30/2008	2F	Specific Conductance	umhos	301
10/30/2008	2F	Specific Conductance	umhos	445
11/20/2008	2F	Specific Conductance	umhos	203
11/20/2008	2F	Specific Conductance	umhos	236
11/20/2008	2F	Specific Conductance	umhos	270
11/20/2008	2F	Specific Conductance	umhos	342
12/11/2008	2F	Specific Conductance	umhos	1835
12/11/2008	2F	Specific Conductance	umhos	2067
12/11/2008	2F	Specific Conductance	umhos	2297
12/11/2008	2F	Specific Conductance	umhos	4092
1/8/2009	2F	Specific Conductance	umhos	848
1/8/2009	2F	Specific Conductance	umhos	887
1/8/2009	2F	Specific Conductance	umhos	892
1/8/2009	2F	Specific Conductance	umhos	965
1/29/2009	2F	Specific Conductance	umhos	210
1/29/2009	2F	Specific Conductance	umhos	231
1/29/2009	2F	Specific Conductance	umhos	262
1/29/2009	2F	Specific Conductance	umhos	356
2/19/2009	2F	Specific Conductance	umhos	180
2/19/2009	2F	Specific Conductance	umhos	204
2/19/2009	2F	Specific Conductance	umhos	205
2/19/2009	2F	Specific Conductance	umhos	306
3/12/2009	2F	Specific Conductance	umhos	177
3/12/2009	2F	Specific Conductance	umhos	221
3/12/2009	2F	Specific Conductance	umhos	224
3/12/2009	2F	Specific Conductance	umhos	414
4/9/2009	2F	Specific Conductance	umhos	766
4/9/2009	2F	Specific Conductance	umhos	783
4/9/2009	2F	Specific Conductance	umhos	851
4/9/2009	2F	Specific Conductance	umhos	762
4/30/2009	2F	Specific Conductance	umhos	225
4/30/2009	2F	Specific Conductance	umhos	271
4/30/2009	2F	Specific Conductance	umhos	376
4/30/2009	2F	Specific Conductance	umhos	270
5/21/2009	2F	Specific Conductance	umhos	206
5/21/2009	2F	Specific Conductance	umhos	292
5/21/2009	2F	Specific Conductance	umhos	281
5/21/2009	2F	Specific Conductance	umhos	276
1/24/2008	2F	Specific Conductance	umhos	192
1/24/2008	2F	Specific Conductance	umhos	226
1/24/2008	2F	Specific Conductance	umhos	314
1/24/2008	2F	Specific Conductance	umhos	227
1/3/2008	2F	Specific Conductance	umhos	580
1/3/2008	2F	Specific Conductance	umhos	599
1/3/2008	2F	Specific Conductance	umhos	658
1/3/2008	2F	Specific Conductance	umhos	591
10/18/2007	2F	Specific Conductance	umhos	357
10/18/2007	2F	Specific Conductance	umhos	378
10/18/2007	2F	Specific Conductance	umhos	432
10/18/2007	2F	Specific Conductance	umhos	385
11/29/2007	2F	Specific Conductance	umhos	165
11/29/2007	2F	Specific Conductance	umhos	138
11/29/2007	2F	Specific Conductance	umhos	270
11/29/2007	2F	Specific Conductance	umhos	175
11/8/2007	2F	Specific Conductance	umhos	155
11/8/2007	2F	Specific Conductance	umhos	205
11/8/2007	2F	Specific Conductance	umhos	294
11/8/2007	2F	Specific Conductance	umhos	185
12/20/2007	2F	Specific Conductance	umhos	161

Sampling Date	Location ID	Analyte	Unit	Concentration
12/20/2007	2F	Specific Conductance	umhos	225
12/20/2007	2F	Specific Conductance	umhos	320
12/20/2007	2F	Specific Conductance	umhos	187
2/14/2008	2F	Specific Conductance	umhos	148
2/14/2008	2F	Specific Conductance	umhos	157
2/14/2008	2F	Specific Conductance	umhos	163
2/14/2008	2F	Specific Conductance	umhos	172
3/6/2008	2F	Specific Conductance	umhos	582
3/6/2008	2F	Specific Conductance	umhos	647
3/6/2008	2F	Specific Conductance	umhos	708
3/6/2008	2F	Specific Conductance	umhos	541
3/6/2008	2F	Specific Conductance	umhos	211
3/6/2008	2F	Specific Conductance	umhos	271
3/6/2008	2F	Specific Conductance	umhos	404
3/6/2008	2F	Specific Conductance	umhos	238
6/11/2009	2F	Specific Conductance	umhos	1469
6/11/2009	2F	Specific Conductance	umhos	1566
6/11/2009	2F	Specific Conductance	umhos	1660
6/11/2009	2F	Specific Conductance	umhos	2170
7/12/2007	2F	Styrene	ug/L	ND
7/12/2007	2F	Sulfate	mg/L	972
8/2/2007	2F	Sulfate	mg/L	136
8/23/2007	2F	Sulfate	mg/L	89.6
9/13/2007	2F	Sulfate	mg/L	62.7
4/3/2008	2F	Sulfate	mg/L	418
4/24/2008	2F	Sulfate	mg/L	94.9
5/15/2008	2F	Sulfate	mg/L	108
6/5/2008	2F	Sulfate	mg/L	135
7/3/2008	2F	Sulfate	mg/L	432
7/3/2008	2F	Sulfate	mg/L	432
7/24/2008	2F	Sulfate	mg/L	135
8/14/2008	2F	Sulfate	mg/L	102
9/4/2008	2F	Sulfate	mg/L	69.4
10/9/2008	2F	Sulfate	mg/L	293
10/30/2008	2F	Sulfate	mg/L	104
11/20/2008	2F	Sulfate	mg/L	106
12/11/2008	2F	Sulfate	mg/L	35.1
1/8/2009	2F	Sulfate	mg/L	422
1/29/2009	2F	Sulfate	mg/L	82.2
2/19/2009	2F	Sulfate	mg/L	103
3/12/2009	2F	Sulfate	mg/L	75.6
4/9/2009	2F	Sulfate	mg/L	406
4/30/2009	2F	Sulfate	mg/L	83.7
5/21/2009	2F	Sulfate	mg/L	90.6
1/24/2008	2F	Sulfate	mg/L	62.8
1/3/2008	2F	Sulfate	mg/L	425
2/14/2008	2F	Sulfate	mg/L	54.6
3/6/2008	2F	Sulfate	mg/L	231
3/6/2008	2F	Sulfate	mg/L	80.9
6/8/2006	2F	Sulfate	mg/L	189
7/6/2006	2F	Sulfate	mg/L	726
7/27/2006	2F	Sulfate	mg/L	132
8/17/2006	2F	Sulfate	mg/L	150
9/7/2006	2F	Sulfate	mg/L	141
10/19/2006	2F	Sulfate	mg/L	779
11/9/2006	2F	Sulfate	mg/L	250
11/30/2006	2F	Sulfate	mg/L	163
12/21/2006	2F	Sulfate	mg/L	158
1/4/2007	2F	Sulfate	mg/L	1164
1/25/2007	2F	Sulfate	mg/L	206
2/15/2007	2F	Sulfate	mg/L	109
3/8/2007	2F	Sulfate	mg/L	45
4/19/2007	2F	Sulfate	mg/L	2267
5/10/2007	2F	Sulfate	mg/L	1950
5/31/2007	2F	Sulfate	mg/L	1760
6/21/2007	2F	Sulfate	mg/L	1561
10/18/2007	2F	Sulfate	mg/L	180
11/29/2007	2F	Sulfate	mg/L	56.7
11/8/2007	2F	Sulfate	mg/L	57.3
12/20/2007	2F	Sulfate	mg/L	77
6/11/2009	2F	Sulfate	mg/L	903
6/8/2006	2F	Temperature	C	15
7/6/2006	2F	Temperature	C	16
7/27/2006	2F	Temperature	C	16
8/17/2006	2F	Temperature	C	15
9/7/2006	2F	Temperature	C	17
10/19/2006	2F	Temperature	C	17
11/9/2006	2F	Temperature	C	17
11/30/2006	2F	Temperature	C	18
12/21/2006	2F	Temperature	C	15
1/4/2007	2F	Temperature	C	16
1/25/2007	2F	Temperature	C	14
2/15/2007	2F	Temperature	C	13
3/8/2007	2F	Temperature	C	14
4/19/2007	2F	Temperature	C	14

Sampling Date	Location ID	Analyte	Unit	Concentration
5/10/2007	2F	Temperature	C	15
5/31/2007	2F	Temperature	C	15
6/21/2007	2F	Temperature	C	15
7/12/2007	2F	Temperature	C	16
7/12/2007	2F	Temperature	C	16
7/12/2007	2F	Temperature	C	16
7/12/2007	2F	Temperature	C	16
8/2/2007	2F	Temperature	C	16
8/2/2007	2F	Temperature	C	16
8/2/2007	2F	Temperature	C	17
8/2/2007	2F	Temperature	C	17
8/23/2007	2F	Temperature	C	16
8/23/2007	2F	Temperature	C	16
8/23/2007	2F	Temperature	C	16
8/23/2007	2F	Temperature	C	17
9/13/2007	2F	Temperature	C	16
9/13/2007	2F	Temperature	C	16
9/13/2007	2F	Temperature	C	16
9/13/2007	2F	Temperature	C	16
4/3/2008	2F	Temperature	C	14
4/3/2008	2F	Temperature	C	14
4/3/2008	2F	Temperature	C	14
4/3/2008	2F	Temperature	C	14
4/24/2008	2F	Temperature	C	16
4/24/2008	2F	Temperature	C	16
4/24/2008	2F	Temperature	C	16
4/24/2008	2F	Temperature	C	17
5/15/2008	2F	Temperature	C	16
5/15/2008	2F	Temperature	C	16
5/15/2008	2F	Temperature	C	16
5/15/2008	2F	Temperature	C	16
6/5/2008	2F	Temperature	C	16
6/5/2008	2F	Temperature	C	16
6/5/2008	2F	Temperature	C	16
6/5/2008	2F	Temperature	C	16
7/3/2008	2F	Temperature	C	16
7/3/2008	2F	Temperature	C	16
7/3/2008	2F	Temperature	C	17
7/3/2008	2F	Temperature	C	17
7/3/2008	2F	Temperature	C	16
7/3/2008	2F	Temperature	C	16
7/3/2008	2F	Temperature	C	17
7/3/2008	2F	Temperature	C	17
7/24/2008	2F	Temperature	C	16
7/24/2008	2F	Temperature	C	16
7/24/2008	2F	Temperature	C	16
7/24/2008	2F	Temperature	C	17
8/14/2008	2F	Temperature	C	17
8/14/2008	2F	Temperature	C	17
8/14/2008	2F	Temperature	C	17
8/14/2008	2F	Temperature	C	17
9/4/2008	2F	Temperature	C	17
9/4/2008	2F	Temperature	C	17
9/4/2008	2F	Temperature	C	17
9/4/2008	2F	Temperature	C	18
10/9/2008	2F	Temperature	C	17
10/9/2008	2F	Temperature	C	17
10/9/2008	2F	Temperature	C	18
10/9/2008	2F	Temperature	C	18
10/30/2008	2F	Temperature	C	16
10/30/2008	2F	Temperature	C	16
10/30/2008	2F	Temperature	C	16
10/30/2008	2F	Temperature	C	16
11/20/2008	2F	Temperature	C	15
11/20/2008	2F	Temperature	C	15
11/20/2008	2F	Temperature	C	15
11/20/2008	2F	Temperature	C	15
12/11/2008	2F	Temperature	C	15
12/11/2008	2F	Temperature	C	15
12/11/2008	2F	Temperature	C	15
12/11/2008	2F	Temperature	C	15
1/8/2009	2F	Temperature	C	15
1/8/2009	2F	Temperature	C	15
1/8/2009	2F	Temperature	C	15
1/8/2009	2F	Temperature	C	15
1/29/2009	2F	Temperature	C	14
1/29/2009	2F	Temperature	C	14
1/29/2009	2F	Temperature	C	14
1/29/2009	2F	Temperature	C	15
2/19/2009	2F	Temperature	C	14
2/19/2009	2F	Temperature	C	15
2/19/2009	2F	Temperature	C	15
2/19/2009	2F	Temperature	C	15
3/12/2009	2F	Temperature	C	14
3/12/2009	2F	Temperature	C	14

Sampling Date	Location ID	Analyte	Unit	Concentration
3/12/2009	2F	Temperature	C	14
3/12/2009	2F	Temperature	C	14
4/9/2009	2F	Temperature	C	15
4/9/2009	2F	Temperature	C	15
4/9/2009	2F	Temperature	C	15
4/9/2009	2F	Temperature	C	15
4/30/2009	2F	Temperature	C	14
4/30/2009	2F	Temperature	C	14
4/30/2009	2F	Temperature	C	14
4/30/2009	2F	Temperature	C	15
5/21/2009	2F	Temperature	C	16
5/21/2009	2F	Temperature	C	16
5/21/2009	2F	Temperature	C	15
5/21/2009	2F	Temperature	C	15
1/24/2008	2F	Temperature	C	15
1/24/2008	2F	Temperature	C	15
1/24/2008	2F	Temperature	C	15
1/24/2008	2F	Temperature	C	15
1/3/2008	2F	Temperature	C	15
1/3/2008	2F	Temperature	C	14
1/3/2008	2F	Temperature	C	15
1/3/2008	2F	Temperature	C	14
10/18/2007	2F	Temperature	C	18.6
10/18/2007	2F	Temperature	C	17.4
10/18/2007	2F	Temperature	C	16.7
10/18/2007	2F	Temperature	C	17.6
11/29/2007	2F	Temperature	C	16
11/29/2007	2F	Temperature	C	16
11/29/2007	2F	Temperature	C	16
11/29/2007	2F	Temperature	C	15
11/8/2007	2F	Temperature	C	16
11/8/2007	2F	Temperature	C	16
11/8/2007	2F	Temperature	C	16
11/8/2007	2F	Temperature	C	16
12/20/2007	2F	Temperature	C	16
12/20/2007	2F	Temperature	C	16
12/20/2007	2F	Temperature	C	15
12/20/2007	2F	Temperature	C	16
2/14/2008	2F	Temperature	C	14.8
2/14/2008	2F	Temperature	C	14.6
2/14/2008	2F	Temperature	C	14.7
2/14/2008	2F	Temperature	C	14.1
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	15
3/6/2008	2F	Temperature	C	14
3/6/2008	2F	Temperature	C	15
6/11/2009	2F	Temperature	C	15
6/11/2009	2F	Temperature	C	15
6/11/2009	2F	Temperature	C	15
6/11/2009	2F	Temperature	C	15
7/12/2007	2F	tert-Butylbenzene	ug/L	ND
7/12/2007	2F	Tetrachloroethene	ug/L	ND
7/12/2007	2F	Thallium	mg/L	ND
7/12/2007	2F	Toluene	ug/L	ND
7/12/2007	2F	Total Alkalinity	mg/L	ND
7/12/2007	2F	Total Hardness,Calculation	mg/L	483
6/8/2006	2F	Total Organic Carbon	mg/L	ND
7/6/2006	2F	Total Organic Carbon	mg/L	1.3
7/27/2006	2F	Total Organic Carbon	mg/L	ND
8/17/2006	2F	Total Organic Carbon	mg/L	ND
9/7/2006	2F	Total Organic Carbon	mg/L	ND
10/19/2006	2F	Total Organic Carbon	mg/L	1.7
11/9/2006	2F	Total Organic Carbon	mg/L	1.1
11/30/2006	2F	Total Organic Carbon	mg/L	ND
12/21/2006	2F	Total Organic Carbon	mg/L	1.2
1/4/2007	2F	Total Organic Carbon	mg/L	3.4
1/25/2007	2F	Total Organic Carbon	mg/L	ND
2/15/2007	2F	Total Organic Carbon	mg/L	ND
3/8/2007	2F	Total Organic Carbon	mg/L	ND
4/19/2007	2F	Total Organic Carbon	mg/L	7.3
5/10/2007	2F	Total Organic Carbon	mg/L	4.9
5/31/2007	2F	Total Organic Carbon	mg/L	4.7
6/21/2007	2F	Total Organic Carbon	mg/L	3.9
7/12/2007	2F	Total Organic Carbon	mg/L	2.9
8/2/2007	2F	Total Organic Carbon	mg/L	ND
8/23/2007	2F	Total Organic Carbon	mg/L	4.6
9/13/2007	2F	Total Organic Carbon	mg/L	ND
4/3/2008	2F	Total Organic Carbon	mg/L	1.8
4/24/2008	2F	Total Organic Carbon	mg/L	ND
5/15/2008	2F	Total Organic Carbon	mg/L	ND
6/5/2008	2F	Total Organic Carbon	mg/L	1.0

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2F	Total Organic Carbon	mg/L	1.5
7/3/2008	2F	Total Organic Carbon	mg/L	1.5
7/24/2008	2F	Total Organic Carbon	mg/L	ND
8/14/2008	2F	Total Organic Carbon	mg/L	1.5
9/4/2008	2F	Total Organic Carbon	mg/L	ND
10/9/2008	2F	Total Organic Carbon	mg/L	1.6
10/30/2008	2F	Total Organic Carbon	mg/L	ND
11/20/2008	2F	Total Organic Carbon	mg/L	ND
12/11/2008	2F	Total Organic Carbon	mg/L	ND
1/8/2009	2F	Total Organic Carbon	mg/L	2.1
1/29/2009	2F	Total Organic Carbon	mg/L	ND
2/19/2009	2F	Total Organic Carbon	mg/L	ND
3/12/2009	2F	Total Organic Carbon	mg/L	ND
4/9/2009	2F	Total Organic Carbon	mg/L	1.7
4/30/2009	2F	Total Organic Carbon	mg/L	ND
5/21/2009	2F	Total Organic Carbon	mg/L	ND
1/24/2008	2F	Total Organic Carbon	mg/L	ND
1/3/2008	2F	Total Organic Carbon	mg/L	1.5
10/18/2007	2F	Total Organic Carbon	mg/L	1
11/29/2007	2F	Total Organic Carbon	mg/L	ND
11/8/2007	2F	Total Organic Carbon	mg/L	ND
12/20/2007	2F	Total Organic Carbon	mg/L	ND
2/14/2008	2F	Total Organic Carbon	mg/L	ND
3/6/2008	2F	Total Organic Carbon	mg/L	1.5
3/6/2008	2F	Total Organic Carbon	mg/L	ND
6/11/2009	2F	Total Organic Carbon	mg/L	3
6/8/2006	2F	Total Organic Halogen	mg/L	ND
7/6/2006	2F	Total Organic Halogen	mg/L	0.017
7/27/2006	2F	Total Organic Halogen	mg/L	ND
8/17/2006	2F	Total Organic Halogen	mg/L	ND
9/7/2006	2F	Total Organic Halogen	mg/L	ND
10/19/2006	2F	Total Organic Halogen	mg/L	0.015
11/9/2006	2F	Total Organic Halogen	mg/L	ND
11/30/2006	2F	Total Organic Halogen	mg/L	ND
12/21/2006	2F	Total Organic Halogen	mg/L	ND
1/4/2007	2F	Total Organic Halogen	mg/L	0.02
2/15/2007	2F	Total Organic Halogen	mg/L	0.02
3/8/2007	2F	Total Organic Halogen	mg/L	0.04
4/19/2007	2F	Total Organic Halogen	mg/L	0.02
5/10/2007	2F	Total Organic Halogen	mg/L	0.03
5/31/2007	2F	Total Organic Halogen	mg/L	0.07
6/21/2007	2F	Total Organic Halogen	mg/L	0.036
7/12/2007	2F	Total Organic Halogen	mg/L	0.05
8/2/2007	2F	Total Organic Halogen	mg/L	0.021
8/23/2007	2F	Total Organic Halogen	mg/L	ND
9/13/2007	2F	Total Organic Halogen	mg/L	0.02
4/24/2008	2F	Total Organic Halogen	mg/L	0.03
5/15/2008	2F	Total Organic Halogen	mg/L	0.01
6/5/2008	2F	Total Organic Halogen	mg/L	ND
7/3/2008	2F	Total Organic Halogen	mg/L	0.01
7/3/2008	2F	Total Organic Halogen	mg/L	0.01
7/24/2008	2F	Total Organic Halogen	mg/L	ND
8/14/2008	2F	Total Organic Halogen	mg/L	ND
9/4/2008	2F	Total Organic Halogen	mg/L	ND
10/9/2008	2F	Total Organic Halogen	mg/L	ND
10/30/2008	2F	Total Organic Halogen	mg/L	0.04
11/20/2008	2F	Total Organic Halogen	mg/L	ND
12/11/2008	2F	Total Organic Halogen	mg/L	ND
1/8/2009	2F	Total Organic Halogen	mg/L	0.09
1/29/2009	2F	Total Organic Halogen	mg/L	0.01
2/19/2009	2F	Total Organic Halogen	mg/L	0.08
3/12/2009	2F	Total Organic Halogen	mg/L	ND
1/24/2008	2F	Total Organic Halogen	mg/L	0.04
1/3/2008	2F	Total Organic Halogen	mg/L	ND
10/18/2007	2F	Total Organic Halogen	mg/L	0.01
11/29/2007	2F	Total Organic Halogen	mg/L	0.02
11/8/2007	2F	Total Organic Halogen	mg/L	ND
12/20/2007	2F	Total Organic Halogen	mg/L	0.02
2/14/2008	2F	Total Organic Halogen	mg/L	ND
3/6/2008	2F	Total Organic Halogen	mg/L	0.06
3/6/2008	2F	Total Organic Halogen	mg/L	0.02
4/3/2008	2F	Total Organic Halogen	mg/L	0.09
4/9/2009	2F	Total Organic Halogen	mg/L	0.08
4/30/2009	2F	Total Organic Halogen	mg/L	ND
5/21/2009	2F	Total Organic Halogen	mg/L	ND
6/11/2009	2F	Total Organic Halogen	mg/L	ND
7/12/2007	2F	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2F	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2F	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2F	Trichloroethene	ug/L	ND
7/12/2007	2F	Trichlorofluoromethane	ug/L	ND
6/8/2006	2F	Turbidity	NTU	2.6
7/6/2006	2F	Turbidity	NTU	8.2
7/27/2006	2F	Turbidity	NTU	1.6
8/17/2006	2F	Turbidity	NTU	1.5

Sampling Date	Location ID	Analyte	Unit	Concentration
9/7/2006	2F	Turbidity	NTU	2.9
10/19/2006	2F	Turbidity	NTU	10
11/9/2006	2F	Turbidity	NTU	15
11/30/2006	2F	Turbidity	NTU	17
12/21/2006	2F	Turbidity	NTU	12
1/4/2007	2F	Turbidity	NTU	49
1/25/2007	2F	Turbidity	NTU	3.5
2/15/2007	2F	Turbidity	NTU	3.4
3/8/2007	2F	Turbidity	NTU	0.53
4/19/2007	2F	Turbidity	NTU	36
5/10/2007	2F	Turbidity	NTU	18
5/31/2007	2F	Turbidity	NTU	21
6/21/2007	2F	Turbidity	NTU	7.2
7/12/2007	2F	Turbidity	NTU	13
8/2/2007	2F	Turbidity	NTU	1.3
8/23/2007	2F	Turbidity	NTU	2.97
9/13/2007	2F	Turbidity	NTU	9
4/3/2008	2F	Turbidity	NTU	64
4/24/2008	2F	Turbidity	NTU	6.2
5/15/2008	2F	Turbidity	NTU	1.6
6/5/2008	2F	Turbidity	NTU	2.13
7/3/2008	2F	Turbidity	NTU	26
7/3/2008	2F	Turbidity	NTU	26
7/24/2008	2F	Turbidity	NTU	0.88
8/14/2008	2F	Turbidity	NTU	0.84
9/4/2008	2F	Turbidity	NTU	0.46
10/9/2008	2F	Turbidity	NTU	33
10/30/2008	2F	Turbidity	NTU	19
11/20/2008	2F	Turbidity	NTU	3.6
12/11/2008	2F	Turbidity	NTU	8.9
1/8/2009	2F	Turbidity	NTU	67
1/29/2009	2F	Turbidity	NTU	3.1
2/19/2009	2F	Turbidity	NTU	1.9
3/12/2009	2F	Turbidity	NTU	2.1
4/9/2009	2F	Turbidity	NTU	49
4/30/2009	2F	Turbidity	NTU	1.9
5/21/2009	2F	Turbidity	NTU	0.69
1/24/2008	2F	Turbidity	NTU	4.8
1/3/2008	2F	Turbidity	NTU	15
10/18/2007	2F	Turbidity	NTU	12
11/29/2007	2F	Turbidity	NTU	2.5
11/8/2007	2F	Turbidity	NTU	8.7
12/20/2007	2F	Turbidity	NTU	4.6
2/14/2008	2F	Turbidity	NTU	5.1
3/6/2008	2F	Turbidity	NTU	7.1
3/6/2008	2F	Turbidity	NTU	3.7
6/11/2009	2F	Turbidity	NTU	2.6
7/12/2007	2F	Vanadium	mg/L	ND
7/12/2007	2F	Vinyl Acetate	ug/L	ND
7/12/2007	2F	Vinyl Chloride	ug/L	ND
7/12/2007	2F	Xylenes, Total	ug/L	ND
7/12/2007	2F	Zinc	mg/L	0.071
Location ID:		**2FDUP**		
Number of Sampling Dates:		**12**		
2/17/2005	2FDUP	Barium	mg/L	0.033
5/19/2005	2FDUP	Barium	mg/L	0.033
8/18/2005	2FDUP	Barium	mg/L	0.034
2/16/2006	2FDUP	Barium	mg/L	0.029
5/18/2006	2FDUP	Barium	mg/L	0.032
7/27/2006	2FDUP	Barium	mg/L	0.034
3/8/2007	2FDUP	Barium	mg/L	0.03
5/31/2007	2FDUP	Barium	mg/L	0.05
8/23/2007	2FDUP	Barium	mg/L	0.033
5/15/2008	2FDUP	Barium	mg/L	0.025
7/24/2008	2FDUP	Barium	mg/L	0.028
10/30/2008	2FDUP	Barium	mg/L	0.034
1/24/2008	2FDUP	Barium	mg/L	0.036
11/29/2007	2FDUP	Barium, ICP	mg/L	0.035
11/8/2007	2FDUP	Barium, ICP	mg/L	0.028
2/17/2005	2FDUP	Chloride	mg/L	17.5
5/19/2005	2FDUP	Chloride	mg/L	19.8
8/18/2005	2FDUP	Chloride	mg/L	23.1
2/16/2006	2FDUP	Chloride	mg/L	23.8
5/18/2006	2FDUP	Chloride	mg/L	46.4
7/27/2006	2FDUP	Chloride	mg/L	26.7
3/8/2007	2FDUP	Chloride	mg/L	29.4
5/31/2007	2FDUP	Chloride	mg/L	62.4
8/23/2007	2FDUP	Chloride	mg/L	20.2
8/23/2007	2FDUP	Chloride	mg/L	20.8
5/15/2008	2FDUP	Chloride	mg/L	30.5
7/24/2008	2FDUP	Chloride	mg/L	31.2
10/30/2008	2FDUP	Chloride	mg/L	29.0
1/24/2008	2FDUP	Chloride	mg/L	22.1
11/29/2007	2FDUP	Chloride	mg/L	20.1
11/8/2007	2FDUP	Chloride	mg/L	20.2

Sampling Date	Location ID	Analyte	Unit	Concentration
2/17/2005	2FDUP	Chromium	mg/L	ND
5/19/2005	2FDUP	Chromium	mg/L	ND
8/18/2005	2FDUP	Chromium	mg/L	ND
2/16/2006	2FDUP	Chromium	mg/L	ND
5/18/2006	2FDUP	Chromium	mg/L	ND
7/27/2006	2FDUP	Chromium	mg/L	ND
3/8/2007	2FDUP	Chromium	mg/L	ND
5/31/2007	2FDUP	Chromium	mg/L	ND
8/23/2007	2FDUP	Chromium	mg/L	ND
5/15/2008	2FDUP	Chromium	mg/L	ND
7/24/2008	2FDUP	Chromium	mg/L	ND
10/30/2008	2FDUP	Chromium	mg/L	0.008
1/24/2008	2FDUP	Chromium	mg/L	0.008
2/17/2005	2FDUP	Chromium, hexavalent	mg/l	ND
5/19/2005	2FDUP	Chromium, hexavalent	mg/l	ND
8/18/2005	2FDUP	Chromium, hexavalent	mg/l	ND
2/16/2006	2FDUP	Chromium, hexavalent	mg/l	ND
5/18/2006	2FDUP	Chromium, hexavalent	mg/l	ND
7/27/2006	2FDUP	Chromium, hexavalent	mg/l	ND
3/8/2007	2FDUP	Chromium, hexavalent	mg/l	ND
5/31/2007	2FDUP	Chromium, hexavalent	mg/l	ND
8/23/2007	2FDUP	Chromium, hexavalent	mg/l	ND
5/15/2008	2FDUP	Chromium, hexavalent	mg/L	ND
7/24/2008	2FDUP	Chromium, hexavalent	mg/L	ND
10/30/2008	2FDUP	Chromium, Hexavalent	mg/L	ND
1/24/2008	2FDUP	Chromium, hexavalent	mg/L	ND
11/29/2007	2FDUP	Chromium, hexavalent	mg/L	ND
11/8/2007	2FDUP	Chromium, hexavalent	mg/L	ND
11/29/2007	2FDUP	Chromium, hexavalent	mg/L	ND
11/8/2007	2FDUP	Chromium, ICP	mg/L	ND
2/17/2005	2FDUP	Chromium, ICP	mg/L	ND
5/19/2005	2FDUP	Iron	mg/L	36.3
8/18/2005	2FDUP	Iron	mg/L	13.9
2/16/2006	2FDUP	Iron	mg/L	32.9
5/18/2006	2FDUP	Iron	mg/L	13.1
7/27/2006	2FDUP	Iron	mg/L	8.48
3/8/2007	2FDUP	Iron	mg/L	11.7
5/31/2007	2FDUP	Iron	mg/L	7.93
8/23/2007	2FDUP	Iron	mg/L	137
5/15/2008	2FDUP	Iron	mg/L	3.13
7/24/2008	2FDUP	Iron	mg/L	2.11
10/30/2008	2FDUP	Iron	mg/L	2.5
1/24/2008	2FDUP	Iron	mg/L	6.37
11/29/2007	2FDUP	Iron	mg/L	7.61
11/8/2007	2FDUP	Iron	mg/L	7.94
2/17/2005	2FDUP	Iron	mg/L	8.2
5/19/2005	2FDUP	Manganese	mg/L	0.881
8/18/2005	2FDUP	Manganese	mg/L	0.44
2/16/2006	2FDUP	Manganese	mg/L	0.844
5/18/2006	2FDUP	Manganese	mg/L	0.444
7/27/2006	2FDUP	Manganese	mg/L	0.35
3/8/2007	2FDUP	Manganese	mg/L	0.409
5/31/2007	2FDUP	Manganese	mg/L	0.437
8/23/2007	2FDUP	Manganese	mg/L	3.18
5/15/2008	2FDUP	Manganese	mg/L	0.319
7/24/2008	2FDUP	Manganese	mg/L	0.377
10/30/2008	2FDUP	Manganese	mg/L	0.366
1/24/2008	2FDUP	Manganese	mg/L	0.423
11/29/2007	2FDUP	Manganese	mg/L	0.318
11/8/2007	2FDUP	Manganese	mg/L	0.289
2/17/2005	2FDUP	Manganese	mg/L	0.282
5/19/2005	2FDUP	pH	pH Units	3.34
8/18/2005	2FDUP	pH	pH Units	3.63
2/16/2006	2FDUP	pH	pH Units	3.4
5/18/2006	2FDUP	pH	pH Units	3.72
7/27/2006	2FDUP	pH	pH Units	3.88
3/8/2007	2FDUP	pH	pH Units	3.71
5/31/2007	2FDUP	pH	pH Units	3.55
8/23/2007	2FDUP	pH	pH Units	4.09
8/23/2007	2FDUP	pH	pH	3.61
8/23/2007	2FDUP	pH	pH	3.63
8/23/2007	2FDUP	pH	pH	3.63
5/15/2008	2FDUP	pH	pH	3.69
5/15/2008	2FDUP	pH	pH	3.62
5/15/2008	2FDUP	pH	pH	3.66
5/15/2008	2FDUP	pH	pH	3.67
7/24/2008	2FDUP	pH	pH	3.68
7/24/2008	2FDUP	pH	pH	3.11
7/24/2008	2FDUP	pH	pH	3.15
7/24/2008	2FDUP	pH	pH	3.15
10/30/2008	2FDUP	pH	pH	3.17
10/30/2008	2FDUP	pH	pH	3.80
10/30/2008	2FDUP	pH	pH	3.82
10/30/2008	2FDUP	pH	pH	3.83
1/24/2008	2FDUP	pH	pH	3.83

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2008	2FDUP	pH	pH	3.85
1/24/2008	2FDUP	pH	pH	3.89
1/24/2008	2FDUP	pH	pH	3.87
11/29/2007	2FDUP	pH	pH Units	3.65
11/29/2007	2FDUP	pH	pH Units	3.63
11/29/2007	2FDUP	pH	pH Units	3.73
11/29/2007	2FDUP	pH	pH Units	3.68
11/8/2007	2FDUP	pH	pH Units	3.93
11/8/2007	2FDUP	pH	pH Units	3.93
11/8/2007	2FDUP	pH	pH Units	3.9
11/8/2007	2FDUP	pH	pH Units	3.98
2/17/2005	2FDUP	Phenols	mg/L	ND
5/19/2005	2FDUP	Phenols	mg/L	ND
8/18/2005	2FDUP	Phenols	mg/L	ND
2/16/2006	2FDUP	Phenols	mg/L	ND
5/18/2006	2FDUP	Phenols	mg/L	ND
7/27/2006	2FDUP	Phenols	mg/L	ND
3/8/2007	2FDUP	Phenols	mg/L	ND
5/31/2007	2FDUP	Phenols	mg/L	ND
8/23/2007	2FDUP	Phenols	mg/L	ND
11/29/2007	2FDUP	Phenols	mg/L	0.11
11/8/2007	2FDUP	Phenols	mg/L	ND
5/15/2008	2FDUP	Phenols, Total	mg/L	ND
7/24/2008	2FDUP	Phenols, Total	mg/L	ND
10/30/2008	2FDUP	Phenols, Total	mg/L	ND
1/24/2008	2FDUP	Phenols, Total	mg/L	ND
2/17/2005	2FDUP	Sodium	mg/L	13
5/19/2005	2FDUP	Sodium	mg/L	10.2
8/18/2005	2FDUP	Sodium	mg/L	19.7
2/16/2006	2FDUP	Sodium	mg/L	29.2
5/18/2006	2FDUP	Sodium	mg/L	26.4
7/27/2006	2FDUP	Sodium	mg/L	41.7
3/8/2007	2FDUP	Sodium	mg/L	46.7
5/31/2007	2FDUP	Sodium	mg/L	233
8/23/2007	2FDUP	Sodium	mg/L	31.8
5/15/2008	2FDUP	Sodium	mg/L	45.5
7/24/2008	2FDUP	Sodium	mg/L	48.1
10/30/2008	2FDUP	Sodium	mg/L	56.9
1/24/2008	2FDUP	Sodium	mg/L	33.5
11/29/2007	2FDUP	Sodium	mg/L	27.5
11/8/2007	2FDUP	Sodium	mg/L	24.6
2/17/2005	2FDUP	Specific Conductance	umhos	725
5/19/2005	2FDUP	Specific Conductance	umhos	492
8/18/2005	2FDUP	Specific Conductance	umhos	802
2/16/2006	2FDUP	Specific Conductance	umhos	537
5/18/2006	2FDUP	Specific Conductance	umhos	561
7/27/2006	2FDUP	Specific Conductance	umhos	620
3/8/2007	2FDUP	Specific Conductance	umhos	465
5/31/2007	2FDUP	Specific Conductance	umhos	1240
8/23/2007	2FDUP	Specific Conductance	umhos	628
8/23/2007	2FDUP	Specific Conductance	umhos	597
8/23/2007	2FDUP	Specific Conductance	umhos	626
8/23/2007	2FDUP	Specific Conductance	umhos	480
5/15/2008	2FDUP	Specific Conductance	umhos	573
5/15/2008	2FDUP	Specific Conductance	umhos	609
5/15/2008	2FDUP	Specific Conductance	umhos	618
5/15/2008	2FDUP	Specific Conductance	umhos	708
7/24/2008	2FDUP	Specific Conductance	umhos	620
7/24/2008	2FDUP	Specific Conductance	umhos	662
7/24/2008	2FDUP	Specific Conductance	umhos	673
7/24/2008	2FDUP	Specific Conductance	umhos	734
10/30/2008	2FDUP	Specific Conductance	umhos	615
10/30/2008	2FDUP	Specific Conductance	umhos	629
10/30/2008	2FDUP	Specific Conductance	umhos	638
10/30/2008	2FDUP	Specific Conductance	umhos	738
1/24/2008	2FDUP	Specific Conductance	umhos	442
1/24/2008	2FDUP	Specific Conductance	umhos	512
1/24/2008	2FDUP	Specific Conductance	umhos	488
1/24/2008	2FDUP	Specific Conductance	umhos	446
11/29/2007	2FDUP	Specific Conductance	umhos	356
11/29/2007	2FDUP	Specific Conductance	umhos	454
11/29/2007	2FDUP	Specific Conductance	umhos	326
11/29/2007	2FDUP	Specific Conductance	umhos	334
11/8/2007	2FDUP	Specific Conductance	umhos	435
11/8/2007	2FDUP	Specific Conductance	umhos	487
11/8/2007	2FDUP	Specific Conductance	umhos	553
11/8/2007	2FDUP	Specific Conductance	umhos	374
8/23/2007	2FDUP	Sulfate	mg/L	177
5/15/2008	2FDUP	Sulfate	mg/L	303
7/24/2008	2FDUP	Sulfate	mg/L	327
10/30/2008	2FDUP	Sulfate	mg/L	310
1/24/2008	2FDUP	Sulfate	mg/L	203
2/17/2005	2FDUP	Sulfate	mg/L	424
5/19/2005	2FDUP	Sulfate	mg/L	321
8/18/2005	2FDUP	Sulfate	mg/L	488

Sampling Date	Location ID	Analyte	Unit	Concentration
2/16/2006	2FDUP	Sulfate	mg/L	316
5/18/2006	2FDUP	Sulfate	mg/L	372
7/27/2006	2FDUP	Sulfate	mg/L	243
3/8/2007	2FDUP	Sulfate	mg/L	272
5/31/2007	2FDUP	Sulfate	mg/L	1712
11/29/2007	2FDUP	Sulfate	mg/L	155
11/8/2007	2FDUP	Sulfate	mg/L	156
2/17/2005	2FDUP	Temperature	C	14
5/19/2005	2FDUP	Temperature	C	14
8/18/2005	2FDUP	Temperature	C	16
2/16/2006	2FDUP	Temperature	C	14
5/18/2006	2FDUP	Temperature	C	14
7/27/2006	2FDUP	Temperature	C	16
3/8/2007	2FDUP	Temperature	C	13
5/31/2007	2FDUP	Temperature	C	15
8/23/2007	2FDUP	Temperature	C	16
8/23/2007	2FDUP	Temperature	C	16
8/23/2007	2FDUP	Temperature	C	16
8/23/2007	2FDUP	Temperature	C	16
8/23/2007	2FDUP	Temperature	C	15
5/15/2008	2FDUP	Temperature	C	16
5/15/2008	2FDUP	Temperature	C	16
5/15/2008	2FDUP	Temperature	C	16
5/15/2008	2FDUP	Temperature	C	16
7/24/2008	2FDUP	Temperature	C	16
7/24/2008	2FDUP	Temperature	C	16
7/24/2008	2FDUP	Temperature	C	16
7/24/2008	2FDUP	Temperature	C	16
10/30/2008	2FDUP	Temperature	C	16
10/30/2008	2FDUP	Temperature	C	16
10/30/2008	2FDUP	Temperature	C	16
10/30/2008	2FDUP	Temperature	C	16
1/24/2008	2FDUP	Temperature	C	15
1/24/2008	2FDUP	Temperature	C	15
1/24/2008	2FDUP	Temperature	C	15
1/24/2008	2FDUP	Temperature	C	15
11/29/2007	2FDUP	Temperature	C	16
11/29/2007	2FDUP	Temperature	C	16
11/29/2007	2FDUP	Temperature	C	15
11/29/2007	2FDUP	Temperature	C	15
11/8/2007	2FDUP	Temperature	C	15
11/8/2007	2FDUP	Temperature	C	16
11/8/2007	2FDUP	Temperature	C	16
11/8/2007	2FDUP	Temperature	C	16
8/23/2007	2FDUP	Total Organic Carbon	mg/L	5.4
5/15/2008	2FDUP	Total Organic Carbon	mg/L	1.4
10/30/2008	2FDUP	Total Organic Carbon	mg/L	1.6
1/24/2008	2FDUP	Total Organic Carbon	mg/L	1.8
2/17/2005	2FDUP	Total Organic Carbon	mg/L	1.5
5/19/2005	2FDUP	Total Organic Carbon	mg/L	1.4
8/18/2005	2FDUP	Total Organic Carbon	mg/L	ND
2/16/2006	2FDUP	Total Organic Carbon	mg/L	ND
5/18/2006	2FDUP	Total Organic Carbon	mg/L	1.1
7/27/2006	2FDUP	Total Organic Carbon	mg/L	1.8
3/8/2007	2FDUP	Total Organic Carbon	mg/L	ND
5/31/2007	2FDUP	Total Organic Carbon	mg/L	5.2
7/24/2008	2FDUP	Total Organic Carbon	mg/L	1.1
11/29/2007	2FDUP	Total Organic Carbon	mg/L	1.1
11/8/2007	2FDUP	Total Organic Carbon	mg/L	1.7
2/17/2005	2FDUP	Total Organic Halogen	mg/L	ND
5/19/2005	2FDUP	Total Organic Halogen	mg/L	ND
8/18/2005	2FDUP	Total Organic Halogen	mg/L	0.01
2/16/2006	2FDUP	Total Organic Halogen	mg/L	ND
5/18/2006	2FDUP	Total Organic Halogen	mg/L	ND
7/27/2006	2FDUP	Total Organic Halogen	mg/L	ND
3/8/2007	2FDUP	Total Organic Halogen	mg/L	0.03
5/31/2007	2FDUP	Total Organic Halogen	mg/L	0.07
8/23/2007	2FDUP	Total Organic Halogen	mg/L	ND
5/15/2008	2FDUP	Total Organic Halogen	mg/L	0.01
7/24/2008	2FDUP	Total Organic Halogen	mg/L	ND
10/30/2008	2FDUP	Total Organic Halogen	mg/L	0.06
1/24/2008	2FDUP	Total Organic Halogen	mg/L	0.04
11/29/2007	2FDUP	Total Organic Halogen	mg/L	0.05
11/8/2007	2FDUP	Total Organic Halogen	mg/L	ND
2/17/2005	2FDUP	Turbidity	NTU	1
5/19/2005	2FDUP	Turbidity	NTU	4
8/18/2005	2FDUP	Turbidity	NTU	3.5
2/16/2006	2FDUP	Turbidity	NTU	1.2
5/18/2006	2FDUP	Turbidity	NTU	0.67
7/27/2006	2FDUP	Turbidity	NTU	3.5
3/8/2007	2FDUP	Turbidity	NTU	0.81
5/31/2007	2FDUP	Turbidity	NTU	32
8/23/2007	2FDUP	Turbidity	NTU	11.5
5/15/2008	2FDUP	Turbidity	NTU	1.8
7/24/2008	2FDUP	Turbidity	NTU	2.2
10/30/2008	2FDUP	Turbidity	NTU	38

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2008	2FDUP	Turbidity	NTU	9.2
11/29/2007	2FDUP	Turbidity	NTU	4.3
11/8/2007	2FDUP	Turbidity	NTU	8.4
Location ID:		**2G**		
Number of Sampling Dates:		**100**		
7/12/2007	2G	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2G	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2G	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2G	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2G	1,1-Dichloroethane	ug/L	ND
7/12/2007	2G	1,1-Dichloroethene	ug/L	ND
7/12/2007	2G	1,1-Dichloropropene	ug/L	ND
7/12/2007	2G	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2G	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2G	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2G	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	2G	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2G	1,2-Dibromoethane	ug/L	ND
7/12/2007	2G	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2G	1,2-Dichloroethane	ug/L	ND
7/12/2007	2G	1,2-Dichloropropane	ug/L	ND
7/12/2007	2G	1,3,5-Trimethylbenzene	ug/L	ND
7/12/2007	2G	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2G	1,3-Dichloropropane	ug/L	ND
7/12/2007	2G	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2G	2,2-Dichloropropane	ug/L	ND
7/12/2007	2G	2-Butanone (MEK)	ug/L	ND
7/12/2007	2G	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2G	2-Chlorotoluene	ug/L	ND
7/12/2007	2G	2-Hexanone	ug/L	ND
7/12/2007	2G	3-Chloro-1-propene	ug/L	ND
7/12/2007	2G	4-Chlorotoluene	ug/L	ND
7/12/2007	2G	4-Isopropyltoluene	ug/L	ND
7/12/2007	2G	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	2G	Acetone	ug/L	ND
7/12/2007	2G	Acrolein	ug/L	ND
7/12/2007	2G	Acrylonitrile	ug/L	ND
7/12/2007	2G	Alkalinity	mg/L	183
7/12/2007	2G	Ammonia	mg/L	28.6
7/12/2007	2G	Antimony	mg/L	ND
7/12/2007	2G	Arsenic	mg/L	ND
1/24/2002	2G	Barium	mg/L	0.045
1/28/2002	2G	Barium	mg/L	0.026
2/1/2002	2G	Barium	mg/L	0.022
2/5/2002	2G	Barium	mg/L	0.02
4/4/2002	2G	Barium	mg/L	0.036
4/8/2002	2G	Barium	mg/L	0.023
4/12/2002	2G	Barium	mg/L	0.023
4/16/2002	2G	Barium	mg/L	0.023
7/18/2002	2G	Barium	mg/L	0.041
7/22/2002	2G	Barium	mg/L	0.029
7/26/2002	2G	Barium	mg/L	0.026
7/30/2002	2G	Barium	mg/L	0.024
10/3/2002	2G	Barium	mg/L	0.036
10/7/2002	2G	Barium	mg/L	0.02
10/11/2002	2G	Barium	mg/L	0.073
10/15/2002	2G	Barium	mg/L	0.028
1/16/2003	2G	Barium	mg/L	0.033
1/21/2003	2G	Barium	mg/L	0.022
1/24/2003	2G	Barium	mg/L	0.023
1/28/2003	2G	Barium	mg/L	0.022
4/3/2003	2G	Barium	mg/L	0.024
4/7/2003	2G	Barium	mg/L	0.023
4/11/2003	2G	Barium	mg/L	0.018
4/15/2003	2G	Barium	mg/L	0.019
7/3/2003	2G	Barium	mg/L	0.023
7/7/2003	2G	Barium	mg/L	0.015
7/11/2003	2G	Barium	mg/L	0.033
7/15/2003	2G	Barium	mg/L	0.016
10/2/2003	2G	Barium	mg/L	0.025
10/6/2003	2G	Barium	mg/L	0.023
10/10/2003	2G	Barium	mg/L	0.025
10/14/2003	2G	Barium	mg/L	0.02
1/8/2004	2G	Barium	mg/L	0.022
1/12/2004	2G	Barium	mg/L	0.019
1/16/2004	2G	Barium	mg/L	0.018
1/20/2004	2G	Barium	mg/L	0.3
4/8/2004	2G	Barium	mg/L	0.021
4/12/2004	2G	Barium	mg/L	0.016
4/16/2004	2G	Barium	mg/L	0.018
5/20/2004	2G	Barium	mg/L	0.017
7/15/2004	2G	Barium	mg/L	0.024
7/19/2004	2G	Barium	mg/L	0.022
7/23/2004	2G	Barium	mg/L	0.022

Sampling Date	Location ID	Analyte	Unit	Concentration
7/27/2004	2G	Barium	mg/L	0.023
1/6/2005	2G	Barium	mg/L	0.033
1/10/2005	2G	Barium	mg/L	0.026
1/14/2005	2G	Barium	mg/L	0.023
1/18/2005	2G	Barium	mg/L	0.024
4/7/2005	2G	Barium	mg/L	0.028
4/11/2005	2G	Barium	mg/L	0.022
4/15/2005	2G	Barium	mg/L	0.022
4/19/2005	2G	Barium	mg/L	0.022
4/19/2005	2G	Barium	mg/L	0.022
7/7/2005	2G	Barium	mg/L	0.024
7/11/2005	2G	Barium	mg/L	0.027
7/15/2005	2G	Barium	mg/L	0.022
7/19/2005	2G	Barium	mg/L	0.021
10/13/2005	2G	Barium	mg/L	0.025
10/17/2005	2G	Barium	mg/L	0.022
10/21/2005	2G	Barium	mg/L	0.019
10/25/2005	2G	Barium	mg/L	0.018
1/5/2006	2G	Barium	mg/L	0.01
1/9/2006	2G	Barium	mg/L	0.006
1/13/2006	2G	Barium	mg/L	0.006
1/17/2006	2G	Barium	mg/L	0.024
4/6/2006	2G	Barium	mg/L	0.021
4/10/2006	2G	Barium	mg/L	0.02
4/14/2006	2G	Barium	mg/L	0.018
4/18/2006	2G	Barium	mg/L	0.02
7/6/2006	2G	Barium	mg/L	ND
7/10/2006	2G	Barium	mg/L	0.027
7/14/2006	2G	Barium	mg/L	0.028
7/18/2006	2G	Barium	mg/L	0.004
7/18/2006	2G	Barium	mg/L	0.089
10/19/2006	2G	Barium	mg/L	0.007
10/23/2006	2G	Barium	mg/L	0.013
10/27/2006	2G	Barium	mg/L	0.007
10/31/2006	2G	Barium	mg/L	0.006
1/4/2007	2G	Barium	mg/L	0.017
1/8/2007	2G	Barium	mg/L	0.007
1/11/2007	2G	Barium	mg/L	0.006
1/16/2007	2G	Barium	mg/L	0.005
4/19/2007	2G	Barium	mg/L	ND
4/23/2007	2G	Barium	mg/L	ND
4/27/2007	2G	Barium	mg/L	ND
5/1/2007	2G	Barium	mg/L	ND
7/12/2007	2G	Barium	mg/L	ND
7/16/2007	2G	Barium	mg/L	0.011
7/20/2007	2G	Barium	mg/L	0.012
7/24/2007	2G	Barium	mg/L	0.012
4/3/2008	2G	Barium	mg/L	0.125
4/7/2008	2G	Barium	mg/L	0.005
4/11/2008	2G	Barium	mg/L	ND
4/15/2008	2G	Barium	mg/L	ND
7/3/2008	2G	Barium	mg/L	ND
7/3/2008	2G	Barium	mg/L	ND
7/7/2008	2G	Barium	mg/L	ND
7/11/2008	2G	Barium	mg/L	ND
7/15/2008	2G	Barium	mg/L	0.033
10/9/2008	2G	Barium	mg/L	0.017
10/13/2008	2G	Barium	mg/L	0.023
10/17/2008	2G	Barium	mg/L	0.036
10/21/2008	2G	Barium	mg/L	0.056
1/8/2009	2G	Barium	mg/L	0.014
1/12/2009	2G	Barium	mg/L	ND
1/16/2009	2G	Barium	mg/L	ND
1/20/2009	2G	Barium	mg/L	0.014
4/9/2009	2G	Barium	mg/L	0.020
4/13/2009	2G	Barium	mg/L	0.021
4/17/2009	2G	Barium	mg/L	0.020
4/21/2009	2G	Barium	mg/L	0.021
1/11/2008	2G	Barium	mg/L	ND
1/15/2008	2G	Barium	mg/L	0.066
1/3/2008	2G	Barium	mg/L	0.013
1/7/2008	2G	Barium	mg/L	ND
10/18/2007	2G	Barium	mg/L	ND
10/22/2007	2G	Barium	mg/L	ND
10/26/2007	2G	Barium	mg/L	0.065
10/30/2007	2G	Barium	mg/L	0.061
7/12/2007	2G	Benzene	ug/L	ND
7/12/2007	2G	Beryllium	mg/L	ND
7/12/2007	2G	BOD	mg/L	68
7/12/2007	2G	Bromobenzene	ug/L	ND
7/12/2007	2G	Bromochloromethane	ug/L	ND
7/12/2007	2G	Bromodichloromethane	ug/L	ND
7/12/2007	2G	Bromoform	ug/L	ND
7/12/2007	2G	Bromomethane	ug/L	ND
7/12/2007	2G	Cadmium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2G	Calcium	mg/L	420
7/12/2007	2G	Carbon Disulfide	ug/L	ND
7/12/2007	2G	Carbon Tetrachloride	ug/L	ND
7/12/2007	2G	Chemical Oxygen Demand	mg/L	279
1/24/2002	2G	Chloride	mg/L	352
1/28/2002	2G	Chloride	mg/L	272
2/1/2002	2G	Chloride	mg/L	257
2/5/2002	2G	Chloride	mg/L	197
4/4/2002	2G	Chloride	mg/L	280
4/8/2002	2G	Chloride	mg/L	537
4/12/2002	2G	Chloride	mg/L	280
4/16/2002	2G	Chloride	mg/L	233
7/18/2002	2G	Chloride	mg/L	264
7/22/2002	2G	Chloride	mg/L	346
7/26/2002	2G	Chloride	mg/L	536
7/30/2002	2G	Chloride	mg/L	308
10/3/2002	2G	Chloride	mg/L	173
10/7/2002	2G	Chloride	mg/L	242
10/11/2002	2G	Chloride	mg/L	247
10/15/2002	2G	Chloride	mg/L	37
1/16/2003	2G	Chloride	mg/L	196
1/21/2003	2G	Chloride	mg/L	186
1/24/2003	2G	Chloride	mg/L	212
1/28/2003	2G	Chloride	mg/L	196
4/3/2003	2G	Chloride	mg/L	197
4/7/2003	2G	Chloride	mg/L	95.4
4/11/2003	2G	Chloride	mg/L	141
4/15/2003	2G	Chloride	mg/L	38.5
7/3/2003	2G	Chloride	mg/L	114
7/7/2003	2G	Chloride	mg/L	117
7/11/2003	2G	Chloride	mg/L	117
7/15/2003	2G	Chloride	mg/L	156
10/2/2003	2G	Chloride	mg/L	185
10/6/2003	2G	Chloride	mg/L	150
10/10/2003	2G	Chloride	mg/L	189
10/14/2003	2G	Chloride	mg/L	202
1/8/2004	2G	Chloride	mg/L	144
1/12/2004	2G	Chloride	mg/L	239
1/16/2004	2G	Chloride	mg/L	194
1/20/2004	2G	Chloride	mg/L	185
4/8/2004	2G	Chloride	mg/L	209
4/12/2004	2G	Chloride	mg/L	224
4/16/2004	2G	Chloride	mg/L	196
5/20/2004	2G	Chloride	mg/L	159
7/15/2004	2G	Chloride	mg/L	154
7/19/2004	2G	Chloride	mg/L	187
7/23/2004	2G	Chloride	mg/L	172
7/27/2004	2G	Chloride	mg/L	162
1/6/2005	2G	Chloride	mg/L	174
1/10/2005	2G	Chloride	mg/L	42.3
1/14/2005	2G	Chloride	mg/L	241
1/18/2005	2G	Chloride	mg/L	216
4/7/2005	2G	Chloride	mg/L	222
4/11/2005	2G	Chloride	mg/L	149
4/15/2005	2G	Chloride	mg/L	164
4/19/2005	2G	Chloride	mg/L	218
7/7/2005	2G	Chloride	mg/L	206
7/11/2005	2G	Chloride	mg/L	310
7/15/2005	2G	Chloride	mg/L	284
7/19/2005	2G	Chloride	mg/L	288
10/13/2005	2G	Chloride	mg/L	197
10/17/2005	2G	Chloride	mg/L	201
10/21/2005	2G	Chloride	mg/L	188
10/25/2005	2G	Chloride	mg/L	189
1/5/2006	2G	Chloride	mg/L	266
1/9/2006	2G	Chloride	mg/L	302
1/13/2006	2G	Chloride	mg/L	298
1/17/2006	2G	Chloride	mg/L	297
4/6/2006	2G	Chloride	mg/L	240
4/10/2006	2G	Chloride	mg/L	246
4/14/2006	2G	Chloride	mg/L	192
4/18/2006	2G	Chloride	mg/L	252
7/6/2006	2G	Chloride	mg/L	203
7/10/2006	2G	Chloride	mg/L	188
7/14/2006	2G	Chloride	mg/L	174
7/18/2006	2G	Chloride	mg/L	204
10/19/2006	2G	Chloride	mg/L	202
10/23/2006	2G	Chloride	mg/L	224
10/27/2006	2G	Chloride	mg/L	247
10/31/2006	2G	Chloride	mg/L	209
1/4/2007	2G	Chloride	mg/L	225
1/8/2007	2G	Chloride	mg/L	190
1/11/2007	2G	Chloride	mg/L	246
1/16/2007	2G	Chloride	mg/L	233
4/19/2007	2G	Chloride	mg/L	196

Sampling Date	Location ID	Analyte	Unit	Concentration
4/23/2007	2G	Chloride	mg/L	186
4/27/2007	2G	Chloride	mg/L	163
5/1/2007	2G	Chloride	mg/L	145
7/12/2007	2G	Chloride	mg/L	222
7/16/2007	2G	Chloride	mg/L	1383
7/20/2007	2G	Chloride	mg/L	226
7/24/2007	2G	Chloride	mg/L	203
4/3/2008	2G	Chloride	mg/L	224
4/7/2008	2G	Chloride	mg/L	184
4/11/2008	2G	Chloride	mg/L	187
4/15/2008	2G	Chloride	mg/L	72.7
7/3/2008	2G	Chloride	mg/L	202
7/3/2008	2G	Chloride	mg/L	202
7/7/2008	2G	Chloride	mg/L	199
7/11/2008	2G	Chloride	mg/L	190
7/15/2008	2G	Chloride	mg/L	215
10/9/2008	2G	Chloride	mg/L	233
10/13/2008	2G	Chloride	mg/L	207
10/17/2008	2G	Chloride	mg/L	210
10/21/2008	2G	Chloride	mg/L	208
1/8/2009	2G	Chloride	mg/L	245
1/12/2009	2G	Chloride	mg/L	217
1/16/2009	2G	Chloride	mg/L	224
1/20/2009	2G	Chloride	mg/L	218
4/9/2009	2G	Chloride	mg/L	256
4/13/2009	2G	Chloride	mg/L	265
4/17/2009	2G	Chloride	mg/L	234
4/21/2009	2G	Chloride	mg/L	263
1/11/2008	2G	Chloride	mg/L	225
1/15/2008	2G	Chloride	mg/L	294
1/3/2008	2G	Chloride	mg/L	232
1/7/2008	2G	Chloride	mg/L	221
10/18/2007	2G	Chloride	mg/L	185
10/22/2007	2G	Chloride	mg/L	197
10/26/2007	2G	Chloride	mg/L	210
10/30/2007	2G	Chloride	mg/L	214
7/12/2007	2G	Chlorobenzene	ug/L	ND
7/12/2007	2G	Chloroethane	ug/L	ND
7/12/2007	2G	Chloroform	ug/L	ND
7/12/2007	2G	Chloromethane	ug/L	ND
1/24/2002	2G	Chromium	mg/L	0.014
1/28/2002	2G	Chromium	mg/L	0.012
2/1/2002	2G	Chromium	mg/L	ND
2/5/2002	2G	Chromium	mg/L	ND
4/4/2002	2G	Chromium	mg/L	0.019
4/8/2002	2G	Chromium	mg/L	ND
4/12/2002	2G	Chromium	mg/L	0.014
4/16/2002	2G	Chromium	mg/L	0.013
7/18/2002	2G	Chromium	mg/L	ND
7/18/2002	2G	Chromium	mg/L	0.032
7/18/2002	2G	Chromium	mg/L	0.032
7/22/2002	2G	Chromium	mg/L	0.011
7/26/2002	2G	Chromium	mg/L	0.012
7/30/2002	2G	Chromium	mg/L	0.014
10/3/2002	2G	Chromium	mg/L	0.012
10/7/2002	2G	Chromium	mg/L	ND
10/11/2002	2G	Chromium	mg/L	0.02
10/15/2002	2G	Chromium	mg/L	ND
1/16/2003	2G	Chromium	mg/L	0.017
1/21/2003	2G	Chromium	mg/L	0.015
1/24/2003	2G	Chromium	mg/L	0.009
1/28/2003	2G	Chromium	mg/L	0.009
4/3/2003	2G	Chromium	mg/L	0.015
4/7/2003	2G	Chromium	mg/L	0.015
4/11/2003	2G	Chromium	mg/L	0.012
4/15/2003	2G	Chromium	mg/L	0.013
7/3/2003	2G	Chromium	mg/L	0.02
7/7/2003	2G	Chromium	mg/L	0.009
7/11/2003	2G	Chromium	mg/L	0.032
7/15/2003	2G	Chromium	mg/L	0.01
10/2/2003	2G	Chromium	mg/L	0.025
10/6/2003	2G	Chromium	mg/L	0.021
10/10/2003	2G	Chromium	mg/L	0.018
10/14/2003	2G	Chromium	mg/L	0.015
1/8/2004	2G	Chromium	mg/L	0.012
1/12/2004	2G	Chromium	mg/L	0.011
1/16/2004	2G	Chromium	mg/L	0.009
1/20/2004	2G	Chromium	mg/L	0.012
4/8/2004	2G	Chromium	mg/L	0.009
4/12/2004	2G	Chromium	mg/L	0.008
4/16/2004	2G	Chromium	mg/L	ND
5/20/2004	2G	Chromium	mg/L	ND
7/15/2004	2G	Chromium	mg/L	0.01
7/19/2004	2G	Chromium	mg/L	0.016
7/23/2004	2G	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/27/2004	2G	Chromium	mg/L	ND
1/6/2005	2G	Chromium	mg/L	ND
1/10/2005	2G	Chromium	mg/L	ND
1/14/2005	2G	Chromium	mg/L	ND
1/18/2005	2G	Chromium	mg/L	ND
4/7/2005	2G	Chromium	mg/L	ND
4/11/2005	2G	Chromium	mg/L	ND
4/15/2005	2G	Chromium	mg/L	ND
4/19/2005	2G	Chromium	mg/L	ND
7/7/2005	2G	Chromium	mg/L	ND
7/11/2005	2G	Chromium	mg/L	ND
7/15/2005	2G	Chromium	mg/L	ND
7/19/2005	2G	Chromium	mg/L	ND
10/13/2005	2G	Chromium	mg/L	ND
10/17/2005	2G	Chromium	mg/L	ND
10/21/2005	2G	Chromium	mg/L	ND
10/25/2005	2G	Chromium	mg/L	ND
1/5/2006	2G	Chromium	mg/L	0.008
1/9/2006	2G	Chromium	mg/L	ND
1/13/2006	2G	Chromium	mg/L	0.01
1/17/2006	2G	Chromium	mg/L	ND
4/6/2006	2G	Chromium	mg/L	ND
4/10/2006	2G	Chromium	mg/L	ND
4/14/2006	2G	Chromium	mg/L	ND
4/18/2006	2G	Chromium	mg/L	ND
7/6/2006	2G	Chromium	mg/L	ND
7/10/2006	2G	Chromium	mg/L	ND
7/14/2006	2G	Chromium	mg/L	ND
7/18/2006	2G	Chromium	mg/L	ND
7/18/2006	2G	Chromium	mg/L	0.007
10/19/2006	2G	Chromium	mg/L	ND
10/23/2006	2G	Chromium	mg/L	ND
10/27/2006	2G	Chromium	mg/L	ND
10/31/2006	2G	Chromium	mg/L	ND
1/4/2007	2G	Chromium	mg/L	0.01
1/8/2007	2G	Chromium	mg/L	ND
1/11/2007	2G	Chromium	mg/L	ND
1/16/2007	2G	Chromium	mg/L	ND
4/19/2007	2G	Chromium	mg/L	0.005
4/23/2007	2G	Chromium	mg/L	0.006
4/27/2007	2G	Chromium	mg/L	0.014
5/1/2007	2G	Chromium	mg/L	ND
7/12/2007	2G	Chromium	mg/L	ND
7/12/2007	2G	Chromium	mg/L	ND
7/16/2007	2G	Chromium	mg/L	0.007
7/20/2007	2G	Chromium	mg/L	0.007
7/24/2007	2G	Chromium	mg/L	0.006
4/3/2008	2G	Chromium	mg/L	ND
4/7/2008	2G	Chromium	mg/L	ND
4/11/2008	2G	Chromium	mg/L	ND
4/15/2008	2G	Chromium	mg/L	ND
7/3/2008	2G	Chromium	mg/L	0.017
7/3/2008	2G	Chromium	mg/L	0.017
7/7/2008	2G	Chromium	mg/L	ND
7/11/2008	2G	Chromium	mg/L	ND
7/15/2008	2G	Chromium	mg/L	ND
10/9/2008	2G	Chromium	mg/L	ND
10/13/2008	2G	Chromium	mg/L	ND
10/17/2008	2G	Chromium	mg/L	0.006
10/21/2008	2G	Chromium	mg/L	0.007
1/8/2009	2G	Chromium	mg/L	ND
1/12/2009	2G	Chromium	mg/L	ND
1/16/2009	2G	Chromium	mg/L	ND
1/20/2009	2G	Chromium	mg/L	ND
4/9/2009	2G	Chromium	mg/L	0.008
4/13/2009	2G	Chromium	mg/L	0.007
4/17/2009	2G	Chromium	mg/L	ND
4/21/2009	2G	Chromium	mg/L	0.011
1/11/2008	2G	Chromium	mg/L	0.006
1/15/2008	2G	Chromium	mg/L	0.007
1/3/2008	2G	Chromium	mg/L	0.007
1/7/2008	2G	Chromium	mg/L	ND
1/24/2002	2G	Chromium, hexavalent	mg/l	ND
1/28/2002	2G	Chromium, hexavalent	mg/l	ND
2/1/2002	2G	Chromium, hexavalent	mg/l	ND
2/5/2002	2G	Chromium, hexavalent	mg/l	ND
4/4/2002	2G	Chromium, hexavalent	mg/l	ND
4/8/2002	2G	Chromium, hexavalent	mg/l	ND
4/12/2002	2G	Chromium, hexavalent	mg/l	ND
4/16/2002	2G	Chromium, hexavalent	mg/l	ND
7/18/2002	2G	Chromium, hexavalent	mg/l	ND
7/22/2002	2G	Chromium, hexavalent	mg/l	ND
7/26/2002	2G	Chromium, hexavalent	mg/l	ND
7/30/2002	2G	Chromium, hexavalent	mg/l	ND
10/3/2002	2G	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/7/2002	2G	Chromium, hexavalent	mg/l	ND
10/11/2002	2G	Chromium, hexavalent	mg/l	ND
10/15/2002	2G	Chromium, hexavalent	mg/l	ND
1/16/2003	2G	Chromium, hexavalent	mg/l	ND
1/21/2003	2G	Chromium, hexavalent	mg/l	ND
1/24/2003	2G	Chromium, hexavalent	mg/l	ND
1/28/2003	2G	Chromium, hexavalent	mg/l	ND
4/3/2003	2G	Chromium, hexavalent	mg/l	ND
4/7/2003	2G	Chromium, hexavalent	mg/l	ND
4/11/2003	2G	Chromium, hexavalent	mg/l	ND
4/15/2003	2G	Chromium, hexavalent	mg/l	ND
7/3/2003	2G	Chromium, hexavalent	mg/l	0.06
7/7/2003	2G	Chromium, hexavalent	mg/l	ND
7/11/2003	2G	Chromium, hexavalent	mg/l	ND
7/15/2003	2G	Chromium, hexavalent	mg/l	ND
10/2/2003	2G	Chromium, hexavalent	mg/l	ND
10/6/2003	2G	Chromium, hexavalent	mg/l	ND
10/10/2003	2G	Chromium, hexavalent	mg/l	ND
10/14/2003	2G	Chromium, hexavalent	mg/l	ND
1/8/2004	2G	Chromium, hexavalent	mg/l	ND
1/12/2004	2G	Chromium, hexavalent	mg/l	ND
1/16/2004	2G	Chromium, hexavalent	mg/l	ND
1/20/2004	2G	Chromium, hexavalent	mg/l	ND
4/8/2004	2G	Chromium, hexavalent	mg/l	ND
4/12/2004	2G	Chromium, hexavalent	mg/l	ND
4/16/2004	2G	Chromium, hexavalent	mg/l	ND
5/20/2004	2G	Chromium, hexavalent	mg/l	ND
7/15/2004	2G	Chromium, hexavalent	mg/l	ND
7/19/2004	2G	Chromium, hexavalent	mg/l	ND
7/23/2004	2G	Chromium, hexavalent	mg/l	ND
7/27/2004	2G	Chromium, hexavalent	mg/l	ND
1/6/2005	2G	Chromium, hexavalent	mg/l	ND
1/10/2005	2G	Chromium, hexavalent	mg/l	ND
1/14/2005	2G	Chromium, hexavalent	mg/l	ND
1/18/2005	2G	Chromium, hexavalent	mg/l	ND
4/7/2005	2G	Chromium, hexavalent	mg/l	ND
4/11/2005	2G	Chromium, hexavalent	mg/l	ND
4/15/2005	2G	Chromium, hexavalent	mg/l	ND
4/19/2005	2G	Chromium, hexavalent	mg/l	ND
7/7/2005	2G	Chromium, hexavalent	mg/l	ND
7/11/2005	2G	Chromium, hexavalent	mg/l	ND
7/15/2005	2G	Chromium, hexavalent	mg/l	ND
7/19/2005	2G	Chromium, hexavalent	mg/l	ND
10/13/2005	2G	Chromium, hexavalent	mg/l	ND
10/17/2005	2G	Chromium, hexavalent	mg/l	ND
10/21/2005	2G	Chromium, hexavalent	mg/l	ND
10/25/2005	2G	Chromium, hexavalent	mg/l	ND
1/5/2006	2G	Chromium, hexavalent	mg/l	ND
1/9/2006	2G	Chromium, hexavalent	mg/l	ND
1/13/2006	2G	Chromium, hexavalent	mg/l	ND
1/17/2006	2G	Chromium, hexavalent	mg/l	ND
4/6/2006	2G	Chromium, hexavalent	mg/l	ND
4/10/2006	2G	Chromium, hexavalent	mg/l	ND
4/14/2006	2G	Chromium, hexavalent	mg/l	ND
4/18/2006	2G	Chromium, hexavalent	mg/l	ND
7/6/2006	2G	Chromium, hexavalent	mg/l	ND
7/10/2006	2G	Chromium, hexavalent	mg/l	ND
7/14/2006	2G	Chromium, hexavalent	mg/l	ND
7/18/2006	2G	Chromium, hexavalent	mg/l	ND
10/19/2006	2G	Chromium, hexavalent	mg/l	ND
10/23/2006	2G	Chromium, hexavalent	mg/l	ND
10/27/2006	2G	Chromium, hexavalent	mg/l	ND
10/31/2006	2G	Chromium, hexavalent	mg/l	ND
1/4/2007	2G	Chromium, hexavalent	mg/l	ND
1/8/2007	2G	Chromium, hexavalent	mg/l	ND
1/11/2007	2G	Chromium, hexavalent	mg/l	ND
1/16/2007	2G	Chromium, hexavalent	mg/l	ND
4/19/2007	2G	Chromium, hexavalent	mg/l	ND
4/23/2007	2G	Chromium, hexavalent	mg/l	ND
4/27/2007	2G	Chromium, hexavalent	mg/l	ND
5/1/2007	2G	Chromium, hexavalent	mg/l	0.13
7/16/2007	2G	Chromium, hexavalent	mg/L	0.14
7/20/2007	2G	Chromium, hexavalent	mg/L	ND
7/24/2007	2G	Chromium, hexavalent	mg/L	ND
4/3/2008	2G	Chromium, Hexavalent	mg/L	ND
4/7/2008	2G	Chromium, hexavalent	mg/L	ND
4/11/2008	2G	Chromium, hexavalent	mg/L	ND
4/15/2008	2G	Chromium, hexavalent	mg/L	ND
7/3/2008	2G	Chromium, Hexavalent	mg/L	ND
7/3/2008	2G	Chromium, Hexavalent	mg/L	ND
7/7/2008	2G	Chromium, Hexavalent	mg/L	ND
7/11/2008	2G	Chromium, Hexavalent	mg/L	-0.01
7/15/2008	2G	Chromium, Hexavalent	mg/L	ND
10/9/2008	2G	Chromium, hexavalent	mg/L	ND
10/13/2008	2G	Chromium, hexavalent	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/17/2008	2G	Chromium, hexavalent	mg/L	ND
10/21/2008	2G	Chromium, hexavalent	mg/L	ND
1/8/2009	2G	Chromium, hexavalent	mg/L	ND
1/12/2009	2G	Chromium, hexavalent	mg/L	ND
1/16/2009	2G	Chromium, hexavalent	mg/L	ND
1/20/2009	2G	Chromium, hexavalent	mg/L	ND
4/9/2009	2G	Chromium, hexavalent	mg/L	ND
4/13/2009	2G	Chromium, hexavalent	mg/L	ND
4/17/2009	2G	Chromium, hexavalent	mg/L	ND
4/21/2009	2G	Chromium, hexavalent	mg/L	ND
1/11/2008	2G	Chromium, hexavalent	mg/L	ND
1/15/2008	2G	Chromium, hexavalent	mg/L	ND
1/3/2008	2G	Chromium, hexavalent	mg/L	ND
1/7/2008	2G	Chromium, hexavalent	mg/L	ND
10/18/2007	2G	Chromium, hexavalent	mg/L	ND
10/22/2007	2G	Chromium, hexavalent	mg/L	ND
10/26/2007	2G	Chromium, hexavalent	mg/L	ND
10/30/2007	2G	Chromium, hexavalent	mg/L	ND
10/18/2007	2G	Chromium, ICP	mg/L	ND
10/22/2007	2G	Chromium, ICP	mg/L	ND
10/26/2007	2G	Chromium, ICP	mg/L	ND
10/30/2007	2G	Chromium, ICP	mg/L	0.006
7/12/2007	2G	cis-1,2-Dichloroethene	ug/L	0.005
7/12/2007	2G	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2G	Cobalt	mg/L	ND
7/12/2007	2G	Copper	mg/L	ND
7/12/2007	2G	Cyanide	mg/L	ND
7/12/2007	2G	Dibromochloromethane	ug/L	ND
7/12/2007	2G	Dibromomethane	ug/L	ND
7/12/2007	2G	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2G	Dichloromethane (MeCl2)	ug/L	1.2
7/12/2007	2G	Ethylbenzene	ug/L	ND
7/12/2007	2G	Hexachlorobutadiene	ug/L	ND
1/24/2002	2G	Iron	mg/L	ND
1/28/2002	2G	Iron	mg/L	3920
2/1/2002	2G	Iron	mg/L	1902
2/5/2002	2G	Iron	mg/L	1287
4/4/2002	2G	Iron	mg/L	848
4/8/2002	2G	Iron	mg/L	2890
4/12/2002	2G	Iron	mg/L	1348
4/16/2002	2G	Iron	mg/L	1320
7/18/2002	2G	Iron	mg/L	1405
7/22/2002	2G	Iron	mg/L	3788
7/26/2002	2G	Iron	mg/L	2660
7/30/2002	2G	Iron	mg/L	2570
10/3/2002	2G	Iron	mg/L	2359
10/7/2002	2G	Iron	mg/L	3153
10/11/2002	2G	Iron	mg/L	1301
10/15/2002	2G	Iron	mg/L	1004
1/16/2003	2G	Iron	mg/L	931
1/21/2003	2G	Iron	mg/L	2978
1/24/2003	2G	Iron	mg/L	1630
1/28/2003	2G	Iron	mg/L	1604
4/3/2003	2G	Iron	mg/L	1589
4/7/2003	2G	Iron	mg/L	1957
4/11/2003	2G	Iron	mg/L	1100
4/15/2003	2G	Iron	mg/L	975
7/3/2003	2G	Iron	mg/L	1036
7/7/2003	2G	Iron	mg/L	1916
7/11/2003	2G	Iron	mg/L	857
7/15/2003	2G	Iron	mg/L	1680
10/2/2003	2G	Iron	mg/L	717
10/6/2003	2G	Iron	mg/L	1503
10/10/2003	2G	Iron	mg/L	1563
10/14/2003	2G	Iron	mg/L	1467
1/8/2004	2G	Iron	mg/L	1560
1/12/2004	2G	Iron	mg/L	1535
1/16/2004	2G	Iron	mg/L	1296
1/20/2004	2G	Iron	mg/L	1169
4/8/2004	2G	Iron	mg/L	1184
4/12/2004	2G	Iron	mg/L	1996
4/16/2004	2G	Iron	mg/L	1388
5/20/2004	2G	Iron	mg/L	1237
7/15/2004	2G	Iron	mg/L	1123
7/15/2004	2G	Iron	mg/L	ND
7/19/2004	2G	Iron	mg/L	1973
7/23/2004	2G	Iron	mg/L	1446
7/27/2004	2G	Iron	mg/L	1662
1/6/2005	2G	Iron	mg/L	1489
1/10/2005	2G	Iron	mg/L	2744
1/14/2005	2G	Iron	mg/L	2046
1/18/2005	2G	Iron	mg/L	2275
4/7/2005	2G	Iron	mg/L	1784
4/11/2005	2G	Iron	mg/L	2480
4/15/2005	2G	Iron	mg/L	1901
				1857

Sampling Date	Location ID	Analyte	Unit	Concentration
4/19/2005	2G	Iron	mg/L	1784
7/7/2005	2G	Iron	mg/L	3663
7/11/2005	2G	Iron	mg/L	1989
7/15/2005	2G	Iron	mg/L	1936
7/19/2005	2G	Iron	mg/L	1961
10/13/2005	2G	Iron	mg/L	2006
10/17/2005	2G	Iron	mg/L	1235
10/21/2005	2G	Iron	mg/L	1070
10/25/2005	2G	Iron	mg/L	1066
1/5/2006	2G	Iron	mg/L	2588
1/9/2006	2G	Iron	mg/L	2079
1/13/2006	2G	Iron	mg/L	1785
1/17/2006	2G	Iron	mg/L	2073
4/6/2006	2G	Iron	mg/L	1519
4/10/2006	2G	Iron	mg/L	1450
4/14/2006	2G	Iron	mg/L	1108
4/18/2006	2G	Iron	mg/L	1407
7/6/2006	2G	Iron	mg/L	1297
7/6/2006	2G	Iron	mg/L	1297
7/10/2006	2G	Iron	mg/L	1086
7/14/2006	2G	Iron	mg/L	1115
7/18/2006	2G	Iron	mg/L	5.96
7/18/2006	2G	Iron	mg/L	986
10/19/2006	2G	Iron	mg/L	1767
10/23/2006	2G	Iron	mg/L	1094
10/27/2006	2G	Iron	mg/L	1102
10/31/2006	2G	Iron	mg/L	1081
1/4/2007	2G	Iron	mg/L	2602
1/8/2007	2G	Iron	mg/L	1743
1/11/2007	2G	Iron	mg/L	1591
1/16/2007	2G	Iron	mg/L	1555
4/19/2007	2G	Iron	mg/L	1085
4/23/2007	2G	Iron	mg/L	997
4/27/2007	2G	Iron	mg/L	1073
5/1/2007	2G	Iron	mg/L	1027
7/12/2007	2G	Iron	mg/L	1376
7/16/2007	2G	Iron	mg/L	1168
7/20/2007	2G	Iron	mg/L	1215
7/24/2007	2G	Iron	mg/L	1303
4/3/2008	2G	Iron	mg/L	1236
4/7/2008	2G	Iron	mg/L	1170
4/11/2008	2G	Iron	mg/L	1132
4/15/2008	2G	Iron	mg/L	1082
7/3/2008	2G	Iron	mg/L	1407
7/3/2008	2G	Iron	mg/L	1407
7/7/2008	2G	Iron	mg/L	11.7
7/11/2008	2G	Iron	mg/L	1360
7/15/2008	2G	Iron	mg/L	1379
10/9/2008	2G	Iron	mg/L	1319
10/13/2008	2G	Iron	mg/L	1292
10/17/2008	2G	Iron	mg/L	1052
10/21/2008	2G	Iron	mg/L	1106
1/8/2009	2G	Iron	mg/L	1143
1/12/2009	2G	Iron	mg/L	1402
1/16/2009	2G	Iron	mg/L	1240
1/20/2009	2G	Iron	mg/L	1230
4/9/2009	2G	Iron	mg/L	1250
4/13/2009	2G	Iron	mg/L	1312
4/17/2009	2G	Iron	mg/L	1254
4/21/2009	2G	Iron	mg/L	1266
1/11/2008	2G	Iron	mg/L	976
1/15/2008	2G	Iron	mg/L	1027
1/3/2008	2G	Iron	mg/L	964
1/7/2008	2G	Iron	mg/L	866
10/18/2007	2G	Iron	mg/L	583
10/22/2007	2G	Iron	mg/L	502
10/26/2007	2G	Iron	mg/L	544
10/30/2007	2G	Iron	mg/L	576
7/12/2007	2G	Isopropylbenzene	ug/L	ND
7/12/2007	2G	Lead	mg/L	ND
7/12/2007	2G	m,p-Xylene	ug/L	ND
7/12/2007	2G	Magnesium	mg/L	211
1/24/2002	2G	Manganese	mg/L	131
1/28/2002	2G	Manganese	mg/L	56.8
2/1/2002	2G	Manganese	mg/L	43.4
2/5/2002	2G	Manganese	mg/L	29.6
4/4/2002	2G	Manganese	mg/L	81.8
4/8/2002	2G	Manganese	mg/L	40.5
4/12/2002	2G	Manganese	mg/L	37.8
4/16/2002	2G	Manganese	mg/L	38.1
7/18/2002	2G	Manganese	mg/L	124
7/22/2002	2G	Manganese	mg/L	83.7
7/26/2002	2G	Manganese	mg/L	72.8
7/30/2002	2G	Manganese	mg/L	74
10/3/2002	2G	Manganese	mg/L	94.1

Sampling Date	Location ID	Analyte	Unit	Concentration
10/7/2002	2G	Manganese	mg/L	39.6
10/11/2002	2G	Manganese	mg/L	29.1
10/15/2002	2G	Manganese	mg/L	29.4
1/16/2003	2G	Manganese	mg/L	87.8
1/21/2003	2G	Manganese	mg/L	54.3
1/24/2003	2G	Manganese	mg/L	50.4
1/28/2003	2G	Manganese	mg/L	48.1
4/3/2003	2G	Manganese	mg/L	57.9
4/7/2003	2G	Manganese	mg/L	37.2
4/11/2003	2G	Manganese	mg/L	33.1
4/15/2003	2G	Manganese	mg/L	35.6
7/3/2003	2G	Manganese	mg/L	54
7/7/2003	2G	Manganese	mg/L	25.3
7/11/2003	2G	Manganese	mg/L	101
7/15/2003	2G	Manganese	mg/L	23.9
10/2/2003	2G	Manganese	mg/L	46
10/6/2003	2G	Manganese	mg/L	42.8
10/10/2003	2G	Manganese	mg/L	52.2
10/14/2003	2G	Manganese	mg/L	45.9
1/8/2004	2G	Manganese	mg/L	46.5
1/12/2004	2G	Manganese	mg/L	38.9
1/16/2004	2G	Manganese	mg/L	39.2
1/20/2004	2G	Manganese	mg/L	43.1
4/8/2004	2G	Manganese	mg/L	60.5
4/12/2004	2G	Manganese	mg/L	43.1
4/16/2004	2G	Manganese	mg/L	41.1
5/20/2004	2G	Manganese	mg/L	38.9
7/15/2004	2G	Manganese	mg/L	58.4
7/19/2004	2G	Manganese	mg/L	46
7/23/2004	2G	Manganese	mg/L	58.5
7/27/2004	2G	Manganese	mg/L	52.8
1/6/2005	2G	Manganese	mg/L	88.7
1/10/2005	2G	Manganese	mg/L	66.2
1/14/2005	2G	Manganese	mg/L	50.9
1/18/2005	2G	Manganese	mg/L	56.8
4/7/2005	2G	Manganese	mg/L	72
4/11/2005	2G	Manganese	mg/L	63.5
4/15/2005	2G	Manganese	mg/L	56.6
4/19/2005	2G	Manganese	mg/L	60.5
7/7/2005	2G	Manganese	mg/L	140
7/11/2005	2G	Manganese	mg/L	65.3
7/15/2005	2G	Manganese	mg/L	64.9
7/19/2005	2G	Manganese	mg/L	58.1
10/13/2005	2G	Manganese	mg/L	56.3
10/17/2005	2G	Manganese	mg/L	34.6
10/21/2005	2G	Manganese	mg/L	33.4
10/25/2005	2G	Manganese	mg/L	38.5
1/5/2006	2G	Manganese	mg/L	3.03
1/9/2006	2G	Manganese	mg/L	43.6
1/13/2006	2G	Manganese	mg/L	35.8
1/17/2006	2G	Manganese	mg/L	36.8
4/6/2006	2G	Manganese	mg/L	45.6
4/10/2006	2G	Manganese	mg/L	47.3
4/14/2006	2G	Manganese	mg/L	37.9
4/18/2006	2G	Manganese	mg/L	49
7/6/2006	2G	Manganese	mg/L	1.43
7/10/2006	2G	Manganese	mg/L	25
7/14/2006	2G	Manganese	mg/L	24.7
7/18/2006	2G	Manganese	mg/L	13.1
7/18/2006	2G	Manganese	mg/L	0.167
10/19/2006	2G	Manganese	mg/L	101
10/23/2006	2G	Manganese	mg/L	26.7
10/27/2006	2G	Manganese	mg/L	56.6
10/31/2006	2G	Manganese	mg/L	55
1/4/2007	2G	Manganese	mg/L	43
1/8/2007	2G	Manganese	mg/L	33.2
1/11/2007	2G	Manganese	mg/L	31.3
1/16/2007	2G	Manganese	mg/L	52.4
4/19/2007	2G	Manganese	mg/L	25
4/23/2007	2G	Manganese	mg/L	35.5
4/27/2007	2G	Manganese	mg/L	58.1
5/1/2007	2G	Manganese	mg/L	40.9
7/12/2007	2G	Manganese	mg/L	46.2
7/16/2007	2G	Manganese	mg/L	40.7
7/20/2007	2G	Manganese	mg/L	40.1
7/24/2007	2G	Manganese	mg/L	41.5
4/3/2008	2G	Manganese	mg/L	43.0
4/7/2008	2G	Manganese	mg/L	47.3
4/11/2008	2G	Manganese	mg/L	45.3
4/15/2008	2G	Manganese	mg/L	43.0
7/3/2008	2G	Manganese	mg/L	49.3
7/3/2008	2G	Manganese	mg/L	49.3
7/7/2008	2G	Manganese	mg/L	0.41
7/11/2008	2G	Manganese	mg/L	46.7
7/15/2008	2G	Manganese	mg/L	48.9

Sampling Date	Location ID	Analyte	Unit	Concentration
10/9/2008	2G	Manganese	mg/L	46.3
10/13/2008	2G	Manganese	mg/L	51.9
10/17/2008	2G	Manganese	mg/L	36.9
10/21/2008	2G	Manganese	mg/L	40.0
1/8/2009	2G	Manganese	mg/L	43.9
1/12/2009	2G	Manganese	mg/L	51.8
1/16/2009	2G	Manganese	mg/L	40.2
1/20/2009	2G	Manganese	mg/L	50.8
4/9/2009	2G	Manganese	mg/L	43.4
4/13/2009	2G	Manganese	mg/L	53.5
4/17/2009	2G	Manganese	mg/L	47.9
4/21/2009	2G	Manganese	mg/L	51.0
1/11/2008	2G	Manganese	mg/L	34.1
1/15/2008	2G	Manganese	mg/L	35.9
1/3/2008	2G	Manganese	mg/L	36.3
1/7/2008	2G	Manganese	mg/L	30.6
10/18/2007	2G	Manganese	mg/L	19.2
10/22/2007	2G	Manganese	mg/L	20.9
10/26/2007	2G	Manganese	mg/L	19
10/30/2007	2G	Manganese	mg/L	21.4
7/12/2007	2G	Mercury	mg/L	ND
7/12/2007	2G	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2G	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2G	Naphthalene	ug/L	ND
7/12/2007	2G	n-Butylbenzene	ug/L	ND
7/12/2007	2G	Nickel	mg/L	ND
7/12/2007	2G	Nitrate	mg/L	ND
7/12/2007	2G	Nitrate/Nitrite	mg/L	ND
7/12/2007	2G	Nitrite	mg/L	ND
7/12/2007	2G	n-Propylbenzene	ug/L	ND
7/12/2007	2G	o-Xylene	ug/L	ND
1/24/2002	2G	pH	pH Units	4.92
1/28/2002	2G	pH	pH Units	4.95
2/1/2002	2G	pH	pH Units	4.82
2/5/2002	2G	pH	pH Units	5.04
4/4/2002	2G	pH	pH Units	5.15
4/8/2002	2G	pH	pH Units	4.27
4/12/2002	2G	pH	pH Units	5.07
4/16/2002	2G	pH	pH Units	5.03
7/18/2002	2G	pH	pH Units	4.03
7/22/2002	2G	pH	pH Units	5.12
7/26/2002	2G	pH	pH Units	4.96
7/30/2002	2G	pH	pH Units	5
10/3/2002	2G	pH	pH Units	4.99
10/7/2002	2G	pH	pH Units	5.13
10/11/2002	2G	pH	pH Units	5.33
10/15/2002	2G	pH	pH Units	5.15
1/16/2003	2G	pH	pH Units	4.18
1/21/2003	2G	pH	pH Units	5.13
1/24/2003	2G	pH	pH Units	5.1
1/28/2003	2G	pH	pH Units	5.13
4/3/2003	2G	pH	pH Units	5.11
4/7/2003	2G	pH	pH Units	5.04
4/11/2003	2G	pH	pH Units	5.01
4/15/2003	2G	pH	pH Units	4.92
7/3/2003	2G	pH	pH Units	5.26
7/7/2003	2G	pH	pH Units	5.29
7/11/2003	2G	pH	pH Units	5.25
7/15/2003	2G	pH	pH Units	5.32
10/2/2003	2G	pH	pH Units	5.13
10/6/2003	2G	pH	pH Units	5
10/10/2003	2G	pH	pH Units	5.01
10/14/2003	2G	pH	pH Units	5.14
1/8/2004	2G	pH	pH Units	5.04
1/12/2004	2G	pH	pH Units	5.21
1/16/2004	2G	pH	pH Units	5.26
1/20/2004	2G	pH	pH Units	5.24
4/8/2004	2G	pH	pH Units	4.98
4/12/2004	2G	pH	pH Units	5.06
4/16/2004	2G	pH	pH Units	4.94
5/20/2004	2G	pH	pH Units	5.03
7/15/2004	2G	pH	pH Units	4.96
7/19/2004	2G	pH	pH Units	5.12
7/23/2004	2G	pH	pH Units	5.09
7/27/2004	2G	pH	pH Units	5.01
1/6/2005	2G	pH	pH Units	5.01
1/10/2005	2G	pH	pH Units	5.31
1/14/2005	2G	pH	pH Units	5.19
1/18/2005	2G	pH	pH Units	5.16
4/7/2005	2G	pH	pH Units	5.19
4/11/2005	2G	pH	pH Units	5.25
4/15/2005	2G	pH	pH Units	5.31
4/19/2005	2G	pH	pH Units	5.34
7/7/2005	2G	pH	pH Units	5.25
7/11/2005	2G	pH	pH Units	5.24

