ENVIRONMENTAL COVENANT

HOLDER: EASTALCO ALUMINUM COMPANY

PROPERTY ADDRESS: 5601 MANOR WOODS ROAD, FREDERICK, MARYLAND 21701

This Environmental Covenant is executed pursuant to the provisions of Subtitle 8, Title 1 of the Environmental Article, Ann. Code of Md. (2015 Repl. Vol.). This Environmental Covenant subjects the Property identified in Paragraph 1 to the activity and/or use limitations in this document. This Environmental Covenant has been approved by the Maryland Department of the Environment ("Department or MDE").

1. **Property Affected**. The Properties affected by this Environmental Covenant are located in Frederick County, Maryland.

- The postal street address of the Property is: 5601 Manor Woods Road, Frederick, Maryland 21701.
- The County Land Records Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
- The Maryland Department of Assessment and Taxation Real Property Account Identifier is: District: 01, Account Number: 000152, 005383, and 005405

Maps and complete metes and bounds descriptions of the Property, Soil Management Area and Landfill Property are attached to this Environmental Covenant as Exhibits A, B and C, respectively.

2. **Property Owner/Holder.** At the time of recordation, Eastalco Aluminum Company is the owner of the Property and a holder of this Environmental Covenant. The mailing address of Eastalco Aluminum Company is: Eastalco Aluminum Company, c/o Alcoa Transformation, Asset Management and Remediation, 201 Isabella Street, Pittsburgh, PA 15212.

3. **Additional Holders/Grantees/Agency.** Alcoa USA Corp. c/o Alcoa Transformation, Asset Management and Remediation, 201 Isabella Street, Pittsburgh, PA 15212.

For purposes of this Environmental Covenant, the Department shall also be a Holder.

4. **Regulatory Program(s) Issuing Departmental Determination.** The following regulatory program(s) within the Department is responsible for having issued a determination requiring the use of this Environmental Covenant:

- ☐ Voluntary Cleanup Program
- ☒ Controlled Hazardous Substance Enforcement Division
- ☐ Oil Control Program
- ☐ Solid Waste Program

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☐ Hazardous Waste Program
☐ Other Program within the Department: _____

5. **Summary of Identified Contamination.** The Property was historically operated as an aluminum smelter until operations were curtailed in December 2005, with formal closure in March 2010. Demolition of the former facility is complete. This historic use has resulted in residual soil contamination in the Soil Management Area and groundwater contamination under the Property. Details regarding residual contamination and the industrial and institutional controls required to eliminate pathways of exposure are set forth in more detail in the attached Site Management Plan (Exhibit D).

6. **Activity & Use Limitations.** The Property is subject to the following activity and use limitations, which the Owner of the Property shall abide by:

- **Land Use Restriction:** The Property is limited to restricted commercial (Tier 2B) or restricted industrial (Tier 3B) purposes.

- **Groundwater Use**: There shall be no use of the groundwater beneath the Property for any purpose.

- **Site Management Plan:** Any activity on the Property or within the Soil Management Area shall meet the requirements of the Site Management Plan, attached as Exhibit D.

- **Fencing Requirement:** Prior to Eastalco Aluminum Company's conveyance of any portion of the Property, the Property Owner shall install a 6' chain link fence surrounding the entirety of the Soil Management Area, as identified in a map attached as Exhibit B. The fence shall be maintained until and unless all Holders consent.

- **Cap Maintenance Restriction:** The Property Owner shall maintain the integrity of any engineered caps identified in the Soil Management Area at all times to prevent any exposure to contaminated soil by any person on the property at any time. The Property Owner shall notify the Department within ten (10) business days after discovery of any needed repairs to a capped area. To evaluate adequacy of the cap, the Property Owner shall perform inspections annually, each April. The Property Owner shall maintain written records documenting all inspections in accordance with the Inspection Checklist included in the Site Management Plan. All necessary repairs to the cap within the Soil Management Area shall be completed within five (5) business days of discovery of the needed repairs, unless an alternate schedule has been approved by the Department. The Property Owner shall maintain records of maintenance of the capped areas.

- **Landfill Post-Closure Care:** The owner of the Landfill Property shall comply with the post-closure care requirements for the two permitted landfills in accordance with the 2015 Closure and Post-Closure Care Plan, attached as Exhibit E.

- **Long-Term Monitoring of Ground Water**: The owner of the Landfill Property shall: (1) maintain compliance with the long-term monitoring of groundwater on the Property in accordance with the Groundwater and Surface Water Monitoring Plan, (Tetra Tech, February 2011), attached as Exhibit F; (2) implement appropriate measures if action levels or other evaluation criteria established in the Groundwater and Surface Water Monitoring Plan are triggered, including implementation of any contingency plan; and (3) replace any wells or monitoring points that are damaged or destroyed.

- **Ground Water Monitoring Well Access and Maintenance**: If a monitoring well is located outside the boundary of the Landfill Property, the owner of the property where the well is located: (1) shall not damage, destroy or remove the well(s); and (2) shall grant a recorded easement to the owner of the Landfill Property to allow access for monitoring and well maintenance.