Sampling Date	Location ID	Analyte	Unit	Concentration
7/15/2005	2G	pH	pH Units	5.25
7/19/2005	2G	pH	pH Units	5.36
10/13/2005	2G	pH	pH Units	5.03
10/17/2005	2G	pH	pH Units	5.22
10/21/2005	2G	pH	pH Units	5.23
10/25/2005	2G	pH	pH Units	5.34
1/5/2006	2G	pH	pH Units	5.14
1/9/2006	2G	pH	pH Units	5.45
1/13/2006	2G	pH	pH Units	5.19
1/17/2006	2G	pH	pH Units	5.3
4/6/2006	2G	pH	pH Units	5.21
4/10/2006	2G	pH	pH Units	5.23
4/14/2006	2G	pH	pH Units	4.58
4/18/2006	2G	pH	pH Units	5.36
7/6/2006	2G	pH	pH Units	5.35
7/10/2006	2G	pH	pH Units	5.43
7/14/2006	2G	pH	pH Units	5.56
7/18/2006	2G	pH	pH Units	5.18
10/19/2006	2G	pH	pH Units	5.23
10/23/2006	2G	pH	pH Units	5.29
10/27/2006	2G	pH	pH Units	5.29
10/31/2006	2G	pH	pH Units	5.39
1/4/2007	2G	pH	pH Units	5.34
1/8/2007	2G	pH	pH Units	5.43
1/11/2007	2G	pH	pH Units	5.58
1/16/2007	2G	pH	pH Units	5.55
4/19/2007	2G	pH	pH Units	5.6
4/23/2007	2G	pH	pH Units	5.53
4/27/2007	2G	pH	pH Units	5.63
5/1/2007	2G	pH	pH Units	5.52
7/12/2007	2G	pH	pH	5.48
7/12/2007	2G	pH	pH	5.53
7/12/2007	2G	pH	pH	5.53
7/12/2007	2G	pH	pH	5.62
7/16/2007	2G	pH	pH	5.19
7/16/2007	2G	pH	pH	5.24
7/16/2007	2G	pH	pH	5.25
7/16/2007	2G	pH	pH	5.32
7/20/2007	2G	pH	pH	5.03
7/20/2007	2G	pH	pH	5.02
7/20/2007	2G	pH	pH	5.04
7/20/2007	2G	pH	pH	5.06
7/24/2007	2G	pH	pH	5.18
7/24/2007	2G	pH	pH	5.19
7/24/2007	2G	pH	pH	5.18
7/24/2007	2G	pH	pH	5.21
4/3/2008	2G	pH	pH	5.52
4/3/2008	2G	pH	pH	5.53
4/3/2008	2G	pH	pH	5.54
4/3/2008	2G	pH	pH	5.58
4/7/2008	2G	pH	pH	5.51
4/7/2008	2G	pH	pH	5.53
4/7/2008	2G	pH	pH	5.53
4/7/2008	2G	pH	pH	5.58
4/11/2008	2G	pH	pH	5.53
4/11/2008	2G	pH	pH	5.53
4/11/2008	2G	pH	pH	5.58
4/11/2008	2G	pH	pH	5.63
4/15/2008	2G	pH	pH	5.52
4/15/2008	2G	pH	pH	5.59
4/15/2008	2G	pH	pH	5.60
4/15/2008	2G	pH	pH	5.63
7/3/2008	2G	pH	pH	5.58
7/3/2008	2G	pH	pH	5.61
7/3/2008	2G	pH	pH	5.61
7/3/2008	2G	pH	pH	5.66
7/3/2008	2G	pH	pH	5.58
7/3/2008	2G	pH	pH	5.61
7/3/2008	2G	pH	pH	5.61
7/3/2008	2G	pH	pH	5.66
7/7/2008	2G	pH	pH	5.54
7/7/2008	2G	pH	pH	5.57
7/7/2008	2G	pH	pH	5.59
7/7/2008	2G	pH	pH	5.59
7/11/2008	2G	pH	pH	5.56
7/11/2008	2G	pH	pH	5.6
7/11/2008	2G	pH	pH	5.6
7/11/2008	2G	pH	pH	5.6
7/15/2008	2G	pH	pH	5.12
7/15/2008	2G	pH	pH	5.12
7/15/2008	2G	pH	pH	5.14
7/15/2008	2G	pH	pH	5.17
10/9/2008	2G	pH	pH	5.56
10/9/2008	2G	pH	pH	5.58
10/9/2008	2G	pH	pH	5.58

Sampling Date	Location ID	Analyte	Unit	Concentration
10/9/2008	2G	pH	pH	5.62
10/13/2008	2G	pH	pH	5.53
10/13/2008	2G	pH	pH	5.54
10/13/2008	2G	pH	pH	5.55
10/13/2008	2G	pH	pH	5.59
10/17/2008	2G	pH	pH	5.27
10/17/2008	2G	pH	pH	5.29
10/17/2008	2G	pH	pH	5.30
10/17/2008	2G	pH	pH	5.34
10/21/2008	2G	pH	pH	5.37
10/21/2008	2G	pH	pH	5.37
10/21/2008	2G	pH	pH	5.40
10/21/2008	2G	pH	pH	5.43
1/8/2009	2G	pH	pH	5.49
1/8/2009	2G	pH	pH	5.50
1/8/2009	2G	pH	pH	5.52
1/8/2009	2G	pH	pH	5.56
1/12/2009	2G	pH	pH	5.46
1/12/2009	2G	pH	pH	5.48
1/12/2009	2G	pH	pH	5.50
1/12/2009	2G	pH	pH	5.54
1/16/2009	2G	pH	pH	5.49
1/16/2009	2G	pH	pH	5.50
1/16/2009	2G	pH	pH	5.52
1/16/2009	2G	pH	pH	5.60
1/20/2009	2G	pH	pH	5.51
1/20/2009	2G	pH	pH	5.56
1/20/2009	2G	pH	pH	5.56
1/20/2009	2G	pH	pH	5.62
4/9/2009	2G	pH	pH	5.51
4/9/2009	2G	pH	pH	5.54
4/9/2009	2G	pH	pH	5.57
4/9/2009	2G	pH	pH	5.73
4/13/2009	2G	pH	pH	5.53
4/13/2009	2G	pH	pH	5.57
4/13/2009	2G	pH	pH	5.59
4/13/2009	2G	pH	pH	5.67
4/17/2009	2G	pH	pH	5.59
4/17/2009	2G	pH	pH	5.56
4/17/2009	2G	pH	pH	5.52
4/17/2009	2G	pH	pH	5.58
4/21/2009	2G	pH	pH	5.51
4/21/2009	2G	pH	pH	5.52
4/21/2009	2G	pH	pH	5.55
4/21/2009	2G	pH	pH	5.62
1/11/2008	2G	pH	pH	5.4
1/11/2008	2G	pH	pH	5.41
1/11/2008	2G	pH	pH	5.4
1/11/2008	2G	pH	pH	5.45
1/15/2008	2G	pH	pH	5.51
1/15/2008	2G	pH	pH	5.54
1/15/2008	2G	pH	pH	5.61
1/15/2008	2G	pH	pH	5.55
1/3/2008	2G	pH	pH	5.01
1/3/2008	2G	pH	pH	5
1/3/2008	2G	pH	pH	5
1/3/2008	2G	pH	pH	5.07
1/7/2008	2G	pH	pH	5.45
1/7/2008	2G	pH	pH	5.42
1/7/2008	2G	pH	pH	5.4
1/7/2008	2G	pH	pH	5.44
10/18/2007	2G	pH	pH	5.56
10/18/2007	2G	pH	pH	5.63
10/18/2007	2G	pH	pH	5.67
10/18/2007	2G	pH	pH	5.68
10/22/2007	2G	pH	pH	5.66
10/22/2007	2G	pH	pH	5.65
10/22/2007	2G	pH	pH	5.67
10/22/2007	2G	pH	pH	5.7
10/26/2007	2G	pH	pH	5.44
10/26/2007	2G	pH	pH	5.49
10/26/2007	2G	pH	pH	5.51
10/26/2007	2G	pH	pH	5.5
10/30/2007	2G	pH	pH	5.52
10/30/2007	2G	pH	pH	5.59
10/30/2007	2G	pH	pH	5.57
10/30/2007	2G	pH	pH	5.59
7/12/2007	2G	Phenols	mg/L	ND
7/16/2007	2G	Phenols	mg/L	ND
7/20/2007	2G	Phenols	mg/L	ND
7/24/2007	2G	Phenols	mg/L	15.6
1/24/2002	2G	Phenols	mg/L	ND
1/28/2002	2G	Phenols	mg/L	0.006
2/1/2002	2G	Phenols	mg/L	0.804
2/5/2002	2G	Phenols	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/4/2002	2G	Phenols	mg/L	0.007
4/8/2002	2G	Phenols	mg/L	0.008
4/12/2002	2G	Phenols	mg/L	0.011
4/16/2002	2G	Phenols	mg/L	0.009
7/18/2002	2G	Phenols	mg/L	0.003
7/22/2002	2G	Phenols	mg/L	0.033
7/26/2002	2G	Phenols	mg/L	0.05
7/30/2002	2G	Phenols	mg/L	ND
10/3/2002	2G	Phenols	mg/L	0.006
10/7/2002	2G	Phenols	mg/L	ND
10/11/2002	2G	Phenols	mg/L	ND
10/15/2002	2G	Phenols	mg/L	ND
1/16/2003	2G	Phenols	mg/L	ND
1/21/2003	2G	Phenols	mg/L	ND
1/24/2003	2G	Phenols	mg/L	ND
1/28/2003	2G	Phenols	mg/L	0.87
4/3/2003	2G	Phenols	mg/L	ND
4/7/2003	2G	Phenols	mg/L	ND
4/11/2003	2G	Phenols	mg/L	ND
4/15/2003	2G	Phenols	mg/L	ND
7/3/2003	2G	Phenols	mg/L	8.8
7/7/2003	2G	Phenols	mg/L	ND
7/11/2003	2G	Phenols	mg/L	ND
7/15/2003	2G	Phenols	mg/L	0.069
10/2/2003	2G	Phenols	mg/L	ND
10/2/2003	2G	Phenols	mg/L	ND
10/6/2003	2G	Phenols	mg/L	ND
10/10/2003	2G	Phenols	mg/L	ND
10/14/2003	2G	Phenols	mg/L	ND
1/8/2004	2G	Phenols	mg/L	ND
1/12/2004	2G	Phenols	mg/L	ND
1/16/2004	2G	Phenols	mg/L	ND
1/20/2004	2G	Phenols	mg/L	ND
4/8/2004	2G	Phenols	mg/L	ND
4/12/2004	2G	Phenols	mg/L	ND
4/16/2004	2G	Phenols	mg/L	ND
5/20/2004	2G	Phenols	mg/L	ND
7/15/2004	2G	Phenols	mg/L	ND
7/15/2004	2G	Phenols	mg/L	ND
7/19/2004	2G	Phenols	mg/L	ND
7/23/2004	2G	Phenols	mg/L	ND
7/27/2004	2G	Phenols	mg/L	ND
1/6/2005	2G	Phenols	mg/L	0.08
1/10/2005	2G	Phenols	mg/L	ND
1/14/2005	2G	Phenols	mg/L	ND
1/18/2005	2G	Phenols	mg/L	ND
4/7/2005	2G	Phenols	mg/L	1.8
4/11/2005	2G	Phenols	mg/L	ND
4/15/2005	2G	Phenols	mg/L	ND
4/19/2005	2G	Phenols	mg/L	ND
7/7/2005	2G	Phenols	mg/L	2.77
7/11/2005	2G	Phenols	mg/L	ND
7/15/2005	2G	Phenols	mg/L	0.3
7/19/2005	2G	Phenols	mg/L	ND
10/13/2005	2G	Phenols	mg/L	0.06
10/17/2005	2G	Phenols	mg/L	ND
10/21/2005	2G	Phenols	mg/L	ND
10/25/2005	2G	Phenols	mg/L	ND
1/5/2006	2G	Phenols	mg/L	ND
1/9/2006	2G	Phenols	mg/L	ND
1/13/2006	2G	Phenols	mg/L	ND
1/17/2006	2G	Phenols	mg/L	ND
4/6/2006	2G	Phenols	mg/L	1.84
4/10/2006	2G	Phenols	mg/L	0.07
4/14/2006	2G	Phenols	mg/L	ND
4/18/2006	2G	Phenols	mg/L	ND
7/6/2006	2G	Phenols	mg/L	ND
7/10/2006	2G	Phenols	mg/L	0.18
7/14/2006	2G	Phenols	mg/L	ND
7/18/2006	2G	Phenols	mg/L	ND
10/19/2006	2G	Phenols	mg/L	0.05
10/23/2006	2G	Phenols	mg/L	0.09
10/27/2006	2G	Phenols	mg/L	ND
10/31/2006	2G	Phenols	mg/L	0.08
1/4/2007	2G	Phenols	mg/L	ND
1/8/2007	2G	Phenols	mg/L	ND
1/11/2007	2G	Phenols	mg/L	ND
1/16/2007	2G	Phenols	mg/L	ND
4/19/2007	2G	Phenols	mg/L	ND
4/23/2007	2G	Phenols	mg/L	ND
4/27/2007	2G	Phenols	mg/L	ND
5/1/2007	2G	Phenols	mg/L	ND
10/18/2007	2G	Phenols	mg/L	ND
10/22/2007	2G	Phenols	mg/L	ND
10/26/2007	2G	Phenols	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/30/2007	2G	Phenols	mg/L	ND
4/3/2008	2G	Phenols, Total	mg/L	0.06
4/7/2008	2G	Phenols, Total	mg/L	ND
4/11/2008	2G	Phenols, Total	mg/L	0.10
4/15/2008	2G	Phenols, Total	mg/L	0.05
7/3/2008	2G	Phenols, Total	mg/L	ND
7/3/2008	2G	Phenols, Total	mg/L	ND
7/7/2008	2G	Phenols, Total	mg/L	ND
7/11/2008	2G	Phenols, Total	mg/L	0.05
7/15/2008	2G	Phenols, Total	mg/L	ND
10/9/2008	2G	Phenols, Total	mg/L	ND
10/13/2008	2G	Phenols, Total	mg/L	ND
10/17/2008	2G	Phenols, Total	mg/L	ND
10/21/2008	2G	Phenols, Total	mg/L	ND
1/8/2009	2G	Phenols, Total	mg/L	ND
1/12/2009	2G	Phenols, Total	mg/L	ND
1/16/2009	2G	Phenols, Total	mg/L	ND
1/20/2009	2G	Phenols, Total	mg/L	ND
4/9/2009	2G	Phenols, Total	mg/L	ND
4/13/2009	2G	Phenols, Total	mg/L	ND
4/17/2009	2G	Phenols, Total	mg/L	ND
4/21/2009	2G	Phenols, Total	mg/L	ND
1/11/2008	2G	Phenols, Total	mg/L	ND
1/15/2008	2G	Phenols, Total	mg/L	ND
1/3/2008	2G	Phenols, Total	mg/L	ND
1/7/2008	2G	Phenols, Total	mg/L	ND
7/12/2007	2G	Potassium	mg/L	50.1
7/12/2007	2G	sec-Butylbenzene	ug/L	ND
7/12/2007	2G	Selenium	mg/L	0.01
7/12/2007	2G	Silver	mg/L	ND
1/24/2002	2G	Sodium	mg/L	278
1/28/2002	2G	Sodium	mg/L	223
2/1/2002	2G	Sodium	mg/L	202
2/5/2002	2G	Sodium	mg/L	185
4/4/2002	2G	Sodium	mg/L	261
4/8/2002	2G	Sodium	mg/L	225
4/12/2002	2G	Sodium	mg/L	253
4/16/2002	2G	Sodium	mg/L	258
7/18/2002	2G	Sodium	mg/L	353
7/22/2002	2G	Sodium	mg/L	379
7/26/2002	2G	Sodium	mg/L	395
7/30/2002	2G	Sodium	mg/L	379
10/3/2002	2G	Sodium	mg/L	256
10/7/2002	2G	Sodium	mg/L	221
10/11/2002	2G	Sodium	mg/L	215
10/15/2002	2G	Sodium	mg/L	210
1/16/2003	2G	Sodium	mg/L	283
1/21/2003	2G	Sodium	mg/L	257
1/24/2003	2G	Sodium	mg/L	264
1/28/2003	2G	Sodium	mg/L	277
4/3/2003	2G	Sodium	mg/L	191
4/7/2003	2G	Sodium	mg/L	182
4/11/2003	2G	Sodium	mg/L	167
4/15/2003	2G	Sodium	mg/L	170
7/3/2003	2G	Sodium	mg/L	210
7/7/2003	2G	Sodium	mg/L	172
7/11/2003	2G	Sodium	mg/L	116
7/15/2003	2G	Sodium	mg/L	167
10/2/2003	2G	Sodium	mg/L	215
10/6/2003	2G	Sodium	mg/L	240
10/10/2003	2G	Sodium	mg/L	244
10/14/2003	2G	Sodium	mg/L	292
1/8/2004	2G	Sodium	mg/L	199
1/12/2004	2G	Sodium	mg/L	210
1/16/2004	2G	Sodium	mg/L	204
1/20/2004	2G	Sodium	mg/L	226
4/8/2004	2G	Sodium	mg/L	228
4/12/2004	2G	Sodium	mg/L	222
4/16/2004	2G	Sodium	mg/L	201
5/20/2004	2G	Sodium	mg/L	218
7/15/2004	2G	Sodium	mg/L	225
7/19/2004	2G	Sodium	mg/L	224
7/23/2004	2G	Sodium	mg/L	256
7/27/2004	2G	Sodium	mg/L	241
1/6/2005	2G	Sodium	mg/L	283
1/10/2005	2G	Sodium	mg/L	335
1/14/2005	2G	Sodium	mg/L	311
1/18/2005	2G	Sodium	mg/L	327
4/7/2005	2G	Sodium	mg/L	285
4/11/2005	2G	Sodium	mg/L	307
4/15/2005	2G	Sodium	mg/L	293
4/19/2005	2G	Sodium	mg/L	286
7/7/2005	2G	Sodium	mg/L	322
7/11/2005	2G	Sodium	mg/L	358
7/15/2005	2G	Sodium	mg/L	382

Sampling Date	Location ID	Analyte	Unit	Concentration
7/19/2005	2G	Sodium	mg/L	367
10/13/2005	2G	Sodium	mg/L	236
10/17/2005	2G	Sodium	mg/L	254
10/21/2005	2G	Sodium	mg/L	234
10/25/2005	2G	Sodium	mg/L	240
1/5/2006	2G	Sodium	mg/L	320
1/9/2006	2G	Sodium	mg/L	337
1/13/2006	2G	Sodium	mg/L	309
1/17/2006	2G	Sodium	mg/L	358
4/6/2006	2G	Sodium	mg/L	304
4/10/2006	2G	Sodium	mg/L	285
4/14/2006	2G	Sodium	mg/L	197
4/18/2006	2G	Sodium	mg/L	267
7/6/2006	2G	Sodium	mg/L	73.2
7/10/2006	2G	Sodium	mg/L	132
7/14/2006	2G	Sodium	mg/L	241
7/18/2006	2G	Sodium	mg/L	204
10/19/2006	2G	Sodium	mg/L	215
10/23/2006	2G	Sodium	mg/L	235
10/27/2006	2G	Sodium	mg/L	231
10/31/2006	2G	Sodium	mg/L	218
1/4/2007	2G	Sodium	mg/L	288
1/8/2007	2G	Sodium	mg/L	322
1/11/2007	2G	Sodium	mg/L	297
1/16/2007	2G	Sodium	mg/L	289
4/19/2007	2G	Sodium	mg/L	186
4/23/2007	2G	Sodium	mg/L	176
4/27/2007	2G	Sodium	mg/L	183
5/1/2007	2G	Sodium	mg/L	178
7/12/2007	2G	Sodium	mg/L	260
7/16/2007	2G	Sodium	mg/L	259
7/20/2007	2G	Sodium	mg/L	253
7/24/2007	2G	Sodium	mg/L	285
4/3/2008	2G	Sodium	mg/L	220
4/7/2008	2G	Sodium	mg/L	248
4/11/2008	2G	Sodium	mg/L	235
4/15/2008	2G	Sodium	mg/L	226
7/7/2008	2G	Sodium	mg/L	2.32
7/11/2008	2G	Sodium	mg/L	258
7/15/2008	2G	Sodium	mg/L	259
10/9/2008	2G	Sodium	mg/L	333
10/13/2008	2G	Sodium	mg/L	298
10/17/2008	2G	Sodium	mg/L	243
10/21/2008	2G	Sodium	mg/L	240
1/8/2009	2G	Sodium	mg/L	267
1/12/2009	2G	Sodium	mg/L	297
1/16/2009	2G	Sodium	mg/L	248
1/20/2009	2G	Sodium	mg/L	267
4/9/2009	2G	Sodium	mg/L	274
4/13/2009	2G	Sodium	mg/L	297
4/17/2009	2G	Sodium	mg/L	262
4/21/2009	2G	Sodium	mg/L	245
1/11/2008	2G	Sodium	mg/L	216
1/15/2008	2G	Sodium	mg/L	230
1/3/2008	2G	Sodium	mg/L	259
1/7/2008	2G	Sodium	mg/L	233
10/18/2007	2G	Sodium	mg/L	206
10/22/2007	2G	Sodium	mg/L	229
10/26/2007	2G	Sodium	mg/L	208
10/30/2007	2G	Sodium	mg/L	233
7/12/2007	2G	Solids, Total Dissolved	mg/L	6960
7/12/2007	2G	Solids, Total Suspended	mg/L	102
1/24/2002	2G	Specific Conductance	umhos	7400
1/28/2002	2G	Specific Conductance	umhos	4.95
2/1/2002	2G	Specific Conductance	umhos	4650
2/5/2002	2G	Specific Conductance	umhos	3670
4/4/2002	2G	Specific Conductance	umhos	6720
4/8/2002	2G	Specific Conductance	umhos	5260
4/12/2002	2G	Specific Conductance	umhos	4690
4/16/2002	2G	Specific Conductance	umhos	5060
7/18/2002	2G	Specific Conductance	umhos	5020
7/22/2002	2G	Specific Conductance	umhos	4090
7/26/2002	2G	Specific Conductance	umhos	2770
7/30/2002	2G	Specific Conductance	umhos	7950
10/3/2002	2G	Specific Conductance	umhos	8880
10/7/2002	2G	Specific Conductance	umhos	5460
10/11/2002	2G	Specific Conductance	umhos	4500
10/15/2002	2G	Specific Conductance	umhos	4340
1/16/2003	2G	Specific Conductance	umhos	7510
1/21/2003	2G	Specific Conductance	umhos	5560
1/24/2003	2G	Specific Conductance	umhos	5840
1/28/2003	2G	Specific Conductance	umhos	5970
4/3/2003	2G	Specific Conductance	umhos	5830
4/7/2003	2G	Specific Conductance	umhos	4390
4/11/2003	2G	Specific Conductance	umhos	5000

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2003	2G	Specific Conductance	umhos	4630
7/3/2003	2G	Specific Conductance	umhos	6290
7/7/2003	2G	Specific Conductance	umhos	4480
7/11/2003	2G	Specific Conductance	umhos	4220
7/15/2003	2G	Specific Conductance	umhos	4220
10/2/2003	2G	Specific Conductance	umhos	5840
10/6/2003	2G	Specific Conductance	umhos	5600
10/10/2003	2G	Specific Conductance	umhos	5050
10/14/2003	2G	Specific Conductance	umhos	5980
1/8/2004	2G	Specific Conductance	umhos	5150
1/12/2004	2G	Specific Conductance	umhos	4810
1/16/2004	2G	Specific Conductance	umhos	1630
1/20/2004	2G	Specific Conductance	umhos	4640
4/8/2004	2G	Specific Conductance	umhos	5140
4/12/2004	2G	Specific Conductance	umhos	4410
4/16/2004	2G	Specific Conductance	umhos	4680
5/20/2004	2G	Specific Conductance	umhos	3960
7/15/2004	2G	Specific Conductance	umhos	6540
7/19/2004	2G	Specific Conductance	umhos	5700
7/23/2004	2G	Specific Conductance	umhos	4950
7/27/2004	2G	Specific Conductance	umhos	4930
1/6/2005	2G	Specific Conductance	umhos	7220
1/10/2005	2G	Specific Conductance	umhos	6080
1/14/2005	2G	Specific Conductance	umhos	4550
1/18/2005	2G	Specific Conductance	umhos	6580
4/7/2005	2G	Specific Conductance	umhos	4100
4/11/2005	2G	Specific Conductance	umhos	5290
4/15/2005	2G	Specific Conductance	umhos	3360
4/19/2005	2G	Specific Conductance	umhos	2700
7/7/2005	2G	Specific Conductance	umhos	8720
7/11/2005	2G	Specific Conductance	umhos	7370
7/15/2005	2G	Specific Conductance	umhos	6870
7/19/2005	2G	Specific Conductance	umhos	6810
10/13/2005	2G	Specific Conductance	umhos	5270
10/17/2005	2G	Specific Conductance	umhos	5400
10/21/2005	2G	Specific Conductance	umhos	4980
10/25/2005	2G	Specific Conductance	umhos	4960
1/5/2006	2G	Specific Conductance	umhos	6010
1/9/2006	2G	Specific Conductance	umhos	4660
1/13/2006	2G	Specific Conductance	umhos	4360
1/17/2006	2G	Specific Conductance	umhos	5560
4/6/2006	2G	Specific Conductance	umhos	5320
4/10/2006	2G	Specific Conductance	umhos	4040
4/14/2006	2G	Specific Conductance	umhos	6330
4/18/2006	2G	Specific Conductance	umhos	6430
7/6/2006	2G	Specific Conductance	umhos	6430
7/10/2006	2G	Specific Conductance	umhos	5070
7/14/2006	2G	Specific Conductance	umhos	5220
7/18/2006	2G	Specific Conductance	umhos	4930
10/19/2006	2G	Specific Conductance	umhos	6390
10/23/2006	2G	Specific Conductance	umhos	5080
10/27/2006	2G	Specific Conductance	umhos	4540
10/31/2006	2G	Specific Conductance	umhos	5670
1/4/2007	2G	Specific Conductance	umhos	6500
1/8/2007	2G	Specific Conductance	umhos	4450
1/11/2007	2G	Specific Conductance	umhos	3730
1/16/2007	2G	Specific Conductance	umhos	2730
4/19/2007	2G	Specific Conductance	umhos	3240
4/23/2007	2G	Specific Conductance	umhos	2760
4/27/2007	2G	Specific Conductance	umhos	2460
5/1/2007	2G	Specific Conductance	umhos	2260
7/12/2007	2G	Specific Conductance	umhos	2390
7/12/2007	2G	Specific Conductance	umhos	2990
7/12/2007	2G	Specific Conductance	umhos	2570
7/12/2007	2G	Specific Conductance	umhos	2480
7/16/2007	2G	Specific Conductance	umhos	16.02
7/16/2007	2G	Specific Conductance	umhos	1492
7/16/2007	2G	Specific Conductance	umhos	1375
7/16/2007	2G	Specific Conductance	umhos	1384
7/20/2007	2G	Specific Conductance	umhos	4670
7/20/2007	2G	Specific Conductance	umhos	4780
7/20/2007	2G	Specific Conductance	umhos	4570
7/20/2007	2G	Specific Conductance	umhos	4590
7/24/2007	2G	Specific Conductance	umhos	4070
7/24/2007	2G	Specific Conductance	umhos	3770
7/24/2007	2G	Specific Conductance	umhos	3800
7/24/2007	2G	Specific Conductance	umhos	4370
4/3/2008	2G	Specific Conductance	umhos	5240
4/3/2008	2G	Specific Conductance	umhos	5250
4/3/2008	2G	Specific Conductance	umhos	5260
4/3/2008	2G	Specific Conductance	umhos	5300
4/7/2008	2G	Specific Conductance	umhos	5400
4/7/2008	2G	Specific Conductance	umhos	5400
4/7/2008	2G	Specific Conductance	umhos	5410
4/7/2008	2G	Specific Conductance	umhos	5440

Sampling Date	Location ID	Analyte	Unit	Concentration
4/11/2008	2G	Specific Conductance	umhos	5400
4/11/2008	2G	Specific Conductance	umhos	5430
4/11/2008	2G	Specific Conductance	umhos	5450
4/11/2008	2G	Specific Conductance	umhos	5470
4/15/2008	2G	Specific Conductance	umhos	5480
4/15/2008	2G	Specific Conductance	umhos	5520
4/15/2008	2G	Specific Conductance	umhos	5590
4/15/2008	2G	Specific Conductance	umhos	6000
7/3/2008	2G	Specific Conductance	umhos	5750
7/3/2008	2G	Specific Conductance	umhos	5700
7/3/2008	2G	Specific Conductance	umhos	5670
7/3/2008	2G	Specific Conductance	umhos	5680
7/3/2008	2G	Specific Conductance	umhos	5670
7/3/2008	2G	Specific Conductance	umhos	5680
7/3/2008	2G	Specific Conductance	umhos	5700
7/3/2008	2G	Specific Conductance	umhos	5750
7/7/2008	2G	Specific Conductance	umhos	5330
7/7/2008	2G	Specific Conductance	umhos	5390
7/7/2008	2G	Specific Conductance	umhos	5400
7/7/2008	2G	Specific Conductance	umhos	5500
7/11/2008	2G	Specific Conductance	umhos	5750
7/11/2008	2G	Specific Conductance	umhos	5800
7/11/2008	2G	Specific Conductance	umhos	5840
7/11/2008	2G	Specific Conductance	umhos	5850
7/15/2008	2G	Specific Conductance	umhos	5840
7/15/2008	2G	Specific Conductance	umhos	5880
7/15/2008	2G	Specific Conductance	umhos	5880
7/15/2008	2G	Specific Conductance	umhos	6180
10/9/2008	2G	Specific Conductance	umhos	5390
10/9/2008	2G	Specific Conductance	umhos	5440
10/9/2008	2G	Specific Conductance	umhos	5540
10/9/2008	2G	Specific Conductance	umhos	5730
10/13/2008	2G	Specific Conductance	umhos	4920
10/13/2008	2G	Specific Conductance	umhos	4950
10/13/2008	2G	Specific Conductance	umhos	4970
10/13/2008	2G	Specific Conductance	umhos	5120
10/17/2008	2G	Specific Conductance	umhos	5080
10/17/2008	2G	Specific Conductance	umhos	5100
10/17/2008	2G	Specific Conductance	umhos	5170
10/17/2008	2G	Specific Conductance	umhos	5390
10/21/2008	2G	Specific Conductance	umhos	4490
10/21/2008	2G	Specific Conductance	umhos	4520
10/21/2008	2G	Specific Conductance	umhos	4580
10/21/2008	2G	Specific Conductance	umhos	4710
1/8/2009	2G	Specific Conductance	umhos	6520
1/8/2009	2G	Specific Conductance	umhos	6540
1/8/2009	2G	Specific Conductance	umhos	6550
1/8/2009	2G	Specific Conductance	umhos	6560
1/12/2009	2G	Specific Conductance	umhos	6440
1/12/2009	2G	Specific Conductance	umhos	6530
1/12/2009	2G	Specific Conductance	umhos	6550
1/12/2009	2G	Specific Conductance	umhos	6560
1/16/2009	2G	Specific Conductance	umhos	6520
1/16/2009	2G	Specific Conductance	umhos	6830
1/16/2009	2G	Specific Conductance	umhos	7010
1/16/2009	2G	Specific Conductance	umhos	7050
1/20/2009	2G	Specific Conductance	umhos	6700
1/20/2009	2G	Specific Conductance	umhos	6710
1/20/2009	2G	Specific Conductance	umhos	6720
1/20/2009	2G	Specific Conductance	umhos	6760
4/9/2009	2G	Specific Conductance	umhos	6750
4/9/2009	2G	Specific Conductance	umhos	6720
4/9/2009	2G	Specific Conductance	umhos	6730
4/9/2009	2G	Specific Conductance	umhos	6750
4/13/2009	2G	Specific Conductance	umhos	7070
4/13/2009	2G	Specific Conductance	umhos	7010
4/13/2009	2G	Specific Conductance	umhos	7000
4/13/2009	2G	Specific Conductance	umhos	7050
4/17/2009	2G	Specific Conductance	umhos	6790
4/17/2009	2G	Specific Conductance	umhos	6750
4/17/2009	2G	Specific Conductance	umhos	6740
4/17/2009	2G	Specific Conductance	umhos	6740
4/21/2009	2G	Specific Conductance	umhos	6450
4/21/2009	2G	Specific Conductance	umhos	6680
4/21/2009	2G	Specific Conductance	umhos	6630
4/21/2009	2G	Specific Conductance	umhos	6710
1/11/2008	2G	Specific Conductance	umhos	1640
1/11/2008	2G	Specific Conductance	umhos	1410
1/11/2008	2G	Specific Conductance	umhos	1280
1/11/2008	2G	Specific Conductance	umhos	1270
1/15/2008	2G	Specific Conductance	umhos	1660
1/15/2008	2G	Specific Conductance	umhos	1460
1/15/2008	2G	Specific Conductance	umhos	1340
1/15/2008	2G	Specific Conductance	umhos	1290
1/3/2008	2G	Specific Conductance	umhos	2400

Sampling Date	Location ID	Analyte	Unit	Concentration
1/3/2008	2G	Specific Conductance	umhos	2190
1/3/2008	2G	Specific Conductance	umhos	2020
1/3/2008	2G	Specific Conductance	umhos	1980
1/7/2008	2G	Specific Conductance	umhos	3020
1/7/2008	2G	Specific Conductance	umhos	2660
1/7/2008	2G	Specific Conductance	umhos	2450
1/7/2008	2G	Specific Conductance	umhos	2410
10/18/2007	2G	Specific Conductance	umhos	3660
10/18/2007	2G	Specific Conductance	umhos	3530
10/18/2007	2G	Specific Conductance	umhos	3460
10/18/2007	2G	Specific Conductance	umhos	3480
10/22/2007	2G	Specific Conductance	umhos	3350
10/22/2007	2G	Specific Conductance	umhos	3130
10/22/2007	2G	Specific Conductance	umhos	3020
10/22/2007	2G	Specific Conductance	umhos	3050
10/26/2007	2G	Specific Conductance	umhos	2090
10/26/2007	2G	Specific Conductance	umhos	2060
10/26/2007	2G	Specific Conductance	umhos	1960
10/26/2007	2G	Specific Conductance	umhos	1850
10/30/2007	2G	Specific Conductance	umhos	3150
10/30/2007	2G	Specific Conductance	umhos	2850
10/30/2007	2G	Specific Conductance	umhos	2660
10/30/2007	2G	Specific Conductance	umhos	2670
7/12/2007	2G	Styrene	ug/L	ND
7/12/2007	2G	Sulfate	mg/L	5033
7/16/2007	2G	Sulfate	mg/L	4340
7/20/2007	2G	Sulfate	mg/L	5053
7/24/2007	2G	Sulfate	mg/L	4413
4/3/2008	2G	Sulfate	mg/L	5053
4/7/2008	2G	Sulfate	mg/L	4266
4/11/2008	2G	Sulfate	mg/L	4370
4/15/2008	2G	Sulfate	mg/L	2789
7/3/2008	2G	Sulfate	mg/L	5174
7/3/2008	2G	Sulfate	mg/L	5174
7/7/2008	2G	Sulfate	mg/L	4717
7/11/2008	2G	Sulfate	mg/L	4780
7/15/2008	2G	Sulfate	mg/L	5248
10/9/2008	2G	Sulfate	mg/L	4936
10/13/2008	2G	Sulfate	mg/L	4771
10/17/2008	2G	Sulfate	mg/L	5067
10/21/2008	2G	Sulfate	mg/L	4597
1/8/2009	2G	Sulfate	mg/L	5761
1/12/2009	2G	Sulfate	mg/L	5306
1/16/2009	2G	Sulfate	mg/L	5651
1/20/2009	2G	Sulfate	mg/L	4734
4/9/2009	2G	Sulfate	mg/L	5569
4/13/2009	2G	Sulfate	mg/L	5973
4/17/2009	2G	Sulfate	mg/L	6166
4/21/2009	2G	Sulfate	mg/L	6901
1/11/2008	2G	Sulfate	mg/L	4384
1/15/2008	2G	Sulfate	mg/L	4712
1/3/2008	2G	Sulfate	mg/L	4762
1/7/2008	2G	Sulfate	mg/L	4140
1/24/2002	2G	Sulfate	mg/L	7986
1/28/2002	2G	Sulfate	mg/L	4983
2/1/2002	2G	Sulfate	mg/L	3942
2/5/2002	2G	Sulfate	mg/L	3342
4/4/2002	2G	Sulfate	mg/L	6572
4/8/2002	2G	Sulfate	mg/L	8700
4/12/2002	2G	Sulfate	mg/L	4640
4/16/2002	2G	Sulfate	mg/L	2441
7/18/2002	2G	Sulfate	mg/L	9640
7/22/2002	2G	Sulfate	mg/L	7169
7/26/2002	2G	Sulfate	mg/L	7226
7/30/2002	2G	Sulfate	mg/L	7022
10/3/2002	2G	Sulfate	mg/L	6640
10/7/2002	2G	Sulfate	mg/L	5450
10/11/2002	2G	Sulfate	mg/L	5111
10/15/2002	2G	Sulfate	mg/L	1933
1/16/2003	2G	Sulfate	mg/L	7070
1/21/2003	2G	Sulfate	mg/L	4860
1/24/2003	2G	Sulfate	mg/L	5587
1/28/2003	2G	Sulfate	mg/L	4920
4/3/2003	2G	Sulfate	mg/L	5220
4/7/2003	2G	Sulfate	mg/L	4580
4/11/2003	2G	Sulfate	mg/L	75
4/15/2003	2G	Sulfate	mg/L	3710
7/3/2003	2G	Sulfate	mg/L	4960
7/7/2003	2G	Sulfate	mg/L	3040
7/11/2003	2G	Sulfate	mg/L	3100
7/15/2003	2G	Sulfate	mg/L	3102
10/2/2003	2G	Sulfate	mg/L	5070
10/6/2003	2G	Sulfate	mg/L	3540
10/10/2003	2G	Sulfate	mg/L	4810
10/14/2003	2G	Sulfate	mg/L	4800

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2004	2G	Sulfate	mg/L	4130
1/12/2004	2G	Sulfate	mg/L	4610
1/16/2004	2G	Sulfate	mg/L	4570
1/20/2004	2G	Sulfate	mg/L	4460
4/8/2004	2G	Sulfate	mg/L	6181
4/12/2004	2G	Sulfate	mg/L	4723
4/16/2004	2G	Sulfate	mg/L	5130
5/20/2004	2G	Sulfate	mg/L	3959
7/15/2004	2G	Sulfate	mg/L	4797
7/19/2004	2G	Sulfate	mg/L	4732
7/23/2004	2G	Sulfate	mg/L	4360
7/27/2004	2G	Sulfate	mg/L	3960
1/6/2005	2G	Sulfate	mg/L	8213
1/10/2005	2G	Sulfate	mg/L	1092
1/14/2005	2G	Sulfate	mg/L	5860
1/18/2005	2G	Sulfate	mg/L	5226
4/7/2005	2G	Sulfate	mg/L	7214
4/11/2005	2G	Sulfate	mg/L	5161
4/15/2005	2G	Sulfate	mg/L	6020
4/19/2005	2G	Sulfate	mg/L	5809
7/7/2005	2G	Sulfate	mg/L	10390
7/11/2005	2G	Sulfate	mg/L	8248
7/15/2005	2G	Sulfate	mg/L	7410
7/19/2005	2G	Sulfate	mg/L	8248
10/13/2005	2G	Sulfate	mg/L	6327
10/17/2005	2G	Sulfate	mg/L	4569
10/21/2005	2G	Sulfate	mg/L	4254
10/25/2005	2G	Sulfate	mg/L	4359
1/5/2006	2G	Sulfate	mg/L	7924
1/9/2006	2G	Sulfate	mg/L	6992
1/13/2006	2G	Sulfate	mg/L	7265
1/17/2006	2G	Sulfate	mg/L	7236
4/6/2006	2G	Sulfate	mg/L	6291
4/10/2006	2G	Sulfate	mg/L	6017
4/14/2006	2G	Sulfate	mg/L	5384
4/18/2006	2G	Sulfate	mg/L	6030
7/6/2006	2G	Sulfate	mg/L	5737
7/10/2006	2G	Sulfate	mg/L	4446
7/14/2006	2G	Sulfate	mg/L	4078
7/18/2006	2G	Sulfate	mg/L	4432
10/19/2006	2G	Sulfate	mg/L	7979
10/23/2006	2G	Sulfate	mg/L	5904
10/27/2006	2G	Sulfate	mg/L	5650
10/31/2006	2G	Sulfate	mg/L	4850
1/4/2007	2G	Sulfate	mg/L	8948
1/8/2007	2G	Sulfate	mg/L	4569
1/11/2007	2G	Sulfate	mg/L	5957
1/16/2007	2G	Sulfate	mg/L	5501
4/19/2007	2G	Sulfate	mg/L	5085
4/23/2007	2G	Sulfate	mg/L	4667
4/27/2007	2G	Sulfate	mg/L	4190
5/1/2007	2G	Sulfate	mg/L	3650
10/18/2007	2G	Sulfate	mg/L	3125
10/22/2007	2G	Sulfate	mg/L	3227
10/26/2007	2G	Sulfate	mg/L	2645
10/30/2007	2G	Sulfate	mg/L	2869
1/24/2002	2G	Temperature	C	15
1/28/2002	2G	Temperature	C	16
2/1/2002	2G	Temperature	C	16
2/5/2002	2G	Temperature	C	14
4/4/2002	2G	Temperature	C	14
4/8/2002	2G	Temperature	C	14
4/12/2002	2G	Temperature	C	14
4/16/2002	2G	Temperature	C	16
7/18/2002	2G	Temperature	C	17
7/22/2002	2G	Temperature	C	17
7/26/2002	2G	Temperature	C	16
7/30/2002	2G	Temperature	C	16
10/3/2002	2G	Temperature	C	18
10/7/2002	2G	Temperature	C	18
10/11/2002	2G	Temperature	C	17
10/15/2002	2G	Temperature	C	16
1/16/2003	2G	Temperature	C	15
1/21/2003	2G	Temperature	C	14
1/24/2003	2G	Temperature	C	14
1/28/2003	2G	Temperature	C	14
4/3/2003	2G	Temperature	C	14
4/7/2003	2G	Temperature	C	12
4/11/2003	2G	Temperature	C	13
4/15/2003	2G	Temperature	C	14
7/3/2003	2G	Temperature	C	16
7/7/2003	2G	Temperature	C	18
7/11/2003	2G	Temperature	C	17
7/15/2003	2G	Temperature	C	17
10/2/2003	2G	Temperature	C	18

Sampling Date	Location ID	Analyte	Unit	Concentration
10/6/2003	2G	Temperature	C	18
10/10/2003	2G	Temperature	C	17
10/14/2003	2G	Temperature	C	18.2
1/8/2004	2G	Temperature	C	14
1/12/2004	2G	Temperature	C	15
1/16/2004	2G	Temperature	C	14
1/20/2004	2G	Temperature	C	14
4/8/2004	2G	Temperature	C	13
4/12/2004	2G	Temperature	C	13
4/16/2004	2G	Temperature	C	14
5/20/2004	2G	Temperature	C	15
7/15/2004	2G	Temperature	C	17
7/19/2004	2G	Temperature	C	17
7/23/2004	2G	Temperature	C	17
7/27/2004	2G	Temperature	C	17
1/6/2005	2G	Temperature	C	15
1/10/2005	2G	Temperature	C	15
1/14/2005	2G	Temperature	C	15
1/18/2005	2G	Temperature	C	14
4/7/2005	2G	Temperature	C	15
4/11/2005	2G	Temperature	C	14
4/15/2005	2G	Temperature	C	14
4/19/2005	2G	Temperature	C	14
7/7/2005	2G	Temperature	C	15
7/11/2005	2G	Temperature	C	15
7/15/2005	2G	Temperature	C	16
7/19/2005	2G	Temperature	C	16
10/13/2005	2G	Temperature	C	15
10/17/2005	2G	Temperature	C	16
10/21/2005	2G	Temperature	C	16
10/25/2005	2G	Temperature	C	16
1/5/2006	2G	Temperature	C	15
1/9/2006	2G	Temperature	C	15
1/13/2006	2G	Temperature	C	15
1/17/2006	2G	Temperature	C	13
4/6/2006	2G	Temperature	C	13
4/10/2006	2G	Temperature	C	14
4/14/2006	2G	Temperature	C	14.7
4/18/2006	2G	Temperature	C	13
7/6/2006	2G	Temperature	C	16
7/10/2006	2G	Temperature	C	17
7/14/2006	2G	Temperature	C	16
7/18/2006	2G	Temperature	C	17
10/19/2006	2G	Temperature	C	17
10/23/2006	2G	Temperature	C	17
10/27/2006	2G	Temperature	C	16
10/31/2006	2G	Temperature	C	17
1/4/2007	2G	Temperature	C	16
1/8/2007	2G	Temperature	C	15
1/11/2007	2G	Temperature	C	15
1/16/2007	2G	Temperature	C	14
4/19/2007	2G	Temperature	C	13
4/23/2007	2G	Temperature	C	14
4/27/2007	2G	Temperature	C	13
5/1/2007	2G	Temperature	C	14
7/12/2007	2G	Temperature	C	16
7/12/2007	2G	Temperature	C	16
7/12/2007	2G	Temperature	C	16
7/12/2007	2G	Temperature	C	17
7/16/2007	2G	Temperature	C	16
7/16/2007	2G	Temperature	C	16
7/16/2007	2G	Temperature	C	16
7/16/2007	2G	Temperature	C	17
7/20/2007	2G	Temperature	C	16
7/20/2007	2G	Temperature	C	16
7/20/2007	2G	Temperature	C	16
7/20/2007	2G	Temperature	C	17
7/24/2007	2G	Temperature	C	16
7/24/2007	2G	Temperature	C	16
7/24/2007	2G	Temperature	C	16
7/24/2007	2G	Temperature	C	17
4/3/2008	2G	Temperature	C	14
4/3/2008	2G	Temperature	C	14
4/3/2008	2G	Temperature	C	14
4/3/2008	2G	Temperature	C	14
4/7/2008	2G	Temperature	C	13
4/7/2008	2G	Temperature	C	13
4/7/2008	2G	Temperature	C	13
4/7/2008	2G	Temperature	C	13
4/11/2008	2G	Temperature	C	15
4/11/2008	2G	Temperature	C	15
4/11/2008	2G	Temperature	C	15
4/11/2008	2G	Temperature	C	15
4/15/2008	2G	Temperature	C	14
4/15/2008	2G	Temperature	C	14

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2008	2G	Temperature	C	15
4/15/2008	2G	Temperature	C	15
7/3/2008	2G	Temperature	C	17
7/3/2008	2G	Temperature	C	16
7/3/2008	2G	Temperature	C	16
7/3/2008	2G	Temperature	C	17
7/3/2008	2G	Temperature	C	16
7/3/2008	2G	Temperature	C	16
7/3/2008	2G	Temperature	C	17
7/3/2008	2G	Temperature	C	17
7/7/2008	2G	Temperature	C	16
7/7/2008	2G	Temperature	C	16
7/7/2008	2G	Temperature	C	17
7/7/2008	2G	Temperature	C	17
7/11/2008	2G	Temperature	C	16
7/11/2008	2G	Temperature	C	17
7/11/2008	2G	Temperature	C	17
7/11/2008	2G	Temperature	C	17
7/15/2008	2G	Temperature	C	17
7/15/2008	2G	Temperature	C	17
7/15/2008	2G	Temperature	C	17
7/15/2008	2G	Temperature	C	17
10/9/2008	2G	Temperature	C	19
10/9/2008	2G	Temperature	C	19
10/9/2008	2G	Temperature	C	19
10/9/2008	2G	Temperature	C	19
10/13/2008	2G	Temperature	C	18
10/13/2008	2G	Temperature	C	18
10/13/2008	2G	Temperature	C	19
10/13/2008	2G	Temperature	C	19
10/17/2008	2G	Temperature	C	18
10/17/2008	2G	Temperature	C	18
10/17/2008	2G	Temperature	C	18
10/17/2008	2G	Temperature	C	18
10/21/2008	2G	Temperature	C	17
10/21/2008	2G	Temperature	C	18
10/21/2008	2G	Temperature	C	18
10/21/2008	2G	Temperature	C	18
1/8/2009	2G	Temperature	C	15
1/8/2009	2G	Temperature	C	15
1/8/2009	2G	Temperature	C	15
1/8/2009	2G	Temperature	C	15
1/12/2009	2G	Temperature	C	15
1/12/2009	2G	Temperature	C	15
1/12/2009	2G	Temperature	C	15
1/12/2009	2G	Temperature	C	15
1/16/2009	2G	Temperature	C	13
1/16/2009	2G	Temperature	C	13
1/16/2009	2G	Temperature	C	13
1/16/2009	2G	Temperature	C	13
1/20/2009	2G	Temperature	C	14
1/20/2009	2G	Temperature	C	14
1/20/2009	2G	Temperature	C	14
1/20/2009	2G	Temperature	C	14
4/9/2009	2G	Temperature	C	14
4/9/2009	2G	Temperature	C	14
4/9/2009	2G	Temperature	C	14
4/9/2009	2G	Temperature	C	15
4/13/2009	2G	Temperature	C	13
4/13/2009	2G	Temperature	C	14
4/13/2009	2G	Temperature	C	13
4/13/2009	2G	Temperature	C	14
4/17/2009	2G	Temperature	C	14
4/17/2009	2G	Temperature	C	14
4/17/2009	2G	Temperature	C	14
4/17/2009	2G	Temperature	C	15
4/21/2009	2G	Temperature	C	14
4/21/2009	2G	Temperature	C	14
4/21/2009	2G	Temperature	C	14
4/21/2009	2G	Temperature	C	14
1/11/2008	2G	Temperature	C	16
1/11/2008	2G	Temperature	C	16
1/11/2008	2G	Temperature	C	16
1/11/2008	2G	Temperature	C	15
1/15/2008	2G	Temperature	C	15
1/15/2008	2G	Temperature	C	15
1/15/2008	2G	Temperature	C	15
1/15/2008	2G	Temperature	C	14
1/3/2008	2G	Temperature	C	15
1/3/2008	2G	Temperature	C	15
1/3/2008	2G	Temperature	C	15
1/3/2008	2G	Temperature	C	13
1/7/2008	2G	Temperature	C	16
1/7/2008	2G	Temperature	C	16
1/7/2008	2G	Temperature	C	16

Sampling Date	Location ID	Analyte	Unit	Concentration
1/7/2008	2G	Temperature	C	16
10/18/2007	2G	Temperature	C	19.2
10/18/2007	2G	Temperature	C	18.2
10/18/2007	2G	Temperature	C	17.7
10/18/2007	2G	Temperature	C	18.2
10/22/2007	2G	Temperature	C	17
10/22/2007	2G	Temperature	C	18
10/22/2007	2G	Temperature	C	18
10/22/2007	2G	Temperature	C	18
10/26/2007	2G	Temperature	C	17
10/26/2007	2G	Temperature	C	17
10/26/2007	2G	Temperature	C	17
10/26/2007	2G	Temperature	C	17
10/30/2007	2G	Temperature	C	18
10/30/2007	2G	Temperature	C	18
10/30/2007	2G	Temperature	C	17
10/30/2007	2G	Temperature	C	18
7/12/2007	2G	tert-Butylbenzene	ug/L	ND
7/12/2007	2G	Tetrachloroethene	ug/L	ND
7/12/2007	2G	Thallium	mg/L	ND
7/12/2007	2G	Toluene	ug/L	ND
7/12/2007	2G	Total Alkalinity	mg/L	183
7/12/2007	2G	Total Hardness,Calculation	mg/L	1918
7/12/2007	2G	Total Organic Carbon	mg/L	17.5
7/12/2007	2G	Total Organic Carbon	mg/L	17.5
7/16/2007	2G	Total Organic Carbon	mg/L	16
7/20/2007	2G	Total Organic Carbon	mg/L	15
7/24/2007	2G	Total Organic Carbon	mg/L	14
4/7/2008	2G	Total Organic Carbon	mg/L	13
4/11/2008	2G	Total Organic Carbon	mg/L	12.2
4/15/2008	2G	Total Organic Carbon	mg/L	13
7/3/2008	2G	Total Organic Carbon	mg/L	13
7/3/2008	2G	Total Organic Carbon	mg/L	15
10/9/2008	2G	Total Organic Carbon	mg/L	16
10/13/2008	2G	Total Organic Carbon	mg/L	15.0
10/17/2008	2G	Total Organic Carbon	mg/L	14.4
10/21/2008	2G	Total Organic Carbon	mg/L	13
1/8/2009	2G	Total Organic Carbon	mg/L	14
1/12/2009	2G	Total Organic Carbon	mg/L	14
1/16/2009	2G	Total Organic Carbon	mg/L	13.0
1/20/2009	2G	Total Organic Carbon	mg/L	15
1/11/2008	2G	Total Organic Carbon	mg/L	14
1/15/2008	2G	Total Organic Carbon	mg/L	15
1/3/2008	2G	Total Organic Carbon	mg/L	14
1/7/2008	2G	Total Organic Carbon	mg/L	6.7
1/24/2002	2G	Total Organic Carbon	mg/L	8.5
1/28/2002	2G	Total Organic Carbon	mg/L	8.8
2/1/2002	2G	Total Organic Carbon	mg/L	9.7
2/5/2002	2G	Total Organic Carbon	mg/L	8.1
4/4/2002	2G	Total Organic Carbon	mg/L	11
4/8/2002	2G	Total Organic Carbon	mg/L	11
4/12/2002	2G	Total Organic Carbon	mg/L	12
4/16/2002	2G	Total Organic Carbon	mg/L	7.9
7/18/2002	2G	Total Organic Carbon	mg/L	12
7/22/2002	2G	Total Organic Carbon	mg/L	12
7/26/2002	2G	Total Organic Carbon	mg/L	12
7/30/2002	2G	Total Organic Carbon	mg/L	8.6
10/3/2002	2G	Total Organic Carbon	mg/L	13
10/7/2002	2G	Total Organic Carbon	mg/L	ND
10/11/2002	2G	Total Organic Carbon	mg/L	13
10/15/2002	2G	Total Organic Carbon	mg/L	11
1/16/2003	2G	Total Organic Carbon	mg/L	11
1/21/2003	2G	Total Organic Carbon	mg/L	9.8
1/24/2003	2G	Total Organic Carbon	mg/L	10.4
1/28/2003	2G	Total Organic Carbon	mg/L	8.3
4/3/2003	2G	Total Organic Carbon	mg/L	9.1
4/7/2003	2G	Total Organic Carbon	mg/L	8.4
4/11/2003	2G	Total Organic Carbon	mg/L	9.3
4/15/2003	2G	Total Organic Carbon	mg/L	8
7/3/2003	2G	Total Organic Carbon	mg/L	6.9
7/7/2003	2G	Total Organic Carbon	mg/L	10
7/11/2003	2G	Total Organic Carbon	mg/L	7.2
7/15/2003	2G	Total Organic Carbon	mg/L	11
10/2/2003	2G	Total Organic Carbon	mg/L	11
10/6/2003	2G	Total Organic Carbon	mg/L	11
10/10/2003	2G	Total Organic Carbon	mg/L	10
10/14/2003	2G	Total Organic Carbon	mg/L	9
1/8/2004	2G	Total Organic Carbon	mg/L	11
1/12/2004	2G	Total Organic Carbon	mg/L	10
1/16/2004	2G	Total Organic Carbon	mg/L	10
1/20/2004	2G	Total Organic Carbon	mg/L	11
4/8/2004	2G	Total Organic Carbon	mg/L	10
4/12/2004	2G	Total Organic Carbon	mg/L	10
4/16/2004	2G	Total Organic Carbon	mg/L	10
5/20/2004	2G	Total Organic Carbon	mg/L	9.8
7/15/2004	2G	Total Organic Carbon	mg/L	

Sampling Date	Location ID	Analyte	Unit	Concentration
7/19/2004	2G	Total Organic Carbon	mg/L	10
7/23/2004	2G	Total Organic Carbon	mg/L	11
7/27/2004	2G	Total Organic Carbon	mg/L	11
1/6/2005	2G	Total Organic Carbon	mg/L	12
1/10/2005	2G	Total Organic Carbon	mg/L	17
1/14/2005	2G	Total Organic Carbon	mg/L	14
1/18/2005	2G	Total Organic Carbon	mg/L	14
4/7/2005	2G	Total Organic Carbon	mg/L	11
4/11/2005	2G	Total Organic Carbon	mg/L	14
4/15/2005	2G	Total Organic Carbon	mg/L	15
4/19/2005	2G	Total Organic Carbon	mg/L	15
7/7/2005	2G	Total Organic Carbon	mg/L	12
7/11/2005	2G	Total Organic Carbon	mg/L	16
7/15/2005	2G	Total Organic Carbon	mg/L	16
7/19/2005	2G	Total Organic Carbon	mg/L	17
10/13/2005	2G	Total Organic Carbon	mg/L	11
10/17/2005	2G	Total Organic Carbon	mg/L	14
10/21/2005	2G	Total Organic Carbon	mg/L	14
10/25/2005	2G	Total Organic Carbon	mg/L	14
1/5/2006	2G	Total Organic Carbon	mg/L	12
1/9/2006	2G	Total Organic Carbon	mg/L	14
1/13/2006	2G	Total Organic Carbon	mg/L	19
1/17/2006	2G	Total Organic Carbon	mg/L	20
4/6/2006	2G	Total Organic Carbon	mg/L	13
4/10/2006	2G	Total Organic Carbon	mg/L	13
4/14/2006	2G	Total Organic Carbon	mg/L	12.9
4/18/2006	2G	Total Organic Carbon	mg/L	15
7/6/2006	2G	Total Organic Carbon	mg/L	10
7/10/2006	2G	Total Organic Carbon	mg/L	13
7/14/2006	2G	Total Organic Carbon	mg/L	14
7/18/2006	2G	Total Organic Carbon	mg/L	15
10/19/2006	2G	Total Organic Carbon	mg/L	9.8
10/23/2006	2G	Total Organic Carbon	mg/L	14
10/27/2006	2G	Total Organic Carbon	mg/L	14
10/31/2006	2G	Total Organic Carbon	mg/L	14
1/4/2007	2G	Total Organic Carbon	mg/L	11
1/8/2007	2G	Total Organic Carbon	mg/L	12
1/11/2007	2G	Total Organic Carbon	mg/L	13
1/16/2007	2G	Total Organic Carbon	mg/L	13
4/19/2007	2G	Total Organic Carbon	mg/L	14
4/23/2007	2G	Total Organic Carbon	mg/L	17
4/27/2007	2G	Total Organic Carbon	mg/L	14
5/1/2007	2G	Total Organic Carbon	mg/L	14
4/3/2008	2G	Total Organic Carbon	mg/L	14
7/7/2008	2G	Total Organic Carbon	mg/L	12
7/11/2008	2G	Total Organic Carbon	mg/L	14
7/15/2008	2G	Total Organic Carbon	mg/L	12.5
4/9/2009	2G	Total Organic Carbon	mg/L	14
4/13/2009	2G	Total Organic Carbon	mg/L	14
4/17/2009	2G	Total Organic Carbon	mg/L	12
4/21/2009	2G	Total Organic Carbon	mg/L	10.8
10/18/2007	2G	Total Organic Carbon	mg/L	18
10/22/2007	2G	Total Organic Carbon	mg/L	17
10/26/2007	2G	Total Organic Carbon	mg/L	15
10/30/2007	2G	Total Organic Carbon	mg/L	15
1/24/2002	2G	Total Organic Halogen	mg/L	0.039
1/28/2002	2G	Total Organic Halogen	mg/L	0.075
2/1/2002	2G	Total Organic Halogen	mg/L	0.055
2/5/2002	2G	Total Organic Halogen	mg/L	0.053
4/4/2002	2G	Total Organic Halogen	mg/L	0.052
4/8/2002	2G	Total Organic Halogen	mg/L	0.092
4/12/2002	2G	Total Organic Halogen	mg/L	56
4/16/2002	2G	Total Organic Halogen	mg/L	60
7/18/2002	2G	Total Organic Halogen	mg/L	ND
7/18/2002	2G	Total Organic Halogen	mg/L	ND
7/22/2002	2G	Total Organic Halogen	mg/L	0.075
7/26/2002	2G	Total Organic Halogen	mg/L	0.081
7/30/2002	2G	Total Organic Halogen	mg/L	0.1
10/3/2002	2G	Total Organic Halogen	mg/L	0.04
10/7/2002	2G	Total Organic Halogen	mg/L	0.053
10/11/2002	2G	Total Organic Halogen	mg/L	0.075
10/15/2002	2G	Total Organic Halogen	mg/L	0.052
1/16/2003	2G	Total Organic Halogen	mg/L	0.045
1/21/2003	2G	Total Organic Halogen	mg/L	0.053
1/24/2003	2G	Total Organic Halogen	mg/L	0.061
1/28/2003	2G	Total Organic Halogen	mg/L	0.066
4/3/2003	2G	Total Organic Halogen	mg/L	0.051
4/7/2003	2G	Total Organic Halogen	mg/L	0.054
4/11/2003	2G	Total Organic Halogen	mg/L	0.048
4/15/2003	2G	Total Organic Halogen	mg/L	0.055
7/3/2003	2G	Total Organic Halogen	mg/L	0.036
7/7/2003	2G	Total Organic Halogen	mg/L	0.053
7/11/2003	2G	Total Organic Halogen	mg/L	0.039
7/15/2003	2G	Total Organic Halogen	mg/L	0.035
10/2/2003	2G	Total Organic Halogen	mg/L	0.057

Sampling Date	Location ID	Analyte	Unit	Concentration
10/6/2003	2G	Total Organic Halogen	mg/L	0.048
10/10/2003	2G	Total Organic Halogen	mg/L	9
10/14/2003	2G	Total Organic Halogen	mg/L	0.043
1/8/2004	2G	Total Organic Halogen	mg/L	0.049
1/12/2004	2G	Total Organic Halogen	mg/L	0.059
1/16/2004	2G	Total Organic Halogen	mg/L	0.052
1/20/2004	2G	Total Organic Halogen	mg/L	0.045
4/8/2004	2G	Total Organic Halogen	mg/L	54
4/12/2004	2G	Total Organic Halogen	mg/L	48
4/16/2004	2G	Total Organic Halogen	mg/L	52
5/20/2004	2G	Total Organic Halogen	mg/L	65
7/15/2004	2G	Total Organic Halogen	mg/L	0.029
7/19/2004	2G	Total Organic Halogen	mg/L	0.03
7/23/2004	2G	Total Organic Halogen	mg/L	0.06
7/27/2004	2G	Total Organic Halogen	mg/L	0.035
1/6/2005	2G	Total Organic Halogen	mg/L	0.069
1/10/2005	2G	Total Organic Halogen	mg/L	0.101
1/14/2005	2G	Total Organic Halogen	mg/L	0.094
1/18/2005	2G	Total Organic Halogen	mg/L	0.079
4/7/2005	2G	Total Organic Halogen	mg/L	0.089
4/11/2005	2G	Total Organic Halogen	mg/L	0.088
4/15/2005	2G	Total Organic Halogen	mg/L	0.049
4/19/2005	2G	Total Organic Halogen	mg/L	0.067
7/7/2005	2G	Total Organic Halogen	mg/L	0.043
7/11/2005	2G	Total Organic Halogen	mg/L	0.045
7/15/2005	2G	Total Organic Halogen	mg/L	0.155
7/19/2005	2G	Total Organic Halogen	mg/L	0.113
10/13/2005	2G	Total Organic Halogen	mg/L	0.055
10/17/2005	2G	Total Organic Halogen	mg/L	0.08
10/21/2005	2G	Total Organic Halogen	mg/L	0.096
10/25/2005	2G	Total Organic Halogen	mg/L	0.103
1/5/2006	2G	Total Organic Halogen	mg/L	0.068
1/9/2006	2G	Total Organic Halogen	mg/L	0.08
1/13/2006	2G	Total Organic Halogen	mg/L	0.079
1/17/2006	2G	Total Organic Halogen	mg/L	0.118
4/6/2006	2G	Total Organic Halogen	mg/L	0.14
4/10/2006	2G	Total Organic Halogen	mg/L	0.121
4/14/2006	2G	Total Organic Halogen	mg/L	0.099
4/18/2006	2G	Total Organic Halogen	mg/L	0.079
7/6/2006	2G	Total Organic Halogen	mg/L	0.073
7/10/2006	2G	Total Organic Halogen	mg/L	0.071
7/14/2006	2G	Total Organic Halogen	mg/L	0.074
7/18/2006	2G	Total Organic Halogen	mg/L	0.082
10/19/2006	2G	Total Organic Halogen	mg/L	0.046
10/23/2006	2G	Total Organic Halogen	mg/L	0.053
10/27/2006	2G	Total Organic Halogen	mg/L	0.061
10/31/2006	2G	Total Organic Halogen	mg/L	0.058
1/4/2007	2G	Total Organic Halogen	mg/L	0.065
1/8/2007	2G	Total Organic Halogen	mg/L	0.061
1/11/2007	2G	Total Organic Halogen	mg/L	0.057
1/16/2007	2G	Total Organic Halogen	mg/L	0.07
4/19/2007	2G	Total Organic Halogen	mg/L	0.1
4/23/2007	2G	Total Organic Halogen	mg/L	0.09
4/27/2007	2G	Total Organic Halogen	mg/L	0.4
5/1/2007	2G	Total Organic Halogen	mg/L	0.2
7/12/2007	2G	Total Organic Halogen	mg/L	0.1
7/16/2007	2G	Total Organic Halogen	mg/L	0.27
7/20/2007	2G	Total Organic Halogen	mg/L	0.06
7/24/2007	2G	Total Organic Halogen	mg/L	0.22
4/7/2008	2G	Total Organic Halogen	mg/L	0.07
4/11/2008	2G	Total Organic Halogen	mg/L	0.09
4/15/2008	2G	Total Organic Halogen	mg/L	0.06
7/3/2008	2G	Total Organic Halogen	mg/L	0.04
7/3/2008	2G	Total Organic Halogen	mg/L	0.04
7/7/2008	2G	Total Organic Halogen	mg/L	0.07
7/11/2008	2G	Total Organic Halogen	mg/L	0.06
7/15/2008	2G	Total Organic Halogen	mg/L	0.07
10/9/2008	2G	Total Organic Halogen	mg/L	ND
10/13/2008	2G	Total Organic Halogen	mg/L	0.5
10/17/2008	2G	Total Organic Halogen	mg/L	0.1
10/21/2008	2G	Total Organic Halogen	mg/L	0.1
1/8/2009	2G	Total Organic Halogen	mg/L	0.12
1/12/2009	2G	Total Organic Halogen	mg/L	0.26
1/16/2009	2G	Total Organic Halogen	mg/L	0.07
1/20/2009	2G	Total Organic Halogen	mg/L	0.4
1/11/2008	2G	Total Organic Halogen	mg/L	0.14
1/15/2008	2G	Total Organic Halogen	mg/L	0.072
1/3/2008	2G	Total Organic Halogen	mg/L	0.1
1/7/2008	2G	Total Organic Halogen	mg/L	0.08
10/18/2007	2G	Total Organic Halogen	mg/L	0.47
10/22/2007	2G	Total Organic Halogen	mg/L	0.12
10/26/2007	2G	Total Organic Halogen	mg/L	0.13
10/30/2007	2G	Total Organic Halogen	mg/L	0.11
4/3/2008	2G	Total Organic Halogen	mg/L	0.09
4/9/2009	2G	Total Organic Halogen	mg/L	0.20

Sampling Date	Location ID	Analyte	Unit	Concentration
4/13/2009	2G	Total Organic Halogen	mg/L	0.16
4/17/2009	2G	Total Organic Halogen	mg/L	ND
4/21/2009	2G	Total Organic Halogen	mg/L	ND
7/12/2007	2G	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2G	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2G	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2G	Trichloroethene	ug/L	ND
7/12/2007	2G	Trichlorofluoromethane	ug/L	ND
1/24/2002	2G	Turbidity	NTU	380
1/28/2002	2G	Turbidity	NTU	178
2/1/2002	2G	Turbidity	NTU	172
2/5/2002	2G	Turbidity	NTU	64
4/4/2002	2G	Turbidity	NTU	230
4/8/2002	2G	Turbidity	NTU	128
4/12/2002	2G	Turbidity	NTU	228
4/16/2002	2G	Turbidity	NTU	212
7/18/2002	2G	Turbidity	NTU	422
7/22/2002	2G	Turbidity	NTU	205
7/26/2002	2G	Turbidity	NTU	290
7/30/2002	2G	Turbidity	NTU	329
10/3/2002	2G	Turbidity	NTU	450
10/7/2002	2G	Turbidity	NTU	339
10/11/2002	2G	Turbidity	NTU	164
10/15/2002	2G	Turbidity	NTU	132
1/16/2003	2G	Turbidity	NTU	395
1/21/2003	2G	Turbidity	NTU	262
1/24/2003	2G	Turbidity	NTU	250
1/28/2003	2G	Turbidity	NTU	287
4/3/2003	2G	Turbidity	NTU	405
4/7/2003	2G	Turbidity	NTU	190
4/11/2003	2G	Turbidity	NTU	250
4/15/2003	2G	Turbidity	NTU	182
7/3/2003	2G	Turbidity	NTU	56
7/7/2003	2G	Turbidity	NTU	124
7/11/2003	2G	Turbidity	NTU	320
7/15/2003	2G	Turbidity	NTU	154
10/2/2003	2G	Turbidity	NTU	105
10/6/2003	2G	Turbidity	NTU	219
10/10/2003	2G	Turbidity	NTU	38
10/14/2003	2G	Turbidity	NTU	62
1/8/2004	2G	Turbidity	NTU	173
1/12/2004	2G	Turbidity	NTU	124
1/16/2004	2G	Turbidity	NTU	19
1/20/2004	2G	Turbidity	NTU	201
4/8/2004	2G	Turbidity	NTU	124
4/12/2004	2G	Turbidity	NTU	69
4/16/2004	2G	Turbidity	NTU	30
5/20/2004	2G	Turbidity	NTU	140
7/15/2004	2G	Turbidity	NTU	197
7/19/2004	2G	Turbidity	NTU	198
7/23/2004	2G	Turbidity	NTU	51
7/27/2004	2G	Turbidity	NTU	184
1/6/2005	2G	Turbidity	NTU	320
1/10/2005	2G	Turbidity	NTU	190
1/14/2005	2G	Turbidity	NTU	27
1/18/2005	2G	Turbidity	NTU	77
4/7/2005	2G	Turbidity	NTU	293
4/11/2005	2G	Turbidity	NTU	52
4/15/2005	2G	Turbidity	NTU	69
4/19/2005	2G	Turbidity	NTU	263
7/7/2005	2G	Turbidity	NTU	332
7/11/2005	2G	Turbidity	NTU	297
7/15/2005	2G	Turbidity	NTU	96
7/19/2005	2G	Turbidity	NTU	392
10/13/2005	2G	Turbidity	NTU	328
10/17/2005	2G	Turbidity	NTU	336
10/21/2005	2G	Turbidity	NTU	102
10/25/2005	2G	Turbidity	NTU	276
1/5/2006	2G	Turbidity	NTU	374
1/9/2006	2G	Turbidity	NTU	342
1/13/2006	2G	Turbidity	NTU	72
1/17/2006	2G	Turbidity	NTU	285
4/6/2006	2G	Turbidity	NTU	283
4/10/2006	2G	Turbidity	NTU	384
4/14/2006	2G	Turbidity	NTU	231
4/18/2006	2G	Turbidity	NTU	331
7/6/2006	2G	Turbidity	NTU	401
7/10/2006	2G	Turbidity	NTU	386
7/14/2006	2G	Turbidity	NTU	181
7/18/2006	2G	Turbidity	NTU	113
10/19/2006	2G	Turbidity	NTU	375
10/23/2006	2G	Turbidity	NTU	398
10/27/2006	2G	Turbidity	NTU	215
10/31/2006	2G	Turbidity	NTU	371
1/4/2007	2G	Turbidity	NTU	468

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2007	2G	Turbidity	NTU	386
1/11/2007	2G	Turbidity	NTU	248
1/16/2007	2G	Turbidity	NTU	398
4/19/2007	2G	Turbidity	NTU	107
4/23/2007	2G	Turbidity	NTU	45
4/27/2007	2G	Turbidity	NTU	95
5/1/2007	2G	Turbidity	NTU	431
7/12/2007	2G	Turbidity	NTU	119
7/16/2007	2G	Turbidity	NTU	441
7/20/2007	2G	Turbidity	NTU	257
7/24/2007	2G	Turbidity	NTU	253
4/3/2008	2G	Turbidity	NTU	428
4/7/2008	2G	Turbidity	NTU	366
4/11/2008	2G	Turbidity	NTU	115
4/15/2008	2G	Turbidity	NTU	324
7/3/2008	2G	Turbidity	NTU	165
7/3/2008	2G	Turbidity	NTU	165
7/7/2008	2G	Turbidity	NTU	421
7/11/2008	2G	Turbidity	NTU	435
7/15/2008	2G	Turbidity	NTU	480
10/9/2008	2G	Turbidity	NTU	458
10/13/2008	2G	Turbidity	NTU	243
10/17/2008	2G	Turbidity	NTU	255
10/21/2008	2G	Turbidity	NTU	286
1/8/2009	2G	Turbidity	NTU	439
1/12/2009	2G	Turbidity	NTU	189
1/16/2009	2G	Turbidity	NTU	71
1/20/2009	2G	Turbidity	NTU	95
4/9/2009	2G	Turbidity	NTU	376
4/13/2009	2G	Turbidity	NTU	352
4/17/2009	2G	Turbidity	NTU	138
4/21/2009	2G	Turbidity	NTU	386
1/11/2008	2G	Turbidity	NTU	80
1/15/2008	2G	Turbidity	NTU	137
1/3/2008	2G	Turbidity	NTU	314
1/7/2008	2G	Turbidity	NTU	246
10/18/2007	2G	Turbidity	NTU	128
10/22/2007	2G	Turbidity	NTU	177
10/26/2007	2G	Turbidity	NTU	142
10/30/2007	2G	Turbidity	NTU	130
7/12/2007	2G	Vanadium	mg/L	ND
7/12/2007	2G	Vinyl Acetate	ug/L	ND
7/12/2007	2G	Vinyl Chloride	ug/L	ND
7/12/2007	2G	Xylenes, Total	ug/L	ND
7/12/2007	2G	Zinc	mg/L	ND
Location ID:		**2GDUP**		
Number of Sampling Dates:		**11**		
1/18/2005	2GDUP	Barium	mg/L	0.025
4/11/2005	2GDUP	Barium	mg/L	0.021
7/11/2005	2GDUP	Barium	mg/L	0.027
10/13/2005	2GDUP	Barium	mg/L	0.027
1/13/2006	2GDUP	Barium	mg/L	0.006
4/10/2006	2GDUP	Barium	mg/L	0.053
7/10/2006	2GDUP	Barium	mg/L	0.028
10/27/2006	2GDUP	Barium	mg/L	0.007
1/11/2007	2GDUP	Barium	mg/L	0.006
7/16/2007	2GDUP	Barium	mg/L	0.011
4/7/2008	2GDUP	Barium	mg/L	0.005
7/7/2008	2GDUP	Barium	mg/L	ND
10/13/2008	2GDUP	Barium	mg/L	0.026
1/16/2009	2GDUP	Barium	mg/L	ND
1/7/2008	2GDUP	Barium	mg/L	ND
1/18/2005	2GDUP	Chloride	mg/L	196
4/11/2005	2GDUP	Chloride	mg/L	115
7/11/2005	2GDUP	Chloride	mg/L	316
10/13/2005	2GDUP	Chloride	mg/L	192
1/13/2006	2GDUP	Chloride	mg/L	298
4/10/2006	2GDUP	Chloride	mg/L	615
7/10/2006	2GDUP	Chloride	mg/L	183
10/27/2006	2GDUP	Chloride	mg/L	244
1/11/2007	2GDUP	Chloride	mg/L	258
7/16/2007	2GDUP	Chloride	mg/L	195
4/7/2008	2GDUP	Chloride	mg/L	218
7/7/2008	2GDUP	Chloride	mg/L	205
10/13/2008	2GDUP	Chloride	mg/L	211
1/16/2009	2GDUP	Chloride	mg/L	226
1/7/2008	2GDUP	Chloride	mg/L	211
1/18/2005	2GDUP	Chromium	mg/L	ND
4/11/2005	2GDUP	Chromium	mg/L	ND
7/11/2005	2GDUP	Chromium	mg/L	ND
10/13/2005	2GDUP	Chromium	mg/L	ND
1/13/2006	2GDUP	Chromium	mg/L	0.01
4/10/2006	2GDUP	Chromium	mg/L	0.061
7/10/2006	2GDUP	Chromium	mg/L	ND
10/27/2006	2GDUP	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/11/2007	2GDUP	Chromium	mg/L	ND
7/16/2007	2GDUP	Chromium	mg/L	0.007
4/7/2008	2GDUP	Chromium	mg/L	ND
7/7/2008	2GDUP	Chromium	mg/L	ND
10/13/2008	2GDUP	Chromium	mg/L	ND
1/16/2009	2GDUP	Chromium	mg/L	ND
1/7/2008	2GDUP	Chromium	mg/L	0.005
1/18/2005	2GDUP	Chromium, hexavalent	mg/l	ND
4/11/2005	2GDUP	Chromium, hexavalent	mg/l	ND
7/11/2005	2GDUP	Chromium, hexavalent	mg/l	ND
10/13/2005	2GDUP	Chromium, hexavalent	mg/l	ND
1/13/2006	2GDUP	Chromium, hexavalent	mg/l	ND
4/10/2006	2GDUP	Chromium, hexavalent	mg/l	ND
7/10/2006	2GDUP	Chromium, hexavalent	mg/l	ND
10/27/2006	2GDUP	Chromium, hexavalent	mg/l	ND
1/11/2007	2GDUP	Chromium, hexavalent	mg/l	ND
7/16/2007	2GDUP	Chromium, hexavalent	mg/l	ND
4/7/2008	2GDUP	Chromium, hexavalent	mg/L	0.14
7/7/2008	2GDUP	Chromium, hexavalent	mg/L	ND
10/13/2008	2GDUP	Chromium, Hexavalent	mg/L	ND
1/16/2009	2GDUP	Chromium, hexavalent	mg/L	ND
1/7/2008	2GDUP	Chromium, hexavalent	mg/L	ND
1/18/2005	2GDUP	Iron	mg/L	ND
4/11/2005	2GDUP	Iron	mg/L	1833
7/11/2005	2GDUP	Iron	mg/L	1595
10/13/2005	2GDUP	Iron	mg/L	2099
1/13/2006	2GDUP	Iron	mg/L	2173
4/10/2006	2GDUP	Iron	mg/L	1945
7/10/2006	2GDUP	Iron	mg/L	7611
10/27/2006	2GDUP	Iron	mg/L	1085
1/11/2007	2GDUP	Iron	mg/L	1111
7/16/2007	2GDUP	Iron	mg/L	1595
4/7/2008	2GDUP	Iron	mg/L	1200
7/7/2008	2GDUP	Iron	mg/L	1216
10/13/2008	2GDUP	Iron	mg/L	11.9
1/16/2009	2GDUP	Iron	mg/L	1477
1/7/2008	2GDUP	Iron	mg/L	1388
1/18/2005	2GDUP	Manganese	mg/L	971
4/11/2005	2GDUP	Manganese	mg/L	58.3
7/11/2005	2GDUP	Manganese	mg/L	52.9
10/13/2005	2GDUP	Manganese	mg/L	68.9
1/13/2006	2GDUP	Manganese	mg/L	59.5
4/10/2006	2GDUP	Manganese	mg/L	35.7
7/10/2006	2GDUP	Manganese	mg/L	207
10/27/2006	2GDUP	Manganese	mg/L	25.4
1/11/2007	2GDUP	Manganese	mg/L	55.7
7/16/2007	2GDUP	Manganese	mg/L	31.5
4/7/2008	2GDUP	Manganese	mg/L	41.8
7/7/2008	2GDUP	Manganese	mg/L	49.8
10/13/2008	2GDUP	Manganese	mg/L	0.416
1/16/2009	2GDUP	Manganese	mg/L	57.1
1/7/2008	2GDUP	Manganese	mg/L	47.1
1/18/2005	2GDUP	pH	pH Units	34.4
4/11/2005	2GDUP	pH	pH Units	5.18
7/11/2005	2GDUP	pH	pH Units	5.28
10/13/2005	2GDUP	pH	pH Units	5.19
1/13/2006	2GDUP	pH	pH Units	5.13
4/10/2006	2GDUP	pH	pH Units	5.24
7/10/2006	2GDUP	pH	pH Units	3.53
10/27/2006	2GDUP	pH	pH Units	5.7
1/11/2007	2GDUP	pH	pH Units	5.3
7/16/2007	2GDUP	pH	pH Units	5.58
7/16/2007	2GDUP	pH	pH	5.35
7/16/2007	2GDUP	pH	pH	5.35
7/16/2007	2GDUP	pH	pH	5.38
4/7/2008	2GDUP	pH	pH	5.3
4/7/2008	2GDUP	pH	pH	5.52
4/7/2008	2GDUP	pH	pH	5.54
4/7/2008	2GDUP	pH	pH	5.58
7/7/2008	2GDUP	pH	pH	5.61
7/7/2008	2GDUP	pH	pH	5.54
7/7/2008	2GDUP	pH	pH	5.56
7/7/2008	2GDUP	pH	pH	5.56
10/13/2008	2GDUP	pH	pH	5.58
10/13/2008	2GDUP	pH	pH	5.53
10/13/2008	2GDUP	pH	pH	5.53
10/13/2008	2GDUP	pH	pH	5.55
1/16/2009	2GDUP	pH	pH	5.56
1/16/2009	2GDUP	pH	pH	5.53
1/16/2009	2GDUP	pH	pH	5.55
1/16/2009	2GDUP	pH	pH	5.56
1/7/2008	2GDUP	pH	pH	5.59
1/7/2008	2GDUP	pH	pH	5.39
1/7/2008	2GDUP	pH	pH	5.41
1/7/2008	2GDUP	pH	pH	5.4

Sampling Date	Location ID	Analyte	Unit	Concentration
1/18/2005	2GDUP	Phenols	mg/L	ND
4/11/2005	2GDUP	Phenols	mg/L	ND
7/11/2005	2GDUP	Phenols	mg/L	0.31
10/13/2005	2GDUP	Phenols	mg/L	ND
1/13/2006	2GDUP	Phenols	mg/L	ND
4/10/2006	2GDUP	Phenols	mg/L	0.08
7/10/2006	2GDUP	Phenols	mg/L	0.18
10/27/2006	2GDUP	Phenols	mg/L	ND
1/11/2007	2GDUP	Phenols	mg/L	ND
7/16/2007	2GDUP	Phenols	mg/L	ND
4/7/2008	2GDUP	Phenols, Total	mg/L	ND
7/7/2008	2GDUP	Phenols, Total	mg/L	ND
10/13/2008	2GDUP	Phenols, Total	mg/L	ND
1/16/2009	2GDUP	Phenols, Total	mg/L	ND
1/7/2008	2GDUP	Phenols, Total	mg/L	ND
1/18/2005	2GDUP	Sodium	mg/L	341
4/11/2005	2GDUP	Sodium	mg/L	264
7/11/2005	2GDUP	Sodium	mg/L	367
10/13/2005	2GDUP	Sodium	mg/L	245
1/13/2006	2GDUP	Sodium	mg/L	336
4/10/2006	2GDUP	Sodium	mg/L	839
7/10/2006	2GDUP	Sodium	mg/L	126
10/27/2006	2GDUP	Sodium	mg/L	233
1/11/2007	2GDUP	Sodium	mg/L	293
7/16/2007	2GDUP	Sodium	mg/L	266
4/7/2008	2GDUP	Sodium	mg/L	258
7/7/2008	2GDUP	Sodium	mg/L	2.26
10/13/2008	2GDUP	Sodium	mg/L	340
1/16/2009	2GDUP	Sodium	mg/L	281
1/7/2008	2GDUP	Sodium	mg/L	255
1/18/2005	2GDUP	Specific Conductance	umhos	5590
4/11/2005	2GDUP	Specific Conductance	umhos	4350
7/11/2005	2GDUP	Specific Conductance	umhos	7290
10/13/2005	2GDUP	Specific Conductance	umhos	5160
1/13/2006	2GDUP	Specific Conductance	umhos	4180
4/10/2006	2GDUP	Specific Conductance	umhos	8620
7/10/2006	2GDUP	Specific Conductance	umhos	5330
10/27/2006	2GDUP	Specific Conductance	umhos	4390
1/11/2007	2GDUP	Specific Conductance	umhos	3560
7/16/2007	2GDUP	Specific Conductance	umhos	1330
7/16/2007	2GDUP	Specific Conductance	umhos	1384
7/16/2007	2GDUP	Specific Conductance	umhos	1340
7/16/2007	2GDUP	Specific Conductance	umhos	1302
4/7/2008	2GDUP	Specific Conductance	umhos	5280
4/7/2008	2GDUP	Specific Conductance	umhos	5290
4/7/2008	2GDUP	Specific Conductance	umhos	5330
4/7/2008	2GDUP	Specific Conductance	umhos	5340
7/7/2008	2GDUP	Specific Conductance	umhos	5160
7/7/2008	2GDUP	Specific Conductance	umhos	5180
7/7/2008	2GDUP	Specific Conductance	umhos	5190
7/7/2008	2GDUP	Specific Conductance	umhos	5500
10/13/2008	2GDUP	Specific Conductance	umhos	4770
10/13/2008	2GDUP	Specific Conductance	umhos	4770
10/13/2008	2GDUP	Specific Conductance	umhos	4800
10/13/2008	2GDUP	Specific Conductance	umhos	5010
1/16/2009	2GDUP	Specific Conductance	umhos	6990
1/16/2009	2GDUP	Specific Conductance	umhos	7010
1/16/2009	2GDUP	Specific Conductance	umhos	7030
1/16/2009	2GDUP	Specific Conductance	umhos	7040
1/7/2008	2GDUP	Specific Conductance	umhos	2250
1/7/2008	2GDUP	Specific Conductance	umhos	2140
1/7/2008	2GDUP	Specific Conductance	umhos	2020
1/7/2008	2GDUP	Specific Conductance	umhos	2000
7/16/2007	2GDUP	Sulfate	mg/L	4256
4/7/2008	2GDUP	Sulfate	mg/L	3831
7/7/2008	2GDUP	Sulfate	mg/L	4779
10/13/2008	2GDUP	Sulfate	mg/L	4787
1/16/2009	2GDUP	Sulfate	mg/L	5962
1/7/2008	2GDUP	Sulfate	mg/L	3913
1/18/2005	2GDUP	Sulfate	mg/L	4637
4/11/2005	2GDUP	Sulfate	mg/L	5005
7/11/2005	2GDUP	Sulfate	mg/L	8494
10/13/2005	2GDUP	Sulfate	mg/L	5944
1/13/2006	2GDUP	Sulfate	mg/L	7301
4/10/2006	2GDUP	Sulfate	mg/L	20398
7/10/2006	2GDUP	Sulfate	mg/L	4325
10/27/2006	2GDUP	Sulfate	mg/L	5578
1/11/2007	2GDUP	Sulfate	mg/L	6060
1/18/2005	2GDUP	Temperature	C	14
4/11/2005	2GDUP	Temperature	C	14
7/11/2005	2GDUP	Temperature	C	15
10/13/2005	2GDUP	Temperature	C	16
1/13/2006	2GDUP	Temperature	C	15
4/10/2006	2GDUP	Temperature	C	11
7/10/2006	2GDUP	Temperature	C	17

Sampling Date	Location ID	Analyte	Unit	Concentration
10/27/2006	2GDUP	Temperature	C	16
1/11/2007	2GDUP	Temperature	C	15
7/16/2007	2GDUP	Temperature	C	16
7/16/2007	2GDUP	Temperature	C	16
7/16/2007	2GDUP	Temperature	C	16
7/16/2007	2GDUP	Temperature	C	17
4/7/2008	2GDUP	Temperature	C	13
4/7/2008	2GDUP	Temperature	C	13
4/7/2008	2GDUP	Temperature	C	13
4/7/2008	2GDUP	Temperature	C	13
7/7/2008	2GDUP	Temperature	C	16
7/7/2008	2GDUP	Temperature	C	16
7/7/2008	2GDUP	Temperature	C	16
7/7/2008	2GDUP	Temperature	C	17
10/13/2008	2GDUP	Temperature	C	18
10/13/2008	2GDUP	Temperature	C	18
10/13/2008	2GDUP	Temperature	C	18
10/13/2008	2GDUP	Temperature	C	19
1/16/2009	2GDUP	Temperature	C	12
1/16/2009	2GDUP	Temperature	C	14
1/16/2009	2GDUP	Temperature	C	14
1/16/2009	2GDUP	Temperature	C	14
1/7/2008	2GDUP	Temperature	C	16
1/7/2008	2GDUP	Temperature	C	16
1/7/2008	2GDUP	Temperature	C	16
1/7/2008	2GDUP	Temperature	C	16
7/16/2007	2GDUP	Total Organic Carbon	mg/L	18
4/7/2008	2GDUP	Total Organic Carbon	mg/L	14
10/13/2008	2GDUP	Total Organic Carbon	mg/L	14
1/16/2009	2GDUP	Total Organic Carbon	mg/L	13
1/7/2008	2GDUP	Total Organic Carbon	mg/L	14
1/18/2005	2GDUP	Total Organic Carbon	mg/L	13
4/11/2005	2GDUP	Total Organic Carbon	mg/L	15
7/11/2005	2GDUP	Total Organic Carbon	mg/L	17
10/13/2005	2GDUP	Total Organic Carbon	mg/L	14
1/13/2006	2GDUP	Total Organic Carbon	mg/L	21
4/10/2006	2GDUP	Total Organic Carbon	mg/L	50
7/10/2006	2GDUP	Total Organic Carbon	mg/L	13
10/27/2006	2GDUP	Total Organic Carbon	mg/L	15
1/11/2007	2GDUP	Total Organic Carbon	mg/L	12
7/7/2008	2GDUP	Total Organic Carbon	mg/L	13
1/18/2005	2GDUP	Total Organic Halogen	mg/L	0.083
4/11/2005	2GDUP	Total Organic Halogen	mg/L	0.083
7/11/2005	2GDUP	Total Organic Halogen	mg/L	0.08
10/13/2005	2GDUP	Total Organic Halogen	mg/L	0.082
1/13/2006	2GDUP	Total Organic Halogen	mg/L	0.067
4/10/2006	2GDUP	Total Organic Halogen	mg/L	0.263
7/10/2006	2GDUP	Total Organic Halogen	mg/L	0.065
10/27/2006	2GDUP	Total Organic Halogen	mg/L	0.07
7/16/2007	2GDUP	Total Organic Halogen	mg/L	0.13
4/7/2008	2GDUP	Total Organic Halogen	mg/L	0.09
7/7/2008	2GDUP	Total Organic Halogen	mg/L	0.06
10/13/2008	2GDUP	Total Organic Halogen	mg/L	0.06
1/16/2009	2GDUP	Total Organic Halogen	mg/L	0.17
1/7/2008	2GDUP	Total Organic Halogen	mg/L	0.09
1/18/2005	2GDUP	Turbidity	NTU	141
4/11/2005	2GDUP	Turbidity	NTU	64
7/11/2005	2GDUP	Turbidity	NTU	340
10/13/2005	2GDUP	Turbidity	NTU	374
1/13/2006	2GDUP	Turbidity	NTU	73
4/10/2006	2GDUP	Turbidity	NTU	70
7/10/2006	2GDUP	Turbidity	NTU	394
10/27/2006	2GDUP	Turbidity	NTU	150
1/11/2007	2GDUP	Turbidity	NTU	99
7/16/2007	2GDUP	Turbidity	NTU	4.36
4/7/2008	2GDUP	Turbidity	NTU	323
7/7/2008	2GDUP	Turbidity	NTU	400
10/13/2008	2GDUP	Turbidity	NTU	226
1/16/2009	2GDUP	Turbidity	NTU	100
1/7/2008	2GDUP	Turbidity	NTU	304

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		2H		
Number of Sampling Dates:		100		
7/12/2007	2H	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2H	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2H	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2H	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2H	1,1-Dichloroethane	ug/L	11.6
7/12/2007	2H	1,1-Dichloroethene	ug/L	ND
7/12/2007	2H	1,1-Dichloropropene	ug/L	ND
7/12/2007	2H	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2H	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2H	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2H	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	2H	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2H	1,2-Dibromoethane	ug/L	ND
7/12/2007	2H	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2H	1,2-Dichloroethane	ug/L	ND
7/12/2007	2H	1,2-Dichloropropane	ug/L	ND
7/12/2007	2H	1,3,5-Trimethylbenzene	ug/L	2.5
7/12/2007	2H	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2H	1,3-Dichloropropane	ug/L	ND
7/12/2007	2H	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2H	2,2-Dichloropropane	ug/L	ND
7/12/2007	2H	2-Butanone (MEK)	ug/L	76
7/12/2007	2H	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2H	2-Chlorotoluene	ug/L	ND
7/12/2007	2H	2-Hexanone	ug/L	ND
7/12/2007	2H	3-Chloro-1-propene	ug/L	ND
7/12/2007	2H	4-Chlorotoluene	ug/L	ND
7/12/2007	2H	4-Isopropyltoluene	ug/L	5.1
7/12/2007	2H	4-Methyl-2-Pentanone (MIBK)	ug/L	114
7/12/2007	2H	Acetone	ug/L	184
7/12/2007	2H	Acrolein	ug/L	ND
7/12/2007	2H	Acrylonitrile	ug/L	ND
7/12/2007	2H	Alkalinity	mg/L	ND
7/12/2007	2H	Ammonia	mg/L	78.2
7/12/2007	2H	Antimony	mg/L	ND
7/12/2007	2H	Arsenic	mg/L	ND
1/21/2002	2H	Barium	mg/L	0.07
1/24/2002	2H	Barium	mg/L	0.092
1/28/2002	2H	Barium	mg/L	0.101
2/1/2002	2H	Barium	mg/L	0.082
2/5/2002	2H	Barium	mg/L	0.09
4/4/2002	2H	Barium	mg/L	0.076
4/8/2002	2H	Barium	mg/L	0.098
4/12/2002	2H	Barium	mg/L	0.095
4/16/2002	2H	Barium	mg/L	0.087
7/18/2002	2H	Barium	mg/L	0.003
7/22/2002	2H	Barium	mg/L	0.084
7/26/2002	2H	Barium	mg/L	0.06
7/30/2002	2H	Barium	mg/L	0.074
10/3/2002	2H	Barium	mg/L	0.082
10/7/2002	2H	Barium	mg/L	0.08
10/11/2002	2H	Barium	mg/L	0.128
10/15/2002	2H	Barium	mg/L	0.089
1/16/2003	2H	Barium	mg/L	0.073
1/24/2003	2H	Barium	mg/L	0.043
1/28/2003	2H	Barium	mg/L	0.084
4/3/2003	2H	Barium	mg/L	0.04
4/7/2003	2H	Barium	mg/L	0.111
4/11/2003	2H	Barium	mg/L	0.042
4/15/2003	2H	Barium	mg/L	0.045
7/3/2003	2H	Barium	mg/L	0.054
7/7/2003	2H	Barium	mg/L	0.047
7/11/2003	2H	Barium	mg/L	0.076
7/15/2003	2H	Barium	mg/L	0.056
10/2/2003	2H	Barium	mg/L	0.074
10/6/2003	2H	Barium	mg/L	ND
10/10/2003	2H	Barium	mg/L	0.075
10/14/2003	2H	Barium	mg/L	0.078
1/8/2004	2H	Barium	mg/L	0.053
1/12/2004	2H	Barium	mg/L	0.063
1/16/2004	2H	Barium	mg/L	0.072
1/20/2004	2H	Barium	mg/L	0.067
4/8/2004	2H	Barium	mg/L	0.05
4/12/2004	2H	Barium	mg/L	0.056
4/16/2004	2H	Barium	mg/L	0.059
6/10/2004	2H	Barium	mg/L	0.051
7/15/2004	2H	Barium	mg/L	0.058
7/19/2004	2H	Barium	mg/L	0.061
7/23/2004	2H	Barium	mg/L	0.061
7/27/2004	2H	Barium	mg/L	0.07
1/6/2005	2H	Barium	mg/L	0.062
1/10/2005	2H	Barium	mg/L	0.064
1/14/2005	2H	Barium	mg/L	0.063

Sampling Date	Location ID	Analyte	Unit	Concentration
1/18/2005	2H	Barium	mg/L	0.064
4/7/2005	2H	Barium	mg/L	0.031
4/7/2005	2H	Barium	mg/L	0.031
4/11/2005	2H	Barium	mg/L	0.066
4/15/2005	2H	Barium	mg/L	0.078
4/19/2005	2H	Barium	mg/L	0.054
7/7/2005	2H	Barium	mg/L	0.005
7/11/2005	2H	Barium	mg/L	0.065
7/15/2005	2H	Barium	mg/L	0.057
7/19/2005	2H	Barium	mg/L	0.066
10/13/2005	2H	Barium	mg/L	0.064
10/17/2005	2H	Barium	mg/L	0.065
10/21/2005	2H	Barium	mg/L	0.058
10/25/2005	2H	Barium	mg/L	0.059
1/5/2006	2H	Barium	mg/L	0.007
1/9/2006	2H	Barium	mg/L	0.004
1/13/2006	2H	Barium	mg/L	0.005
1/17/2006	2H	Barium	mg/L	0.019
4/6/2006	2H	Barium	mg/L	0.058
4/10/2006	2H	Barium	mg/L	0.052
4/14/2006	2H	Barium	mg/L	0.053
4/18/2006	2H	Barium	mg/L	0.056
7/6/2006	2H	Barium	mg/L	ND
7/10/2006	2H	Barium	mg/L	0.017
7/14/2006	2H	Barium	mg/L	ND
7/18/2006	2H	Barium	mg/L	0.004
10/19/2006	2H	Barium	mg/L	0.008
10/23/2006	2H	Barium	mg/L	0.012
10/27/2006	2H	Barium	mg/L	0.009
10/31/2006	2H	Barium	mg/L	0.006
1/4/2007	2H	Barium	mg/L	0.011
1/8/2007	2H	Barium	mg/L	0.012
1/11/2007	2H	Barium	mg/L	0.01
1/16/2007	2H	Barium	mg/L	0.009
4/19/2007	2H	Barium	mg/L	0.007
4/23/2007	2H	Barium	mg/L	0.026
4/27/2007	2H	Barium	mg/L	0.007
5/1/2007	2H	Barium	mg/L	0.006
7/12/2007	2H	Barium	mg/L	ND
7/16/2007	2H	Barium	mg/L	0.014
7/20/2007	2H	Barium	mg/L	0.007
7/24/2007	2H	Barium	mg/L	0.012
4/3/2008	2H	Barium	mg/L	0.079
4/7/2008	2H	Barium	mg/L	0.010
4/11/2008	2H	Barium	mg/L	ND
4/15/2008	2H	Barium	mg/L	ND
7/3/2008	2H	Barium	mg/L	0.036
7/3/2008	2H	Barium	mg/L	0.036
7/7/2008	2H	Barium	mg/L	ND
7/11/2008	2H	Barium	mg/L	ND
7/15/2008	2H	Barium	mg/L	0.026
10/9/2008	2H	Barium	mg/L	0.019
10/13/2008	2H	Barium	mg/L	0.017
10/17/2008	2H	Barium	mg/L	0.033
10/21/2008	2H	Barium	mg/L	0.049
1/8/2009	2H	Barium	mg/L	0.014
1/12/2009	2H	Barium	mg/L	0.017
1/16/2009	2H	Barium	mg/L	ND
1/20/2009	2H	Barium	mg/L	0.014
4/9/2009	2H	Barium	mg/L	0.022
4/13/2009	2H	Barium	mg/L	0.020
4/17/2009	2H	Barium	mg/L	0.021
4/21/2009	2H	Barium	mg/L	0.021
1/11/2008	2H	Barium	mg/L	0.018
1/15/2008	2H	Barium	mg/L	0.051
1/3/2008	2H	Barium	mg/L	0.012
1/7/2008	2H	Barium	mg/L	ND
10/18/2007	2H	Barium	mg/L	ND
10/22/2007	2H	Barium	mg/L	ND
10/26/2007	2H	Barium	mg/L	0.052
10/30/2007	2H	Barium	mg/L	ND
7/12/2007	2H	Benzene	ug/L	5.9
7/12/2007	2H	Beryllium	mg/L	ND
7/12/2007	2H	BOD	mg/L	39
7/12/2007	2H	Bromobenzene	ug/L	ND
7/12/2007	2H	Bromochloromethane	ug/L	ND
7/12/2007	2H	Bromodichloromethane	ug/L	ND
7/12/2007	2H	Bromoform	ug/L	ND
7/12/2007	2H	Bromomethane	ug/L	ND
7/12/2007	2H	Cadmium	mg/L	ND
7/12/2007	2H	Calcium	mg/L	389
7/12/2007	2H	Carbon Disulfide	ug/L	15.9
7/12/2007	2H	Carbon Tetrachloride	ug/L	ND
7/12/2007	2H	Chemical Oxygen Demand	mg/L	1385
1/21/2002	2H	Chloride	mg/L	683

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2002	2H	Chloride	mg/L	858
1/28/2002	2H	Chloride	mg/L	841
2/1/2002	2H	Chloride	mg/L	869
2/5/2002	2H	Chloride	mg/L	642
4/4/2002	2H	Chloride	mg/L	1819
4/8/2002	2H	Chloride	mg/L	935
4/12/2002	2H	Chloride	mg/L	869
4/16/2002	2H	Chloride	mg/L	1379
7/18/2002	2H	Chloride	mg/L	859
7/22/2002	2H	Chloride	mg/L	875
7/26/2002	2H	Chloride	mg/L	964
7/30/2002	2H	Chloride	mg/L	811
10/3/2002	2H	Chloride	mg/L	708
10/7/2002	2H	Chloride	mg/L	913
10/11/2002	2H	Chloride	mg/L	690
10/15/2002	2H	Chloride	mg/L	596
1/16/2003	2H	Chloride	mg/L	779
1/24/2003	2H	Chloride	mg/L	217
1/28/2003	2H	Chloride	mg/L	694
4/3/2003	2H	Chloride	mg/L	682
4/7/2003	2H	Chloride	mg/L	658
4/11/2003	2H	Chloride	mg/L	506
4/15/2003	2H	Chloride	mg/L	698
7/3/2003	2H	Chloride	mg/L	600
7/7/2003	2H	Chloride	mg/L	581
7/11/2003	2H	Chloride	mg/L	629
7/15/2003	2H	Chloride	mg/L	662
10/2/2003	2H	Chloride	mg/L	277
10/6/2003	2H	Chloride	mg/L	551
10/10/2003	2H	Chloride	mg/L	739
10/14/2003	2H	Chloride	mg/L	544
1/8/2004	2H	Chloride	mg/L	608
1/12/2004	2H	Chloride	mg/L	585
1/16/2004	2H	Chloride	mg/L	548
1/20/2004	2H	Chloride	mg/L	593
4/8/2004	2H	Chloride	mg/L	529
4/12/2004	2H	Chloride	mg/L	639
4/16/2004	2H	Chloride	mg/L	578
6/10/2004	2H	Chloride	mg/L	710
7/15/2004	2H	Chloride	mg/L	706
7/19/2004	2H	Chloride	mg/L	749
7/23/2004	2H	Chloride	mg/L	704
7/27/2004	2H	Chloride	mg/L	724
1/6/2005	2H	Chloride	mg/L	556
1/10/2005	2H	Chloride	mg/L	571
1/14/2005	2H	Chloride	mg/L	738
1/18/2005	2H	Chloride	mg/L	742
4/7/2005	2H	Chloride	mg/L	191
4/7/2005	2H	Chloride	mg/L	191
4/11/2005	2H	Chloride	mg/L	395
4/15/2005	2H	Chloride	mg/L	179
4/15/2005	2H	Chloride	mg/L	179
4/19/2005	2H	Chloride	mg/L	609
7/7/2005	2H	Chloride	mg/L	713
7/11/2005	2H	Chloride	mg/L	757
7/15/2005	2H	Chloride	mg/L	842
7/19/2005	2H	Chloride	mg/L	821
10/13/2005	2H	Chloride	mg/L	715
10/17/2005	2H	Chloride	mg/L	837
10/21/2005	2H	Chloride	mg/L	717
10/25/2005	2H	Chloride	mg/L	771
1/5/2006	2H	Chloride	mg/L	752
1/9/2006	2H	Chloride	mg/L	779
1/13/2006	2H	Chloride	mg/L	827
1/17/2006	2H	Chloride	mg/L	722
4/6/2006	2H	Chloride	mg/L	913
4/10/2006	2H	Chloride	mg/L	778
4/14/2006	2H	Chloride	mg/L	738
4/18/2006	2H	Chloride	mg/L	731
7/6/2006	2H	Chloride	mg/L	804
7/10/2006	2H	Chloride	mg/L	719
7/14/2006	2H	Chloride	mg/L	741
7/18/2006	2H	Chloride	mg/L	826
10/19/2006	2H	Chloride	mg/L	703
10/23/2006	2H	Chloride	mg/L	667
10/27/2006	2H	Chloride	mg/L	777
10/31/2006	2H	Chloride	mg/L	823
1/4/2007	2H	Chloride	mg/L	2805
1/8/2007	2H	Chloride	mg/L	704
1/11/2007	2H	Chloride	mg/L	805
1/16/2007	2H	Chloride	mg/L	857
4/19/2007	2H	Chloride	mg/L	685
4/23/2007	2H	Chloride	mg/L	712
4/27/2007	2H	Chloride	mg/L	579
5/1/2007	2H	Chloride	mg/L	679

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2H	Chloride	mg/L	684
7/16/2007	2H	Chloride	mg/L	692
7/20/2007	2H	Chloride	mg/L	702
7/24/2007	2H	Chloride	mg/L	826
4/3/2008	2H	Chloride	mg/L	675
4/7/2008	2H	Chloride	mg/L	696
4/11/2008	2H	Chloride	mg/L	674
4/15/2008	2H	Chloride	mg/L	712
7/3/2008	2H	Chloride	mg/L	704
7/3/2008	2H	Chloride	mg/L	704
7/7/2008	2H	Chloride	mg/L	692
7/11/2008	2H	Chloride	mg/L	694
7/15/2008	2H	Chloride	mg/L	838
10/9/2008	2H	Chloride	mg/L	735
10/13/2008	2H	Chloride	mg/L	750
10/17/2008	2H	Chloride	mg/L	733
10/21/2008	2H	Chloride	mg/L	770
1/8/2009	2H	Chloride	mg/L	645
1/12/2009	2H	Chloride	mg/L	708
1/16/2009	2H	Chloride	mg/L	711
1/20/2009	2H	Chloride	mg/L	799
4/9/2009	2H	Chloride	mg/L	744
4/13/2009	2H	Chloride	mg/L	793
4/17/2009	2H	Chloride	mg/L	610
4/21/2009	2H	Chloride	mg/L	674
1/11/2008	2H	Chloride	mg/L	674
1/15/2008	2H	Chloride	mg/L	747
1/3/2008	2H	Chloride	mg/L	731
1/7/2008	2H	Chloride	mg/L	684
10/18/2007	2H	Chloride	mg/L	653
10/22/2007	2H	Chloride	mg/L	830
10/26/2007	2H	Chloride	mg/L	692
10/30/2007	2H	Chloride	mg/L	678
7/12/2007	2H	Chlorobenzene	ug/L	ND
7/12/2007	2H	Chloroethane	ug/L	ND
7/12/2007	2H	Chloroform	ug/L	ND
7/12/2007	2H	Chloromethane	ug/L	ND
1/21/2002	2H	Chromium	mg/L	0.127
1/24/2002	2H	Chromium	mg/L	0.086
1/28/2002	2H	Chromium	mg/L	0.168
2/1/2002	2H	Chromium	mg/L	0.08
2/5/2002	2H	Chromium	mg/L	0.09
4/4/2002	2H	Chromium	mg/L	0.056
4/8/2002	2H	Chromium	mg/L	0.108
4/12/2002	2H	Chromium	mg/L	0.071
4/16/2002	2H	Chromium	mg/L	0.112
7/18/2002	2H	Chromium	mg/L	ND
7/18/2002	2H	Chromium	mg/L	ND
7/22/2002	2H	Chromium	mg/L	0.133
7/26/2002	2H	Chromium	mg/L	0.07
7/30/2002	2H	Chromium	mg/L	0.131
10/3/2002	2H	Chromium	mg/L	0.117
10/7/2002	2H	Chromium	mg/L	0.13
10/11/2002	2H	Chromium	mg/L	0.158
10/15/2002	2H	Chromium	mg/L	0.122
1/16/2003	2H	Chromium	mg/L	0.121
1/24/2003	2H	Chromium	mg/L	0.063
1/28/2003	2H	Chromium	mg/L	0.121
4/3/2003	2H	Chromium	mg/L	0.099
4/7/2003	2H	Chromium	mg/L	0.123
4/11/2003	2H	Chromium	mg/L	0.12
4/15/2003	2H	Chromium	mg/L	0.125
7/3/2003	2H	Chromium	mg/L	0.133
7/7/2003	2H	Chromium	mg/L	0.084
7/11/2003	2H	Chromium	mg/L	0.133
7/15/2003	2H	Chromium	mg/L	0.134
10/2/2003	2H	Chromium	mg/L	0.171
10/6/2003	2H	Chromium	mg/L	ND
10/10/2003	2H	Chromium	mg/L	0.141
10/14/2003	2H	Chromium	mg/L	0.145
1/8/2004	2H	Chromium	mg/L	0.117
1/12/2004	2H	Chromium	mg/L	0.105
1/16/2004	2H	Chromium	mg/L	0.113
1/20/2004	2H	Chromium	mg/L	0.098
4/8/2004	2H	Chromium	mg/L	0.119
4/12/2004	2H	Chromium	mg/L	0.112
4/16/2004	2H	Chromium	mg/L	0.085
6/10/2004	2H	Chromium	mg/L	0.097
7/15/2004	2H	Chromium	mg/L	0.084
7/19/2004	2H	Chromium	mg/L	0.089
7/23/2004	2H	Chromium	mg/L	0.106
7/27/2004	2H	Chromium	mg/L	0.102
1/6/2005	2H	Chromium	mg/L	0.051
1/10/2005	2H	Chromium	mg/L	0.056
1/14/2005	2H	Chromium	mg/L	0.052

Sampling Date	Location ID	Analyte	Unit	Concentration
1/18/2005	2H	Chromium	mg/L	ND
4/7/2005	2H	Chromium	mg/L	ND
4/11/2005	2H	Chromium	mg/L	ND
4/15/2005	2H	Chromium	mg/L	ND
4/19/2005	2H	Chromium	mg/L	0.009
7/7/2005	2H	Chromium	mg/L	0.047
7/11/2005	2H	Chromium	mg/L	0.051
7/15/2005	2H	Chromium	mg/L	0.052
7/19/2005	2H	Chromium	mg/L	0.045
10/13/2005	2H	Chromium	mg/L	0.054
10/17/2005	2H	Chromium	mg/L	0.04
10/21/2005	2H	Chromium	mg/L	0.055
10/25/2005	2H	Chromium	mg/L	0.049
1/5/2006	2H	Chromium	mg/L	0.048
1/9/2006	2H	Chromium	mg/L	0.045
1/13/2006	2H	Chromium	mg/L	0.047
1/17/2006	2H	Chromium	mg/L	0.039
4/6/2006	2H	Chromium	mg/L	0.065
4/10/2006	2H	Chromium	mg/L	0.05
4/14/2006	2H	Chromium	mg/L	0.059
4/18/2006	2H	Chromium	mg/L	0.055
7/6/2006	2H	Chromium	mg/L	ND
7/10/2006	2H	Chromium	mg/L	0.045
7/14/2006	2H	Chromium	mg/L	0.041
7/18/2006	2H	Chromium	mg/L	0.047
10/19/2006	2H	Chromium	mg/L	0.039
10/23/2006	2H	Chromium	mg/L	0.038
10/27/2006	2H	Chromium	mg/L	0.041
10/31/2006	2H	Chromium	mg/L	0.043
1/4/2007	2H	Chromium	mg/L	0.038
1/8/2007	2H	Chromium	mg/L	0.044
1/11/2007	2H	Chromium	mg/L	0.042
1/16/2007	2H	Chromium	mg/L	0.041
4/19/2007	2H	Chromium	mg/L	0.043
4/23/2007	2H	Chromium	mg/L	0.043
4/27/2007	2H	Chromium	mg/L	0.042
5/1/2007	2H	Chromium	mg/L	0.036
7/12/2007	2H	Chromium	mg/L	0.07
7/12/2007	2H	Chromium	mg/L	ND
7/16/2007	2H	Chromium	mg/L	0.041
7/20/2007	2H	Chromium	mg/L	0.039
7/24/2007	2H	Chromium	mg/L	0.039
4/3/2008	2H	Chromium	mg/L	ND
4/7/2008	2H	Chromium	mg/L	0.026
4/11/2008	2H	Chromium	mg/L	0.048
4/15/2008	2H	Chromium	mg/L	0.042
7/3/2008	2H	Chromium	mg/L	0.042
7/3/2008	2H	Chromium	mg/L	0.042
7/7/2008	2H	Chromium	mg/L	ND
7/11/2008	2H	Chromium	mg/L	ND
7/15/2008	2H	Chromium	mg/L	0.046
10/9/2008	2H	Chromium	mg/L	0.023
10/13/2008	2H	Chromium	mg/L	0.02
10/17/2008	2H	Chromium	mg/L	0.024
10/21/2008	2H	Chromium	mg/L	0.028
1/8/2009	2H	Chromium	mg/L	0.020
1/12/2009	2H	Chromium	mg/L	0.016
1/16/2009	2H	Chromium	mg/L	0.017
1/20/2009	2H	Chromium	mg/L	ND
4/9/2009	2H	Chromium	mg/L	0.032
4/13/2009	2H	Chromium	mg/L	0.029
4/17/2009	2H	Chromium	mg/L	0.038
4/21/2009	2H	Chromium	mg/L	0.026
1/11/2008	2H	Chromium	mg/L	0.092
1/15/2008	2H	Chromium	mg/L	0.036
1/3/2008	2H	Chromium	mg/L	0.032
1/7/2008	2H	Chromium	mg/L	0.045
1/21/2002	2H	Chromium, hexavalent	mg/l	ND
1/24/2002	2H	Chromium, hexavalent	mg/l	ND
1/28/2002	2H	Chromium, hexavalent	mg/l	0.01
2/1/2002	2H	Chromium, hexavalent	mg/l	0.02
2/5/2002	2H	Chromium, hexavalent	mg/l	ND
4/4/2002	2H	Chromium, hexavalent	mg/l	ND
4/8/2002	2H	Chromium, hexavalent	mg/l	ND
4/12/2002	2H	Chromium, hexavalent	mg/l	ND
4/16/2002	2H	Chromium, hexavalent	mg/l	ND
7/18/2002	2H	Chromium, hexavalent	mg/l	ND
7/22/2002	2H	Chromium, hexavalent	mg/l	ND
7/26/2002	2H	Chromium, hexavalent	mg/l	ND
7/30/2002	2H	Chromium, hexavalent	mg/l	ND
10/3/2002	2H	Chromium, hexavalent	mg/l	0.04
10/7/2002	2H	Chromium, hexavalent	mg/l	ND
10/11/2002	2H	Chromium, hexavalent	mg/l	ND
10/15/2002	2H	Chromium, hexavalent	mg/l	ND
1/16/2003	2H	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/24/2003	2H	Chromium, hexavalent	mg/l	ND
1/28/2003	2H	Chromium, hexavalent	mg/l	ND
4/3/2003	2H	Chromium, hexavalent	mg/l	ND
4/7/2003	2H	Chromium, hexavalent	mg/l	ND
4/11/2003	2H	Chromium, hexavalent	mg/l	ND
4/15/2003	2H	Chromium, hexavalent	mg/l	ND
7/3/2003	2H	Chromium, hexavalent	mg/l	ND
7/7/2003	2H	Chromium, hexavalent	mg/l	ND
7/11/2003	2H	Chromium, hexavalent	mg/l	ND
7/15/2003	2H	Chromium, hexavalent	mg/l	ND
10/2/2003	2H	Chromium, hexavalent	mg/l	0.02
10/6/2003	2H	Chromium, hexavalent	mg/l	ND
10/10/2003	2H	Chromium, hexavalent	mg/l	ND
10/14/2003	2H	Chromium, hexavalent	mg/l	ND
1/8/2004	2H	Chromium, hexavalent	mg/l	ND
1/12/2004	2H	Chromium, hexavalent	mg/l	0.01
1/16/2004	2H	Chromium, hexavalent	mg/l	ND
1/20/2004	2H	Chromium, hexavalent	mg/l	ND
4/8/2004	2H	Chromium, hexavalent	mg/l	ND
4/12/2004	2H	Chromium, hexavalent	mg/l	ND
4/16/2004	2H	Chromium, hexavalent	mg/l	ND
6/10/2004	2H	Chromium, hexavalent	mg/l	ND
7/15/2004	2H	Chromium, hexavalent	mg/l	ND
7/19/2004	2H	Chromium, hexavalent	mg/l	ND
7/23/2004	2H	Chromium, hexavalent	mg/l	ND
7/27/2004	2H	Chromium, hexavalent	mg/l	ND
1/6/2005	2H	Chromium, hexavalent	mg/l	ND
1/10/2005	2H	Chromium, hexavalent	mg/l	ND
1/14/2005	2H	Chromium, hexavalent	mg/l	ND
1/18/2005	2H	Chromium, hexavalent	mg/l	ND
4/7/2005	2H	Chromium, hexavalent	mg/l	ND
4/11/2005	2H	Chromium, hexavalent	mg/l	ND
4/15/2005	2H	Chromium, hexavalent	mg/l	ND
4/19/2005	2H	Chromium, hexavalent	mg/l	ND
7/7/2005	2H	Chromium, hexavalent	mg/l	ND
7/11/2005	2H	Chromium, hexavalent	mg/l	ND
7/15/2005	2H	Chromium, hexavalent	mg/l	ND
7/19/2005	2H	Chromium, hexavalent	mg/l	ND
10/13/2005	2H	Chromium, hexavalent	mg/l	ND
10/17/2005	2H	Chromium, hexavalent	mg/l	ND
10/21/2005	2H	Chromium, hexavalent	mg/l	ND
10/25/2005	2H	Chromium, hexavalent	mg/l	ND
1/5/2006	2H	Chromium, hexavalent	mg/l	ND
1/9/2006	2H	Chromium, hexavalent	mg/l	ND
1/13/2006	2H	Chromium, hexavalent	mg/l	ND
1/17/2006	2H	Chromium, hexavalent	mg/l	ND
4/6/2006	2H	Chromium, hexavalent	mg/l	ND
4/10/2006	2H	Chromium, hexavalent	mg/l	ND
4/14/2006	2H	Chromium, hexavalent	mg/l	ND
4/18/2006	2H	Chromium, hexavalent	mg/l	ND
7/6/2006	2H	Chromium, hexavalent	mg/l	ND
7/10/2006	2H	Chromium, hexavalent	mg/l	ND
7/14/2006	2H	Chromium, hexavalent	mg/l	ND
7/18/2006	2H	Chromium, hexavalent	mg/l	ND
10/19/2006	2H	Chromium, hexavalent	mg/l	ND
10/23/2006	2H	Chromium, hexavalent	mg/l	ND
10/27/2006	2H	Chromium, hexavalent	mg/l	ND
10/31/2006	2H	Chromium, hexavalent	mg/l	ND
1/4/2007	2H	Chromium, hexavalent	mg/l	ND
1/8/2007	2H	Chromium, hexavalent	mg/l	ND
1/11/2007	2H	Chromium, hexavalent	mg/l	ND
1/16/2007	2H	Chromium, hexavalent	mg/l	ND
4/19/2007	2H	Chromium, hexavalent	mg/l	ND
4/23/2007	2H	Chromium, hexavalent	mg/l	ND
4/27/2007	2H	Chromium, hexavalent	mg/l	ND
5/1/2007	2H	Chromium, hexavalent	mg/l	0.07
7/16/2007	2H	Chromium, hexavalent	mg/L	ND
7/20/2007	2H	Chromium, hexavalent	mg/L	0.02
7/24/2007	2H	Chromium, hexavalent	mg/L	ND
4/3/2008	2H	Chromium, hexavalent	mg/L	ND
4/7/2008	2H	Chromium, hexavalent	mg/L	ND
4/11/2008	2H	Chromium, hexavalent	mg/L	ND
4/15/2008	2H	Chromium, hexavalent	mg/L	ND
7/3/2008	2H	Chromium, hexavalent	mg/L	ND
7/3/2008	2H	Chromium, hexavalent	mg/L	ND
7/7/2008	2H	Chromium, hexavalent	mg/L	ND
7/11/2008	2H	Chromium, hexavalent	mg/L	ND
7/15/2008	2H	Chromium, hexavalent	mg/L	ND
10/9/2008	2H	Chromium, hexavalent	mg/L	ND
10/13/2008	2H	Chromium, hexavalent	mg/L	ND
10/17/2008	2H	Chromium, hexavalent	mg/L	ND
10/21/2008	2H	Chromium, hexavalent	mg/L	ND
1/8/2009	2H	Chromium, hexavalent	mg/L	ND
1/12/2009	2H	Chromium, hexavalent	mg/L	ND
1/16/2009	2H	Chromium, hexavalent	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/20/2009	2H	Chromium, hexavalent	mg/L	ND
4/9/2009	2H	Chromium, hexavalent	mg/L	ND
4/13/2009	2H	Chromium, hexavalent	mg/L	ND
4/17/2009	2H	Chromium, hexavalent	mg/L	ND
4/21/2009	2H	Chromium, hexavalent	mg/L	ND
1/11/2008	2H	Chromium, hexavalent	mg/L	ND
1/15/2008	2H	Chromium, hexavalent	mg/L	ND
1/3/2008	2H	Chromium, hexavalent	mg/L	ND
1/7/2008	2H	Chromium, hexavalent	mg/L	ND
10/18/2007	2H	Chromium, hexavalent	mg/L	ND
10/22/2007	2H	Chromium, hexavalent	mg/L	ND
10/26/2007	2H	Chromium, hexavalent	mg/L	ND
10/30/2007	2H	Chromium, hexavalent	mg/L	ND
10/18/2007	2H	Chromium, ICP	mg/L	0.042
10/22/2007	2H	Chromium, ICP	mg/L	0.038
10/26/2007	2H	Chromium, ICP	mg/L	0.051
10/30/2007	2H	Chromium, ICP	mg/L	0.042
7/12/2007	2H	cis-1,2-Dichloroethene	ug/L	2.4
7/12/2007	2H	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2H	Cobalt	mg/L	ND
7/12/2007	2H	Copper	mg/L	ND
7/12/2007	2H	Cyanide	mg/L	ND
7/12/2007	2H	Dibromochloromethane	ug/L	ND
7/12/2007	2H	Dibromomethane	ug/L	ND
7/12/2007	2H	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2H	Dichloromethane (MeCl2)	ug/L	10.6
7/12/2007	2H	Ethylbenzene	ug/L	2.2
7/12/2007	2H	Hexachlorobutadiene	ug/L	ND
1/21/2002	2H	Iron	mg/L	9889
1/24/2002	2H	Iron	mg/L	10500
1/28/2002	2H	Iron	mg/L	12050
2/1/2002	2H	Iron	mg/L	10790
2/5/2002	2H	Iron	mg/L	11250
4/4/2002	2H	Iron	mg/L	11160
4/8/2002	2H	Iron	mg/L	10950
4/12/2002	2H	Iron	mg/L	10740
4/16/2002	2H	Iron	mg/L	9468
7/18/2002	2H	Iron	mg/L	10090
7/22/2002	2H	Iron	mg/L	10470
7/26/2002	2H	Iron	mg/L	10700
7/30/2002	2H	Iron	mg/L	10160
10/3/2002	2H	Iron	mg/L	10090
10/7/2002	2H	Iron	mg/L	10430
10/11/2002	2H	Iron	mg/L	10090
10/15/2002	2H	Iron	mg/L	10720
1/16/2003	2H	Iron	mg/L	10110
1/24/2003	2H	Iron	mg/L	5071
1/28/2003	2H	Iron	mg/L	10580
4/3/2003	2H	Iron	mg/L	7209
4/7/2003	2H	Iron	mg/L	7552
4/11/2003	2H	Iron	mg/L	6603
4/15/2003	2H	Iron	mg/L	9128
7/3/2003	2H	Iron	mg/L	10100
7/7/2003	2H	Iron	mg/L	10820
7/11/2003	2H	Iron	mg/L	9040
7/15/2003	2H	Iron	mg/L	9049
10/2/2003	2H	Iron	mg/L	8528
10/6/2003	2H	Iron	mg/L	9620
10/10/2003	2H	Iron	mg/L	10610
10/14/2003	2H	Iron	mg/L	9830
1/8/2004	2H	Iron	mg/L	6550
1/12/2004	2H	Iron	mg/L	9058
1/16/2004	2H	Iron	mg/L	8926
1/20/2004	2H	Iron	mg/L	8863
4/8/2004	2H	Iron	mg/L	8748
4/12/2004	2H	Iron	mg/L	9249
4/16/2004	2H	Iron	mg/L	8725
6/10/2004	2H	Iron	mg/L	9438
7/15/2004	2H	Iron	mg/L	8623
7/19/2004	2H	Iron	mg/L	8786
7/23/2004	2H	Iron	mg/L	9683
7/27/2004	2H	Iron	mg/L	9360
1/6/2005	2H	Iron	mg/L	7873
1/10/2005	2H	Iron	mg/L	7712
1/14/2005	2H	Iron	mg/L	7827
1/14/2005	2H	Iron	mg/L	7827
1/18/2005	2H	Iron	mg/L	8246
4/7/2005	2H	Iron	mg/L	2979
4/11/2005	2H	Iron	mg/L	8004
4/15/2005	2H	Iron	mg/L	8589
4/19/2005	2H	Iron	mg/L	8380
7/7/2005	2H	Iron	mg/L	8983
7/11/2005	2H	Iron	mg/L	10380
7/15/2005	2H	Iron	mg/L	8790
7/19/2005	2H	Iron	mg/L	9752

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2005	2H	Iron	mg/L	8555
10/17/2005	2H	Iron	mg/L	8416
10/21/2005	2H	Iron	mg/L	8810
10/25/2005	2H	Iron	mg/L	8770
1/5/2006	2H	Iron	mg/L	7802
1/9/2006	2H	Iron	mg/L	4687
1/13/2006	2H	Iron	mg/L	7442
1/17/2006	2H	Iron	mg/L	9277
4/6/2006	2H	Iron	mg/L	8900
4/10/2006	2H	Iron	mg/L	7205
4/14/2006	2H	Iron	mg/L	7262
4/18/2006	2H	Iron	mg/L	8119
7/6/2006	2H	Iron	mg/L	10873
7/10/2006	2H	Iron	mg/L	8534
7/14/2006	2H	Iron	mg/L	10175
7/18/2006	2H	Iron	mg/L	9099
10/19/2006	2H	Iron	mg/L	6090
10/23/2006	2H	Iron	mg/L	6388
10/27/2006	2H	Iron	mg/L	6476
10/31/2006	2H	Iron	mg/L	1977
1/4/2007	2H	Iron	mg/L	8449
1/8/2007	2H	Iron	mg/L	9189
1/11/2007	2H	Iron	mg/L	9147
1/16/2007	2H	Iron	mg/L	8754
4/19/2007	2H	Iron	mg/L	7869
4/23/2007	2H	Iron	mg/L	7608
4/27/2007	2H	Iron	mg/L	7803
5/1/2007	2H	Iron	mg/L	8557
7/12/2007	2H	Iron	mg/L	7547
7/16/2007	2H	Iron	mg/L	ND
7/20/2007	2H	Iron	mg/L	8352
7/24/2007	2H	Iron	mg/L	6910
4/3/2008	2H	Iron	mg/L	6475
4/7/2008	2H	Iron	mg/L	7803
4/11/2008	2H	Iron	mg/L	8126
4/15/2008	2H	Iron	mg/L	6385
7/3/2008	2H	Iron	mg/L	6097
7/3/2008	2H	Iron	mg/L	6097
7/7/2008	2H	Iron	mg/L	6059
7/11/2008	2H	Iron	mg/L	6279
7/15/2008	2H	Iron	mg/L	6156
10/9/2008	2H	Iron	mg/L	7008
10/13/2008	2H	Iron	mg/L	7372
10/17/2008	2H	Iron	mg/L	5604
10/21/2008	2H	Iron	mg/L	5397
1/8/2009	2H	Iron	mg/L	4288
1/12/2009	2H	Iron	mg/L	5097
1/16/2009	2H	Iron	mg/L	5181
1/20/2009	2H	Iron	mg/L	5893
4/9/2009	2H	Iron	mg/L	4968
4/13/2009	2H	Iron	mg/L	5662
4/17/2009	2H	Iron	mg/L	5881
4/21/2009	2H	Iron	mg/L	5927
1/11/2008	2H	Iron	mg/L	5750
1/15/2008	2H	Iron	mg/L	6256
1/3/2008	2H	Iron	mg/L	3997
1/7/2008	2H	Iron	mg/L	5558
10/18/2007	2H	Iron	mg/L	7527
10/22/2007	2H	Iron	mg/L	7422
10/26/2007	2H	Iron	mg/L	6971
10/30/2007	2H	Iron	mg/L	7338
7/12/2007	2H	Isopropylbenzene	ug/L	2.3
7/12/2007	2H	Lead	mg/L	ND
7/12/2007	2H	m,p-Xylene	ug/L	5.1
7/12/2007	2H	Magnesium	mg/L	660
1/21/2002	2H	Manganese	mg/L	281
1/24/2002	2H	Manganese	mg/L	295
1/28/2002	2H	Manganese	mg/L	339
2/1/2002	2H	Manganese	mg/L	307
2/5/2002	2H	Manganese	mg/L	318
4/4/2002	2H	Manganese	mg/L	314
4/8/2002	2H	Manganese	mg/L	309
4/12/2002	2H	Manganese	mg/L	302
4/16/2002	2H	Manganese	mg/L	263
7/18/2002	2H	Manganese	mg/L	280
7/22/2002	2H	Manganese	mg/L	294
7/26/2002	2H	Manganese	mg/L	301
7/30/2002	2H	Manganese	mg/L	285
10/3/2002	2H	Manganese	mg/L	282
10/7/2002	2H	Manganese	mg/L	293
10/11/2002	2H	Manganese	mg/L	279
10/15/2002	2H	Manganese	mg/L	299
1/16/2003	2H	Manganese	mg/L	289
1/24/2003	2H	Manganese	mg/L	175
1/28/2003	2H	Manganese	mg/L	306

Sampling Date	Location ID	Analyte	Unit	Concentration
4/3/2003	2H	Manganese	mg/L	214
4/7/2003	2H	Manganese	mg/L	224
4/11/2003	2H	Manganese	mg/L	189
4/15/2003	2H	Manganese	mg/L	258
7/3/2003	2H	Manganese	mg/L	292
7/7/2003	2H	Manganese	mg/L	313
7/11/2003	2H	Manganese	mg/L	258
7/15/2003	2H	Manganese	mg/L	257
10/2/2003	2H	Manganese	mg/L	237
10/6/2003	2H	Manganese	mg/L	269
10/10/2003	2H	Manganese	mg/L	300
10/14/2003	2H	Manganese	mg/L	276
1/8/2004	2H	Manganese	mg/L	184
1/12/2004	2H	Manganese	mg/L	255
1/16/2004	2H	Manganese	mg/L	251
1/20/2004	2H	Manganese	mg/L	248
4/8/2004	2H	Manganese	mg/L	248
4/12/2004	2H	Manganese	mg/L	262
4/16/2004	2H	Manganese	mg/L	243
6/10/2004	2H	Manganese	mg/L	225
7/15/2004	2H	Manganese	mg/L	241
7/19/2004	2H	Manganese	mg/L	251
7/23/2004	2H	Manganese	mg/L	273
7/27/2004	2H	Manganese	mg/L	260
1/6/2005	2H	Manganese	mg/L	217
1/10/2005	2H	Manganese	mg/L	246
1/10/2005	2H	Manganese	mg/L	246
1/14/2005	2H	Manganese	mg/L	245
1/18/2005	2H	Manganese	mg/L	233
4/7/2005	2H	Manganese	mg/L	104
4/11/2005	2H	Manganese	mg/L	225
4/15/2005	2H	Manganese	mg/L	248
4/19/2005	2H	Manganese	mg/L	239
7/7/2005	2H	Manganese	mg/L	274
7/11/2005	2H	Manganese	mg/L	363
7/15/2005	2H	Manganese	mg/L	266
7/19/2005	2H	Manganese	mg/L	276
10/13/2005	2H	Manganese	mg/L	239
10/17/2005	2H	Manganese	mg/L	233
10/21/2005	2H	Manganese	mg/L	244
10/25/2005	2H	Manganese	mg/L	259
1/5/2006	2H	Manganese	mg/L	241
1/9/2006	2H	Manganese	mg/L	140
1/13/2006	2H	Manganese	mg/L	212
1/17/2006	2H	Manganese	mg/L	265
4/6/2006	2H	Manganese	mg/L	251
4/10/2006	2H	Manganese	mg/L	196
4/14/2006	2H	Manganese	mg/L	209
4/18/2006	2H	Manganese	mg/L	236
7/6/2006	2H	Manganese	mg/L	51.3
7/10/2006	2H	Manganese	mg/L	172
7/14/2006	2H	Manganese	mg/L	257
7/18/2006	2H	Manganese	mg/L	259
10/19/2006	2H	Manganese	mg/L	203
10/23/2006	2H	Manganese	mg/L	204
10/27/2006	2H	Manganese	mg/L	207
10/31/2006	2H	Manganese	mg/L	308
1/4/2007	2H	Manganese	mg/L	243
1/8/2007	2H	Manganese	mg/L	241
1/11/2007	2H	Manganese	mg/L	240
1/16/2007	2H	Manganese	mg/L	190
4/19/2007	2H	Manganese	mg/L	202
4/23/2007	2H	Manganese	mg/L	203
4/27/2007	2H	Manganese	mg/L	ND
5/1/2007	2H	Manganese	mg/L	ND
7/12/2007	2H	Manganese	mg/L	209
7/16/2007	2H	Manganese	mg/L	205
7/20/2007	2H	Manganese	mg/L	233
7/24/2007	2H	Manganese	mg/L	238
4/3/2008	2H	Manganese	mg/L	170
4/7/2008	2H	Manganese	mg/L	ND
4/11/2008	2H	Manganese	mg/L	255
4/15/2008	2H	Manganese	mg/L	208
7/3/2008	2H	Manganese	mg/L	169
7/3/2008	2H	Manganese	mg/L	169
7/7/2008	2H	Manganese	mg/L	1.9
7/11/2008	2H	Manganese	mg/L	219
7/15/2008	2H	Manganese	mg/L	204
10/9/2008	2H	Manganese	mg/L	ND
10/13/2008	2H	Manganese	mg/L	277
10/17/2008	2H	Manganese	mg/L	192
10/21/2008	2H	Manganese	mg/L	192
1/8/2009	2H	Manganese	mg/L	143
1/12/2009	2H	Manganese	mg/L	190
1/16/2009	2H	Manganese	mg/L	159

Sampling Date	Location ID	Analyte	Unit	Concentration
1/20/2009	2H	Manganese	mg/L	205
4/9/2009	2H	Manganese	mg/L	151
4/13/2009	2H	Manganese	mg/L	189
4/17/2009	2H	Manganese	mg/L	189
4/21/2009	2H	Manganese	mg/L	183
1/11/2008	2H	Manganese	mg/L	193
1/15/2008	2H	Manganese	mg/L	183
1/3/2008	2H	Manganese	mg/L	210
1/7/2008	2H	Manganese	mg/L	175
10/18/2007	2H	Manganese	mg/L	218
10/22/2007	2H	Manganese	mg/L	ND
10/26/2007	2H	Manganese	mg/L	225
10/30/2007	2H	Manganese	mg/L	216
7/12/2007	2H	Mercury	mg/L	ND
7/12/2007	2H	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2H	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2H	Naphthalene	ug/L	5.8
7/12/2007	2H	n-Butylbenzene	ug/L	ND
7/12/2007	2H	Nickel	mg/L	ND
7/12/2007	2H	Nitrate	mg/L	ND
7/12/2007	2H	Nitrate/Nitrite	mg/L	ND
7/12/2007	2H	Nitrite	mg/L	ND
7/12/2007	2H	n-Propylbenzene	ug/L	ND
7/12/2007	2H	o-Xylene	ug/L	8.4
1/21/2002	2H	pH	pH	3.31
1/24/2002	2H	pH	pH	3.46
1/28/2002	2H	pH	pH	3.49
2/1/2002	2H	pH	pH	3.41
2/5/2002	2H	pH	pH	3.72
4/4/2002	2H	pH	pH	3.78
4/8/2002	2H	pH	pH	3.73
4/12/2002	2H	pH	pH	3.55
4/16/2002	2H	pH	pH	3.65
7/18/2002	2H	pH	pH	3.64
7/22/2002	2H	pH	pH	3.73
7/26/2002	2H	pH	pH	3.65
7/30/2002	2H	pH	pH	3.69
10/3/2002	2H	pH	pH	3.53
10/7/2002	2H	pH	pH	3.6
10/11/2002	2H	pH	pH	3.83
10/15/2002	2H	pH	pH	3.53
1/16/2003	2H	pH	pH	3.58
1/24/2003	2H	pH	pH	4.65
1/28/2003	2H	pH	pH	3.75
4/3/2003	2H	pH	pH	2.07
4/7/2003	2H	pH	pH	2.61
4/11/2003	2H	pH	pH	2.57
4/15/2003	2H	pH	pH	2.53
7/3/2003	2H	pH	pH	3.49
7/7/2003	2H	pH	pH	3.46
7/11/2003	2H	pH	pH	3.59
7/15/2003	2H	pH	pH	3.68
10/2/2003	2H	pH	pH	3.72
10/6/2003	2H	pH	pH	3.54
10/10/2003	2H	pH	pH	3.57
10/14/2003	2H	pH	pH	3.71
1/8/2004	2H	pH	pH	3.68
1/12/2004	2H	pH	pH	3.86
1/16/2004	2H	pH	pH	3.81
1/20/2004	2H	pH	pH	3.79
4/8/2004	2H	pH	pH	3.22
4/12/2004	2H	pH	pH	3.27
4/16/2004	2H	pH	pH	3.36
6/10/2004	2H	pH	pH	3.53
7/15/2004	2H	pH	pH	3.35
7/19/2004	2H	pH	pH	3.72
7/23/2004	2H	pH	pH	3.98
7/27/2004	2H	pH	pH	3.52
1/6/2005	2H	pH	pH	3.54
1/10/2005	2H	pH	pH	3.83
1/14/2005	2H	pH	pH	3.86
1/18/2005	2H	pH	pH	3.53
4/7/2005	2H	pH	pH	4.22
4/11/2005	2H	pH	pH	3.62
4/15/2005	2H	pH	pH	3.69
4/19/2005	2H	pH	pH	3.73
7/7/2005	2H	pH	pH	3.3
7/11/2005	2H	pH	pH	2.84
7/15/2005	2H	pH	pH	3.19
7/19/2005	2H	pH	pH	3.15
10/13/2005	2H	pH	pH	3.43
10/17/2005	2H	pH	pH	3.39
10/21/2005	2H	pH	pH	3.55
10/25/2005	2H	pH	pH	3.43
1/5/2006	2H	pH	pH	3.11

Sampling Date	Location ID	Analyte	Unit	Concentration
1/9/2006	2H	pH	pH	3.45
1/13/2006	2H	pH	pH	3.3
1/17/2006	2H	pH	pH	3.3
4/6/2006	2H	pH	pH	3.25
4/10/2006	2H	pH	pH	3.45
4/14/2006	2H	pH	pH	3.16
4/18/2006	2H	pH	pH	3.63
7/6/2006	2H	pH	pH	3.45
7/10/2006	2H	pH	pH	3.5
7/14/2006	2H	pH	pH	3.63
7/18/2006	2H	pH	pH	3.19
10/19/2006	2H	pH	pH	3.57
10/23/2006	2H	pH	pH	3.65
10/27/2006	2H	pH	pH	3.53
10/31/2006	2H	pH	pH	3.77
1/4/2007	2H	pH	pH	3.62
1/8/2007	2H	pH	pH	3.77
1/11/2007	2H	pH	pH	3.84
1/16/2007	2H	pH	pH	3.8
4/19/2007	2H	pH	pH	3.62
4/23/2007	2H	pH	pH	3.57
4/27/2007	2H	pH	pH	3.66
5/1/2007	2H	pH	pH	3.7
7/12/2007	2H	pH	pH	3.62
7/12/2007	2H	pH	pH	3.61
7/12/2007	2H	pH	pH	3.62
7/12/2007	2H	pH	pH	3.62
7/16/2007	2H	pH	pH	3.6
7/16/2007	2H	pH	pH	3.58
7/16/2007	2H	pH	pH	3.63
7/16/2007	2H	pH	pH	3.63
7/20/2007	2H	pH	pH	3.18
7/20/2007	2H	pH	pH	3.17
7/20/2007	2H	pH	pH	3.18
7/20/2007	2H	pH	pH	3.2
7/24/2007	2H	pH	pH	3.29
7/24/2007	2H	pH	pH	3.3
7/24/2007	2H	pH	pH	3.3
7/24/2007	2H	pH	pH	3.29
4/3/2008	2H	pH	pH	3.15
4/3/2008	2H	pH	pH	3.16
4/3/2008	2H	pH	pH	3.18
4/3/2008	2H	pH	pH	3.19
4/7/2008	2H	pH	pH	3.36
4/7/2008	2H	pH	pH	3.41
4/7/2008	2H	pH	pH	3.43
4/7/2008	2H	pH	pH	3.48
4/11/2008	2H	pH	pH	3.47
4/11/2008	2H	pH	pH	3.47
4/11/2008	2H	pH	pH	3.47
4/11/2008	2H	pH	pH	3.52
4/15/2008	2H	pH	pH	3.52
4/15/2008	2H	pH	pH	3.52
4/15/2008	2H	pH	pH	3.52
4/15/2008	2H	pH	pH	3.54
7/3/2008	2H	pH	pH	3.66
7/3/2008	2H	pH	pH	3.64
7/3/2008	2H	pH	pH	3.64
7/3/2008	2H	pH	pH	3.61
7/3/2008	2H	pH	pH	3.61
7/3/2008	2H	pH	pH	3.64
7/3/2008	2H	pH	pH	3.64
7/3/2008	2H	pH	pH	3.66
7/7/2008	2H	pH	pH	3.53
7/7/2008	2H	pH	pH	3.54
7/7/2008	2H	pH	pH	3.55
7/7/2008	2H	pH	pH	3.6
7/11/2008	2H	pH	pH	3.63
7/11/2008	2H	pH	pH	3.66
7/11/2008	2H	pH	pH	3.66
7/11/2008	2H	pH	pH	3.67
7/15/2008	2H	pH	pH	3.3
7/15/2008	2H	pH	pH	3.3
7/15/2008	2H	pH	pH	3.31
7/15/2008	2H	pH	pH	3.36
10/9/2008	2H	pH	pH	3.56
10/9/2008	2H	pH	pH	3.56
10/9/2008	2H	pH	pH	3.56
10/9/2008	2H	pH	pH	3.56
10/13/2008	2H	pH	pH	3.47
10/13/2008	2H	pH	pH	3.47
10/13/2008	2H	pH	pH	3.47
10/13/2008	2H	pH	pH	3.47
10/17/2008	2H	pH	pH	3.02
10/17/2008	2H	pH	pH	3.14

Sampling Date	Location ID	Analyte	Unit	Concentration
10/17/2008	2H	pH	pH	3.14
10/17/2008	2H	pH	pH	3.16
10/21/2008	2H	pH	pH	3.28
10/21/2008	2H	pH	pH	3.28
10/21/2008	2H	pH	pH	3.28
10/21/2008	2H	pH	pH	3.28
1/8/2009	2H	pH	pH	3.87
1/8/2009	2H	pH	pH	3.87
1/8/2009	2H	pH	pH	3.87
1/8/2009	2H	pH	pH	3.90
1/12/2009	2H	pH	pH	3.81
1/12/2009	2H	pH	pH	3.81
1/12/2009	2H	pH	pH	3.82
1/12/2009	2H	pH	pH	3.88
1/16/2009	2H	pH	pH	3.90
1/16/2009	2H	pH	pH	3.90
1/16/2009	2H	pH	pH	3.90
1/16/2009	2H	pH	pH	3.91
1/20/2009	2H	pH	pH	3.78
1/20/2009	2H	pH	pH	3.78
1/20/2009	2H	pH	pH	3.78
1/20/2009	2H	pH	pH	3.80
4/9/2009	2H	pH	pH	3.97
4/9/2009	2H	pH	pH	3.96
4/9/2009	2H	pH	pH	3.94
4/9/2009	2H	pH	pH	3.96
4/13/2009	2H	pH	pH	3.97
4/13/2009	2H	pH	pH	3.92
4/13/2009	2H	pH	pH	3.90
4/13/2009	2H	pH	pH	3.92
4/17/2009	2H	pH	pH	4.01
4/17/2009	2H	pH	pH	3.90
4/17/2009	2H	pH	pH	3.89
4/17/2009	2H	pH	pH	3.91
4/21/2009	2H	pH	pH	3.88
4/21/2009	2H	pH	pH	3.85
4/21/2009	2H	pH	pH	3.83
4/21/2009	2H	pH	pH	3.83
1/11/2008	2H	pH	pH	3.68
1/11/2008	2H	pH	pH	3.41
1/11/2008	2H	pH	pH	3.45
1/11/2008	2H	pH	pH	3.43
1/15/2008	2H	pH	pH	3.82
1/15/2008	2H	pH	pH	3.63
1/15/2008	2H	pH	pH	3.6
1/15/2008	2H	pH	pH	3.73
1/3/2008	2H	pH	pH	3.07
1/3/2008	2H	pH	pH	3.04
1/3/2008	2H	pH	pH	3.04
1/3/2008	2H	pH	pH	4.33
1/7/2008	2H	pH	pH	3.58
1/7/2008	2H	pH	pH	3.58
1/7/2008	2H	pH	pH	3.58
1/7/2008	2H	pH	pH	3.56
10/18/2007	2H	pH	pH	3.23
10/18/2007	2H	pH	pH	3.23
10/18/2007	2H	pH	pH	3.33
10/18/2007	2H	pH	pH	3.22
10/22/2007	2H	pH	pH	3.5
10/22/2007	2H	pH	pH	3.47
10/22/2007	2H	pH	pH	3.49
10/22/2007	2H	pH	pH	3.51
10/26/2007	2H	pH	pH	3.31
10/26/2007	2H	pH	pH	3.21
10/26/2007	2H	pH	pH	3.23
10/26/2007	2H	pH	pH	3.25
10/30/2007	2H	pH	pH	3.6
10/30/2007	2H	pH	pH	3.59
10/30/2007	2H	pH	pH	3.53
10/30/2007	2H	pH	pH	3.55
7/12/2007	2H	Phenols	mg/L	ND
7/20/2007	2H	Phenols	mg/L	ND
7/24/2007	2H	Phenols	mg/L	8.7
1/21/2002	2H	Phenols	mg/L	ND
1/24/2002	2H	Phenols	mg/L	0.085
1/28/2002	2H	Phenols	mg/L	0.086
2/1/2002	2H	Phenols	mg/L	0.342
2/5/2002	2H	Phenols	mg/L	0.082
4/4/2002	2H	Phenols	mg/L	0.117
4/8/2002	2H	Phenols	mg/L	0.105
4/12/2002	2H	Phenols	mg/L	0.161
4/16/2002	2H	Phenols	mg/L	0.081
7/18/2002	2H	Phenols	mg/L	0.066
7/22/2002	2H	Phenols	mg/L	0.075
7/26/2002	2H	Phenols	mg/L	0.1

Sampling Date	Location ID	Analyte	Unit	Concentration
7/30/2002	2H	Phenols	mg/L	0.08
10/3/2002	2H	Phenols	mg/L	0.146
10/7/2002	2H	Phenols	mg/L	0.094
10/11/2002	2H	Phenols	mg/L	0.07
10/15/2002	2H	Phenols	mg/L	0.122
1/16/2003	2H	Phenols	mg/L	ND
1/24/2003	2H	Phenols	mg/L	0.1
1/28/2003	2H	Phenols	mg/L	ND
4/3/2003	2H	Phenols	mg/L	0.05
4/7/2003	2H	Phenols	mg/L	0.05
4/11/2003	2H	Phenols	mg/L	ND
4/15/2003	2H	Phenols	mg/L	0.091
7/3/2003	2H	Phenols	mg/L	0.111
7/7/2003	2H	Phenols	mg/L	ND
7/11/2003	2H	Phenols	mg/L	ND
7/15/2003	2H	Phenols	mg/L	0.109
10/2/2003	2H	Phenols	mg/L	ND
10/2/2003	2H	Phenols	mg/L	ND
10/6/2003	2H	Phenols	mg/L	ND
10/10/2003	2H	Phenols	mg/L	ND
10/14/2003	2H	Phenols	mg/L	ND
1/8/2004	2H	Phenols	mg/L	ND
1/12/2004	2H	Phenols	mg/L	ND
1/16/2004	2H	Phenols	mg/L	ND
1/20/2004	2H	Phenols	mg/L	ND
4/8/2004	2H	Phenols	mg/L	ND
4/12/2004	2H	Phenols	mg/L	ND
4/16/2004	2H	Phenols	mg/L	ND
6/10/2004	2H	Phenols	mg/L	ND
7/15/2004	2H	Phenols	mg/L	ND
7/19/2004	2H	Phenols	mg/L	0.08
7/23/2004	2H	Phenols	mg/L	ND
7/27/2004	2H	Phenols	mg/L	0.08
1/6/2005	2H	Phenols	mg/L	0.13
1/10/2005	2H	Phenols	mg/L	0.11
1/14/2005	2H	Phenols	mg/L	0.12
1/18/2005	2H	Phenols	mg/L	ND
4/7/2005	2H	Phenols	mg/L	0.03
4/11/2005	2H	Phenols	mg/L	0.08
4/15/2005	2H	Phenols	mg/L	0.08
4/19/2005	2H	Phenols	mg/L	0.09
7/7/2005	2H	Phenols	mg/L	0.1
7/11/2005	2H	Phenols	mg/L	0.08
7/15/2005	2H	Phenols	mg/L	0.09
7/19/2005	2H	Phenols	mg/L	0.17
10/13/2005	2H	Phenols	mg/L	0.05
10/17/2005	2H	Phenols	mg/L	0.05
10/21/2005	2H	Phenols	mg/L	ND
10/25/2005	2H	Phenols	mg/L	ND
1/5/2006	2H	Phenols	mg/L	ND
1/9/2006	2H	Phenols	mg/L	0.11
1/13/2006	2H	Phenols	mg/L	0.08
1/17/2006	2H	Phenols	mg/L	0.09
4/6/2006	2H	Phenols	mg/L	0.09
4/10/2006	2H	Phenols	mg/L	0.18
4/14/2006	2H	Phenols	mg/L	0.19
4/18/2006	2H	Phenols	mg/L	ND
7/6/2006	2H	Phenols	mg/L	0.1
7/10/2006	2H	Phenols	mg/L	0.08
7/14/2006	2H	Phenols	mg/L	0.11
7/18/2006	2H	Phenols	mg/L	0.08
10/19/2006	2H	Phenols	mg/L	0.146
10/23/2006	2H	Phenols	mg/L	0.07
10/27/2006	2H	Phenols	mg/L	0.11
10/31/2006	2H	Phenols	mg/L	0.09
1/4/2007	2H	Phenols	mg/L	0.08
1/8/2007	2H	Phenols	mg/L	0.09
1/11/2007	2H	Phenols	mg/L	0.1
1/16/2007	2H	Phenols	mg/L	0.12
4/19/2007	2H	Phenols	mg/L	0.06
4/23/2007	2H	Phenols	mg/L	ND
4/27/2007	2H	Phenols	mg/L	ND
5/1/2007	2H	Phenols	mg/L	ND
7/16/2007	2H	Phenols	mg/L	ND
10/18/2007	2H	Phenols	mg/L	326
10/22/2007	2H	Phenols	mg/L	0.07
10/26/2007	2H	Phenols	mg/L	ND
10/30/2007	2H	Phenols	mg/L	0.06
4/3/2008	2H	Phenols, Total	mg/L	0.10
4/7/2008	2H	Phenols, Total	mg/L	0.11
4/11/2008	2H	Phenols, Total	mg/L	0.12
4/15/2008	2H	Phenols, Total	mg/L	0.11
7/3/2008	2H	Phenols, Total	mg/L	0.08
7/3/2008	2H	Phenols, Total	mg/L	0.08
7/7/2008	2H	Phenols, Total	mg/L	0.17

Sampling Date	Location ID	Analyte	Unit	Concentration
7/11/2008	2H	Phenols, Total	mg/L	0.05
7/15/2008	2H	Phenols, Total	mg/L	0.11
10/9/2008	2H	Phenols, Total	mg/L	0.11
10/13/2008	2H	Phenols, Total	mg/L	ND
10/17/2008	2H	Phenols, Total	mg/L	ND
10/21/2008	2H	Phenols, Total	mg/L	0.07
1/8/2009	2H	Phenols, Total	mg/L	0.05
1/12/2009	2H	Phenols, Total	mg/L	0.06
1/16/2009	2H	Phenols, Total	mg/L	0.11
1/20/2009	2H	Phenols, Total	mg/L	ND
4/9/2009	2H	Phenols, Total	mg/L	ND
4/13/2009	2H	Phenols, Total	mg/L	ND
4/17/2009	2H	Phenols, Total	mg/L	ND
4/21/2009	2H	Phenols, Total	mg/L	ND
1/11/2008	2H	Phenols, Total	mg/L	12
1/15/2008	2H	Phenols, Total	mg/L	ND
1/3/2008	2H	Phenols, Total	mg/L	ND
1/7/2008	2H	Phenols, Total	mg/L	ND
7/12/2007	2H	Potassium	mg/L	126
7/12/2007	2H	sec-Butylbenzene	ug/L	ND
7/12/2007	2H	Selenium	mg/L	0.021
7/12/2007	2H	Silver	mg/L	ND
1/21/2002	2H	Sodium	mg/L	931
1/24/2002	2H	Sodium	mg/L	878
1/28/2002	2H	Sodium	mg/L	941
2/1/2002	2H	Sodium	mg/L	907
2/5/2002	2H	Sodium	mg/L	1025
4/4/2002	2H	Sodium	mg/L	881
4/8/2002	2H	Sodium	mg/L	880
4/12/2002	2H	Sodium	mg/L	901
4/16/2002	2H	Sodium	mg/L	848
7/18/2002	2H	Sodium	mg/L	970
7/22/2002	2H	Sodium	mg/L	882
7/26/2002	2H	Sodium	mg/L	908
7/30/2002	2H	Sodium	mg/L	855
10/3/2002	2H	Sodium	mg/L	874
10/7/2002	2H	Sodium	mg/L	917
10/11/2002	2H	Sodium	mg/L	922
10/15/2002	2H	Sodium	mg/L	926
1/16/2003	2H	Sodium	mg/L	915
1/24/2003	2H	Sodium	mg/L	336
1/28/2003	2H	Sodium	mg/L	913
4/3/2003	2H	Sodium	mg/L	1082
4/7/2003	2H	Sodium	mg/L	849
4/11/2003	2H	Sodium	mg/L	769
4/15/2003	2H	Sodium	mg/L	907
7/3/2003	2H	Sodium	mg/L	1059
7/7/2003	2H	Sodium	mg/L	1101
7/11/2003	2H	Sodium	mg/L	848
7/15/2003	2H	Sodium	mg/L	802
10/2/2003	2H	Sodium	mg/L	841
10/6/2003	2H	Sodium	mg/L	935
10/10/2003	2H	Sodium	mg/L	1049
10/14/2003	2H	Sodium	mg/L	1010
1/8/2004	2H	Sodium	mg/L	573
1/12/2004	2H	Sodium	mg/L	863
1/16/2004	2H	Sodium	mg/L	853
1/20/2004	2H	Sodium	mg/L	886
4/8/2004	2H	Sodium	mg/L	926
4/12/2004	2H	Sodium	mg/L	870
4/16/2004	2H	Sodium	mg/L	843
6/10/2004	2H	Sodium	mg/L	754
7/15/2004	2H	Sodium	mg/L	866
7/19/2004	2H	Sodium	mg/L	892
7/23/2004	2H	Sodium	mg/L	943
7/27/2004	2H	Sodium	mg/L	926
1/6/2005	2H	Sodium	mg/L	804
1/10/2005	2H	Sodium	mg/L	876
1/14/2005	2H	Sodium	mg/L	847
1/18/2005	2H	Sodium	mg/L	894
4/7/2005	2H	Sodium	mg/L	236
4/11/2005	2H	Sodium	mg/L	889
4/15/2005	2H	Sodium	mg/L	899
4/19/2005	2H	Sodium	mg/L	871
7/7/2005	2H	Sodium	mg/L	806
7/11/2005	2H	Sodium	mg/L	936
7/15/2005	2H	Sodium	mg/L	1122
7/19/2005	2H	Sodium	mg/L	961
10/13/2005	2H	Sodium	mg/L	864
10/17/2005	2H	Sodium	mg/L	871
10/21/2005	2H	Sodium	mg/L	919
10/25/2005	2H	Sodium	mg/L	856
1/5/2006	2H	Sodium	mg/L	910
1/9/2006	2H	Sodium	mg/L	487
1/13/2006	2H	Sodium	mg/L	740

Sampling Date	Location ID	Analyte	Unit	Concentration
1/17/2006	2H	Sodium	mg/L	861
4/6/2006	2H	Sodium	mg/L	928
4/10/2006	2H	Sodium	mg/L	814
4/14/2006	2H	Sodium	mg/L	773
4/18/2006	2H	Sodium	mg/L	822
7/6/2006	2H	Sodium	mg/L	ND
7/10/2006	2H	Sodium	mg/L	588
7/14/2006	2H	Sodium	mg/L	907
7/18/2006	2H	Sodium	mg/L	810
10/19/2006	2H	Sodium	mg/L	707
10/23/2006	2H	Sodium	mg/L	774
10/27/2006	2H	Sodium	mg/L	775
10/31/2006	2H	Sodium	mg/L	219
1/4/2007	2H	Sodium	mg/L	924
1/8/2007	2H	Sodium	mg/L	882
1/11/2007	2H	Sodium	mg/L	855
1/16/2007	2H	Sodium	mg/L	894
4/19/2007	2H	Sodium	mg/L	773
4/23/2007	2H	Sodium	mg/L	783
4/27/2007	2H	Sodium	mg/L	737
5/1/2007	2H	Sodium	mg/L	815
7/12/2007	2H	Sodium	mg/L	742
7/16/2007	2H	Sodium	mg/L	766
7/20/2007	2H	Sodium	mg/L	823
7/24/2007	2H	Sodium	mg/L	920
4/3/2008	2H	Sodium	mg/L	691
4/7/2008	2H	Sodium	mg/L	869
4/11/2008	2H	Sodium	mg/L	1074
4/15/2008	2H	Sodium	mg/L	875
7/3/2008	2H	Sodium	mg/L	818
7/3/2008	2H	Sodium	mg/L	818
7/7/2008	2H	Sodium	mg/L	7.88
7/11/2008	2H	Sodium	mg/L	883
7/15/2008	2H	Sodium	mg/L	794
10/9/2008	2H	Sodium	mg/L	1081
10/13/2008	2H	Sodium	mg/L	925
10/17/2008	2H	Sodium	mg/L	748
10/21/2008	2H	Sodium	mg/L	769
1/8/2009	2H	Sodium	mg/L	745
1/12/2009	2H	Sodium	mg/L	821
1/16/2009	2H	Sodium	mg/L	803
1/20/2009	2H	Sodium	mg/L	847
4/9/2009	2H	Sodium	mg/L	729
4/13/2009	2H	Sodium	mg/L	847
4/17/2009	2H	Sodium	mg/L	841
4/21/2009	2H	Sodium	mg/L	744
1/11/2008	2H	Sodium	mg/L	766
1/15/2008	2H	Sodium	mg/L	755
1/3/2008	2H	Sodium	mg/L	921
1/7/2008	2H	Sodium	mg/L	776
10/18/2007	2H	Sodium	mg/L	881
10/22/2007	2H	Sodium	mg/L	939
10/26/2007	2H	Sodium	mg/L	778
10/30/2007	2H	Sodium	mg/L	781
7/12/2007	2H	Solids, Total Dissolved	mg/L	26800
7/12/2007	2H	Solids, Total Suspended	mg/L	23
1/21/2002	2H	Specific Conductance	umhos	15490
1/24/2002	2H	Specific Conductance	umhos	14450
1/28/2002	2H	Specific Conductance	umhos	14890
2/1/2002	2H	Specific Conductance	umhos	11140
2/5/2002	2H	Specific Conductance	umhos	10970
4/4/2002	2H	Specific Conductance	umhos	15100
4/8/2002	2H	Specific Conductance	umhos	13750
4/12/2002	2H	Specific Conductance	umhos	11640
4/16/2002	2H	Specific Conductance	umhos	9090
7/18/2002	2H	Specific Conductance	umhos	6710
7/22/2002	2H	Specific Conductance	umhos	6480
7/26/2002	2H	Specific Conductance	umhos	4510
7/30/2002	2H	Specific Conductance	umhos	18550
10/3/2002	2H	Specific Conductance	umhos	17950
10/7/2002	2H	Specific Conductance	umhos	15650
10/11/2002	2H	Specific Conductance	umhos	13140
10/15/2002	2H	Specific Conductance	umhos	12390
1/16/2003	2H	Specific Conductance	umhos	15780
1/24/2003	2H	Specific Conductance	umhos	9770
1/28/2003	2H	Specific Conductance	umhos	17650
4/3/2003	2H	Specific Conductance	umhos	13850
4/7/2003	2H	Specific Conductance	umhos	13160
4/11/2003	2H	Specific Conductance	umhos	14330
4/15/2003	2H	Specific Conductance	umhos	13220
7/3/2003	2H	Specific Conductance	umhos	16700
7/7/2003	2H	Specific Conductance	umhos	14730
7/11/2003	2H	Specific Conductance	umhos	13450
7/15/2003	2H	Specific Conductance	umhos	11550
10/2/2003	2H	Specific Conductance	umhos	13920

Sampling Date	Location ID	Analyte	Unit	Concentration
10/6/2003	2H	Specific Conductance	umhos	16840
10/10/2003	2H	Specific Conductance	umhos	13410
10/14/2003	2H	Specific Conductance	umhos	18830
1/8/2004	2H	Specific Conductance	umhos	12940
1/12/2004	2H	Specific Conductance	umhos	12750
1/16/2004	2H	Specific Conductance	umhos	11580
1/20/2004	2H	Specific Conductance	umhos	11040
4/8/2004	2H	Specific Conductance	umhos	12390
4/12/2004	2H	Specific Conductance	umhos	10130
4/16/2004	2H	Specific Conductance	umhos	10830
6/10/2004	2H	Specific Conductance	umhos	9200
7/15/2004	2H	Specific Conductance	umhos	15780
7/19/2004	2H	Specific Conductance	umhos	13900
7/23/2004	2H	Specific Conductance	umhos	11180
7/23/2004	2H	Specific Conductance	umhos	11180
7/27/2004	2H	Specific Conductance	umhos	11770
1/6/2005	2H	Specific Conductance	umhos	14210
1/10/2005	2H	Specific Conductance	umhos	14660
1/14/2005	2H	Specific Conductance	umhos	9540
1/18/2005	2H	Specific Conductance	umhos	13470
4/7/2005	2H	Specific Conductance	umhos	4930
4/11/2005	2H	Specific Conductance	umhos	10720
4/15/2005	2H	Specific Conductance	umhos	6030
4/19/2005	2H	Specific Conductance	umhos	4360
7/7/2005	2H	Specific Conductance	umhos	17500
7/11/2005	2H	Specific Conductance	umhos	16000
7/15/2005	2H	Specific Conductance	umhos	13550
7/19/2005	2H	Specific Conductance	umhos	12770
10/13/2005	2H	Specific Conductance	umhos	9050
10/17/2005	2H	Specific Conductance	umhos	17040
10/21/2005	2H	Specific Conductance	umhos	15270
10/25/2005	2H	Specific Conductance	umhos	15480
1/5/2006	2H	Specific Conductance	umhos	9900
1/9/2006	2H	Specific Conductance	umhos	8940
1/13/2006	2H	Specific Conductance	umhos	7180
1/17/2006	2H	Specific Conductance	umhos	11530
4/6/2006	2H	Specific Conductance	umhos	13600
4/10/2006	2H	Specific Conductance	umhos	8030
4/14/2006	2H	Specific Conductance	umhos	18250
4/18/2006	2H	Specific Conductance	umhos	15770
7/6/2006	2H	Specific Conductance	umhos	8280
7/10/2006	2H	Specific Conductance	umhos	15620
7/14/2006	2H	Specific Conductance	umhos	14410
7/18/2006	2H	Specific Conductance	umhos	11520
10/19/2006	2H	Specific Conductance	umhos	13310
10/23/2006	2H	Specific Conductance	umhos	11270
10/27/2006	2H	Specific Conductance	umhos	8030
10/31/2006	2H	Specific Conductance	umhos	14390
1/4/2007	2H	Specific Conductance	umhos	14910
1/8/2007	2H	Specific Conductance	umhos	6070
1/11/2007	2H	Specific Conductance	umhos	7920
1/16/2007	2H	Specific Conductance	umhos	3760
4/19/2007	2H	Specific Conductance	umhos	5720
4/23/2007	2H	Specific Conductance	umhos	4780
4/27/2007	2H	Specific Conductance	umhos	2740
5/1/2007	2H	Specific Conductance	umhos	2860
7/12/2007	2H	Specific Conductance	umhos	8970
7/12/2007	2H	Specific Conductance	umhos	10100
7/12/2007	2H	Specific Conductance	umhos	10440
7/12/2007	2H	Specific Conductance	umhos	10980
7/16/2007	2H	Specific Conductance	umhos	1352
7/16/2007	2H	Specific Conductance	umhos	1367
7/16/2007	2H	Specific Conductance	umhos	1370
7/16/2007	2H	Specific Conductance	umhos	1420
7/20/2007	2H	Specific Conductance	umhos	12640
7/20/2007	2H	Specific Conductance	umhos	13250
7/20/2007	2H	Specific Conductance	umhos	13270
7/20/2007	2H	Specific Conductance	umhos	13350
7/24/2007	2H	Specific Conductance	umhos	8590
7/24/2007	2H	Specific Conductance	umhos	9130
7/24/2007	2H	Specific Conductance	umhos	9590
7/24/2007	2H	Specific Conductance	umhos	10040
4/3/2008	2H	Specific Conductance	umhos	15800
4/3/2008	2H	Specific Conductance	umhos	15850
4/3/2008	2H	Specific Conductance	umhos	16050
4/3/2008	2H	Specific Conductance	umhos	16140
4/7/2008	2H	Specific Conductance	umhos	15180
4/7/2008	2H	Specific Conductance	umhos	15240
4/7/2008	2H	Specific Conductance	umhos	15290
4/7/2008	2H	Specific Conductance	umhos	15320
4/11/2008	2H	Specific Conductance	umhos	15170
4/11/2008	2H	Specific Conductance	umhos	15970
4/11/2008	2H	Specific Conductance	umhos	16010
4/11/2008	2H	Specific Conductance	umhos	16040
4/15/2008	2H	Specific Conductance	umhos	15270

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2008	2H	Specific Conductance	umhos	15470
4/15/2008	2H	Specific Conductance	umhos	15540
4/15/2008	2H	Specific Conductance	umhos	15620
7/3/2008	2H	Specific Conductance	umhos	14160
7/3/2008	2H	Specific Conductance	umhos	14870
7/3/2008	2H	Specific Conductance	umho	15090
7/3/2008	2H	Specific Conductance	umhos	15350
7/3/2008	2H	Specific Conductance	umhos	14160
7/3/2008	2H	Specific Conductance	umhos	14870
7/3/2008	2H	Specific Conductance	umho	15090
7/3/2008	2H	Specific Conductance	umhos	15350
7/3/2008	2H	Specific Conductance	umhos	10930
7/7/2008	2H	Specific Conductance	umhos	13310
7/7/2008	2H	Specific Conductance	umhos	13520
7/7/2008	2H	Specific Conductance	umhos	13520
7/7/2008	2H	Specific Conductance	umhos	14860
7/11/2008	2H	Specific Conductance	umhos	15290
7/11/2008	2H	Specific Conductance	umhos	15310
7/11/2008	2H	Specific Conductance	umhos	15390
7/11/2008	2H	Specific Conductance	umhos	15140
7/15/2008	2H	Specific Conductance	umhos	15160
7/15/2008	2H	Specific Conductance	umhos	15242
7/15/2008	2H	Specific Conductance	umhos	15330
7/15/2008	2H	Specific Conductance	umhos	14070
10/9/2008	2H	Specific Conductance	umhos	14140
10/9/2008	2H	Specific Conductance	umhos	14140
10/9/2008	2H	Specific Conductance	umhos	14150
10/9/2008	2H	Specific Conductance	umhos	11140
10/13/2008	2H	Specific Conductance	umhos	11430
10/13/2008	2H	Specific Conductance	umhos	11650
10/13/2008	2H	Specific Conductance	umhos	11750
10/13/2008	2H	Specific Conductance	umhos	13220
10/17/2008	2H	Specific Conductance	umhos	13410
10/17/2008	2H	Specific Conductance	umhos	13440
10/17/2008	2H	Specific Conductance	umhos	13610
10/17/2008	2H	Specific Conductance	umhos	10050
10/21/2008	2H	Specific Conductance	umhos	10340
10/21/2008	2H	Specific Conductance	umhos	10420
10/21/2008	2H	Specific Conductance	umhos	9810
10/21/2008	2H	Specific Conductance	umhos	16250
1/8/2009	2H	Specific Conductance	umhos	16330
1/8/2009	2H	Specific Conductance	umhos	16350
1/8/2009	2H	Specific Conductance	umhos	16440
1/8/2009	2H	Specific Conductance	umhos	16280
1/12/2009	2H	Specific Conductance	umhos	16300
1/12/2009	2H	Specific Conductance	umhos	16350
1/12/2009	2H	Specific Conductance	umhos	16370
1/12/2009	2H	Specific Conductance	umhos	17300
1/16/2009	2H	Specific Conductance	umhos	17380
1/16/2009	2H	Specific Conductance	umhos	17560
1/16/2009	2H	Specific Conductance	umhos	17580
1/16/2009	2H	Specific Conductance	umhos	17180
1/20/2009	2H	Specific Conductance	umhos	17320
1/20/2009	2H	Specific Conductance	umhos	17360
1/20/2009	2H	Specific Conductance	umhos	17440
1/20/2009	2H	Specific Conductance	umhos	15610
4/9/2009	2H	Specific Conductance	umhos	15700
4/9/2009	2H	Specific Conductance	umhos	15890
4/9/2009	2H	Specific Conductance	umhos	15870
4/9/2009	2H	Specific Conductance	umhos	16500
4/13/2009	2H	Specific Conductance	umhos	16520
4/13/2009	2H	Specific Conductance	umhos	16600
4/13/2009	2H	Specific Conductance	umhos	16630
4/13/2009	2H	Specific Conductance	umhos	16390
4/17/2009	2H	Specific Conductance	umhos	16240
4/17/2009	2H	Specific Conductance	umhos	16350
4/17/2009	2H	Specific Conductance	umhos	16160
4/17/2009	2H	Specific Conductance	umhos	16310
4/21/2009	2H	Specific Conductance	umhos	16240
4/21/2009	2H	Specific Conductance	umhos	16190
4/21/2009	2H	Specific Conductance	umhos	16480
4/21/2009	2H	Specific Conductance	umhos	2350
1/11/2008	2H	Specific Conductance	umhos	2300
1/11/2008	2H	Specific Conductance	umhos	2260
1/11/2008	2H	Specific Conductance	umhos	2220
1/11/2008	2H	Specific Conductance	umhos	2690
1/15/2008	2H	Specific Conductance	umhos	2700
1/15/2008	2H	Specific Conductance	umhos	2660
1/15/2008	2H	Specific Conductance	umhos	2630
1/15/2008	2H	Specific Conductance	umhos	5290
1/3/2008	2H	Specific Conductance	umhos	5250
1/3/2008	2H	Specific Conductance	umhos	5260
1/3/2008	2H	Specific Conductance	umhos	3120
1/3/2008	2H	Specific Conductance	umhos	6110
1/7/2008	2H	Specific Conductance	umhos	6150

Sampling Date	Location ID	Analyte	Unit	Concentration
1/7/2008	2H	Specific Conductance	umhos	6210
1/7/2008	2H	Specific Conductance	umhos	6150
10/18/2007	2H	Specific Conductance	umhos	10940
10/18/2007	2H	Specific Conductance	umhos	11270
10/18/2007	2H	Specific Conductance	umhos	11560
10/18/2007	2H	Specific Conductance	umhos	11920
10/22/2007	2H	Specific Conductance	umhos	7250
10/22/2007	2H	Specific Conductance	umhos	7520
10/22/2007	2H	Specific Conductance	umhos	7990
10/22/2007	2H	Specific Conductance	umhos	8170
10/26/2007	2H	Specific Conductance	umhos	5080
10/26/2007	2H	Specific Conductance	umhos	4950
10/26/2007	2H	Specific Conductance	umhos	4990
10/26/2007	2H	Specific Conductance	umhos	4990
10/30/2007	2H	Specific Conductance	umhos	8970
10/30/2007	2H	Specific Conductance	umhos	8740
10/30/2007	2H	Specific Conductance	umhos	8990
10/30/2007	2H	Specific Conductance	umhos	9050
7/12/2007	2H	Styrene	ug/L	ND
7/12/2007	2H	Sulfate	mg/L	20719
7/16/2007	2H	Sulfate	mg/L	20083
7/20/2007	2H	Sulfate	mg/L	20852
7/24/2007	2H	Sulfate	mg/L	23877
4/3/2008	2H	Sulfate	mg/L	16424
4/7/2008	2H	Sulfate	mg/L	16968
4/11/2008	2H	Sulfate	mg/L	16537
4/15/2008	2H	Sulfate	mg/L	17615
7/3/2008	2H	Sulfate	mg/L	19464
7/3/2008	2H	Sulfate	mg/L	19464
7/7/2008	2H	Sulfate	mg/L	ND
7/11/2008	2H	Sulfate	mg/L	19526
7/15/2008	2H	Sulfate	mg/L	22112
10/9/2008	2H	Sulfate	mg/L	17935
10/13/2008	2H	Sulfate	mg/L	20651
10/17/2008	2H	Sulfate	mg/L	18839
10/21/2008	2H	Sulfate	mg/L	20470
1/8/2009	2H	Sulfate	mg/L	17193
1/12/2009	2H	Sulfate	mg/L	17382
1/16/2009	2H	Sulfate	mg/L	20589
1/20/2009	2H	Sulfate	mg/L	17333
4/9/2009	2H	Sulfate	mg/L	15326
4/13/2009	2H	Sulfate	mg/L	16263
4/17/2009	2H	Sulfate	mg/L	16932
4/21/2009	2H	Sulfate	mg/L	19069
1/11/2008	2H	Sulfate	mg/L	18298
1/15/2008	2H	Sulfate	mg/L	19557
1/3/2008	2H	Sulfate	mg/L	19804
1/7/2008	2H	Sulfate	mg/L	15524
1/21/2002	2H	Sulfate	mg/L	20100
1/24/2002	2H	Sulfate	mg/L	15363
1/28/2002	2H	Sulfate	mg/L	16369
2/1/2002	2H	Sulfate	mg/L	15334
2/5/2002	2H	Sulfate	mg/L	12216
4/4/2002	2H	Sulfate	mg/L	38878
4/8/2002	2H	Sulfate	mg/L	28793
4/12/2002	2H	Sulfate	mg/L	29707
4/16/2002	2H	Sulfate	mg/L	22536
7/18/2002	2H	Sulfate	mg/L	25000
7/22/2002	2H	Sulfate	mg/L	27155
7/26/2002	2H	Sulfate	mg/L	15073
7/30/2002	2H	Sulfate	mg/L	15055
10/3/2002	2H	Sulfate	mg/L	20730
10/7/2002	2H	Sulfate	mg/L	32170
10/11/2002	2H	Sulfate	mg/L	25300
10/15/2002	2H	Sulfate	mg/L	24500
1/16/2003	2H	Sulfate	mg/L	25800
1/24/2003	2H	Sulfate	mg/L	9370
1/28/2003	2H	Sulfate	mg/L	27100
4/3/2003	2H	Sulfate	mg/L	17300
4/7/2003	2H	Sulfate	mg/L	17800
4/11/2003	2H	Sulfate	mg/L	18400
4/15/2003	2H	Sulfate	mg/L	18800
7/3/2003	2H	Sulfate	mg/L	21700
7/7/2003	2H	Sulfate	mg/L	22000
7/11/2003	2H	Sulfate	mg/L	23500
7/15/2003	2H	Sulfate	mg/L	21835
10/2/2003	2H	Sulfate	mg/L	6920
10/6/2003	2H	Sulfate	mg/L	16400
10/10/2003	2H	Sulfate	mg/L	22500
10/14/2003	2H	Sulfate	mg/L	15900
1/8/2004	2H	Sulfate	mg/L	20400
1/12/2004	2H	Sulfate	mg/L	19400
1/16/2004	2H	Sulfate	mg/L	17500
1/20/2004	2H	Sulfate	mg/L	19200
4/8/2004	2H	Sulfate	mg/L	16277