- **Soil Disturbance:** The Property Owner shall submit written notification, to the attention of the Chief, State Assessment and Remediation Division, at least 30 days prior to any planned future soil disturbance within the Soil Management Area. Any soil excavation and disposal shall comply with the Site Management Plan, including complying with a health and safety plan and soil disposal and capping requirements. In the event of an unplanned emergency excavation on the property, the property owner shall verbally or electronically notify the Department within 24 hours following initiation of the emergency excavation activities. Within ten days following completion of an unplanned emergency excavation, the property owner shall file a detailed written report with the Department. All excavated soil within the Soil Management Area may be placed under a cap, however, movement of excavated materials from a WDS area to other portions of the Property is prohibited. Alternatively, excavated soil may be disposed off-site; the soil shall be analyzed before disposal and the analytical results shall be the basis for appropriate disposition of the material in accordance with applicable local, State, and federal laws and regulations. No excavated material from the Soil Management Area shall be disposed in areas with current or proposed residential use or zoning.

- **Excavation Encountering Groundwater:** When conducting any excavation activities on the Property extending to the ground water table, the Property Owner shall implement the requirements of a site-specific health and safety plan in accordance with the Site Management Plan to ensure that worker protection measures are met. The encountered ground water shall be containerized during all dewatering activities at the property and shall be analyzed before disposal. The analytical results shall be the basis for appropriate disposition of the ground water in accordance with applicable local, State and federal laws and regulations.

- **Health and Safety Plan:** Prior to conducting any excavation activities within the Soil Management Area, a site-specific Health and Safety Plan for all personnel will be developed, implemented and maintained on-site in accordance with the SMP. The Health and Safety Plan must include appropriate dust control measures and air monitoring to ensure that all worker protection requirements are met. All personnel will be made aware of the Health and Safety Plan.

7. **Notice of Limitations in Future Conveyances.** This Environmental Covenant runs with the land and shall be binding on successors in interest. Each instrument hereafter conveying any interest in the Property subject to this Environmental Covenant shall contain a notice of the activity and use limitations set forth in this Environmental Covenant and shall provide the recorded location of this Environmental Covenant. The Owner shall notify the Department in writing at least 30 days prior to any transfer of the Property or of any portion of the Property that is subject to the proposed Site Management Plan.

8. **Access by the Department.** In addition to any rights already possessed by the Department, this Environmental Covenant grants to the Department a right of access of the Property to implement or enforce this Environmental Covenant.

9. **Recordation & Filing with Registry.** The Owner shall record this Environmental Covenant in the Land Records of Frederick County following the execution of this Environmental Covenant and send a copy of the recorded Environmental Covenant to the Department within 30 days of recordation. This Environmental Covenant shall be filed as soon as possible after execution in the Registry of Environmental Covenants maintained by the Department. This Environmental Covenant may be found electronically on MDE's website at:

www.mde.maryland.gov/programs/land/marylandbrownfieldvcp/pages/programs/landprograms/errp_brownfields/uecca.aspx

10. **Termination or Modification.** This Environmental Covenant may only be terminated or modified in accordance with Sections 1-808 or 1-809 of the Environmental Article, Ann. Code of Md. (2015 Repl. Vol.)

11. **Department's Address.** Communications with the Department regarding this Environmental Covenant shall be sent to: Registry of Environmental Covenants, Maryland Department of the Environment, Land Management Administration, Land Restoration Program, 1800 Washington Blvd., Baltimore, MD 21230.

Environmental Covenant
5601 Manor Woods Road, Frederick, Maryland 21701.
Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
Tax Parcels: District: 01, Account Number: 000152, 005383, and 005405

IN WITNESS WHEREOF, the parties hereto have caused this Environmental Covenant to be executed and delivered as of the day and year first below written.

ACKNOWLEDGMENTS by Owner(s) and any Holder(s), in the following form:

ATTEST:

Signature

Robyn L. Gross
Printed Name

FOR THE OWNER/HOLDER

Eastalco Aluminum Company

Signature

Mark A. Stiffler
Printed Name

President
Title

Commonwealth
~~STATE~~ OF PENNSYLVANIA, City OF Pittsburgh, TO WIT:

I HEREBY CERTIFY, that on this 28th day of November, 2017, before me, the undersigned Notary Public of said State, personally appeared and acknowledged himself/herself to be an authorized representative of the Owner/Holder, Eastalco Aluminum Company, and being authorized to do so, acknowledged that he/she executed the same on behalf of the Owner/Holder for the purposes herein contained.

WITNESS my hand and Notarial Seal.

Notary Public

My Commission Expires: May 2, 2020

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Sarah J. Pappert, Notary Public
City of Pittsburgh, Allegheny County
My Commission Expires May 2, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

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ATTEST:

Signature

Robyn L. Gross
Printed Name

FOR THE HOLDER

Alcoa USA Corp.