Sampling Date	Location ID	Analyte	Unit	Concentration
4/12/2004	2H	Sulfate	mg/L	17744
4/16/2004	2H	Sulfate	mg/L	19030
6/10/2004	2H	Sulfate	mg/L	22623
7/15/2004	2H	Sulfate	mg/L	21550
7/19/2004	2H	Sulfate	mg/L	22580
7/23/2004	2H	Sulfate	mg/L	21520
7/27/2004	2H	Sulfate	mg/L	21438
1/6/2005	2H	Sulfate	mg/L	18202
1/10/2005	2H	Sulfate	mg/L	18766
1/14/2005	2H	Sulfate	mg/L	21480
1/18/2005	2H	Sulfate	mg/L	23166
4/7/2005	2H	Sulfate	mg/L	8379
4/11/2005	2H	Sulfate	mg/L	16912
4/15/2005	2H	Sulfate	mg/L	8230
4/19/2005	2H	Sulfate	mg/L	19257
7/7/2005	2H	Sulfate	mg/L	30002
7/11/2005	2H	Sulfate	mg/L	32508
7/15/2005	2H	Sulfate	mg/L	26414
7/19/2005	2H	Sulfate	mg/L	25176
10/13/2005	2H	Sulfate	mg/L	22346
10/17/2005	2H	Sulfate	mg/L	22404
10/21/2005	2H	Sulfate	mg/L	21328
10/25/2005	2H	Sulfate	mg/L	24396
1/5/2006	2H	Sulfate	mg/L	24369
1/9/2006	2H	Sulfate	mg/L	24020
1/13/2006	2H	Sulfate	mg/L	24205
1/17/2006	2H	Sulfate	mg/L	22361
4/6/2006	2H	Sulfate	mg/L	30845
4/10/2006	2H	Sulfate	mg/L	24470
4/14/2006	2H	Sulfate	mg/L	22277
4/18/2006	2H	Sulfate	mg/L	23767
7/6/2006	2H	Sulfate	mg/L	20494
7/10/2006	2H	Sulfate	mg/L	23710
7/14/2006	2H	Sulfate	mg/L	23975
7/18/2006	2H	Sulfate	mg/L	23951
10/19/2006	2H	Sulfate	mg/L	21805
10/23/2006	2H	Sulfate	mg/L	23910
10/27/2006	2H	Sulfate	mg/L	22767
10/31/2006	2H	Sulfate	mg/L	24000
1/4/2007	2H	Sulfate	mg/L	21816
1/8/2007	2H	Sulfate	mg/L	21302
1/11/2007	2H	Sulfate	mg/L	22700
1/16/2007	2H	Sulfate	mg/L	23700
4/19/2007	2H	Sulfate	mg/L	20101
4/23/2007	2H	Sulfate	mg/L	20192
4/27/2007	2H	Sulfate	mg/L	16500
5/1/2007	2H	Sulfate	mg/L	19352
10/18/2007	2H	Sulfate	mg/L	19394
10/22/2007	2H	Sulfate	mg/L	19693
10/26/2007	2H	Sulfate	mg/L	20100
10/30/2007	2H	Sulfate	mg/L	20649
1/21/2002	2H	Temperature	C	13
1/24/2002	2H	Temperature	C	14
1/28/2002	2H	Temperature	C	14
2/1/2002	2H	Temperature	C	15
2/5/2002	2H	Temperature	C	14
4/4/2002	2H	Temperature	C	14
4/8/2002	2H	Temperature	C	15
4/12/2002	2H	Temperature	C	14
4/16/2002	2H	Temperature	C	15
7/18/2002	2H	Temperature	C	15
7/22/2002	2H	Temperature	C	15
7/26/2002	2H	Temperature	C	15
7/30/2002	2H	Temperature	C	15
10/3/2002	2H	Temperature	C	15
10/7/2002	2H	Temperature	C	15
10/11/2002	2H	Temperature	C	15
10/15/2002	2H	Temperature	C	15
1/16/2003	2H	Temperature	C	14
1/24/2003	2H	Temperature	C	14
1/28/2003	2H	Temperature	C	14
4/3/2003	2H	Temperature	C	12
4/7/2003	2H	Temperature	C	9
4/11/2003	2H	Temperature	C	9
4/15/2003	2H	Temperature	C	11
7/3/2003	2H	Temperature	C	17
7/7/2003	2H	Temperature	C	18
7/11/2003	2H	Temperature	C	19
7/15/2003	2H	Temperature	C	20
10/2/2003	2H	Temperature	C	18
10/6/2003	2H	Temperature	C	19
10/10/2003	2H	Temperature	C	19
10/14/2003	2H	Temperature	C	18.4
1/8/2004	2H	Temperature	C	12
1/12/2004	2H	Temperature	C	12

Sampling Date	Location ID	Analyte	Unit	Concentration
1/16/2004	2H	Temperature	C	11
1/20/2004	2H	Temperature	C	11
4/8/2004	2H	Temperature	C	10
4/12/2004	2H	Temperature	C	10
4/16/2004	2H	Temperature	C	10
6/10/2004	2H	Temperature	C	11
7/15/2004	2H	Temperature	C	18
7/19/2004	2H	Temperature	C	18
7/23/2004	2H	Temperature	C	19
7/27/2004	2H	Temperature	C	20
1/6/2005	2H	Temperature	C	13
1/10/2005	2H	Temperature	C	13
1/14/2005	2H	Temperature	C	13
1/18/2005	2H	Temperature	C	11
4/7/2005	2H	Temperature	C	13
4/11/2005	2H	Temperature	C	11
4/15/2005	2H	Temperature	C	11
4/19/2005	2H	Temperature	C	12
7/7/2005	2H	Temperature	C	17
7/11/2005	2H	Temperature	C	17
7/15/2005	2H	Temperature	C	18
7/19/2005	2H	Temperature	C	17
10/13/2005	2H	Temperature	C	19
10/17/2005	2H	Temperature	C	18
10/21/2005	2H	Temperature	C	18
10/25/2005	2H	Temperature	C	17
1/5/2006	2H	Temperature	C	12
1/9/2006	2H	Temperature	C	12
1/13/2006	2H	Temperature	C	12
1/17/2006	2H	Temperature	C	10
4/6/2006	2H	Temperature	C	10
4/10/2006	2H	Temperature	C	11
4/14/2006	2H	Temperature	C	13
4/18/2006	2H	Temperature	C	11
7/6/2006	2H	Temperature	C	17
7/10/2006	2H	Temperature	C	18
7/14/2006	2H	Temperature	C	19
7/18/2006	2H	Temperature	C	19
10/19/2006	2H	Temperature	C	19
10/23/2006	2H	Temperature	C	17
10/27/2006	2H	Temperature	C	17
10/31/2006	2H	Temperature	C	18
1/4/2007	2H	Temperature	C	14
1/8/2007	2H	Temperature	C	13
1/11/2007	2H	Temperature	C	13
1/16/2007	2H	Temperature	C	13
4/19/2007	2H	Temperature	C	11
4/23/2007	2H	Temperature	C	12
4/27/2007	2H	Temperature	C	11
5/1/2007	2H	Temperature	C	12
7/12/2007	2H	Temperature	C	18
7/12/2007	2H	Temperature	C	17
7/12/2007	2H	Temperature	C	17
7/12/2007	2H	Temperature	C	18
7/16/2007	2H	Temperature	C	18
7/16/2007	2H	Temperature	C	18
7/16/2007	2H	Temperature	C	18
7/16/2007	2H	Temperature	C	18
7/20/2007	2H	Temperature	C	18
7/20/2007	2H	Temperature	C	18
7/20/2007	2H	Temperature	C	18
7/20/2007	2H	Temperature	C	18
7/24/2007	2H	Temperature	C	18
7/24/2007	2H	Temperature	C	18
7/24/2007	2H	Temperature	C	18
7/24/2007	2H	Temperature	C	18
4/3/2008	2H	Temperature	C	19
4/3/2008	2H	Temperature	C	11
4/3/2008	2H	Temperature	C	11
4/3/2008	2H	Temperature	C	11
4/7/2008	2H	Temperature	C	11
4/7/2008	2H	Temperature	C	11
4/7/2008	2H	Temperature	C	11
4/7/2008	2H	Temperature	C	11
4/11/2008	2H	Temperature	C	11
4/11/2008	2H	Temperature	C	12
4/11/2008	2H	Temperature	C	12
4/11/2008	2H	Temperature	C	12
4/15/2008	2H	Temperature	C	12
4/15/2008	2H	Temperature	C	11
4/15/2008	2H	Temperature	C	11
4/15/2008	2H	Temperature	C	12
7/3/2008	2H	Temperature	C	12
7/3/2008	2H	Temperature	C	20
7/3/2008	2H	Temperature	C	19
7/3/2008	2H	Temperature	C	18

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2H	Temperature	C	18
7/3/2008	2H	Temperature	C	18
7/3/2008	2H	Temperature	C	18
7/3/2008	2H	Temperature	C	19
7/3/2008	2H	Temperature	C	20
7/7/2008	2H	Temperature	C	18
7/7/2008	2H	Temperature	C	18
7/7/2008	2H	Temperature	C	18
7/7/2008	2H	Temperature	C	18
7/11/2008	2H	Temperature	C	18
7/11/2008	2H	Temperature	C	19
7/11/2008	2H	Temperature	C	19
7/11/2008	2H	Temperature	C	19
7/15/2008	2H	Temperature	C	18
7/15/2008	2H	Temperature	C	19
7/15/2008	2H	Temperature	C	19
7/15/2008	2H	Temperature	C	19
10/9/2008	2H	Temperature	C	20
10/9/2008	2H	Temperature	C	20
10/9/2008	2H	Temperature	C	20
10/9/2008	2H	Temperature	C	20
10/13/2008	2H	Temperature	C	19
10/13/2008	2H	Temperature	C	19
10/13/2008	2H	Temperature	C	19
10/13/2008	2H	Temperature	C	20
10/17/2008	2H	Temperature	C	18
10/17/2008	2H	Temperature	C	18
10/17/2008	2H	Temperature	C	19
10/17/2008	2H	Temperature	C	19
10/21/2008	2H	Temperature	C	18
10/21/2008	2H	Temperature	C	18
10/21/2008	2H	Temperature	C	18
10/21/2008	2H	Temperature	C	18
1/8/2009	2H	Temperature	C	12
1/8/2009	2H	Temperature	C	12
1/8/2009	2H	Temperature	C	13
1/8/2009	2H	Temperature	C	13
1/12/2009	2H	Temperature	C	12
1/12/2009	2H	Temperature	C	12
1/12/2009	2H	Temperature	C	12
1/12/2009	2H	Temperature	C	12
1/16/2009	2H	Temperature	C	11
1/16/2009	2H	Temperature	C	11
1/16/2009	2H	Temperature	C	11
1/16/2009	2H	Temperature	C	11
1/20/2009	2H	Temperature	C	10
1/20/2009	2H	Temperature	C	10
1/20/2009	2H	Temperature	C	11
1/20/2009	2H	Temperature	C	11
4/9/2009	2H	Temperature	C	11
4/9/2009	2H	Temperature	C	11
4/9/2009	2H	Temperature	C	12
4/9/2009	2H	Temperature	C	12
4/13/2009	2H	Temperature	C	10
4/13/2009	2H	Temperature	C	10
4/13/2009	2H	Temperature	C	10
4/13/2009	2H	Temperature	C	10
4/17/2009	2H	Temperature	C	11
4/17/2009	2H	Temperature	C	11
4/17/2009	2H	Temperature	C	11
4/17/2009	2H	Temperature	C	12
4/21/2009	2H	Temperature	C	11
4/21/2009	2H	Temperature	C	11
4/21/2009	2H	Temperature	C	11
4/21/2009	2H	Temperature	C	12
1/11/2008	2H	Temperature	C	12
1/11/2008	2H	Temperature	C	12
1/11/2008	2H	Temperature	C	13
1/11/2008	2H	Temperature	C	12
1/15/2008	2H	Temperature	C	12
1/15/2008	2H	Temperature	C	12
1/15/2008	2H	Temperature	C	12
1/15/2008	2H	Temperature	C	11
1/3/2008	2H	Temperature	C	13
1/3/2008	2H	Temperature	C	13
1/3/2008	2H	Temperature	C	13
1/3/2008	2H	Temperature	C	14
1/7/2008	2H	Temperature	C	13
1/7/2008	2H	Temperature	C	13
1/7/2008	2H	Temperature	C	13
1/7/2008	2H	Temperature	C	13
10/18/2007	2H	Temperature	C	20.1
10/18/2007	2H	Temperature	C	19.7
10/18/2007	2H	Temperature	C	19.3
10/18/2007	2H	Temperature	C	19.6

Sampling Date	Location ID	Analyte	Unit	Concentration
10/22/2007	2H	Temperature	C	19
10/22/2007	2H	Temperature	C	19
10/22/2007	2H	Temperature	C	19
10/22/2007	2H	Temperature	C	20
10/26/2007	2H	Temperature	C	18
10/26/2007	2H	Temperature	C	18
10/26/2007	2H	Temperature	C	18
10/26/2007	2H	Temperature	C	18
10/30/2007	2H	Temperature	C	18
10/30/2007	2H	Temperature	C	18
10/30/2007	2H	Temperature	C	18
10/30/2007	2H	Temperature	C	18
7/12/2007	2H	tert-Butylbenzene	ug/L	ND
7/12/2007	2H	Tetrachloroethene	ug/L	ND
7/12/2007	2H	Thallium	mg/L	ND
7/12/2007	2H	Toluene	ug/L	7.8
7/12/2007	2H	Total Alkalinity	mg/L	ND
7/12/2007	2H	Total Hardness,Calculation	mg/L	3689
7/12/2007	2H	Total Organic Carbon	mg/L	51.7
7/16/2007	2H	Total Organic Carbon	mg/L	50.4
7/20/2007	2H	Total Organic Carbon	mg/L	51
7/24/2007	2H	Total Organic Carbon	mg/L	48
4/7/2008	2H	Total Organic Carbon	mg/L	34
4/11/2008	2H	Total Organic Carbon	mg/L	32
4/15/2008	2H	Total Organic Carbon	mg/L	32.6
7/3/2008	2H	Total Organic Carbon	mg/L	33
7/3/2008	2H	Total Organic Carbon	mg/L	33
10/9/2008	2H	Total Organic Carbon	mg/L	36
10/13/2008	2H	Total Organic Carbon	mg/L	38
10/17/2008	2H	Total Organic Carbon	mg/L	34.7
10/21/2008	2H	Total Organic Carbon	mg/L	35.9
1/8/2009	2H	Total Organic Carbon	mg/L	36
1/12/2009	2H	Total Organic Carbon	mg/L	39
1/16/2009	2H	Total Organic Carbon	mg/L	38
1/20/2009	2H	Total Organic Carbon	mg/L	39
1/11/2008	2H	Total Organic Carbon	mg/L	30
1/15/2008	2H	Total Organic Carbon	mg/L	34
1/3/2008	2H	Total Organic Carbon	mg/L	36
1/7/2008	2H	Total Organic Carbon	mg/L	28
1/21/2002	2H	Total Organic Carbon	mg/L	24
1/24/2002	2H	Total Organic Carbon	mg/L	4.7
1/28/2002	2H	Total Organic Carbon	mg/L	47
2/1/2002	2H	Total Organic Carbon	mg/L	42
2/5/2002	2H	Total Organic Carbon	mg/L	42
4/4/2002	2H	Total Organic Carbon	mg/L	38
4/8/2002	2H	Total Organic Carbon	mg/L	40
4/12/2002	2H	Total Organic Carbon	mg/L	42
4/16/2002	2H	Total Organic Carbon	mg/L	39
7/18/2002	2H	Total Organic Carbon	mg/L	39
7/22/2002	2H	Total Organic Carbon	mg/L	42
7/26/2002	2H	Total Organic Carbon	mg/L	32
7/30/2002	2H	Total Organic Carbon	mg/L	39
10/3/2002	2H	Total Organic Carbon	mg/L	ND
10/7/2002	2H	Total Organic Carbon	mg/L	29
10/11/2002	2H	Total Organic Carbon	mg/L	ND
10/15/2002	2H	Total Organic Carbon	mg/L	ND
1/16/2003	2H	Total Organic Carbon	mg/L	24
1/24/2003	2H	Total Organic Carbon	mg/L	11
1/28/2003	2H	Total Organic Carbon	mg/L	45.7
4/3/2003	2H	Total Organic Carbon	mg/L	36
4/7/2003	2H	Total Organic Carbon	mg/L	37
4/11/2003	2H	Total Organic Carbon	mg/L	37
4/15/2003	2H	Total Organic Carbon	mg/L	39
7/3/2003	2H	Total Organic Carbon	mg/L	36
7/7/2003	2H	Total Organic Carbon	mg/L	35
7/11/2003	2H	Total Organic Carbon	mg/L	36
7/15/2003	2H	Total Organic Carbon	mg/L	37
10/2/2003	2H	Total Organic Carbon	mg/L	45
10/6/2003	2H	Total Organic Carbon	mg/L	44
10/10/2003	2H	Total Organic Carbon	mg/L	45
10/14/2003	2H	Total Organic Carbon	mg/L	44
1/8/2004	2H	Total Organic Carbon	mg/L	42
1/12/2004	2H	Total Organic Carbon	mg/L	44
1/16/2004	2H	Total Organic Carbon	mg/L	40
1/20/2004	2H	Total Organic Carbon	mg/L	43
4/8/2004	2H	Total Organic Carbon	mg/L	44
4/12/2004	2H	Total Organic Carbon	mg/L	46
4/16/2004	2H	Total Organic Carbon	mg/L	45
6/10/2004	2H	Total Organic Carbon	mg/L	44
7/15/2004	2H	Total Organic Carbon	mg/L	44
7/19/2004	2H	Total Organic Carbon	mg/L	45
7/23/2004	2H	Total Organic Carbon	mg/L	44
7/27/2004	2H	Total Organic Carbon	mg/L	45
1/6/2005	2H	Total Organic Carbon	mg/L	48
1/10/2005	2H	Total Organic Carbon	mg/L	50

Sampling Date	Location ID	Analyte	Unit	Concentration
1/14/2005	2H	Total Organic Carbon	mg/L	47
1/18/2005	2H	Total Organic Carbon	mg/L	47
4/7/2005	2H	Total Organic Carbon	mg/L	6.6
4/11/2005	2H	Total Organic Carbon	mg/L	49
4/15/2005	2H	Total Organic Carbon	mg/L	49
4/19/2005	2H	Total Organic Carbon	mg/L	48
7/7/2005	2H	Total Organic Carbon	mg/L	46
7/11/2005	2H	Total Organic Carbon	mg/L	46
7/15/2005	2H	Total Organic Carbon	mg/L	48
7/19/2005	2H	Total Organic Carbon	mg/L	50
10/13/2005	2H	Total Organic Carbon	mg/L	45
10/17/2005	2H	Total Organic Carbon	mg/L	47
10/21/2005	2H	Total Organic Carbon	mg/L	46
10/25/2005	2H	Total Organic Carbon	mg/L	42
1/5/2006	2H	Total Organic Carbon	mg/L	44.6
1/9/2006	2H	Total Organic Carbon	mg/L	41
1/13/2006	2H	Total Organic Carbon	mg/L	55
1/17/2006	2H	Total Organic Carbon	mg/L	53
4/6/2006	2H	Total Organic Carbon	mg/L	45
4/10/2006	2H	Total Organic Carbon	mg/L	49
4/14/2006	2H	Total Organic Carbon	mg/L	50.6
4/18/2006	2H	Total Organic Carbon	mg/L	54
7/6/2006	2H	Total Organic Carbon	mg/L	45
7/10/2006	2H	Total Organic Carbon	mg/L	43
7/14/2006	2H	Total Organic Carbon	mg/L	44
7/18/2006	2H	Total Organic Carbon	mg/L	46
10/19/2006	2H	Total Organic Carbon	mg/L	42
10/23/2006	2H	Total Organic Carbon	mg/L	42
10/27/2006	2H	Total Organic Carbon	mg/L	42
10/31/2006	2H	Total Organic Carbon	mg/L	42
1/4/2007	2H	Total Organic Carbon	mg/L	2
1/8/2007	2H	Total Organic Carbon	mg/L	35
1/11/2007	2H	Total Organic Carbon	mg/L	44
1/16/2007	2H	Total Organic Carbon	mg/L	42
4/19/2007	2H	Total Organic Carbon	mg/L	49
4/23/2007	2H	Total Organic Carbon	mg/L	59
4/27/2007	2H	Total Organic Carbon	mg/L	48
5/1/2007	2H	Total Organic Carbon	mg/L	58
4/3/2008	2H	Total Organic Carbon	mg/L	35
7/7/2008	2H	Total Organic Carbon	mg/L	36
7/11/2008	2H	Total Organic Carbon	mg/L	38
7/15/2008	2H	Total Organic Carbon	mg/L	31.6
4/9/2009	2H	Total Organic Carbon	mg/L	5.1
4/13/2009	2H	Total Organic Carbon	mg/L	30
4/17/2009	2H	Total Organic Carbon	mg/L	27
4/21/2009	2H	Total Organic Carbon	mg/L	29.7
10/18/2007	2H	Total Organic Carbon	mg/L	48
10/22/2007	2H	Total Organic Carbon	mg/L	51
10/26/2007	2H	Total Organic Carbon	mg/L	50
10/30/2007	2H	Total Organic Carbon	mg/L	49
1/21/2002	2H	Total Organic Halogen	mg/L	0.25
1/24/2002	2H	Total Organic Halogen	mg/L	0.238
1/28/2002	2H	Total Organic Halogen	mg/L	0.267
2/1/2002	2H	Total Organic Halogen	mg/L	0.245
2/5/2002	2H	Total Organic Halogen	mg/L	0.024
4/4/2002	2H	Total Organic Halogen	mg/L	0.212
4/8/2002	2H	Total Organic Halogen	mg/L	0.242
4/12/2002	2H	Total Organic Halogen	mg/L	246
4/16/2002	2H	Total Organic Halogen	mg/L	232
7/18/2002	2H	Total Organic Halogen	mg/L	0.022
7/22/2002	2H	Total Organic Halogen	mg/L	0.024
7/26/2002	2H	Total Organic Halogen	mg/L	0.256
7/30/2002	2H	Total Organic Halogen	mg/L	0.216
10/3/2002	2H	Total Organic Halogen	mg/L	0.266
10/7/2002	2H	Total Organic Halogen	mg/L	0.245
10/11/2002	2H	Total Organic Halogen	mg/L	0.255
10/15/2002	2H	Total Organic Halogen	mg/L	0.084
1/16/2003	2H	Total Organic Halogen	mg/L	ND
1/24/2003	2H	Total Organic Halogen	mg/L	0.033
1/28/2003	2H	Total Organic Halogen	mg/L	0.247
4/3/2003	2H	Total Organic Halogen	mg/L	0.274
4/7/2003	2H	Total Organic Halogen	mg/L	0.23
4/11/2003	2H	Total Organic Halogen	mg/L	0.258
4/15/2003	2H	Total Organic Halogen	mg/L	0.217
7/3/2003	2H	Total Organic Halogen	mg/L	0.239
7/7/2003	2H	Total Organic Halogen	mg/L	0.253
7/11/2003	2H	Total Organic Halogen	mg/L	0.254
7/15/2003	2H	Total Organic Halogen	mg/L	ND
10/2/2003	2H	Total Organic Halogen	mg/L	0.253
10/6/2003	2H	Total Organic Halogen	mg/L	0.246
10/10/2003	2H	Total Organic Halogen	mg/L	0.218
10/14/2003	2H	Total Organic Halogen	mg/L	0.023
1/8/2004	2H	Total Organic Halogen	mg/L	0.276
1/12/2004	2H	Total Organic Halogen	mg/L	0.255
1/16/2004	2H	Total Organic Halogen	mg/L	0.26

Sampling Date	Location ID	Analyte	Unit	Concentration
1/20/2004	2H	Total Organic Halogen	mg/L	0.227
4/8/2004	2H	Total Organic Halogen	mg/L	295
4/12/2004	2H	Total Organic Halogen	mg/L	246
4/16/2004	2H	Total Organic Halogen	mg/L	227
6/10/2004	2H	Total Organic Halogen	mg/L	296
7/15/2004	2H	Total Organic Halogen	mg/L	0.214
7/19/2004	2H	Total Organic Halogen	mg/L	0.161
7/23/2004	2H	Total Organic Halogen	mg/L	0.183
7/27/2004	2H	Total Organic Halogen	mg/L	0.263
1/6/2005	2H	Total Organic Halogen	mg/L	0.284
1/10/2005	2H	Total Organic Halogen	mg/L	0.237
1/14/2005	2H	Total Organic Halogen	mg/L	0.282
1/18/2005	2H	Total Organic Halogen	mg/L	0.28
4/7/2005	2H	Total Organic Halogen	mg/L	0.075
4/11/2005	2H	Total Organic Halogen	mg/L	0.362
4/15/2005	2H	Total Organic Halogen	mg/L	0.253
4/19/2005	2H	Total Organic Halogen	mg/L	0.236
7/7/2005	2H	Total Organic Halogen	mg/L	0.133
7/11/2005	2H	Total Organic Halogen	mg/L	0.2
7/15/2005	2H	Total Organic Halogen	mg/L	0.339
7/19/2005	2H	Total Organic Halogen	mg/L	0.298
10/13/2005	2H	Total Organic Halogen	mg/L	0.366
10/17/2005	2H	Total Organic Halogen	mg/L	0.282
10/21/2005	2H	Total Organic Halogen	mg/L	0.292
10/25/2005	2H	Total Organic Halogen	mg/L	0.307
1/5/2006	2H	Total Organic Halogen	mg/L	0.277
1/9/2006	2H	Total Organic Halogen	mg/L	0.309
1/13/2006	2H	Total Organic Halogen	mg/L	0.256
1/17/2006	2H	Total Organic Halogen	mg/L	ND
4/6/2006	2H	Total Organic Halogen	mg/L	0.281
4/10/2006	2H	Total Organic Halogen	mg/L	0.285
4/14/2006	2H	Total Organic Halogen	mg/L	0.349
4/18/2006	2H	Total Organic Halogen	mg/L	0.285
7/6/2006	2H	Total Organic Halogen	mg/L	0.304
7/10/2006	2H	Total Organic Halogen	mg/L	0.273
7/14/2006	2H	Total Organic Halogen	mg/L	0.296
7/18/2006	2H	Total Organic Halogen	mg/L	0.28
10/19/2006	2H	Total Organic Halogen	mg/L	0.162
10/23/2006	2H	Total Organic Halogen	mg/L	0.162
10/27/2006	2H	Total Organic Halogen	mg/L	0.156
10/31/2006	2H	Total Organic Halogen	mg/L	0.166
1/4/2007	2H	Total Organic Halogen	mg/L	0.181
1/8/2007	2H	Total Organic Halogen	mg/L	0.195
1/11/2007	2H	Total Organic Halogen	mg/L	0.194
1/16/2007	2H	Total Organic Halogen	mg/L	0.147
4/19/2007	2H	Total Organic Halogen	mg/L	0.2
4/23/2007	2H	Total Organic Halogen	mg/L	0.6
4/27/2007	2H	Total Organic Halogen	mg/L	0.1
5/1/2007	2H	Total Organic Halogen	mg/L	0.3
7/12/2007	2H	Total Organic Halogen	mg/L	0.4
7/16/2007	2H	Total Organic Halogen	mg/L	0.4
7/20/2007	2H	Total Organic Halogen	mg/L	0.33
7/24/2007	2H	Total Organic Halogen	mg/L	0.32
4/3/2008	2H	Total Organic Halogen	mg/L	0.28
4/7/2008	2H	Total Organic Halogen	mg/L	0.30
4/11/2008	2H	Total Organic Halogen	mg/L	0.05
4/15/2008	2H	Total Organic Halogen	mg/L	0.33
7/3/2008	2H	Total Organic Halogen	mg/L	1.7
7/3/2008	2H	Total Organic Halogen	mg/L	1.7
7/7/2008	2H	Total Organic Halogen	mg/L	0.19
7/11/2008	2H	Total Organic Halogen	mg/L	0.22
7/15/2008	2H	Total Organic Halogen	mg/L	0.29
10/9/2008	2H	Total Organic Halogen	mg/L	ND
10/13/2008	2H	Total Organic Halogen	mg/L	0.5
10/17/2008	2H	Total Organic Halogen	mg/L	0.4
10/21/2008	2H	Total Organic Halogen	mg/L	0.6
1/8/2009	2H	Total Organic Halogen	mg/L	0.51
1/12/2009	2H	Total Organic Halogen	mg/L	0.44
1/16/2009	2H	Total Organic Halogen	mg/L	0.3
1/20/2009	2H	Total Organic Halogen	mg/L	0.3
1/11/2008	2H	Total Organic Halogen	mg/L	0.3
1/15/2008	2H	Total Organic Halogen	mg/L	0.26
1/3/2008	2H	Total Organic Halogen	mg/L	0.29
1/7/2008	2H	Total Organic Halogen	mg/L	0.31
10/18/2007	2H	Total Organic Halogen	mg/L	0.26
10/22/2007	2H	Total Organic Halogen	mg/L	0.33
10/26/2007	2H	Total Organic Halogen	mg/L	0.4
10/30/2007	2H	Total Organic Halogen	mg/L	0.42
4/9/2009	2H	Total Organic Halogen	mg/L	0.23
4/13/2009	2H	Total Organic Halogen	mg/L	0.59
4/17/2009	2H	Total Organic Halogen	mg/L	ND
4/21/2009	2H	Total Organic Halogen	mg/L	0.064
7/12/2007	2H	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2H	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2H	trans-1,4-Dichloro-2-butene	ug/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2H	Trichloroethene	ug/L	ND
7/12/2007	2H	Trichlorofluoromethane	ug/L	ND
1/21/2002	2H	Turbidity	NTU	91
1/24/2002	2H	Turbidity	NTU	64
1/28/2002	2H	Turbidity	NTU	71
2/1/2002	2H	Turbidity	NTU	77
2/5/2002	2H	Turbidity	NTU	76
4/4/2002	2H	Turbidity	NTU	150
4/8/2002	2H	Turbidity	NTU	72
4/12/2002	2H	Turbidity	NTU	56
4/16/2002	2H	Turbidity	NTU	56
7/18/2002	2H	Turbidity	NTU	62
7/22/2002	2H	Turbidity	NTU	48
7/26/2002	2H	Turbidity	NTU	62
7/30/2002	2H	Turbidity	NTU	57
10/3/2002	2H	Turbidity	NTU	48
10/7/2002	2H	Turbidity	NTU	98
10/11/2002	2H	Turbidity	NTU	75
10/15/2002	2H	Turbidity	NTU	30
1/16/2003	2H	Turbidity	NTU	89
1/24/2003	2H	Turbidity	NTU	218
1/28/2003	2H	Turbidity	NTU	54
4/3/2003	2H	Turbidity	NTU	145
4/7/2003	2H	Turbidity	NTU	110
4/11/2003	2H	Turbidity	NTU	7.4
4/15/2003	2H	Turbidity	NTU	142
7/3/2003	2H	Turbidity	NTU	71
7/7/2003	2H	Turbidity	NTU	48
7/11/2003	2H	Turbidity	NTU	40
7/15/2003	2H	Turbidity	NTU	48
10/2/2003	2H	Turbidity	NTU	49
10/6/2003	2H	Turbidity	NTU	39
10/10/2003	2H	Turbidity	NTU	18
10/14/2003	2H	Turbidity	NTU	23
1/8/2004	2H	Turbidity	NTU	230
1/12/2004	2H	Turbidity	NTU	47
1/16/2004	2H	Turbidity	NTU	21
1/20/2004	2H	Turbidity	NTU	18
4/8/2004	2H	Turbidity	NTU	78
4/12/2004	2H	Turbidity	NTU	47
4/16/2004	2H	Turbidity	NTU	21
6/10/2004	2H	Turbidity	NTU	27
7/15/2004	2H	Turbidity	NTU	43
7/19/2004	2H	Turbidity	NTU	46
7/23/2004	2H	Turbidity	NTU	26
7/27/2004	2H	Turbidity	NTU	41
1/6/2005	2H	Turbidity	NTU	64
1/10/2005	2H	Turbidity	NTU	34
1/14/2005	2H	Turbidity	NTU	15
1/18/2005	2H	Turbidity	NTU	11
4/7/2005	2H	Turbidity	NTU	103
4/11/2005	2H	Turbidity	NTU	20
4/15/2005	2H	Turbidity	NTU	18
4/19/2005	2H	Turbidity	NTU	27
7/7/2005	2H	Turbidity	NTU	53
7/11/2005	2H	Turbidity	NTU	48
7/15/2005	2H	Turbidity	NTU	29
7/19/2005	2H	Turbidity	NTU	36
10/13/2005	2H	Turbidity	NTU	47
10/17/2005	2H	Turbidity	NTU	42
10/21/2005	2H	Turbidity	NTU	28
10/25/2005	2H	Turbidity	NTU	19
1/5/2006	2H	Turbidity	NTU	79
1/9/2006	2H	Turbidity	NTU	44
1/13/2006	2H	Turbidity	NTU	14
1/17/2006	2H	Turbidity	NTU	18
4/6/2006	2H	Turbidity	NTU	52
4/10/2006	2H	Turbidity	NTU	60
4/14/2006	2H	Turbidity	NTU	20
4/18/2006	2H	Turbidity	NTU	48
7/6/2006	2H	Turbidity	NTU	54
7/10/2006	2H	Turbidity	NTU	49
7/14/2006	2H	Turbidity	NTU	30
7/18/2006	2H	Turbidity	NTU	34
10/19/2006	2H	Turbidity	NTU	75
10/23/2006	2H	Turbidity	NTU	41
10/27/2006	2H	Turbidity	NTU	29
10/31/2006	2H	Turbidity	NTU	38
1/4/2007	2H	Turbidity	NTU	52
1/8/2007	2H	Turbidity	NTU	49
1/11/2007	2H	Turbidity	NTU	28
1/16/2007	2H	Turbidity	NTU	38
4/19/2007	2H	Turbidity	NTU	12
4/23/2007	2H	Turbidity	NTU	12
4/27/2007	2H	Turbidity	NTU	14

Sampling Date	Location ID	Analyte	Unit	Concentration
5/1/2007	2H	Turbidity	NTU	38
7/12/2007	2H	Turbidity	NTU	37
7/16/2007	2H	Turbidity	NTU	27
7/20/2007	2H	Turbidity	NTU	31
7/24/2007	2H	Turbidity	NTU	34
4/3/2008	2H	Turbidity	NTU	41
4/7/2008	2H	Turbidity	NTU	30
4/11/2008	2H	Turbidity	NTU	17
4/15/2008	2H	Turbidity	NTU	33
7/3/2008	2H	Turbidity	NTU	40
7/3/2008	2H	Turbidity	NTU	40
7/7/2008	2H	Turbidity	NTU	27
7/11/2008	2H	Turbidity	NTU	46
7/15/2008	2H	Turbidity	NTU	49.5
10/9/2008	2H	Turbidity	NTU	54
10/13/2008	2H	Turbidity	NTU	18
10/17/2008	2H	Turbidity	NTU	16
10/21/2008	2H	Turbidity	NTU	15
1/8/2009	2H	Turbidity	NTU	44
1/12/2009	2H	Turbidity	NTU	12
1/16/2009	2H	Turbidity	NTU	13
1/20/2009	2H	Turbidity	NTU	9.3
4/9/2009	2H	Turbidity	NTU	38
4/13/2009	2H	Turbidity	NTU	35
4/17/2009	2H	Turbidity	NTU	16
4/21/2009	2H	Turbidity	NTU	40
1/11/2008	2H	Turbidity	NTU	13
1/15/2008	2H	Turbidity	NTU	22
1/3/2008	2H	Turbidity	NTU	20
1/7/2008	2H	Turbidity	NTU	10
10/18/2007	2H	Turbidity	NTU	17
10/22/2007	2H	Turbidity	NTU	24
10/26/2007	2H	Turbidity	NTU	18
10/30/2007	2H	Turbidity	NTU	21
7/12/2007	2H	Vanadium	mg/L	ND
7/12/2007	2H	Vinyl Acetate	ug/L	ND
7/12/2007	2H	Vinyl Chloride	ug/L	ND
7/12/2007	2H	Xylenes, Total	ug/L	13.5
7/12/2007	2H	Zinc	mg/L	ND
Location ID:		**2HDUP**		
Number of Sampling Dates:		**33**		
7/12/2007	2HDUP	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	2HDUP	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	2HDUP	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	2HDUP	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	2HDUP	1,1-Dichloroethane	ug/L	13.4
7/12/2007	2HDUP	1,1-Dichloroethene	ug/L	ND
7/12/2007	2HDUP	1,1-Dichloropropene	ug/L	ND
7/12/2007	2HDUP	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	2HDUP	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	2HDUP	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	2HDUP	1,2,4-Trimethylbenzene	ug/L	2.2
7/12/2007	2HDUP	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	2HDUP	1,2-Dibromoethane	ug/L	ND
7/12/2007	2HDUP	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	2HDUP	1,2-Dichloroethane	ug/L	ND
7/12/2007	2HDUP	1,2-Dichloropropane	ug/L	ND
7/12/2007	2HDUP	1,3,5-Trimethylbenzene	ug/L	2.5
7/12/2007	2HDUP	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	2HDUP	1,3-Dichloropropane	ug/L	ND
7/12/2007	2HDUP	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	2HDUP	2,2-Dichloropropane	ug/L	ND
7/12/2007	2HDUP	2-Butanone (MEK)	ug/L	93.1
7/12/2007	2HDUP	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	2HDUP	2-Chlorotoluene	ug/L	ND
7/12/2007	2HDUP	2-Hexanone	ug/L	ND
7/12/2007	2HDUP	3-Chloro-1-propene	ug/L	ND
7/12/2007	2HDUP	4-Chlorotoluene	ug/L	ND
7/12/2007	2HDUP	4-Isopropyltoluene	ug/L	5.4
7/12/2007	2HDUP	4-Methyl-2-Pentanone (MIBK)	ug/L	133
7/12/2007	2HDUP	Acetone	ug/L	236
7/12/2007	2HDUP	Acrolein	ug/L	ND
7/12/2007	2HDUP	Acrylonitrile	ug/L	ND
7/12/2007	2HDUP	Alkalinity	mg/L	ND
7/12/2007	2HDUP	Ammonia	mg/L	79.1
7/12/2007	2HDUP	Antimony	mg/L	ND
7/12/2007	2HDUP	Arsenic	mg/L	ND
1/6/2005	2HDUP	Barium	mg/L	0.063
1/10/2005	2HDUP	Barium	mg/L	0.065
4/7/2005	2HDUP	Barium	mg/L	0.058
4/19/2005	2HDUP	Barium	mg/L	0.048
7/7/2005	2HDUP	Barium	mg/L	0.008
7/19/2005	2HDUP	Barium	mg/L	0.018
10/17/2005	2HDUP	Barium	mg/L	0.068
10/21/2005	2HDUP	Barium	mg/L	0.054

Sampling Date	Location ID	Analyte	Unit	Concentration
10/25/2005	2HDUP	Barium	mg/L	0.058
1/5/2006	2HDUP	Barium	mg/L	0.005
1/17/2006	2HDUP	Barium	mg/L	0.018
4/6/2006	2HDUP	Barium	mg/L	0.059
4/14/2006	2HDUP	Barium	mg/L	0.051
7/6/2006	2HDUP	Barium	mg/L	ND
7/18/2006	2HDUP	Barium	mg/L	0.007
7/18/2006	2HDUP	Barium	mg/L	0.03
10/19/2006	2HDUP	Barium	mg/L	0.009
10/23/2006	2HDUP	Barium	mg/L	0.013
1/4/2007	2HDUP	Barium	mg/L	0.011
1/16/2007	2HDUP	Barium	mg/L	0.009
4/19/2007	2HDUP	Barium	mg/L	0.006
4/27/2007	2HDUP	Barium	mg/L	0.008
5/1/2007	2HDUP	Barium	mg/L	0.007
7/12/2007	2HDUP	Barium	mg/L	ND
7/24/2007	2HDUP	Barium	mg/L	0.015
4/3/2008	2HDUP	Barium	mg/L	0.081
4/15/2008	2HDUP	Barium	mg/L	ND
7/3/2008	2HDUP	Barium	mg/L	0.038
7/3/2008	2HDUP	Barium	mg/L	0.038
7/11/2008	2HDUP	Barium	mg/L	ND
10/9/2008	2HDUP	Barium	mg/L	0.016
10/17/2008	2HDUP	Barium	mg/L	0.036
10/21/2008	2HDUP	Barium	mg/L	0.046
1/8/2009	2HDUP	Barium	mg/L	0.015
1/12/2009	2HDUP	Barium	mg/L	0.016
1/20/2009	2HDUP	Barium	mg/L	0.014
4/9/2009	2HDUP	Barium	mg/L	0.021
4/13/2009	2HDUP	Barium	mg/L	0.023
4/17/2009	2HDUP	Barium	mg/L	0.022
4/21/2009	2HDUP	Barium	mg/L	0.021
1/15/2008	2HDUP	Barium	mg/L	0.049
1/3/2008	2HDUP	Barium	mg/L	0.014
10/22/2007	2HDUP	Barium	mg/L	ND
10/26/2007	2HDUP	Barium	mg/L	0.051
10/30/2007	2HDUP	Barium	mg/L	ND
7/12/2007	2HDUP	Benzene	ug/L	6.8
7/12/2007	2HDUP	Beryllium	mg/L	ND
7/12/2007	2HDUP	BOD	mg/L	56
7/12/2007	2HDUP	Bromobenzene	ug/L	ND
7/12/2007	2HDUP	Bromochloromethane	ug/L	ND
7/12/2007	2HDUP	Bromodichloromethane	ug/L	ND
7/12/2007	2HDUP	Bromoform	ug/L	ND
7/12/2007	2HDUP	Bromomethane	ug/L	ND
7/12/2007	2HDUP	Cadmium	mg/L	ND
7/12/2007	2HDUP	Calcium	mg/L	318
7/12/2007	2HDUP	Carbon Disulfide	ug/L	18.9
7/12/2007	2HDUP	Carbon Tetrachloride	ug/L	ND
7/12/2007	2HDUP	Chemical Oxygen Demand	mg/L	1339
1/6/2005	2HDUP	Chloride	mg/L	550
1/10/2005	2HDUP	Chloride	mg/L	29.9
4/7/2005	2HDUP	Chloride	mg/L	723
4/7/2005	2HDUP	Chloride	mg/L	723
4/19/2005	2HDUP	Chloride	mg/L	691
7/7/2005	2HDUP	Chloride	mg/L	746
7/19/2005	2HDUP	Chloride	mg/L	814
10/17/2005	2HDUP	Chloride	mg/L	758
10/21/2005	2HDUP	Chloride	mg/L	667
10/25/2005	2HDUP	Chloride	mg/L	688
1/5/2006	2HDUP	Chloride	mg/L	761
1/17/2006	2HDUP	Chloride	mg/L	770
4/6/2006	2HDUP	Chloride	mg/L	824
4/14/2006	2HDUP	Chloride	mg/L	724
7/6/2006	2HDUP	Chloride	mg/L	839
7/18/2006	2HDUP	Chloride	mg/L	745
10/19/2006	2HDUP	Chloride	mg/L	767
10/23/2006	2HDUP	Chloride	mg/L	785
1/4/2007	2HDUP	Chloride	mg/L	2961
1/16/2007	2HDUP	Chloride	mg/L	718
4/19/2007	2HDUP	Chloride	mg/L	702
4/27/2007	2HDUP	Chloride	mg/L	712
5/1/2007	2HDUP	Chloride	mg/L	961
7/12/2007	2HDUP	Chloride	mg/L	721
7/24/2007	2HDUP	Chloride	mg/L	899
4/3/2008	2HDUP	Chloride	mg/L	737
4/15/2008	2HDUP	Chloride	mg/L	774
7/3/2008	2HDUP	Chloride	mg/L	695
7/3/2008	2HDUP	Chloride	mg/L	695
7/11/2008	2HDUP	Chloride	mg/L	693
1/8/2009	2HDUP	Chloride	mg/L	638
1/12/2009	2HDUP	Chloride	mg/L	683
1/20/2009	2HDUP	Chloride	mg/L	727
4/9/2009	2HDUP	Chloride	mg/L	703
4/13/2009	2HDUP	Chloride	mg/L	789

Sampling Date	Location ID	Analyte	Unit	Concentration
4/17/2009	2HDUP	Chloride	mg/L	594
4/21/2009	2HDUP	Chloride	mg/L	716
1/15/2008	2HDUP	Chloride	mg/L	755
1/3/2008	2HDUP	Chloride	mg/L	740
10/22/2007	2HDUP	Chloride	mg/L	814
10/26/2007	2HDUP	Chloride	mg/L	675
10/30/2007	2HDUP	Chloride	mg/L	708
7/12/2007	2HDUP	Chlorobenzene	ug/L	ND
7/12/2007	2HDUP	Chloroethane	ug/L	ND
7/12/2007	2HDUP	Chloroform	ug/L	ND
7/12/2007	2HDUP	Chloromethane	ug/L	ND
1/6/2005	2HDUP	Chromium	mg/L	0.061
1/10/2005	2HDUP	Chromium	mg/L	0.06
4/7/2005	2HDUP	Chromium	mg/L	0.019
4/19/2005	2HDUP	Chromium	mg/L	ND
7/7/2005	2HDUP	Chromium	mg/L	0.046
7/19/2005	2HDUP	Chromium	mg/L	ND
10/17/2005	2HDUP	Chromium	mg/L	0.034
10/21/2005	2HDUP	Chromium	mg/L	0.039
10/25/2005	2HDUP	Chromium	mg/L	0.046
1/5/2006	2HDUP	Chromium	mg/L	0.038
1/17/2006	2HDUP	Chromium	mg/L	0.037
4/6/2006	2HDUP	Chromium	mg/L	0.064
4/14/2006	2HDUP	Chromium	mg/L	0.061
7/6/2006	2HDUP	Chromium	mg/L	ND
7/18/2006	2HDUP	Chromium	mg/L	0.047
7/18/2006	2HDUP	Chromium	mg/L	0.021
10/19/2006	2HDUP	Chromium	mg/L	0.04
10/23/2006	2HDUP	Chromium	mg/L	0.04
1/4/2007	2HDUP	Chromium	mg/L	0.038
1/16/2007	2HDUP	Chromium	mg/L	0.042
4/19/2007	2HDUP	Chromium	mg/L	0.042
4/27/2007	2HDUP	Chromium	mg/L	0.043
5/1/2007	2HDUP	Chromium	mg/L	0.035
7/12/2007	2HDUP	Chromium	mg/L	0.067
7/24/2007	2HDUP	Chromium	mg/L	0.04
4/3/2008	2HDUP	Chromium	mg/L	ND
4/15/2008	2HDUP	Chromium	mg/L	0.046
7/3/2008	2HDUP	Chromium	mg/L	0.038
7/3/2008	2HDUP	Chromium	mg/L	0.038
7/11/2008	2HDUP	Chromium	mg/L	0.048
10/9/2008	2HDUP	Chromium	mg/L	0.020
10/17/2008	2HDUP	Chromium	mg/L	0.024
10/21/2008	2HDUP	Chromium	mg/L	0.028
1/8/2009	2HDUP	Chromium	mg/L	0.020
1/12/2009	2HDUP	Chromium	mg/L	0.016
1/20/2009	2HDUP	Chromium	mg/L	ND
4/9/2009	2HDUP	Chromium	mg/L	0.032
4/13/2009	2HDUP	Chromium	mg/L	0.039
4/17/2009	2HDUP	Chromium	mg/L	0.033
4/21/2009	2HDUP	Chromium	mg/L	0.023
1/15/2008	2HDUP	Chromium	mg/L	0.035
1/3/2008	2HDUP	Chromium	mg/L	0.047
1/6/2005	2HDUP	Chromium, hexavalent	mg/l	ND
1/10/2005	2HDUP	Chromium, hexavalent	mg/l	ND
4/7/2005	2HDUP	Chromium, hexavalent	mg/l	ND
4/19/2005	2HDUP	Chromium, hexavalent	mg/l	ND
7/7/2005	2HDUP	Chromium, hexavalent	mg/l	ND
7/19/2005	2HDUP	Chromium, hexavalent	mg/l	ND
10/17/2005	2HDUP	Chromium, hexavalent	mg/l	ND
10/21/2005	2HDUP	Chromium, hexavalent	mg/l	ND
10/25/2005	2HDUP	Chromium, hexavalent	mg/l	ND
1/5/2006	2HDUP	Chromium, hexavalent	mg/l	ND
1/17/2006	2HDUP	Chromium, hexavalent	mg/l	ND
4/6/2006	2HDUP	Chromium, hexavalent	mg/l	ND
4/14/2006	2HDUP	Chromium, hexavalent	mg/l	ND
7/6/2006	2HDUP	Chromium, hexavalent	mg/l	ND
7/18/2006	2HDUP	Chromium, hexavalent	mg/l	ND
10/19/2006	2HDUP	Chromium, hexavalent	mg/l	-0.01
10/23/2006	2HDUP	Chromium, hexavalent	mg/l	ND
1/4/2007	2HDUP	Chromium, hexavalent	mg/l	ND
1/16/2007	2HDUP	Chromium, hexavalent	mg/l	ND
4/19/2007	2HDUP	Chromium, hexavalent	mg/l	ND
4/27/2007	2HDUP	Chromium, hexavalent	mg/l	ND
5/1/2007	2HDUP	Chromium, hexavalent	mg/l	0.07
7/12/2007	2HDUP	Chromium, hexavalent	mg/L	ND
7/24/2007	2HDUP	Chromium, hexavalent	mg/L	ND
4/3/2008	2HDUP	Chromium, Hexavalent	mg/L	ND
4/15/2008	2HDUP	Chromium, hexavalent	mg/L	ND
7/3/2008	2HDUP	Chromium, Hexavalent	mg/L	ND
7/3/2008	2HDUP	Chromium, Hexavalent	mg/L	ND
7/11/2008	2HDUP	Chromium, Hexavalent	mg/L	ND
10/9/2008	2HDUP	Chromium, hexavalent	mg/L	ND
10/17/2008	2HDUP	Chromium, hexavalent	mg/L	ND
10/21/2008	2HDUP	Chromium, hexavalent	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2009	2HDUP	Chromium, hexavalent	mg/L	ND
1/12/2009	2HDUP	Chromium, hexavalent	mg/L	ND
1/20/2009	2HDUP	Chromium, hexavalent	mg/L	ND
4/9/2009	2HDUP	Chromium, hexavalent	mg/L	ND
4/13/2009	2HDUP	Chromium, hexavalent	mg/L	ND
4/17/2009	2HDUP	Chromium, hexavalent	mg/L	ND
4/21/2009	2HDUP	Chromium, hexavalent	mg/L	ND
1/15/2008	2HDUP	Chromium, hexavalent	mg/L	ND
1/3/2008	2HDUP	Chromium, hexavalent	mg/L	ND
10/22/2007	2HDUP	Chromium, hexavalent	mg/L	ND
10/26/2007	2HDUP	Chromium, hexavalent	mg/L	ND
10/30/2007	2HDUP	Chromium, hexavalent	mg/L	ND
10/22/2007	2HDUP	Chromium, ICP	mg/L	0.038
10/26/2007	2HDUP	Chromium, ICP	mg/L	0.051
10/30/2007	2HDUP	Chromium, ICP	mg/L	0.043
7/12/2007	2HDUP	cis-1,2-Dichloroethene	ug/L	2.5
7/12/2007	2HDUP	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	2HDUP	Cobalt	mg/L	ND
7/12/2007	2HDUP	Copper	mg/L	ND
7/12/2007	2HDUP	Cyanide	mg/L	ND
7/12/2007	2HDUP	Dibromochloromethane	ug/L	ND
7/12/2007	2HDUP	Dibromomethane	ug/L	ND
7/12/2007	2HDUP	Dichlorodifluoromethane	ug/L	ND
7/12/2007	2HDUP	Dichloromethane (MeCl2)	ug/L	12.4
7/12/2007	2HDUP	Ethylbenzene	ug/L	2.5
7/12/2007	2HDUP	Hexachlorobutadiene	ug/L	ND
1/6/2005	2HDUP	Iron	mg/L	8108
1/10/2005	2HDUP	Iron	mg/L	7728
4/7/2005	2HDUP	Iron	mg/L	8340
4/19/2005	2HDUP	Iron	mg/L	7235
7/7/2005	2HDUP	Iron	mg/L	8838
7/19/2005	2HDUP	Iron	mg/L	9952
10/17/2005	2HDUP	Iron	mg/L	8460
10/21/2005	2HDUP	Iron	mg/L	7879
10/21/2005	2HDUP	Iron	mg/L	7879
10/25/2005	2HDUP	Iron	mg/L	8633
10/25/2005	2HDUP	Iron	mg/L	8633
1/5/2006	2HDUP	Iron	mg/L	8015
1/17/2006	2HDUP	Iron	mg/L	8284
4/6/2006	2HDUP	Iron	mg/L	8533
4/14/2006	2HDUP	Iron	mg/L	7318
7/6/2006	2HDUP	Iron	mg/L	10114
7/18/2006	2HDUP	Iron	mg/L	10.1
7/18/2006	2HDUP	Iron	mg/L	9332
10/19/2006	2HDUP	Iron	mg/L	5295
10/23/2006	2HDUP	Iron	mg/L	6536
1/4/2007	2HDUP	Iron	mg/L	8158
1/16/2007	2HDUP	Iron	mg/L	8674
4/19/2007	2HDUP	Iron	mg/L	8241
4/27/2007	2HDUP	Iron	mg/L	7633
5/1/2007	2HDUP	Iron	mg/L	8835
7/12/2007	2HDUP	Iron	mg/L	7879
7/24/2007	2HDUP	Iron	mg/L	7280
4/3/2008	2HDUP	Iron	mg/L	6166
4/15/2008	2HDUP	Iron	mg/L	7233
7/3/2008	2HDUP	Iron	mg/L	5824
7/3/2008	2HDUP	Iron	mg/L	5824
7/11/2008	2HDUP	Iron	mg/L	6086
1/8/2009	2HDUP	Iron	mg/L	4664
1/12/2009	2HDUP	Iron	mg/L	5105
1/20/2009	2HDUP	Iron	mg/L	5451
4/9/2009	2HDUP	Iron	mg/L	4448
4/13/2009	2HDUP	Iron	mg/L	4993
4/17/2009	2HDUP	Iron	mg/L	6087
4/21/2009	2HDUP	Iron	mg/L	5156
1/15/2008	2HDUP	Iron	mg/L	5400
1/3/2008	2HDUP	Iron	mg/L	6102
10/22/2007	2HDUP	Iron	mg/L	6643
10/26/2007	2HDUP	Iron	mg/L	7350
10/30/2007	2HDUP	Iron	mg/L	7023
7/12/2007	2HDUP	Isopropylbenzene	ug/L	2.3
7/12/2007	2HDUP	Lead	mg/L	ND
7/12/2007	2HDUP	m,p-Xylene	ug/L	5.6
7/12/2007	2HDUP	Magnesium	mg/L	664
1/6/2005	2HDUP	Manganese	mg/L	223
1/10/2005	2HDUP	Manganese	mg/L	241
4/7/2005	2HDUP	Manganese	mg/L	238
4/19/2005	2HDUP	Manganese	mg/L	207
7/7/2005	2HDUP	Manganese	mg/L	269
7/19/2005	2HDUP	Manganese	mg/L	282
10/17/2005	2HDUP	Manganese	mg/L	233
10/21/2005	2HDUP	Manganese	mg/L	218
10/25/2005	2HDUP	Manganese	mg/L	256
1/5/2006	2HDUP	Manganese	mg/L	247
1/17/2006	2HDUP	Manganese	mg/L	241

Sampling Date	Location ID	Analyte	Unit	Concentration
4/6/2006	2HDUP	Manganese	mg/L	241
4/14/2006	2HDUP	Manganese	mg/L	209
7/6/2006	2HDUP	Manganese	mg/L	50.5
7/18/2006	2HDUP	Manganese	mg/L	266
7/18/2006	2HDUP	Manganese	mg/L	0.16
10/19/2006	2HDUP	Manganese	mg/L	175
10/23/2006	2HDUP	Manganese	mg/L	209
1/4/2007	2HDUP	Manganese	mg/L	235
1/16/2007	2HDUP	Manganese	mg/L	192
4/19/2007	2HDUP	Manganese	mg/L	211
4/27/2007	2HDUP	Manganese	mg/L	3.85
5/1/2007	2HDUP	Manganese	mg/L	261
7/12/2007	2HDUP	Manganese	mg/L	216
7/24/2007	2HDUP	Manganese	mg/L	251
4/3/2008	2HDUP	Manganese	mg/L	218
4/15/2008	2HDUP	Manganese	mg/L	211
7/3/2008	2HDUP	Manganese	mg/L	213
7/3/2008	2HDUP	Manganese	mg/L	213
7/11/2008	2HDUP	Manganese	mg/L	ND
10/9/2008	2HDUP	Manganese	mg/L	190
10/17/2008	2HDUP	Manganese	mg/L	192
10/21/2008	2HDUP	Manganese	mg/L	174
1/8/2009	2HDUP	Manganese	mg/L	155
1/12/2009	2HDUP	Manganese	mg/L	190
1/20/2009	2HDUP	Manganese	mg/L	191
4/9/2009	2HDUP	Manganese	mg/L	138
4/13/2009	2HDUP	Manganese	mg/L	189
4/17/2009	2HDUP	Manganese	mg/L	196
4/21/2009	2HDUP	Manganese	mg/L	170
1/15/2008	2HDUP	Manganese	mg/L	186
1/3/2008	2HDUP	Manganese	mg/L	190
10/22/2007	2HDUP	Manganese	mg/L	ND
10/26/2007	2HDUP	Manganese	mg/L	233
10/30/2007	2HDUP	Manganese	mg/L	224
7/12/2007	2HDUP	Mercury	mg/L	ND
7/12/2007	2HDUP	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	2HDUP	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	2HDUP	Naphthalene	ug/L	4.9
7/12/2007	2HDUP	n-Butylbenzene	ug/L	ND
7/12/2007	2HDUP	Nickel	mg/L	ND
7/12/2007	2HDUP	Nitrate	mg/L	ND
7/12/2007	2HDUP	Nitrate/Nitrite	mg/L	ND
7/12/2007	2HDUP	Nitrite	mg/L	ND
7/12/2007	2HDUP	n-Propylbenzene	ug/L	ND
7/12/2007	2HDUP	o-Xylene	ug/L	9.1
1/6/2005	2HDUP	pH	pH	3.57
1/10/2005	2HDUP	pH	pH	3.8
4/7/2005	2HDUP	pH	pH	3.62
4/19/2005	2HDUP	pH	pH	3.74
7/7/2005	2HDUP	pH	pH	3.37
7/19/2005	2HDUP	pH	pH	3.5
10/17/2005	2HDUP	pH	pH	3.53
10/21/2005	2HDUP	pH	pH	3.57
10/25/2005	2HDUP	pH	pH	3.53
1/5/2006	2HDUP	pH	pH	3.14
1/17/2006	2HDUP	pH	pH	3.07
4/6/2006	2HDUP	pH	pH	3.29
4/14/2006	2HDUP	pH	pH	3.06
7/6/2006	2HDUP	pH	pH	3.39
7/18/2006	2HDUP	pH	pH	3.14
10/19/2006	2HDUP	pH	pH	3.59
10/23/2006	2HDUP	pH	pH	3.6
1/4/2007	2HDUP	pH	pH	3.71
1/16/2007	2HDUP	pH	pH	3.78
4/19/2007	2HDUP	pH	pH	3.62
4/27/2007	2HDUP	pH	pH	3.69
5/1/2007	2HDUP	pH	pH	3.69
7/12/2007	2HDUP	pH	pH	3.69
7/12/2007	2HDUP	pH	pH	3.64
7/12/2007	2HDUP	pH	pH	3.65
7/12/2007	2HDUP	pH	pH	3.76
7/24/2007	2HDUP	pH	pH	3.32
7/24/2007	2HDUP	pH	pH	3.31
7/24/2007	2HDUP	pH	pH	3.32
7/24/2007	2HDUP	pH	pH	3.32
4/3/2008	2HDUP	pH	pH	3.18
4/3/2008	2HDUP	pH	pH	3.26
4/3/2008	2HDUP	pH	pH	3.33
4/3/2008	2HDUP	pH	pH	3.33
4/15/2008	2HDUP	pH	pH	3.52
4/15/2008	2HDUP	pH	pH	3.52
4/15/2008	2HDUP	pH	pH	3.52
4/15/2008	2HDUP	pH	pH	3.53
7/3/2008	2HDUP	pH	pH	3.62
7/3/2008	2HDUP	pH	pH	3.61

Sampling Date	Location ID	Analyte	Unit	Concentration
7/3/2008	2HDUP	pH	pH	3.61
7/3/2008	2HDUP	pH	pH	3.61
7/3/2008	2HDUP	pH	pH	3.61
7/3/2008	2HDUP	pH	pH	3.61
7/3/2008	2HDUP	pH	pH	3.61
7/3/2008	2HDUP	pH	pH	3.62
7/11/2008	2HDUP	pH	pH	3.67
7/11/2008	2HDUP	pH	pH	3.69
7/11/2008	2HDUP	pH	pH	3.7
7/11/2008	2HDUP	pH	pH	3.8
10/9/2008	2HDUP	pH	pH	3.55
10/9/2008	2HDUP	pH	pH	3.56
10/9/2008	2HDUP	pH	pH	3.56
10/9/2008	2HDUP	pH	pH	3.57
10/17/2008	2HDUP	pH	pH	3.14
10/17/2008	2HDUP	pH	pH	3.17
10/17/2008	2HDUP	pH	pH	3.17
10/17/2008	2HDUP	pH	pH	3.17
10/21/2008	2HDUP	pH	pH	3.28
10/21/2008	2HDUP	pH	pH	3.30
10/21/2008	2HDUP	pH	pH	3.30
10/21/2008	2HDUP	pH	pH	3.30
1/8/2009	2HDUP	pH	pH	3.88
1/8/2009	2HDUP	pH	pH	3.90
1/8/2009	2HDUP	pH	pH	3.90
1/8/2009	2HDUP	pH	pH	3.91
1/12/2009	2HDUP	pH	pH	3.87
1/12/2009	2HDUP	pH	pH	3.87
1/12/2009	2HDUP	pH	pH	3.87
1/12/2009	2HDUP	pH	pH	3.87
1/20/2009	2HDUP	pH	pH	3.80
1/20/2009	2HDUP	pH	pH	3.80
1/20/2009	2HDUP	pH	pH	3.80
1/20/2009	2HDUP	pH	pH	3.80
4/9/2009	2HDUP	pH	pH	3.96
4/9/2009	2HDUP	pH	pH	3.98
4/9/2009	2HDUP	pH	pH	3.96
4/9/2009	2HDUP	pH	pH	3.98
4/13/2009	2HDUP	pH	pH	3.92
4/13/2009	2HDUP	pH	pH	3.91
4/13/2009	2HDUP	pH	pH	3.89
4/13/2009	2HDUP	pH	pH	3.91
4/17/2009	2HDUP	pH	pH	3.87
4/17/2009	2HDUP	pH	pH	3.88
4/17/2009	2HDUP	pH	pH	3.88
4/17/2009	2HDUP	pH	pH	3.88
4/21/2009	2HDUP	pH	pH	3.87
4/21/2009	2HDUP	pH	pH	3.86
4/21/2009	2HDUP	pH	pH	3.86
4/21/2009	2HDUP	pH	pH	3.86
1/15/2008	2HDUP	pH	pH	3.67
1/15/2008	2HDUP	pH	pH	3.65
1/15/2008	2HDUP	pH	pH	3.65
1/15/2008	2HDUP	pH	pH	3.67
1/3/2008	2HDUP	pH	pH	3.02
1/3/2008	2HDUP	pH	pH	3.01
1/3/2008	2HDUP	pH	pH	3.03
1/3/2008	2HDUP	pH	pH	3.08
10/22/2007	2HDUP	pH	pH	3.57
10/22/2007	2HDUP	pH	pH	3.58
10/22/2007	2HDUP	pH	pH	3.58
10/22/2007	2HDUP	pH	pH	3.58
10/26/2007	2HDUP	pH	pH	3.3
10/26/2007	2HDUP	pH	pH	3.3
10/26/2007	2HDUP	pH	pH	3.3
10/26/2007	2HDUP	pH	pH	3.3
10/30/2007	2HDUP	pH	pH	3.58
10/30/2007	2HDUP	pH	pH	3.55
10/30/2007	2HDUP	pH	pH	3.54
10/30/2007	2HDUP	pH	pH	3.56
7/12/2007	2HDUP	Phenols	mg/L	ND
1/6/2005	2HDUP	Phenols	mg/L	ND
1/10/2005	2HDUP	Phenols	mg/L	0.15
4/7/2005	2HDUP	Phenols	mg/L	0.11
4/19/2005	2HDUP	Phenols	mg/L	0.06
7/7/2005	2HDUP	Phenols	mg/L	0.08
7/19/2005	2HDUP	Phenols	mg/L	0.08
10/17/2005	2HDUP	Phenols	mg/L	ND
10/21/2005	2HDUP	Phenols	mg/L	ND
10/25/2005	2HDUP	Phenols	mg/L	ND
1/5/2006	2HDUP	Phenols	mg/L	ND
1/17/2006	2HDUP	Phenols	mg/L	0.06
4/6/2006	2HDUP	Phenols	mg/L	0.08
4/14/2006	2HDUP	Phenols	mg/L	0.11
7/6/2006	2HDUP	Phenols	mg/L	0.08

Sampling Date	Location ID	Analyte	Unit	Concentration
7/18/2006	2HDUP	Phenols	mg/L	0.12
10/19/2006	2HDUP	Phenols	mg/L	15.7
10/23/2006	2HDUP	Phenols	mg/L	0.06
1/4/2007	2HDUP	Phenols	mg/L	0.07
1/16/2007	2HDUP	Phenols	mg/L	0.09
4/19/2007	2HDUP	Phenols	mg/L	0.06
4/27/2007	2HDUP	Phenols	mg/L	0.07
5/1/2007	2HDUP	Phenols	mg/L	ND
7/24/2007	2HDUP	Phenols	mg/L	ND
10/22/2007	2HDUP	Phenols	mg/L	0.11
10/26/2007	2HDUP	Phenols	mg/L	ND
10/30/2007	2HDUP	Phenols	mg/L	0.08
4/3/2008	2HDUP	Phenols, Total	mg/L	0.12
4/15/2008	2HDUP	Phenols, Total	mg/L	0.09
7/3/2008	2HDUP	Phenols, Total	mg/L	54
7/3/2008	2HDUP	Phenols, Total	mg/L	54
7/11/2008	2HDUP	Phenols, Total	mg/L	ND
10/9/2008	2HDUP	Phenols, Total	mg/L	0.07
10/17/2008	2HDUP	Phenols, Total	mg/L	ND
10/21/2008	2HDUP	Phenols, Total	mg/L	ND
1/8/2009	2HDUP	Phenols, Total	mg/L	0.05
1/12/2009	2HDUP	Phenols, Total	mg/L	0.05
1/20/2009	2HDUP	Phenols, Total	mg/L	ND
4/9/2009	2HDUP	Phenols, Total	mg/L	ND
4/13/2009	2HDUP	Phenols, Total	mg/L	ND
4/17/2009	2HDUP	Phenols, Total	mg/L	ND
4/21/2009	2HDUP	Phenols, Total	mg/L	ND
1/15/2008	2HDUP	Phenols, Total	mg/L	66
1/3/2008	2HDUP	Phenols, Total	mg/L	ND
7/12/2007	2HDUP	Potassium	mg/L	137
7/12/2007	2HDUP	sec-Butylbenzene	ug/L	ND
7/12/2007	2HDUP	Selenium	mg/L	0.016
7/12/2007	2HDUP	Silver	mg/L	ND
1/6/2005	2HDUP	Sodium	mg/L	843
1/10/2005	2HDUP	Sodium	mg/L	859
4/7/2005	2HDUP	Sodium	mg/L	880
4/19/2005	2HDUP	Sodium	mg/L	787
7/7/2005	2HDUP	Sodium	mg/L	785
7/19/2005	2HDUP	Sodium	mg/L	955
10/17/2005	2HDUP	Sodium	mg/L	882
10/21/2005	2HDUP	Sodium	mg/L	824
10/25/2005	2HDUP	Sodium	mg/L	842
1/5/2006	2HDUP	Sodium	mg/L	940
1/17/2006	2HDUP	Sodium	mg/L	771
4/6/2006	2HDUP	Sodium	mg/L	876
4/14/2006	2HDUP	Sodium	mg/L	726
7/6/2006	2HDUP	Sodium	mg/L	ND
7/18/2006	2HDUP	Sodium	mg/L	833
10/19/2006	2HDUP	Sodium	mg/L	595
10/23/2006	2HDUP	Sodium	mg/L	788
1/4/2007	2HDUP	Sodium	mg/L	881
1/16/2007	2HDUP	Sodium	mg/L	837
4/19/2007	2HDUP	Sodium	mg/L	812
4/27/2007	2HDUP	Sodium	mg/L	704
5/1/2007	2HDUP	Sodium	mg/L	820
7/12/2007	2HDUP	Sodium	mg/L	744
7/24/2007	2HDUP	Sodium	mg/L	896
4/3/2008	2HDUP	Sodium	mg/L	780
4/15/2008	2HDUP	Sodium	mg/L	789
7/3/2008	2HDUP	Sodium	mg/L	886
7/3/2008	2HDUP	Sodium	mg/L	886
7/11/2008	2HDUP	Sodium	mg/L	853
1/8/2009	2HDUP	Sodium	mg/L	769
1/12/2009	2HDUP	Sodium	mg/L	828
1/20/2009	2HDUP	Sodium	mg/L	791
4/9/2009	2HDUP	Sodium	mg/L	655
4/13/2009	2HDUP	Sodium	mg/L	840
4/17/2009	2HDUP	Sodium	mg/L	879
4/21/2009	2HDUP	Sodium	mg/L	687
1/15/2008	2HDUP	Sodium	mg/L	731
1/3/2008	2HDUP	Sodium	mg/L	869
10/22/2007	2HDUP	Sodium	mg/L	885
10/26/2007	2HDUP	Sodium	mg/L	816
10/30/2007	2HDUP	Sodium	mg/L	797
7/12/2007	2HDUP	Solids, Total Dissolved	mg/L	28300
7/12/2007	2HDUP	Solids, Total Suspended	mg/L	37
1/6/2005	2HDUP	Specific Conductance	umhos	14370
1/10/2005	2HDUP	Specific Conductance	umhos	12730
4/7/2005	2HDUP	Specific Conductance	umhos	7790
4/19/2005	2HDUP	Specific Conductance	umhos	4480
7/7/2005	2HDUP	Specific Conductance	umhos	18730
7/19/2005	2HDUP	Specific Conductance	umhos	15280
10/17/2005	2HDUP	Specific Conductance	umhos	17540
10/21/2005	2HDUP	Specific Conductance	umhos	15770
10/25/2005	2HDUP	Specific Conductance	umhos	15490

Sampling Date	Location ID	Analyte	Unit	Concentration
1/5/2006	2HDUP	Specific Conductance	umhos	10880
1/17/2006	2HDUP	Specific Conductance	umhos	11790
4/6/2006	2HDUP	Specific Conductance	umhos	14250
4/14/2006	2HDUP	Specific Conductance	umhos	18370
7/6/2006	2HDUP	Specific Conductance	umhos	18650
7/18/2006	2HDUP	Specific Conductance	umhos	13330
10/19/2006	2HDUP	Specific Conductance	umhos	14470
10/23/2006	2HDUP	Specific Conductance	umhos	12880
1/4/2007	2HDUP	Specific Conductance	umhos	16060
1/16/2007	2HDUP	Specific Conductance	umhos	3990
4/19/2007	2HDUP	Specific Conductance	umhos	5810
4/27/2007	2HDUP	Specific Conductance	umhos	3070
5/1/2007	2HDUP	Specific Conductance	umhos	2770
7/12/2007	2HDUP	Specific Conductance	umhos	11000
7/12/2007	2HDUP	Specific Conductance	umhos	11240
7/12/2007	2HDUP	Specific Conductance	umhos	11190
7/12/2007	2HDUP	Specific Conductance	umhos	11330
7/24/2007	2HDUP	Specific Conductance	umhos	10170
7/24/2007	2HDUP	Specific Conductance	umhos	10220
7/24/2007	2HDUP	Specific Conductance	umhos	10430
7/24/2007	2HDUP	Specific Conductance	umhos	10570
4/3/2008	2HDUP	Specific Conductance	umhos	16110
4/3/2008	2HDUP	Specific Conductance	umhos	16130
4/3/2008	2HDUP	Specific Conductance	umhos	16180
4/3/2008	2HDUP	Specific Conductance	umhos	16250
4/15/2008	2HDUP	Specific Conductance	umhos	15640
4/15/2008	2HDUP	Specific Conductance	umhos	15750
4/15/2008	2HDUP	Specific Conductance	umhos	15770
4/15/2008	2HDUP	Specific Conductance	umhos	15810
7/3/2008	2HDUP	Specific Conductance	umhos	15060
7/3/2008	2HDUP	Specific Conductance	umhos	14760
7/3/2008	2HDUP	Specific Conductance	umhos	14660
7/3/2008	2HDUP	Specific Conductance	umhos	14850
7/3/2008	2HDUP	Specific Conductance	umhos	14660
7/3/2008	2HDUP	Specific Conductance	umhos	14760
7/3/2008	2HDUP	Specific Conductance	umhos	14850
7/3/2008	2HDUP	Specific Conductance	umhos	15060
7/11/2008	2HDUP	Specific Conductance	umhos	14770
7/11/2008	2HDUP	Specific Conductance	umhos	15150
7/11/2008	2HDUP	Specific Conductance	umhos	15450
7/11/2008	2HDUP	Specific Conductance	umhos	15590
10/9/2008	2HDUP	Specific Conductance	umhos	14120
10/9/2008	2HDUP	Specific Conductance	umhos	14200
10/9/2008	2HDUP	Specific Conductance	umhos	14260
10/9/2008	2HDUP	Specific Conductance	umhos	14280
10/17/2008	2HDUP	Specific Conductance	umhos	13620
10/17/2008	2HDUP	Specific Conductance	umhos	13640
10/17/2008	2HDUP	Specific Conductance	umhos	13660
10/17/2008	2HDUP	Specific Conductance	umhos	13730
10/21/2008	2HDUP	Specific Conductance	umhos	10770
10/21/2008	2HDUP	Specific Conductance	umhos	11000
10/21/2008	2HDUP	Specific Conductance	umhos	11170
10/21/2008	2HDUP	Specific Conductance	umhos	11280
1/8/2009	2HDUP	Specific Conductance	umhos	16310
1/8/2009	2HDUP	Specific Conductance	umhos	16360
1/8/2009	2HDUP	Specific Conductance	umhos	16380
1/8/2009	2HDUP	Specific Conductance	umhos	16450
1/12/2009	2HDUP	Specific Conductance	umhos	16260
1/12/2009	2HDUP	Specific Conductance	umhos	16280
1/12/2009	2HDUP	Specific Conductance	umhos	16300
1/12/2009	2HDUP	Specific Conductance	umhos	16330
1/20/2009	2HDUP	Specific Conductance	umhos	17140
1/20/2009	2HDUP	Specific Conductance	umhos	17280
1/20/2009	2HDUP	Specific Conductance	umhos	17310
1/20/2009	2HDUP	Specific Conductance	umhos	17430
4/9/2009	2HDUP	Specific Conductance	umhos	15810
4/9/2009	2HDUP	Specific Conductance	umhos	15920
4/9/2009	2HDUP	Specific Conductance	umhos	15960
4/9/2009	2HDUP	Specific Conductance	umhos	16040
4/13/2009	2HDUP	Specific Conductance	umhos	16530
4/13/2009	2HDUP	Specific Conductance	umhos	16500
4/13/2009	2HDUP	Specific Conductance	umhos	16650
4/13/2009	2HDUP	Specific Conductance	umhos	16720
4/17/2009	2HDUP	Specific Conductance	umhos	16230
4/17/2009	2HDUP	Specific Conductance	umhos	16220
4/17/2009	2HDUP	Specific Conductance	umhos	16220
4/17/2009	2HDUP	Specific Conductance	umhos	16260
4/21/2009	2HDUP	Specific Conductance	umhos	16250
4/21/2009	2HDUP	Specific Conductance	umhos	16380
4/21/2009	2HDUP	Specific Conductance	umhos	16590
4/21/2009	2HDUP	Specific Conductance	umhos	16700
1/15/2008	2HDUP	Specific Conductance	umhos	2620
1/15/2008	2HDUP	Specific Conductance	umhos	2570
1/15/2008	2HDUP	Specific Conductance	umhos	2620
1/15/2008	2HDUP	Specific Conductance	umhos	2620

Sampling Date	Location ID	Analyte	Unit	Concentration
1/3/2008	2HDUP	Specific Conductance	umhos	5550
1/3/2008	2HDUP	Specific Conductance	umhos	5290
1/3/2008	2HDUP	Specific Conductance	umhos	5210
1/3/2008	2HDUP	Specific Conductance	umhos	5190
10/22/2007	2HDUP	Specific Conductance	umhos	8420
10/22/2007	2HDUP	Specific Conductance	umhos	8400
10/22/2007	2HDUP	Specific Conductance	umhos	8710
10/22/2007	2HDUP	Specific Conductance	umhos	8880
10/26/2007	2HDUP	Specific Conductance	umhos	442
10/26/2007	2HDUP	Specific Conductance	umhos	448
10/26/2007	2HDUP	Specific Conductance	umhos	442
10/26/2007	2HDUP	Specific Conductance	umhos	458
10/30/2007	2HDUP	Specific Conductance	umhos	8440
10/30/2007	2HDUP	Specific Conductance	umhos	8570
10/30/2007	2HDUP	Specific Conductance	umhos	8640
10/30/2007	2HDUP	Specific Conductance	umhos	8900
7/12/2007	2HDUP	Styrene	ug/L	ND
7/12/2007	2HDUP	Sulfate	mg/L	11330
7/24/2007	2HDUP	Sulfate	mg/L	26935
4/3/2008	2HDUP	Sulfate	mg/L	18074
4/15/2008	2HDUP	Sulfate	mg/L	19424
7/3/2008	2HDUP	Sulfate	mg/L	19143
7/3/2008	2HDUP	Sulfate	mg/L	19143
7/11/2008	2HDUP	Sulfate	mg/L	19380
10/9/2008	2HDUP	Sulfate	mg/L	18945
10/17/2008	2HDUP	Sulfate	mg/L	21086
10/21/2008	2HDUP	Sulfate	mg/L	18863
1/8/2009	2HDUP	Sulfate	mg/L	16810
1/12/2009	2HDUP	Sulfate	mg/L	16856
1/20/2009	2HDUP	Sulfate	mg/L	15804
4/9/2009	2HDUP	Sulfate	mg/L	16980
4/13/2009	2HDUP	Sulfate	mg/L	17698
4/17/2009	2HDUP	Sulfate	mg/L	16820
4/21/2009	2HDUP	Sulfate	mg/L	19443
1/15/2008	2HDUP	Sulfate	mg/L	20123
1/3/2008	2HDUP	Sulfate	mg/L	20427
1/6/2005	2HDUP	Sulfate	mg/L	17872
1/10/2005	2HDUP	Sulfate	mg/L	967
4/7/2005	2HDUP	Sulfate	mg/L	22631
4/19/2005	2HDUP	Sulfate	mg/L	22422
7/7/2005	2HDUP	Sulfate	mg/L	30775
7/19/2005	2HDUP	Sulfate	mg/L	29724
10/17/2005	2HDUP	Sulfate	mg/L	23950
10/21/2005	2HDUP	Sulfate	mg/L	20226
10/25/2005	2HDUP	Sulfate	mg/L	22736
1/5/2006	2HDUP	Sulfate	mg/L	22977
1/17/2006	2HDUP	Sulfate	mg/L	22604
4/6/2006	2HDUP	Sulfate	mg/L	22217
4/14/2006	2HDUP	Sulfate	mg/L	23176
7/6/2006	2HDUP	Sulfate	mg/L	21200
7/18/2006	2HDUP	Sulfate	mg/L	22931
10/19/2006	2HDUP	Sulfate	mg/L	23599
10/23/2006	2HDUP	Sulfate	mg/L	24207
1/4/2007	2HDUP	Sulfate	mg/L	22148
1/16/2007	2HDUP	Sulfate	mg/L	21363
4/19/2007	2HDUP	Sulfate	mg/L	20792
4/27/2007	2HDUP	Sulfate	mg/L	21350
5/1/2007	2HDUP	Sulfate	mg/L	23500
10/22/2007	2HDUP	Sulfate	mg/L	19265
10/26/2007	2HDUP	Sulfate	mg/L	19797
10/30/2007	2HDUP	Sulfate	mg/L	20092
1/6/2005	2HDUP	Temperature	C	13
1/10/2005	2HDUP	Temperature	C	12
4/7/2005	2HDUP	Temperature	C	12
4/19/2005	2HDUP	Temperature	C	12
7/7/2005	2HDUP	Temperature	C	17
7/19/2005	2HDUP	Temperature	C	16
10/17/2005	2HDUP	Temperature	C	17
10/21/2005	2HDUP	Temperature	C	18
10/25/2005	2HDUP	Temperature	C	17
1/5/2006	2HDUP	Temperature	C	12
1/17/2006	2HDUP	Temperature	C	10
4/6/2006	2HDUP	Temperature	C	11
4/14/2006	2HDUP	Temperature	C	15.8
7/6/2006	2HDUP	Temperature	C	17
7/18/2006	2HDUP	Temperature	C	19
10/19/2006	2HDUP	Temperature	C	19
10/23/2006	2HDUP	Temperature	C	17
1/4/2007	2HDUP	Temperature	C	14
1/16/2007	2HDUP	Temperature	C	13
4/19/2007	2HDUP	Temperature	C	11
4/27/2007	2HDUP	Temperature	C	11
5/1/2007	2HDUP	Temperature	C	12
7/12/2007	2HDUP	Temperature	C	16
7/12/2007	2HDUP	Temperature	C	17

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	2HDUP	Temperature	C	17
7/12/2007	2HDUP	Temperature	C	17
7/24/2007	2HDUP	Temperature	C	17
7/24/2007	2HDUP	Temperature	C	17
7/24/2007	2HDUP	Temperature	C	17
7/24/2007	2HDUP	Temperature	C	18
4/3/2008	2HDUP	Temperature	C	11
4/3/2008	2HDUP	Temperature	C	11
4/3/2008	2HDUP	Temperature	C	11
4/3/2008	2HDUP	Temperature	C	11
4/15/2008	2HDUP	Temperature	C	11
4/15/2008	2HDUP	Temperature	C	12
4/15/2008	2HDUP	Temperature	C	12
4/15/2008	2HDUP	Temperature	C	12
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/3/2008	2HDUP	Temperature	C	17
7/11/2008	2HDUP	Temperature	C	18
7/11/2008	2HDUP	Temperature	C	18
7/11/2008	2HDUP	Temperature	C	18
7/11/2008	2HDUP	Temperature	C	19
10/9/2008	2HDUP	Temperature	C	19
10/9/2008	2HDUP	Temperature	C	20
10/9/2008	2HDUP	Temperature	C	20
10/9/2008	2HDUP	Temperature	C	20
10/17/2008	2HDUP	Temperature	C	18
10/17/2008	2HDUP	Temperature	C	18
10/17/2008	2HDUP	Temperature	C	18
10/17/2008	2HDUP	Temperature	C	18
10/21/2008	2HDUP	Temperature	C	18
10/21/2008	2HDUP	Temperature	C	18
10/21/2008	2HDUP	Temperature	C	18
10/21/2008	2HDUP	Temperature	C	18
1/8/2009	2HDUP	Temperature	C	13
1/8/2009	2HDUP	Temperature	C	13
1/8/2009	2HDUP	Temperature	C	13
1/8/2009	2HDUP	Temperature	C	13
1/12/2009	2HDUP	Temperature	C	12
1/12/2009	2HDUP	Temperature	C	12
1/12/2009	2HDUP	Temperature	C	12
1/12/2009	2HDUP	Temperature	C	12
1/20/2009	2HDUP	Temperature	C	11
1/20/2009	2HDUP	Temperature	C	11
1/20/2009	2HDUP	Temperature	C	11
1/20/2009	2HDUP	Temperature	C	11
4/9/2009	2HDUP	Temperature	C	11
4/9/2009	2HDUP	Temperature	C	11
4/9/2009	2HDUP	Temperature	C	11
4/9/2009	2HDUP	Temperature	C	12
4/13/2009	2HDUP	Temperature	C	10
4/13/2009	2HDUP	Temperature	C	10
4/13/2009	2HDUP	Temperature	C	10
4/13/2009	2HDUP	Temperature	C	10
4/17/2009	2HDUP	Temperature	C	11
4/17/2009	2HDUP	Temperature	C	11
4/17/2009	2HDUP	Temperature	C	11
4/17/2009	2HDUP	Temperature	C	11
4/21/2009	2HDUP	Temperature	C	12
4/21/2009	2HDUP	Temperature	C	11
4/21/2009	2HDUP	Temperature	C	12
4/21/2009	2HDUP	Temperature	C	12
1/15/2008	2HDUP	Temperature	C	12
1/15/2008	2HDUP	Temperature	C	12
1/15/2008	2HDUP	Temperature	C	12
1/15/2008	2HDUP	Temperature	C	12
1/3/2008	2HDUP	Temperature	C	13
1/3/2008	2HDUP	Temperature	C	13
1/3/2008	2HDUP	Temperature	C	13
1/3/2008	2HDUP	Temperature	C	12
10/22/2007	2HDUP	Temperature	C	19
10/22/2007	2HDUP	Temperature	C	18
10/22/2007	2HDUP	Temperature	C	19
10/22/2007	2HDUP	Temperature	C	19
10/26/2007	2HDUP	Temperature	C	18
10/26/2007	2HDUP	Temperature	C	18
10/26/2007	2HDUP	Temperature	C	18
10/26/2007	2HDUP	Temperature	C	18
10/30/2007	2HDUP	Temperature	C	18
10/30/2007	2HDUP	Temperature	C	18
10/30/2007	2HDUP	Temperature	C	18

Sampling Date	Location ID	Analyte	Unit	Concentration
10/30/2007	2HDUP	Temperature	C	18
7/12/2007	2HDUP	tert-Butylbenzene	ug/L	ND
7/12/2007	2HDUP	Tetrachloroethene	ug/L	ND
7/12/2007	2HDUP	Thallium	mg/L	ND
7/12/2007	2HDUP	Toluene	ug/L	8.5
7/12/2007	2HDUP	Total Alkalinity	mg/L	ND
7/12/2007	2HDUP	Total Hardness,Calculation	mg/L	3528
7/12/2007	2HDUP	Total Organic Carbon	mg/L	53.1
7/24/2007	2HDUP	Total Organic Carbon	mg/L	52
4/3/2008	2HDUP	Total Organic Carbon	mg/L	33
4/15/2008	2HDUP	Total Organic Carbon	mg/L	31.1
7/3/2008	2HDUP	Total Organic Carbon	mg/L	35
7/3/2008	2HDUP	Total Organic Carbon	mg/L	35
1/8/2009	2HDUP	Total Organic Carbon	mg/L	36
1/12/2009	2HDUP	Total Organic Carbon	mg/L	40
1/20/2009	2HDUP	Total Organic Carbon	mg/L	39
1/15/2008	2HDUP	Total Organic Carbon	mg/L	35
1/3/2008	2HDUP	Total Organic Carbon	mg/L	36
1/6/2005	2HDUP	Total Organic Carbon	mg/L	49
1/10/2005	2HDUP	Total Organic Carbon	mg/L	50
4/7/2005	2HDUP	Total Organic Carbon	mg/L	49
4/19/2005	2HDUP	Total Organic Carbon	mg/L	51
7/7/2005	2HDUP	Total Organic Carbon	mg/L	48
7/19/2005	2HDUP	Total Organic Carbon	mg/L	49
10/17/2005	2HDUP	Total Organic Carbon	mg/L	44
10/21/2005	2HDUP	Total Organic Carbon	mg/L	46
10/25/2005	2HDUP	Total Organic Carbon	mg/L	42
1/5/2006	2HDUP	Total Organic Carbon	mg/L	42.8
1/17/2006	2HDUP	Total Organic Carbon	mg/L	52
4/6/2006	2HDUP	Total Organic Carbon	mg/L	54
4/14/2006	2HDUP	Total Organic Carbon	mg/L	51.3
7/6/2006	2HDUP	Total Organic Carbon	mg/L	45
7/18/2006	2HDUP	Total Organic Carbon	mg/L	46
10/19/2006	2HDUP	Total Organic Carbon	mg/L	41
10/23/2006	2HDUP	Total Organic Carbon	mg/L	41
1/4/2007	2HDUP	Total Organic Carbon	mg/L	47
1/16/2007	2HDUP	Total Organic Carbon	mg/L	42
4/19/2007	2HDUP	Total Organic Carbon	mg/L	50
4/27/2007	2HDUP	Total Organic Carbon	mg/L	52
5/1/2007	2HDUP	Total Organic Carbon	mg/L	56
7/11/2008	2HDUP	Total Organic Carbon	mg/L	35
4/9/2009	2HDUP	Total Organic Carbon	mg/L	5.4
4/13/2009	2HDUP	Total Organic Carbon	mg/L	32
4/17/2009	2HDUP	Total Organic Carbon	mg/L	29
4/21/2009	2HDUP	Total Organic Carbon	mg/L	26.2
10/22/2007	2HDUP	Total Organic Carbon	mg/L	49
10/26/2007	2HDUP	Total Organic Carbon	mg/L	50
10/30/2007	2HDUP	Total Organic Carbon	mg/L	50
1/6/2005	2HDUP	Total Organic Halogen	mg/L	0.283
1/10/2005	2HDUP	Total Organic Halogen	mg/L	0.28
4/7/2005	2HDUP	Total Organic Halogen	mg/L	0.251
4/19/2005	2HDUP	Total Organic Halogen	mg/L	0.284
7/7/2005	2HDUP	Total Organic Halogen	mg/L	0.131
7/19/2005	2HDUP	Total Organic Halogen	mg/L	0.274
10/17/2005	2HDUP	Total Organic Halogen	mg/L	0.287
10/21/2005	2HDUP	Total Organic Halogen	mg/L	0.283
10/25/2005	2HDUP	Total Organic Halogen	mg/L	0.276
1/5/2006	2HDUP	Total Organic Halogen	mg/L	0.296
1/17/2006	2HDUP	Total Organic Halogen	mg/L	0.314
4/6/2006	2HDUP	Total Organic Halogen	mg/L	0.308
4/14/2006	2HDUP	Total Organic Halogen	mg/L	0.247
7/6/2006	2HDUP	Total Organic Halogen	mg/L	0.321
7/18/2006	2HDUP	Total Organic Halogen	mg/L	0.297
10/19/2006	2HDUP	Total Organic Halogen	mg/L	0.167
10/23/2006	2HDUP	Total Organic Halogen	mg/L	0.173
1/4/2007	2HDUP	Total Organic Halogen	mg/L	0.184
1/16/2007	2HDUP	Total Organic Halogen	mg/L	0.198
4/19/2007	2HDUP	Total Organic Halogen	mg/L	0.2
4/27/2007	2HDUP	Total Organic Halogen	mg/L	0.3
5/1/2007	2HDUP	Total Organic Halogen	mg/L	0.3
7/12/2007	2HDUP	Total Organic Halogen	mg/L	0.5
7/24/2007	2HDUP	Total Organic Halogen	mg/L	0.4
4/15/2008	2HDUP	Total Organic Halogen	mg/L	0.41
7/3/2008	2HDUP	Total Organic Halogen	mg/L	0.23
7/3/2008	2HDUP	Total Organic Halogen	mg/L	0.23
7/11/2008	2HDUP	Total Organic Halogen	mg/L	0.23
10/9/2008	2HDUP	Total Organic Halogen	mg/L	0.6
10/17/2008	2HDUP	Total Organic Halogen	mg/L	0.5
10/21/2008	2HDUP	Total Organic Halogen	mg/L	0.9
1/8/2009	2HDUP	Total Organic Halogen	mg/L	0.38
1/12/2009	2HDUP	Total Organic Halogen	mg/L	0.48
1/20/2009	2HDUP	Total Organic Halogen	mg/L	0.4
1/15/2008	2HDUP	Total Organic Halogen	mg/L	0.22
1/3/2008	2HDUP	Total Organic Halogen	mg/L	0.28
10/22/2007	2HDUP	Total Organic Halogen	mg/L	0.36