Signature

MARK A. STIFFLER
Printed Name

VICE PRESIDENT
Title

Commonwealth
~~STATE~~ OF PENNSYLVANIA, City OF Pittsburgh, TO WIT:

I HEREBY CERTIFY, that on this 28th day of November, 2017, before me, the undersigned Notary Public of said State, personally appeared and acknowledged himself/herself to be an authorized representative of the Holder, Alcoa USA Corp. and being authorized to do so, acknowledged that he/she executed the same on behalf of the Holder for the purposes herein contained.

WITNESS my hand and Notarial Seal.

Notary Public

My Commission Expires: May 2, 2020

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Sarah J. Pappert, Notary Public
City of Pittsburgh, Allegheny County
My Commission Expires May 2, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

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ATTEST:

FOR THE AGENCY/HOLDER

MARYLAND DEPARTMENT OF THE ENVIRONMENT
LAND AND MATERIALS ADMINISTRATION

Hilary Miller
Signature

Hilary Miller
Printed Name

Director
Title

Signature

Printed Name

STATE OF MARYLAND, County OF Baltimore, TO WIT:

I HEREBY CERTIFY, that on this 12th day of December, 2017, before me, the undersigned Notary Public of said State, personally appeared Hilary Miller, who acknowledged herself to be the Director, Land and Materials Administration, Maryland Department of the Environment, known to me to be the person whose name is subscribed to the within instrument, and acknowledged that she executed the same for the purposes herein contained as the duly authorized Director of said Administration by signing her name as Director of said Administration.

WITNESS my hand and Notarial Seal.

MELISSA L. ALLEN NOTARY PUBLIC BALTIMORE COUNTY, MD

Notary Public

My Commission Expires: June 17, 2021

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Approved for form and legal sufficiency

This 5th day of December, 2017

Assistant Attorney General

I CERTIFY that this document was prepared by or under the supervision of the undersigned, an attorney duly admitted to practice before the Court of Appeals of Maryland

(Attorney Signature)

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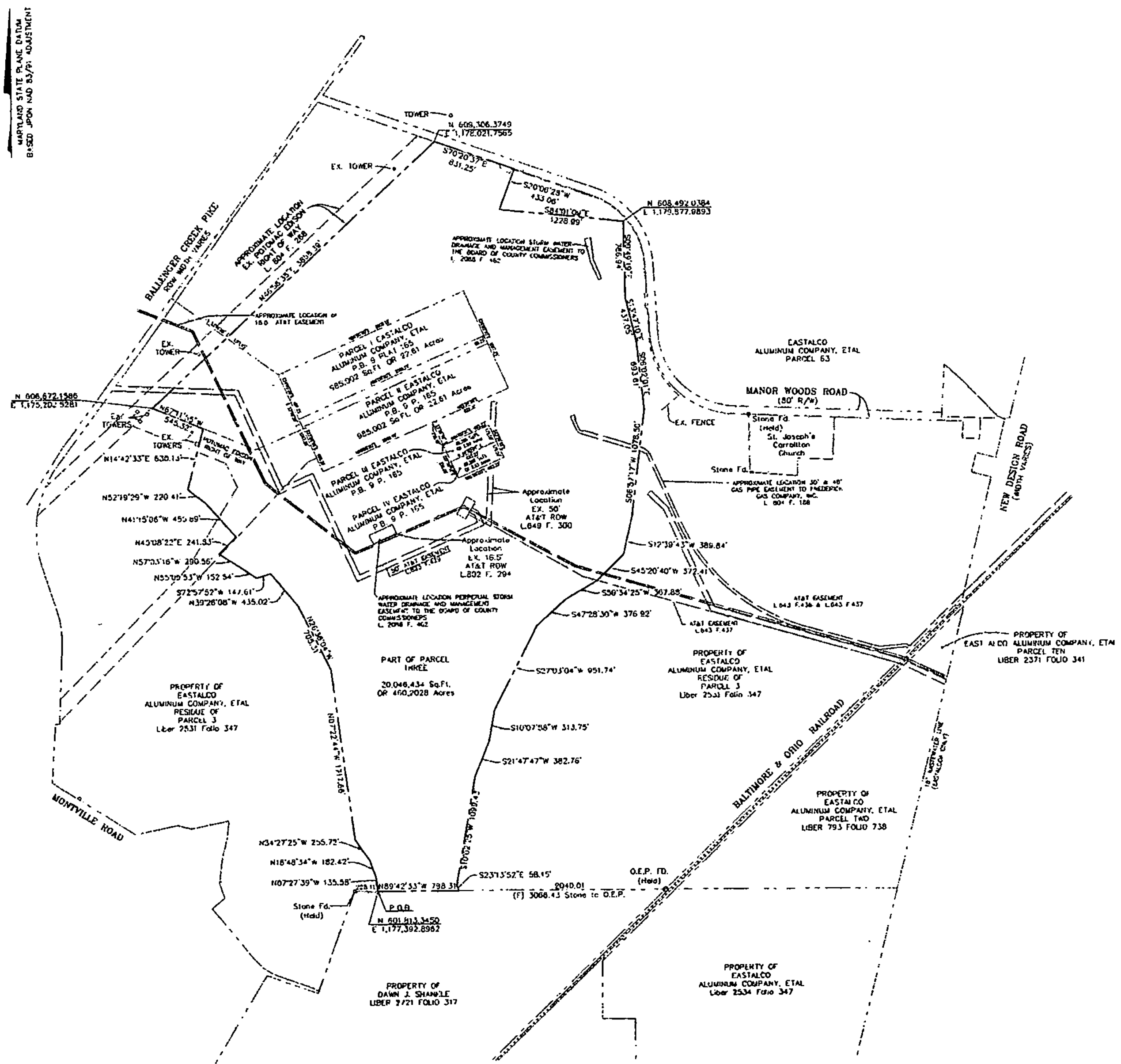
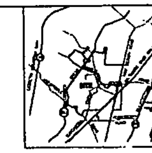
EXHIBIT A
PROPERTY MAP AND METES AND BOUNDS DESCRIPTION