Sampling Date	Location ID	Analyte	Unit	Concentration
10/26/2007	2HDUP	Total Organic Halogen	mg/L	0.31
10/30/2007	2HDUP	Total Organic Halogen	mg/L	0.34
4/3/2008	2HDUP	Total Organic Halogen	mg/L	0.26
4/9/2009	2HDUP	Total Organic Halogen	mg/L	0.49
4/13/2009	2HDUP	Total Organic Halogen	mg/L	0.65
4/17/2009	2HDUP	Total Organic Halogen	mg/L	ND
4/21/2009	2HDUP	Total Organic Halogen	mg/L	0.133
7/12/2007	2HDUP	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	2HDUP	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	2HDUP	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	2HDUP	Trichloroethene	ug/L	ND
7/12/2007	2HDUP	Trichlorofluoromethane	ug/L	ND
1/6/2005	2HDUP	Turbidity	NTU	55
1/10/2005	2HDUP	Turbidity	NTU	20
4/7/2005	2HDUP	Turbidity	NTU	53
4/19/2005	2HDUP	Turbidity	NTU	30
7/7/2005	2HDUP	Turbidity	NTU	82
7/19/2005	2HDUP	Turbidity	NTU	30
10/17/2005	2HDUP	Turbidity	NTU	49
10/21/2005	2HDUP	Turbidity	NTU	31
10/25/2005	2HDUP	Turbidity	NTU	39
1/5/2006	2HDUP	Turbidity	NTU	75
1/17/2006	2HDUP	Turbidity	NTU	24
4/6/2006	2HDUP	Turbidity	NTU	66
4/14/2006	2HDUP	Turbidity	NTU	30
7/6/2006	2HDUP	Turbidity	NTU	67
7/18/2006	2HDUP	Turbidity	NTU	33
10/19/2006	2HDUP	Turbidity	NTU	27
10/23/2006	2HDUP	Turbidity	NTU	41
1/4/2007	2HDUP	Turbidity	NTU	52
1/16/2007	2HDUP	Turbidity	NTU	35
4/19/2007	2HDUP	Turbidity	NTU	11
4/27/2007	2HDUP	Turbidity	NTU	13
5/1/2007	2HDUP	Turbidity	NTU	41
7/12/2007	2HDUP	Turbidity	NTU	27
7/24/2007	2HDUP	Turbidity	NTU	35
4/3/2008	2HDUP	Turbidity	NTU	30
4/15/2008	2HDUP	Turbidity	NTU	34
7/3/2008	2HDUP	Turbidity	NTU	37
7/3/2008	2HDUP	Turbidity	NTU	37
7/11/2008	2HDUP	Turbidity	NTU	41
10/17/2008	2HDUP	Turbidity	NTU	14
10/21/2008	2HDUP	Turbidity	NTU	13
1/8/2009	2HDUP	Turbidity	NTU	42
1/12/2009	2HDUP	Turbidity	NTU	12
1/20/2009	2HDUP	Turbidity	NTU	12
4/9/2009	2HDUP	Turbidity	NTU	42
4/13/2009	2HDUP	Turbidity	NTU	27
4/17/2009	2HDUP	Turbidity	NTU	17
4/21/2009	2HDUP	Turbidity	NTU	37
1/15/2008	2HDUP	Turbidity	NTU	26
1/3/2008	2HDUP	Turbidity	NTU	17
10/22/2007	2HDUP	Turbidity	NTU	23
10/26/2007	2HDUP	Turbidity	NTU	15
10/30/2007	2HDUP	Turbidity	NTU	25
7/12/2007	2HDUP	Vanadium	mg/L	ND
7/12/2007	2HDUP	Vinyl Acetate	ug/L	ND
7/12/2007	2HDUP	Vinyl Chloride	ug/L	ND
7/12/2007	2HDUP	Xylenes, Total	ug/L	14.7
7/12/2007	2HDUP	Zinc	mg/L	ND
Location ID:		**BLANK**		
4/7/2005	BLANK	Barium	mg/L	ND
4/7/2005	BLANK	Barium	mg/L	ND
6/9/2005	BLANK	Barium	mg/L	ND
6/9/2005	BLANK	Barium	mg/L	ND
10/13/2005	BLANK	Barium	mg/L	ND
10/17/2005	BLANK	Barium	mg/L	ND
10/21/2005	BLANK	Barium	mg/L	ND
10/25/2005	BLANK	Barium	mg/L	ND
11/3/2005	BLANK	Barium	mg/L	ND
11/23/2005	BLANK	Barium	mg/L	ND
12/15/2005	BLANK	Barium	mg/L	ND
1/5/2006	BLANK	Barium	mg/L	ND
1/9/2006	BLANK	Barium	mg/L	ND
1/13/2006	BLANK	Barium	mg/L	ND
1/17/2006	BLANK	Barium	mg/L	ND
1/26/2006	BLANK	Barium	mg/L	ND
2/16/2006	BLANK	Barium	mg/L	ND
3/9/2006	BLANK	Barium	mg/L	ND
3/23/2006	BLANK	Barium	mg/L	ND
4/6/2006	BLANK	Barium	mg/L	ND
4/10/2006	BLANK	Barium	mg/L	ND
4/14/2006	BLANK	Barium	mg/L	ND
4/18/2006	BLANK	Barium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/27/2006	BLANK	Barium	mg/L	ND
5/18/2006	BLANK	Barium	mg/L	ND
6/8/2006	BLANK	Barium	mg/L	ND
7/6/2006	BLANK	Barium	mg/L	ND
7/10/2006	BLANK	Barium	mg/L	ND
7/14/2006	BLANK	Barium	mg/L	ND
7/18/2006	BLANK	Barium	mg/L	ND
7/27/2006	BLANK	Barium	mg/L	ND
8/17/2006	BLANK	Barium	mg/L	ND
8/21/2006	BLANK	Barium	mg/L	ND
8/22/2006	BLANK	Barium	mg/L	ND
8/23/2006	BLANK	Barium	mg/L	ND
8/24/2006	BLANK	Barium	mg/L	ND
8/25/2006	BLANK	Barium	mg/L	ND
8/31/2006	BLANK	Barium	mg/L	ND
9/7/2006	BLANK	Barium	mg/L	ND
10/19/2006	BLANK	Barium	mg/L	ND
10/23/2006	BLANK	Barium	mg/L	ND
10/27/2006	BLANK	Barium	mg/L	ND
10/31/2006	BLANK	Barium	mg/L	ND
11/9/2006	BLANK	Barium	mg/L	ND
11/30/2006	BLANK	Barium	mg/L	ND
12/21/2006	BLANK	Barium	mg/L	ND
1/4/2007	BLANK	Barium	mg/L	ND
1/8/2007	BLANK	Barium	mg/L	ND
1/11/2007	BLANK	Barium	mg/L	ND
1/16/2007	BLANK	Barium	mg/L	ND
1/25/2007	BLANK	Barium	mg/L	ND
2/1/2007	BLANK	Barium	mg/L	ND
2/15/2007	BLANK	Barium	mg/L	ND
3/8/2007	BLANK	Barium	mg/L	ND
4/19/2007	BLANK	Barium	mg/L	ND
4/23/2007	BLANK	Barium	mg/L	ND
4/27/2007	BLANK	Barium	mg/L	ND
5/1/2007	BLANK	Barium	mg/L	ND
5/10/2007	BLANK	Barium	mg/L	ND
5/31/2007	BLANK	Barium	mg/L	ND
6/21/2007	BLANK	Barium	mg/L	ND
7/26/2007	BLANK	Barium	mg/L	ND
1/8/2009	BLANK	Barium	mg/L	ND
1/12/2009	BLANK	Barium	mg/L	ND
1/16/2009	BLANK	Barium	mg/L	ND
1/20/2009	BLANK	Barium	mg/L	ND
1/29/2009	BLANK	Barium	mg/L	ND
2/19/2009	BLANK	Barium	mg/L	ND
3/12/2009	BLANK	Barium	mg/L	ND
3/24/2009	BLANK	Barium	mg/L	ND
4/9/2009	BLANK	Barium	mg/L	ND
4/13/2009	BLANK	Barium	mg/L	ND
4/17/2009	BLANK	Barium	mg/L	ND
4/21/2009	BLANK	Barium	mg/L	ND
4/30/2009	BLANK	Barium	mg/L	ND
5/21/2009	BLANK	Barium	mg/L	ND
2/8/2008	BLANK	Barium	mg/L	ND
6/11/2009	BLANK	Barium	mg/L	ND
4/7/2005	BLANK	Chloride	mg/L	ND
4/7/2005	BLANK	Chloride	mg/L	ND
4/7/2005	BLANK	Chloride	mg/L	ND
6/9/2005	BLANK	Chloride	mg/L	ND
6/9/2005	BLANK	Chloride	mg/L	ND
10/13/2005	BLANK	Chloride	mg/L	ND
10/17/2005	BLANK	Chloride	mg/L	ND
10/21/2005	BLANK	Chloride	mg/L	ND
10/25/2005	BLANK	Chloride	mg/L	ND
11/3/2005	BLANK	Chloride	mg/L	ND
11/23/2005	BLANK	Chloride	mg/L	ND
12/15/2005	BLANK	Chloride	mg/L	ND
1/5/2006	BLANK	Chloride	mg/L	ND
1/9/2006	BLANK	Chloride	mg/L	ND
1/13/2006	BLANK	Chloride	mg/L	ND
1/17/2006	BLANK	Chloride	mg/L	ND
1/26/2006	BLANK	Chloride	mg/L	ND
2/16/2006	BLANK	Chloride	mg/L	0.62
3/9/2006	BLANK	Chloride	mg/L	ND
3/23/2006	BLANK	Chloride	mg/L	ND
4/6/2006	BLANK	Chloride	mg/L	ND
4/10/2006	BLANK	Chloride	mg/L	ND
4/14/2006	BLANK	Chloride	mg/L	ND
4/18/2006	BLANK	Chloride	mg/L	ND
4/27/2006	BLANK	Chloride	mg/L	ND
5/18/2006	BLANK	Chloride	mg/L	ND
6/8/2006	BLANK	Chloride	mg/L	ND
7/6/2006	BLANK	Chloride	mg/L	ND
7/10/2006	BLANK	Chloride	mg/L	ND
7/14/2006	BLANK	Chloride	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/18/2006	BLANK	Chloride	mg/L	ND
7/27/2006	BLANK	Chloride	mg/L	0.85
8/17/2006	BLANK	Chloride	mg/L	ND
8/21/2006	BLANK	Chloride	mg/L	0.636
8/22/2006	BLANK	Chloride	mg/L	0.68
8/23/2006	BLANK	Chloride	mg/L	ND
8/24/2006	BLANK	Chloride	mg/L	ND
8/25/2006	BLANK	Chloride	mg/L	ND
8/31/2006	BLANK	Chloride	mg/L	0.65
9/7/2006	BLANK	Chloride	mg/L	0.67
10/19/2006	BLANK	Chloride	mg/L	ND
10/23/2006	BLANK	Chloride	mg/L	ND
10/27/2006	BLANK	Chloride	mg/L	ND
10/31/2006	BLANK	Chloride	mg/L	ND
11/9/2006	BLANK	Chloride	mg/L	ND
11/30/2006	BLANK	Chloride	mg/L	ND
12/21/2006	BLANK	Chloride	mg/L	ND
1/4/2007	BLANK	Chloride	mg/L	ND
1/8/2007	BLANK	Chloride	mg/L	ND
1/11/2007	BLANK	Chloride	mg/L	ND
1/16/2007	BLANK	Chloride	mg/L	ND
1/25/2007	BLANK	Chloride	mg/L	ND
2/1/2007	BLANK	Chloride	mg/L	0.61
2/15/2007	BLANK	Chloride	mg/L	ND
3/8/2007	BLANK	Chloride	mg/L	ND
4/19/2007	BLANK	Chloride	mg/L	ND
4/23/2007	BLANK	Chloride	mg/L	ND
4/27/2007	BLANK	Chloride	mg/L	ND
5/1/2007	BLANK	Chloride	mg/L	ND
5/10/2007	BLANK	Chloride	mg/L	ND
5/31/2007	BLANK	Chloride	mg/L	ND
6/21/2007	BLANK	Chloride	mg/L	ND
7/26/2007	BLANK	Chloride	mg/L	ND
1/8/2009	BLANK	Chloride	mg/L	ND
1/12/2009	BLANK	Chloride	mg/L	ND
1/16/2009	BLANK	Chloride	mg/L	ND
1/20/2009	BLANK	Chloride	mg/L	ND
1/29/2009	BLANK	Chloride	mg/L	ND
2/19/2009	BLANK	Chloride	mg/L	ND
3/12/2009	BLANK	Chloride	mg/L	ND
3/24/2009	BLANK	Chloride	mg/L	ND
4/9/2009	BLANK	Chloride	mg/L	ND
4/13/2009	BLANK	Chloride	mg/L	ND
4/17/2009	BLANK	Chloride	mg/L	ND
4/21/2009	BLANK	Chloride	mg/L	ND
4/30/2009	BLANK	Chloride	mg/L	ND
5/21/2009	BLANK	Chloride	mg/L	ND
2/8/2008	BLANK	Chloride	mg/L	ND
6/11/2009	BLANK	Chloride	mg/L	ND
4/7/2005	BLANK	Chromium	mg/L	ND
6/9/2005	BLANK	Chromium	mg/L	ND
10/13/2005	BLANK	Chromium	mg/L	ND
10/17/2005	BLANK	Chromium	mg/L	ND
10/21/2005	BLANK	Chromium	mg/L	ND
10/25/2005	BLANK	Chromium	mg/L	ND
11/3/2005	BLANK	Chromium	mg/L	ND
11/23/2005	BLANK	Chromium	mg/L	ND
12/15/2005	BLANK	Chromium	mg/L	ND
1/5/2006	BLANK	Chromium	mg/L	ND
1/9/2006	BLANK	Chromium	mg/L	ND
1/13/2006	BLANK	Chromium	mg/L	ND
1/17/2006	BLANK	Chromium	mg/L	ND
1/26/2006	BLANK	Chromium	mg/L	ND
2/16/2006	BLANK	Chromium	mg/L	ND
3/9/2006	BLANK	Chromium	mg/L	ND
3/23/2006	BLANK	Chromium	mg/L	ND
4/6/2006	BLANK	Chromium	mg/L	ND
4/10/2006	BLANK	Chromium	mg/L	ND
4/14/2006	BLANK	Chromium	mg/L	ND
4/18/2006	BLANK	Chromium	mg/L	ND
4/27/2006	BLANK	Chromium	mg/L	ND
5/18/2006	BLANK	Chromium	mg/L	ND
6/8/2006	BLANK	Chromium	mg/L	ND
7/6/2006	BLANK	Chromium	mg/L	ND
7/10/2006	BLANK	Chromium	mg/L	ND
7/14/2006	BLANK	Chromium	mg/L	ND
7/18/2006	BLANK	Chromium	mg/L	ND
7/27/2006	BLANK	Chromium	mg/L	ND
8/17/2006	BLANK	Chromium	mg/L	ND
8/21/2006	BLANK	Chromium	mg/L	ND
8/22/2006	BLANK	Chromium	mg/L	ND
8/23/2006	BLANK	Chromium	mg/L	ND
8/24/2006	BLANK	Chromium	mg/L	ND
8/25/2006	BLANK	Chromium	mg/L	ND
8/31/2006	BLANK	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
9/7/2006	BLANK	Chromium	mg/L	ND
10/19/2006	BLANK	Chromium	mg/L	ND
10/23/2006	BLANK	Chromium	mg/L	ND
10/27/2006	BLANK	Chromium	mg/L	ND
10/31/2006	BLANK	Chromium	mg/L	ND
11/9/2006	BLANK	Chromium	mg/L	ND
11/30/2006	BLANK	Chromium	mg/L	ND
12/21/2006	BLANK	Chromium	mg/L	ND
1/4/2007	BLANK	Chromium	mg/L	ND
1/8/2007	BLANK	Chromium	mg/L	ND
1/11/2007	BLANK	Chromium	mg/L	ND
1/16/2007	BLANK	Chromium	mg/L	ND
1/25/2007	BLANK	Chromium	mg/L	ND
2/1/2007	BLANK	Chromium	mg/L	ND
2/15/2007	BLANK	Chromium	mg/L	ND
3/8/2007	BLANK	Chromium	mg/L	ND
4/19/2007	BLANK	Chromium	mg/L	ND
4/23/2007	BLANK	Chromium	mg/L	ND
4/27/2007	BLANK	Chromium	mg/L	ND
5/1/2007	BLANK	Chromium	mg/L	ND
5/10/2007	BLANK	Chromium	mg/L	ND
5/31/2007	BLANK	Chromium	mg/L	ND
6/21/2007	BLANK	Chromium	mg/L	ND
7/26/2007	BLANK	Chromium	mg/L	ND
1/8/2009	BLANK	Chromium	mg/L	ND
1/12/2009	BLANK	Chromium	mg/L	ND
1/16/2009	BLANK	Chromium	mg/L	ND
1/20/2009	BLANK	Chromium	mg/L	ND
1/29/2009	BLANK	Chromium	mg/L	ND
2/19/2009	BLANK	Chromium	mg/L	ND
3/12/2009	BLANK	Chromium	mg/L	ND
3/24/2009	BLANK	Chromium	mg/L	ND
4/9/2009	BLANK	Chromium	mg/L	ND
4/13/2009	BLANK	Chromium	mg/L	ND
4/17/2009	BLANK	Chromium	mg/L	ND
4/21/2009	BLANK	Chromium	mg/L	ND
4/30/2009	BLANK	Chromium	mg/L	ND
5/21/2009	BLANK	Chromium	mg/L	ND
2/8/2008	BLANK	Chromium	mg/L	ND
6/11/2009	BLANK	Chromium	mg/L	ND
4/7/2005	BLANK	Chromium, hexavalent	mg/l	ND
6/9/2005	BLANK	Chromium, hexavalent	mg/l	ND
10/13/2005	BLANK	Chromium, hexavalent	mg/l	ND
10/17/2005	BLANK	Chromium, hexavalent	mg/l	ND
10/21/2005	BLANK	Chromium, hexavalent	mg/l	ND
10/25/2005	BLANK	Chromium, hexavalent	mg/l	ND
11/3/2005	BLANK	Chromium, hexavalent	mg/l	ND
11/23/2005	BLANK	Chromium, hexavalent	mg/l	ND
12/15/2005	BLANK	Chromium, hexavalent	mg/l	ND
1/5/2006	BLANK	Chromium, hexavalent	mg/l	ND
1/9/2006	BLANK	Chromium, hexavalent	mg/l	ND
1/13/2006	BLANK	Chromium, hexavalent	mg/l	ND
1/17/2006	BLANK	Chromium, hexavalent	mg/l	ND
1/26/2006	BLANK	Chromium, hexavalent	mg/l	ND
2/16/2006	BLANK	Chromium, hexavalent	mg/l	ND
3/9/2006	BLANK	Chromium, hexavalent	mg/l	ND
3/23/2006	BLANK	Chromium, hexavalent	mg/l	ND
4/6/2006	BLANK	Chromium, hexavalent	mg/l	ND
4/10/2006	BLANK	Chromium, hexavalent	mg/l	ND
4/14/2006	BLANK	Chromium, hexavalent	mg/l	ND
4/18/2006	BLANK	Chromium, hexavalent	mg/l	ND
4/27/2006	BLANK	Chromium, hexavalent	mg/l	ND
5/18/2006	BLANK	Chromium, hexavalent	mg/l	ND
6/8/2006	BLANK	Chromium, hexavalent	mg/l	ND
7/6/2006	BLANK	Chromium, hexavalent	mg/l	ND
7/10/2006	BLANK	Chromium, hexavalent	mg/l	ND
7/14/2006	BLANK	Chromium, hexavalent	mg/l	ND
7/18/2006	BLANK	Chromium, hexavalent	mg/l	ND
7/27/2006	BLANK	Chromium, hexavalent	mg/l	ND
8/17/2006	BLANK	Chromium, hexavalent	mg/l	ND
8/31/2006	BLANK	Chromium, hexavalent	mg/l	ND
9/7/2006	BLANK	Chromium, hexavalent	mg/l	ND
10/19/2006	BLANK	Chromium, hexavalent	mg/l	ND
10/23/2006	BLANK	Chromium, hexavalent	mg/l	ND
10/27/2006	BLANK	Chromium, hexavalent	mg/l	ND
10/31/2006	BLANK	Chromium, hexavalent	mg/l	ND
11/9/2006	BLANK	Chromium, hexavalent	mg/l	ND
11/30/2006	BLANK	Chromium, hexavalent	mg/l	ND
12/21/2006	BLANK	Chromium, hexavalent	mg/l	ND
1/4/2007	BLANK	Chromium, hexavalent	mg/l	ND
1/8/2007	BLANK	Chromium, hexavalent	mg/l	ND
1/11/2007	BLANK	Chromium, hexavalent	mg/l	ND
1/16/2007	BLANK	Chromium, hexavalent	mg/l	ND
1/25/2007	BLANK	Chromium, hexavalent	mg/l	ND
2/1/2007	BLANK	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
2/15/2007	BLANK	Chromium, hexavalent	mg/l	ND
3/8/2007	BLANK	Chromium, hexavalent	mg/l	ND
4/19/2007	BLANK	Chromium, hexavalent	mg/l	ND
4/23/2007	BLANK	Chromium, hexavalent	mg/l	ND
4/27/2007	BLANK	Chromium, hexavalent	mg/l	ND
5/1/2007	BLANK	Chromium, hexavalent	mg/l	ND
5/10/2007	BLANK	Chromium, hexavalent	mg/l	ND
5/31/2007	BLANK	Chromium, hexavalent	mg/l	ND
6/21/2007	BLANK	Chromium, hexavalent	mg/l	ND
7/26/2007	BLANK	Chromium, hexavalent	mg/L	ND
1/8/2009	BLANK	Chromium, hexavalent	mg/L	ND
1/12/2009	BLANK	Chromium, hexavalent	mg/L	ND
1/16/2009	BLANK	Chromium, hexavalent	mg/L	ND
1/20/2009	BLANK	Chromium, hexavalent	mg/L	ND
1/29/2009	BLANK	Chromium, hexavalent	mg/L	ND
2/19/2009	BLANK	Chromium, hexavalent	mg/L	ND
3/12/2009	BLANK	Chromium, hexavalent	mg/L	ND
3/24/2009	BLANK	Chromium, hexavalent	mg/L	ND
4/9/2009	BLANK	Chromium, hexavalent	mg/L	ND
4/13/2009	BLANK	Chromium, hexavalent	mg/L	ND
4/17/2009	BLANK	Chromium, hexavalent	mg/L	ND
4/21/2009	BLANK	Chromium, hexavalent	mg/L	ND
4/30/2009	BLANK	Chromium, hexavalent	mg/L	ND
5/21/2009	BLANK	Chromium, hexavalent	mg/L	ND
2/8/2008	BLANK	Chromium, hexavalent	mg/L	ND
6/11/2009	BLANK	Chromium, hexavalent	mg/L	ND
8/21/2006	BLANK	Dichloromethane (MeCl2)	ug/L	ND
8/22/2006	BLANK	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	BLANK	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	BLANK	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	BLANK	Dichloromethane (MeCl2)	ug/L	ND
4/7/2005	BLANK	Iron	mg/L	0.017
4/7/2005	BLANK	Iron	mg/L	0.017
6/9/2005	BLANK	Iron	mg/L	ND
6/9/2005	BLANK	Iron	mg/L	ND
10/13/2005	BLANK	Iron	mg/L	0.009
10/13/2005	BLANK	Iron	mg/L	0.009
10/17/2005	BLANK	Iron	mg/L	ND
10/17/2005	BLANK	Iron	mg/L	ND
10/21/2005	BLANK	Iron	mg/L	ND
10/21/2005	BLANK	Iron	mg/L	ND
10/25/2005	BLANK	Iron	mg/L	ND
10/25/2005	BLANK	Iron	mg/L	ND
11/3/2005	BLANK	Iron	mg/L	ND
11/3/2005	BLANK	Iron	mg/L	ND
11/23/2005	BLANK	Iron	mg/L	ND
11/23/2005	BLANK	Iron	mg/L	ND
12/15/2005	BLANK	Iron	mg/L	ND
12/15/2005	BLANK	Iron	mg/L	ND
1/5/2006	BLANK	Iron	mg/L	ND
1/9/2006	BLANK	Iron	mg/L	ND
1/13/2006	BLANK	Iron	mg/L	ND
1/17/2006	BLANK	Iron	mg/L	ND
1/26/2006	BLANK	Iron	mg/L	ND
2/16/2006	BLANK	Iron	mg/L	ND
3/9/2006	BLANK	Iron	mg/L	ND
3/23/2006	BLANK	Iron	mg/L	ND
4/6/2006	BLANK	Iron	mg/L	ND
4/10/2006	BLANK	Iron	mg/L	ND
4/14/2006	BLANK	Iron	mg/L	ND
4/18/2006	BLANK	Iron	mg/L	ND
4/27/2006	BLANK	Iron	mg/L	5
5/18/2006	BLANK	Iron	mg/L	0.255
6/8/2006	BLANK	Iron	mg/L	0.029
7/6/2006	BLANK	Iron	mg/L	ND
7/6/2006	BLANK	Iron	mg/L	ND
7/10/2006	BLANK	Iron	mg/L	ND
7/14/2006	BLANK	Iron	mg/L	ND
7/18/2006	BLANK	Iron	mg/L	ND
7/27/2006	BLANK	Iron	mg/L	ND
8/17/2006	BLANK	Iron	mg/L	ND
8/21/2006	BLANK	Iron	mg/L	ND
8/22/2006	BLANK	Iron	mg/L	ND
8/23/2006	BLANK	Iron	mg/L	ND
8/24/2006	BLANK	Iron	mg/L	ND
8/25/2006	BLANK	Iron	mg/L	ND
8/31/2006	BLANK	Iron	mg/L	0.043
9/7/2006	BLANK	Iron	mg/L	ND
10/19/2006	BLANK	Iron	mg/L	ND
10/23/2006	BLANK	Iron	mg/L	0.147
10/27/2006	BLANK	Iron	mg/L	ND
10/31/2006	BLANK	Iron	mg/L	ND
11/9/2006	BLANK	Iron	mg/L	ND
11/30/2006	BLANK	Iron	mg/L	ND
12/21/2006	BLANK	Iron	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/4/2007	BLANK	Iron	mg/L	ND
1/8/2007	BLANK	Iron	mg/L	ND
1/11/2007	BLANK	Iron	mg/L	ND
1/16/2007	BLANK	Iron	mg/L	ND
1/25/2007	BLANK	Iron	mg/L	ND
2/1/2007	BLANK	Iron	mg/L	ND
2/15/2007	BLANK	Iron	mg/L	ND
3/8/2007	BLANK	Iron	mg/L	ND
4/19/2007	BLANK	Iron	mg/L	ND
4/23/2007	BLANK	Iron	mg/L	ND
4/27/2007	BLANK	Iron	mg/L	ND
5/1/2007	BLANK	Iron	mg/L	ND
5/10/2007	BLANK	Iron	mg/L	ND
5/31/2007	BLANK	Iron	mg/L	ND
6/21/2007	BLANK	Iron	mg/L	ND
7/26/2007	BLANK	Iron	mg/L	ND
1/8/2009	BLANK	Iron	mg/L	ND
1/12/2009	BLANK	Iron	mg/L	ND
1/16/2009	BLANK	Iron	mg/L	ND
1/20/2009	BLANK	Iron	mg/L	ND
1/29/2009	BLANK	Iron	mg/L	ND
2/19/2009	BLANK	Iron	mg/L	ND
3/12/2009	BLANK	Iron	mg/L	ND
3/24/2009	BLANK	Iron	mg/L	ND
4/9/2009	BLANK	Iron	mg/L	ND
4/13/2009	BLANK	Iron	mg/L	ND
4/17/2009	BLANK	Iron	mg/L	ND
4/21/2009	BLANK	Iron	mg/L	ND
4/30/2009	BLANK	Iron	mg/L	ND
5/21/2009	BLANK	Iron	mg/L	ND
2/8/2008	BLANK	Iron	mg/L	ND
6/11/2009	BLANK	Iron	mg/L	0.06
4/7/2005	BLANK	Manganese	mg/L	ND
6/9/2005	BLANK	Manganese	mg/L	ND
10/13/2005	BLANK	Manganese	mg/L	ND
10/17/2005	BLANK	Manganese	mg/L	ND
10/21/2005	BLANK	Manganese	mg/L	ND
10/25/2005	BLANK	Manganese	mg/L	ND
11/3/2005	BLANK	Manganese	mg/L	ND
11/23/2005	BLANK	Manganese	mg/L	ND
12/15/2005	BLANK	Manganese	mg/L	ND
1/5/2006	BLANK	Manganese	mg/L	ND
1/9/2006	BLANK	Manganese	mg/L	ND
1/13/2006	BLANK	Manganese	mg/L	ND
1/17/2006	BLANK	Manganese	mg/L	ND
1/26/2006	BLANK	Manganese	mg/L	ND
2/16/2006	BLANK	Manganese	mg/L	ND
3/9/2006	BLANK	Manganese	mg/L	ND
3/23/2006	BLANK	Manganese	mg/L	ND
4/6/2006	BLANK	Manganese	mg/L	ND
4/10/2006	BLANK	Manganese	mg/L	ND
4/14/2006	BLANK	Manganese	mg/L	ND
4/18/2006	BLANK	Manganese	mg/L	ND
4/27/2006	BLANK	Manganese	mg/L	ND
5/18/2006	BLANK	Manganese	mg/L	ND
6/8/2006	BLANK	Manganese	mg/L	ND
7/6/2006	BLANK	Manganese	mg/L	ND
7/10/2006	BLANK	Manganese	mg/L	ND
7/14/2006	BLANK	Manganese	mg/L	ND
7/18/2006	BLANK	Manganese	mg/L	ND
7/27/2006	BLANK	Manganese	mg/L	ND
8/17/2006	BLANK	Manganese	mg/L	ND
8/21/2006	BLANK	Manganese	mg/L	ND
8/22/2006	BLANK	Manganese	mg/L	ND
8/23/2006	BLANK	Manganese	mg/L	ND
8/24/2006	BLANK	Manganese	mg/L	ND
8/25/2006	BLANK	Manganese	mg/L	ND
8/31/2006	BLANK	Manganese	mg/L	ND
9/7/2006	BLANK	Manganese	mg/L	ND
10/19/2006	BLANK	Manganese	mg/L	ND
10/23/2006	BLANK	Manganese	mg/L	ND
10/27/2006	BLANK	Manganese	mg/L	ND
10/31/2006	BLANK	Manganese	mg/L	ND
11/9/2006	BLANK	Manganese	mg/L	ND
11/30/2006	BLANK	Manganese	mg/L	ND
12/21/2006	BLANK	Manganese	mg/L	ND
1/4/2007	BLANK	Manganese	mg/L	ND
1/8/2007	BLANK	Manganese	mg/L	ND
1/11/2007	BLANK	Manganese	mg/L	ND
1/16/2007	BLANK	Manganese	mg/L	ND
1/25/2007	BLANK	Manganese	mg/L	ND
2/1/2007	BLANK	Manganese	mg/L	ND
2/15/2007	BLANK	Manganese	mg/L	ND
3/8/2007	BLANK	Manganese	mg/L	ND
4/19/2007	BLANK	Manganese	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/23/2007	BLANK	Manganese	mg/L	ND
4/27/2007	BLANK	Manganese	mg/L	ND
5/1/2007	BLANK	Manganese	mg/L	ND
5/10/2007	BLANK	Manganese	mg/L	ND
5/31/2007	BLANK	Manganese	mg/L	ND
6/21/2007	BLANK	Manganese	mg/L	ND
7/26/2007	BLANK	Manganese	mg/L	ND
1/8/2009	BLANK	Manganese	mg/L	ND
1/12/2009	BLANK	Manganese	mg/L	ND
1/16/2009	BLANK	Manganese	mg/L	ND
1/20/2009	BLANK	Manganese	mg/L	ND
1/29/2009	BLANK	Manganese	mg/L	ND
2/19/2009	BLANK	Manganese	mg/L	ND
3/12/2009	BLANK	Manganese	mg/L	ND
3/24/2009	BLANK	Manganese	mg/L	ND
4/9/2009	BLANK	Manganese	mg/L	ND
4/13/2009	BLANK	Manganese	mg/L	ND
4/17/2009	BLANK	Manganese	mg/L	ND
4/21/2009	BLANK	Manganese	mg/L	ND
4/30/2009	BLANK	Manganese	mg/L	ND
5/21/2009	BLANK	Manganese	mg/L	ND
2/8/2008	BLANK	Manganese	mg/L	ND
6/11/2009	BLANK	Manganese	mg/L	ND
4/7/2005	BLANK	pH	pH Units	6.19
4/7/2005	BLANK	pH	pH Units	6.19
4/7/2005	BLANK	pH	pH Units	6.19
6/9/2005	BLANK	pH	pH Units	5.72
6/9/2005	BLANK	pH	pH Units	5.72
10/13/2005	BLANK	pH	pH Units	7.48
10/17/2005	BLANK	pH	pH Units	5.28
10/21/2005	BLANK	pH	pH Units	5.27
10/25/2005	BLANK	pH	pH Units	5.79
11/3/2005	BLANK	pH	pH Units	6.15
11/23/2005	BLANK	pH	pH Units	6.05
12/15/2005	BLANK	pH	pH Units	6.13
1/5/2006	BLANK	pH	pH Units	6.25
1/9/2006	BLANK	pH	pH Units	6.74
1/13/2006	BLANK	pH	pH Units	5.89
1/17/2006	BLANK	pH	pH Units	5.22
1/26/2006	BLANK	pH	pH Units	6.69
2/16/2006	BLANK	pH	pH Units	6.95
3/9/2006	BLANK	pH	pH Units	7.33
4/6/2006	BLANK	pH	pH Units	5.22
4/10/2006	BLANK	pH	pH Units	5.4
4/14/2006	BLANK	pH	pH Units	5.24
4/18/2006	BLANK	pH	pH Units	5.65
4/27/2006	BLANK	pH	pH Units	7.95
5/18/2006	BLANK	pH	pH Units	7.19
6/8/2006	BLANK	pH	pH Units	6.05
7/6/2006	BLANK	pH	pH Units	5.98
7/10/2006	BLANK	pH	pH Units	5.9
7/14/2006	BLANK	pH	pH Units	6.04
7/18/2006	BLANK	pH	pH Units	5.75
7/27/2006	BLANK	pH	pH Units	5.76
8/17/2006	BLANK	pH	pH Units	6.4
9/7/2006	BLANK	pH	pH Units	6.54
10/19/2006	BLANK	pH	pH Units	5.89
10/23/2006	BLANK	pH	pH Units	5.82
10/27/2006	BLANK	pH	pH Units	5.4
10/31/2006	BLANK	pH	pH Units	6.43
11/9/2006	BLANK	pH	pH Units	19
11/30/2006	BLANK	pH	pH Units	7.07
12/21/2006	BLANK	pH	pH Units	7.47
1/4/2007	BLANK	pH	pH Units	5.67
1/8/2007	BLANK	pH	pH Units	5.49
1/11/2007	BLANK	pH	pH Units	5.78
1/16/2007	BLANK	pH	pH Units	5.68
1/25/2007	BLANK	pH	pH Units	5.93
2/15/2007	BLANK	pH	pH Units	5.7
3/8/2007	BLANK	pH	pH Units	5.92
4/19/2007	BLANK	pH	pH Units	5.97
4/23/2007	BLANK	pH	pH Units	5.75
4/27/2007	BLANK	pH	pH Units	6.38
5/1/2007	BLANK	pH	pH Units	6.06
5/10/2007	BLANK	pH	pH Units	7.06
5/31/2007	BLANK	pH	pH Units	6.26
6/21/2007	BLANK	pH	pH Units	5.95
1/8/2009	BLANK	pH	pH	6.26
1/12/2009	BLANK	pH	pH	5.65
1/16/2009	BLANK	pH	pH	6.00
1/20/2009	BLANK	pH	pH	5.53
1/29/2009	BLANK	pH	pH	5.79
2/19/2009	BLANK	pH	pH	7.05
3/12/2009	BLANK	pH	pH	6.22
4/9/2009	BLANK	pH	pH	7.17

Sampling Date	Location ID	Analyte	Unit	Concentration
4/13/2009	BLANK	pH	pH	6.51
4/17/2009	BLANK	pH	pH	6.52
4/21/2009	BLANK	pH	pH	7.60
4/30/2009	BLANK	pH	pH	6.94
5/21/2009	BLANK	pH	pH	5.83
6/11/2009	BLANK	pH	pH	5.95
4/7/2005	BLANK	Phenols	mg/L	ND
4/7/2005	BLANK	Phenols	mg/L	ND
4/7/2005	BLANK	Phenols	mg/L	ND
6/9/2005	BLANK	Phenols	mg/L	ND
6/9/2005	BLANK	Phenols	mg/L	ND
6/9/2005	BLANK	Phenols	mg/L	ND
10/13/2005	BLANK	Phenols	mg/L	ND
10/17/2005	BLANK	Phenols	mg/L	ND
10/21/2005	BLANK	Phenols	mg/L	ND
10/25/2005	BLANK	Phenols	mg/L	ND
11/3/2005	BLANK	Phenols	mg/L	ND
11/23/2005	BLANK	Phenols	mg/L	ND
12/15/2005	BLANK	Phenols	mg/L	ND
1/5/2006	BLANK	Phenols	mg/L	ND
1/9/2006	BLANK	Phenols	mg/L	ND
1/13/2006	BLANK	Phenols	mg/L	ND
1/17/2006	BLANK	Phenols	mg/L	ND
1/26/2006	BLANK	Phenols	mg/L	ND
2/16/2006	BLANK	Phenols	mg/L	ND
3/9/2006	BLANK	Phenols	mg/L	ND
3/23/2006	BLANK	Phenols	mg/L	ND
4/6/2006	BLANK	Phenols	mg/L	ND
4/10/2006	BLANK	Phenols	mg/L	ND
4/14/2006	BLANK	Phenols	mg/L	ND
4/18/2006	BLANK	Phenols	mg/L	ND
4/27/2006	BLANK	Phenols	mg/L	ND
5/18/2006	BLANK	Phenols	mg/L	ND
6/8/2006	BLANK	Phenols	mg/L	ND
7/6/2006	BLANK	Phenols	mg/L	ND
7/10/2006	BLANK	Phenols	mg/L	ND
7/14/2006	BLANK	Phenols	mg/L	ND
7/18/2006	BLANK	Phenols	mg/L	ND
7/27/2006	BLANK	Phenols	mg/L	ND
8/17/2006	BLANK	Phenols	mg/L	ND
8/31/2006	BLANK	Phenols	mg/L	ND
9/7/2006	BLANK	Phenols	mg/L	ND
10/19/2006	BLANK	Phenols	mg/L	ND
10/23/2006	BLANK	Phenols	mg/L	ND
10/27/2006	BLANK	Phenols	mg/L	ND
10/31/2006	BLANK	Phenols	mg/L	ND
11/9/2006	BLANK	Phenols	mg/L	ND
11/30/2006	BLANK	Phenols	mg/L	ND
12/21/2006	BLANK	Phenols	mg/L	ND
1/4/2007	BLANK	Phenols	mg/L	ND
1/8/2007	BLANK	Phenols	mg/L	ND
1/11/2007	BLANK	Phenols	mg/L	ND
1/16/2007	BLANK	Phenols	mg/L	ND
1/25/2007	BLANK	Phenols	mg/L	ND
2/15/2007	BLANK	Phenols	mg/L	ND
3/8/2007	BLANK	Phenols	mg/L	ND
4/19/2007	BLANK	Phenols	mg/L	ND
4/23/2007	BLANK	Phenols	mg/L	ND
4/27/2007	BLANK	Phenols	mg/L	ND
5/1/2007	BLANK	Phenols	mg/L	ND
5/10/2007	BLANK	Phenols	mg/L	ND
5/31/2007	BLANK	Phenols	mg/L	ND
6/21/2007	BLANK	Phenols	mg/L	ND
1/8/2009	BLANK	Phenols, Total	mg/L	0.007
1/12/2009	BLANK	Phenols, Total	mg/L	ND
1/16/2009	BLANK	Phenols, Total	mg/L	ND
1/20/2009	BLANK	Phenols, Total	mg/L	ND
1/29/2009	BLANK	Phenols, Total	mg/L	ND
2/19/2009	BLANK	Phenols, Total	mg/L	ND
3/12/2009	BLANK	Phenols, Total	mg/L	ND
3/24/2009	BLANK	Phenols, Total	mg/L	ND
4/9/2009	BLANK	Phenols, Total	mg/L	ND
4/13/2009	BLANK	Phenols, Total	mg/L	ND
4/17/2009	BLANK	Phenols, Total	mg/L	ND
4/21/2009	BLANK	Phenols, Total	mg/L	ND
4/30/2009	BLANK	Phenols, Total	mg/L	ND
5/21/2009	BLANK	Phenols, Total	mg/L	ND
6/11/2009	BLANK	Phenols, Total	mg/L	ND
4/7/2005	BLANK	Sodium	mg/L	ND
4/7/2005	BLANK	Sodium	mg/L	ND
4/7/2005	BLANK	Sodium	mg/L	ND
6/9/2005	BLANK	Sodium	mg/L	ND
6/9/2005	BLANK	Sodium	mg/L	ND
10/13/2005	BLANK	Sodium	mg/L	ND
10/17/2005	BLANK	Sodium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/21/2005	BLANK	Sodium	mg/L	ND
10/25/2005	BLANK	Sodium	mg/L	ND
11/3/2005	BLANK	Sodium	mg/L	ND
11/23/2005	BLANK	Sodium	mg/L	ND
12/15/2005	BLANK	Sodium	mg/L	ND
1/5/2006	BLANK	Sodium	mg/L	ND
1/9/2006	BLANK	Sodium	mg/L	ND
1/13/2006	BLANK	Sodium	mg/L	ND
1/17/2006	BLANK	Sodium	mg/L	ND
1/26/2006	BLANK	Sodium	mg/L	ND
2/16/2006	BLANK	Sodium	mg/L	ND
3/9/2006	BLANK	Sodium	mg/L	ND
3/23/2006	BLANK	Sodium	mg/L	ND
4/6/2006	BLANK	Sodium	mg/L	ND
4/10/2006	BLANK	Sodium	mg/L	ND
4/14/2006	BLANK	Sodium	mg/L	ND
4/18/2006	BLANK	Sodium	mg/L	ND
4/27/2006	BLANK	Sodium	mg/L	ND
5/18/2006	BLANK	Sodium	mg/L	ND
6/8/2006	BLANK	Sodium	mg/L	0.303
7/6/2006	BLANK	Sodium	mg/L	ND
7/10/2006	BLANK	Sodium	mg/L	ND
7/14/2006	BLANK	Sodium	mg/L	ND
7/18/2006	BLANK	Sodium	mg/L	ND
7/27/2006	BLANK	Sodium	mg/L	ND
8/17/2006	BLANK	Sodium	mg/L	ND
8/31/2006	BLANK	Sodium	mg/L	ND
9/7/2006	BLANK	Sodium	mg/L	ND
10/19/2006	BLANK	Sodium	mg/L	ND
10/23/2006	BLANK	Sodium	mg/L	0.235
10/27/2006	BLANK	Sodium	mg/L	ND
10/31/2006	BLANK	Sodium	mg/L	ND
11/9/2006	BLANK	Sodium	mg/L	ND
11/30/2006	BLANK	Sodium	mg/L	ND
12/21/2006	BLANK	Sodium	mg/L	ND
1/4/2007	BLANK	Sodium	mg/L	ND
1/8/2007	BLANK	Sodium	mg/L	ND
1/11/2007	BLANK	Sodium	mg/L	ND
1/16/2007	BLANK	Sodium	mg/L	ND
1/25/2007	BLANK	Sodium	mg/L	ND
2/1/2007	BLANK	Sodium	mg/L	ND
2/15/2007	BLANK	Sodium	mg/L	ND
3/8/2007	BLANK	Sodium	mg/L	ND
4/19/2007	BLANK	Sodium	mg/L	ND
4/23/2007	BLANK	Sodium	mg/L	ND
4/27/2007	BLANK	Sodium	mg/L	ND
5/1/2007	BLANK	Sodium	mg/L	ND
5/10/2007	BLANK	Sodium	mg/L	ND
5/31/2007	BLANK	Sodium	mg/L	0.529
6/21/2007	BLANK	Sodium	mg/L	ND
7/26/2007	BLANK	Sodium	mg/L	ND
1/8/2009	BLANK	Sodium	mg/L	0.108
1/12/2009	BLANK	Sodium	mg/L	0.104
1/16/2009	BLANK	Sodium	mg/L	ND
1/20/2009	BLANK	Sodium	mg/L	ND
1/29/2009	BLANK	Sodium	mg/L	ND
2/19/2009	BLANK	Sodium	mg/L	ND
3/12/2009	BLANK	Sodium	mg/L	ND
3/24/2009	BLANK	Sodium	mg/L	ND
4/9/2009	BLANK	Sodium	mg/L	ND
4/13/2009	BLANK	Sodium	mg/L	ND
4/17/2009	BLANK	Sodium	mg/L	ND
4/21/2009	BLANK	Sodium	mg/L	0.090
4/30/2009	BLANK	Sodium	mg/L	ND
5/21/2009	BLANK	Sodium	mg/L	0.031
2/8/2008	BLANK	Sodium	mg/L	ND
6/11/2009	BLANK	Sodium	mg/L	0.084
4/7/2005	BLANK	Specific Conductance	umhos	2
4/7/2005	BLANK	Specific Conductance	umhos	2
4/7/2005	BLANK	Specific Conductance	umhos	2
6/9/2005	BLANK	Specific Conductance	umhos	1
6/9/2005	BLANK	Specific Conductance	umhos	1
10/13/2005	BLANK	Specific Conductance	umhos	2
10/17/2005	BLANK	Specific Conductance	umhos	4
10/21/2005	BLANK	Specific Conductance	umhos	2
10/25/2005	BLANK	Specific Conductance	umhos	4
11/3/2005	BLANK	Specific Conductance	umhos	1
11/23/2005	BLANK	Specific Conductance	umhos	2
12/15/2005	BLANK	Specific Conductance	umhos	ND
1/5/2006	BLANK	Specific Conductance	umhos	2
1/9/2006	BLANK	Specific Conductance	umhos	1
1/13/2006	BLANK	Specific Conductance	umhos	3
1/17/2006	BLANK	Specific Conductance	umhos	3
1/26/2006	BLANK	Specific Conductance	umhos	2
2/16/2006	BLANK	Specific Conductance	umhos	1

Sampling Date	Location ID	Analyte	Unit	Concentration
3/9/2006	BLANK	Specific Conductance	umhos	1
4/6/2006	BLANK	Specific Conductance	umhos	2
4/10/2006	BLANK	Specific Conductance	umhos	2
4/14/2006	BLANK	Specific Conductance	umhos	9
4/18/2006	BLANK	Specific Conductance	umhos	2
4/27/2006	BLANK	Specific Conductance	umhos	13
5/18/2006	BLANK	Specific Conductance	umhos	4
6/8/2006	BLANK	Specific Conductance	umhos	2
7/6/2006	BLANK	Specific Conductance	umhos	1
7/10/2006	BLANK	Specific Conductance	umhos	0
7/14/2006	BLANK	Specific Conductance	umhos	2
7/18/2006	BLANK	Specific Conductance	umhos	1
7/27/2006	BLANK	Specific Conductance	umhos	2
8/17/2006	BLANK	Specific Conductance	umhos	2
9/7/2006	BLANK	Specific Conductance	umhos	1
10/19/2006	BLANK	Specific Conductance	umhos	2
10/23/2006	BLANK	Specific Conductance	umhos	1
10/27/2006	BLANK	Specific Conductance	umhos	1
10/31/2006	BLANK	Specific Conductance	umhos	1
11/9/2006	BLANK	Specific Conductance	umhos	2
11/30/2006	BLANK	Specific Conductance	umhos	2
12/21/2006	BLANK	Specific Conductance	umhos	2
1/4/2007	BLANK	Specific Conductance	umhos	1
1/8/2007	BLANK	Specific Conductance	umhos	3
1/11/2007	BLANK	Specific Conductance	umhos	10
1/16/2007	BLANK	Specific Conductance	umhos	1
1/25/2007	BLANK	Specific Conductance	umhos	2
2/15/2007	BLANK	Specific Conductance	umhos	4
3/8/2007	BLANK	Specific Conductance	umhos	2
4/19/2007	BLANK	Specific Conductance	umhos	2
4/23/2007	BLANK	Specific Conductance	umhos	2
4/27/2007	BLANK	Specific Conductance	umhos	2
5/1/2007	BLANK	Specific Conductance	umhos	2
5/10/2007	BLANK	Specific Conductance	umhos	2
5/31/2007	BLANK	Specific Conductance	umhos	1
6/21/2007	BLANK	Specific Conductance	umhos	1
1/8/2009	BLANK	Specific Conductance	umhos	2
1/12/2009	BLANK	Specific Conductance	umhos	5
1/16/2009	BLANK	Specific Conductance	umhos	1
1/20/2009	BLANK	Specific Conductance	umhos	2
1/29/2009	BLANK	Specific Conductance	umhos	2
2/19/2009	BLANK	Specific Conductance	umhos	2
3/12/2009	BLANK	Specific Conductance	umhos	1
4/9/2009	BLANK	Specific Conductance	umhos	2
4/13/2009	BLANK	Specific Conductance	umhos	1
4/17/2009	BLANK	Specific Conductance	umhos	1
4/21/2009	BLANK	Specific Conductance	umhos	1
4/30/2009	BLANK	Specific Conductance	umhos	1
5/21/2009	BLANK	Specific Conductance	umhos	1
6/11/2009	BLANK	Specific Conductance	umhos	1
7/26/2007	BLANK	Sulfate	mg/L	ND
1/8/2009	BLANK	Sulfate	mg/L	ND
1/12/2009	BLANK	Sulfate	mg/L	ND
1/16/2009	BLANK	Sulfate	mg/L	ND
1/20/2009	BLANK	Sulfate	mg/L	ND
1/29/2009	BLANK	Sulfate	mg/L	ND
2/19/2009	BLANK	Sulfate	mg/L	ND
3/12/2009	BLANK	Sulfate	mg/L	ND
3/24/2009	BLANK	Sulfate	mg/L	ND
4/9/2009	BLANK	Sulfate	mg/L	ND
4/13/2009	BLANK	Sulfate	mg/L	ND
4/17/2009	BLANK	Sulfate	mg/L	ND
4/21/2009	BLANK	Sulfate	mg/L	ND
4/30/2009	BLANK	Sulfate	mg/L	ND
5/21/2009	BLANK	Sulfate	mg/L	ND
2/8/2008	BLANK	Sulfate	mg/L	ND
4/7/2005	BLANK	Sulfate	mg/L	ND
4/7/2005	BLANK	Sulfate	mg/L	ND
4/7/2005	BLANK	Sulfate	mg/L	ND
6/9/2005	BLANK	Sulfate	mg/L	ND
6/9/2005	BLANK	Sulfate	mg/L	ND
10/13/2005	BLANK	Sulfate	mg/L	ND
10/17/2005	BLANK	Sulfate	mg/L	ND
10/21/2005	BLANK	Sulfate	mg/L	ND
10/25/2005	BLANK	Sulfate	mg/L	ND
11/3/2005	BLANK	Sulfate	mg/L	ND
11/23/2005	BLANK	Sulfate	mg/L	ND
12/15/2005	BLANK	Sulfate	mg/L	ND
1/5/2006	BLANK	Sulfate	mg/L	ND
1/9/2006	BLANK	Sulfate	mg/L	ND
1/13/2006	BLANK	Sulfate	mg/L	ND
1/17/2006	BLANK	Sulfate	mg/L	ND
1/26/2006	BLANK	Sulfate	mg/L	ND
2/16/2006	BLANK	Sulfate	mg/L	ND
3/9/2006	BLANK	Sulfate	mg/L	ND
3/23/2006	BLANK	Sulfate	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/6/2006	BLANK	Sulfate	mg/L	ND
4/10/2006	BLANK	Sulfate	mg/L	ND
4/14/2006	BLANK	Sulfate	mg/L	ND
4/18/2006	BLANK	Sulfate	mg/L	ND
4/27/2006	BLANK	Sulfate	mg/L	ND
5/18/2006	BLANK	Sulfate	mg/L	ND
6/8/2006	BLANK	Sulfate	mg/L	ND
7/6/2006	BLANK	Sulfate	mg/L	ND
7/10/2006	BLANK	Sulfate	mg/L	ND
7/14/2006	BLANK	Sulfate	mg/L	ND
7/18/2006	BLANK	Sulfate	mg/L	ND
7/27/2006	BLANK	Sulfate	mg/L	ND
8/17/2006	BLANK	Sulfate	mg/L	ND
8/21/2006	BLANK	Sulfate	mg/L	ND
8/22/2006	BLANK	Sulfate	mg/L	ND
8/23/2006	BLANK	Sulfate	mg/L	ND
8/24/2006	BLANK	Sulfate	mg/L	ND
8/25/2006	BLANK	Sulfate	mg/L	ND
8/31/2006	BLANK	Sulfate	mg/L	ND
9/7/2006	BLANK	Sulfate	mg/L	ND
10/19/2006	BLANK	Sulfate	mg/L	ND
10/23/2006	BLANK	Sulfate	mg/L	ND
10/27/2006	BLANK	Sulfate	mg/L	ND
10/31/2006	BLANK	Sulfate	mg/L	ND
11/9/2006	BLANK	Sulfate	mg/L	ND
11/30/2006	BLANK	Sulfate	mg/L	ND
12/21/2006	BLANK	Sulfate	mg/L	ND
1/4/2007	BLANK	Sulfate	mg/L	ND
1/8/2007	BLANK	Sulfate	mg/L	ND
1/11/2007	BLANK	Sulfate	mg/L	ND
1/16/2007	BLANK	Sulfate	mg/L	ND
1/25/2007	BLANK	Sulfate	mg/L	ND
2/1/2007	BLANK	Sulfate	mg/L	ND
2/15/2007	BLANK	Sulfate	mg/L	0.55
3/8/2007	BLANK	Sulfate	mg/L	ND
4/19/2007	BLANK	Sulfate	mg/L	ND
4/23/2007	BLANK	Sulfate	mg/L	ND
4/27/2007	BLANK	Sulfate	mg/L	ND
5/1/2007	BLANK	Sulfate	mg/L	ND
5/10/2007	BLANK	Sulfate	mg/L	ND
5/31/2007	BLANK	Sulfate	mg/L	ND
6/21/2007	BLANK	Sulfate	mg/L	ND
6/11/2009	BLANK	Sulfate	mg/L	ND
4/7/2005	BLANK	Temperature	C	20
6/9/2005	BLANK	Temperature	C	25
10/13/2005	BLANK	Temperature	C	14
10/17/2005	BLANK	Temperature	C	11
10/21/2005	BLANK	Temperature	C	14
10/25/2005	BLANK	Temperature	C	10
11/3/2005	BLANK	Temperature	C	9
11/23/2005	BLANK	Temperature	C	6
12/15/2005	BLANK	Temperature	C	ND
1/5/2006	BLANK	Temperature	C	10
1/9/2006	BLANK	Temperature	C	7
1/13/2006	BLANK	Temperature	C	20
1/17/2006	BLANK	Temperature	C	1
1/26/2006	BLANK	Temperature	C	4
2/16/2006	BLANK	Temperature	C	11
3/9/2006	BLANK	Temperature	C	11
4/6/2006	BLANK	Temperature	C	12
4/10/2006	BLANK	Temperature	C	9
4/14/2006	BLANK	Temperature	C	19.8
4/18/2006	BLANK	Temperature	C	8
4/27/2006	BLANK	Temperature	C	15
5/18/2006	BLANK	Temperature	C	18
6/8/2006	BLANK	Temperature	C	20
7/6/2006	BLANK	Temperature	C	23
7/10/2006	BLANK	Temperature	C	25
7/14/2006	BLANK	Temperature	C	27
7/18/2006	BLANK	Temperature	C	30
7/27/2006	BLANK	Temperature	C	28
8/17/2006	BLANK	Temperature	C	23
9/7/2006	BLANK	Temperature	C	22
10/19/2006	BLANK	Temperature	C	20
10/23/2006	BLANK	Temperature	C	12
10/27/2006	BLANK	Temperature	C	10
10/31/2006	BLANK	Temperature	C	15
11/9/2006	BLANK	Temperature	C	7.28
11/30/2006	BLANK	Temperature	C	17
12/21/2006	BLANK	Temperature	C	8
1/4/2007	BLANK	Temperature	C	12
1/8/2007	BLANK	Temperature	C	12
1/11/2007	BLANK	Temperature	C	8
1/16/2007	BLANK	Temperature	C	21
1/25/2007	BLANK	Temperature	C	4

Sampling Date	Location ID	Analyte	Unit	Concentration
2/15/2007	BLANK	Temperature	C	1
3/8/2007	BLANK	Temperature	C	1
4/19/2007	BLANK	Temperature	C	14
4/23/2007	BLANK	Temperature	C	20
4/27/2007	BLANK	Temperature	C	15
5/1/2007	BLANK	Temperature	C	17
5/10/2007	BLANK	Temperature	C	22
5/31/2007	BLANK	Temperature	C	24
6/21/2007	BLANK	Temperature	C	23
1/8/2009	BLANK	Temperature	C	6
1/12/2009	BLANK	Temperature	C	2
1/16/2009	BLANK	Temperature	C	1
1/20/2009	BLANK	Temperature	C	1
1/29/2009	BLANK	Temperature	C	4
2/19/2009	BLANK	Temperature	C	12
3/12/2009	BLANK	Temperature	C	11
4/9/2009	BLANK	Temperature	C	12
4/13/2009	BLANK	Temperature	C	7
4/17/2009	BLANK	Temperature	C	13
4/21/2009	BLANK	Temperature	C	14
4/30/2009	BLANK	Temperature	C	16
5/21/2009	BLANK	Temperature	C	19
6/11/2009	BLANK	Temperature	C	22
7/26/2007	BLANK	Total Organic Carbon	mg/L	ND
1/8/2009	BLANK	Total Organic Carbon	mg/L	ND
1/12/2009	BLANK	Total Organic Carbon	mg/L	ND
1/16/2009	BLANK	Total Organic Carbon	mg/L	ND
1/20/2009	BLANK	Total Organic Carbon	mg/L	ND
1/29/2009	BLANK	Total Organic Carbon	mg/L	ND
2/19/2009	BLANK	Total Organic Carbon	mg/L	ND
3/12/2009	BLANK	Total Organic Carbon	mg/L	ND
3/24/2009	BLANK	Total Organic Carbon	mg/L	ND
2/8/2008	BLANK	Total Organic Carbon	mg/L	ND
4/7/2005	BLANK	Total Organic Carbon	mg/L	ND
4/7/2005	BLANK	Total Organic Carbon	mg/L	ND
4/7/2005	BLANK	Total Organic Carbon	mg/L	ND
6/9/2005	BLANK	Total Organic Carbon	mg/L	ND
6/9/2005	BLANK	Total Organic Carbon	mg/L	ND
10/13/2005	BLANK	Total Organic Carbon	mg/L	ND
10/17/2005	BLANK	Total Organic Carbon	mg/L	ND
10/21/2005	BLANK	Total Organic Carbon	mg/L	ND
10/25/2005	BLANK	Total Organic Carbon	mg/L	ND
11/3/2005	BLANK	Total Organic Carbon	mg/L	ND
11/23/2005	BLANK	Total Organic Carbon	mg/L	ND
12/15/2005	BLANK	Total Organic Carbon	mg/L	ND
1/5/2006	BLANK	Total Organic Carbon	mg/L	ND
1/9/2006	BLANK	Total Organic Carbon	mg/L	ND
1/13/2006	BLANK	Total Organic Carbon	mg/L	ND
1/17/2006	BLANK	Total Organic Carbon	mg/L	ND
1/26/2006	BLANK	Total Organic Carbon	mg/L	ND
2/16/2006	BLANK	Total Organic Carbon	mg/L	ND
3/9/2006	BLANK	Total Organic Carbon	mg/L	ND
3/23/2006	BLANK	Total Organic Carbon	mg/L	1.3
4/6/2006	BLANK	Total Organic Carbon	mg/L	ND
4/10/2006	BLANK	Total Organic Carbon	mg/L	ND
4/14/2006	BLANK	Total Organic Carbon	mg/L	ND
4/18/2006	BLANK	Total Organic Carbon	mg/L	ND
4/27/2006	BLANK	Total Organic Carbon	mg/L	ND
5/18/2006	BLANK	Total Organic Carbon	mg/L	ND
6/8/2006	BLANK	Total Organic Carbon	mg/L	ND
7/6/2006	BLANK	Total Organic Carbon	mg/L	ND
7/10/2006	BLANK	Total Organic Carbon	mg/L	ND
7/14/2006	BLANK	Total Organic Carbon	mg/L	ND
7/18/2006	BLANK	Total Organic Carbon	mg/L	ND
7/27/2006	BLANK	Total Organic Carbon	mg/L	ND
8/17/2006	BLANK	Total Organic Carbon	mg/L	ND
8/31/2006	BLANK	Total Organic Carbon	mg/L	ND
9/7/2006	BLANK	Total Organic Carbon	mg/L	ND
10/19/2006	BLANK	Total Organic Carbon	mg/L	ND
10/23/2006	BLANK	Total Organic Carbon	mg/L	ND
10/27/2006	BLANK	Total Organic Carbon	mg/L	ND
10/31/2006	BLANK	Total Organic Carbon	mg/L	ND
11/9/2006	BLANK	Total Organic Carbon	mg/L	ND
11/30/2006	BLANK	Total Organic Carbon	mg/L	ND
12/21/2006	BLANK	Total Organic Carbon	mg/L	ND
1/4/2007	BLANK	Total Organic Carbon	mg/L	ND
1/8/2007	BLANK	Total Organic Carbon	mg/L	ND
1/11/2007	BLANK	Total Organic Carbon	mg/L	ND
1/16/2007	BLANK	Total Organic Carbon	mg/L	ND
1/25/2007	BLANK	Total Organic Carbon	mg/L	ND
2/1/2007	BLANK	Total Organic Carbon	mg/L	ND
2/15/2007	BLANK	Total Organic Carbon	mg/L	ND
3/8/2007	BLANK	Total Organic Carbon	mg/L	ND
4/19/2007	BLANK	Total Organic Carbon	mg/L	ND
4/23/2007	BLANK	Total Organic Carbon	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/27/2007	BLANK	Total Organic Carbon	mg/L	ND
5/1/2007	BLANK	Total Organic Carbon	mg/L	ND
5/10/2007	BLANK	Total Organic Carbon	mg/L	ND
5/31/2007	BLANK	Total Organic Carbon	mg/L	ND
6/21/2007	BLANK	Total Organic Carbon	mg/L	ND
4/9/2009	BLANK	Total Organic Carbon	mg/L	ND
4/13/2009	BLANK	Total Organic Carbon	mg/L	ND
4/17/2009	BLANK	Total Organic Carbon	mg/L	ND
4/21/2009	BLANK	Total Organic Carbon	mg/L	ND
4/30/2009	BLANK	Total Organic Carbon	mg/L	ND
5/21/2009	BLANK	Total Organic Carbon	mg/L	ND
6/11/2009	BLANK	Total Organic Carbon	mg/L	ND
4/7/2005	BLANK	Total Organic Halogen	mg/L	ND
6/9/2005	BLANK	Total Organic Halogen	mg/L	ND
10/13/2005	BLANK	Total Organic Halogen	mg/L	ND
10/17/2005	BLANK	Total Organic Halogen	mg/L	0.012
10/21/2005	BLANK	Total Organic Halogen	mg/L	ND
10/25/2005	BLANK	Total Organic Halogen	mg/L	ND
11/3/2005	BLANK	Total Organic Halogen	mg/L	ND
11/23/2005	BLANK	Total Organic Halogen	mg/L	ND
12/15/2005	BLANK	Total Organic Halogen	mg/L	ND
1/5/2006	BLANK	Total Organic Halogen	mg/L	ND
1/9/2006	BLANK	Total Organic Halogen	mg/L	ND
1/13/2006	BLANK	Total Organic Halogen	mg/L	ND
1/17/2006	BLANK	Total Organic Halogen	mg/L	ND
1/26/2006	BLANK	Total Organic Halogen	mg/L	ND
2/16/2006	BLANK	Total Organic Halogen	mg/L	ND
3/9/2006	BLANK	Total Organic Halogen	mg/L	ND
3/23/2006	BLANK	Total Organic Halogen	mg/L	ND
4/6/2006	BLANK	Total Organic Halogen	mg/L	0.022
4/10/2006	BLANK	Total Organic Halogen	mg/L	0.021
4/14/2006	BLANK	Total Organic Halogen	mg/L	ND
4/18/2006	BLANK	Total Organic Halogen	mg/L	ND
4/27/2006	BLANK	Total Organic Halogen	mg/L	ND
5/18/2006	BLANK	Total Organic Halogen	mg/L	ND
6/8/2006	BLANK	Total Organic Halogen	mg/L	ND
7/6/2006	BLANK	Total Organic Halogen	mg/L	ND
7/10/2006	BLANK	Total Organic Halogen	mg/L	ND
7/14/2006	BLANK	Total Organic Halogen	mg/L	ND
7/18/2006	BLANK	Total Organic Halogen	mg/L	0.015
7/27/2006	BLANK	Total Organic Halogen	mg/L	ND
8/17/2006	BLANK	Total Organic Halogen	mg/L	ND
8/31/2006	BLANK	Total Organic Halogen	mg/L	ND
9/7/2006	BLANK	Total Organic Halogen	mg/L	ND
10/19/2006	BLANK	Total Organic Halogen	mg/L	ND
10/23/2006	BLANK	Total Organic Halogen	mg/L	ND
10/27/2006	BLANK	Total Organic Halogen	mg/L	ND
10/31/2006	BLANK	Total Organic Halogen	mg/L	ND
11/9/2006	BLANK	Total Organic Halogen	mg/L	0.051
11/30/2006	BLANK	Total Organic Halogen	mg/L	ND
12/21/2006	BLANK	Total Organic Halogen	mg/L	ND
1/4/2007	BLANK	Total Organic Halogen	mg/L	ND
1/8/2007	BLANK	Total Organic Halogen	mg/L	ND
1/11/2007	BLANK	Total Organic Halogen	mg/L	ND
1/16/2007	BLANK	Total Organic Halogen	mg/L	ND
2/1/2007	BLANK	Total Organic Halogen	mg/L	ND
2/15/2007	BLANK	Total Organic Halogen	mg/L	ND
3/8/2007	BLANK	Total Organic Halogen	mg/L	ND
4/19/2007	BLANK	Total Organic Halogen	mg/L	0.03
4/23/2007	BLANK	Total Organic Halogen	mg/L	ND
4/27/2007	BLANK	Total Organic Halogen	mg/L	ND
5/1/2007	BLANK	Total Organic Halogen	mg/L	0.01
5/10/2007	BLANK	Total Organic Halogen	mg/L	ND
5/31/2007	BLANK	Total Organic Halogen	mg/L	ND
6/21/2007	BLANK	Total Organic Halogen	mg/L	ND
7/26/2007	BLANK	Total Organic Halogen	mg/L	ND
1/8/2009	BLANK	Total Organic Halogen	mg/L	ND
1/12/2009	BLANK	Total Organic Halogen	mg/L	0.12
1/16/2009	BLANK	Total Organic Halogen	mg/L	ND
1/20/2009	BLANK	Total Organic Halogen	mg/L	0.1
1/29/2009	BLANK	Total Organic Halogen	mg/L	ND
2/19/2009	BLANK	Total Organic Halogen	mg/L	0.05
3/12/2009	BLANK	Total Organic Halogen	mg/L	ND
2/8/2008	BLANK	Total Organic Halogen	mg/L	ND
3/24/2009	BLANK	Total Organic Halogen	mg/L	ND
4/9/2009	BLANK	Total Organic Halogen	mg/L	0.01
4/13/2009	BLANK	Total Organic Halogen	mg/L	0.02
4/17/2009	BLANK	Total Organic Halogen	mg/L	ND
4/21/2009	BLANK	Total Organic Halogen	mg/L	ND
4/30/2009	BLANK	Total Organic Halogen	mg/L	ND
5/21/2009	BLANK	Total Organic Halogen	mg/L	ND
6/11/2009	BLANK	Total Organic Halogen	mg/L	ND
4/7/2005	BLANK	Turbidity	NTU	ND
6/9/2005	BLANK	Turbidity	NTU	ND
10/13/2005	BLANK	Turbidity	NTU	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/17/2005	BLANK	Turbidity	NTU	ND
10/21/2005	BLANK	Turbidity	NTU	ND
10/25/2005	BLANK	Turbidity	NTU	ND
11/3/2005	BLANK	Turbidity	NTU	ND
11/23/2005	BLANK	Turbidity	NTU	ND
12/15/2005	BLANK	Turbidity	NTU	ND
1/5/2006	BLANK	Turbidity	NTU	ND
1/9/2006	BLANK	Turbidity	NTU	ND
1/13/2006	BLANK	Turbidity	NTU	ND
1/17/2006	BLANK	Turbidity	NTU	ND
1/26/2006	BLANK	Turbidity	NTU	ND
2/16/2006	BLANK	Turbidity	NTU	ND
3/9/2006	BLANK	Turbidity	NTU	ND
4/6/2006	BLANK	Turbidity	NTU	ND
4/10/2006	BLANK	Turbidity	NTU	ND
4/14/2006	BLANK	Turbidity	NTU	ND
4/18/2006	BLANK	Turbidity	NTU	ND
4/27/2006	BLANK	Turbidity	NTU	ND
5/18/2006	BLANK	Turbidity	NTU	ND
6/8/2006	BLANK	Turbidity	NTU	ND
7/6/2006	BLANK	Turbidity	NTU	ND
7/10/2006	BLANK	Turbidity	NTU	ND
7/14/2006	BLANK	Turbidity	NTU	ND
7/18/2006	BLANK	Turbidity	NTU	ND
7/27/2006	BLANK	Turbidity	NTU	ND
8/17/2006	BLANK	Turbidity	NTU	ND
8/21/2006	BLANK	Turbidity	NTU	ND
8/22/2006	BLANK	Turbidity	NTU	ND
8/23/2006	BLANK	Turbidity	NTU	ND
8/24/2006	BLANK	Turbidity	NTU	ND
8/25/2006	BLANK	Turbidity	NTU	ND
9/7/2006	BLANK	Turbidity	NTU	ND
10/19/2006	BLANK	Turbidity	NTU	ND
10/23/2006	BLANK	Turbidity	NTU	ND
10/27/2006	BLANK	Turbidity	NTU	ND
10/31/2006	BLANK	Turbidity	NTU	ND
11/9/2006	BLANK	Turbidity	NTU	ND
11/30/2006	BLANK	Turbidity	NTU	0.12
12/21/2006	BLANK	Turbidity	NTU	ND
1/4/2007	BLANK	Turbidity	NTU	ND
1/8/2007	BLANK	Turbidity	NTU	ND
1/11/2007	BLANK	Turbidity	NTU	ND
1/16/2007	BLANK	Turbidity	NTU	ND
1/25/2007	BLANK	Turbidity	NTU	ND
2/15/2007	BLANK	Turbidity	NTU	ND
3/8/2007	BLANK	Turbidity	NTU	ND
4/19/2007	BLANK	Turbidity	NTU	ND
4/23/2007	BLANK	Turbidity	NTU	ND
4/27/2007	BLANK	Turbidity	NTU	ND
5/1/2007	BLANK	Turbidity	NTU	0.21
5/10/2007	BLANK	Turbidity	NTU	ND
5/31/2007	BLANK	Turbidity	NTU	ND
6/21/2007	BLANK	Turbidity	NTU	ND
1/8/2009	BLANK	Turbidity	NTU	ND
1/12/2009	BLANK	Turbidity	NTU	ND
1/16/2009	BLANK	Turbidity	NTU	ND
1/20/2009	BLANK	Turbidity	NTU	ND
1/29/2009	BLANK	Turbidity	NTU	ND
2/19/2009	BLANK	Turbidity	NTU	ND
3/12/2009	BLANK	Turbidity	NTU	ND
4/9/2009	BLANK	Turbidity	NTU	ND
4/13/2009	BLANK	Turbidity	NTU	ND
4/17/2009	BLANK	Turbidity	NTU	ND
4/21/2009	BLANK	Turbidity	NTU	ND
4/30/2009	BLANK	Turbidity	NTU	ND
5/21/2009	BLANK	Turbidity	NTU	0.02
6/11/2009	BLANK	Turbidity	NTU	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		Field Blank		
7/12/2007	Field Blank	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	Field Blank	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	Field Blank	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	Field Blank	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	Field Blank	1,1-Dichloroethane	ug/L	ND
7/12/2007	Field Blank	1,1-Dichloroethene	ug/L	ND
7/12/2007	Field Blank	1,1-Dichloropropene	ug/L	ND
7/12/2007	Field Blank	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	Field Blank	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	Field Blank	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	Field Blank	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	Field Blank	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	Field Blank	1,2-Dibromoethane	ug/L	ND
7/12/2007	Field Blank	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	Field Blank	1,2-Dichloroethane	ug/L	ND
7/12/2007	Field Blank	1,2-Dichloropropane	ug/L	ND
7/12/2007	Field Blank	1,3,5-Trimethylbenzene	ug/L	ND
7/12/2007	Field Blank	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	Field Blank	1,3-Dichloropropane	ug/L	ND
7/12/2007	Field Blank	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	Field Blank	2,2-Dichloropropane	ug/L	ND
7/12/2007	Field Blank	2-Butanone (MEK)	ug/L	ND
7/12/2007	Field Blank	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	Field Blank	2-Chlorotoluene	ug/L	ND
7/12/2007	Field Blank	2-Hexanone	ug/L	ND
7/12/2007	Field Blank	3-Chloro-1-propene	ug/L	ND
7/12/2007	Field Blank	4-Chlorotoluene	ug/L	ND
7/12/2007	Field Blank	4-Isopropyltoluene	ug/L	ND
7/12/2007	Field Blank	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	Field Blank	Acetone	ug/L	ND
7/12/2007	Field Blank	Acrolein	ug/L	ND
7/12/2007	Field Blank	Acrylonitrile	ug/L	ND
7/12/2007	Field Blank	Alkalinity, Bicarbonate	mg/L	1.5
7/12/2007	Field Blank	Ammonia	mg/L	ND
7/12/2007	Field Blank	Antimony	mg/L	ND
7/12/2007	Field Blank	Arsenic	mg/L	ND
1/6/2005	Field Blank	Barium	mg/L	ND
1/10/2005	Field Blank	Barium	mg/L	ND
1/14/2005	Field Blank	Barium	mg/L	ND
1/18/2005	Field Blank	Barium	mg/L	ND
1/27/2005	Field Blank	Barium	mg/L	ND
2/8/2005	Field Blank	Barium	mg/L	ND
2/17/2005	Field Blank	Barium	mg/L	ND
4/11/2005	Field Blank	Barium	mg/L	ND
4/15/2005	Field Blank	Barium	mg/L	ND
4/19/2005	Field Blank	Barium	mg/L	ND
4/28/2005	Field Blank	Barium	mg/L	ND
4/28/2005	Field Blank	Barium	mg/L	ND
5/19/2005	Field Blank	Barium	mg/L	ND
5/27/2005	Field Blank	Barium	mg/L	ND
7/7/2005	Field Blank	Barium	mg/L	ND
7/11/2005	Field Blank	Barium	mg/L	ND
7/15/2005	Field Blank	Barium	mg/L	ND
7/19/2005	Field Blank	Barium	mg/L	ND
7/22/2005	Field Blank	Barium	mg/L	ND
7/28/2005	Field Blank	Barium	mg/L	ND
8/18/2005	Field Blank	Barium	mg/L	ND
9/8/2005	Field Blank	Barium	mg/L	ND
7/12/2007	Field Blank	Barium	mg/L	ND
7/16/2007	Field Blank	Barium	mg/L	ND
7/20/2007	Field Blank	Barium	mg/L	ND
7/24/2007	Field Blank	Barium	mg/L	ND
8/2/2007	Field Blank	Barium	mg/L	ND
8/23/2007	Field Blank	Barium	mg/L	ND
9/13/2007	Field Blank	Barium	mg/L	ND
4/3/2008	Field Blank	Barium	mg/L	ND
4/7/2008	Field Blank	Barium	mg/L	ND
4/11/2008	Field Blank	Barium	mg/L	ND
4/15/2008	Field Blank	Barium	mg/L	ND
4/24/2008	Field Blank	Barium	mg/L	ND
5/15/2008	Field Blank	Barium	mg/L	ND
6/5/2008	Field Blank	Barium	mg/L	ND
7/3/2008	Field Blank	Barium	mg/L	ND
7/3/2008	Field Blank	Barium	mg/L	ND
7/7/2008	Field Blank	Barium	mg/L	ND
7/10/2008	Field Blank	Barium	mg/L	ND
7/11/2008	Field Blank	Barium	mg/L	ND
7/15/2008	Field Blank	Barium	mg/L	ND
7/24/2008	Field Blank	Barium	mg/L	ND
8/14/2008	Field Blank	Barium	mg/L	ND
9/4/2008	Field Blank	Barium	mg/L	ND
10/9/2008	Field Blank	Barium	mg/L	ND
10/13/2008	Field Blank	Barium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/17/2008	Field Blank	Barium	mg/L	ND
10/21/2008	Field Blank	Barium	mg/L	ND
10/30/2008	Field Blank	Barium	mg/L	ND
11/20/2008	Field Blank	Barium	mg/L	ND
12/11/2008	Field Blank	Barium	mg/L	ND
1/8/2009	Field Blank	Barium	mg/L	ND
1/12/2009	Field Blank	Barium	mg/L	ND
1/16/2009	Field Blank	Barium	mg/L	ND
1/20/2009	Field Blank	Barium	mg/L	ND
1/29/2009	Field Blank	Barium	mg/L	ND
2/19/2009	Field Blank	Barium	mg/L	ND
3/12/2009	Field Blank	Barium	mg/L	ND
3/24/2009	Field Blank	Barium	mg/L	ND
1/11/2008	Field Blank	Barium	mg/L	ND
1/15/2008	Field Blank	Barium	mg/L	ND
1/24/2008	Field Blank	Barium	mg/L	ND
1/3/2008	Field Blank	Barium	mg/L	ND
1/7/2008	Field Blank	Barium	mg/L	ND
10/18/2007	Field Blank	Barium	mg/L	ND
10/22/2007	Field Blank	Barium	mg/L	ND
10/26/2007	Field Blank	Barium	mg/L	ND
10/30/2007	Field Blank	Barium	mg/L	ND
11/29/2007	Field Blank	Barium	mg/L	ND
11/8/2007	Field Blank	Barium	mg/L	ND
12/20/2007	Field Blank	Barium	mg/L	-0.005
2/14/2008	Field Blank	Barium	mg/L	ND
3/6/2008	Field Blank	Barium	mg/L	ND
7/12/2007	Field Blank	Benzene	ug/L	ND
7/12/2007	Field Blank	Beryllium	mg/L	ND
7/12/2007	Field Blank	BOD	mg/L	ND
7/12/2007	Field Blank	Bromobenzene	ug/L	ND
7/12/2007	Field Blank	Bromochloromethane	ug/L	ND
7/12/2007	Field Blank	Bromodichloromethane	ug/L	ND
7/12/2007	Field Blank	Bromoform	ug/L	ND
7/12/2007	Field Blank	Bromomethane	ug/L	ND
7/12/2007	Field Blank	Cadmium	mg/L	ND
7/12/2007	Field Blank	Calcium	mg/L	ND
7/12/2007	Field Blank	Carbon Disulfide	ug/L	ND
7/12/2007	Field Blank	Carbon Tetrachloride	ug/L	ND
7/12/2007	Field Blank	Chemical Oxygen Demand	mg/L	ND
1/6/2005	Field Blank	Chloride	mg/L	ND
1/10/2005	Field Blank	Chloride	mg/L	ND
1/14/2005	Field Blank	Chloride	mg/L	ND
1/18/2005	Field Blank	Chloride	mg/L	ND
1/27/2005	Field Blank	Chloride	mg/L	0.65
2/8/2005	Field Blank	Chloride	mg/L	0.71
2/17/2005	Field Blank	Chloride	mg/L	ND
4/11/2005	Field Blank	Chloride	mg/L	ND
4/15/2005	Field Blank	Chloride	mg/L	ND
4/19/2005	Field Blank	Chloride	mg/L	ND
4/28/2005	Field Blank	Chloride	mg/L	ND
5/19/2005	Field Blank	Chloride	mg/L	ND
5/27/2005	Field Blank	Chloride	mg/L	1.62
7/7/2005	Field Blank	Chloride	mg/L	ND
7/11/2005	Field Blank	Chloride	mg/L	ND
7/15/2005	Field Blank	Chloride	mg/L	ND
7/19/2005	Field Blank	Chloride	mg/L	ND
7/22/2005	Field Blank	Chloride	mg/L	0.64
7/28/2005	Field Blank	Chloride	mg/L	ND
8/18/2005	Field Blank	Chloride	mg/L	ND
9/8/2005	Field Blank	Chloride	mg/L	ND
7/12/2007	Field Blank	Chloride	mg/L	ND
7/16/2007	Field Blank	Chloride	mg/L	ND
7/20/2007	Field Blank	Chloride	mg/L	ND
7/24/2007	Field Blank	Chloride	mg/L	ND
8/2/2007	Field Blank	Chloride	mg/L	ND
8/23/2007	Field Blank	Chloride	mg/L	ND
9/13/2007	Field Blank	Chloride	mg/L	0.66
4/3/2008	Field Blank	Chloride	mg/L	ND
4/7/2008	Field Blank	Chloride	mg/L	ND
4/11/2008	Field Blank	Chloride	mg/L	ND
4/15/2008	Field Blank	Chloride	mg/L	ND
4/24/2008	Field Blank	Chloride	mg/L	ND
5/15/2008	Field Blank	Chloride	mg/L	ND
6/5/2008	Field Blank	Chloride	mg/L	ND
7/3/2008	Field Blank	Chloride	mg/L	ND
7/3/2008	Field Blank	Chloride	mg/L	ND
7/7/2008	Field Blank	Chloride	mg/L	ND
7/10/2008	Field Blank	Chloride	mg/L	ND
7/11/2008	Field Blank	Chloride	mg/L	ND
7/15/2008	Field Blank	Chloride	mg/L	ND
7/24/2008	Field Blank	Chloride	mg/L	ND
8/14/2008	Field Blank	Chloride	mg/L	ND
9/4/2008	Field Blank	Chloride	mg/L	ND
10/9/2008	Field Blank	Chloride	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2008	Field Blank	Chloride	mg/L	ND
10/17/2008	Field Blank	Chloride	mg/L	ND
10/21/2008	Field Blank	Chloride	mg/L	ND
10/30/2008	Field Blank	Chloride	mg/L	ND
11/20/2008	Field Blank	Chloride	mg/L	ND
12/11/2008	Field Blank	Chloride	mg/L	ND
1/8/2009	Field Blank	Chloride	mg/L	ND
1/12/2009	Field Blank	Chloride	mg/L	ND
1/16/2009	Field Blank	Chloride	mg/L	ND
1/20/2009	Field Blank	Chloride	mg/L	ND
1/29/2009	Field Blank	Chloride	mg/L	ND
2/19/2009	Field Blank	Chloride	mg/L	ND
3/12/2009	Field Blank	Chloride	mg/L	ND
3/24/2009	Field Blank	Chloride	mg/L	6.07
1/11/2008	Field Blank	Chloride	mg/L	ND
1/15/2008	Field Blank	Chloride	mg/L	ND
1/24/2008	Field Blank	Chloride	mg/L	ND
1/3/2008	Field Blank	Chloride	mg/L	ND
1/7/2008	Field Blank	Chloride	mg/L	ND
10/18/2007	Field Blank	Chloride	mg/L	ND
10/22/2007	Field Blank	Chloride	mg/L	ND
10/26/2007	Field Blank	Chloride	mg/L	ND
10/30/2007	Field Blank	Chloride	mg/L	32.4
11/29/2007	Field Blank	Chloride	mg/L	ND
11/8/2007	Field Blank	Chloride	mg/L	ND
12/20/2007	Field Blank	Chloride	mg/L	ND
2/14/2008	Field Blank	Chloride	mg/L	ND
3/6/2008	Field Blank	Chloride	mg/L	ND
7/12/2007	Field Blank	Chlorobenzene	ug/L	ND
7/12/2007	Field Blank	Chloroethane	ug/L	ND
7/12/2007	Field Blank	Chloroform	ug/L	ND
7/12/2007	Field Blank	Chloromethane	ug/L	ND
1/6/2005	Field Blank	Chromium	mg/L	ND
1/10/2005	Field Blank	Chromium	mg/L	ND
1/14/2005	Field Blank	Chromium	mg/L	ND
1/18/2005	Field Blank	Chromium	mg/L	ND
1/27/2005	Field Blank	Chromium	mg/L	ND
2/8/2005	Field Blank	Chromium	mg/L	ND
2/17/2005	Field Blank	Chromium	mg/L	ND
4/11/2005	Field Blank	Chromium	mg/L	ND
4/15/2005	Field Blank	Chromium	mg/L	ND
4/19/2005	Field Blank	Chromium	mg/L	ND
4/28/2005	Field Blank	Chromium	mg/L	ND
5/19/2005	Field Blank	Chromium	mg/L	ND
5/27/2005	Field Blank	Chromium	mg/L	ND
7/7/2005	Field Blank	Chromium	mg/L	ND
7/11/2005	Field Blank	Chromium	mg/L	ND
7/15/2005	Field Blank	Chromium	mg/L	ND
7/19/2005	Field Blank	Chromium	mg/L	ND
7/22/2005	Field Blank	Chromium	mg/L	ND
7/28/2005	Field Blank	Chromium	mg/L	ND
8/18/2005	Field Blank	Chromium	mg/L	ND
9/8/2005	Field Blank	Chromium	mg/L	ND
7/12/2007	Field Blank	Chromium	mg/L	ND
7/16/2007	Field Blank	Chromium	mg/L	ND
7/20/2007	Field Blank	Chromium	mg/L	ND
7/24/2007	Field Blank	Chromium	mg/L	ND
8/2/2007	Field Blank	Chromium	mg/L	ND
8/2/2007	Field Blank	Chromium	mg/L	ND
8/23/2007	Field Blank	Chromium	mg/L	ND
9/13/2007	Field Blank	Chromium	mg/L	ND
4/3/2008	Field Blank	Chromium	mg/L	ND
4/7/2008	Field Blank	Chromium	mg/L	ND
4/11/2008	Field Blank	Chromium	mg/L	ND
4/15/2008	Field Blank	Chromium	mg/L	ND
4/24/2008	Field Blank	Chromium	mg/L	ND
5/15/2008	Field Blank	Chromium	mg/L	ND
6/5/2008	Field Blank	Chromium	mg/L	ND
7/3/2008	Field Blank	Chromium	mg/L	ND
7/3/2008	Field Blank	Chromium	mg/L	ND
7/7/2008	Field Blank	Chromium	mg/L	ND
7/10/2008	Field Blank	Chromium	mg/L	ND
7/11/2008	Field Blank	Chromium	mg/L	ND
7/15/2008	Field Blank	Chromium	mg/L	ND
7/24/2008	Field Blank	Chromium	mg/L	0.006
8/14/2008	Field Blank	Chromium	mg/L	ND
9/4/2008	Field Blank	Chromium	mg/L	ND
10/9/2008	Field Blank	Chromium	mg/L	ND
10/13/2008	Field Blank	Chromium	mg/L	ND
10/17/2008	Field Blank	Chromium	mg/L	ND
10/21/2008	Field Blank	Chromium	mg/L	ND
10/30/2008	Field Blank	Chromium	mg/L	0.007
11/20/2008	Field Blank	Chromium	mg/L	ND
12/11/2008	Field Blank	Chromium	mg/L	ND
1/8/2009	Field Blank	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/12/2009	Field Blank	Chromium	mg/L	ND
1/16/2009	Field Blank	Chromium	mg/L	ND
1/20/2009	Field Blank	Chromium	mg/L	ND
1/29/2009	Field Blank	Chromium	mg/L	ND
2/19/2009	Field Blank	Chromium	mg/L	ND
3/12/2009	Field Blank	Chromium	mg/L	ND
3/24/2009	Field Blank	Chromium	mg/L	ND
1/11/2008	Field Blank	Chromium	mg/L	ND
1/15/2008	Field Blank	Chromium	mg/L	ND
1/24/2008	Field Blank	Chromium	mg/L	ND
1/3/2008	Field Blank	Chromium	mg/L	ND
1/7/2008	Field Blank	Chromium	mg/L	ND
2/14/2008	Field Blank	Chromium	mg/L	ND
3/6/2008	Field Blank	Chromium	mg/L	ND
1/6/2005	Field Blank	Chromium, hexavalent	mg/l	ND
1/10/2005	Field Blank	Chromium, hexavalent	mg/l	ND
1/14/2005	Field Blank	Chromium, hexavalent	mg/l	ND
1/18/2005	Field Blank	Chromium, hexavalent	mg/l	ND
1/27/2005	Field Blank	Chromium, hexavalent	mg/l	ND
2/8/2005	Field Blank	Chromium, hexavalent	mg/l	ND
2/17/2005	Field Blank	Chromium, hexavalent	mg/l	ND
4/11/2005	Field Blank	Chromium, hexavalent	mg/l	ND
4/15/2005	Field Blank	Chromium, hexavalent	mg/l	ND
4/19/2005	Field Blank	Chromium, hexavalent	mg/l	ND
4/28/2005	Field Blank	Chromium, hexavalent	mg/l	ND
5/19/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/7/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/11/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/15/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/19/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/22/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/28/2005	Field Blank	Chromium, hexavalent	mg/l	ND
8/18/2005	Field Blank	Chromium, hexavalent	mg/l	ND
9/8/2005	Field Blank	Chromium, hexavalent	mg/l	ND
7/12/2007	Field Blank	Chromium, hexavalent	mg/L	ND
7/16/2007	Field Blank	Chromium, hexavalent	mg/L	ND
7/20/2007	Field Blank	Chromium, hexavalent	mg/L	ND
7/24/2007	Field Blank	Chromium, hexavalent	mg/L	ND
8/23/2007	Field Blank	Chromium, hexavalent	mg/L	ND
9/13/2007	Field Blank	Chromium, hexavalent	mg/L	ND
4/3/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
4/7/2008	Field Blank	Chromium, hexavalent	mg/L	ND
4/11/2008	Field Blank	Chromium, hexavalent	mg/L	ND
4/15/2008	Field Blank	Chromium, hexavalent	mg/L	ND
4/24/2008	Field Blank	Chromium, hexavalent	mg/L	ND
5/15/2008	Field Blank	Chromium, hexavalent	mg/L	ND
6/5/2008	Field Blank	Chromium, hexavalent	mg/L	ND
7/3/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/3/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/7/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/10/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/11/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/15/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
7/24/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
8/14/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
9/4/2008	Field Blank	Chromium, Hexavalent	mg/L	ND
10/9/2008	Field Blank	Chromium, hexavalent	mg/L	ND
10/13/2008	Field Blank	Chromium, hexavalent	mg/L	ND
10/17/2008	Field Blank	Chromium, hexavalent	mg/L	ND
10/21/2008	Field Blank	Chromium, hexavalent	mg/L	ND
10/30/2008	Field Blank	Chromium, hexavalent	mg/L	ND
11/20/2008	Field Blank	Chromium, hexavalent	mg/L	ND
12/11/2008	Field Blank	Chromium, hexavalent	mg/L	ND
1/8/2009	Field Blank	Chromium, hexavalent	mg/L	ND
1/12/2009	Field Blank	Chromium, hexavalent	mg/L	ND
1/16/2009	Field Blank	Chromium, hexavalent	mg/L	ND
1/20/2009	Field Blank	Chromium, hexavalent	mg/L	ND
1/29/2009	Field Blank	Chromium, hexavalent	mg/L	ND
2/19/2009	Field Blank	Chromium, hexavalent	mg/L	ND
3/12/2009	Field Blank	Chromium, hexavalent	mg/L	ND
3/24/2009	Field Blank	Chromium, hexavalent	mg/L	ND
1/11/2008	Field Blank	Chromium, hexavalent	mg/L	ND
1/15/2008	Field Blank	Chromium, hexavalent	mg/L	ND
1/24/2008	Field Blank	Chromium, hexavalent	mg/L	ND
1/3/2008	Field Blank	Chromium, hexavalent	mg/L	ND
1/7/2008	Field Blank	Chromium, hexavalent	mg/L	ND
10/18/2007	Field Blank	Chromium, hexavalent	mg/L	ND
10/22/2007	Field Blank	Chromium, hexavalent	mg/L	ND
10/26/2007	Field Blank	Chromium, hexavalent	mg/L	ND
10/30/2007	Field Blank	Chromium, hexavalent	mg/L	ND
11/29/2007	Field Blank	Chromium, hexavalent	mg/L	ND
11/8/2007	Field Blank	Chromium, hexavalent	mg/L	ND
12/20/2007	Field Blank	Chromium, hexavalent	mg/L	ND
2/14/2008	Field Blank	Chromium, hexavalent	mg/L	ND
3/6/2008	Field Blank	Chromium, hexavalent	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/18/2007	Field Blank	Chromium, ICP	mg/L	ND
10/22/2007	Field Blank	Chromium, ICP	mg/L	ND
10/26/2007	Field Blank	Chromium, ICP	mg/L	ND
10/30/2007	Field Blank	Chromium, ICP	mg/L	ND
11/29/2007	Field Blank	Chromium, ICP	mg/L	ND
11/8/2007	Field Blank	Chromium, ICP	mg/L	ND
12/20/2007	Field Blank	Chromium, ICP	mg/L	ND
7/12/2007	Field Blank	cis-1,2-Dichloroethene	ug/L	ND
7/12/2007	Field Blank	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	Field Blank	Cobalt	mg/L	ND
7/12/2007	Field Blank	Copper	mg/L	ND
7/12/2007	Field Blank	Cyanide	mg/L	ND
7/12/2007	Field Blank	Dibromochloromethane	ug/L	ND
7/12/2007	Field Blank	Dibromomethane	ug/L	ND
7/12/2007	Field Blank	Dichlorodifluoromethane	ug/L	ND
7/12/2007	Field Blank	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	Field Blank	Ethylbenzene	ug/L	ND
7/12/2007	Field Blank	Hexachlorobutadiene	ug/L	ND
1/6/2005	Field Blank	Iron	mg/L	ND
1/10/2005	Field Blank	Iron	mg/L	ND
1/14/2005	Field Blank	Iron	mg/L	ND
1/18/2005	Field Blank	Iron	mg/L	ND
1/27/2005	Field Blank	Iron	mg/L	0.083
2/8/2005	Field Blank	Iron	mg/L	ND
2/17/2005	Field Blank	Iron	mg/L	0.01
4/11/2005	Field Blank	Iron	mg/L	ND
4/15/2005	Field Blank	Iron	mg/L	ND
4/19/2005	Field Blank	Iron	mg/L	ND
4/28/2005	Field Blank	Iron	mg/L	0.015
5/19/2005	Field Blank	Iron	mg/L	ND
5/27/2005	Field Blank	Iron	mg/L	ND
7/7/2005	Field Blank	Iron	mg/L	ND
7/11/2005	Field Blank	Iron	mg/L	ND
7/15/2005	Field Blank	Iron	mg/L	ND
7/19/2005	Field Blank	Iron	mg/L	ND
7/22/2005	Field Blank	Iron	mg/L	ND
7/28/2005	Field Blank	Iron	mg/L	ND
8/18/2005	Field Blank	Iron	mg/L	ND
9/8/2005	Field Blank	Iron	mg/L	ND
7/12/2007	Field Blank	Iron	mg/L	ND
7/16/2007	Field Blank	Iron	mg/L	ND
7/20/2007	Field Blank	Iron	mg/L	ND
7/24/2007	Field Blank	Iron	mg/L	ND
8/2/2007	Field Blank	Iron	mg/L	ND
8/23/2007	Field Blank	Iron	mg/L	ND
9/13/2007	Field Blank	Iron	mg/L	ND
4/3/2008	Field Blank	Iron	mg/L	ND
4/7/2008	Field Blank	Iron	mg/L	ND
4/11/2008	Field Blank	Iron	mg/L	ND
4/15/2008	Field Blank	Iron	mg/L	ND
4/24/2008	Field Blank	Iron	mg/L	ND
5/15/2008	Field Blank	Iron	mg/L	ND
6/5/2008	Field Blank	Iron	mg/L	ND
7/3/2008	Field Blank	Iron	mg/L	ND
7/3/2008	Field Blank	Iron	mg/L	ND
7/7/2008	Field Blank	Iron	mg/L	0.073
7/10/2008	Field Blank	Iron	mg/L	ND
7/11/2008	Field Blank	Iron	mg/L	ND
7/15/2008	Field Blank	Iron	mg/L	ND
7/24/2008	Field Blank	Iron	mg/L	ND
8/14/2008	Field Blank	Iron	mg/L	ND
9/4/2008	Field Blank	Iron	mg/L	ND
10/9/2008	Field Blank	Iron	mg/L	ND
10/13/2008	Field Blank	Iron	mg/L	ND
10/17/2008	Field Blank	Iron	mg/L	ND
10/21/2008	Field Blank	Iron	mg/L	ND
10/30/2008	Field Blank	Iron	mg/L	0.055
11/20/2008	Field Blank	Iron	mg/L	ND
12/11/2008	Field Blank	Iron	mg/L	ND
1/8/2009	Field Blank	Iron	mg/L	ND
1/12/2009	Field Blank	Iron	mg/L	0.051
1/16/2009	Field Blank	Iron	mg/L	ND
1/20/2009	Field Blank	Iron	mg/L	ND
1/29/2009	Field Blank	Iron	mg/L	ND
2/19/2009	Field Blank	Iron	mg/L	ND
3/12/2009	Field Blank	Iron	mg/L	ND
3/24/2009	Field Blank	Iron	mg/L	ND
1/11/2008	Field Blank	Iron	mg/L	ND
1/15/2008	Field Blank	Iron	mg/L	ND
1/24/2008	Field Blank	Iron	mg/L	ND
1/3/2008	Field Blank	Iron	mg/L	ND
1/7/2008	Field Blank	Iron	mg/L	ND
10/18/2007	Field Blank	Iron	mg/L	ND
10/22/2007	Field Blank	Iron	mg/L	ND
10/26/2007	Field Blank	Iron	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/30/2007	Field Blank	Iron	mg/L	ND
11/29/2007	Field Blank	Iron	mg/L	ND
11/8/2007	Field Blank	Iron	mg/L	ND
12/20/2007	Field Blank	Iron	mg/L	ND
2/14/2008	Field Blank	Iron	mg/L	ND
3/6/2008	Field Blank	Iron	mg/L	ND
7/12/2007	Field Blank	Isopropylbenzene	ug/L	ND
7/12/2007	Field Blank	Lead	mg/L	ND
7/12/2007	Field Blank	m,p-Xylene	ug/L	ND
7/12/2007	Field Blank	Magnesium	mg/L	ND
1/6/2005	Field Blank	Manganese	mg/L	ND
1/10/2005	Field Blank	Manganese	mg/L	ND
1/14/2005	Field Blank	Manganese	mg/L	ND
1/18/2005	Field Blank	Manganese	mg/L	ND
1/27/2005	Field Blank	Manganese	mg/L	ND
2/8/2005	Field Blank	Manganese	mg/L	ND
2/17/2005	Field Blank	Manganese	mg/L	ND
4/11/2005	Field Blank	Manganese	mg/L	ND
4/15/2005	Field Blank	Manganese	mg/L	ND
4/19/2005	Field Blank	Manganese	mg/L	ND
4/28/2005	Field Blank	Manganese	mg/L	ND
5/19/2005	Field Blank	Manganese	mg/L	ND
5/27/2005	Field Blank	Manganese	mg/L	ND
7/7/2005	Field Blank	Manganese	mg/L	ND
7/11/2005	Field Blank	Manganese	mg/L	ND
7/15/2005	Field Blank	Manganese	mg/L	ND
7/19/2005	Field Blank	Manganese	mg/L	ND
7/22/2005	Field Blank	Manganese	mg/L	ND
7/28/2005	Field Blank	Manganese	mg/L	ND
8/18/2005	Field Blank	Manganese	mg/L	ND
9/8/2005	Field Blank	Manganese	mg/L	ND
7/12/2007	Field Blank	Manganese	mg/L	ND
7/16/2007	Field Blank	Manganese	mg/L	ND
7/20/2007	Field Blank	Manganese	mg/L	ND
7/24/2007	Field Blank	Manganese	mg/L	ND
8/2/2007	Field Blank	Manganese	mg/L	ND
8/23/2007	Field Blank	Manganese	mg/L	ND
9/13/2007	Field Blank	Manganese	mg/L	ND
4/3/2008	Field Blank	Manganese	mg/L	ND
4/7/2008	Field Blank	Manganese	mg/L	ND
4/11/2008	Field Blank	Manganese	mg/L	ND
4/15/2008	Field Blank	Manganese	mg/L	ND
4/24/2008	Field Blank	Manganese	mg/L	ND
5/15/2008	Field Blank	Manganese	mg/L	ND
6/5/2008	Field Blank	Manganese	mg/L	ND
7/3/2008	Field Blank	Manganese	mg/L	ND
7/3/2008	Field Blank	Manganese	mg/L	ND
7/7/2008	Field Blank	Manganese	mg/L	ND
7/10/2008	Field Blank	Manganese	mg/L	ND
7/11/2008	Field Blank	Manganese	mg/L	ND
7/15/2008	Field Blank	Manganese	mg/L	ND
7/24/2008	Field Blank	Manganese	mg/L	ND
8/14/2008	Field Blank	Manganese	mg/L	ND
9/4/2008	Field Blank	Manganese	mg/L	ND
10/9/2008	Field Blank	Manganese	mg/L	ND
10/13/2008	Field Blank	Manganese	mg/L	ND
10/17/2008	Field Blank	Manganese	mg/L	ND
10/21/2008	Field Blank	Manganese	mg/L	ND
10/30/2008	Field Blank	Manganese	mg/L	ND
11/20/2008	Field Blank	Manganese	mg/L	ND
12/11/2008	Field Blank	Manganese	mg/L	ND
1/8/2009	Field Blank	Manganese	mg/L	ND
1/12/2009	Field Blank	Manganese	mg/L	ND
1/16/2009	Field Blank	Manganese	mg/L	ND
1/20/2009	Field Blank	Manganese	mg/L	ND
1/29/2009	Field Blank	Manganese	mg/L	ND
2/19/2009	Field Blank	Manganese	mg/L	ND
3/12/2009	Field Blank	Manganese	mg/L	ND
3/24/2009	Field Blank	Manganese	mg/L	ND
1/11/2008	Field Blank	Manganese	mg/L	ND
1/15/2008	Field Blank	Manganese	mg/L	ND
1/24/2008	Field Blank	Manganese	mg/L	ND
1/3/2008	Field Blank	Manganese	mg/L	ND
1/7/2008	Field Blank	Manganese	mg/L	ND
10/18/2007	Field Blank	Manganese	mg/L	ND
10/22/2007	Field Blank	Manganese	mg/L	ND
10/26/2007	Field Blank	Manganese	mg/L	ND
10/30/2007	Field Blank	Manganese	mg/L	ND
11/29/2007	Field Blank	Manganese	mg/L	ND
11/8/2007	Field Blank	Manganese	mg/L	ND
12/20/2007	Field Blank	Manganese	mg/L	ND
2/14/2008	Field Blank	Manganese	mg/L	ND
3/6/2008	Field Blank	Manganese	mg/L	ND
7/12/2007	Field Blank	Mercury	mg/L	ND
7/12/2007	Field Blank	Methyl Iodide (Iodomethane)	ug/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	Field Blank	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	Field Blank	Naphthalene	ug/L	ND
7/12/2007	Field Blank	n-Butylbenzene	ug/L	ND
7/12/2007	Field Blank	Nickel	mg/L	ND
7/12/2007	Field Blank	Nitrate	mg/L	ND
7/12/2007	Field Blank	Nitrate/Nitrite	mg/L	ND
7/12/2007	Field Blank	Nitrite	mg/L	ND
7/12/2007	Field Blank	n-Propylbenzene	ug/L	ND
7/12/2007	Field Blank	o-Xylene	ug/L	ND
1/6/2005	Field Blank	pH	pH Units	ND
1/10/2005	Field Blank	pH	pH Units	5.84
1/14/2005	Field Blank	pH	pH Units	6.28
1/18/2005	Field Blank	pH	pH Units	4.8
1/27/2005	Field Blank	pH	pH Units	6.77
2/17/2005	Field Blank	pH	pH Units	6
4/11/2005	Field Blank	pH	pH Units	5.6
4/15/2005	Field Blank	pH	pH Units	5.68
4/19/2005	Field Blank	pH	pH Units	5.86
4/28/2005	Field Blank	pH	pH Units	5.77
5/19/2005	Field Blank	pH	pH Units	6.9
7/7/2005	Field Blank	pH	pH Units	5.86
7/11/2005	Field Blank	pH	pH Units	5.1
7/15/2005	Field Blank	pH	pH Units	5.42
7/19/2005	Field Blank	pH	pH Units	5.26
7/28/2005	Field Blank	pH	pH Units	6.37
8/18/2005	Field Blank	pH	pH Units	6.99
9/8/2005	Field Blank	pH	pH Units	8.06
7/12/2007	Field Blank	pH	pH	5.7
7/16/2007	Field Blank	pH	pH	5.51
7/20/2007	Field Blank	pH	pH	6.23
7/24/2007	Field Blank	pH	pH	5.6
8/2/2007	Field Blank	pH	pH	6.01
8/23/2007	Field Blank	pH	pH	5.83
9/13/2007	Field Blank	pH	pH	6.27
4/3/2008	Field Blank	pH	pH	5.87
4/7/2008	Field Blank	pH	pH	5.96
4/11/2008	Field Blank	pH	pH	7.60
4/15/2008	Field Blank	pH	pH	5.98
4/24/2008	Field Blank	pH	pH	6.22
5/15/2008	Field Blank	pH	pH	5.98
6/5/2008	Field Blank	pH	pH	5.74
7/3/2008	Field Blank	pH	pH	6.01
7/3/2008	Field Blank	pH	pH	6.01
7/7/2008	Field Blank	pH	pH	5.7
7/11/2008	Field Blank	pH	pH	5.96
7/15/2008	Field Blank	pH	pH	7.04
7/24/2008	Field Blank	pH	pH	5.99
8/14/2008	Field Blank	pH	pH	6.04
9/4/2008	Field Blank	pH	pH	5.83
10/9/2008	Field Blank	pH	pH	5.87
10/13/2008	Field Blank	pH	pH	5.78
10/17/2008	Field Blank	pH	pH	5.33
10/21/2008	Field Blank	pH	pH	5.54
10/30/2008	Field Blank	pH	pH	6.86
11/20/2008	Field Blank	pH	pH	6.82
12/11/2008	Field Blank	pH	pH	5.33
1/8/2009	Field Blank	pH	pH	6.28
1/12/2009	Field Blank	pH	pH	5.78
1/16/2009	Field Blank	pH	pH	6.04
1/20/2009	Field Blank	pH	pH	5.65
1/29/2009	Field Blank	pH	pH	5.81
2/19/2009	Field Blank	pH	pH	6.98
3/12/2009	Field Blank	pH	pH	6.23
1/11/2008	Field Blank	pH	pH	5.87
1/15/2008	Field Blank	pH	pH	5.78
1/24/2008	Field Blank	pH	pH	6.2
1/3/2008	Field Blank	pH	pH	5.04
1/7/2008	Field Blank	pH	pH	5.83
10/18/2007	Field Blank	pH	pH Units	6.89
10/22/2007	Field Blank	pH	pH Units	5.69
10/26/2007	Field Blank	pH	pH Units	7.11
10/30/2007	Field Blank	pH	pH Units	6.52
11/29/2007	Field Blank	pH	pH Units	5.64
11/8/2007	Field Blank	pH	pH Units	6.49
12/20/2007	Field Blank	pH	pH Units	5.27
2/14/2008	Field Blank	pH	pH	7.02
3/6/2008	Field Blank	pH	pH	6.12
7/12/2007	Field Blank	Phenols	mg/L	ND
7/16/2007	Field Blank	Phenols	mg/L	ND
7/20/2007	Field Blank	Phenols	mg/L	ND
7/24/2007	Field Blank	Phenols	mg/L	ND
8/2/2007	Field Blank	Phenols	mg/L	ND
8/23/2007	Field Blank	Phenols	mg/L	ND
9/13/2007	Field Blank	Phenols	mg/L	ND
1/6/2005	Field Blank	Phenols	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/10/2005	Field Blank	Phenols	mg/L	ND
1/14/2005	Field Blank	Phenols	mg/L	ND
1/18/2005	Field Blank	Phenols	mg/L	ND
1/27/2005	Field Blank	Phenols	mg/L	ND
2/17/2005	Field Blank	Phenols	mg/L	ND
4/11/2005	Field Blank	Phenols	mg/L	ND
4/15/2005	Field Blank	Phenols	mg/L	ND
4/19/2005	Field Blank	Phenols	mg/L	ND
4/28/2005	Field Blank	Phenols	mg/L	ND
5/19/2005	Field Blank	Phenols	mg/L	ND
7/7/2005	Field Blank	Phenols	mg/L	ND
7/11/2005	Field Blank	Phenols	mg/L	ND
7/15/2005	Field Blank	Phenols	mg/L	ND
7/19/2005	Field Blank	Phenols	mg/L	ND
7/22/2005	Field Blank	Phenols	mg/L	ND
7/22/2005	Field Blank	Phenols	mg/L	ND
7/28/2005	Field Blank	Phenols	mg/L	ND
8/18/2005	Field Blank	Phenols	mg/L	ND
9/8/2005	Field Blank	Phenols	mg/L	ND
9/8/2005	Field Blank	Phenols	mg/L	ND
10/18/2007	Field Blank	Phenols	mg/L	ND
10/22/2007	Field Blank	Phenols	mg/L	ND
10/26/2007	Field Blank	Phenols	mg/L	ND
10/30/2007	Field Blank	Phenols	mg/L	ND
11/29/2007	Field Blank	Phenols	mg/L	ND
11/8/2007	Field Blank	Phenols	mg/L	ND
12/20/2007	Field Blank	Phenols	mg/L	ND
4/3/2008	Field Blank	Phenols, Total	mg/L	ND
4/7/2008	Field Blank	Phenols, Total	mg/L	ND
4/11/2008	Field Blank	Phenols, Total	mg/L	ND
4/15/2008	Field Blank	Phenols, Total	mg/L	ND
4/24/2008	Field Blank	Phenols, Total	mg/L	0.016
5/15/2008	Field Blank	Phenols, Total	mg/L	0.06
6/5/2008	Field Blank	Phenols, Total	mg/L	ND
7/3/2008	Field Blank	Phenols, Total	mg/L	ND
7/3/2008	Field Blank	Phenols, Total	mg/L	ND
7/7/2008	Field Blank	Phenols, Total	mg/L	ND
7/10/2008	Field Blank	Phenols, Total	mg/L	ND
7/11/2008	Field Blank	Phenols, Total	mg/L	ND
7/15/2008	Field Blank	Phenols, Total	mg/L	ND
7/24/2008	Field Blank	Phenols, Total	mg/L	ND
8/14/2008	Field Blank	Phenols, Total	mg/L	ND
9/4/2008	Field Blank	Phenols, Total	mg/L	ND
10/9/2008	Field Blank	Phenols, Total	mg/L	ND
10/13/2008	Field Blank	Phenols, Total	mg/L	ND
10/17/2008	Field Blank	Phenols, Total	mg/L	ND
10/21/2008	Field Blank	Phenols, Total	mg/L	ND
10/30/2008	Field Blank	Phenols, Total	mg/L	ND
11/20/2008	Field Blank	Phenols, Total	mg/L	ND
12/11/2008	Field Blank	Phenols, Total	mg/L	ND
1/8/2009	Field Blank	Phenols, Total	mg/L	0.006
1/12/2009	Field Blank	Phenols, Total	mg/L	ND
1/16/2009	Field Blank	Phenols, Total	mg/L	ND
1/20/2009	Field Blank	Phenols, Total	mg/L	ND
1/29/2009	Field Blank	Phenols, Total	mg/L	ND
2/19/2009	Field Blank	Phenols, Total	mg/L	ND
3/12/2009	Field Blank	Phenols, Total	mg/L	ND
3/24/2009	Field Blank	Phenols, Total	mg/L	ND
1/11/2008	Field Blank	Phenols, Total	mg/L	ND
1/15/2008	Field Blank	Phenols, Total	mg/L	ND
1/24/2008	Field Blank	Phenols, Total	mg/L	ND
1/3/2008	Field Blank	Phenols, Total	mg/L	ND
1/7/2008	Field Blank	Phenols, Total	mg/L	ND
2/14/2008	Field Blank	Phenols, Total	mg/L	ND
3/6/2008	Field Blank	Phenols, Total	mg/L	ND
7/12/2007	Field Blank	Potassium	mg/L	ND
7/12/2007	Field Blank	sec-Butylbenzene	ug/L	ND
7/12/2007	Field Blank	Selenium	mg/L	ND
7/12/2007	Field Blank	Silver	mg/L	ND
1/6/2005	Field Blank	Sodium	mg/L	ND
1/10/2005	Field Blank	Sodium	mg/L	ND
1/14/2005	Field Blank	Sodium	mg/L	0.244
1/18/2005	Field Blank	Sodium	mg/L	ND
1/27/2005	Field Blank	Sodium	mg/L	ND
2/8/2005	Field Blank	Sodium	mg/L	ND
2/17/2005	Field Blank	Sodium	mg/L	ND
4/11/2005	Field Blank	Sodium	mg/L	ND
4/15/2005	Field Blank	Sodium	mg/L	ND
4/19/2005	Field Blank	Sodium	mg/L	ND
4/28/2005	Field Blank	Sodium	mg/L	ND
5/19/2005	Field Blank	Sodium	mg/L	ND
5/27/2005	Field Blank	Sodium	mg/L	ND
5/27/2005	Field Blank	Sodium	mg/L	ND
7/7/2005	Field Blank	Sodium	mg/L	ND
7/11/2005	Field Blank	Sodium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/15/2005	Field Blank	Sodium	mg/L	ND
7/19/2005	Field Blank	Sodium	mg/L	ND
7/22/2005	Field Blank	Sodium	mg/L	ND
7/28/2005	Field Blank	Sodium	mg/L	ND
8/18/2005	Field Blank	Sodium	mg/L	ND
9/8/2005	Field Blank	Sodium	mg/L	ND
7/12/2007	Field Blank	Sodium	mg/L	ND
7/16/2007	Field Blank	Sodium	mg/L	ND
7/20/2007	Field Blank	Sodium	mg/L	ND
7/24/2007	Field Blank	Sodium	mg/L	ND
8/2/2007	Field Blank	Sodium	mg/L	ND
8/23/2007	Field Blank	Sodium	mg/L	ND
9/13/2007	Field Blank	Sodium	mg/L	ND
4/3/2008	Field Blank	Sodium	mg/L	0.153
4/7/2008	Field Blank	Sodium	mg/L	0.134
4/11/2008	Field Blank	Sodium	mg/L	ND
4/15/2008	Field Blank	Sodium	mg/L	ND
4/24/2008	Field Blank	Sodium	mg/L	ND
5/15/2008	Field Blank	Sodium	mg/L	ND
6/5/2008	Field Blank	Sodium	mg/L	ND
7/3/2008	Field Blank	Sodium	mg/L	ND
7/3/2008	Field Blank	Sodium	mg/L	ND
7/7/2008	Field Blank	Sodium	mg/L	0.283
7/10/2008	Field Blank	Sodium	mg/L	ND
7/11/2008	Field Blank	Sodium	mg/L	ND
7/15/2008	Field Blank	Sodium	mg/L	0.091
7/24/2008	Field Blank	Sodium	mg/L	ND
8/14/2008	Field Blank	Sodium	mg/L	ND
9/4/2008	Field Blank	Sodium	mg/L	ND
10/9/2008	Field Blank	Sodium	mg/L	0.517
10/13/2008	Field Blank	Sodium	mg/L	ND
10/17/2008	Field Blank	Sodium	mg/L	ND
10/21/2008	Field Blank	Sodium	mg/L	ND
10/30/2008	Field Blank	Sodium	mg/L	0.436
11/20/2008	Field Blank	Sodium	mg/L	0.075
12/11/2008	Field Blank	Sodium	mg/L	ND
1/8/2009	Field Blank	Sodium	mg/L	ND
1/12/2009	Field Blank	Sodium	mg/L	0.119
1/16/2009	Field Blank	Sodium	mg/L	ND
1/20/2009	Field Blank	Sodium	mg/L	ND
1/29/2009	Field Blank	Sodium	mg/L	ND
2/19/2009	Field Blank	Sodium	mg/L	ND
3/12/2009	Field Blank	Sodium	mg/L	ND
3/24/2009	Field Blank	Sodium	mg/L	ND
1/11/2008	Field Blank	Sodium	mg/L	ND
1/15/2008	Field Blank	Sodium	mg/L	ND
1/24/2008	Field Blank	Sodium	mg/L	ND
1/3/2008	Field Blank	Sodium	mg/L	ND
1/7/2008	Field Blank	Sodium	mg/L	ND
10/18/2007	Field Blank	Sodium	mg/L	ND
10/22/2007	Field Blank	Sodium	mg/L	ND
10/26/2007	Field Blank	Sodium	mg/L	ND
10/30/2007	Field Blank	Sodium	mg/L	ND
11/29/2007	Field Blank	Sodium	mg/L	ND
11/8/2007	Field Blank	Sodium	mg/L	ND
12/20/2007	Field Blank	Sodium	mg/L	ND
2/14/2008	Field Blank	Sodium	mg/L	0.084
3/6/2008	Field Blank	Sodium	mg/L	0.150
7/12/2007	Field Blank	Solids, Total Dissolved	mg/L	ND
7/12/2007	Field Blank	Solids, Total Suspended	mg/L	ND
1/6/2005	Field Blank	Specific Conductance	umhos	4
1/10/2005	Field Blank	Specific Conductance	umhos	3
1/14/2005	Field Blank	Specific Conductance	umhos	6
1/18/2005	Field Blank	Specific Conductance	umhos	6
1/27/2005	Field Blank	Specific Conductance	umhos	4
2/17/2005	Field Blank	Specific Conductance	umhos	5
4/11/2005	Field Blank	Specific Conductance	umhos	2
4/11/2005	Field Blank	Specific Conductance	umhos	2
4/11/2005	Field Blank	Specific Conductance	umhos	2
4/15/2005	Field Blank	Specific Conductance	umhos	1
4/19/2005	Field Blank	Specific Conductance	umhos	1
4/28/2005	Field Blank	Specific Conductance	umhos	2
5/19/2005	Field Blank	Specific Conductance	umhos	1
7/15/2005	Field Blank	Specific Conductance	umhos	2
7/19/2005	Field Blank	Specific Conductance	umhos	2
7/28/2005	Field Blank	Specific Conductance	umhos	2
9/8/2005	Field Blank	Specific Conductance	umhos	2
7/12/2007	Field Blank	Specific Conductance	umhos	ND
7/16/2007	Field Blank	Specific Conductance	umhos	ND
7/20/2007	Field Blank	Specific Conductance	umhos	1
7/24/2007	Field Blank	Specific Conductance	umhos	2
8/2/2007	Field Blank	Specific Conductance	umhos	1
8/23/2007	Field Blank	Specific Conductance	umhos	ND
9/13/2007	Field Blank	Specific Conductance	umhos	2
4/3/2008	Field Blank	Specific Conductance	umhos	2

Sampling Date	Location ID	Analyte	Unit	Concentration
4/7/2008	Field Blank	Specific Conductance	umhos	2
4/11/2008	Field Blank	Specific Conductance	umhos	2
4/15/2008	Field Blank	Specific Conductance	umhos	2
4/24/2008	Field Blank	Specific Conductance	umhos	2
5/15/2008	Field Blank	Specific Conductance	umhos	2
6/5/2008	Field Blank	Specific Conductance	umhos	1
7/3/2008	Field Blank	Specific Conductance	umhos	1
7/3/2008	Field Blank	Specific Conductance	umhos	1
7/7/2008	Field Blank	Specific Conductance	umhos	2
7/11/2008	Field Blank	Specific Conductance	umhos	1
7/15/2008	Field Blank	Specific Conductance	umhos	1
7/24/2008	Field Blank	Specific Conductance	umhos	1
8/14/2008	Field Blank	Specific Conductance	umhos	1
9/4/2008	Field Blank	Specific Conductance	umhos	1
10/9/2008	Field Blank	Specific Conductance	umhos	1
10/13/2008	Field Blank	Specific Conductance	umhos	2
10/17/2008	Field Blank	Specific Conductance	umhos	1
10/21/2008	Field Blank	Specific Conductance	umhos	2
10/30/2008	Field Blank	Specific Conductance	umhos	1
11/20/2008	Field Blank	Specific Conductance	umhos	2
12/11/2008	Field Blank	Specific Conductance	umhos	11
1/8/2009	Field Blank	Specific Conductance	umhos	2
1/12/2009	Field Blank	Specific Conductance	umhos	4
1/16/2009	Field Blank	Specific Conductance	umhos	1
1/20/2009	Field Blank	Specific Conductance	umhos	2
1/29/2009	Field Blank	Specific Conductance	umhos	1
2/19/2009	Field Blank	Specific Conductance	umhos	1
3/12/2009	Field Blank	Specific Conductance	umhos	1
1/11/2008	Field Blank	Specific Conductance	umhos	2
1/15/2008	Field Blank	Specific Conductance	umhos	6
1/24/2008	Field Blank	Specific Conductance	umhos	3
1/3/2008	Field Blank	Specific Conductance	umhos	2
1/7/2008	Field Blank	Specific Conductance	umhos	2
10/18/2007	Field Blank	Specific Conductance	umhos	1.8
10/22/2007	Field Blank	Specific Conductance	umhos	2
10/26/2007	Field Blank	Specific Conductance	umhos	2
10/30/2007	Field Blank	Specific Conductance	umhos	1
11/29/2007	Field Blank	Specific Conductance	umhos	ND
11/8/2007	Field Blank	Specific Conductance	umhos	1
12/20/2007	Field Blank	Specific Conductance	umhos	2
2/14/2008	Field Blank	Specific Conductance	umhos	002
3/6/2008	Field Blank	Specific Conductance	umhos	2
7/12/2007	Field Blank	Styrene	ug/L	ND
7/12/2007	Field Blank	Sulfate	mg/L	ND
7/16/2007	Field Blank	Sulfate	mg/L	ND
7/20/2007	Field Blank	Sulfate	mg/L	ND
7/24/2007	Field Blank	Sulfate	mg/L	ND
8/2/2007	Field Blank	Sulfate	mg/L	ND
8/23/2007	Field Blank	Sulfate	mg/L	ND
9/13/2007	Field Blank	Sulfate	mg/L	ND
4/3/2008	Field Blank	Sulfate	mg/L	ND
4/7/2008	Field Blank	Sulfate	mg/L	ND
4/11/2008	Field Blank	Sulfate	mg/L	ND
4/15/2008	Field Blank	Sulfate	mg/L	ND
4/24/2008	Field Blank	Sulfate	mg/L	ND
5/15/2008	Field Blank	Sulfate	mg/L	ND
6/5/2008	Field Blank	Sulfate	mg/L	ND
7/3/2008	Field Blank	Sulfate	mg/L	ND
7/3/2008	Field Blank	Sulfate	mg/L	ND
7/7/2008	Field Blank	Sulfate	mg/L	ND
7/10/2008	Field Blank	Sulfate	mg/L	ND
7/11/2008	Field Blank	Sulfate	mg/L	ND
7/15/2008	Field Blank	Sulfate	mg/L	ND
7/24/2008	Field Blank	Sulfate	mg/L	ND
8/14/2008	Field Blank	Sulfate	mg/L	ND
9/4/2008	Field Blank	Sulfate	mg/L	ND
10/9/2008	Field Blank	Sulfate	mg/L	ND
10/13/2008	Field Blank	Sulfate	mg/L	ND
10/17/2008	Field Blank	Sulfate	mg/L	ND
10/21/2008	Field Blank	Sulfate	mg/L	ND
10/30/2008	Field Blank	Sulfate	mg/L	ND
11/20/2008	Field Blank	Sulfate	mg/L	ND
12/11/2008	Field Blank	Sulfate	mg/L	ND
1/8/2009	Field Blank	Sulfate	mg/L	ND
1/12/2009	Field Blank	Sulfate	mg/L	ND
1/16/2009	Field Blank	Sulfate	mg/L	ND
1/20/2009	Field Blank	Sulfate	mg/L	ND
1/29/2009	Field Blank	Sulfate	mg/L	ND
2/19/2009	Field Blank	Sulfate	mg/L	ND
3/12/2009	Field Blank	Sulfate	mg/L	ND
3/24/2009	Field Blank	Sulfate	mg/L	ND
1/11/2008	Field Blank	Sulfate	mg/L	ND
1/15/2008	Field Blank	Sulfate	mg/L	ND
1/24/2008	Field Blank	Sulfate	mg/L	ND
1/3/2008	Field Blank	Sulfate	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/7/2008	Field Blank	Sulfate	mg/L	ND
2/14/2008	Field Blank	Sulfate	mg/L	ND
3/6/2008	Field Blank	Sulfate	mg/L	ND
1/6/2005	Field Blank	Sulfate	mg/L	ND
1/10/2005	Field Blank	Sulfate	mg/L	ND
1/14/2005	Field Blank	Sulfate	mg/L	ND
1/18/2005	Field Blank	Sulfate	mg/L	ND
1/27/2005	Field Blank	Sulfate	mg/L	ND
2/8/2005	Field Blank	Sulfate	mg/L	ND
2/17/2005	Field Blank	Sulfate	mg/L	ND
4/11/2005	Field Blank	Sulfate	mg/L	ND
4/15/2005	Field Blank	Sulfate	mg/L	ND
4/19/2005	Field Blank	Sulfate	mg/L	ND
4/28/2005	Field Blank	Sulfate	mg/L	ND
5/19/2005	Field Blank	Sulfate	mg/L	ND
5/27/2005	Field Blank	Sulfate	mg/L	ND
7/7/2005	Field Blank	Sulfate	mg/L	ND
7/11/2005	Field Blank	Sulfate	mg/L	ND
7/15/2005	Field Blank	Sulfate	mg/L	ND
7/19/2005	Field Blank	Sulfate	mg/L	ND
7/22/2005	Field Blank	Sulfate	mg/L	ND
7/28/2005	Field Blank	Sulfate	mg/L	ND
8/18/2005	Field Blank	Sulfate	mg/L	ND
9/8/2005	Field Blank	Sulfate	mg/L	ND
10/18/2007	Field Blank	Sulfate	mg/L	ND
10/22/2007	Field Blank	Sulfate	mg/L	ND
10/26/2007	Field Blank	Sulfate	mg/L	ND
10/30/2007	Field Blank	Sulfate	mg/L	ND
11/29/2007	Field Blank	Sulfate	mg/L	ND
11/8/2007	Field Blank	Sulfate	mg/L	ND
12/20/2007	Field Blank	Sulfate	mg/L	ND
1/6/2005	Field Blank	Temperature	C	8
1/10/2005	Field Blank	Temperature	C	8
1/14/2005	Field Blank	Temperature	C	15
1/18/2005	Field Blank	Temperature	C	3
1/27/2005	Field Blank	Temperature	C	6
2/17/2005	Field Blank	Temperature	C	2
4/11/2005	Field Blank	Temperature	C	14
4/15/2005	Field Blank	Temperature	C	12
4/19/2005	Field Blank	Temperature	C	17
4/28/2005	Field Blank	Temperature	C	16
5/19/2005	Field Blank	Temperature	C	16
7/7/2005	Field Blank	Temperature	C	25
7/11/2005	Field Blank	Temperature	C	27
7/15/2005	Field Blank	Temperature	C	25
7/19/2005	Field Blank	Temperature	C	26
7/28/2005	Field Blank	Temperature	C	26
8/18/2005	Field Blank	Temperature	C	24
9/8/2005	Field Blank	Temperature	C	20
7/12/2007	Field Blank	Temperature	C	25
7/16/2007	Field Blank	Temperature	C	29
7/20/2007	Field Blank	Temperature	C	27
7/24/2007	Field Blank	Temperature	C	23
8/2/2007	Field Blank	Temperature	C	11
8/23/2007	Field Blank	Temperature	C	21
9/13/2007	Field Blank	Temperature	C	20
4/3/2008	Field Blank	Temperature	C	10
4/7/2008	Field Blank	Temperature	C	8
4/11/2008	Field Blank	Temperature	C	17
4/15/2008	Field Blank	Temperature	C	11
4/24/2008	Field Blank	Temperature	C	20
5/15/2008	Field Blank	Temperature	C	21
6/5/2008	Field Blank	Temperature	C	23
7/3/2008	Field Blank	Temperature	C	25
7/3/2008	Field Blank	Temperature	C	25
7/7/2008	Field Blank	Temperature	C	25
7/11/2008	Field Blank	Temperature	C	26
7/15/2008	Field Blank	Temperature	C	26
7/24/2008	Field Blank	Temperature	C	25
8/14/2008	Field Blank	Temperature	C	28
9/4/2008	Field Blank	Temperature	C	25
10/9/2008	Field Blank	Temperature	C	20
10/13/2008	Field Blank	Temperature	C	16
10/17/2008	Field Blank	Temperature	C	16
10/21/2008	Field Blank	Temperature	C	10
10/30/2008	Field Blank	Temperature	C	9
11/20/2008	Field Blank	Temperature	C	6
12/11/2008	Field Blank	Temperature	C	14
1/8/2009	Field Blank	Temperature	C	6
1/12/2009	Field Blank	Temperature	C	1
1/16/2009	Field Blank	Temperature	C	1
1/20/2009	Field Blank	Temperature	C	1
1/29/2009	Field Blank	Temperature	C	4
2/19/2009	Field Blank	Temperature	C	11
3/12/2009	Field Blank	Temperature	C	12

Sampling Date	Location ID	Analyte	Unit	Concentration
1/11/2008	Field Blank	Temperature	C	11
1/15/2008	Field Blank	Temperature	C	4
1/24/2008	Field Blank	Temperature	C	4
1/3/2008	Field Blank	Temperature	C	1
1/7/2008	Field Blank	Temperature	C	10
10/18/2007	Field Blank	Temperature	C	21.1
10/22/2007	Field Blank	Temperature	C	17
10/26/2007	Field Blank	Temperature	C	16
10/30/2007	Field Blank	Temperature	C	11
11/29/2007	Field Blank	Temperature	C	5
11/8/2007	Field Blank	Temperature	C	8
12/20/2007	Field Blank	Temperature	C	6
2/14/2008	Field Blank	Temperature	C	14.1
3/6/2008	Field Blank	Temperature	C	9
7/12/2007	Field Blank	tert-Butylbenzene	ug/L	ND
7/12/2007	Field Blank	Tetrachloroethene	ug/L	ND
7/12/2007	Field Blank	Thallium	mg/L	ND
7/12/2007	Field Blank	Toluene	ug/L	ND
7/12/2007	Field Blank	Total Alkalinity	mg/L	1.5
7/12/2007	Field Blank	Total Hardness,Calculation	mg/L	ND
7/12/2007	Field Blank	Total Organic Carbon	mg/L	ND
7/16/2007	Field Blank	Total Organic Carbon	mg/L	ND
7/20/2007	Field Blank	Total Organic Carbon	mg/L	ND
7/24/2007	Field Blank	Total Organic Carbon	mg/L	ND
8/2/2007	Field Blank	Total Organic Carbon	mg/L	ND
8/23/2007	Field Blank	Total Organic Carbon	mg/L	3.1
9/13/2007	Field Blank	Total Organic Carbon	mg/L	ND
4/3/2008	Field Blank	Total Organic Carbon	mg/L	ND
4/7/2008	Field Blank	Total Organic Carbon	mg/L	ND
4/11/2008	Field Blank	Total Organic Carbon	mg/L	ND
4/15/2008	Field Blank	Total Organic Carbon	mg/L	ND
4/24/2008	Field Blank	Total Organic Carbon	mg/L	ND
5/15/2008	Field Blank	Total Organic Carbon	mg/L	ND
6/5/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/3/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/3/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/9/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/13/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/17/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/21/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/30/2008	Field Blank	Total Organic Carbon	mg/L	ND
11/20/2008	Field Blank	Total Organic Carbon	mg/L	ND
12/11/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/8/2009	Field Blank	Total Organic Carbon	mg/L	ND
1/12/2009	Field Blank	Total Organic Carbon	mg/L	1.9
1/16/2009	Field Blank	Total Organic Carbon	mg/L	ND
1/20/2009	Field Blank	Total Organic Carbon	mg/L	ND
1/29/2009	Field Blank	Total Organic Carbon	mg/L	ND
2/19/2009	Field Blank	Total Organic Carbon	mg/L	ND
3/12/2009	Field Blank	Total Organic Carbon	mg/L	ND
3/24/2009	Field Blank	Total Organic Carbon	mg/L	ND
1/11/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/15/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/24/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/3/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/7/2008	Field Blank	Total Organic Carbon	mg/L	ND
2/14/2008	Field Blank	Total Organic Carbon	mg/L	ND
3/6/2008	Field Blank	Total Organic Carbon	mg/L	ND
1/6/2005	Field Blank	Total Organic Carbon	mg/L	ND
1/10/2005	Field Blank	Total Organic Carbon	mg/L	ND
1/14/2005	Field Blank	Total Organic Carbon	mg/L	ND
1/18/2005	Field Blank	Total Organic Carbon	mg/L	ND
1/27/2005	Field Blank	Total Organic Carbon	mg/L	ND
2/8/2005	Field Blank	Total Organic Carbon	mg/L	ND
2/17/2005	Field Blank	Total Organic Carbon	mg/L	ND
4/11/2005	Field Blank	Total Organic Carbon	mg/L	ND
4/15/2005	Field Blank	Total Organic Carbon	mg/L	ND
4/28/2005	Field Blank	Total Organic Carbon	mg/L	ND
5/19/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/7/2005	Field Blank	Total Organic Carbon	mg/L	3.2
7/11/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/15/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/19/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/22/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/28/2005	Field Blank	Total Organic Carbon	mg/L	ND
8/18/2005	Field Blank	Total Organic Carbon	mg/L	ND
9/8/2005	Field Blank	Total Organic Carbon	mg/L	ND
7/7/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/10/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/11/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/15/2008	Field Blank	Total Organic Carbon	mg/L	ND
7/24/2008	Field Blank	Total Organic Carbon	mg/L	ND
8/14/2008	Field Blank	Total Organic Carbon	mg/L	ND
9/4/2008	Field Blank	Total Organic Carbon	mg/L	ND
10/18/2007	Field Blank	Total Organic Carbon	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/22/2007	Field Blank	Total Organic Carbon	mg/L	ND
10/26/2007	Field Blank	Total Organic Carbon	mg/L	ND
10/30/2007	Field Blank	Total Organic Carbon	mg/L	ND
11/29/2007	Field Blank	Total Organic Carbon	mg/L	ND
11/8/2007	Field Blank	Total Organic Carbon	mg/L	ND
12/20/2007	Field Blank	Total Organic Carbon	mg/L	ND
1/6/2005	Field Blank	Total Organic Halogen	mg/L	ND
1/10/2005	Field Blank	Total Organic Halogen	mg/L	ND
1/14/2005	Field Blank	Total Organic Halogen	mg/L	ND
1/18/2005	Field Blank	Total Organic Halogen	mg/L	ND
1/27/2005	Field Blank	Total Organic Halogen	mg/L	ND
2/8/2005	Field Blank	Total Organic Halogen	mg/L	ND
2/17/2005	Field Blank	Total Organic Halogen	mg/L	ND
4/11/2005	Field Blank	Total Organic Halogen	mg/L	ND
4/15/2005	Field Blank	Total Organic Halogen	mg/L	ND
4/19/2005	Field Blank	Total Organic Halogen	mg/L	ND
4/28/2005	Field Blank	Total Organic Halogen	mg/L	ND
5/19/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/7/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/11/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/15/2005	Field Blank	Total Organic Halogen	mg/L	0.016
7/19/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/22/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/28/2005	Field Blank	Total Organic Halogen	mg/L	ND
8/18/2005	Field Blank	Total Organic Halogen	mg/L	ND
9/8/2005	Field Blank	Total Organic Halogen	mg/L	ND
7/12/2007	Field Blank	Total Organic Halogen	mg/L	ND
7/16/2007	Field Blank	Total Organic Halogen	mg/L	0.01
7/20/2007	Field Blank	Total Organic Halogen	mg/L	ND
7/24/2007	Field Blank	Total Organic Halogen	mg/L	ND
8/2/2007	Field Blank	Total Organic Halogen	mg/L	ND
8/23/2007	Field Blank	Total Organic Halogen	mg/L	ND
9/13/2007	Field Blank	Total Organic Halogen	mg/L	ND
4/3/2008	Field Blank	Total Organic Halogen	mg/L	ND
4/7/2008	Field Blank	Total Organic Halogen	mg/L	ND
4/11/2008	Field Blank	Total Organic Halogen	mg/L	ND
4/15/2008	Field Blank	Total Organic Halogen	mg/L	0.03
4/24/2008	Field Blank	Total Organic Halogen	mg/L	0.02
5/15/2008	Field Blank	Total Organic Halogen	mg/L	0.01
6/5/2008	Field Blank	Total Organic Halogen	mg/L	ND
7/3/2008	Field Blank	Total Organic Halogen	mg/L	ND
7/3/2008	Field Blank	Total Organic Halogen	mg/L	ND
7/7/2008	Field Blank	Total Organic Halogen	mg/L	0.01
7/10/2008	Field Blank	Total Organic Halogen	mg/L	0.04
7/11/2008	Field Blank	Total Organic Halogen	mg/L	ND
7/15/2008	Field Blank	Total Organic Halogen	mg/L	ND
7/24/2008	Field Blank	Total Organic Halogen	mg/L	ND
8/14/2008	Field Blank	Total Organic Halogen	mg/L	ND
9/4/2008	Field Blank	Total Organic Halogen	mg/L	ND
10/9/2008	Field Blank	Total Organic Halogen	mg/L	0.01
10/13/2008	Field Blank	Total Organic Halogen	mg/L	ND
10/17/2008	Field Blank	Total Organic Halogen	mg/L	ND
10/21/2008	Field Blank	Total Organic Halogen	mg/L	ND
10/30/2008	Field Blank	Total Organic Halogen	mg/L	0.03
11/20/2008	Field Blank	Total Organic Halogen	mg/L	ND
12/11/2008	Field Blank	Total Organic Halogen	mg/L	ND
1/8/2009	Field Blank	Total Organic Halogen	mg/L	ND
1/12/2009	Field Blank	Total Organic Halogen	mg/L	0.07
1/16/2009	Field Blank	Total Organic Halogen	mg/L	ND
1/20/2009	Field Blank	Total Organic Halogen	mg/L	0.02
1/29/2009	Field Blank	Total Organic Halogen	mg/L	ND
2/19/2009	Field Blank	Total Organic Halogen	mg/L	0.05
3/12/2009	Field Blank	Total Organic Halogen	mg/L	ND
1/11/2008	Field Blank	Total Organic Halogen	mg/L	ND
1/15/2008	Field Blank	Total Organic Halogen	mg/L	ND
1/24/2008	Field Blank	Total Organic Halogen	mg/L	0.03
1/3/2008	Field Blank	Total Organic Halogen	mg/L	ND
1/7/2008	Field Blank	Total Organic Halogen	mg/L	ND
10/18/2007	Field Blank	Total Organic Halogen	mg/L	ND
10/22/2007	Field Blank	Total Organic Halogen	mg/L	ND
10/26/2007	Field Blank	Total Organic Halogen	mg/L	ND
10/30/2007	Field Blank	Total Organic Halogen	mg/L	ND
11/29/2007	Field Blank	Total Organic Halogen	mg/L	0.03
11/8/2007	Field Blank	Total Organic Halogen	mg/L	0.02
12/20/2007	Field Blank	Total Organic Halogen	mg/L	ND
2/14/2008	Field Blank	Total Organic Halogen	mg/L	0.06
3/6/2008	Field Blank	Total Organic Halogen	mg/L	0.04
3/24/2009	Field Blank	Total Organic Halogen	mg/L	0.03
7/12/2007	Field Blank	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	Field Blank	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	Field Blank	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	Field Blank	Trichloroethene	ug/L	ND
7/12/2007	Field Blank	Trichlorofluoromethane	ug/L	ND
1/6/2005	Field Blank	Turbidity	NTU	ND
1/10/2005	Field Blank	Turbidity	NTU	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/14/2005	Field Blank	Turbidity	NTU	ND
1/18/2005	Field Blank	Turbidity	NTU	0.26
1/27/2005	Field Blank	Turbidity	NTU	ND
2/17/2005	Field Blank	Turbidity	NTU	ND
4/11/2005	Field Blank	Turbidity	NTU	ND
4/15/2005	Field Blank	Turbidity	NTU	ND
4/19/2005	Field Blank	Turbidity	NTU	ND
4/28/2005	Field Blank	Turbidity	NTU	ND
5/19/2005	Field Blank	Turbidity	NTU	ND
5/27/2005	Field Blank	Turbidity	NTU	ND
7/7/2005	Field Blank	Turbidity	NTU	ND
7/11/2005	Field Blank	Turbidity	NTU	0.11
7/15/2005	Field Blank	Turbidity	NTU	ND
7/19/2005	Field Blank	Turbidity	NTU	ND
7/28/2005	Field Blank	Turbidity	NTU	ND
8/18/2005	Field Blank	Turbidity	NTU	ND
9/8/2005	Field Blank	Turbidity	NTU	ND
7/12/2007	Field Blank	Turbidity	NTU	0.12
7/16/2007	Field Blank	Turbidity	NTU	ND
7/20/2007	Field Blank	Turbidity	NTU	ND
7/24/2007	Field Blank	Turbidity	NTU	ND
8/2/2007	Field Blank	Turbidity	NTU	ND
8/23/2007	Field Blank	Turbidity	NTU	ND
4/3/2008	Field Blank	Turbidity	NTU	0.20
4/7/2008	Field Blank	Turbidity	NTU	0.30
4/11/2008	Field Blank	Turbidity	NTU	ND
4/15/2008	Field Blank	Turbidity	NTU	0.11
4/24/2008	Field Blank	Turbidity	NTU	0.16
5/15/2008	Field Blank	Turbidity	NTU	ND
6/5/2008	Field Blank	Turbidity	NTU	0.08
7/3/2008	Field Blank	Turbidity	NTU	ND
7/3/2008	Field Blank	Turbidity	NTU	ND
7/7/2008	Field Blank	Turbidity	NTU	ND
7/10/2008	Field Blank	Turbidity	NTU	0.15
7/11/2008	Field Blank	Turbidity	NTU	ND
7/15/2008	Field Blank	Turbidity	NTU	0.02
7/24/2008	Field Blank	Turbidity	NTU	ND
8/14/2008	Field Blank	Turbidity	NTU	0.02
9/4/2008	Field Blank	Turbidity	NTU	ND
10/9/2008	Field Blank	Turbidity	NTU	ND
10/13/2008	Field Blank	Turbidity	NTU	ND
10/17/2008	Field Blank	Turbidity	NTU	0.10
10/21/2008	Field Blank	Turbidity	NTU	ND
10/30/2008	Field Blank	Turbidity	NTU	0.33
11/20/2008	Field Blank	Turbidity	NTU	ND
12/11/2008	Field Blank	Turbidity	NTU	ND
1/8/2009	Field Blank	Turbidity	NTU	ND
1/12/2009	Field Blank	Turbidity	NTU	ND
1/16/2009	Field Blank	Turbidity	NTU	ND
1/20/2009	Field Blank	Turbidity	NTU	ND
1/29/2009	Field Blank	Turbidity	NTU	ND
2/19/2009	Field Blank	Turbidity	NTU	ND
3/12/2009	Field Blank	Turbidity	NTU	ND
1/11/2008	Field Blank	Turbidity	NTU	0.79
1/15/2008	Field Blank	Turbidity	NTU	0.14
1/24/2008	Field Blank	Turbidity	NTU	0.15
1/3/2008	Field Blank	Turbidity	NTU	ND
1/7/2008	Field Blank	Turbidity	NTU	0.18
10/18/2007	Field Blank	Turbidity	NTU	0.12
10/22/2007	Field Blank	Turbidity	NTU	ND
10/26/2007	Field Blank	Turbidity	NTU	0.36
10/30/2007	Field Blank	Turbidity	NTU	ND
11/29/2007	Field Blank	Turbidity	NTU	ND
11/8/2007	Field Blank	Turbidity	NTU	ND
12/20/2007	Field Blank	Turbidity	NTU	ND
2/14/2008	Field Blank	Turbidity	NTU	ND
3/6/2008	Field Blank	Turbidity	NTU	0.48
7/12/2007	Field Blank	Vanadium	mg/L	ND
7/12/2007	Field Blank	Vinyl Acetate	ug/L	ND
7/12/2007	Field Blank	Vinyl Chloride	ug/L	ND
7/12/2007	Field Blank	Xylenes, Total	ug/L	ND
7/12/2007	Field Blank	Zinc	mg/L	ND

M

Sampling Date	Location ID	Analyte	Unit	Concentration
	7			
Location ID:				
Number of Sampling Dates:				
2/8/2005	M	Barium	mg/L	0.063
7/22/2005	M	Barium	mg/L	0.05
3/23/2006	M	Barium	mg/L	0.018
8/31/2006	M	Barium	mg/L	0.008
2/1/2007	M	Barium	mg/L	ND
7/26/2007	M	Barium	mg/L	0.014
7/10/2008	M	Barium	mg/L	0.024
7/10/2008	M	Barium	mg/L	0.024
3/24/2009	M	Barium	mg/L	0.053
2/8/2008	M	Barium	mg/L	0.048
2/8/2005	M	Chloride	mg/L	487
7/22/2005	M	Chloride	mg/L	567
3/23/2006	M	Chloride	mg/L	688
8/31/2006	M	Chloride	mg/L	708
2/1/2007	M	Chloride	mg/L	666
7/26/2007	M	Chloride	mg/L	666
7/10/2008	M	Chloride	mg/L	657
7/10/2008	M	Chloride	mg/L	657
3/24/2009	M	Chloride	mg/L	609
2/8/2008	M	Chloride	mg/L	592
2/8/2005	M	Chromium	mg/L	ND
7/22/2005	M	Chromium	mg/L	ND
3/23/2006	M	Chromium	mg/L	ND
8/31/2006	M	Chromium	mg/L	ND
2/1/2007	M	Chromium	mg/L	ND
7/26/2007	M	Chromium	mg/L	0.009
7/10/2008	M	Chromium	mg/L	0.018
7/10/2008	M	Chromium	mg/L	0.018
3/24/2009	M	Chromium	mg/L	0.023
2/8/2008	M	Chromium	mg/L	0.058
2/8/2005	M	Chromium, hexavalent	mg/l	ND
7/22/2005	M	Chromium, hexavalent	mg/l	ND
3/23/2006	M	Chromium, hexavalent	mg/l	ND
8/31/2006	M	Chromium, hexavalent	mg/l	ND
2/1/2007	M	Chromium, hexavalent	mg/l	ND
7/26/2007	M	Chromium, hexavalent	mg/L	ND
7/10/2008	M	Chromium, Hexavalent	mg/L	ND
7/10/2008	M	Chromium, Hexavalent	mg/L	ND
3/24/2009	M	Chromium, hexavalent	mg/L	ND
2/8/2008	M	Chromium, hexavalent	mg/L	ND
2/8/2005	M	Iron	mg/L	7962
7/22/2005	M	Iron	mg/L	9141
3/23/2006	M	Iron	mg/L	9288
8/31/2006	M	Iron	mg/L	7698
2/1/2007	M	Iron	mg/L	7525
7/26/2007	M	Iron	mg/L	7587
7/10/2008	M	Iron	mg/L	7695
7/10/2008	M	Iron	mg/L	7695
3/24/2009	M	Iron	mg/L	6526
2/8/2008	M	Iron	mg/L	7211
2/8/2005	M	Manganese	mg/L	279
7/22/2005	M	Manganese	mg/L	324
3/23/2006	M	Manganese	mg/L	306
8/31/2006	M	Manganese	mg/L	296
2/1/2007	M	Manganese	mg/L	279
7/26/2007	M	Manganese	mg/L	318
7/10/2008	M	Manganese	mg/L	340
7/10/2008	M	Manganese	mg/L	340
3/24/2009	M	Manganese	mg/L	247
2/8/2008	M	Manganese	mg/L	233
7/22/2005	M	Phenols	mg/L	ND
3/23/2006	M	Phenols	mg/L	ND
8/31/2006	M	Phenols	mg/L	3
7/10/2008	M	Phenols, Total	mg/L	ND
7/10/2008	M	Phenols, Total	mg/L	ND
3/24/2009	M	Phenols, Total	mg/L	ND
2/8/2005	M	Sodium	mg/L	616
7/22/2005	M	Sodium	mg/L	664
3/23/2006	M	Sodium	mg/L	581
8/31/2006	M	Sodium	mg/L	609
2/1/2007	M	Sodium	mg/L	600
7/26/2007	M	Sodium	mg/L	679
7/10/2008	M	Sodium	mg/L	682
7/10/2008	M	Sodium	mg/L	682
3/24/2009	M	Sodium	mg/L	502
2/8/2008	M	Sodium	mg/L	44.7
7/26/2007	M	Sulfate	mg/L	no report
7/10/2008	M	Sulfate	mg/L	18983
7/10/2008	M	Sulfate	mg/L	18983
3/24/2009	M	Sulfate	mg/L	ND
2/8/2008	M	Sulfate	mg/L	15801
2/8/2005	M	Sulfate	mg/L	15960

Sampling Date	Location ID	Analyte	Unit	Concentration
7/22/2005	M	Sulfate	mg/L	23791
3/23/2006	M	Sulfate	mg/L	24332
8/31/2006	M	Sulfate	mg/L	18600
2/1/2007	M	Sulfate	mg/L	20809
7/26/2007	M	Total Organic Carbon	mg/L	ND
3/24/2009	M	Total Organic Carbon	mg/L	ND
2/8/2008	M	Total Organic Carbon	mg/L	ND
2/8/2005	M	Total Organic Carbon	mg/L	5
7/22/2005	M	Total Organic Carbon	mg/L	3.8
3/23/2006	M	Total Organic Carbon	mg/L	5.9
8/31/2006	M	Total Organic Carbon	mg/L	4.6
2/1/2007	M	Total Organic Carbon	mg/L	4.7
7/10/2008	M	Total Organic Carbon	mg/L	6
7/10/2008	M	Total Organic Carbon	mg/L	6
2/8/2005	M	Total Organic Halogen	mg/L	0.038
7/22/2005	M	Total Organic Halogen	mg/L	0.537
3/23/2006	M	Total Organic Halogen	mg/L	0.572
8/31/2006	M	Total Organic Halogen	mg/L	0.065
2/1/2007	M	Total Organic Halogen	mg/L	0.03
7/26/2007	M	Total Organic Halogen	mg/L	0.29
7/10/2008	M	Total Organic Halogen	mg/L	0.05
7/10/2008	M	Total Organic Halogen	mg/L	0.05
2/8/2008	M	Total Organic Halogen	mg/L	0.04
3/24/2009	M	Total Organic Halogen	mg/L	0.2
7/10/2008	M	Turbidity	NTU	272
7/10/2008	M	Turbidity	NTU	272

Location ID:

Sampling Date	Location ID	Analyte	Unit	Concentration
Number of Sampling Dates:		**MDUP**		
		1		
7/22/2005	MDUP	Barium	mg/L	0.052
7/22/2005	MDUP	Chloride	mg/L	557
7/22/2005	MDUP	Chromium	mg/L	ND
7/22/2005	MDUP	Chromium, hexavalent	mg/l	ND
7/22/2005	MDUP	Iron	mg/L	9453
7/22/2005	MDUP	Iron	mg/L	9453
7/22/2005	MDUP	Manganese	mg/L	339
7/22/2005	MDUP	Phenols	mg/L	90
7/22/2005	MDUP	Phenols	mg/L	90
7/22/2005	MDUP	Sodium	mg/L	688
7/22/2005	MDUP	Sulfate	mg/L	20849
7/22/2005	MDUP	Total Organic Carbon	mg/L	5.2
7/22/2005	MDUP	Total Organic Halogen	mg/L	0.055
Location ID:		**MW-2DUP**		
Number of Sampling Dates:		**1**		
8/22/2006	MW-2DUP	Barium	mg/L	0.095
8/22/2006	MW-2DUP	Chloride	mg/L	1.94
8/22/2006	MW-2DUP	Chromium	mg/L	ND
8/22/2006	MW-2DUP	Dichloromethane (MeCl2)	ug/L	ND
8/22/2006	MW-2DUP	Iron	mg/L	0.089
8/22/2006	MW-2DUP	Manganese	mg/L	0.022
8/22/2006	MW-2DUP	Sulfate	mg/L	18.2
8/22/2006	MW-2DUP	Turbidity	NTU	6.6

Sampling Date	Location ID	Analyte	Unit	Concentration
	R			
	7			
Location ID:				
Number of Sampling Dates:				
2/8/2005	R	Barium	mg/L	0.109
7/22/2005	R	Barium	mg/L	0.092
3/23/2006	R	Barium	mg/L	0.088
8/31/2006	R	Barium	mg/L	0.113
2/1/2007	R	Barium	mg/L	0.136
7/26/2007	R	Barium	mg/L	0.119
7/10/2008	R	Barium	mg/L	0.067
3/24/2009	R	Barium	mg/L	0.108
2/8/2008	R	Barium	mg/L	0.092
2/8/2005	R	Chloride	mg/L	8.98
7/22/2005	R	Chloride	mg/L	8.91
3/23/2006	R	Chloride	mg/L	4.16
8/31/2006	R	Chloride	mg/L	9.38
2/1/2007	R	Chloride	mg/L	10.1
7/26/2007	R	Chloride	mg/L	4.08
7/10/2008	R	Chloride	mg/L	6.41
3/24/2009	R	Chloride	mg/L	9.29
2/8/2008	R	Chloride	mg/L	8.63
2/8/2005	R	Chromium	mg/L	ND
7/22/2005	R	Chromium	mg/L	ND
3/23/2006	R	Chromium	mg/L	ND
8/31/2006	R	Chromium	mg/L	ND
2/1/2007	R	Chromium	mg/L	0.008
7/26/2007	R	Chromium	mg/L	ND
7/10/2008	R	Chromium	mg/L	ND
3/24/2009	R	Chromium	mg/L	ND
2/8/2008	R	Chromium	mg/L	0.018
2/8/2005	R	Chromium, hexavalent	mg/l	ND
7/22/2005	R	Chromium, hexavalent	mg/l	ND
3/23/2006	R	Chromium, hexavalent	mg/l	ND
8/31/2006	R	Chromium, hexavalent	mg/l	ND
2/1/2007	R	Chromium, hexavalent	mg/l	ND
7/26/2007	R	Chromium, hexavalent	mg/L	ND
7/10/2008	R	Chromium, Hexavalent	mg/L	ND
3/24/2009	R	Chromium, hexavalent	mg/L	ND
2/8/2008	R	Chromium, hexavalent	mg/L	ND
2/8/2005	R	Iron	mg/L	18.9
7/22/2005	R	Iron	mg/L	13.2
3/23/2006	R	Iron	mg/L	17.2
8/31/2006	R	Iron	mg/L	2.01
2/1/2007	R	Iron	mg/L	15.2
7/26/2007	R	Iron	mg/L	0.645
7/10/2008	R	Iron	mg/L	10.3
3/24/2009	R	Iron	mg/L	3.14
2/8/2008	R	Iron	mg/L	11.1
2/8/2005	R	Manganese	mg/L	0.249
7/22/2005	R	Manganese	mg/L	0.234
3/23/2006	R	Manganese	mg/L	0.251
8/31/2006	R	Manganese	mg/L	0.175
2/1/2007	R	Manganese	mg/L	0.22
7/26/2007	R	Manganese	mg/L	0.031
7/10/2008	R	Manganese	mg/L	0.175
3/24/2009	R	Manganese	mg/L	0.171
2/8/2008	R	Manganese	mg/L	0.333
7/22/2005	R	Phenols	mg/L	ND
3/23/2006	R	Phenols	mg/L	ND
8/31/2006	R	Phenols	mg/L	ND
7/10/2008	R	Phenols, Total	mg/L	ND
3/24/2009	R	Phenols, Total	mg/L	ND
2/8/2005	R	Sodium	mg/L	11.7
7/22/2005	R	Sodium	mg/L	11.4
3/23/2006	R	Sodium	mg/L	9.5
8/31/2006	R	Sodium	mg/L	10.5
2/1/2007	R	Sodium	mg/L	11.1
7/26/2007	R	Sodium	mg/L	12
7/10/2008	R	Sodium	mg/L	9.93
3/24/2009	R	Sodium	mg/L	10.7
2/8/2008	R	Sodium	mg/L	15.8
7/26/2007	R	Sulfate	mg/L	15.8
7/10/2008	R	Sulfate	mg/L	9.33
3/24/2009	R	Sulfate	mg/L	9.53
2/8/2008	R	Sulfate	mg/L	18.8
2/8/2005	R	Sulfate	mg/L	13.7
7/22/2005	R	Sulfate	mg/L	20.8
3/23/2006	R	Sulfate	mg/L	14
8/31/2006	R	Sulfate	mg/L	15.3
2/1/2007	R	Sulfate	mg/L	42.8
3/24/2009	R	Total Organic Carbon	mg/L	ND
2/8/2008	R	Total Organic Carbon	mg/L	ND
2/8/2005	R	Total Organic Carbon	mg/L	ND
7/22/2005	R	Total Organic Carbon	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
3/23/2006	R	Total Organic Carbon	mg/L	ND
8/31/2006	R	Total Organic Carbon	mg/L	ND
2/1/2007	R	Total Organic Carbon	mg/L	ND
7/26/2007	R	Total Organic Carbon	mg/L	ND
7/10/2008	R	Total Organic Carbon	mg/L	ND
2/8/2005	R	Total Organic Halogen	mg/L	ND
7/22/2005	R	Total Organic Halogen	mg/L	ND
3/23/2006	R	Total Organic Halogen	mg/L	0.016
8/31/2006	R	Total Organic Halogen	mg/L	ND
2/1/2007	R	Total Organic Halogen	mg/L	ND
7/26/2007	R	Total Organic Halogen	mg/L	ND
7/10/2008	R	Total Organic Halogen	mg/L	0.02
2/8/2008	R	Total Organic Halogen	mg/L	ND
3/24/2009	R	Total Organic Halogen	mg/L	0.02
7/10/2008	R	Turbidity	NTU	139
Location ID:				
Number of Sampling Dates:				
		RW5		
		1		
5/27/2005	RW5	Barium	mg/L	0.07
5/27/2005	RW5	Chloride	mg/L	3.22
5/27/2005	RW5	Chromium	mg/L	ND
5/27/2005	RW5	Iron	mg/L	0.044
5/27/2005	RW5	Manganese	mg/L	0.217
5/27/2005	RW5	Sodium	mg/L	7.58
5/27/2005	RW5	Sulfate	mg/L	14.6
5/27/2005	RW5	Turbidity	NTU	0.33
Location ID:		**RW5DUP**		
Number of Sampling Dates:		**1**		
5/27/2005	RW5DUP	Barium	mg/L	0.066
5/27/2005	RW5DUP	Chloride	mg/L	3.27
5/27/2005	RW5DUP	Chromium	mg/L	ND
5/27/2005	RW5DUP	Iron	mg/L	0.02
5/27/2005	RW5DUP	Manganese	mg/L	0.177
5/27/2005	RW5DUP	Sodium	mg/L	7.38
5/27/2005	RW5DUP	Sulfate	mg/L	14.4
5/27/2005	RW5DUP	Turbidity	NTU	0.32

Sampling Date	Location ID	Analyte	Unit	Concentration
	S			
	7			
Location ID:				
Number of Sampling Dates:				
2/8/2005	S	Barium	mg/L	0.075
7/22/2005	S	Barium	mg/L	0.082
3/23/2006	S	Barium	mg/L	0.096
8/31/2006	S	Barium	mg/L	0.069
2/1/2007	S	Barium	mg/L	0.131
7/26/2007	S	Barium	mg/L	0.065
7/10/2008	S	Barium	mg/L	0.061
3/24/2009	S	Barium	mg/L	0.064
2/8/2008	S	Barium	mg/L	0.087
2/8/2005	S	Chloride	mg/L	118
7/22/2005	S	Chloride	mg/L	130
3/23/2006	S	Chloride	mg/L	158
8/31/2006	S	Chloride	mg/L	136
2/1/2007	S	Chloride	mg/L	179
7/26/2007	S	Chloride	mg/L	138
7/10/2008	S	Chloride	mg/L	135
3/24/2009	S	Chloride	mg/L	127
2/8/2008	S	Chloride	mg/L	107
2/8/2005	S	Chromium	mg/L	ND
7/22/2005	S	Chromium	mg/L	ND
3/23/2006	S	Chromium	mg/L	ND
8/31/2006	S	Chromium	mg/L	ND
2/1/2007	S	Chromium	mg/L	0.008
7/26/2007	S	Chromium	mg/L	ND
7/10/2008	S	Chromium	mg/L	0.015
3/24/2009	S	Chromium	mg/L	ND
2/8/2008	S	Chromium	mg/L	ND
2/8/2005	S	Chromium, hexavalent	mg/l	ND
7/22/2005	S	Chromium, hexavalent	mg/l	ND
3/23/2006	S	Chromium, hexavalent	mg/l	ND
8/31/2006	S	Chromium, hexavalent	mg/l	ND
2/1/2007	S	Chromium, hexavalent	mg/l	ND
7/26/2007	S	Chromium, hexavalent	mg/L	ND
7/10/2008	S	Chromium, Hexavalent	mg/L	ND
3/24/2009	S	Chromium, hexavalent	mg/L	ND
2/8/2008	S	Chromium, hexavalent	mg/L	ND
2/8/2005	S	Iron	mg/L	0.918
7/22/2005	S	Iron	mg/L	0.962
3/23/2006	S	Iron	mg/L	1.47
8/31/2006	S	Iron	mg/L	7.27
2/1/2007	S	Iron	mg/L	5.07
7/26/2007	S	Iron	mg/L	0.501
7/10/2008	S	Iron	mg/L	41.3
3/24/2009	S	Iron	mg/L	0.836
2/8/2008	S	Iron	mg/L	0.392
2/8/2005	S	Manganese	mg/L	1.86
7/22/2005	S	Manganese	mg/L	1.88
3/23/2006	S	Manganese	mg/L	1.79
8/31/2006	S	Manganese	mg/L	1.87
2/1/2007	S	Manganese	mg/L	1.79
7/26/2007	S	Manganese	mg/L	1.86
7/10/2008	S	Manganese	mg/L	3.26
3/24/2009	S	Manganese	mg/L	1.68
2/8/2008	S	Manganese	mg/L	1.50
7/22/2005	S	Phenols	mg/L	ND
3/23/2006	S	Phenols	mg/L	ND
8/31/2006	S	Phenols	mg/L	ND
7/10/2008	S	Phenols, Total	mg/L	ND
3/24/2009	S	Phenols, Total	mg/L	ND
2/8/2005	S	Sodium	mg/L	69.3
7/22/2005	S	Sodium	mg/L	67.7
3/23/2006	S	Sodium	mg/L	64.9
8/31/2006	S	Sodium	mg/L	61
2/1/2007	S	Sodium	mg/L	78.4
7/26/2007	S	Sodium	mg/L	66.3
7/10/2008	S	Sodium	mg/L	72.1
3/24/2009	S	Sodium	mg/L	67.7
2/8/2008	S	Sodium	mg/L	83.1
7/26/2007	S	Sulfate	mg/L	61.5
7/10/2008	S	Sulfate	mg/L	250
3/24/2009	S	Sulfate	mg/L	95.9
2/8/2008	S	Sulfate	mg/L	99.6
2/8/2005	S	Sulfate	mg/L	123
2/8/2005	S	Sulfate	mg/L	123
7/22/2005	S	Sulfate	mg/L	94.5
3/23/2006	S	Sulfate	mg/L	96.9
8/31/2006	S	Sulfate	mg/L	91.3
2/1/2007	S	Sulfate	mg/L	103
7/26/2007	S	Total Organic Carbon	mg/L	2.4
3/24/2009	S	Total Organic Carbon	mg/L	26
2/8/2008	S	Total Organic Carbon	mg/L	2.7

Sampling Date	Location ID	Analyte	Unit	Concentration
2/8/2005	S	Total Organic Carbon	mg/L	2.2
7/22/2005	S	Total Organic Carbon	mg/L	1.4
3/23/2006	S	Total Organic Carbon	mg/L	2.4
8/31/2006	S	Total Organic Carbon	mg/L	2

Sampling Date	Location ID	Analyte	Unit	Concentration
2/1/2007	S	Total Organic Carbon	mg/L	2.4
7/10/2008	S	Total Organic Carbon	mg/L	3.2
2/8/2005	S	Total Organic Halogen	mg/L	ND
7/22/2005	S	Total Organic Halogen	mg/L	0.035
3/23/2006	S	Total Organic Halogen	mg/L	0.036
8/31/2006	S	Total Organic Halogen	mg/L	0.16
2/1/2007	S	Total Organic Halogen	mg/L	0.06
7/26/2007	S	Total Organic Halogen	mg/L	0.06
7/10/2008	S	Total Organic Halogen	mg/L	0.05
2/8/2008	S	Total Organic Halogen	mg/L	0.03
3/24/2009	S	Total Organic Halogen	mg/L	0.09
7/10/2008	S	Turbidity	NTU	49
	SDUP	2		
Location ID:				
Number of Sampling Dates:				
2/8/2005	SDUP	Barium	mg/L	0.078
2/1/2007	SDUP	Barium	mg/L	0.134
7/10/2008	SDUP	Barium	mg/L	0.057
3/24/2009	SDUP	Barium	mg/L	0.064
2/8/2005	SDUP	Chloride	mg/L	129
2/1/2007	SDUP	Chloride	mg/L	166
7/10/2008	SDUP	Chloride	mg/L	131
3/24/2009	SDUP	Chloride	mg/L	113
2/8/2005	SDUP	Chromium	mg/L	ND
2/1/2007	SDUP	Chromium	mg/L	0.008
7/10/2008	SDUP	Chromium	mg/L	0.013
3/24/2009	SDUP	Chromium	mg/L	ND
2/8/2005	SDUP	Chromium, hexavalent	mg/l	ND
2/1/2007	SDUP	Chromium, hexavalent	mg/l	ND
7/10/2008	SDUP	Chromium, Hexavalent	mg/L	ND
3/24/2009	SDUP	Chromium, hexavalent	mg/L	ND
2/8/2005	SDUP	Iron	mg/L	1.13
2/1/2007	SDUP	Iron	mg/L	5.13
7/10/2008	SDUP	Iron	mg/L	38.6
3/24/2009	SDUP	Iron	mg/L	0.875
2/8/2005	SDUP	Manganese	mg/L	1.88
2/1/2007	SDUP	Manganese	mg/L	1.78
7/10/2008	SDUP	Manganese	mg/L	3.38
3/24/2009	SDUP	Manganese	mg/L	1.71
7/10/2008	SDUP	Phenols, Total	mg/L	ND
3/24/2009	SDUP	Phenols, Total	mg/L	ND
2/8/2005	SDUP	Sodium	mg/L	70.1
2/1/2007	SDUP	Sodium	mg/L	77.6
7/10/2008	SDUP	Sodium	mg/L	68.9
3/24/2009	SDUP	Sodium	mg/L	67.8
7/10/2008	SDUP	Sulfate	mg/L	420
3/24/2009	SDUP	Sulfate	mg/L	116
2/8/2005	SDUP	Sulfate	mg/L	103
2/1/2007	SDUP	Sulfate	mg/L	92.1
3/24/2009	SDUP	Total Organic Carbon	mg/L	2.7
2/8/2005	SDUP	Total Organic Carbon	mg/L	2.4
2/1/2007	SDUP	Total Organic Carbon	mg/L	3.3
7/10/2008	SDUP	Total Organic Carbon	mg/L	3
2/8/2005	SDUP	Total Organic Halogen	mg/L	0.047
2/1/2007	SDUP	Total Organic Halogen	mg/L	0.05
7/10/2008	SDUP	Total Organic Halogen	mg/L	0.07
3/24/2009	SDUP	Total Organic Halogen	mg/L	0.08
7/10/2008	SDUP	Turbidity	NTU	36
Location ID:				

Sampling Date	Location ID	Analyte	Unit	Concentration
Number of Sampling Dates:		**SS-1**		
		1		
8/25/2006	SS-1	Barium	mg/L	0.072
8/25/2006	SS-1	Chromium	mg/L	ND
8/25/2006	SS-1	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	SS-1	Iron	mg/L	0.235
8/25/2006	SS-1	Manganese	mg/L	0.03
8/25/2006	SS-1	Turbidity	NTU	9.5
Location ID:		**SS-2**		
Number of Sampling Dates:		**1**		
8/22/2006	SS-2	Barium	mg/L	0.066
8/22/2006	SS-2	Chloride	mg/L	31.1
8/22/2006	SS-2	Chromium	mg/L	ND
8/22/2006	SS-2	Dichloromethane (MeCl2)	ug/L	ND
8/22/2006	SS-2	Iron	mg/L	0.16
8/22/2006	SS-2	Manganese	mg/L	0.014
8/22/2006	SS-2	Sulfate	mg/L	27.6
8/22/2006	SS-2	Turbidity	NTU	3.9
Location ID:		**SS-3**		
Number of Sampling Dates:		**1**		
8/25/2006	SS-3	Barium	mg/L	0.07
8/25/2006	SS-3	Chloride	mg/L	23.1
8/25/2006	SS-3	Chromium	mg/L	ND
8/25/2006	SS-3	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	SS-3	Iron	mg/L	0.32
8/25/2006	SS-3	Manganese	mg/L	0.03
8/25/2006	SS-3	Sulfate	mg/L	19.9
8/25/2006	SS-3	Turbidity	NTU	11
Location ID:		**SS-5**		
Number of Sampling Dates:		**1**		
8/21/2006	SS-5	Barium	mg/L	0.124
8/21/2006	SS-5	Chloride	mg/L	6.37
8/21/2006	SS-5	Chromium	mg/L	ND
8/21/2006	SS-5	Dichloromethane (MeCl2)	ug/L	ND
8/21/2006	SS-5	Iron	mg/L	1.86
8/21/2006	SS-5	Manganese	mg/L	0.577
8/21/2006	SS-5	Sulfate	mg/L	66.8
8/21/2006	SS-5	Turbidity	NTU	153

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		Trip Blank		
7/12/2007	Trip Blank	1,1,1,2-Tetrachloroethane	ug/L	ND
7/12/2007	Trip Blank	1,1,1-Trichloroethane	ug/L	ND
7/12/2007	Trip Blank	1,1,2,2-Tetrachloroethane	ug/L	ND
7/12/2007	Trip Blank	1,1,2-Trichloroethane	ug/L	ND
7/12/2007	Trip Blank	1,1-Dichloroethane	ug/L	ND
7/12/2007	Trip Blank	1,1-Dichloroethene	ug/L	ND
7/12/2007	Trip Blank	1,1-Dichloropropene	ug/L	ND
7/12/2007	Trip Blank	1,2,3-Trichlorobenzene	ug/L	ND
7/12/2007	Trip Blank	1,2,3-Trichloropropane	ug/L	ND
7/12/2007	Trip Blank	1,2,4-Trichlorobenzene	ug/L	ND
7/12/2007	Trip Blank	1,2,4-Trimethylbenzene	ug/L	ND
7/12/2007	Trip Blank	1,2-Dibromo-3-Chloropropane	ug/L	ND
7/12/2007	Trip Blank	1,2-Dibromoethane	ug/L	ND
7/12/2007	Trip Blank	1,2-Dichlorobenzene	ug/L	ND
7/12/2007	Trip Blank	1,2-Dichloroethane	ug/L	ND
7/12/2007	Trip Blank	1,2-Dichloropropane	ug/L	ND
7/12/2007	Trip Blank	1,3,5-Trimethylbenzene	ug/L	ND
7/12/2007	Trip Blank	1,3-Dichlorobenzene	ug/L	ND
7/12/2007	Trip Blank	1,3-Dichloropropane	ug/L	ND
7/12/2007	Trip Blank	1,4-Dichlorobenzene	ug/L	ND
7/12/2007	Trip Blank	2,2-Dichloropropane	ug/L	ND
7/12/2007	Trip Blank	2-Butanone (MEK)	ug/L	ND
7/12/2007	Trip Blank	2-Chloroethylvinyl Ether	ug/L	ND
7/12/2007	Trip Blank	2-Chlorotoluene	ug/L	ND
7/12/2007	Trip Blank	2-Hexanone	ug/L	ND
7/12/2007	Trip Blank	3-Chloro-1-propene	ug/L	ND
7/12/2007	Trip Blank	4-Chlorotoluene	ug/L	ND
7/12/2007	Trip Blank	4-Isopropyltoluene	ug/L	ND
7/12/2007	Trip Blank	4-Methyl-2-Pentanone (MIBK)	ug/L	ND
7/12/2007	Trip Blank	Acetone	ug/L	ND
7/12/2007	Trip Blank	Acrolein	ug/L	ND
7/12/2007	Trip Blank	Acrylonitrile	ug/L	ND
7/12/2007	Trip Blank	Alkalinity, Bicarbonate	mg/L	1.5
7/12/2007	Trip Blank	Ammonia	mg/L	ND
7/12/2007	Trip Blank	Antimony	mg/L	ND
7/12/2007	Trip Blank	Arsenic	mg/L	ND
1/6/2005	Trip Blank	Barium	mg/L	ND
1/10/2005	Trip Blank	Barium	mg/L	ND
1/14/2005	Trip Blank	Barium	mg/L	ND
1/18/2005	Trip Blank	Barium	mg/L	ND
1/27/2005	Trip Blank	Barium	mg/L	ND
2/8/2005	Trip Blank	Barium	mg/L	ND
2/17/2005	Trip Blank	Barium	mg/L	ND
4/7/2005	Trip Blank	Barium	mg/L	ND
4/11/2005	Trip Blank	Barium	mg/L	ND
4/15/2005	Trip Blank	Barium	mg/L	ND
4/19/2005	Trip Blank	Barium	mg/L	ND
4/28/2005	Trip Blank	Barium	mg/L	ND
5/19/2005	Trip Blank	Barium	mg/L	ND
6/9/2005	Trip Blank	Barium	mg/L	ND
7/7/2005	Trip Blank	Barium	mg/L	ND
7/11/2005	Trip Blank	Barium	mg/L	ND
7/15/2005	Trip Blank	Barium	mg/L	ND
7/19/2005	Trip Blank	Barium	mg/L	ND
7/28/2005	Trip Blank	Barium	mg/L	ND
8/18/2005	Trip Blank	Barium	mg/L	ND
9/8/2005	Trip Blank	Barium	mg/L	ND
10/13/2005	Trip Blank	Barium	mg/L	ND
10/17/2005	Trip Blank	Barium	mg/L	ND
10/21/2005	Trip Blank	Barium	mg/L	ND
10/25/2005	Trip Blank	Barium	mg/L	ND
11/3/2005	Trip Blank	Barium	mg/L	ND
11/23/2005	Trip Blank	Barium	mg/L	ND
12/15/2005	Trip Blank	Barium	mg/L	ND
1/5/2006	Trip Blank	Barium	mg/L	ND
1/9/2006	Trip Blank	Barium	mg/L	ND
1/13/2006	Trip Blank	Barium	mg/L	ND
1/17/2006	Trip Blank	Barium	mg/L	ND
1/26/2006	Trip Blank	Barium	mg/L	ND
2/16/2006	Trip Blank	Barium	mg/L	ND
3/9/2006	Trip Blank	Barium	mg/L	ND
3/23/2006	Trip Blank	Barium	mg/L	ND
4/6/2006	Trip Blank	Barium	mg/L	ND
4/10/2006	Trip Blank	Barium	mg/L	ND
4/14/2006	Trip Blank	Barium	mg/L	ND
4/18/2006	Trip Blank	Barium	mg/L	ND
4/27/2006	Trip Blank	Barium	mg/L	ND
5/18/2006	Trip Blank	Barium	mg/L	ND
6/8/2006	Trip Blank	Barium	mg/L	ND
7/6/2006	Trip Blank	Barium	mg/L	ND
7/10/2006	Trip Blank	Barium	mg/L	ND
7/14/2006	Trip Blank	Barium	mg/L	ND
7/18/2006	Trip Blank	Barium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/27/2006	Trip Blank	Barium	mg/L	ND
8/17/2006	Trip Blank	Barium	mg/L	ND
8/31/2006	Trip Blank	Barium	mg/L	ND
9/7/2006	Trip Blank	Barium	mg/L	ND
10/19/2006	Trip Blank	Barium	mg/L	ND
10/23/2006	Trip Blank	Barium	mg/L	ND
10/27/2006	Trip Blank	Barium	mg/L	ND
10/31/2006	Trip Blank	Barium	mg/L	ND
11/9/2006	Trip Blank	Barium	mg/L	ND
11/30/2006	Trip Blank	Barium	mg/L	ND
12/21/2006	Trip Blank	Barium	mg/L	ND
1/4/2007	Trip Blank	Barium	mg/L	ND
1/8/2007	Trip Blank	Barium	mg/L	ND
1/11/2007	Trip Blank	Barium	mg/L	ND
1/16/2007	Trip Blank	Barium	mg/L	ND
1/25/2007	Trip Blank	Barium	mg/L	ND
2/1/2007	Trip Blank	Barium	mg/L	ND
2/15/2007	Trip Blank	Barium	mg/L	ND
3/8/2007	Trip Blank	Barium	mg/L	ND
4/19/2007	Trip Blank	Barium	mg/L	ND
4/23/2007	Trip Blank	Barium	mg/L	ND
4/27/2007	Trip Blank	Barium	mg/L	ND
5/1/2007	Trip Blank	Barium	mg/L	ND
5/10/2007	Trip Blank	Barium	mg/L	ND
5/31/2007	Trip Blank	Barium	mg/L	ND
6/21/2007	Trip Blank	Barium	mg/L	ND
7/12/2007	Trip Blank	Barium	mg/L	ND
7/16/2007	Trip Blank	Barium	mg/L	ND
7/20/2007	Trip Blank	Barium	mg/L	ND
7/24/2007	Trip Blank	Barium	mg/L	ND
7/26/2007	Trip Blank	Barium	mg/L	ND
8/2/2007	Trip Blank	Barium	mg/L	0.007
8/23/2007	Trip Blank	Barium	mg/L	ND
9/13/2007	Trip Blank	Barium	mg/L	ND
4/3/2008	Trip Blank	Barium	mg/L	ND
4/7/2008	Trip Blank	Barium	mg/L	ND
4/11/2008	Trip Blank	Barium	mg/L	ND
4/15/2008	Trip Blank	Barium	mg/L	ND
4/24/2008	Trip Blank	Barium	mg/L	ND
5/15/2008	Trip Blank	Barium	mg/L	ND
6/5/2008	Trip Blank	Barium	mg/L	ND
7/3/2008	Trip Blank	Barium	mg/L	ND
7/3/2008	Trip Blank	Barium	mg/L	ND
7/7/2008	Trip Blank	Barium	mg/L	ND
7/10/2008	Trip Blank	Barium	mg/L	ND
7/11/2008	Trip Blank	Barium	mg/L	ND
7/15/2008	Trip Blank	Barium	mg/L	ND
7/24/2008	Trip Blank	Barium	mg/L	ND
8/14/2008	Trip Blank	Barium	mg/L	ND
9/4/2008	Trip Blank	Barium	mg/L	ND
10/9/2008	Trip Blank	Barium	mg/L	ND
10/13/2008	Trip Blank	Barium	mg/L	ND
10/17/2008	Trip Blank	Barium	mg/L	ND
10/21/2008	Trip Blank	Barium	mg/L	ND
10/30/2008	Trip Blank	Barium	mg/L	ND
11/20/2008	Trip Blank	Barium	mg/L	ND
12/11/2008	Trip Blank	Barium	mg/L	ND
1/8/2009	Trip Blank	Barium	mg/L	ND
1/12/2009	Trip Blank	Barium	mg/L	ND
1/16/2009	Trip Blank	Barium	mg/L	ND
1/20/2009	Trip Blank	Barium	mg/L	ND
1/29/2009	Trip Blank	Barium	mg/L	ND
2/19/2009	Trip Blank	Barium	mg/L	ND
3/12/2009	Trip Blank	Barium	mg/L	ND
3/24/2009	Trip Blank	Barium	mg/L	ND
4/9/2009	Trip Blank	Barium	mg/L	ND
4/13/2009	Trip Blank	Barium	mg/L	ND
4/17/2009	Trip Blank	Barium	mg/L	ND
4/21/2009	Trip Blank	Barium	mg/L	ND
4/30/2009	Trip Blank	Barium	mg/L	ND
5/21/2009	Trip Blank	Barium	mg/L	ND
1/11/2008	Trip Blank	Barium	mg/L	ND
1/15/2008	Trip Blank	Barium	mg/L	ND
1/24/2008	Trip Blank	Barium	mg/L	ND
1/3/2008	Trip Blank	Barium	mg/L	ND
1/7/2008	Trip Blank	Barium	mg/L	ND
10/18/2007	Trip Blank	Barium	mg/L	ND
10/22/2007	Trip Blank	Barium	mg/L	ND
10/26/2007	Trip Blank	Barium	mg/L	ND
10/30/2007	Trip Blank	Barium	mg/L	ND
11/29/2007	Trip Blank	Barium	mg/L	ND
11/8/2007	Trip Blank	Barium	mg/L	ND
12/20/2007	Trip Blank	Barium	mg/L	ND
2/14/2008	Trip Blank	Barium	mg/L	ND
2/8/2008	Trip Blank	Barium	mg/L	0.015