LINE TABLE

Point Of Beginning	North: 601813.3450		East: 1177392.8962
Line	Course: N 07-27-33 W	Length: 135.5801	
	North: 601947.7833		East: 1177375.2905
Line	Course: N 18-48-34 W	Length: 182.4245	
	North: 602120.4656		East: 1177316.4729
Line	Course: N 34-27-25 W	Length: 255.7225	
	North: 602331.3221		East: 1177171.7885
Line	Course: N 07-22-44 W	Length: 1717.6622	
	North: 604034.7595		East: 1176951.1688
Line	Course: N 26-36-04 W	Length: 705.3074	
	North: 604665.4070		East: 1176635.3687
Line	Course: N 39-26-08 W	Length: 435.0229	
	North: 605001.3924		East: 1176359.0379
Line	Course: S 72-57-52 W	Length: 147.6119	
	North: 604958.1472		East: 1176217.0027
Line	Course: N 55-09-53 W	Length: 152.5424	
	North: 605045.2624		East: 1176092.6983
Line	Course: N 57-03-16 W	Length: 290.5568	
	North: 605203.2993		East: 1175848.8646
Line	Course: N 45-08-22 E	Length: 241.8325	
	North: 605373.8840		East: 1176020.2816
Line	Course: N 41-15-06 W	Length: 455.8899	
	North: 605716.6315		East: 1175719.6826
Line	Course: N 52-19-29 W	Length: 220.4069	
	North: 605851.3422		East: 1175545.2317
Line	Course: N 14-42-33 E	Length: 630.1343	
	North: 606460.8252		East: 1175705.2308
Line	Course: N 67-11-59 W	Length: 545.3200	
	North: 606672.1574		East: 1175202.5255
Line	Course: N 46-38-35 E	Length: 3858.3862	
	North: 609306.3737		East: 1178021.7539
Line	Course: S 70-20-37 E	Length: 831.2542	
	North: 609026.7576		East: 1178804.5683
Line	Course: S 20-06-28 W	Length: 433.0848	
	North: 608620.0893		East: 1178655.6852
Line	Course: S 84-01-09 E	Length: 1228.9892	
	North: 608492.0339		East: 1179877.9858
Line	Course: S 00-48-19 E	Length: 766.9433	
	North: 607725.1695		East: 1179888.9377
Line	Course: S 13-47-10 E	Length: 437.0468	
	North: 607300.7112		East: 1179993.1356
Line	Course: S 06-02-01 E	Length: 693.6131	
	North: 606610.9404		East: 1180066.0476
Line	Course: S 06-57-17 W	Length: 1078.5000	
	North: 605540.3758		East: 1179935.4524
Line	Course: S 12-39-43 W	Length: 389.8400	
	North: 605160.0166		East: 1179850.0002
Line	Course: S 45-20-40 W	Length: 372.4100	
	North: 604898.2708		East: 1179585.0883
Line	Course: S 59-34-25 W	Length: 367.8817	
	North: 604711.9641		East: 1179267.8710
Line	Course: S 47-28-30 W	Length: 376.9247	
	North: 604457.1062		East: 1178990.0841
Line	Course: S 27-03-04 W	Length: 951.7383	
	North: 603609.5768		East: 1178557.2486
Line	Course: S 10-07-58 W	Length: 313.7528	
	North: 603300.7199		East: 1178502.0501
Line	Course: S 21-47-47 W	Length: 382.7572	
	North: 602945.3263		East: 1178359.9288
Line	Course: S 10-02-25 W	Length: 1069.4338	
	North: 601862.7298		East: 1178168.2531
Line	Course: S 23-13-52 E	Length: 58.1562	
	North: 601809.2568		East: 1178191.1922
Line	Course: N 89-42-33 W	Length: 798.3134	
	North: 601813.3411		East: 1177392.8891



VICINITY MAP
SCALE 1"=2000'

NOTES

1. This Boundary Survey was performed without the benefit of a Title Report, the property is subject to all applicable Easements, Rights of Way and Covenants of Record. This Boundary Survey is not a comprehensive record of Appurtenances or Encumbrances of Record or in Use at the time of this survey.

2. The bearings shown on this Boundary Survey are in the Maryland Coordinate System NAD 83 (MCS) based on Frederick County Monuments "MANOR" and "MANOR AZIMUTH"

3. The easements shown on this Boundary Survey are a graphic representation of the easements shown on a Plat entitled "Identification Plat for the Lands of ALCOA'S EAST ALCO WORKS" as prepared by Harris, Smariga & Associates, Inc in October 2002

SURVEYOR'S CERTIFICATION

I hereby certify, to the best of my professional knowledge, information and belief that:

1) The Boundary Survey shown hereon was performed on the ground in July and August, 2006

2) The property included in this Boundary Survey is part of the Third Parcel conveyed by EASTALCO VENTURE to EASTALCO ALUMINUM COMPANY by a Deed dated December 3, 1997 and Recorded among the Land Records of Frederick County, Maryland in Liber 2371 at Folio 341

3) The sole purpose of this boundary survey is to establish and define the limits of a 460 acre parcel of land as shown hereon. This survey does not shown all easements and improvements located thereon.

6.07.06
Date

Paul L. Doyle
Property Line Surveyor
Maryland No. 362

PHR+A

Patton Harris Rust & Associates, Inc.
Engineers. Surveyors. Planners. Landscape Architects.
12850 Middlebrook Road, Germantown, MD 20876
T 301.528.4300 F 301.528.0419

DAT	REVISION	DATE
1	ADD LINE TABLE AND COORDINATES	10/24/06
2	ADD LINE TABLE NOTE	10/27/06

BOUNDARY SURVEY OF ALCOA'S EASTALCO WORKS

5601 MANOR WOODS ROAD
BENTSVILLE MAGISTERIAL DISTRICT
FREDERICK COUNTY, MARYLAND 21703-7947

DRAWN: EGM
CHECKED:
DATE: AUGUST, 2006
SCALE: 1"=500'
SHEET 1 OF
FILE NO: 13542-1-0

BK 12205 PG0010

Patton Harris Rust & Associates
Engineers. Surveyors. Planners. Landscape Architects.

Description of Parcel Three

Being a part of that piece or parcel of land situated, lying and being in the Buckeystown Election District Number 1 of Frederick County, Maryland as conveyed to Eastalco Aluminum Company from Eastalco Venture as Parcel Three in a deed dated December 3, 1997 as recorded among the Land Records of Frederick County, Maryland in Liber 2371 at Folio 341, said property to include the following Parcel I, Parcel II, Parcel III and Parcel IV as shown on a record plat entitled " EASTALCO ALUMINUM COMPANY" as recorded in the aforesaid County in Plat Book 9 as Plat 165, the parcel being more particularly described as follows in the Maryland State Grid Meridian (NAD83):

Beginning at a point in the 25th or North 89^48'50" West 3067.81 Foot line of Parcel Three as recorded among the aforesaid land records in Liber 2371 at Folio 341, said point being South 89^42'33" East 228.11 feet from a stone from at the end of the said 25th line and thence running in over and through the said parcel three the following 31 courses;

1. North 07^27'39" West 135.58 feet to a point; thence
2. North 18^48'34" West 182.42 feet to a point: thence
3. North 34^27'25" West 255.72 feet to a point: thence
4. North 07^22'44" West 1717.66 feet to a point; thence
5. North 26^36'04" West 705.31 feet to a point; thence
6. North 39^26'08" West 435.02 feet to a point; thence
7. South 72^57'52" West 147.61 feet to a point; thence
8. North 55^09'53" West 152.54 feet to a point; thence
9. North 57^03'16" West 290.56 feet to a point; thence
10. North 45^08'22" East 241.83 feet to a point; thence
11. North 41^15'06" West 455.89 feet to a point; thence
12. North 52^19'29" West 220.41 feet to a point; thence
13. North 14^42'33" East 630.13 feet to a point; thence
14. North 67^11'55" East 545.32 feet to a point; thence
15. North 46^56'35" East 3,858.39 feet to a point, said point being in the southern right way line of Manor Woods Road (80 feet wide) as shown Frederick County Right Way Plant Number 16; thence running along the southern right way line of said road the following course
16. South 70^20'37" East 831.25 feet to a point, said point lying North 70^18'58" West 816.09 feet from centerline station 28+92.82 as shown on said plat; thence leaving said right of way of Manor Woods Road and running
17. South 20^06'28" West 433.06 feet to a point; thence
18. South 84^01'09" East 1,228.99 feet to a point; thence
19. South 00^49'19" East 766.94 feet to a point; thence
20. South 13^47'10" East 437.05 feet to a point; thence
21. South 06^02'01" East 693.61 feet to a point; thence

PHR+A

Corporate:
Chantilly, VA

Maryland Offices:
Baltimore
Columbia
Frederick
Germantown
Hollywood
Hunt Valley

Virginia Offices:
Bridgewater
Chantilly
Charlottesville
Fredericksburg
Leesburg
Virginia Beach
Winchester
Woodbridge

West Virginia Office:
Martinsburg

Laboratories:
Chantilly
Fredericksburg

T 301.528.4300
F 301.528.0419
12850 Middlebrook Rd
Suite 200
Germantown, MD
20876