Sampling Date	Location ID	Analyte	Unit	Concentration
3/6/2008	Trip Blank	Barium	mg/L	ND
6/11/2009	Trip Blank	Barium	mg/L	ND
7/12/2007	Trip Blank	Benzene	ug/L	ND
7/12/2007	Trip Blank	Beryllium	mg/L	ND
7/12/2007	Trip Blank	BOD	mg/L	ND
7/12/2007	Trip Blank	Bromobenzene	ug/L	ND
7/12/2007	Trip Blank	Bromochloromethane	ug/L	ND
7/12/2007	Trip Blank	Bromodichloromethane	ug/L	ND
7/12/2007	Trip Blank	Bromoform	ug/L	ND
7/12/2007	Trip Blank	Bromomethane	ug/L	ND
7/12/2007	Trip Blank	Cadmium	mg/L	0.004
7/12/2007	Trip Blank	Calcium	mg/L	ND
7/12/2007	Trip Blank	Carbon Disulfide	ug/L	ND
7/12/2007	Trip Blank	Carbon Tetrachloride	ug/L	ND
7/12/2007	Trip Blank	Chemical Oxygen Demand	mg/L	ND
1/6/2005	Trip Blank	Chloride	mg/L	ND
1/10/2005	Trip Blank	Chloride	mg/L	ND
1/14/2005	Trip Blank	Chloride	mg/L	ND
1/18/2005	Trip Blank	Chloride	mg/L	ND
1/27/2005	Trip Blank	Chloride	mg/L	0.72
2/8/2005	Trip Blank	Chloride	mg/L	ND
2/17/2005	Trip Blank	Chloride	mg/L	ND
4/7/2005	Trip Blank	Chloride	mg/L	ND
4/11/2005	Trip Blank	Chloride	mg/L	ND
4/15/2005	Trip Blank	Chloride	mg/L	ND
4/19/2005	Trip Blank	Chloride	mg/L	ND
4/28/2005	Trip Blank	Chloride	mg/L	ND
5/19/2005	Trip Blank	Chloride	mg/L	ND
5/19/2005	Trip Blank	Chloride	mg/L	ND
6/9/2005	Trip Blank	Chloride	mg/L	ND
7/7/2005	Trip Blank	Chloride	mg/L	0.62
7/11/2005	Trip Blank	Chloride	mg/L	ND
7/15/2005	Trip Blank	Chloride	mg/L	ND
7/19/2005	Trip Blank	Chloride	mg/L	ND
7/28/2005	Trip Blank	Chloride	mg/L	ND
8/18/2005	Trip Blank	Chloride	mg/L	ND
9/8/2005	Trip Blank	Chloride	mg/L	ND
10/13/2005	Trip Blank	Chloride	mg/L	ND
10/17/2005	Trip Blank	Chloride	mg/L	ND
10/21/2005	Trip Blank	Chloride	mg/L	ND
10/25/2005	Trip Blank	Chloride	mg/L	ND
11/3/2005	Trip Blank	Chloride	mg/L	ND
11/23/2005	Trip Blank	Chloride	mg/L	ND
12/15/2005	Trip Blank	Chloride	mg/L	ND
1/5/2006	Trip Blank	Chloride	mg/L	ND
1/9/2006	Trip Blank	Chloride	mg/L	ND
1/13/2006	Trip Blank	Chloride	mg/L	ND
1/17/2006	Trip Blank	Chloride	mg/L	ND
1/26/2006	Trip Blank	Chloride	mg/L	ND
2/16/2006	Trip Blank	Chloride	mg/L	ND
3/9/2006	Trip Blank	Chloride	mg/L	ND
3/23/2006	Trip Blank	Chloride	mg/L	ND
4/6/2006	Trip Blank	Chloride	mg/L	ND
4/10/2006	Trip Blank	Chloride	mg/L	ND
4/14/2006	Trip Blank	Chloride	mg/L	ND
4/18/2006	Trip Blank	Chloride	mg/L	ND
4/27/2006	Trip Blank	Chloride	mg/L	ND
5/18/2006	Trip Blank	Chloride	mg/L	ND
6/8/2006	Trip Blank	Chloride	mg/L	ND
7/6/2006	Trip Blank	Chloride	mg/L	ND
7/10/2006	Trip Blank	Chloride	mg/L	ND
7/14/2006	Trip Blank	Chloride	mg/L	ND
7/18/2006	Trip Blank	Chloride	mg/L	ND
7/27/2006	Trip Blank	Chloride	mg/L	ND
8/17/2006	Trip Blank	Chloride	mg/L	ND
8/31/2006	Trip Blank	Chloride	mg/L	ND
9/7/2006	Trip Blank	Chloride	mg/L	ND
10/19/2006	Trip Blank	Chloride	mg/L	ND
10/23/2006	Trip Blank	Chloride	mg/L	ND
10/27/2006	Trip Blank	Chloride	mg/L	ND
10/31/2006	Trip Blank	Chloride	mg/L	ND
11/9/2006	Trip Blank	Chloride	mg/L	ND
11/30/2006	Trip Blank	Chloride	mg/L	ND
12/21/2006	Trip Blank	Chloride	mg/L	ND
1/4/2007	Trip Blank	Chloride	mg/L	ND
1/8/2007	Trip Blank	Chloride	mg/L	ND
1/11/2007	Trip Blank	Chloride	mg/L	ND
1/16/2007	Trip Blank	Chloride	mg/L	ND
1/25/2007	Trip Blank	Chloride	mg/L	ND
2/1/2007	Trip Blank	Chloride	mg/L	0.61
2/15/2007	Trip Blank	Chloride	mg/L	ND
3/8/2007	Trip Blank	Chloride	mg/L	ND
4/19/2007	Trip Blank	Chloride	mg/L	ND
4/23/2007	Trip Blank	Chloride	mg/L	ND
4/27/2007	Trip Blank	Chloride	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
5/1/2007	Trip Blank	Chloride	mg/L	1.91
5/10/2007	Trip Blank	Chloride	mg/L	ND
5/31/2007	Trip Blank	Chloride	mg/L	ND
6/21/2007	Trip Blank	Chloride	mg/L	2.05
7/12/2007	Trip Blank	Chloride	mg/L	ND
7/16/2007	Trip Blank	Chloride	mg/L	ND
7/20/2007	Trip Blank	Chloride	mg/L	ND
7/24/2007	Trip Blank	Chloride	mg/L	ND
7/26/2007	Trip Blank	Chloride	mg/L	ND
8/2/2007	Trip Blank	Chloride	mg/L	29.8
8/23/2007	Trip Blank	Chloride	mg/L	ND
9/13/2007	Trip Blank	Chloride	mg/L	ND
4/3/2008	Trip Blank	Chloride	mg/L	ND
4/7/2008	Trip Blank	Chloride	mg/L	ND
4/11/2008	Trip Blank	Chloride	mg/L	ND
4/15/2008	Trip Blank	Chloride	mg/L	3.83
4/24/2008	Trip Blank	Chloride	mg/L	ND
5/15/2008	Trip Blank	Chloride	mg/L	ND
6/5/2008	Trip Blank	Chloride	mg/L	ND
7/3/2008	Trip Blank	Chloride	mg/L	ND
7/3/2008	Trip Blank	Chloride	mg/L	ND
7/7/2008	Trip Blank	Chloride	mg/L	0.71
7/10/2008	Trip Blank	Chloride	mg/L	ND
7/11/2008	Trip Blank	Chloride	mg/L	ND
7/15/2008	Trip Blank	Chloride	mg/L	ND
7/24/2008	Trip Blank	Chloride	mg/L	ND
8/14/2008	Trip Blank	Chloride	mg/L	ND
9/4/2008	Trip Blank	Chloride	mg/L	ND
10/9/2008	Trip Blank	Chloride	mg/L	ND
10/13/2008	Trip Blank	Chloride	mg/L	ND
10/17/2008	Trip Blank	Chloride	mg/L	ND
10/21/2008	Trip Blank	Chloride	mg/L	ND
10/30/2008	Trip Blank	Chloride	mg/L	ND
11/20/2008	Trip Blank	Chloride	mg/L	ND
12/11/2008	Trip Blank	Chloride	mg/L	ND
1/8/2009	Trip Blank	Chloride	mg/L	ND
1/12/2009	Trip Blank	Chloride	mg/L	ND
1/16/2009	Trip Blank	Chloride	mg/L	ND
1/20/2009	Trip Blank	Chloride	mg/L	ND
1/29/2009	Trip Blank	Chloride	mg/L	ND
2/19/2009	Trip Blank	Chloride	mg/L	ND
3/12/2009	Trip Blank	Chloride	mg/L	ND
3/24/2009	Trip Blank	Chloride	mg/L	ND
4/9/2009	Trip Blank	Chloride	mg/L	ND
4/13/2009	Trip Blank	Chloride	mg/L	ND
4/17/2009	Trip Blank	Chloride	mg/L	ND
4/21/2009	Trip Blank	Chloride	mg/L	ND
4/30/2009	Trip Blank	Chloride	mg/L	ND
5/21/2009	Trip Blank	Chloride	mg/L	ND
1/11/2008	Trip Blank	Chloride	mg/L	ND
1/15/2008	Trip Blank	Chloride	mg/L	ND
1/24/2008	Trip Blank	Chloride	mg/L	ND
1/3/2008	Trip Blank	Chloride	mg/L	ND
1/7/2008	Trip Blank	Chloride	mg/L	ND
10/18/2007	Trip Blank	Chloride	mg/L	ND
10/22/2007	Trip Blank	Chloride	mg/L	ND
10/26/2007	Trip Blank	Chloride	mg/L	6.65
10/30/2007	Trip Blank	Chloride	mg/L	ND
11/29/2007	Trip Blank	Chloride	mg/L	ND
11/8/2007	Trip Blank	Chloride	mg/L	ND
12/20/2007	Trip Blank	Chloride	mg/L	ND
2/14/2008	Trip Blank	Chloride	mg/L	ND
2/8/2008	Trip Blank	Chloride	mg/L	9.06
3/6/2008	Trip Blank	Chloride	mg/L	ND
6/11/2009	Trip Blank	Chloride	mg/L	ND
7/12/2007	Trip Blank	Chlorobenzene	ug/L	ND
7/12/2007	Trip Blank	Chloroethane	ug/L	ND
7/12/2007	Trip Blank	Chloroform	ug/L	ND
7/12/2007	Trip Blank	Chloromethane	ug/L	ND
1/6/2005	Trip Blank	Chromium	mg/L	ND
1/10/2005	Trip Blank	Chromium	mg/L	ND
1/14/2005	Trip Blank	Chromium	mg/L	ND
1/18/2005	Trip Blank	Chromium	mg/L	ND
1/27/2005	Trip Blank	Chromium	mg/L	ND
2/8/2005	Trip Blank	Chromium	mg/L	ND
2/17/2005	Trip Blank	Chromium	mg/L	ND
4/7/2005	Trip Blank	Chromium	mg/L	ND
4/11/2005	Trip Blank	Chromium	mg/L	ND
4/15/2005	Trip Blank	Chromium	mg/L	ND
4/19/2005	Trip Blank	Chromium	mg/L	ND
4/28/2005	Trip Blank	Chromium	mg/L	ND
5/19/2005	Trip Blank	Chromium	mg/L	ND
6/9/2005	Trip Blank	Chromium	mg/L	ND
7/7/2005	Trip Blank	Chromium	mg/L	ND
7/11/2005	Trip Blank	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/15/2005	Trip Blank	Chromium	mg/L	ND
7/19/2005	Trip Blank	Chromium	mg/L	ND
7/28/2005	Trip Blank	Chromium	mg/L	ND
8/18/2005	Trip Blank	Chromium	mg/L	ND
9/8/2005	Trip Blank	Chromium	mg/L	ND
10/13/2005	Trip Blank	Chromium	mg/L	ND
10/17/2005	Trip Blank	Chromium	mg/L	ND
10/21/2005	Trip Blank	Chromium	mg/L	ND
10/25/2005	Trip Blank	Chromium	mg/L	ND
11/3/2005	Trip Blank	Chromium	mg/L	ND
11/23/2005	Trip Blank	Chromium	mg/L	ND
12/15/2005	Trip Blank	Chromium	mg/L	ND
1/5/2006	Trip Blank	Chromium	mg/L	ND
1/9/2006	Trip Blank	Chromium	mg/L	ND
1/13/2006	Trip Blank	Chromium	mg/L	ND
1/17/2006	Trip Blank	Chromium	mg/L	ND
1/26/2006	Trip Blank	Chromium	mg/L	ND
2/16/2006	Trip Blank	Chromium	mg/L	ND
3/9/2006	Trip Blank	Chromium	mg/L	ND
3/23/2006	Trip Blank	Chromium	mg/L	ND
4/6/2006	Trip Blank	Chromium	mg/L	ND
4/10/2006	Trip Blank	Chromium	mg/L	ND
4/14/2006	Trip Blank	Chromium	mg/L	ND
4/18/2006	Trip Blank	Chromium	mg/L	ND
4/27/2006	Trip Blank	Chromium	mg/L	ND
5/18/2006	Trip Blank	Chromium	mg/L	ND
6/8/2006	Trip Blank	Chromium	mg/L	ND
7/6/2006	Trip Blank	Chromium	mg/L	ND
7/10/2006	Trip Blank	Chromium	mg/L	ND
7/14/2006	Trip Blank	Chromium	mg/L	ND
7/18/2006	Trip Blank	Chromium	mg/L	ND
7/27/2006	Trip Blank	Chromium	mg/L	ND
8/17/2006	Trip Blank	Chromium	mg/L	ND
8/31/2006	Trip Blank	Chromium	mg/L	ND
9/7/2006	Trip Blank	Chromium	mg/L	ND
10/19/2006	Trip Blank	Chromium	mg/L	ND
10/23/2006	Trip Blank	Chromium	mg/L	ND
10/27/2006	Trip Blank	Chromium	mg/L	ND
10/31/2006	Trip Blank	Chromium	mg/L	ND
11/9/2006	Trip Blank	Chromium	mg/L	ND
11/30/2006	Trip Blank	Chromium	mg/L	ND
12/21/2006	Trip Blank	Chromium	mg/L	ND
1/4/2007	Trip Blank	Chromium	mg/L	ND
1/8/2007	Trip Blank	Chromium	mg/L	ND
1/11/2007	Trip Blank	Chromium	mg/L	ND
1/16/2007	Trip Blank	Chromium	mg/L	ND
1/25/2007	Trip Blank	Chromium	mg/L	ND
2/1/2007	Trip Blank	Chromium	mg/L	ND
2/15/2007	Trip Blank	Chromium	mg/L	ND
3/8/2007	Trip Blank	Chromium	mg/L	ND
4/19/2007	Trip Blank	Chromium	mg/L	ND
4/23/2007	Trip Blank	Chromium	mg/L	ND
4/27/2007	Trip Blank	Chromium	mg/L	ND
5/1/2007	Trip Blank	Chromium	mg/L	ND
5/10/2007	Trip Blank	Chromium	mg/L	ND
5/31/2007	Trip Blank	Chromium	mg/L	ND
6/21/2007	Trip Blank	Chromium	mg/L	ND
7/12/2007	Trip Blank	Chromium	mg/L	ND
7/16/2007	Trip Blank	Chromium	mg/L	ND
7/20/2007	Trip Blank	Chromium	mg/L	ND
7/24/2007	Trip Blank	Chromium	mg/L	ND
7/26/2007	Trip Blank	Chromium	mg/L	ND
8/2/2007	Trip Blank	Chromium	mg/L	ND
8/23/2007	Trip Blank	Chromium	mg/L	ND
9/13/2007	Trip Blank	Chromium	mg/L	ND
4/3/2008	Trip Blank	Chromium	mg/L	ND
4/7/2008	Trip Blank	Chromium	mg/L	ND
4/11/2008	Trip Blank	Chromium	mg/L	ND
4/15/2008	Trip Blank	Chromium	mg/L	ND
4/24/2008	Trip Blank	Chromium	mg/L	ND
5/15/2008	Trip Blank	Chromium	mg/L	ND
6/5/2008	Trip Blank	Chromium	mg/L	ND
7/3/2008	Trip Blank	Chromium	mg/L	ND
7/3/2008	Trip Blank	Chromium	mg/L	ND
7/7/2008	Trip Blank	Chromium	mg/L	ND
7/10/2008	Trip Blank	Chromium	mg/L	ND
7/11/2008	Trip Blank	Chromium	mg/L	ND
7/15/2008	Trip Blank	Chromium	mg/L	ND
7/24/2008	Trip Blank	Chromium	mg/L	0.006
8/14/2008	Trip Blank	Chromium	mg/L	ND
9/4/2008	Trip Blank	Chromium	mg/L	ND
10/9/2008	Trip Blank	Chromium	mg/L	ND
10/13/2008	Trip Blank	Chromium	mg/L	ND
10/17/2008	Trip Blank	Chromium	mg/L	ND
10/21/2008	Trip Blank	Chromium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/30/2008	Trip Blank	Chromium	mg/L	0.007
11/20/2008	Trip Blank	Chromium	mg/L	ND
12/11/2008	Trip Blank	Chromium	mg/L	ND
1/8/2009	Trip Blank	Chromium	mg/L	ND
1/12/2009	Trip Blank	Chromium	mg/L	ND
1/16/2009	Trip Blank	Chromium	mg/L	ND
1/20/2009	Trip Blank	Chromium	mg/L	ND
1/29/2009	Trip Blank	Chromium	mg/L	ND
2/19/2009	Trip Blank	Chromium	mg/L	ND
3/12/2009	Trip Blank	Chromium	mg/L	ND
3/24/2009	Trip Blank	Chromium	mg/L	ND
4/9/2009	Trip Blank	Chromium	mg/L	ND
4/13/2009	Trip Blank	Chromium	mg/L	ND
4/17/2009	Trip Blank	Chromium	mg/L	ND
4/21/2009	Trip Blank	Chromium	mg/L	ND
4/30/2009	Trip Blank	Chromium	mg/L	ND
5/21/2009	Trip Blank	Chromium	mg/L	ND
1/11/2008	Trip Blank	Chromium	mg/L	ND
1/15/2008	Trip Blank	Chromium	mg/L	ND
1/24/2008	Trip Blank	Chromium	mg/L	ND
1/3/2008	Trip Blank	Chromium	mg/L	ND
1/7/2008	Trip Blank	Chromium	mg/L	ND
10/18/2007	Trip Blank	Chromium	mg/L	ND
10/22/2007	Trip Blank	Chromium	mg/L	ND
10/26/2007	Trip Blank	Chromium	mg/L	ND
10/30/2007	Trip Blank	Chromium	mg/L	ND
11/29/2007	Trip Blank	Chromium	mg/L	ND
11/8/2007	Trip Blank	Chromium	mg/L	ND
12/20/2007	Trip Blank	Chromium	mg/L	ND
2/14/2008	Trip Blank	Chromium	mg/L	ND
2/8/2008	Trip Blank	Chromium	mg/L	ND
3/6/2008	Trip Blank	Chromium	mg/L	ND
6/11/2009	Trip Blank	Chromium	mg/L	ND
1/6/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
1/10/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
1/14/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
1/18/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
1/27/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
2/8/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
2/17/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
4/7/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
4/11/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
4/15/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
4/19/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
4/28/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
5/19/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
6/9/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
7/7/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
7/11/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
7/15/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
7/19/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
7/28/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
8/18/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
9/8/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
10/13/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
10/17/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
10/21/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
10/25/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
11/3/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
11/23/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
12/15/2005	Trip Blank	Chromium, hexavalent	mg/l	ND
1/5/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
1/9/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
1/13/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
1/17/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
1/26/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
2/16/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
3/9/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
3/23/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
4/6/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
4/10/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
4/14/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
4/18/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
4/27/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
5/18/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
6/8/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
7/6/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
7/10/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
7/14/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
7/18/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
7/27/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
8/17/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
8/31/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
9/7/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
10/19/2006	Trip Blank	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/23/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
10/27/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
10/31/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
11/9/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
11/30/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
12/21/2006	Trip Blank	Chromium, hexavalent	mg/l	ND
1/4/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
1/8/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
1/11/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
1/16/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
1/25/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
2/1/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
2/15/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
3/8/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
4/19/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
4/23/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
4/27/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
5/1/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
5/10/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
5/31/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
6/21/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
7/12/2007	Trip Blank	Chromium, hexavalent	mg/l	ND
7/16/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
7/20/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
7/24/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
7/26/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
8/2/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
8/23/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
9/13/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
4/3/2008	Trip Blank	Chromium, hexavalent	mg/L	0.01
4/7/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
4/11/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
4/15/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
4/24/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
5/15/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
6/5/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/3/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/3/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/7/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/10/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/11/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/15/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
7/24/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
8/14/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
9/4/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/9/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/13/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/17/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/21/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/30/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
11/20/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
12/11/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
1/8/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
1/12/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
1/16/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
1/20/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
1/29/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
2/19/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
3/12/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
3/24/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
4/9/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
4/13/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
4/17/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
4/21/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
4/30/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
5/21/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
1/11/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
1/15/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
1/24/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
1/3/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
1/7/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
10/18/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
10/22/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
10/26/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
10/30/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
11/29/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
11/8/2007	Trip Blank	Chromium, hexavalent	mg/L	ND
12/20/2007	Trip Blank	Chromium, hexavalent	mg/L	0.01
2/14/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
2/8/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
3/6/2008	Trip Blank	Chromium, hexavalent	mg/L	ND
6/11/2009	Trip Blank	Chromium, hexavalent	mg/L	ND
7/12/2007	Trip Blank	cis-1,2-Dichloroethene	ug/L	ND
7/12/2007	Trip Blank	cis-1,3-Dichloropropene	ug/L	ND
7/12/2007	Trip Blank	Cobalt	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/12/2007	Trip Blank	Copper	mg/L	ND
7/12/2007	Trip Blank	Cyanide	mg/L	ND
7/12/2007	Trip Blank	Dibromochloromethane	ug/L	ND
7/12/2007	Trip Blank	Dibromomethane	ug/L	ND
7/12/2007	Trip Blank	Dichlorodifluoromethane	ug/L	ND
8/21/2006	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
8/22/2006	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	Trip Blank	Dichloromethane (MeCl2)	ug/L	ND
7/12/2007	Trip Blank	Ethylbenzene	ug/L	ND
7/12/2007	Trip Blank	Hexachlorobutadiene	ug/L	ND
1/6/2005	Trip Blank	Iron	mg/L	ND
1/10/2005	Trip Blank	Iron	mg/L	ND
1/14/2005	Trip Blank	Iron	mg/L	ND
1/18/2005	Trip Blank	Iron	mg/L	0.02
1/27/2005	Trip Blank	Iron	mg/L	ND
2/8/2005	Trip Blank	Iron	mg/L	ND
2/17/2005	Trip Blank	Iron	mg/L	ND
4/7/2005	Trip Blank	Iron	mg/L	ND
4/11/2005	Trip Blank	Iron	mg/L	ND
4/15/2005	Trip Blank	Iron	mg/L	ND
4/19/2005	Trip Blank	Iron	mg/L	ND
4/28/2005	Trip Blank	Iron	mg/L	0.024
5/19/2005	Trip Blank	Iron	mg/L	0.038
6/9/2005	Trip Blank	Iron	mg/L	ND
7/7/2005	Trip Blank	Iron	mg/L	ND
7/11/2005	Trip Blank	Iron	mg/L	ND
7/15/2005	Trip Blank	Iron	mg/L	ND
7/19/2005	Trip Blank	Iron	mg/L	ND
7/28/2005	Trip Blank	Iron	mg/L	ND
8/18/2005	Trip Blank	Iron	mg/L	ND
9/8/2005	Trip Blank	Iron	mg/L	ND
9/8/2005	Trip Blank	Iron	mg/L	ND
10/13/2005	Trip Blank	Iron	mg/L	0.011
10/17/2005	Trip Blank	Iron	mg/L	0.014
10/21/2005	Trip Blank	Iron	mg/L	ND
10/25/2005	Trip Blank	Iron	mg/L	ND
11/3/2005	Trip Blank	Iron	mg/L	ND
11/3/2005	Trip Blank	Iron	mg/L	ND
11/23/2005	Trip Blank	Iron	mg/L	ND
11/23/2005	Trip Blank	Iron	mg/L	ND
12/15/2005	Trip Blank	Iron	mg/L	ND
12/15/2005	Trip Blank	Iron	mg/L	ND
1/5/2006	Trip Blank	Iron	mg/L	ND
1/9/2006	Trip Blank	Iron	mg/L	ND
1/13/2006	Trip Blank	Iron	mg/L	ND
1/17/2006	Trip Blank	Iron	mg/L	ND
1/26/2006	Trip Blank	Iron	mg/L	0.029
2/16/2006	Trip Blank	Iron	mg/L	ND
3/9/2006	Trip Blank	Iron	mg/L	ND
3/23/2006	Trip Blank	Iron	mg/L	0.019
4/6/2006	Trip Blank	Iron	mg/L	ND
4/10/2006	Trip Blank	Iron	mg/L	ND
4/14/2006	Trip Blank	Iron	mg/L	ND
4/18/2006	Trip Blank	Iron	mg/L	ND
4/27/2006	Trip Blank	Iron	mg/L	5
5/18/2006	Trip Blank	Iron	mg/L	0.048
6/8/2006	Trip Blank	Iron	mg/L	0.029
7/6/2006	Trip Blank	Iron	mg/L	ND
7/6/2006	Trip Blank	Iron	mg/L	ND
7/10/2006	Trip Blank	Iron	mg/L	0.038
7/14/2006	Trip Blank	Iron	mg/L	0.017
7/18/2006	Trip Blank	Iron	mg/L	ND
7/27/2006	Trip Blank	Iron	mg/L	ND
8/17/2006	Trip Blank	Iron	mg/L	ND
8/31/2006	Trip Blank	Iron	mg/L	0.017
9/7/2006	Trip Blank	Iron	mg/L	ND
10/19/2006	Trip Blank	Iron	mg/L	0.173
10/23/2006	Trip Blank	Iron	mg/L	ND
10/27/2006	Trip Blank	Iron	mg/L	ND
10/31/2006	Trip Blank	Iron	mg/L	ND
11/9/2006	Trip Blank	Iron	mg/L	ND
11/30/2006	Trip Blank	Iron	mg/L	ND
12/21/2006	Trip Blank	Iron	mg/L	ND
1/4/2007	Trip Blank	Iron	mg/L	ND
1/8/2007	Trip Blank	Iron	mg/L	ND
1/11/2007	Trip Blank	Iron	mg/L	ND
1/16/2007	Trip Blank	Iron	mg/L	ND
1/25/2007	Trip Blank	Iron	mg/L	ND
2/1/2007	Trip Blank	Iron	mg/L	ND
2/15/2007	Trip Blank	Iron	mg/L	0.062
3/8/2007	Trip Blank	Iron	mg/L	ND
4/19/2007	Trip Blank	Iron	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/23/2007	Trip Blank	Iron	mg/L	ND
4/27/2007	Trip Blank	Iron	mg/L	ND
5/1/2007	Trip Blank	Iron	mg/L	ND
5/10/2007	Trip Blank	Iron	mg/L	ND
5/31/2007	Trip Blank	Iron	mg/L	ND
6/21/2007	Trip Blank	Iron	mg/L	ND
7/12/2007	Trip Blank	Iron	mg/L	ND
7/16/2007	Trip Blank	Iron	mg/L	ND
7/20/2007	Trip Blank	Iron	mg/L	ND
7/24/2007	Trip Blank	Iron	mg/L	ND
7/26/2007	Trip Blank	Iron	mg/L	ND
8/2/2007	Trip Blank	Iron	mg/L	ND
8/23/2007	Trip Blank	Iron	mg/L	ND
9/13/2007	Trip Blank	Iron	mg/L	ND
4/3/2008	Trip Blank	Iron	mg/L	ND
4/7/2008	Trip Blank	Iron	mg/L	0.186
4/11/2008	Trip Blank	Iron	mg/L	ND
4/15/2008	Trip Blank	Iron	mg/L	ND
4/24/2008	Trip Blank	Iron	mg/L	ND
5/15/2008	Trip Blank	Iron	mg/L	ND
6/5/2008	Trip Blank	Iron	mg/L	ND
7/3/2008	Trip Blank	Iron	mg/L	ND
7/3/2008	Trip Blank	Iron	mg/L	ND
7/7/2008	Trip Blank	Iron	mg/L	0.085
7/10/2008	Trip Blank	Iron	mg/L	ND
7/11/2008	Trip Blank	Iron	mg/L	ND
7/15/2008	Trip Blank	Iron	mg/L	ND
7/24/2008	Trip Blank	Iron	mg/L	ND
8/14/2008	Trip Blank	Iron	mg/L	ND
9/4/2008	Trip Blank	Iron	mg/L	ND
10/9/2008	Trip Blank	Iron	mg/L	ND
10/13/2008	Trip Blank	Iron	mg/L	ND
10/17/2008	Trip Blank	Iron	mg/L	ND
10/21/2008	Trip Blank	Iron	mg/L	ND
10/30/2008	Trip Blank	Iron	mg/L	ND
11/20/2008	Trip Blank	Iron	mg/L	ND
12/11/2008	Trip Blank	Iron	mg/L	ND
1/8/2009	Trip Blank	Iron	mg/L	ND
1/12/2009	Trip Blank	Iron	mg/L	ND
1/16/2009	Trip Blank	Iron	mg/L	ND
1/20/2009	Trip Blank	Iron	mg/L	ND
1/29/2009	Trip Blank	Iron	mg/L	ND
2/19/2009	Trip Blank	Iron	mg/L	ND
3/12/2009	Trip Blank	Iron	mg/L	ND
3/24/2009	Trip Blank	Iron	mg/L	ND
4/9/2009	Trip Blank	Iron	mg/L	ND
4/13/2009	Trip Blank	Iron	mg/L	ND
4/17/2009	Trip Blank	Iron	mg/L	ND
4/21/2009	Trip Blank	Iron	mg/L	0.066
4/30/2009	Trip Blank	Iron	mg/L	ND
5/21/2009	Trip Blank	Iron	mg/L	ND
1/11/2008	Trip Blank	Iron	mg/L	ND
1/15/2008	Trip Blank	Iron	mg/L	ND
1/24/2008	Trip Blank	Iron	mg/L	ND
1/3/2008	Trip Blank	Iron	mg/L	ND
1/7/2008	Trip Blank	Iron	mg/L	ND
10/18/2007	Trip Blank	Iron	mg/L	ND
10/22/2007	Trip Blank	Iron	mg/L	ND
10/26/2007	Trip Blank	Iron	mg/L	ND
10/30/2007	Trip Blank	Iron	mg/L	ND
11/29/2007	Trip Blank	Iron	mg/L	ND
11/8/2007	Trip Blank	Iron	mg/L	ND
12/20/2007	Trip Blank	Iron	mg/L	ND
2/14/2008	Trip Blank	Iron	mg/L	0.011
2/8/2008	Trip Blank	Iron	mg/L	ND
3/6/2008	Trip Blank	Iron	mg/L	ND
6/11/2009	Trip Blank	Iron	mg/L	0.056
7/12/2007	Trip Blank	Isopropylbenzene	ug/L	ND
7/12/2007	Trip Blank	Lead	mg/L	ND
7/12/2007	Trip Blank	m,p-Xylene	ug/L	ND
7/12/2007	Trip Blank	Magnesium	mg/L	ND
1/6/2005	Trip Blank	Manganese	mg/L	ND
1/10/2005	Trip Blank	Manganese	mg/L	ND
1/14/2005	Trip Blank	Manganese	mg/L	ND
1/18/2005	Trip Blank	Manganese	mg/L	ND
1/27/2005	Trip Blank	Manganese	mg/L	ND
2/8/2005	Trip Blank	Manganese	mg/L	ND
2/17/2005	Trip Blank	Manganese	mg/L	ND
4/7/2005	Trip Blank	Manganese	mg/L	ND
4/11/2005	Trip Blank	Manganese	mg/L	ND
4/15/2005	Trip Blank	Manganese	mg/L	ND
4/19/2005	Trip Blank	Manganese	mg/L	ND
4/28/2005	Trip Blank	Manganese	mg/L	ND
5/19/2005	Trip Blank	Manganese	mg/L	ND
6/9/2005	Trip Blank	Manganese	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
7/7/2005	Trip Blank	Manganese	mg/L	ND
7/11/2005	Trip Blank	Manganese	mg/L	ND
7/15/2005	Trip Blank	Manganese	mg/L	ND
7/19/2005	Trip Blank	Manganese	mg/L	ND
7/28/2005	Trip Blank	Manganese	mg/L	ND
8/18/2005	Trip Blank	Manganese	mg/L	ND
9/8/2005	Trip Blank	Manganese	mg/L	ND
10/13/2005	Trip Blank	Manganese	mg/L	ND
10/17/2005	Trip Blank	Manganese	mg/L	ND
10/21/2005	Trip Blank	Manganese	mg/L	ND
10/25/2005	Trip Blank	Manganese	mg/L	ND
11/3/2005	Trip Blank	Manganese	mg/L	ND
11/23/2005	Trip Blank	Manganese	mg/L	ND
12/15/2005	Trip Blank	Manganese	mg/L	ND
1/5/2006	Trip Blank	Manganese	mg/L	ND
1/9/2006	Trip Blank	Manganese	mg/L	ND
1/13/2006	Trip Blank	Manganese	mg/L	ND
1/17/2006	Trip Blank	Manganese	mg/L	ND
1/26/2006	Trip Blank	Manganese	mg/L	ND
2/16/2006	Trip Blank	Manganese	mg/L	ND
3/9/2006	Trip Blank	Manganese	mg/L	ND
3/23/2006	Trip Blank	Manganese	mg/L	ND
4/6/2006	Trip Blank	Manganese	mg/L	ND
4/10/2006	Trip Blank	Manganese	mg/L	ND
4/14/2006	Trip Blank	Manganese	mg/L	ND
4/18/2006	Trip Blank	Manganese	mg/L	ND
4/27/2006	Trip Blank	Manganese	mg/L	ND
5/18/2006	Trip Blank	Manganese	mg/L	ND
6/8/2006	Trip Blank	Manganese	mg/L	ND
7/6/2006	Trip Blank	Manganese	mg/L	ND
7/10/2006	Trip Blank	Manganese	mg/L	ND
7/14/2006	Trip Blank	Manganese	mg/L	ND
7/18/2006	Trip Blank	Manganese	mg/L	ND
7/27/2006	Trip Blank	Manganese	mg/L	ND
8/17/2006	Trip Blank	Manganese	mg/L	ND
8/31/2006	Trip Blank	Manganese	mg/L	ND
9/7/2006	Trip Blank	Manganese	mg/L	ND
10/19/2006	Trip Blank	Manganese	mg/L	ND
10/23/2006	Trip Blank	Manganese	mg/L	ND
10/27/2006	Trip Blank	Manganese	mg/L	ND
10/31/2006	Trip Blank	Manganese	mg/L	ND
11/9/2006	Trip Blank	Manganese	mg/L	ND
11/30/2006	Trip Blank	Manganese	mg/L	ND
12/21/2006	Trip Blank	Manganese	mg/L	ND
1/4/2007	Trip Blank	Manganese	mg/L	ND
1/8/2007	Trip Blank	Manganese	mg/L	ND
1/11/2007	Trip Blank	Manganese	mg/L	ND
1/16/2007	Trip Blank	Manganese	mg/L	ND
1/25/2007	Trip Blank	Manganese	mg/L	ND
2/1/2007	Trip Blank	Manganese	mg/L	ND
2/15/2007	Trip Blank	Manganese	mg/L	ND
3/8/2007	Trip Blank	Manganese	mg/L	ND
4/19/2007	Trip Blank	Manganese	mg/L	ND
4/23/2007	Trip Blank	Manganese	mg/L	ND
4/27/2007	Trip Blank	Manganese	mg/L	ND
5/1/2007	Trip Blank	Manganese	mg/L	ND
5/10/2007	Trip Blank	Manganese	mg/L	ND
5/31/2007	Trip Blank	Manganese	mg/L	ND
6/21/2007	Trip Blank	Manganese	mg/L	ND
7/12/2007	Trip Blank	Manganese	mg/L	ND
7/16/2007	Trip Blank	Manganese	mg/L	ND
7/20/2007	Trip Blank	Manganese	mg/L	ND
7/24/2007	Trip Blank	Manganese	mg/L	ND
7/26/2007	Trip Blank	Manganese	mg/L	ND
8/2/2007	Trip Blank	Manganese	mg/L	ND
8/23/2007	Trip Blank	Manganese	mg/L	ND
9/13/2007	Trip Blank	Manganese	mg/L	ND
4/3/2008	Trip Blank	Manganese	mg/L	ND
4/7/2008	Trip Blank	Manganese	mg/L	0.002
4/11/2008	Trip Blank	Manganese	mg/L	ND
4/15/2008	Trip Blank	Manganese	mg/L	ND
4/24/2008	Trip Blank	Manganese	mg/L	ND
5/15/2008	Trip Blank	Manganese	mg/L	ND
6/5/2008	Trip Blank	Manganese	mg/L	ND
7/3/2008	Trip Blank	Manganese	mg/L	ND
7/3/2008	Trip Blank	Manganese	mg/L	ND
7/7/2008	Trip Blank	Manganese	mg/L	ND
7/10/2008	Trip Blank	Manganese	mg/L	ND
7/11/2008	Trip Blank	Manganese	mg/L	ND
7/15/2008	Trip Blank	Manganese	mg/L	ND
7/24/2008	Trip Blank	Manganese	mg/L	ND
8/14/2008	Trip Blank	Manganese	mg/L	ND
9/4/2008	Trip Blank	Manganese	mg/L	ND
10/9/2008	Trip Blank	Manganese	mg/L	ND
10/13/2008	Trip Blank	Manganese	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/17/2008	Trip Blank	Manganese	mg/L	ND
10/21/2008	Trip Blank	Manganese	mg/L	ND
10/30/2008	Trip Blank	Manganese	mg/L	ND
11/20/2008	Trip Blank	Manganese	mg/L	ND
12/11/2008	Trip Blank	Manganese	mg/L	ND
1/8/2009	Trip Blank	Manganese	mg/L	ND
1/12/2009	Trip Blank	Manganese	mg/L	ND
1/16/2009	Trip Blank	Manganese	mg/L	ND
1/20/2009	Trip Blank	Manganese	mg/L	ND
1/29/2009	Trip Blank	Manganese	mg/L	ND
2/19/2009	Trip Blank	Manganese	mg/L	ND
3/12/2009	Trip Blank	Manganese	mg/L	ND
3/24/2009	Trip Blank	Manganese	mg/L	ND
4/9/2009	Trip Blank	Manganese	mg/L	ND
4/13/2009	Trip Blank	Manganese	mg/L	ND
4/17/2009	Trip Blank	Manganese	mg/L	ND
4/21/2009	Trip Blank	Manganese	mg/L	ND
4/30/2009	Trip Blank	Manganese	mg/L	ND
5/21/2009	Trip Blank	Manganese	mg/L	ND
1/11/2008	Trip Blank	Manganese	mg/L	ND
1/15/2008	Trip Blank	Manganese	mg/L	ND
1/24/2008	Trip Blank	Manganese	mg/L	ND
1/3/2008	Trip Blank	Manganese	mg/L	ND
1/7/2008	Trip Blank	Manganese	mg/L	ND
10/18/2007	Trip Blank	Manganese	mg/L	ND
10/22/2007	Trip Blank	Manganese	mg/L	ND
10/26/2007	Trip Blank	Manganese	mg/L	ND
10/30/2007	Trip Blank	Manganese	mg/L	ND
11/29/2007	Trip Blank	Manganese	mg/L	ND
11/8/2007	Trip Blank	Manganese	mg/L	ND
12/20/2007	Trip Blank	Manganese	mg/L	ND
2/14/2008	Trip Blank	Manganese	mg/L	ND
2/8/2008	Trip Blank	Manganese	mg/L	ND
3/6/2008	Trip Blank	Manganese	mg/L	ND
6/11/2009	Trip Blank	Manganese	mg/L	ND
7/12/2007	Trip Blank	Mercury	mg/L	ND
7/12/2007	Trip Blank	Methyl Iodide (Iodomethane)	ug/L	ND
7/12/2007	Trip Blank	Methyl-tert-butyl ether	ug/L	ND
7/12/2007	Trip Blank	Naphthalene	ug/L	ND
7/12/2007	Trip Blank	n-Butylbenzene	ug/L	ND
7/12/2007	Trip Blank	Nickel	mg/L	ND
7/12/2007	Trip Blank	Nitrate	mg/L	ND
7/12/2007	Trip Blank	Nitrate/Nitrite	mg/L	ND
7/12/2007	Trip Blank	Nitrite	mg/L	ND
7/12/2007	Trip Blank	n-Propylbenzene	ug/L	ND
7/12/2007	Trip Blank	o-Xylene	ug/L	ND
1/6/2005	Trip Blank	pH	pH Units	6.36
1/10/2005	Trip Blank	pH	pH Units	5.71
1/14/2005	Trip Blank	pH	pH Units	6.34
1/18/2005	Trip Blank	pH	pH Units	4.9
1/27/2005	Trip Blank	pH	pH Units	6.93
2/17/2005	Trip Blank	pH	pH Units	6.11
4/7/2005	Trip Blank	pH	pH Units	6.06
4/11/2005	Trip Blank	pH	pH Units	5.53
4/15/2005	Trip Blank	pH	pH Units	5.63
4/19/2005	Trip Blank	pH	pH Units	5.71
4/28/2005	Trip Blank	pH	pH Units	5.65
5/19/2005	Trip Blank	pH	pH Units	6.84
6/9/2005	Trip Blank	pH	pH Units	5.69
7/7/2005	Trip Blank	pH	pH Units	5.83
7/11/2005	Trip Blank	pH	pH Units	4.84
7/15/2005	Trip Blank	pH	pH Units	5.76
7/19/2005	Trip Blank	pH	pH Units	5.27
7/28/2005	Trip Blank	pH	pH Units	6.16
8/18/2005	Trip Blank	pH	pH Units	7.04
9/8/2005	Trip Blank	pH	pH Units	8.09
10/13/2005	Trip Blank	pH	pH Units	7.43
10/17/2005	Trip Blank	pH	pH Units	4.67
10/21/2005	Trip Blank	pH	pH Units	5.4
10/25/2005	Trip Blank	pH	pH Units	5.8
11/3/2005	Trip Blank	pH	pH Units	6.16
11/23/2005	Trip Blank	pH	pH Units	6.09
12/15/2005	Trip Blank	pH	pH Units	6.22
1/5/2006	Trip Blank	pH	pH Units	6.23
1/9/2006	Trip Blank	pH	pH Units	6.83
1/13/2006	Trip Blank	pH	pH Units	5.9
1/17/2006	Trip Blank	pH	pH Units	5.03
1/26/2006	Trip Blank	pH	pH Units	6.78
2/16/2006	Trip Blank	pH	pH Units	6.87
3/9/2006	Trip Blank	pH	pH Units	7.27
4/6/2006	Trip Blank	pH	pH Units	5.09
4/10/2006	Trip Blank	pH	pH Units	5.22
4/14/2006	Trip Blank	pH	pH Units	5.31
4/18/2006	Trip Blank	pH	pH Units	5.27
4/27/2006	Trip Blank	pH	pH Units	7.83

Sampling Date	Location ID	Analyte	Unit	Concentration
5/18/2006	Trip Blank	pH	pH Units	7.35
6/8/2006	Trip Blank	pH	pH Units	6.1
7/6/2006	Trip Blank	pH	pH Units	6.11
7/10/2006	Trip Blank	pH	pH Units	6.02
7/14/2006	Trip Blank	pH	pH Units	6.06
7/18/2006	Trip Blank	pH	pH Units	6.03
7/27/2006	Trip Blank	pH	pH Units	5.66
8/17/2006	Trip Blank	pH	pH Units	6.49
9/7/2006	Trip Blank	pH	pH Units	6.56
10/19/2006	Trip Blank	pH	pH Units	5.83
10/23/2006	Trip Blank	pH	pH Units	5.79
10/27/2006	Trip Blank	pH	pH Units	5.36
10/31/2006	Trip Blank	pH	pH Units	6.64
11/9/2006	Trip Blank	pH	pH Units	7.3
11/30/2006	Trip Blank	pH	pH Units	7.06
12/21/2006	Trip Blank	pH	pH Units	7.44
1/4/2007	Trip Blank	pH	pH Units	5.41
1/8/2007	Trip Blank	pH	pH Units	5.46
1/11/2007	Trip Blank	pH	pH Units	5.18
1/16/2007	Trip Blank	pH	pH Units	5.78
1/25/2007	Trip Blank	pH	pH Units	5.74
2/15/2007	Trip Blank	pH	pH Units	5.58
3/8/2007	Trip Blank	pH	pH Units	5.6
4/19/2007	Trip Blank	pH	pH Units	5.87
4/23/2007	Trip Blank	pH	pH Units	5.62
4/27/2007	Trip Blank	pH	pH Units	6.35
5/1/2007	Trip Blank	pH	pH Units	6.1
5/10/2007	Trip Blank	pH	pH Units	7.08
5/31/2007	Trip Blank	pH	pH Units	6.18
6/21/2007	Trip Blank	pH	pH Units	5.73
7/12/2007	Trip Blank	pH	pH	5.69
7/16/2007	Trip Blank	pH	pH	5.45
7/20/2007	Trip Blank	pH	pH	6.09
7/24/2007	Trip Blank	pH	pH	5.5
8/2/2007	Trip Blank	pH	pH	5.95
8/23/2007	Trip Blank	pH	pH	5.81
9/13/2007	Trip Blank	pH	pH	6.44
4/3/2008	Trip Blank	pH	pH	5.25
4/7/2008	Trip Blank	pH	pH	5.76
4/11/2008	Trip Blank	pH	pH	7.69
4/15/2008	Trip Blank	pH	pH	5.91
4/24/2008	Trip Blank	pH	pH	6.28
5/15/2008	Trip Blank	pH	pH	5.96
6/5/2008	Trip Blank	pH	pH	5.65
7/3/2008	Trip Blank	pH	pH	6.2
7/3/2008	Trip Blank	pH	pH	6.2
7/7/2008	Trip Blank	pH	pH	5.53
7/11/2008	Trip Blank	pH	pH	5.94
7/15/2008	Trip Blank	pH	pH	7.03
7/24/2008	Trip Blank	pH	pH	5.92
8/14/2008	Trip Blank	pH	pH	6.05
9/4/2008	Trip Blank	pH	pH	5.85
10/9/2008	Trip Blank	pH	pH	5.87
10/13/2008	Trip Blank	pH	pH	5.68
10/17/2008	Trip Blank	pH	pH	5.18
10/21/2008	Trip Blank	pH	pH	5.43
10/30/2008	Trip Blank	pH	pH	6.80
11/20/2008	Trip Blank	pH	pH	6.83
12/11/2008	Trip Blank	pH	pH	4.37
1/8/2009	Trip Blank	pH	pH	6.26
1/12/2009	Trip Blank	pH	pH	5.65
1/16/2009	Trip Blank	pH	pH	6.00
1/20/2009	Trip Blank	pH	pH	5.53
1/29/2009	Trip Blank	pH	pH	5.79
2/19/2009	Trip Blank	pH	pH	7.05
3/12/2009	Trip Blank	pH	pH	6.22
4/9/2009	Trip Blank	pH	pH	7.17
4/13/2009	Trip Blank	pH	pH	6.55
4/17/2009	Trip Blank	pH	pH	6.45
4/21/2009	Trip Blank	pH	pH	7.56
4/30/2009	Trip Blank	pH	pH	7.03
5/21/2009	Trip Blank	pH	pH	5.77
1/11/2008	Trip Blank	pH	pH	5.83
1/15/2008	Trip Blank	pH	pH	5.58
1/24/2008	Trip Blank	pH	pH	6.24
1/3/2008	Trip Blank	pH	pH	5.03
1/7/2008	Trip Blank	pH	pH	5.69
10/18/2007	Trip Blank	pH	pH Units	6.43
10/22/2007	Trip Blank	pH	pH Units	5.73
10/26/2007	Trip Blank	pH	pH Units	7.17
10/30/2007	Trip Blank	pH	pH Units	6.64
11/29/2007	Trip Blank	pH	pH Units	5.64
11/8/2007	Trip Blank	pH	pH Units	6.64
12/20/2007	Trip Blank	pH	pH	5.27
2/14/2008	Trip Blank	pH	pH	6.97

Sampling Date	Location ID	Analyte	Unit	Concentration
3/6/2008	Trip Blank	pH	pH	6.19
6/11/2009	Trip Blank	pH	pH	5.95
7/12/2007	Trip Blank	Phenols	mg/L	ND
7/16/2007	Trip Blank	Phenols	mg/L	ND
7/20/2007	Trip Blank	Phenols	mg/L	ND
7/24/2007	Trip Blank	Phenols	mg/L	ND
8/2/2007	Trip Blank	Phenols	mg/L	ND
8/23/2007	Trip Blank	Phenols	mg/L	ND
1/6/2005	Trip Blank	Phenols	mg/L	ND
1/10/2005	Trip Blank	Phenols	mg/L	ND
1/14/2005	Trip Blank	Phenols	mg/L	ND
1/18/2005	Trip Blank	Phenols	mg/L	ND
1/27/2005	Trip Blank	Phenols	mg/L	ND
2/17/2005	Trip Blank	Phenols	mg/L	ND
4/7/2005	Trip Blank	Phenols	mg/L	ND
4/11/2005	Trip Blank	Phenols	mg/L	ND
4/15/2005	Trip Blank	Phenols	mg/L	ND
4/19/2005	Trip Blank	Phenols	mg/L	ND
4/28/2005	Trip Blank	Phenols	mg/L	ND
5/19/2005	Trip Blank	Phenols	mg/L	ND
6/9/2005	Trip Blank	Phenols	mg/L	ND
6/9/2005	Trip Blank	Phenols	mg/L	ND
7/7/2005	Trip Blank	Phenols	mg/L	ND
7/11/2005	Trip Blank	Phenols	mg/L	ND
7/15/2005	Trip Blank	Phenols	mg/L	ND
7/19/2005	Trip Blank	Phenols	mg/L	ND
7/28/2005	Trip Blank	Phenols	mg/L	ND
8/18/2005	Trip Blank	Phenols	mg/L	ND
9/8/2005	Trip Blank	Phenols	mg/L	ND
9/8/2005	Trip Blank	Phenols	mg/L	ND
10/13/2005	Trip Blank	Phenols	mg/L	ND
10/17/2005	Trip Blank	Phenols	mg/L	ND
10/21/2005	Trip Blank	Phenols	mg/L	ND
10/25/2005	Trip Blank	Phenols	mg/L	ND
11/3/2005	Trip Blank	Phenols	mg/L	ND
11/23/2005	Trip Blank	Phenols	mg/L	ND
12/15/2005	Trip Blank	Phenols	mg/L	ND
1/5/2006	Trip Blank	Phenols	mg/L	ND
1/9/2006	Trip Blank	Phenols	mg/L	ND
1/13/2006	Trip Blank	Phenols	mg/L	ND
1/17/2006	Trip Blank	Phenols	mg/L	ND
1/26/2006	Trip Blank	Phenols	mg/L	ND
2/16/2006	Trip Blank	Phenols	mg/L	ND
3/9/2006	Trip Blank	Phenols	mg/L	ND
3/23/2006	Trip Blank	Phenols	mg/L	ND
4/6/2006	Trip Blank	Phenols	mg/L	ND
4/10/2006	Trip Blank	Phenols	mg/L	ND
4/14/2006	Trip Blank	Phenols	mg/L	ND
4/18/2006	Trip Blank	Phenols	mg/L	ND
4/27/2006	Trip Blank	Phenols	mg/L	ND
5/18/2006	Trip Blank	Phenols	mg/L	ND
6/8/2006	Trip Blank	Phenols	mg/L	ND
7/6/2006	Trip Blank	Phenols	mg/L	ND
7/10/2006	Trip Blank	Phenols	mg/L	ND
7/14/2006	Trip Blank	Phenols	mg/L	ND
7/18/2006	Trip Blank	Phenols	mg/L	ND
7/27/2006	Trip Blank	Phenols	mg/L	ND
8/17/2006	Trip Blank	Phenols	mg/L	ND
8/31/2006	Trip Blank	Phenols	mg/L	ND
9/7/2006	Trip Blank	Phenols	mg/L	ND
10/19/2006	Trip Blank	Phenols	mg/L	ND
10/23/2006	Trip Blank	Phenols	mg/L	ND
10/27/2006	Trip Blank	Phenols	mg/L	ND
10/31/2006	Trip Blank	Phenols	mg/L	ND
11/9/2006	Trip Blank	Phenols	mg/L	ND
11/30/2006	Trip Blank	Phenols	mg/L	ND
12/21/2006	Trip Blank	Phenols	mg/L	ND
1/4/2007	Trip Blank	Phenols	mg/L	ND
1/8/2007	Trip Blank	Phenols	mg/L	ND
1/11/2007	Trip Blank	Phenols	mg/L	ND
1/16/2007	Trip Blank	Phenols	mg/L	ND
1/25/2007	Trip Blank	Phenols	mg/L	ND
2/15/2007	Trip Blank	Phenols	mg/L	ND
3/8/2007	Trip Blank	Phenols	mg/L	ND
4/19/2007	Trip Blank	Phenols	mg/L	ND
4/23/2007	Trip Blank	Phenols	mg/L	ND
4/27/2007	Trip Blank	Phenols	mg/L	ND
5/1/2007	Trip Blank	Phenols	mg/L	ND
5/10/2007	Trip Blank	Phenols	mg/L	ND
5/31/2007	Trip Blank	Phenols	mg/L	ND
6/21/2007	Trip Blank	Phenols	mg/L	ND
9/13/2007	Trip Blank	Phenols	mg/L	ND
4/3/2008	Trip Blank	Phenols, Total	mg/L	0.09
4/7/2008	Trip Blank	Phenols, Total	mg/L	ND
4/11/2008	Trip Blank	Phenols, Total	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2008	Trip Blank	Phenols, Total	mg/L	ND
4/24/2008	Trip Blank	Phenols, Total	mg/L	ND
5/15/2008	Trip Blank	Phenols, Total	mg/L	ND
6/5/2008	Trip Blank	Phenols, Total	mg/L	ND
7/3/2008	Trip Blank	Phenols, Total	mg/L	ND
7/3/2008	Trip Blank	Phenols, Total	mg/L	ND
7/7/2008	Trip Blank	Phenols, Total	mg/L	ND
7/10/2008	Trip Blank	Phenols, Total	mg/L	ND
7/11/2008	Trip Blank	Phenols, Total	mg/L	ND
7/15/2008	Trip Blank	Phenols, Total	mg/L	ND
7/24/2008	Trip Blank	Phenols, Total	mg/L	ND
8/14/2008	Trip Blank	Phenols, Total	mg/L	ND
9/4/2008	Trip Blank	Phenols, Total	mg/L	ND
10/9/2008	Trip Blank	Phenols, Total	mg/L	ND
10/13/2008	Trip Blank	Phenols, Total	mg/L	ND
10/17/2008	Trip Blank	Phenols, Total	mg/L	ND
10/21/2008	Trip Blank	Phenols, Total	mg/L	ND
10/30/2008	Trip Blank	Phenols, Total	mg/L	ND
11/20/2008	Trip Blank	Phenols, Total	mg/L	ND
12/11/2008	Trip Blank	Phenols, Total	mg/L	ND
1/8/2009	Trip Blank	Phenols, Total	mg/L	0.007
1/12/2009	Trip Blank	Phenols, Total	mg/L	ND
1/16/2009	Trip Blank	Phenols, Total	mg/L	ND
1/20/2009	Trip Blank	Phenols, Total	mg/L	ND
1/29/2009	Trip Blank	Phenols, Total	mg/L	ND
2/19/2009	Trip Blank	Phenols, Total	mg/L	ND
3/12/2009	Trip Blank	Phenols, Total	mg/L	ND
3/24/2009	Trip Blank	Phenols, Total	mg/L	ND
4/9/2009	Trip Blank	Phenols, Total	mg/L	ND
4/13/2009	Trip Blank	Phenols, Total	mg/L	ND
4/17/2009	Trip Blank	Phenols, Total	mg/L	ND
4/21/2009	Trip Blank	Phenols, Total	mg/L	ND
4/30/2009	Trip Blank	Phenols, Total	mg/L	ND
5/21/2009	Trip Blank	Phenols, Total	mg/L	ND
1/11/2008	Trip Blank	Phenols, Total	mg/L	ND
1/15/2008	Trip Blank	Phenols, Total	mg/L	ND
1/24/2008	Trip Blank	Phenols, Total	mg/L	ND
1/3/2008	Trip Blank	Phenols, Total	mg/L	ND
1/7/2008	Trip Blank	Phenols, Total	mg/L	ND
10/18/2007	Trip Blank	Phenols, Total	mg/L	ND
10/22/2007	Trip Blank	Phenols, Total	mg/L	ND
10/26/2007	Trip Blank	Phenols, Total	mg/L	ND
10/30/2007	Trip Blank	Phenols, Total	mg/L	ND
11/29/2007	Trip Blank	Phenols, Total	mg/L	ND
11/8/2007	Trip Blank	Phenols, Total	mg/L	ND
12/20/2007	Trip Blank	Phenols, Total	mg/L	ND
2/14/2008	Trip Blank	Phenols, Total	mg/L	ND
3/6/2008	Trip Blank	Phenols, Total	mg/L	ND
6/11/2009	Trip Blank	Phenols, Total	mg/L	ND
7/12/2007	Trip Blank	Potassium	mg/L	ND
7/12/2007	Trip Blank	sec-Butylbenzene	ug/L	ND
7/12/2007	Trip Blank	Selenium	mg/L	ND
7/12/2007	Trip Blank	Silver	mg/L	0.002
1/6/2005	Trip Blank	Sodium	mg/L	ND
1/10/2005	Trip Blank	Sodium	mg/L	ND
1/14/2005	Trip Blank	Sodium	mg/L	0.202
1/18/2005	Trip Blank	Sodium	mg/L	ND
1/27/2005	Trip Blank	Sodium	mg/L	ND
2/8/2005	Trip Blank	Sodium	mg/L	ND
2/17/2005	Trip Blank	Sodium	mg/L	ND
4/7/2005	Trip Blank	Sodium	mg/L	ND
4/11/2005	Trip Blank	Sodium	mg/L	ND
4/15/2005	Trip Blank	Sodium	mg/L	ND
4/19/2005	Trip Blank	Sodium	mg/L	ND
4/28/2005	Trip Blank	Sodium	mg/L	ND
5/19/2005	Trip Blank	Sodium	mg/L	0.913
6/9/2005	Trip Blank	Sodium	mg/L	ND
7/7/2005	Trip Blank	Sodium	mg/L	ND
7/11/2005	Trip Blank	Sodium	mg/L	ND
7/15/2005	Trip Blank	Sodium	mg/L	ND
7/19/2005	Trip Blank	Sodium	mg/L	ND
7/28/2005	Trip Blank	Sodium	mg/L	ND
8/18/2005	Trip Blank	Sodium	mg/L	ND
9/8/2005	Trip Blank	Sodium	mg/L	ND
10/13/2005	Trip Blank	Sodium	mg/L	ND
10/17/2005	Trip Blank	Sodium	mg/L	ND
10/21/2005	Trip Blank	Sodium	mg/L	ND
10/25/2005	Trip Blank	Sodium	mg/L	ND
11/3/2005	Trip Blank	Sodium	mg/L	ND
11/23/2005	Trip Blank	Sodium	mg/L	ND
12/15/2005	Trip Blank	Sodium	mg/L	ND
1/5/2006	Trip Blank	Sodium	mg/L	ND
1/9/2006	Trip Blank	Sodium	mg/L	ND
1/13/2006	Trip Blank	Sodium	mg/L	ND
1/17/2006	Trip Blank	Sodium	mg/L	0.26

Sampling Date	Location ID	Analyte	Unit	Concentration
1/26/2006	Trip Blank	Sodium	mg/L	0.383
2/16/2006	Trip Blank	Sodium	mg/L	ND
3/9/2006	Trip Blank	Sodium	mg/L	ND
3/23/2006	Trip Blank	Sodium	mg/L	ND
4/6/2006	Trip Blank	Sodium	mg/L	ND
4/10/2006	Trip Blank	Sodium	mg/L	ND
4/14/2006	Trip Blank	Sodium	mg/L	ND
4/18/2006	Trip Blank	Sodium	mg/L	ND
4/27/2006	Trip Blank	Sodium	mg/L	ND
5/18/2006	Trip Blank	Sodium	mg/L	0.646
6/8/2006	Trip Blank	Sodium	mg/L	ND
7/6/2006	Trip Blank	Sodium	mg/L	ND
7/10/2006	Trip Blank	Sodium	mg/L	ND
7/14/2006	Trip Blank	Sodium	mg/L	ND
7/18/2006	Trip Blank	Sodium	mg/L	ND
7/27/2006	Trip Blank	Sodium	mg/L	ND
8/17/2006	Trip Blank	Sodium	mg/L	ND
8/31/2006	Trip Blank	Sodium	mg/L	ND
9/7/2006	Trip Blank	Sodium	mg/L	ND
10/19/2006	Trip Blank	Sodium	mg/L	0.258
10/23/2006	Trip Blank	Sodium	mg/L	0.223
10/27/2006	Trip Blank	Sodium	mg/L	ND
10/31/2006	Trip Blank	Sodium	mg/L	ND
11/9/2006	Trip Blank	Sodium	mg/L	ND
11/30/2006	Trip Blank	Sodium	mg/L	ND
12/21/2006	Trip Blank	Sodium	mg/L	ND
1/4/2007	Trip Blank	Sodium	mg/L	ND
1/8/2007	Trip Blank	Sodium	mg/L	ND
1/11/2007	Trip Blank	Sodium	mg/L	ND
1/16/2007	Trip Blank	Sodium	mg/L	ND
1/25/2007	Trip Blank	Sodium	mg/L	ND
2/1/2007	Trip Blank	Sodium	mg/L	ND
2/15/2007	Trip Blank	Sodium	mg/L	ND
3/8/2007	Trip Blank	Sodium	mg/L	ND
4/19/2007	Trip Blank	Sodium	mg/L	ND
4/23/2007	Trip Blank	Sodium	mg/L	ND
4/27/2007	Trip Blank	Sodium	mg/L	ND
5/1/2007	Trip Blank	Sodium	mg/L	0.886
5/10/2007	Trip Blank	Sodium	mg/L	ND
5/31/2007	Trip Blank	Sodium	mg/L	0.616
6/21/2007	Trip Blank	Sodium	mg/L	ND
7/12/2007	Trip Blank	Sodium	mg/L	ND
7/16/2007	Trip Blank	Sodium	mg/L	ND
7/20/2007	Trip Blank	Sodium	mg/L	ND
7/24/2007	Trip Blank	Sodium	mg/L	ND
7/26/2007	Trip Blank	Sodium	mg/L	ND
8/2/2007	Trip Blank	Sodium	mg/L	1.3
8/23/2007	Trip Blank	Sodium	mg/L	ND
9/13/2007	Trip Blank	Sodium	mg/L	ND
4/3/2008	Trip Blank	Sodium	mg/L	0.135
4/7/2008	Trip Blank	Sodium	mg/L	0.181
4/11/2008	Trip Blank	Sodium	mg/L	ND
4/15/2008	Trip Blank	Sodium	mg/L	ND
4/24/2008	Trip Blank	Sodium	mg/L	ND
5/15/2008	Trip Blank	Sodium	mg/L	ND
6/5/2008	Trip Blank	Sodium	mg/L	ND
7/3/2008	Trip Blank	Sodium	mg/L	ND
7/3/2008	Trip Blank	Sodium	mg/L	ND
7/7/2008	Trip Blank	Sodium	mg/L	0.255
7/10/2008	Trip Blank	Sodium	mg/L	ND
7/11/2008	Trip Blank	Sodium	mg/L	ND
7/15/2008	Trip Blank	Sodium	mg/L	0.221
7/24/2008	Trip Blank	Sodium	mg/L	ND
8/14/2008	Trip Blank	Sodium	mg/L	ND
9/4/2008	Trip Blank	Sodium	mg/L	ND
10/9/2008	Trip Blank	Sodium	mg/L	0.794
10/13/2008	Trip Blank	Sodium	mg/L	ND
10/17/2008	Trip Blank	Sodium	mg/L	ND
10/21/2008	Trip Blank	Sodium	mg/L	ND
10/30/2008	Trip Blank	Sodium	mg/L	0.498
11/20/2008	Trip Blank	Sodium	mg/L	0.104
12/11/2008	Trip Blank	Sodium	mg/L	ND
1/8/2009	Trip Blank	Sodium	mg/L	0.108
1/12/2009	Trip Blank	Sodium	mg/L	0.104
1/16/2009	Trip Blank	Sodium	mg/L	ND
1/20/2009	Trip Blank	Sodium	mg/L	ND
1/29/2009	Trip Blank	Sodium	mg/L	ND
2/19/2009	Trip Blank	Sodium	mg/L	ND
3/12/2009	Trip Blank	Sodium	mg/L	ND
3/24/2009	Trip Blank	Sodium	mg/L	ND
4/9/2009	Trip Blank	Sodium	mg/L	0.051
4/13/2009	Trip Blank	Sodium	mg/L	ND
4/17/2009	Trip Blank	Sodium	mg/L	ND
4/21/2009	Trip Blank	Sodium	mg/L	0.125
4/30/2009	Trip Blank	Sodium	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
5/21/2009	Trip Blank	Sodium	mg/L	ND
1/11/2008	Trip Blank	Sodium	mg/L	ND
1/15/2008	Trip Blank	Sodium	mg/L	ND
1/24/2008	Trip Blank	Sodium	mg/L	ND
1/3/2008	Trip Blank	Sodium	mg/L	ND
1/7/2008	Trip Blank	Sodium	mg/L	ND
10/18/2007	Trip Blank	Sodium	mg/L	ND
10/22/2007	Trip Blank	Sodium	mg/L	ND
10/26/2007	Trip Blank	Sodium	mg/L	ND
10/30/2007	Trip Blank	Sodium	mg/L	ND
11/29/2007	Trip Blank	Sodium	mg/L	ND
11/8/2007	Trip Blank	Sodium	mg/L	ND
12/20/2007	Trip Blank	Sodium	mg/L	ND
2/14/2008	Trip Blank	Sodium	mg/L	0.130
2/8/2008	Trip Blank	Sodium	mg/L	2.69
3/6/2008	Trip Blank	Sodium	mg/L	ND
6/11/2009	Trip Blank	Sodium	mg/L	0.133
7/12/2007	Trip Blank	Solids, Total Dissolved	mg/L	ND
7/12/2007	Trip Blank	Solids, Total Suspended	mg/L	ND
1/6/2005	Trip Blank	Specific Conductance	umhos	5
1/10/2005	Trip Blank	Specific Conductance	umhos	3
1/14/2005	Trip Blank	Specific Conductance	umhos	6
1/18/2005	Trip Blank	Specific Conductance	umhos	10
1/27/2005	Trip Blank	Specific Conductance	umhos	7
2/17/2005	Trip Blank	Specific Conductance	umhos	3
4/7/2005	Trip Blank	Specific Conductance	umhos	3
4/11/2005	Trip Blank	Specific Conductance	umhos	4
4/15/2005	Trip Blank	Specific Conductance	umhos	1
4/19/2005	Trip Blank	Specific Conductance	umhos	1
4/28/2005	Trip Blank	Specific Conductance	umhos	10
5/19/2005	Trip Blank	Specific Conductance	umhos	3
6/9/2005	Trip Blank	Specific Conductance	umhos	2
7/15/2005	Trip Blank	Specific Conductance	umhos	8
7/19/2005	Trip Blank	Specific Conductance	umhos	4
7/28/2005	Trip Blank	Specific Conductance	umhos	1
8/18/2005	Trip Blank	Specific Conductance	umhos	2
9/8/2005	Trip Blank	Specific Conductance	umhos	9
10/13/2005	Trip Blank	Specific Conductance	umhos	2
10/17/2005	Trip Blank	Specific Conductance	umhos	15
10/21/2005	Trip Blank	Specific Conductance	umhos	5
10/25/2005	Trip Blank	Specific Conductance	umhos	6
11/3/2005	Trip Blank	Specific Conductance	umhos	2
11/23/2005	Trip Blank	Specific Conductance	umhos	2
12/15/2005	Trip Blank	Specific Conductance	umhos	3
1/5/2006	Trip Blank	Specific Conductance	umhos	2
1/9/2006	Trip Blank	Specific Conductance	umhos	1
1/13/2006	Trip Blank	Specific Conductance	umhos	4
1/17/2006	Trip Blank	Specific Conductance	umhos	1
1/26/2006	Trip Blank	Specific Conductance	umhos	2
2/16/2006	Trip Blank	Specific Conductance	umhos	1
3/9/2006	Trip Blank	Specific Conductance	umhos	1
4/6/2006	Trip Blank	Specific Conductance	umhos	ND
4/10/2006	Trip Blank	Specific Conductance	umhos	2
4/14/2006	Trip Blank	Specific Conductance	umhos	2
4/18/2006	Trip Blank	Specific Conductance	umhos	2
4/27/2006	Trip Blank	Specific Conductance	umhos	14
5/18/2006	Trip Blank	Specific Conductance	umhos	2
6/8/2006	Trip Blank	Specific Conductance	umhos	2
7/6/2006	Trip Blank	Specific Conductance	umhos	ND
7/10/2006	Trip Blank	Specific Conductance	umhos	1
7/14/2006	Trip Blank	Specific Conductance	umhos	2
7/18/2006	Trip Blank	Specific Conductance	umhos	2
7/27/2006	Trip Blank	Specific Conductance	umhos	15
8/17/2006	Trip Blank	Specific Conductance	umhos	2
9/7/2006	Trip Blank	Specific Conductance	umhos	12
10/19/2006	Trip Blank	Specific Conductance	umhos	2
10/23/2006	Trip Blank	Specific Conductance	umhos	1
10/27/2006	Trip Blank	Specific Conductance	umhos	1
10/31/2006	Trip Blank	Specific Conductance	umhos	1
11/9/2006	Trip Blank	Specific Conductance	umhos	2
11/30/2006	Trip Blank	Specific Conductance	umhos	3
12/21/2006	Trip Blank	Specific Conductance	umhos	2
1/4/2007	Trip Blank	Specific Conductance	umhos	1
1/8/2007	Trip Blank	Specific Conductance	umhos	2
1/11/2007	Trip Blank	Specific Conductance	umhos	10
1/16/2007	Trip Blank	Specific Conductance	umhos	1
1/25/2007	Trip Blank	Specific Conductance	umhos	8
2/15/2007	Trip Blank	Specific Conductance	umhos	4
3/8/2007	Trip Blank	Specific Conductance	umhos	6
4/19/2007	Trip Blank	Specific Conductance	umhos	3
4/23/2007	Trip Blank	Specific Conductance	umhos	3
4/27/2007	Trip Blank	Specific Conductance	umhos	2
5/1/2007	Trip Blank	Specific Conductance	umhos	15
5/10/2007	Trip Blank	Specific Conductance	umhos	2
5/31/2007	Trip Blank	Specific Conductance	umhos	2

Sampling Date	Location ID	Analyte	Unit	Concentration
6/21/2007	Trip Blank	Specific Conductance	umhos	2
7/12/2007	Trip Blank	Specific Conductance	umhos	2
7/16/2007	Trip Blank	Specific Conductance	umhos	2
7/20/2007	Trip Blank	Specific Conductance	umhos	2
7/24/2007	Trip Blank	Specific Conductance	umhos	2
8/2/2007	Trip Blank	Specific Conductance	umhos	3
8/23/2007	Trip Blank	Specific Conductance	umhos	2
9/13/2007	Trip Blank	Specific Conductance	umhos	1

Sampling Date	Location ID	Analyte	Unit	Concentration
4/3/2008	Trip Blank	Specific Conductance	umhos	4
4/7/2008	Trip Blank	Specific Conductance	umhos	5
4/11/2008	Trip Blank	Specific Conductance	umhos	3
4/15/2008	Trip Blank	Specific Conductance	umhos	5
4/24/2008	Trip Blank	Specific Conductance	umhos	4
5/15/2008	Trip Blank	Specific Conductance	umhos	2
6/5/2008	Trip Blank	Specific Conductance	umhos	2
7/3/2008	Trip Blank	Specific Conductance	umhos	2
7/3/2008	Trip Blank	Specific Conductance	umhos	2
7/7/2008	Trip Blank	Specific Conductance	umhos	4
7/11/2008	Trip Blank	Specific Conductance	umhos	2
7/15/2008	Trip Blank	Specific Conductance	umhos	1
7/24/2008	Trip Blank	Specific Conductance	umhos	2
8/14/2008	Trip Blank	Specific Conductance	umhos	2
9/4/2008	Trip Blank	Specific Conductance	umhos	2
10/9/2008	Trip Blank	Specific Conductance	umhos	1
10/13/2008	Trip Blank	Specific Conductance	umhos	3
10/17/2008	Trip Blank	Specific Conductance	umhos	2
10/21/2008	Trip Blank	Specific Conductance	umhos	2
10/30/2008	Trip Blank	Specific Conductance	umhos	1
11/20/2008	Trip Blank	Specific Conductance	umhos	3
12/11/2008	Trip Blank	Specific Conductance	umhos	4
1/8/2009	Trip Blank	Specific Conductance	umhos	2
1/12/2009	Trip Blank	Specific Conductance	umhos	5
1/16/2009	Trip Blank	Specific Conductance	umhos	1
1/20/2009	Trip Blank	Specific Conductance	umhos	2
1/29/2009	Trip Blank	Specific Conductance	umhos	2
2/19/2009	Trip Blank	Specific Conductance	umhos	2
3/12/2009	Trip Blank	Specific Conductance	umhos	1
4/9/2009	Trip Blank	Specific Conductance	umhos	1
4/13/2009	Trip Blank	Specific Conductance	umhos	2
4/17/2009	Trip Blank	Specific Conductance	umhos	1
4/21/2009	Trip Blank	Specific Conductance	umhos	2
4/30/2009	Trip Blank	Specific Conductance	umhos	2
5/21/2009	Trip Blank	Specific Conductance	umhos	2
1/11/2008	Trip Blank	Specific Conductance	umhos	3
1/15/2008	Trip Blank	Specific Conductance	umhos	6
1/24/2008	Trip Blank	Specific Conductance	umhos	4
1/3/2008	Trip Blank	Specific Conductance	umhos	6
1/7/2008	Trip Blank	Specific Conductance	umhos	2
10/18/2007	Trip Blank	Specific Conductance	umhos	2.9
10/22/2007	Trip Blank	Specific Conductance	umhos	2
10/26/2007	Trip Blank	Specific Conductance	umhos	3
10/30/2007	Trip Blank	Specific Conductance	umhos	1
11/29/2007	Trip Blank	Specific Conductance	umhos	2
11/8/2007	Trip Blank	Specific Conductance	umhos	2
12/20/2007	Trip Blank	Specific Conductance	umhos	2
2/14/2008	Trip Blank	Specific Conductance	umhos	003
3/6/2008	Trip Blank	Specific Conductance	umhos	3
6/11/2009	Trip Blank	Specific Conductance	umhos	2
7/12/2007	Trip Blank	Styrene	ug/L	ND
7/12/2007	Trip Blank	Sulfate	mg/L	5.15
7/16/2007	Trip Blank	Sulfate	mg/L	ND
7/20/2007	Trip Blank	Sulfate	mg/L	ND
7/24/2007	Trip Blank	Sulfate	mg/L	ND
7/26/2007	Trip Blank	Sulfate	mg/L	ND
8/2/2007	Trip Blank	Sulfate	mg/L	21.5
8/23/2007	Trip Blank	Sulfate	mg/L	ND
4/3/2008	Trip Blank	Sulfate	mg/L	ND
4/7/2008	Trip Blank	Sulfate	mg/L	ND
4/11/2008	Trip Blank	Sulfate	mg/L	2.47
4/15/2008	Trip Blank	Sulfate	mg/L	ND
4/24/2008	Trip Blank	Sulfate	mg/L	ND
5/15/2008	Trip Blank	Sulfate	mg/L	ND
6/5/2008	Trip Blank	Sulfate	mg/L	ND
7/3/2008	Trip Blank	Sulfate	mg/L	ND
7/3/2008	Trip Blank	Sulfate	mg/L	ND
7/7/2008	Trip Blank	Sulfate	mg/L	ND
7/10/2008	Trip Blank	Sulfate	mg/L	ND
7/11/2008	Trip Blank	Sulfate	mg/L	ND
7/15/2008	Trip Blank	Sulfate	mg/L	ND
7/24/2008	Trip Blank	Sulfate	mg/L	ND
8/14/2008	Trip Blank	Sulfate	mg/L	ND
9/4/2008	Trip Blank	Sulfate	mg/L	ND
10/9/2008	Trip Blank	Sulfate	mg/L	ND
10/13/2008	Trip Blank	Sulfate	mg/L	ND
10/17/2008	Trip Blank	Sulfate	mg/L	ND
10/21/2008	Trip Blank	Sulfate	mg/L	ND
10/30/2008	Trip Blank	Sulfate	mg/L	ND
11/20/2008	Trip Blank	Sulfate	mg/L	ND
12/11/2008	Trip Blank	Sulfate	mg/L	ND
1/8/2009	Trip Blank	Sulfate	mg/L	ND
1/12/2009	Trip Blank	Sulfate	mg/L	ND
1/16/2009	Trip Blank	Sulfate	mg/L	ND
1/20/2009	Trip Blank	Sulfate	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/29/2009	Trip Blank	Sulfate	mg/L	ND
2/19/2009	Trip Blank	Sulfate	mg/L	ND
3/12/2009	Trip Blank	Sulfate	mg/L	ND
3/24/2009	Trip Blank	Sulfate	mg/L	ND
4/9/2009	Trip Blank	Sulfate	mg/L	3.35
4/13/2009	Trip Blank	Sulfate	mg/L	1.73
4/17/2009	Trip Blank	Sulfate	mg/L	ND
4/21/2009	Trip Blank	Sulfate	mg/L	ND
4/30/2009	Trip Blank	Sulfate	mg/L	ND
5/21/2009	Trip Blank	Sulfate	mg/L	ND
1/11/2008	Trip Blank	Sulfate	mg/L	ND
1/15/2008	Trip Blank	Sulfate	mg/L	ND
1/24/2008	Trip Blank	Sulfate	mg/L	ND
1/3/2008	Trip Blank	Sulfate	mg/L	ND
1/7/2008	Trip Blank	Sulfate	mg/L	ND
2/14/2008	Trip Blank	Sulfate	mg/L	ND
2/8/2008	Trip Blank	Sulfate	mg/L	2.95
3/6/2008	Trip Blank	Sulfate	mg/L	ND
1/6/2005	Trip Blank	Sulfate	mg/L	ND
1/10/2005	Trip Blank	Sulfate	mg/L	0.84
1/14/2005	Trip Blank	Sulfate	mg/L	ND
1/18/2005	Trip Blank	Sulfate	mg/L	ND
1/27/2005	Trip Blank	Sulfate	mg/L	0.56
2/8/2005	Trip Blank	Sulfate	mg/L	ND
2/17/2005	Trip Blank	Sulfate	mg/L	ND
4/7/2005	Trip Blank	Sulfate	mg/L	ND
4/11/2005	Trip Blank	Sulfate	mg/L	1.65
4/15/2005	Trip Blank	Sulfate	mg/L	ND
4/19/2005	Trip Blank	Sulfate	mg/L	ND
4/28/2005	Trip Blank	Sulfate	mg/L	ND
5/19/2005	Trip Blank	Sulfate	mg/L	ND
6/9/2005	Trip Blank	Sulfate	mg/L	ND
7/7/2005	Trip Blank	Sulfate	mg/L	ND
7/11/2005	Trip Blank	Sulfate	mg/L	ND
7/15/2005	Trip Blank	Sulfate	mg/L	ND
7/19/2005	Trip Blank	Sulfate	mg/L	ND
7/28/2005	Trip Blank	Sulfate	mg/L	ND
8/18/2005	Trip Blank	Sulfate	mg/L	ND
9/8/2005	Trip Blank	Sulfate	mg/L	ND
10/13/2005	Trip Blank	Sulfate	mg/L	ND
10/17/2005	Trip Blank	Sulfate	mg/L	ND
10/21/2005	Trip Blank	Sulfate	mg/L	ND
10/25/2005	Trip Blank	Sulfate	mg/L	ND
11/3/2005	Trip Blank	Sulfate	mg/L	ND
11/23/2005	Trip Blank	Sulfate	mg/L	ND
12/15/2005	Trip Blank	Sulfate	mg/L	ND
1/5/2006	Trip Blank	Sulfate	mg/L	ND
1/9/2006	Trip Blank	Sulfate	mg/L	ND
1/13/2006	Trip Blank	Sulfate	mg/L	ND
1/17/2006	Trip Blank	Sulfate	mg/L	ND
1/26/2006	Trip Blank	Sulfate	mg/L	ND
2/16/2006	Trip Blank	Sulfate	mg/L	ND
3/9/2006	Trip Blank	Sulfate	mg/L	ND
3/23/2006	Trip Blank	Sulfate	mg/L	ND
4/6/2006	Trip Blank	Sulfate	mg/L	ND
4/10/2006	Trip Blank	Sulfate	mg/L	ND
4/14/2006	Trip Blank	Sulfate	mg/L	ND
4/18/2006	Trip Blank	Sulfate	mg/L	ND
4/27/2006	Trip Blank	Sulfate	mg/L	ND
5/18/2006	Trip Blank	Sulfate	mg/L	ND
6/8/2006	Trip Blank	Sulfate	mg/L	ND
7/6/2006	Trip Blank	Sulfate	mg/L	ND
7/10/2006	Trip Blank	Sulfate	mg/L	ND
7/14/2006	Trip Blank	Sulfate	mg/L	ND
7/18/2006	Trip Blank	Sulfate	mg/L	ND
7/27/2006	Trip Blank	Sulfate	mg/L	ND
8/17/2006	Trip Blank	Sulfate	mg/L	ND
8/31/2006	Trip Blank	Sulfate	mg/L	ND
9/7/2006	Trip Blank	Sulfate	mg/L	ND
10/19/2006	Trip Blank	Sulfate	mg/L	ND
10/23/2006	Trip Blank	Sulfate	mg/L	ND
10/27/2006	Trip Blank	Sulfate	mg/L	ND
10/31/2006	Trip Blank	Sulfate	mg/L	ND
11/9/2006	Trip Blank	Sulfate	mg/L	ND
11/30/2006	Trip Blank	Sulfate	mg/L	ND
12/21/2006	Trip Blank	Sulfate	mg/L	ND
1/4/2007	Trip Blank	Sulfate	mg/L	ND
1/8/2007	Trip Blank	Sulfate	mg/L	ND
1/11/2007	Trip Blank	Sulfate	mg/L	ND
1/16/2007	Trip Blank	Sulfate	mg/L	ND
1/25/2007	Trip Blank	Sulfate	mg/L	ND
2/1/2007	Trip Blank	Sulfate	mg/L	ND
2/15/2007	Trip Blank	Sulfate	mg/L	ND
3/8/2007	Trip Blank	Sulfate	mg/L	ND
4/19/2007	Trip Blank	Sulfate	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/23/2007	Trip Blank	Sulfate	mg/L	ND
4/27/2007	Trip Blank	Sulfate	mg/L	ND
5/1/2007	Trip Blank	Sulfate	mg/L	0.455
5/10/2007	Trip Blank	Sulfate	mg/L	ND
5/31/2007	Trip Blank	Sulfate	mg/L	ND
6/21/2007	Trip Blank	Sulfate	mg/L	ND
9/13/2007	Trip Blank	Sulfate	mg/L	ND
10/18/2007	Trip Blank	Sulfate	mg/L	ND
10/22/2007	Trip Blank	Sulfate	mg/L	ND
10/26/2007	Trip Blank	Sulfate	mg/L	ND
10/30/2007	Trip Blank	Sulfate	mg/L	ND
11/29/2007	Trip Blank	Sulfate	mg/L	ND
11/8/2007	Trip Blank	Sulfate	mg/L	ND
12/20/2007	Trip Blank	Sulfate	mg/L	ND
6/11/2009	Trip Blank	Sulfate	mg/L	ND
1/6/2005	Trip Blank	Temperature	C	8
1/10/2005	Trip Blank	Temperature	C	8
1/14/2005	Trip Blank	Temperature	C	15
1/18/2005	Trip Blank	Temperature	C	3
1/27/2005	Trip Blank	Temperature	C	6
2/17/2005	Trip Blank	Temperature	C	5
4/7/2005	Trip Blank	Temperature	C	20
4/11/2005	Trip Blank	Temperature	C	14
4/15/2005	Trip Blank	Temperature	C	12
4/19/2005	Trip Blank	Temperature	C	17
4/28/2005	Trip Blank	Temperature	C	16
5/19/2005	Trip Blank	Temperature	C	16
6/9/2005	Trip Blank	Temperature	C	25
7/7/2005	Trip Blank	Temperature	C	25
7/11/2005	Trip Blank	Temperature	C	27
7/15/2005	Trip Blank	Temperature	C	25
7/19/2005	Trip Blank	Temperature	C	26
7/28/2005	Trip Blank	Temperature	C	26
8/18/2005	Trip Blank	Temperature	C	24
9/8/2005	Trip Blank	Temperature	C	20
10/13/2005	Trip Blank	Temperature	C	14
10/17/2005	Trip Blank	Temperature	C	11
10/21/2005	Trip Blank	Temperature	C	14
10/25/2005	Trip Blank	Temperature	C	10
11/3/2005	Trip Blank	Temperature	C	9
11/23/2005	Trip Blank	Temperature	C	6
12/15/2005	Trip Blank	Temperature	C	ND
1/5/2006	Trip Blank	Temperature	C	10
1/9/2006	Trip Blank	Temperature	C	7
1/13/2006	Trip Blank	Temperature	C	20
1/17/2006	Trip Blank	Temperature	C	3
1/26/2006	Trip Blank	Temperature	C	4
2/16/2006	Trip Blank	Temperature	C	11
3/9/2006	Trip Blank	Temperature	C	11
4/6/2006	Trip Blank	Temperature	C	12
4/10/2006	Trip Blank	Temperature	C	9
4/14/2006	Trip Blank	Temperature	C	19.1
4/18/2006	Trip Blank	Temperature	C	8
4/27/2006	Trip Blank	Temperature	C	11
5/18/2006	Trip Blank	Temperature	C	18
6/8/2006	Trip Blank	Temperature	C	20
7/6/2006	Trip Blank	Temperature	C	23
7/10/2006	Trip Blank	Temperature	C	25
7/14/2006	Trip Blank	Temperature	C	27
7/18/2006	Trip Blank	Temperature	C	30
7/27/2006	Trip Blank	Temperature	C	28
8/17/2006	Trip Blank	Temperature	C	23
9/7/2006	Trip Blank	Temperature	C	22
10/19/2006	Trip Blank	Temperature	C	20
10/23/2006	Trip Blank	Temperature	C	12
10/27/2006	Trip Blank	Temperature	C	10
10/31/2006	Trip Blank	Temperature	C	15
11/9/2006	Trip Blank	Temperature	C	19
11/30/2006	Trip Blank	Temperature	C	17
12/21/2006	Trip Blank	Temperature	C	8
1/4/2007	Trip Blank	Temperature	C	12
1/8/2007	Trip Blank	Temperature	C	12
1/11/2007	Trip Blank	Temperature	C	8
1/16/2007	Trip Blank	Temperature	C	21
1/25/2007	Trip Blank	Temperature	C	4
2/15/2007	Trip Blank	Temperature	C	2
3/8/2007	Trip Blank	Temperature	C	1
4/19/2007	Trip Blank	Temperature	C	14
4/23/2007	Trip Blank	Temperature	C	20
4/27/2007	Trip Blank	Temperature	C	15
5/1/2007	Trip Blank	Temperature	C	17
5/10/2007	Trip Blank	Temperature	C	22
5/31/2007	Trip Blank	Temperature	C	24
6/21/2007	Trip Blank	Temperature	C	23
7/12/2007	Trip Blank	Temperature	C	25