BK 12205 PG0012

22. South 06^57'17" West 1,078.50 feet to a point; thence
23. South 12^39'43" West 389.84 feet to a point; thence
24. South 45^20'40" West 372.41 feet to a point; thence
25. South 59^34'25" West 367.88 feet to a point; thence
26. South 47^28'30" West 376.92 feet to a point; thence
27. South 27^03'04" West 951.74 feet to a point; thence
28. South 10^07'58" West 313.75 feet to a point; thence
29. South 21^47'47" West 382.76 feet to a point; thence
30. South 10^02'25" West 1,099.43 feet to a point; thence
31. South 23^13'52" East 58.15 feet to a point; said point being North 89^42'33" West 2,040.01 feet from a open end pipe found at the beginning of the said 25th line of Liber 2531 at Folio 347; thence binding and running with part of said 25th line the following course
32. North 89^42'33" West 798.31 feet to the point of beginning containing 20,046,434 square feet or 460.2028 acres of land more or less as now surveyed by Patton Harris & Rust in August of 2006. Subject to all covenants, easement, restrictions and right of way of record.

PHR+A

I hereby certify to the best of my knowledge, Information and belief that this description was prepared under my supervision and is based upon available records.

STATE OF MARYLAND PAUL LeROY COON No. 562 REGISTERED PROPERTY LINE SURVEYOR

Paul LeRoy Coon
Property Line Surveyor
Maryland Registration No. 562

Environmental Covenant
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Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
Tax Parcels: District: 01, Account Number: 000152, 005383, and 005405

EXHIBIT B
SOIL MANAGEMENT AREA MAP AND METES AND BOUNDS DESCRIPTION

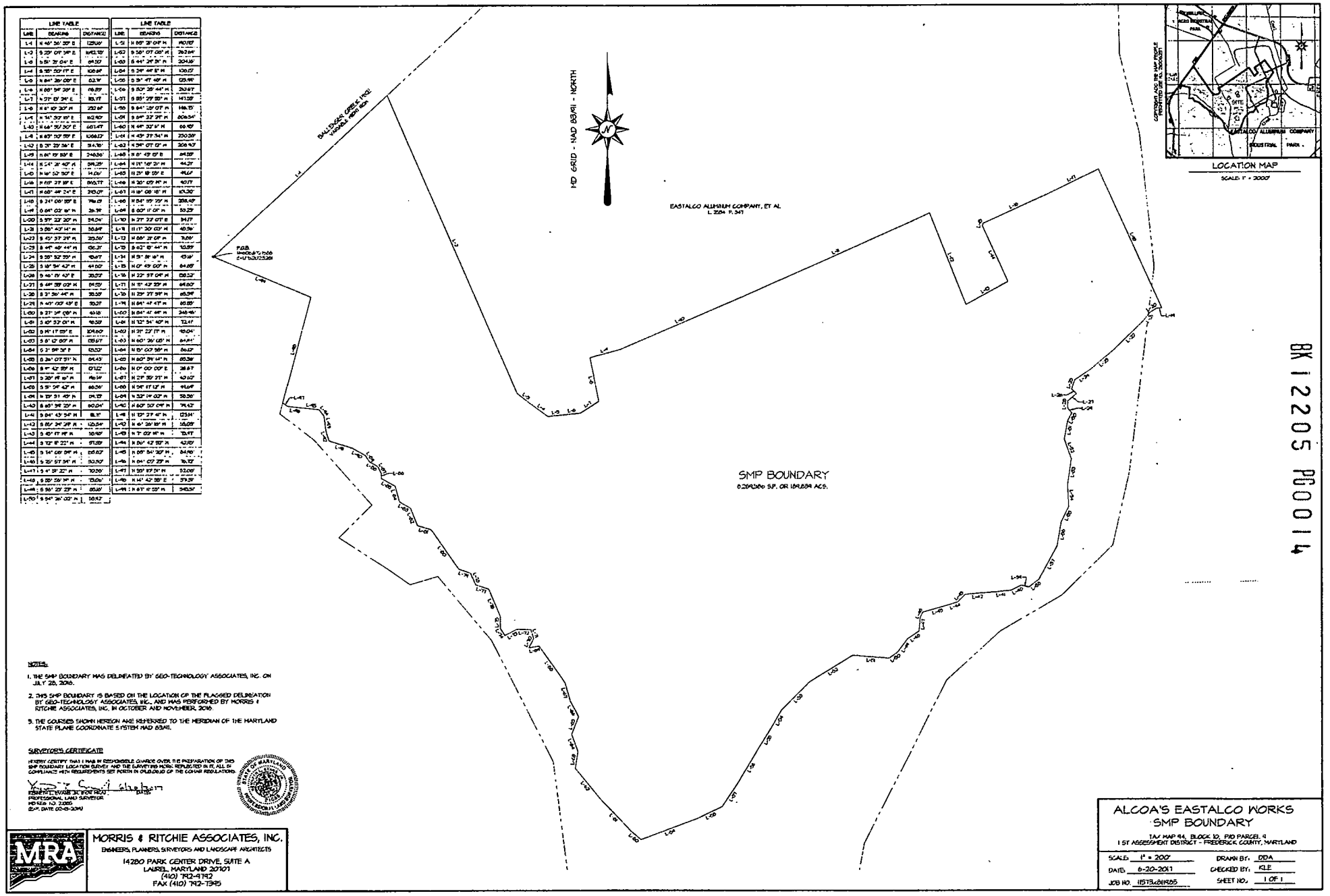

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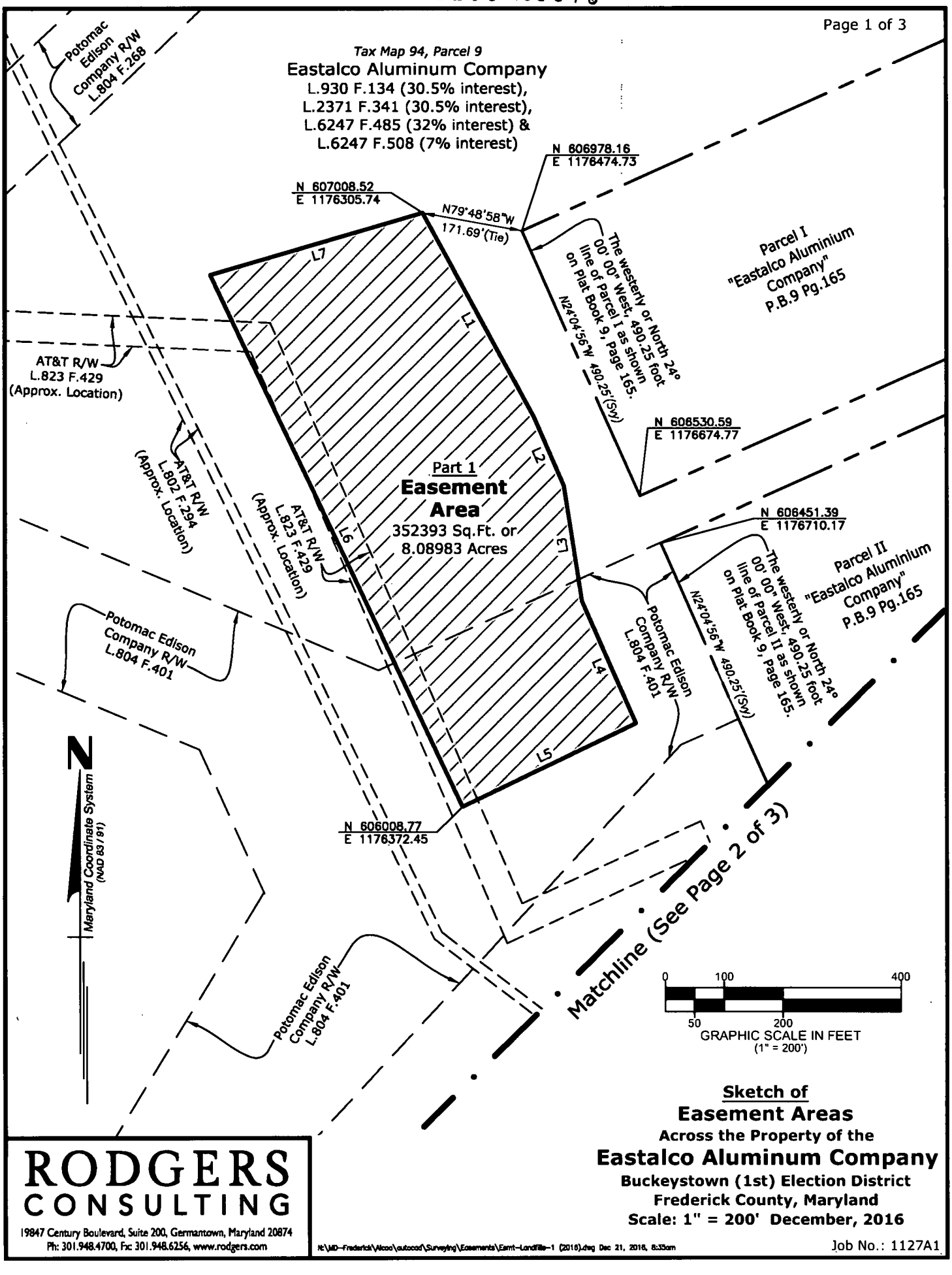
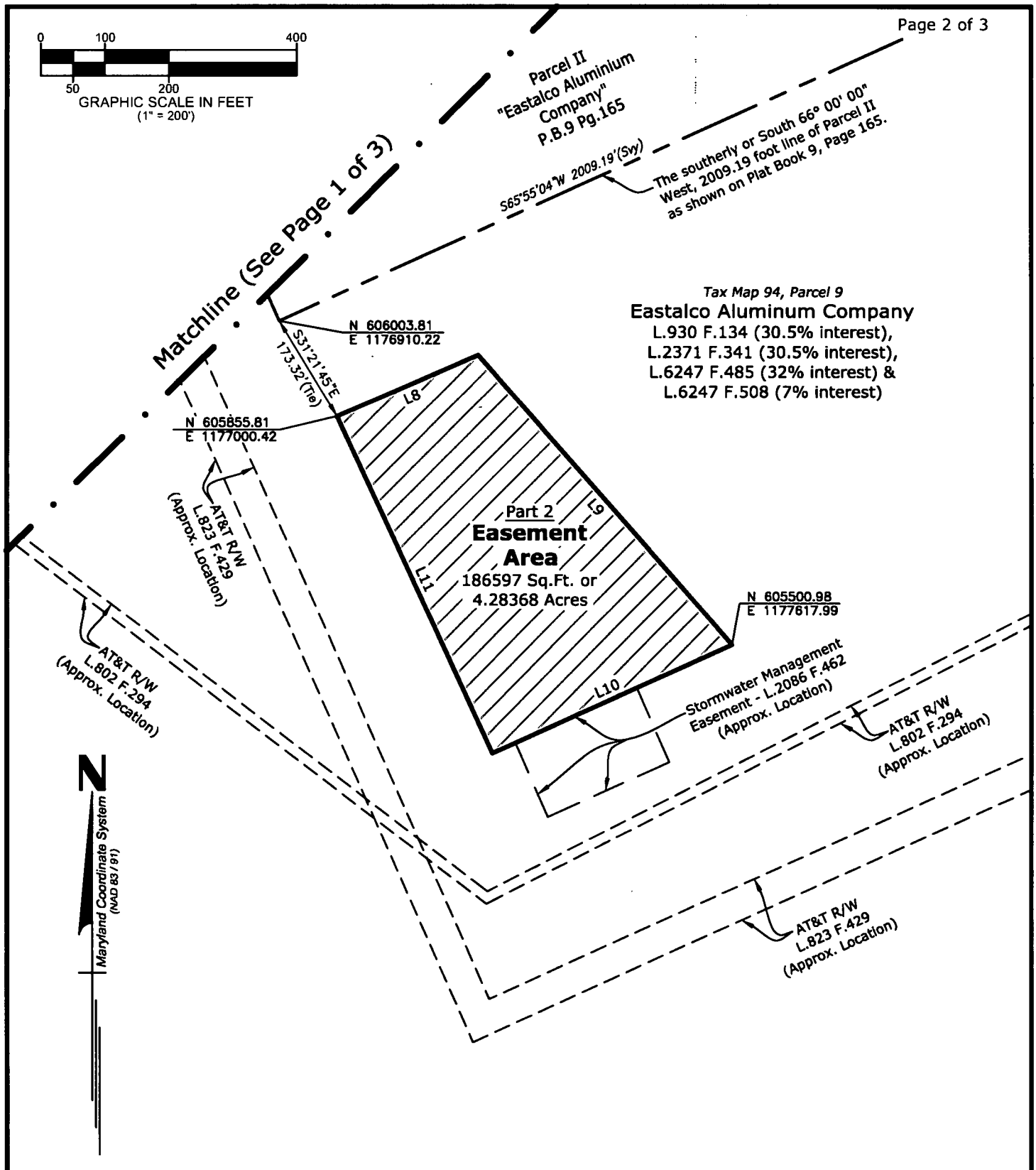
EXHIBIT C
MAP AND METES AND BOUNDS DESCRIPTION OF LANDFILL PROPERTY