Sampling Date	Location ID	Analyte	Unit	Concentration
7/16/2007	Trip Blank	Temperature	C	29
7/20/2007	Trip Blank	Temperature	C	27
7/24/2007	Trip Blank	Temperature	C	23
8/2/2007	Trip Blank	Temperature	C	11
8/23/2007	Trip Blank	Temperature	C	21
9/13/2007	Trip Blank	Temperature	C	20
4/3/2008	Trip Blank	Temperature	C	10
4/7/2008	Trip Blank	Temperature	C	8
4/11/2008	Trip Blank	Temperature	C	17
4/15/2008	Trip Blank	Temperature	C	11
4/24/2008	Trip Blank	Temperature	C	20
5/15/2008	Trip Blank	Temperature	C	21
6/5/2008	Trip Blank	Temperature	C	23
7/3/2008	Trip Blank	Temperature	C	25
7/3/2008	Trip Blank	Temperature	C	25
7/7/2008	Trip Blank	Temperature	C	25
7/11/2008	Trip Blank	Temperature	C	26
7/15/2008	Trip Blank	Temperature	C	26
7/24/2008	Trip Blank	Temperature	C	25
8/14/2008	Trip Blank	Temperature	C	28
9/4/2008	Trip Blank	Temperature	C	25
10/9/2008	Trip Blank	Temperature	C	19
10/13/2008	Trip Blank	Temperature	C	15
10/17/2008	Trip Blank	Temperature	C	17
10/21/2008	Trip Blank	Temperature	C	11
10/30/2008	Trip Blank	Temperature	C	9
11/20/2008	Trip Blank	Temperature	C	6
12/11/2008	Trip Blank	Temperature	C	13
1/8/2009	Trip Blank	Temperature	C	6
1/12/2009	Trip Blank	Temperature	C	2
1/16/2009	Trip Blank	Temperature	C	1
1/20/2009	Trip Blank	Temperature	C	1
1/29/2009	Trip Blank	Temperature	C	4
2/19/2009	Trip Blank	Temperature	C	12
3/12/2009	Trip Blank	Temperature	C	11
4/9/2009	Trip Blank	Temperature	C	12
4/13/2009	Trip Blank	Temperature	C	7
4/17/2009	Trip Blank	Temperature	C	12
4/21/2009	Trip Blank	Temperature	C	14
4/30/2009	Trip Blank	Temperature	C	16
5/21/2009	Trip Blank	Temperature	C	19
1/11/2008	Trip Blank	Temperature	C	11
1/15/2008	Trip Blank	Temperature	C	4
1/24/2008	Trip Blank	Temperature	C	4
1/3/2008	Trip Blank	Temperature	C	1
1/7/2008	Trip Blank	Temperature	C	10
10/18/2007	Trip Blank	Temperature	C	17.5
10/22/2007	Trip Blank	Temperature	C	17
10/26/2007	Trip Blank	Temperature	C	16
10/30/2007	Trip Blank	Temperature	C	11
11/29/2007	Trip Blank	Temperature	C	5
11/8/2007	Trip Blank	Temperature	C	8
12/20/2007	Trip Blank	Temperature	C	6
2/14/2008	Trip Blank	Temperature	C	15.2
3/6/2008	Trip Blank	Temperature	C	9
6/11/2009	Trip Blank	Temperature	C	22
7/12/2007	Trip Blank	tert-Butylbenzene	ug/L	ND
7/12/2007	Trip Blank	Tetrachloroethene	ug/L	ND
7/12/2007	Trip Blank	Thallium	mg/L	ND
7/12/2007	Trip Blank	Toluene	ug/L	ND
7/12/2007	Trip Blank	Total Alkalinity	mg/L	1.5
7/12/2007	Trip Blank	Total Hardness,Calculation	mg/L	ND
7/12/2007	Trip Blank	Total Organic Carbon	mg/L	ND
7/16/2007	Trip Blank	Total Organic Carbon	mg/L	ND
7/20/2007	Trip Blank	Total Organic Carbon	mg/L	1.1
7/24/2007	Trip Blank	Total Organic Carbon	mg/L	ND
7/26/2007	Trip Blank	Total Organic Carbon	mg/L	ND
8/2/2007	Trip Blank	Total Organic Carbon	mg/L	1
8/23/2007	Trip Blank	Total Organic Carbon	mg/L	3.2
9/13/2007	Trip Blank	Total Organic Carbon	mg/L	ND
4/3/2008	Trip Blank	Total Organic Carbon	mg/L	ND
4/7/2008	Trip Blank	Total Organic Carbon	mg/L	ND
4/11/2008	Trip Blank	Total Organic Carbon	mg/L	ND
4/15/2008	Trip Blank	Total Organic Carbon	mg/L	ND
4/24/2008	Trip Blank	Total Organic Carbon	mg/L	ND
5/15/2008	Trip Blank	Total Organic Carbon	mg/L	ND
6/5/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/3/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/3/2008	Trip Blank	Total Organic Carbon	mg/L	ND
10/9/2008	Trip Blank	Total Organic Carbon	mg/L	ND
10/13/2008	Trip Blank	Total Organic Carbon	mg/L	ND
10/17/2008	Trip Blank	Total Organic Carbon	mg/L	ND
10/21/2008	Trip Blank	Total Organic Carbon	mg/L	ND
10/30/2008	Trip Blank	Total Organic Carbon	mg/L	ND
11/20/2008	Trip Blank	Total Organic Carbon	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
12/11/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/8/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/12/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/16/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/20/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/29/2009	Trip Blank	Total Organic Carbon	mg/L	ND
2/19/2009	Trip Blank	Total Organic Carbon	mg/L	ND
3/12/2009	Trip Blank	Total Organic Carbon	mg/L	ND
3/24/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/11/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/15/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/24/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/3/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/7/2008	Trip Blank	Total Organic Carbon	mg/L	ND
2/14/2008	Trip Blank	Total Organic Carbon	mg/L	ND
2/8/2008	Trip Blank	Total Organic Carbon	mg/L	ND
3/6/2008	Trip Blank	Total Organic Carbon	mg/L	ND
1/6/2005	Trip Blank	Total Organic Carbon	mg/L	ND
1/10/2005	Trip Blank	Total Organic Carbon	mg/L	ND
1/14/2005	Trip Blank	Total Organic Carbon	mg/L	ND
1/18/2005	Trip Blank	Total Organic Carbon	mg/L	ND
1/27/2005	Trip Blank	Total Organic Carbon	mg/L	ND
2/8/2005	Trip Blank	Total Organic Carbon	mg/L	ND
2/17/2005	Trip Blank	Total Organic Carbon	mg/L	ND
4/7/2005	Trip Blank	Total Organic Carbon	mg/L	ND
4/11/2005	Trip Blank	Total Organic Carbon	mg/L	ND
4/15/2005	Trip Blank	Total Organic Carbon	mg/L	ND
4/19/2005	Trip Blank	Total Organic Carbon	mg/L	ND
4/28/2005	Trip Blank	Total Organic Carbon	mg/L	ND
5/19/2005	Trip Blank	Total Organic Carbon	mg/L	ND
6/9/2005	Trip Blank	Total Organic Carbon	mg/L	ND
7/7/2005	Trip Blank	Total Organic Carbon	mg/L	ND
7/11/2005	Trip Blank	Total Organic Carbon	mg/L	ND
7/15/2005	Trip Blank	Total Organic Carbon	mg/L	ND
7/19/2005	Trip Blank	Total Organic Carbon	mg/L	ND
7/28/2005	Trip Blank	Total Organic Carbon	mg/L	ND
8/18/2005	Trip Blank	Total Organic Carbon	mg/L	ND
9/8/2005	Trip Blank	Total Organic Carbon	mg/L	ND
10/13/2005	Trip Blank	Total Organic Carbon	mg/L	ND
10/17/2005	Trip Blank	Total Organic Carbon	mg/L	ND
10/21/2005	Trip Blank	Total Organic Carbon	mg/L	ND
10/25/2005	Trip Blank	Total Organic Carbon	mg/L	ND
11/3/2005	Trip Blank	Total Organic Carbon	mg/L	ND
11/23/2005	Trip Blank	Total Organic Carbon	mg/L	ND
12/15/2005	Trip Blank	Total Organic Carbon	mg/L	ND
1/5/2006	Trip Blank	Total Organic Carbon	mg/L	ND
1/9/2006	Trip Blank	Total Organic Carbon	mg/L	ND
1/13/2006	Trip Blank	Total Organic Carbon	mg/L	ND
1/17/2006	Trip Blank	Total Organic Carbon	mg/L	ND
1/26/2006	Trip Blank	Total Organic Carbon	mg/L	ND
2/16/2006	Trip Blank	Total Organic Carbon	mg/L	ND
3/9/2006	Trip Blank	Total Organic Carbon	mg/L	ND
3/23/2006	Trip Blank	Total Organic Carbon	mg/L	ND
4/6/2006	Trip Blank	Total Organic Carbon	mg/L	ND
4/10/2006	Trip Blank	Total Organic Carbon	mg/L	ND
4/14/2006	Trip Blank	Total Organic Carbon	mg/L	ND
4/18/2006	Trip Blank	Total Organic Carbon	mg/L	ND
4/27/2006	Trip Blank	Total Organic Carbon	mg/L	ND
5/18/2006	Trip Blank	Total Organic Carbon	mg/L	ND
6/8/2006	Trip Blank	Total Organic Carbon	mg/L	ND
7/6/2006	Trip Blank	Total Organic Carbon	mg/L	ND
7/10/2006	Trip Blank	Total Organic Carbon	mg/L	ND
7/14/2006	Trip Blank	Total Organic Carbon	mg/L	ND
7/18/2006	Trip Blank	Total Organic Carbon	mg/L	ND
7/27/2006	Trip Blank	Total Organic Carbon	mg/L	ND
8/17/2006	Trip Blank	Total Organic Carbon	mg/L	ND
8/31/2006	Trip Blank	Total Organic Carbon	mg/L	ND
9/7/2006	Trip Blank	Total Organic Carbon	mg/L	ND
10/19/2006	Trip Blank	Total Organic Carbon	mg/L	ND
10/23/2006	Trip Blank	Total Organic Carbon	mg/L	ND
10/27/2006	Trip Blank	Total Organic Carbon	mg/L	ND
10/31/2006	Trip Blank	Total Organic Carbon	mg/L	ND
11/9/2006	Trip Blank	Total Organic Carbon	mg/L	ND
11/30/2006	Trip Blank	Total Organic Carbon	mg/L	ND
12/21/2006	Trip Blank	Total Organic Carbon	mg/L	ND
1/4/2007	Trip Blank	Total Organic Carbon	mg/L	ND
1/8/2007	Trip Blank	Total Organic Carbon	mg/L	ND
1/11/2007	Trip Blank	Total Organic Carbon	mg/L	ND
1/16/2007	Trip Blank	Total Organic Carbon	mg/L	ND
1/25/2007	Trip Blank	Total Organic Carbon	mg/L	ND
2/1/2007	Trip Blank	Total Organic Carbon	mg/L	ND
2/15/2007	Trip Blank	Total Organic Carbon	mg/L	ND
3/8/2007	Trip Blank	Total Organic Carbon	mg/L	ND
4/19/2007	Trip Blank	Total Organic Carbon	mg/L	ND
4/23/2007	Trip Blank	Total Organic Carbon	mg/L	1.3

Sampling Date	Location ID	Analyte	Unit	Concentration
4/27/2007	Trip Blank	Total Organic Carbon	mg/L	ND
5/1/2007	Trip Blank	Total Organic Carbon	mg/L	ND
5/10/2007	Trip Blank	Total Organic Carbon	mg/L	ND
5/31/2007	Trip Blank	Total Organic Carbon	mg/L	ND
6/21/2007	Trip Blank	Total Organic Carbon	mg/L	ND
7/7/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/10/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/11/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/15/2008	Trip Blank	Total Organic Carbon	mg/L	ND
7/24/2008	Trip Blank	Total Organic Carbon	mg/L	ND
8/14/2008	Trip Blank	Total Organic Carbon	mg/L	ND
9/4/2008	Trip Blank	Total Organic Carbon	mg/L	ND
4/9/2009	Trip Blank	Total Organic Carbon	mg/L	ND
4/13/2009	Trip Blank	Total Organic Carbon	mg/L	ND
4/17/2009	Trip Blank	Total Organic Carbon	mg/L	ND
4/21/2009	Trip Blank	Total Organic Carbon	mg/L	ND
4/30/2009	Trip Blank	Total Organic Carbon	mg/L	ND
5/21/2009	Trip Blank	Total Organic Carbon	mg/L	ND
10/18/2007	Trip Blank	Total Organic Carbon	mg/L	ND
10/22/2007	Trip Blank	Total Organic Carbon	mg/L	ND
10/26/2007	Trip Blank	Total Organic Carbon	mg/L	ND
10/30/2007	Trip Blank	Total Organic Carbon	mg/L	ND
11/29/2007	Trip Blank	Total Organic Carbon	mg/L	ND
11/8/2007	Trip Blank	Total Organic Carbon	mg/L	ND
12/20/2007	Trip Blank	Total Organic Carbon	mg/L	ND
6/11/2009	Trip Blank	Total Organic Carbon	mg/L	ND
1/6/2005	Trip Blank	Total Organic Halogen	mg/L	ND
1/10/2005	Trip Blank	Total Organic Halogen	mg/L	ND
1/14/2005	Trip Blank	Total Organic Halogen	mg/L	ND
1/18/2005	Trip Blank	Total Organic Halogen	mg/L	ND
1/27/2005	Trip Blank	Total Organic Halogen	mg/L	ND
2/8/2005	Trip Blank	Total Organic Halogen	mg/L	ND
2/17/2005	Trip Blank	Total Organic Halogen	mg/L	ND
4/7/2005	Trip Blank	Total Organic Halogen	mg/L	ND
4/11/2005	Trip Blank	Total Organic Halogen	mg/L	ND
4/15/2005	Trip Blank	Total Organic Halogen	mg/L	ND
4/19/2005	Trip Blank	Total Organic Halogen	mg/L	ND
4/28/2005	Trip Blank	Total Organic Halogen	mg/L	ND
5/19/2005	Trip Blank	Total Organic Halogen	mg/L	0.014
6/9/2005	Trip Blank	Total Organic Halogen	mg/L	ND
7/7/2005	Trip Blank	Total Organic Halogen	mg/L	ND
7/11/2005	Trip Blank	Total Organic Halogen	mg/L	ND
7/15/2005	Trip Blank	Total Organic Halogen	mg/L	ND
7/19/2005	Trip Blank	Total Organic Halogen	mg/L	ND
7/28/2005	Trip Blank	Total Organic Halogen	mg/L	ND
8/18/2005	Trip Blank	Total Organic Halogen	mg/L	ND
9/8/2005	Trip Blank	Total Organic Halogen	mg/L	ND
10/13/2005	Trip Blank	Total Organic Halogen	mg/L	ND
10/17/2005	Trip Blank	Total Organic Halogen	mg/L	ND
10/21/2005	Trip Blank	Total Organic Halogen	mg/L	ND
10/25/2005	Trip Blank	Total Organic Halogen	mg/L	ND
11/3/2005	Trip Blank	Total Organic Halogen	mg/L	ND
11/23/2005	Trip Blank	Total Organic Halogen	mg/L	ND
12/15/2005	Trip Blank	Total Organic Halogen	mg/L	ND
1/5/2006	Trip Blank	Total Organic Halogen	mg/L	ND
1/9/2006	Trip Blank	Total Organic Halogen	mg/L	ND
1/13/2006	Trip Blank	Total Organic Halogen	mg/L	0.013
1/17/2006	Trip Blank	Total Organic Halogen	mg/L	ND
1/26/2006	Trip Blank	Total Organic Halogen	mg/L	ND
2/16/2006	Trip Blank	Total Organic Halogen	mg/L	ND
3/9/2006	Trip Blank	Total Organic Halogen	mg/L	ND
3/23/2006	Trip Blank	Total Organic Halogen	mg/L	ND
4/6/2006	Trip Blank	Total Organic Halogen	mg/L	ND
4/10/2006	Trip Blank	Total Organic Halogen	mg/L	0.015
4/14/2006	Trip Blank	Total Organic Halogen	mg/L	ND
4/18/2006	Trip Blank	Total Organic Halogen	mg/L	0.011
4/27/2006	Trip Blank	Total Organic Halogen	mg/L	ND
5/18/2006	Trip Blank	Total Organic Halogen	mg/L	ND
6/8/2006	Trip Blank	Total Organic Halogen	mg/L	ND
7/6/2006	Trip Blank	Total Organic Halogen	mg/L	ND
7/10/2006	Trip Blank	Total Organic Halogen	mg/L	ND
7/14/2006	Trip Blank	Total Organic Halogen	mg/L	ND
7/18/2006	Trip Blank	Total Organic Halogen	mg/L	ND
7/27/2006	Trip Blank	Total Organic Halogen	mg/L	ND
8/17/2006	Trip Blank	Total Organic Halogen	mg/L	ND
8/31/2006	Trip Blank	Total Organic Halogen	mg/L	ND
9/7/2006	Trip Blank	Total Organic Halogen	mg/L	ND
10/19/2006	Trip Blank	Total Organic Halogen	mg/L	ND
10/23/2006	Trip Blank	Total Organic Halogen	mg/L	ND
10/27/2006	Trip Blank	Total Organic Halogen	mg/L	ND
10/31/2006	Trip Blank	Total Organic Halogen	mg/L	ND
11/9/2006	Trip Blank	Total Organic Halogen	mg/L	ND
11/30/2006	Trip Blank	Total Organic Halogen	mg/L	ND
12/21/2006	Trip Blank	Total Organic Halogen	mg/L	ND
1/4/2007	Trip Blank	Total Organic Halogen	mg/L	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
1/8/2007	Trip Blank	Total Organic Halogen	mg/L	ND
1/11/2007	Trip Blank	Total Organic Halogen	mg/L	ND
1/16/2007	Trip Blank	Total Organic Halogen	mg/L	ND
2/1/2007	Trip Blank	Total Organic Halogen	mg/L	ND
2/15/2007	Trip Blank	Total Organic Halogen	mg/L	ND
3/8/2007	Trip Blank	Total Organic Halogen	mg/L	0.01
4/19/2007	Trip Blank	Total Organic Halogen	mg/L	ND
4/23/2007	Trip Blank	Total Organic Halogen	mg/L	ND
4/27/2007	Trip Blank	Total Organic Halogen	mg/L	ND
5/1/2007	Trip Blank	Total Organic Halogen	mg/L	0.02
5/10/2007	Trip Blank	Total Organic Halogen	mg/L	ND
5/31/2007	Trip Blank	Total Organic Halogen	mg/L	ND
6/21/2007	Trip Blank	Total Organic Halogen	mg/L	ND
7/12/2007	Trip Blank	Total Organic Halogen	mg/L	0.01
7/16/2007	Trip Blank	Total Organic Halogen	mg/L	0.01
7/20/2007	Trip Blank	Total Organic Halogen	mg/L	ND
7/24/2007	Trip Blank	Total Organic Halogen	mg/L	ND
7/26/2007	Trip Blank	Total Organic Halogen	mg/L	ND
8/2/2007	Trip Blank	Total Organic Halogen	mg/L	ND
8/23/2007	Trip Blank	Total Organic Halogen	mg/L	ND
9/13/2007	Trip Blank	Total Organic Halogen	mg/L	ND
4/3/2008	Trip Blank	Total Organic Halogen	mg/L	ND
4/7/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
4/11/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
4/15/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
4/24/2008	Trip Blank	Total Organic Halogen	mg/L	0.01
5/15/2008	Trip Blank	Total Organic Halogen	mg/L	ND
6/5/2008	Trip Blank	Total Organic Halogen	mg/L	ND
7/3/2008	Trip Blank	Total Organic Halogen	mg/L	ND
7/3/2008	Trip Blank	Total Organic Halogen	mg/L	ND
7/7/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
7/10/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
7/11/2008	Trip Blank	Total Organic Halogen	mg/L	ND
7/15/2008	Trip Blank	Total Organic Halogen	mg/L	ND
7/24/2008	Trip Blank	Total Organic Halogen	mg/L	ND
8/14/2008	Trip Blank	Total Organic Halogen	mg/L	ND
9/4/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/9/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/13/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/17/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/21/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/30/2008	Trip Blank	Total Organic Halogen	mg/L	0.04
11/20/2008	Trip Blank	Total Organic Halogen	mg/L	ND
12/11/2008	Trip Blank	Total Organic Halogen	mg/L	ND
1/8/2009	Trip Blank	Total Organic Halogen	mg/L	ND
1/12/2009	Trip Blank	Total Organic Halogen	mg/L	0.12
1/16/2009	Trip Blank	Total Organic Halogen	mg/L	ND
1/20/2009	Trip Blank	Total Organic Halogen	mg/L	0.1
1/29/2009	Trip Blank	Total Organic Halogen	mg/L	ND
2/19/2009	Trip Blank	Total Organic Halogen	mg/L	0.05
3/12/2009	Trip Blank	Total Organic Halogen	mg/L	ND
1/11/2008	Trip Blank	Total Organic Halogen	mg/L	ND
1/15/2008	Trip Blank	Total Organic Halogen	mg/L	ND
1/24/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
1/3/2008	Trip Blank	Total Organic Halogen	mg/L	ND
1/7/2008	Trip Blank	Total Organic Halogen	mg/L	ND
10/18/2007	Trip Blank	Total Organic Halogen	mg/L	ND
10/22/2007	Trip Blank	Total Organic Halogen	mg/L	ND
10/26/2007	Trip Blank	Total Organic Halogen	mg/L	ND
10/30/2007	Trip Blank	Total Organic Halogen	mg/L	ND
11/29/2007	Trip Blank	Total Organic Halogen	mg/L	0.02
11/8/2007	Trip Blank	Total Organic Halogen	mg/L	0.02
12/20/2007	Trip Blank	Total Organic Halogen	mg/L	ND
2/14/2008	Trip Blank	Total Organic Halogen	mg/L	0.05
2/8/2008	Trip Blank	Total Organic Halogen	mg/L	0.02
3/6/2008	Trip Blank	Total Organic Halogen	mg/L	0.06
3/24/2009	Trip Blank	Total Organic Halogen	mg/L	ND
4/9/2009	Trip Blank	Total Organic Halogen	mg/L	0.01
4/13/2009	Trip Blank	Total Organic Halogen	mg/L	0.01
4/17/2009	Trip Blank	Total Organic Halogen	mg/L	ND
4/21/2009	Trip Blank	Total Organic Halogen	mg/L	ND
4/30/2009	Trip Blank	Total Organic Halogen	mg/L	ND
5/21/2009	Trip Blank	Total Organic Halogen	mg/L	ND
6/11/2009	Trip Blank	Total Organic Halogen	mg/L	ND
7/12/2007	Trip Blank	trans-1,2-Dichloroethene	ug/L	ND
7/12/2007	Trip Blank	trans-1,3-Dichloropropene	ug/L	ND
7/12/2007	Trip Blank	trans-1,4-Dichloro-2-butene	ug/L	ND
7/12/2007	Trip Blank	Trichloroethene	ug/L	ND
7/12/2007	Trip Blank	Trichlorofluoromethane	ug/L	ND
1/6/2005	Trip Blank	Turbidity	NTU	ND
1/10/2005	Trip Blank	Turbidity	NTU	ND
1/14/2005	Trip Blank	Turbidity	NTU	ND
1/18/2005	Trip Blank	Turbidity	NTU	ND
1/27/2005	Trip Blank	Turbidity	NTU	ND
2/17/2005	Trip Blank	Turbidity	NTU	0.14

Sampling Date	Location ID	Analyte	Unit	Concentration
4/7/2005	Trip Blank	Turbidity	NTU	ND
4/11/2005	Trip Blank	Turbidity	NTU	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
4/15/2005	Trip Blank	Turbidity	NTU	ND
4/19/2005	Trip Blank	Turbidity	NTU	ND
4/28/2005	Trip Blank	Turbidity	NTU	ND
5/19/2005	Trip Blank	Turbidity	NTU	ND
6/9/2005	Trip Blank	Turbidity	NTU	ND
7/7/2005	Trip Blank	Turbidity	NTU	0.13
7/11/2005	Trip Blank	Turbidity	NTU	ND
7/15/2005	Trip Blank	Turbidity	NTU	ND
7/19/2005	Trip Blank	Turbidity	NTU	ND
7/28/2005	Trip Blank	Turbidity	NTU	ND
8/18/2005	Trip Blank	Turbidity	NTU	ND
9/8/2005	Trip Blank	Turbidity	NTU	ND
10/13/2005	Trip Blank	Turbidity	NTU	ND
10/17/2005	Trip Blank	Turbidity	NTU	ND
10/21/2005	Trip Blank	Turbidity	NTU	ND
10/25/2005	Trip Blank	Turbidity	NTU	ND
11/3/2005	Trip Blank	Turbidity	NTU	ND
11/23/2005	Trip Blank	Turbidity	NTU	ND
12/15/2005	Trip Blank	Turbidity	NTU	ND
1/5/2006	Trip Blank	Turbidity	NTU	ND
1/9/2006	Trip Blank	Turbidity	NTU	ND
1/13/2006	Trip Blank	Turbidity	NTU	ND
1/17/2006	Trip Blank	Turbidity	NTU	ND
1/26/2006	Trip Blank	Turbidity	NTU	ND
2/16/2006	Trip Blank	Turbidity	NTU	ND
3/9/2006	Trip Blank	Turbidity	NTU	ND
4/6/2006	Trip Blank	Turbidity	NTU	ND
4/10/2006	Trip Blank	Turbidity	NTU	ND
4/14/2006	Trip Blank	Turbidity	NTU	ND
4/18/2006	Trip Blank	Turbidity	NTU	ND
4/27/2006	Trip Blank	Turbidity	NTU	0.17
5/18/2006	Trip Blank	Turbidity	NTU	ND
6/8/2006	Trip Blank	Turbidity	NTU	ND
7/6/2006	Trip Blank	Turbidity	NTU	ND
7/10/2006	Trip Blank	Turbidity	NTU	ND
7/14/2006	Trip Blank	Turbidity	NTU	ND
7/18/2006	Trip Blank	Turbidity	NTU	ND
7/27/2006	Trip Blank	Turbidity	NTU	ND
8/17/2006	Trip Blank	Turbidity	NTU	ND
9/7/2006	Trip Blank	Turbidity	NTU	ND
10/19/2006	Trip Blank	Turbidity	NTU	ND
10/23/2006	Trip Blank	Turbidity	NTU	ND
10/27/2006	Trip Blank	Turbidity	NTU	ND
10/31/2006	Trip Blank	Turbidity	NTU	ND
11/9/2006	Trip Blank	Turbidity	NTU	ND
11/30/2006	Trip Blank	Turbidity	NTU	ND
12/21/2006	Trip Blank	Turbidity	NTU	ND
1/4/2007	Trip Blank	Turbidity	NTU	ND
1/8/2007	Trip Blank	Turbidity	NTU	ND
1/11/2007	Trip Blank	Turbidity	NTU	ND
1/16/2007	Trip Blank	Turbidity	NTU	ND
1/25/2007	Trip Blank	Turbidity	NTU	ND
2/15/2007	Trip Blank	Turbidity	NTU	0.29
3/8/2007	Trip Blank	Turbidity	NTU	ND
4/19/2007	Trip Blank	Turbidity	NTU	ND
4/23/2007	Trip Blank	Turbidity	NTU	ND
4/27/2007	Trip Blank	Turbidity	NTU	0.5
5/1/2007	Trip Blank	Turbidity	NTU	ND
5/10/2007	Trip Blank	Turbidity	NTU	ND
5/31/2007	Trip Blank	Turbidity	NTU	ND
6/21/2007	Trip Blank	Turbidity	NTU	ND
7/12/2007	Trip Blank	Turbidity	NTU	0.19
7/16/2007	Trip Blank	Turbidity	NTU	ND
7/20/2007	Trip Blank	Turbidity	NTU	ND
7/24/2007	Trip Blank	Turbidity	NTU	0.1
8/2/2007	Trip Blank	Turbidity	NTU	ND
8/23/2007	Trip Blank	Turbidity	NTU	0.31
9/13/2007	Trip Blank	Turbidity	NTU	0.12
4/3/2008	Trip Blank	Turbidity	NTU	0.29
4/7/2008	Trip Blank	Turbidity	NTU	0.47
4/11/2008	Trip Blank	Turbidity	NTU	ND
4/15/2008	Trip Blank	Turbidity	NTU	0.14
4/24/2008	Trip Blank	Turbidity	NTU	ND
5/15/2008	Trip Blank	Turbidity	NTU	ND
6/5/2008	Trip Blank	Turbidity	NTU	0.02
7/3/2008	Trip Blank	Turbidity	NTU	ND
7/3/2008	Trip Blank	Turbidity	NTU	ND
7/7/2008	Trip Blank	Turbidity	NTU	ND
7/10/2008	Trip Blank	Turbidity	NTU	0.2
7/11/2008	Trip Blank	Turbidity	NTU	ND
7/15/2008	Trip Blank	Turbidity	NTU	0.02
7/24/2008	Trip Blank	Turbidity	NTU	ND
8/14/2008	Trip Blank	Turbidity	NTU	0.03
9/4/2008	Trip Blank	Turbidity	NTU	0.15
10/9/2008	Trip Blank	Turbidity	NTU	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
10/13/2008	Trip Blank	Turbidity	NTU	ND
10/17/2008	Trip Blank	Turbidity	NTU	ND
10/21/2008	Trip Blank	Turbidity	NTU	ND
10/30/2008	Trip Blank	Turbidity	NTU	0.11
11/20/2008	Trip Blank	Turbidity	NTU	ND
12/11/2008	Trip Blank	Turbidity	NTU	ND
1/8/2009	Trip Blank	Turbidity	NTU	ND
1/12/2009	Trip Blank	Turbidity	NTU	ND
1/16/2009	Trip Blank	Turbidity	NTU	ND
1/20/2009	Trip Blank	Turbidity	NTU	ND
1/29/2009	Trip Blank	Turbidity	NTU	ND
2/19/2009	Trip Blank	Turbidity	NTU	ND
3/12/2009	Trip Blank	Turbidity	NTU	ND
4/9/2009	Trip Blank	Turbidity	NTU	ND
4/13/2009	Trip Blank	Turbidity	NTU	ND
4/17/2009	Trip Blank	Turbidity	NTU	ND
4/21/2009	Trip Blank	Turbidity	NTU	ND
4/30/2009	Trip Blank	Turbidity	NTU	ND
5/21/2009	Trip Blank	Turbidity	NTU	ND
1/11/2008	Trip Blank	Turbidity	NTU	0.05
1/15/2008	Trip Blank	Turbidity	NTU	0.78
1/24/2008	Trip Blank	Turbidity	NTU	ND
1/3/2008	Trip Blank	Turbidity	NTU	0.15
1/7/2008	Trip Blank	Turbidity	NTU	ND
10/18/2007	Trip Blank	Turbidity	NTU	0.13
10/22/2007	Trip Blank	Turbidity	NTU	0.49
10/26/2007	Trip Blank	Turbidity	NTU	ND
10/30/2007	Trip Blank	Turbidity	NTU	1.1
11/29/2007	Trip Blank	Turbidity	NTU	0.15
11/8/2007	Trip Blank	Turbidity	NTU	ND
12/20/2007	Trip Blank	Turbidity	NTU	ND
2/14/2008	Trip Blank	Turbidity	NTU	0.11
3/6/2008	Trip Blank	Turbidity	NTU	0.15
6/11/2009	Trip Blank	Turbidity	NTU	0.26
7/12/2007	Trip Blank	Vanadium	mg/L	ND
7/12/2007	Trip Blank	Vinyl Acetate	ug/L	ND
7/12/2007	Trip Blank	Vinyl Chloride	ug/L	ND
7/12/2007	Trip Blank	Xylenes, Total	ug/L	ND
7/12/2007	Trip Blank	Zinc	mg/L	ND
Location ID:		**WDUP 1**		
Number of Sampling Dates:				
7/26/2007	WDUP	Barium	mg/L	0.093
7/26/2007	WDUP	Chloride	mg/L	202
7/26/2007	WDUP	Chromium	mg/L	ND
7/26/2007	WDUP	Chromium	mg/L	0.031
7/26/2007	WDUP	Iron	mg/L	119
7/26/2007	WDUP	Manganese	mg/L	0.343
7/26/2007	WDUP	Sodium	mg/L	151
7/26/2007	WDUP	Sulfate	mg/L	22.6
7/26/2007	WDUP	Total Organic Carbon	mg/L	52
7/26/2007	WDUP	Total Organic Halogen	mg/L	0.37
Location ID:		**W**		
Number of Sampling Dates:		**7**		
2/8/2005	W	Barium	mg/L	0.107
7/22/2005	W	Barium	mg/L	0.115
3/23/2006	W	Barium	mg/L	ND
8/31/2006	W	Barium	mg/L	0.067
2/1/2007	W	Barium	mg/L	0.097
7/26/2007	W	Barium	mg/L	0.095
7/10/2008	W	Barium	mg/L	0.091
3/24/2009	W	Barium	mg/L	0.093
2/8/2008	W	Barium	mg/L	0.082
2/8/2005	W	Chloride	mg/L	131
7/22/2005	W	Chloride	mg/L	226
3/23/2006	W	Chloride	mg/L	247
8/31/2006	W	Chloride	mg/L	245
2/1/2007	W	Chloride	mg/L	209
7/26/2007	W	Chloride	mg/L	217
7/10/2008	W	Chloride	mg/L	166
3/24/2009	W	Chloride	mg/L	131
2/8/2008	W	Chloride	mg/L	401
2/8/2005	W	Chromium	mg/L	0.021
7/22/2005	W	Chromium	mg/L	0.018
3/23/2006	W	Chromium	mg/L	ND
8/31/2006	W	Chromium	mg/L	ND
2/1/2007	W	Chromium	mg/L	0.026
7/26/2007	W	Chromium	mg/L	0.034
7/10/2008	W	Chromium	mg/L	0.046
3/24/2009	W	Chromium	mg/L	0.023
2/8/2008	W	Chromium	mg/L	0.009
2/8/2005	W	Chromium, hexavalent	mg/l	ND
7/22/2005	W	Chromium, hexavalent	mg/l	ND
3/23/2006	W	Chromium, hexavalent	mg/l	ND
8/31/2006	W	Chromium, hexavalent	mg/l	ND

Sampling Date	Location ID	Analyte	Unit	Concentration
2/1/2007	W	Chromium, hexavalent	mg/l	ND
7/26/2007	W	Chromium, hexavalent	mg/L	ND
7/10/2008	W	Chromium, Hexavalent	mg/L	ND
3/24/2009	W	Chromium, hexavalent	mg/L	ND
2/8/2008	W	Chromium, hexavalent	mg/L	ND
2/8/2005	W	Iron	mg/L	149
7/22/2005	W	Iron	mg/L	125
3/23/2006	W	Iron	mg/L	0.035
8/31/2006	W	Iron	mg/L	46.4
2/1/2007	W	Iron	mg/L	123
7/26/2007	W	Iron	mg/L	164
7/10/2008	W	Iron	mg/L	119
3/24/2009	W	Iron	mg/L	124
2/8/2008	W	Iron	mg/L	72.0
2/8/2005	W	Manganese	mg/L	0.325
7/22/2005	W	Manganese	mg/L	0.363
3/23/2006	W	Manganese	mg/L	0.039
8/31/2006	W	Manganese	mg/L	1.28
2/1/2007	W	Manganese	mg/L	11.5
7/26/2007	W	Manganese	mg/L	0.374
7/10/2008	W	Manganese	mg/L	0.269
3/24/2009	W	Manganese	mg/L	0.220
2/8/2008	W	Manganese	mg/L	1.54
7/22/2005	W	Phenols	mg/L	4.2
7/22/2005	W	Phenols	mg/L	4.2
3/23/2006	W	Phenols	mg/L	ND
8/31/2006	W	Phenols	mg/L	ND
7/10/2008	W	Phenols, Total	mg/L	ND
3/24/2009	W	Phenols, Total	mg/L	ND
2/8/2005	W	Sodium	mg/L	141
7/22/2005	W	Sodium	mg/L	197
3/23/2006	W	Sodium	mg/L	170
8/31/2006	W	Sodium	mg/L	297
2/1/2007	W	Sodium	mg/L	167
7/26/2007	W	Sodium	mg/L	184
7/10/2008	W	Sodium	mg/L	154
3/24/2009	W	Sodium	mg/L	138
2/8/2008	W	Sodium	mg/L	304
7/26/2007	W	Sulfate	mg/L	28
7/10/2008	W	Sulfate	mg/L	ND
3/24/2009	W	Sulfate	mg/L	ND
2/8/2008	W	Sulfate	mg/L	213
2/8/2005	W	Sulfate	mg/L	17.9
7/22/2005	W	Sulfate	mg/L	42.9
3/23/2006	W	Sulfate	mg/L	60.5
8/31/2006	W	Sulfate	mg/L	52.7
2/1/2007	W	Sulfate	mg/L	30.6
7/26/2007	W	Total Organic Carbon	mg/L	56
3/24/2009	W	Total Organic Carbon	mg/L	262
2/8/2008	W	Total Organic Carbon	mg/L	28
2/8/2005	W	Total Organic Carbon	mg/L	62
7/22/2005	W	Total Organic Carbon	mg/L	51
3/23/2006	W	Total Organic Carbon	mg/L	1.7
8/31/2006	W	Total Organic Carbon	mg/L	31
2/1/2007	W	Total Organic Carbon	mg/L	57
7/10/2008	W	Total Organic Carbon	mg/L	57
2/8/2005	W	Total Organic Halogen	mg/L	0.583
7/22/2005	W	Total Organic Halogen	mg/L	0.257
3/23/2006	W	Total Organic Halogen	mg/L	0.425
8/31/2006	W	Total Organic Halogen	mg/L	ND
2/1/2007	W	Total Organic Halogen	mg/L	0.08
7/26/2007	W	Total Organic Halogen	mg/L	0.31
7/10/2008	W	Total Organic Halogen	mg/L	0.14
2/8/2008	W	Total Organic Halogen	mg/L	0.07
3/24/2009	W	Total Organic Halogen	mg/L	0.3
7/10/2008	W	Turbidity	NTU	252

Sampling Date	Location ID	Analyte	Unit	Concentration
Location ID:		**W-1**		
Number of Sampling Dates:		**1**		
8/21/2006	W-1	Barium	mg/L	0.03
8/21/2006	W-1	Chloride	mg/L	13.5
8/21/2006	W-1	Chromium	mg/L	0.005
8/21/2006	W-1	Dichloromethane (MeCl2)	ug/L	ND
8/21/2006	W-1	Iron	mg/L	1.88
8/21/2006	W-1	Manganese	mg/L	0.663
8/21/2006	W-1	Sulfate	mg/L	109
8/21/2006	W-1	Turbidity	NTU	17
Location ID:	**W10**			
Number of Sampling Dates:				
8/24/2006	W-10	Barium	mg/L	0.117
8/24/2006	W-10	Chloride	mg/L	1.48
8/24/2006	W-10	Chromium	mg/L	ND
8/24/2006	W-10	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-10	Iron	mg/L	0.243
8/24/2006	W-10	Manganese	mg/L	1.08
8/24/2006	W-10	Sulfate	mg/L	24.7
8/24/2006	W-10	Turbidity	NTU	12
Location ID:	**W-10DUP**			
Number of Sampling Dates:				
8/24/2006	W-10DUP	Chloride	mg/L	1.45
8/24/2006	W-10DUP	Chromium	mg/L	ND
8/24/2006	W-10DUP	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-10DUP	Iron	mg/L	0.214
8/24/2006	W-10DUP	Manganese	mg/L	1.05

Sampling Date	Location ID	Analyte	Unit	Concentration
8/24/2006	W-10DUP	Sulfate	mg/L	24.6
8/24/2006	W-10DUP	Turbidity	NTU	8.3
Location ID:	**W-11**			
Number of Sampling Dates:				
8/23/2006	W-11	Barium	mg/L	0.129
8/23/2006	W-11	Chloride	mg/L	3.2
8/23/2006	W-11	Chromium	mg/L	ND
8/23/2006	W-11	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	W-11	Iron	mg/L	0.251
8/23/2006	W-11	Manganese	mg/L	0.14
8/23/2006	W-11	Sulfate	mg/L	18
8/23/2006	W-11	Turbidity	NTU	3.1
Location ID:	**W-12**			
Number of Sampling Dates:				
8/23/2006	W-12	Barium	mg/L	0.048
8/23/2006	W-12	Chloride	mg/L	2.43
8/23/2006	W-12	Chromium	mg/L	ND
8/23/2006	W-12	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	W-12	Iron	mg/L	0.271
8/23/2006	W-12	Manganese	mg/L	0.412
8/23/2006	W-12	Sulfate	mg/L	24.2
8/23/2006	W-12	Turbidity	NTU	5.7
Location ID:	**W-13**			
Number of Sampling Dates:				
8/21/2006	W-13	Barium	mg/L	0.117
8/21/2006	W-13	Chloride	mg/L	1.63
8/21/2006	W-13	Chromium	mg/L	ND
8/21/2006	W-13	Dichloromethane (MeCl2)	ug/L	ND
8/21/2006	W-13	Iron	mg/L	0.372
8/21/2006	W-13	Manganese	mg/L	0.06
8/21/2006	W-13	Sulfate	mg/L	25
8/21/2006	W-13	Turbidity	NTU	1.7
Location ID:	**W-13DUP**			
Number of Sampling Dates:				
8/21/2006	W-13DUP	Barium	mg/L	0.125
8/21/2006	W-13DUP	Chloride	mg/L	1.33
8/21/2006	W-13DUP	Chromium	mg/L	0.006
8/21/2006	W-13DUP	Dichloromethane (MeCl2)	ug/L	ND
8/21/2006	W-13DUP	Iron	mg/L	0.735
8/21/2006	W-13DUP	Manganese	mg/L	0.078
8/21/2006	W-13DUP	Sulfate	mg/L	25
8/21/2006	W-13DUP	Turbidity	NTU	1.6
Location ID:	**W-14**			
Number of Sampling Dates:				
8/21/2006	W-14	Barium	mg/L	0.031
8/21/2006	W-14	Chloride	mg/L	50.6
8/21/2006	W-14	Chromium	mg/L	ND
8/21/2006	W-14	Dichloromethane (MeCl2)	ug/L	ND
8/21/2006	W-14	Iron	mg/L	0.381
8/21/2006	W-14	Manganese	mg/L	0.225

Sampling Date	Location ID	Analyte	Unit	Concentration
8/21/2006	W-14	Sulfate	mg/L	691
8/21/2006	W-14	Turbidity	NTU	8.4
Location ID:	**W-16**			
Number of Sampling Dates:				
8/24/2006	W-16	Barium	mg/L	0.479
8/24/2006	W-16	Chloride	mg/L	2.45
8/24/2006	W-16	Chromium	mg/L	ND
8/24/2006	W-16	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-16	Iron	mg/L	1.14
8/24/2006	W-16	Manganese	mg/L	0.073
8/24/2006	W-16	Sulfate	mg/L	11.1
8/24/2006	W-16	Turbidity	NTU	31
Location ID:	**W-17**			
Number of Sampling Dates:	**2**			
8/22/2006	W-17	Barium	mg/L	0.252
8/22/2006	W-17	Chloride	mg/L	8.07
8/24/2006	W-17	Barium	mg/L	0.368
8/24/2006	W-17	Chloride	mg/L	3.65
8/24/2006	W-17	Chromium	mg/L	ND
8/24/2006	W-17	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-17	Iron	mg/L	0.053
8/24/2006	W-17	Manganese	mg/L	0.512
8/24/2006	W-17	Sulfate	mg/L	13
8/24/2006	W-17	Turbidity	NTU	12
Location ID:				
8/22/2006	W-19	Iron	mg/L	0.582
8/22/2006	W-19	Sulfate	mg/L	162
8/22/2006	W-21	Manganese	mg/L	2.97
8/22/2006	W-21	Turbidity	NTU	6.5
8/22/2006	W-26	Chromium	mg/L	ND
8/22/2006	W-29	Barium	mg/L	0.036
8/22/2006	W-31	Iron	mg/L	3.48
8/22/2006	W-33	Manganese	mg/L	1.78
8/22/2006	W-38	Chromium	mg/L	ND
Location ID:	**W-4**			
Number of Sampling Dates:				
8/23/2006	W-4	Barium	mg/L	0.108
8/23/2006	W-4	Chloride	mg/L	1.6
8/23/2006	W-4	Chromium	mg/L	ND
8/23/2006	W-4	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	W-4	Iron	mg/L	0.187
8/23/2006	W-4	Manganese	mg/L	0.011

Sampling Date	Location ID	Analyte	Unit	Concentration
8/23/2006	W-4	Sulfate	mg/L	9.18
8/23/2006	W-4	Turbidity	NTU	6.3
Location ID:	**W-4DUP**			
Number of Sampling Dates:				
8/23/2006	W-4DUP	Barium	mg/L	0.134
8/23/2006	W-4DUP	Chloride	mg/L	1.39
8/23/2006	W-4DUP	Chromium	mg/L	ND
8/23/2006	W-4DUP	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	W-4DUP	Iron	mg/L	0.301
8/23/2006	W-4DUP	Manganese	mg/L	0.017
8/23/2006	W-4DUP	Sulfate	mg/L	8.5
8/23/2006	W-4DUP	Turbidity	NTU	12
Location ID:	**W-5**			
Number of Sampling Dates:				
8/22/2006	W-5	Chloride	mg/L	6.15
8/23/2006	W-5	Barium	mg/L	0.064
8/23/2006	W-5	Chloride	mg/L	1.52
8/23/2006	W-5	Chromium	mg/L	ND
8/23/2006	W-5	Dichloromethane (MeCl2)	ug/L	ND
8/23/2006	W-5	Iron	mg/L	0.556
8/23/2006	W-5	Manganese	mg/L	0.129
8/23/2006	W-5	Sulfate	mg/L	16.8
8/23/2006	W-5	Turbidity	NTU	6
Location ID:	**W-6**			
Number of Sampling Dates:				
8/25/2006	W-6	Barium	mg/L	0.082
8/25/2006	W-6	Chloride	mg/L	1.71
8/25/2006	W-6	Chromium	mg/L	ND
8/25/2006	W-6	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	W-6	Iron	mg/L	ND
8/25/2006	W-6	Manganese	mg/L	0.005
8/25/2006	W-6	Sulfate	mg/L	7.55
8/25/2006	W-6	Turbidity	NTU	2.7
8/22/2006	**W-64**	**Dichloromethane (MeCl2)**	**ug/L**	**ND**
Location ID:	**W-6DUP**			
Number of Sampling Dates:				
8/25/2006	W-6DUP	Barium	mg/L	0.064
8/25/2006	W-6DUP	Chloride	mg/L	1.71
8/25/2006	W-6DUP	Chromium	mg/L	ND
8/25/2006	W-6DUP	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	W-6DUP	Iron	mg/L	0.109
8/25/2006	W-6DUP	Manganese	mg/L	0.013

Sampling Date	Location ID	Analyte	Unit	Concentration
8/25/2006	W-6DUP	Sulfate	mg/L	7.82
8/25/2006	W-6DUP	Turbidity	NTU	2.2
Location ID:	**W-7**			
Number of Sampling Dates:				
8/22/2006	W-7	Sulfate	mg/L	20.5
8/25/2006	W-7	Barium	mg/L	0.143
8/25/2006	W-7	Chloride	mg/L	1.61
8/25/2006	W-7	Chromium	mg/L	ND
8/25/2006	W-7	Dichloromethane (MeCl2)	ug/L	ND
8/25/2006	W-7	Iron	mg/L	0.137
8/25/2006	W-7	Manganese	mg/L	0.041
8/25/2006	W-7	Sulfate	mg/L	9.05
8/25/2006	W-7	Turbidity	NTU	7.4
	W-76			
8/25/2006	W-76	Dichloromethane (MeCl2)	ug/L	ND
Location ID:	**W-8**			
Number of Sampling Dates:				
8/24/2006	W-8	Barium	mg/L	0.04
8/24/2006	W-8	Chloride	mg/L	2.85
8/24/2006	W-8	Chromium	mg/L	ND
8/24/2006	W-8	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-8	Iron	mg/L	0.225
8/24/2006	W-8	Manganese	mg/L	0.031
8/24/2006	W-8	Sulfate	mg/L	7.62
8/24/2006	W-8	Turbidity	NTU	2.5
Location ID:	**W-9**			
Number of Sampling Dates:				
8/22/2006	W-9	Turbidity	NTU	32
8/24/2006	W-9	Barium	mg/L	0.243
8/24/2006	W-9	Chloride	mg/L	1.74
8/24/2006	W-9	Chromium	mg/L	ND
8/24/2006	W-9	Dichloromethane (MeCl2)	ug/L	ND
8/24/2006	W-9	Iron	mg/L	0.423
8/24/2006	W-9	Manganese	mg/L	0.335
8/24/2006	W-9	Sulfate	mg/L	10
8/24/2006	W-9	Turbidity	NTU	8
Location ID:	**WDUP**			
Number of Sampling Dates:				
3/23/2006	WDUP	Barium	mg/L	0.084
3/23/2006	WDUP	Chloride	mg/L	253
3/23/2006	WDUP	Chromium	mg/L	ND
3/23/2006	WDUP	Chromium, hexavalent	mg/l	ND
3/23/2006	WDUP	Iron	mg/L	93.2
3/23/2006	WDUP	Manganese	mg/L	0.478
3/23/2006	WDUP	Phenols	mg/L	ND
3/23/2006	WDUP	Sodium	mg/L	191
3/23/2006	WDUP	Sulfate	mg/L	56.3

Sampling Date	Location ID	Analyte	Unit	Concentration
3/23/2006	WDUP	Total Organic Carbon	mg/L	43
3/23/2006	WDUP	Total Organic Halogen	mg/L	0.354
Location ID:	Y			
Number of Sampling Dates:				
2/8/2005	Y	Barium	mg/L	0.205
7/22/2005	Y	Barium	mg/L	0.175
3/23/2006	Y	Barium	mg/L	0.133
8/31/2006	Y	Barium	mg/L	0.141
2/1/2007	Y	Barium	mg/L	0.125
7/26/2007	Y	Barium	mg/L	0.224
7/10/2008	Y	Barium	mg/L	0.17
3/24/2009	Y	Barium	mg/L	0.128
2/8/2008	Y	Barium	mg/L	0.153
2/8/2005	Y	Chloride	mg/L	1027
2/8/2005	Y	Chloride	mg/L	1027
7/22/2005	Y	Chloride	mg/L	1050
3/23/2006	Y	Chloride	mg/L	1269
8/31/2006	Y	Chloride	mg/L	1078
2/1/2007	Y	Chloride	mg/L	1070
7/26/2007	Y	Chloride	mg/L	1111
7/10/2008	Y	Chloride	mg/L	945
3/24/2009	Y	Chloride	mg/L	939
2/8/2008	Y	Chloride	mg/L	1113
2/8/2005	Y	Chromium	mg/L	ND
7/22/2005	Y	Chromium	mg/L	ND
3/23/2006	Y	Chromium	mg/L	ND
8/31/2006	Y	Chromium	mg/L	ND
2/1/2007	Y	Chromium	mg/L	ND
7/26/2007	Y	Chromium	mg/L	0.009
7/10/2008	Y	Chromium	mg/L	0.014
3/24/2009	Y	Chromium	mg/L	ND
2/8/2008	Y	Chromium	mg/L	ND
2/8/2005	Y	Chromium, hexavalent	mg/l	ND
7/22/2005	Y	Chromium, hexavalent	mg/l	ND
3/23/2006	Y	Chromium, hexavalent	mg/l	ND
8/31/2006	Y	Chromium, hexavalent	mg/l	ND
2/1/2007	Y	Chromium, hexavalent	mg/l	ND
7/26/2007	Y	Chromium, hexavalent	mg/L	ND
7/10/2008	Y	Chromium, Hexavalent	mg/L	ND
3/24/2009	Y	Chromium, hexavalent	mg/L	ND
2/8/2008	Y	Chromium, hexavalent	mg/L	ND
2/8/2005	Y	Iron	mg/L	9.46
7/22/2005	Y	Iron	mg/L	37.4
3/23/2006	Y	Iron	mg/L	30.4
8/31/2006	Y	Iron	mg/L	20.9
2/1/2007	Y	Iron	mg/L	7.11
7/26/2007	Y	Iron	mg/L	2.11
7/10/2008	Y	Iron	mg/L	2.29
3/24/2009	Y	Iron	mg/L	23.5
2/8/2008	Y	Iron	mg/L	50.2
2/8/2005	Y	Manganese	mg/L	2.1
7/22/2005	Y	Manganese	mg/L	2.32
3/23/2006	Y	Manganese	mg/L	2.55
8/31/2006	Y	Manganese	mg/L	2.26
2/1/2007	Y	Manganese	mg/L	1.69
7/26/2007	Y	Manganese	mg/L	1.86
7/10/2008	Y	Manganese	mg/L	1.74
3/24/2009	Y	Manganese	mg/L	2.44
2/8/2008	Y	Manganese	mg/L	2.58
7/22/2005	Y	Phenols	mg/L	ND
3/23/2006	Y	Phenols	mg/L	ND
8/31/2006	Y	Phenols	mg/L	ND
7/10/2008	Y	Phenols, Total	mg/L	ND
3/24/2009	Y	Phenols, Total	mg/L	ND
2/8/2005	Y	Sodium	mg/L	437
2/8/2005	Y	Sodium	mg/L	437
7/22/2005	Y	Sodium	mg/L	407
3/23/2006	Y	Sodium	mg/L	373
8/31/2006	Y	Sodium	mg/L	364
2/1/2007	Y	Sodium	mg/L	403
7/26/2007	Y	Sodium	mg/L	380
7/10/2008	Y	Sodium	mg/L	400
3/24/2009	Y	Sodium	mg/L	418
2/8/2008	Y	Sodium	mg/L	359
7/26/2007	Y	Sulfate	mg/L	56.4
7/10/2008	Y	Sulfate	mg/L	62.8
3/24/2009	Y	Sulfate	mg/L	54.0
2/8/2008	Y	Sulfate	mg/L	91.0
2/8/2005	Y	Sulfate	mg/L	126
7/22/2005	Y	Sulfate	mg/L	110
3/23/2006	Y	Sulfate	mg/L	58
8/31/2006	Y	Sulfate	mg/L	73
2/1/2007	Y	Sulfate	mg/L	88.1
7/26/2007	Y	Total Organic Carbon	mg/L	3
3/24/2009	Y	Total Organic Carbon	mg/L	19

Sampling Date	Location ID	Analyte	Unit	Concentration
2/8/2008	Y	Total Organic Carbon	mg/L	1.4
2/8/2005	Y	Total Organic Carbon	mg/L	2.6
7/22/2005	Y	Total Organic Carbon	mg/L	ND
3/23/2006	Y	Total Organic Carbon	mg/L	2.5
8/31/2006	Y	Total Organic Carbon	mg/L	1.2
2/1/2007	Y	Total Organic Carbon	mg/L	1.2
7/10/2008	Y	Total Organic Carbon	mg/L	2.5
2/8/2005	Y	Total Organic Halogen	mg/L	0.102
7/22/2005	Y	Total Organic Halogen	mg/L	0.21
3/23/2006	Y	Total Organic Halogen	mg/L	0.09
8/31/2006	Y	Total Organic Halogen	mg/L	0.085
2/1/2007	Y	Total Organic Halogen	mg/L	0.2
7/26/2007	Y	Total Organic Halogen	mg/L	0.26
7/10/2008	Y	Total Organic Halogen	mg/L	0.06
2/8/2008	Y	Total Organic Halogen	mg/L	0.07
3/24/2009	Y	Total Organic Halogen	mg/L	0.2
7/10/2008	Y	Turbidity	NTU	31
Location ID:	**Z**			
Number of Sampling Dates:				
2/8/2005	Z	Barium	mg/L	0.054
7/22/2005	Z	Barium	mg/L	0.047
3/23/2006	Z	Barium	mg/L	0.033
8/31/2006	Z	Barium	mg/L	0.082
2/1/2007	Z	Barium	mg/L	0.067
7/26/2007	Z	Barium	mg/L	0.056
7/10/2008	Z	Barium	mg/L	0.042
3/24/2009	Z	Barium	mg/L	0.056
2/8/2008	Z	Barium	mg/L	0.061
2/8/2005	Z	Chloride	mg/L	387
2/8/2005	Z	Chloride	mg/L	387
7/22/2005	Z	Chloride	mg/L	716
3/23/2006	Z	Chloride	mg/L	518
8/31/2006	Z	Chloride	mg/L	481
2/1/2007	Z	Chloride	mg/L	422
7/26/2007	Z	Chloride	mg/L	602
7/10/2008	Z	Chloride	mg/L	931
3/24/2009	Z	Chloride	mg/L	956
2/8/2008	Z	Chloride	mg/L	492
2/8/2005	Z	Chromium	mg/L	ND
7/22/2005	Z	Chromium	mg/L	ND
3/23/2006	Z	Chromium	mg/L	ND
8/31/2006	Z	Chromium	mg/L	0.015
2/1/2007	Z	Chromium	mg/L	ND
7/26/2007	Z	Chromium	mg/L	ND
7/26/2007	Z	Chromium	mg/L	ND
7/10/2008	Z	Chromium	mg/L	0.011
3/24/2009	Z	Chromium	mg/L	ND
2/8/2008	Z	Chromium	mg/L	ND
2/8/2005	Z	Chromium, hexavalent	mg/l	ND
7/22/2005	Z	Chromium, hexavalent	mg/l	ND
3/23/2006	Z	Chromium, hexavalent	mg/l	ND
8/31/2006	Z	Chromium, hexavalent	mg/l	ND
2/1/2007	Z	Chromium, hexavalent	mg/l	ND
7/10/2008	Z	Chromium, Hexavalent	mg/L	ND
3/24/2009	Z	Chromium, hexavalent	mg/L	ND
2/8/2008	Z	Chromium, hexavalent	mg/L	ND
2/8/2005	Z	Iron	mg/L	64.7
7/22/2005	Z	Iron	mg/L	204
3/23/2006	Z	Iron	mg/L	90.3
8/31/2006	Z	Iron	mg/L	96.2
2/1/2007	Z	Iron	mg/L	23.1
7/26/2007	Z	Iron	mg/L	41
7/10/2008	Z	Iron	mg/L	243
3/24/2009	Z	Iron	mg/L	264
2/8/2008	Z	Iron	mg/L	29.9
2/8/2005	Z	Manganese	mg/L	3.5
7/22/2005	Z	Manganese	mg/L	2.07
3/23/2006	Z	Manganese	mg/L	1.3
8/31/2006	Z	Manganese	mg/L	0.421
2/1/2007	Z	Manganese	mg/L	0.984
7/26/2007	Z	Manganese	mg/L	1.41
7/10/2008	Z	Manganese	mg/L	2.76
3/24/2009	Z	Manganese	mg/L	2.79
2/8/2008	Z	Manganese	mg/L	1.69
7/22/2005	Z	Phenols	mg/L	ND
3/23/2006	Z	Phenols	mg/L	ND
8/31/2006	Z	Phenols	mg/L	ND
7/10/2008	Z	Phenols, Total	mg/L	ND
3/24/2009	Z	Phenols, Total	mg/L	ND
2/8/2005	Z	Sodium	mg/L	313
7/22/2005	Z	Sodium	mg/L	560

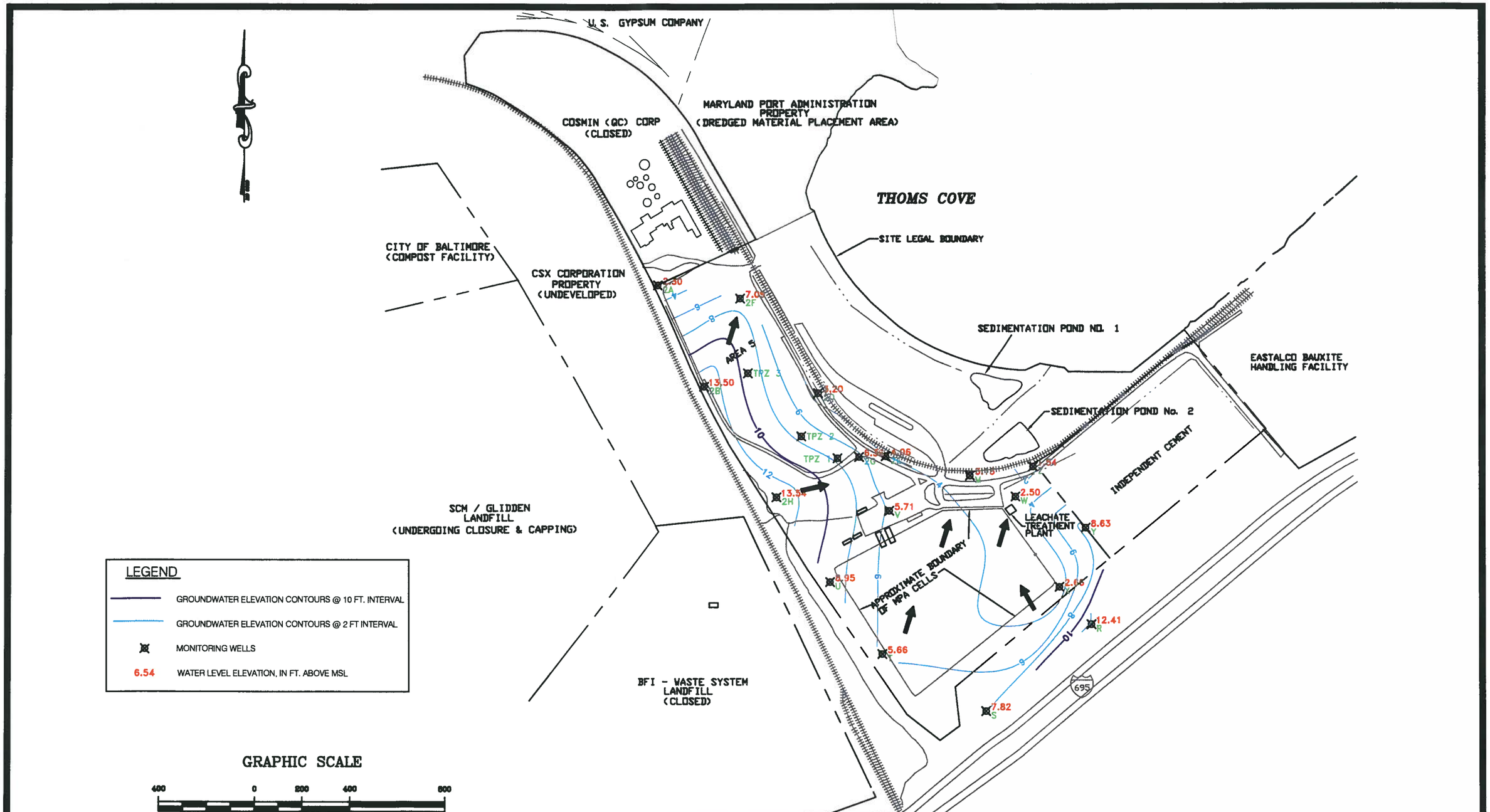
Sampling Date	Location ID	Analyte	Unit	Concentration
3/23/2006	Z	Sodium	mg/L	331
8/31/2006	Z	Sodium	mg/L	180
2/1/2007	Z	Sodium	mg/L	276
7/26/2007	Z	Sodium	mg/L	354
7/10/2008	Z	Sodium	mg/L	691
3/24/2009	Z	Sodium	mg/L	727
2/8/2008	Z	Sodium	mg/L	288
7/26/2007	Z	Sulfate	mg/L	613
7/10/2008	Z	Sulfate	mg/L	2327
3/24/2009	Z	Sulfate	mg/L	2374
2/8/2008	Z	Sulfate	mg/L	602
2/8/2005	Z	Sulfate	mg/L	670
7/22/2005	Z	Sulfate	mg/L	2161
3/23/2006	Z	Sulfate	mg/L	1072
8/31/2006	Z	Sulfate	mg/L	594
2/1/2007	Z	Sulfate	mg/L	415
7/26/2007	Z	Total Organic Carbon	mg/L	22
3/24/2009	Z	Total Organic Carbon	mg/L	37
2/8/2008	Z	Total Organic Carbon	mg/L	21
2/8/2005	Z	Total Organic Carbon	mg/L	30
7/22/2005	Z	Total Organic Carbon	mg/L	12
3/23/2006	Z	Total Organic Carbon	mg/L	17
8/31/2006	Z	Total Organic Carbon	mg/L	47
2/1/2007	Z	Total Organic Carbon	mg/L	31
7/10/2008	Z	Total Organic Carbon	mg/L	13
2/8/2005	Z	Total Organic Halogen	mg/L	0.28
7/22/2005	Z	Total Organic Halogen	mg/L	0.158
3/23/2006	Z	Total Organic Halogen	mg/L	0.196
8/31/2006	Z	Total Organic Halogen	mg/L	0.185
2/1/2007	Z	Total Organic Halogen	mg/L	0.1
7/26/2007	Z	Total Organic Halogen	mg/L	0.35
7/10/2008	Z	Total Organic Halogen	mg/L	0.06
2/8/2008	Z	Total Organic Halogen	mg/L	0.06
3/24/2009	Z	Total Organic Halogen	mg/L	0.2
7/10/2008	Z	Turbidity	NTU	577

Appendix D

Analytical Results and Laboratory Data

2009

Groundwater Contour Map



MARYLAND ENVIRONMENTAL SERVICE

HAWKINS POINT
GROUND WATER CONTOUR MAP
4 TH QUARTER 2009
~~FIGURE 2~~

J:\HAWKINSPT\2008

February 2010

Fourth Quarter Groundwater Monitoring Report

Hawkins Point Hazardous Waste Facility

1.0 Introduction

This report compiles the data from the groundwater monitoring events during the fourth quarter of 2009 (October 1, 2009 through December 31, 2009) at the Hawkins Point Hazardous Waste Facility. The data was statistically evaluated using both the One-Way ANOVA and the Non-Parametric ANOVA procedures, as required by the RCRA Permit #A-264.

2.0 Site Background Information

The Hawkins Point Hazardous Waste Landfill, located at 5501 Quarantine Road, Baltimore, Maryland 21226 comprises ten (10) waste cells containing historical chrome ore tailings, chrome process waste, chrome contaminated soil, trash, and debris from the former Allied Corporation, Baltimore Works. The landfill stopped accepting waste when it reached capacity in 1993. As an operational function of the landfill, leachate flow is collected in underground transfer lines from each cell and then combined in a 21,573 gallon aboveground tank. Collected leachate is then transported offsite by a licensed hauler (Envirite of Pennsylvania, Inc.) for treatment and disposal. A Site Vicinity Map is enclosed as Figure 1.

Soils onsite range from Post-Cretaceous sediments near the surface and are primarily silty clays with trace sands. This second layer averages a depth of approximately ten (10) feet and has hydraulic conductivity values in the range of $1x10^{-4}$cm/s. Below this layer, Cretaceous clay is encountered. This layer has an average depth of around 50 feet and previous geotechnical testing (Black & Veatch, 1986) has shown the layer to have a hydraulic conductivity of $1x10^{-6}$cm/s. Varying from sixty to one hundred feet below mean sea level, and under the clay layer, is an equally thick deposit of Cretaceous sands. Hydraulic conductivity here is in the $1x10^{-2}$cm/s range (Black & Veatch, 1986). Groundwater flow is generally from west to east, towards Thoms Cove. Seventeen (17) monitoring wells are located along the site perimeter and three (3) piezometers (TPZ 1, 2 & 3) are located within Area 5. The piezometers were installed as part of the landfill repair in 2005. By design, the piezometers did not penetrate below the fill into the natural water table and are therefore indicative only of the perched water table within the fill. These piezometers are not used in generating the Groundwater Contour Map (Appendix E). There are no other known wells within the limits of the landfill.

The site is divided into three (3) basic areas: Area 5 comprising of compliance wells 2D, 2F, and 2B; the (Trough Area) with compliance wells 2E, 2G, and 2H; and the MPA area with non-compliance wells M, R, S, T, U, V, W, X, Y, Z, and 2A. A Schematic Map outlining the landfill areas and the wells locations is enclosed as Figure 2.

The depth to water is measured in all wells on a quarterly basis. The three (3) upgradient non-compliance wells (R, S, Y) and three (3) downgradient non-compliance wells (M, Z, W), as well as 2A, are sampled during the first and third quarter event of each year. The locations of all wells are shown on the Groundwater Elevation Contour Map in Appendix E.

3.0 General Site Conditions

Each well on-site is inspected monthly by the facility operators for integrity and any physical damage or tampering. Prior to purging, Maryland Environmental Service (MES) inspects the wells for any damage. No damages to the wells were observed during the Fourth Quarter 2009 monitoring event as noted in the field logs from each sampling event.

4.0 Quarterly Sampling Event

Groundwater samples were collected from compliance wells 2D, 2F, 2B (Area 5) and 2E, 2G and 2H (Trough Area) during this quarterly sampling event and analyzed by Atlantic Coast Laboratories. During the quarterly monitoring period, all of the wells in Area 5 and the Trough Area were sampled in quadruplicate as per the RCRA Controlled Hazardous Substances Permit number A-264 for this site. The compliance wells sampled during the second quarter sampling events were analyzed for the list of metals and indicator parameters established in the MDE approved Sampling and Analysis Plan. During the fourth quarter monitoring period, Well 2D (laboratory analysis sample order number A09100415) had one constituent for total chromium that exceeded the Maximum Contamination Level (MCL) of 0.1 milligrams per liter (mg/L) with a concentration of 0.373 mg/L.

Completed field data notes from this monitoring event are included in Appendix A. Sampling event summaries are enclosed in Appendix B. Historical groundwater quality data for the last three (3) to five (5) years for all compliance and non-compliance wells are enclosed in Appendix C as required by RCRA Controlled Hazardous Substance (CHS) Permit A-264 Section I.G. The laboratory analytical reports are included in Appendix D.

5.0 Field Logs

Prior to the purging event, the depth to water and the depth to the bottom of each well was measured by MES staff and recorded in the field logbook. Three (3) well volumes were calculated and subsequently purged using dedicated submersible bladder pumps. The purged water was collected in a drum and discharged into the on-site leachate collection tank. Field measurements including pH, specific conductivity and temperature were recorded in the field book during the sample collection. Copies of the field logs are included in Appendix A for review.

6.0 Quality Assurance / Quality Control

In addition to the Quality Assurance / Quality Control (QA/QC) performed by the laboratory, one (1) field blank sample was collected and analyzed during each day of sampling to establish quality control for sample collection techniques. Field blanks were prepared on-site with deionized water and handled using the same sampling protocol as the groundwater samples. Trip blanks were prepared in the MES lab for each of the sampling events. At least one (1) duplicate was collected for every ten (10) samples, or once per day in accordance with the Sampling and Analysis Plan.

There were a total of five (5) trace detections (four (4) of turbidity and one (1) of iron) determined by the laboratory analysis of the trip blanks. The detections were reported from the results of five (5) different sampling events. The laboratory analytical results from several of the duplicate samples throughout the Fourth Quarter sampling event varied from analytical results of the initial well sample. A chart comparing samples and duplicates (Table 1.0) can be found, along with the sample event summaries, in Appendix B. The duplicate samples are collected immediately after the original sample collection. Additionally, Table 1.0 notes variations in the turbidity between the original samples and the duplicate samples. The differences in turbidity readings are believed to potentially be a result of sampling techniques.

7.0 Chain of Custody

Each groundwater sample bottle was marked using unique sample identification and documented on a Chain of Custody (COC) form. Additionally, the sample location, date, and collection time, were recorded on the COC. Each sample was preserved as required by the test method and relinquished to the laboratory for analysis. Copies of the COC forms from the Fourth Quarter 2009 monitoring event are included in Appendix A.

8.0 Groundwater Elevation Contour Map and Velocity Calculations

A Groundwater Elevation Contour Map and spreadsheet showing water levels and elevations are both included in Appendix E. The Groundwater Elevation Contour Map was constructed using the depths to water measured during the fourth quarter and recorded on the field logs. The water table elevations were then determined by subtracting the depth to water from the casing reference elevation. The groundwater elevation contours do not indicate any significant changes in the hydrogeologic conditions of the site since the last quarterly sampling event. Direction of groundwater flow is towards the east in the Trough Area and towards the northeast in Area 5.

Table 2
Depth to Water / Water Table Elevation 4th Quarter 09
4th Quarter 2009

ID #	Northing	Easting	Top PVC	DTW	Depth	GW Elev
TPZ 1	562016.6	1439830.4	39.89	12.75	16.85	27.14
TPZ 2	562108.5	1439678.3	65.83	37.70	42.10	28.13
TPZ 3	562373.4	1439455.6	78.40	37.70	44.50	40.70
2A	562741.1	1439074.9	43.50	41.20	64.00	2.30
2B	562317.7	1439272.6	41.50	28.00	47.75	13.50
2D	562289.3	1439749.1	27.30	25.00	38.25	2.30
2E	562025.5	1440032.1	22.83	18.75	42.55	4.08
2F*	562686.7	1439423.0	29.94	22.85	31.95	7.09
2G**	562021.9	1439921.0	24.86	18.50	37.60	6.36
2H	561853.5	1439574.4	21.24	7.70	32.50	13.54
M	561944.1	1440383.4	20.78	17.65	41.40	3.13
R	561320.3	1440895.5	28.71	16.30	63.60	12.41
S	560957.0	1440448.4	38.67	30.85	62.60	7.82
T	561196.6	1440015.4	38.16	32.50	54.55	5.66
U	561497.7	1439798.0	33.55	24.60	63.00	8.95
V	561796.9	1440046.9	28.71	23.00	49.35	5.71
W	561856.2	1440574.7	23.10	20.60	32.30	2.50
X	561477.6	1440760.7	28.86	26.20	47.00	2.66
Y	561725.3	1440872.1	26.08	17.45	43.40	8.63
Z	561981.9	1440649.3	17.39	15.85	31.35	1.54

*Well 2F depth to water was incorrectly documented on the elevation and purge logs however it was correctly noted on the 1st day rep log. **Well 2G elevation was noted only on the purge sheet.

As dictated by the controlled hazardous waste substance permit, the calculation of the groundwater velocity was performed using the following formula and assumptions:

$V = Ki / n_e$
V = velocity (feet per day)
K = hydraulic conductivity (0.34 ft/day)
i = hydraulic gradient (dh/dl)
n_e = effective porosity (0.30)

The calculated velocities are illustrated in the following table:

Wells	2B → 2D	2B → 2F	2B → 2G
	i=(13.50-2.30)/422 i= 0.026 V=((0.34'/day)(.026)) 0.3 V = 0.030 ft/day	i=(13.50-7.09)/582 i= 0.011 V=((0.34'/day)(.011)) 0.3 V = 0.012 ft/day	i=(13.50-6.36)/635 i= 0.011 V=((0.34'/day)(.011)) 0.3 V=0.012 ft/day

Note: The n_e and k values are obtained from 1986 Black and Veatch Hydrogeologic Assessment and slug test data.

9.0 Statistical Analysis

Downgradient wells 2D and 2F were statistically compared to the upgradient monitoring well 2B to determine if there is a significant change in groundwater chemistry as groundwater migrates below the fill. Based on the hydrogeologic location of these wells, the groundwater flow is typically directed from the upgradient well 2B towards the downgradient wells 2D and 2F. These three (3) wells have previously been denoted as the Area 5 wells. Additionally, Trough Area wells 2E and 2G were statistically compared to upgradient well 2H. The hydrogeology and direction of the groundwater flow in this area is different from the hydrogeology in Area 5; therefore, Trough Area wells are statistically analyzed separately from Area 5 wells. The Statistical evaluation was based on the comparisons between the upgradient and downgradient wells in each denoted area. As required by the regulatory requirements, a background pool was compiled using the data from all four (4) replicates from this sampling event for the downgradient wells and the last two (2) years of sampling events for the upgradient wells as required by CHS Permit A-264 section IV.F. A commercially available software package (*ChemStat*) was utilized to statistically evaluate all downgradient wells for possible impacts. The complete statistical analysis calculations are included in Appendix D.

All of the quarterly indicator and groundwater quality parameters were statistically analyzed. The analyses were in accordance with the RCRA CHS number A-264 in order to determine if the downgradient wells have been impacted by landfill leachate. Appendix E - Figure 2 contain groundwater directional flow and corresponding wells locations.

As per the EPA's "*Interim Final Guidance Document on the Statistical Analysis of Groundwater Monitoring Data of RCRA Facilities" (1989)* and "*Addendum to Interim Final Guidance" (1992)*, the number of samples below the detection limit (non-detects) was determined. The statistical analysis for both areas (Area 5 and Trough Area) were run using the Kruskal-Wallis Non-Parametric Test because the data for all parameters was either not normal, did not have equal variance, or had greater than fifteen percent (>15%) non-detects.

When the Non-Parametric ANOVA procedure is used, according to RCRA CHS Permit A-264 section IV.F, all non-detectable data is replaced by half the value of the minimum Practical Quantitation Level (PQL/2). If the minimum PQL is not available, the Laboratory Detection Limit (LDL) was used. When the non-parametric procedure is used, the non-detects are replaced by the ranked values by treating all the non-detects as tied values.

10.0 Results

The Fourth Quarter 2009 Groundwater Monitoring Event exhibited one of the analytical results for well 2D exceeding the Maximum Contamination Level (MCL) for total chromium of 0.1 milligrams per liter (mg/L) with a concentration of 0.373 mg/L. MES informed the Maryland Department of the Environment (MDE) of the MCL exceedance and of a possible statistically significant increase (SSI) on January 26, 2010. The statistical analysis was expeditiously run in accordance with the permit requirements for analysis, and it was determined that well 2D did not exhibit an SSI for the Fourth Quarter 2009 monitoring period.

In addition, groundwater monitoring well 2F displayed an SSI for barium, 2D and 2F displayed SSI's for pH, and temperature, and 2E and 2G displayed SSI's for pH and turbidity. SSIs for pH have occurred in previous quarterly sampling events. Due to naturally acidic conditions in the site area, an increase in pH towards a neutral value shows a reduction of the acidity of the groundwater indicating an improvement in groundwater quality across the site.

For the 4th Quarter 2009, the pH for Area 5 displays significant difference in 2B versus 2D. The data collected indicates that the downgradient well (2B) has a pH of approximately 3.0 when compared to the 6.0 pH of background well (2D). Given these results an SSI is present this quarter and assuming that the pH results will be similar in subsequent quarters, an SSI will remain present for pH. Please note that the Trough Area has similar findings with the exception that both of the downgradient wells (2E and 2G) are significantly higher than the background well (2H). Table 3 below displays the 4th Quarter field data pH ranges and pH averages for the compliance wells.

Table 3: 4th Quarter pH Data – Hawkins Point

Well	pH Range	pH Average
2H (upgradient)	3.02 – 4.33	3.60
2E (downgradient)	4.46 – 4.98	4.76
2G (downgradient)	5.46 – 5.79	5.59
2B (upgradient)	2.65 – 3.84	3.39
2D (downgradient)	6.10 – 6.61	6.37
2F (downgradient)	3.28 – 4.70	4.02

During the 4th quarter, only Trough Area compliance well 2G exhibited an SSI for turbidity. Note that the turbidity can be affected by sampling methodology as well as by groundwater quality. This can be especially observed in older wells that have been well developed. The analytical results display that there is high variability in the turbidity from the Trough Area wells and that is why there is a SSI for well 2G. Table 4, below, displays the 4th Quarter analytical data turbidity ranges and turbidity averages for the compliance wells.

Table 4: 4th Quarter Turbidity Data – Hawkins Point

Well	Turbidity Range	Turbidity Average
2H (upgradient)	9.3 – 54	28.32
2E (downgradient)	24 – 203	111.25
2G (downgradient)	31 – 494	268.50
2B (upgradient)	8.1 – 16	11.78
2D (downgradient)	2 – 27	9.33
2F (downgradient)	2 – 31	13.93

Temperature displated an SSI in all downgradient compliance wells (2D, 2F, 2E, and 2G) this quarter. As is displayed in Table 5 below, downgradient wells in the Trough Area (2E and 2G) are on average approximately two (2) degrees Celsius warmer than the upgradient well (2H) and in Area 5 downgradient wells (2D and 2F) are approximately one (1) and two (2) degrees Celsuis warmer than upgradient well (2B).

Table 5: 4th Quarter Temperature Data – Hawkins Point

Well	Temperature Range	Temperature Average
2H (upgradient)	10 – 20	14.65
2E (downgradient)	15 – 17	16.25
2G (downgradient)	16 – 18	16.88
2B (upgradient)	14 – 15	14.56
2D (downgradient)	14 – 18	16.44
2F (downgradient)	14 – 16	15.69

11.0 Conclusions

Moving forward, MES will immediately note if MCL exceendance occurs and is reviewing and updating its contingency plan that will consider if future groundwater analytical results that exhibit readings for target analytes that yield a statistically significant increase.

Based on the results of this quarter's analytical data and statistical analysis, the Hawkins Point facility will continue to remain in detection monitoring.

March 19, 2010

SWM Retrofit Proposal

MOFFATT & NICHOL

2700 Lighthouse Point
Suite 501
Baltimore, MD 21224
(410) 563-7300
Fax (410) 563-4330

March 19, 2010

Maryland Environmental Service
259 Najoles Road
Millersville, Maryland 21108

Attn: Mr. Horace Bennett
Project Manager

Re: MES A/E Shortlist contract 07-02-01
Hawkins Point SWM Retrofit

Dear Mr. Bennett:

Moffatt & Nichol (M&N) is pleased to provide this proposal for Hawkins Point SWM Retrofit services to the Maryland Environmental Service (MES). The duration of this task will be approximately six months. Our scope of services shall include the following subtasks:

Subtask 1 Project Management
M&N will provide project management and document task status in sufficient detail to substantiate services provided and associated charges. M&N will submit monthly status reports to MES electronically in Microsoft Office Suite format within the first 5 working days of each month. Status reports will summarize work performed on each subtask and any problems encountered. A hard copy of the progress report will also be submitted with the monthly invoice. For fee derivation purposes, six status reports are estimated.

Subtask 2 Design, Permitting and Construction Services to Retrofit existing SWM Facilities at Hawkins Point
M&N's consultants will provide the following services:

- Whitney, Bailey, Cox & Magnani (WBCM) will provide final engineering design, permitting and construction services to obtain additional stormwater credits which will be banked in the Institutional Stormwater Program (ISP).
- Whitney, Bailey, Cox & Magnani (WBCM) will provide design and permitting services for the filling of Cell 40.
- NMP Engineering Consultants, Inc. will provide MDE approved expedited review of retrofit design as well as review of Cell 40.
- EBA Engineering will collect topography at five areas having a total area of 6.39 acres for use in the engineering design.

M&N will utilize Whitney Bailey Cox and Magnani (WBCM) to complete this assignment. In addition, we will utilize NMP Engineering for the MDE approved expedited review of retrofit design, and EBA for the survey services. NMP and EBA are Maryland State Approved MBEs and will be responsible for 20% of the work in this contract. Craig Huntley will serve as M&N's project manager for this task. In this capacity, he will be the main point of contact with MES concerning contractual matters. The technical fee for this assignment is $84,960.31. The manhour and fee derivation as well as WBCM and EBAS's Scope of Services and Price Proposal are attached.

We appreciate the opportunity to submit this proposal and look forward to working with you on this project.

Sincerely
MOFFATT & NICHOL

Craig Huntley

Attachments

P:\6728-07 HP SWM Retrofit\Project Management\Proposal\Proposal Ltr 2010-3-19.doc

Moffatt & Nichol Cost Proposal - 3/19/10
Technical Services Under Task 7
Subtask 7.1.Hawkins Point SWM Retrofit

Description	Labor Category	Labor Hrs	Rate	Overhead	Profit	Burdened Labor Rate	Burdened Labor Amount	Burdened ODC***	Totals
Sub-Task 7.1 - Project Management									
Labor	Principal	4	$75.00	$120.00	$19.50	$214.50	$ 858.00		$ 858.00
Labor	Project Manager	32	$58.00	$92.80	$15.08	$165.88	$ 5,308.16		$ 5,308.16
							$ 35.70		
Subtask Total							$ 6,166.16	$ -	**$ 6,166.16**
Other Direct Costs									
Mileage/Tolls									$ 40.00
Reproduction									$ -
Postage/Delivery									$ -
Telephone/Fax									$ -
Subtask Total								$ -	**$ 40.00**
TOTAL								M&N Total	**$ 6,206.16**
								WBCM Total	**$61,644.00**
								NMP Engineering	**$ 6,000.00**
								EBA Engineering	**$11,110.15**
								Total	**$84,960.31**

Project Staff:

Principal

Tom Shafer

Project Manager

Craig Huntley

CADD TECHNICIAN

Cheryl Brant

WBCM
ARCHITECTURE ENGINEERING CONSTRUCTION

WHITNEY BAILEY COX & MAGNANI, LLC

March 12, 2010

Moffatt & Nichol Engineers
2700 Lighthouse Point East
Suite 501
Baltimore, Maryland 21224

ATTN: Mr. Craig Huntley

TASK: HPMT SWM Retrofit

WBCM Job No.: 2009 0274.01.P

Gentlemen:

At the request of the Maryland Port Administration (MPA), we are transmitting this proposal to provide design, permitting and construction phase services for the Hawkins Point Marine Terminal, Stormwater Management (SWM) Retrofit project. The MPA desires to obtain additional stormwater credits which will be banked in the Institutional Stormwater Program (ISP) to offset development projects at other terminals. At the same time, MES desires to eliminate or repair the outfall structures for two (2) sediment basins which are no longer required for monitoring/sampling. WBCM has developed preliminary plans and cost estimates for the retrofitting these basins and presented the findings to MES and MPA. Additionally, the retrofit concept was reviewed with MDE-WMA and they concur with the approach. This project will include the final engineering design, permitting and construction phase services.

In accordance with our phone conversation of March 10, 2010, the design and permitting services for the filling of Cell 40 have also been added to the scope of this project.

A detailed description of the anticipated services and associated manhours is attached to this proposal. Our proposed fee is summarized on the attached Estimated Cost and Price Summary Form. We appreciate the opportunity to submit our proposal. Should you need any additional information, please call.

Sincerely,

WHITNEY, BAILEY, COX & MAGNANI, LLC

Mark Shafer

Mark W. Shafer, P.E.
Executive Vice President

DEPARTMENT OF TRANSPORTATION

ESTIMATED COST AND PRICE SUMMARY - CONSULTANT SERVICES CONTRACT

Administration: Maryland Port Administration Prepared by: WBCM, LLC Date: March 12, 2010

Contract No.: Consultant: Whitney, Bailey, Cox & Magnani, LLC

Subcontractor:

Project: HPMT SWM Retrofit 2009 0274.01.P

1.	Direct Labor:	698 Manhours X	$ 36.41 Average Hourly Rate		=	$ 25,411.28
2.	Escalation:	0.00% of Item 1			=	$ -
		Subtotal (Items 1 & 2)	$ 25,411.28			
3.	Payroll Additives P.B. & O.H.	119.10% of Item 1 & 2; Append Itemization			=	$ 30,264.83
4.	Total of Items 1, 2 and 3 above:				=	$ 55,676.00
5.	Fixed Fee	a. Dollar amount to cover Profit and other factors				
		b. Line 5a represents 10% of Line 4			=	$ 5,568.00
6.	Estimated Direct Expenses:					
	a. Travel	200 miles @ $ 0.50 /mile		= $ 100.00		
	b. Printing			= $ 300.00		
	c. Computer			=		
	d. Telephone/Fax			=		
	e. Laboratory Testing			=		
	f. Other - Graphic Presentation			=		
				Total Direct Expenses	=	$ 400.00
7.	Other (Specify)	a.				
		b.				
		c.				
		d.				
				Subtotal Other	=	$ -
8.	Total Proposed Fee for this (Total Project)				=	$ 61,644.00

9. Estimated Average Hourly Rate

Classification Extension	Average Hourly Salary		Hours		
Project Manager:	$ 51.25	x	92	=	$ 4,715.00
Engineers:					
Structural		x		=	$ -
Mechanical		x		=	$ -
Electrical		x		=	$ -
Traffic		x		=	$ -
Civil	$ 40.04	x	402	=	$ 16,096.08
Surveys		x		=	$ -
Drafting	$ 22.55	x	204	=	$ 4,600.20
Architects		x		=	$ -
Geologist - Geotech Engineer		x		=	$ -
		Total:	698	=	$ 25,411.28

Estimated Average Rate = Extension divided by Hours = $ 36.41

2009 0274.01.P

HPMT SWM Retrofit

November 9, 2009

Additional Design and Construction Phase Services

Manhour Breakdown

Task Description	Project Manager	Civil Engineer	CADD Technician	Total
Design / Permitting Phase Services (SWM and Cell 40)				
Design Coordination Meetings	12			12
Construction Drawings	24	200	160	384
Specifications	8	40	8	56
Cost Estimate	4	16	4	24
MDE SWM/ESC Permitting	4	32	8	44
CAC Permitting	4	32	8	44
MDE Hazardous Waste Coordination (Cell 40 Filling)	8	8		16
Prepare MPA Specification for Cell 40 Fill Material Screening, Etc.	4	16		20
Technical Administration	12			12
Construction Phase Services (SWM and Cell 40)				
Progress Meetings / Site Visits		16		16
Submittals - Shop Drawings		18	8	26
RFI's / Change Orders / Drawing Revisions		24	8	32
Technical Administration	12			12
TOTAL MAN HOURS	**92**	**402**	**204**	**698**

EBA Engineering, Inc.
CONSULTING ENGINEERS
Seton Business Park
4813 Seton Drive, Baltimore, Maryland 21215-3211 • (410) 358-7171 • Fax (410) 358-7213 • www.ebaengineering.com

February 25, 2010

Moffatt & Nichol Engineers
2700 Lighthouse Point East
Suite 501
Baltimore, Maryland 21224

Attn: Craig Huntley

Re: Hawkins Point Marine Terminal HPMT SWM Retrofit Survey MES Contract # 07-02-01
EBA Proposal No: S-10-003

Dear Mr. Huntley:

Based on our conversations EBA Engineering Inc. is pleased to submit this proposal to provide surveying services for the referenced project in the amount of **$11,110.15**.

Scope of Services

- Recover existing horizontal and vertical controls set by others. The client will provide this information before the start of fieldwork.
- Collect topography at five areas having a total area of approximately 6.39 acres, as shown on the map attached to your email dated 02/24/2010. The railroad track and ballast area are not included in the work.

Deliverables & Submissions

- A drawing in AutoCAD format showing the results of the topographic survey, showing contours at one foot intervals.

Survey Conditions

- Surveying activity, requiring excavation or ground disturbance by the crew, will not be performed..

If you should have any questions regarding this proposal, please do not hesitate to call me at 410-358-7171.

Very truly yours,

EBA ENGINEERING, INC.

Harish J. Patel, PE, RLS, LEED AP
Vice President

EBA Engineering, Inc. Cost Proposal - 2/22/2010
Technical Services For Site Utility PSE Development
Hawkins Pt. Marine Terminal HPMT SWM Retrofit

Description		Labor Category	Labor Hrs	Rate	Overhead	Profit	Burdened Labor Rate	Burdened Labor Amount	Burdened ODC***	Totals
Field Surveys- Check Survey on Traverse and Topo										
	Labor	Principal	2	$68.95	$89.64	$15.86	$174.45	$ 348.90		$ 348.90
	Labor	Project Manager	16	$40.00	$52.00	$9.20	$101.20	$ 1,619.20		$ 1,619.20
	Labor	Engineer/Designer	18	$31.70	$41.21	$7.29	$80.20	$ 1,443.62		$ 1,443.62
	Labor	Survey Crew	48	$40.00	$52.00	$9.20	$101.20	$ 4,857.60		$ 4,857.60
	Labor	CADD Technician	48	$22.80	$29.64	$5.24	$57.68	$ 2,768.83		$ 2,768.83
	Subtask Total							$ 11,038.15	$ -	$ 11,038.15
Other Direct Costs										
	Mileage/Tolls	150 miles @ 0.48								$ 72.00
	Reproduction									$ -
	Postage/Delivery								$ -	$ -
	Telephone/Fax								$ -	$ -
	Subtask Total								$ -	$ 72.00
								Subtotal		$ 11,110.15
								Total		$ 11,110.15