Sketch of
Easement Areas
Across the Property of the
Eastalco Aluminum Company
Buckeystown (1st) Election District
Frederick County, Maryland
Scale: 1" = 200' December, 2016

Job No.: 1127A1

RODGERS CONSULTING
19847 Century Boulevard, Suite 200, Germantown, Maryland 20874
Ph: 301.948.4700, Fx: 301.948.6256, www.rodgers.com



Sketch of

Easement Areas

Across the Property of the

Eastalco Aluminum Company

Buckeystown (1st) Election District
Frederick County, Maryland
Scale: 1" = 200' December, 2016

RODGERS
CONSULTING
19847 Century Boulevard, Suite 200, Germantown, Maryland 20874
Ph: 301.948.4700, Fax 301.948.6256, www.rodgers.com

h:\MD-Frederick\Vicco\autocad\Surveying\Easements\Esmt-Landfills-1 (2016).dwg Dec 21, 2016, 8:35am

Job No.: 1127A1

Surveyor's Certification

I hereby certify that this easement sketch, consisting of 3 sheets, is correct; that the easement outlines shown hereon are running in, through, over and across part of the the property acquired by Amax Aluminum Company of Maryland, Inc., a Delaware corporation, from Eastalco Venture, a Maryland partnership, by a deed dated December 28, 1973, and recorded among the Land Records of Frederick County, Maryland, in Liber 930 at folio 134 (as to a 30.5% interest); the said Amax Aluminum Company of Maryland changed its name to Alumax of Maryland, Inc., on November 14, 1973, and merged into Eastalco Aluminum Company, a Delaware corporation, on December 30, 1997; also being part of the property acquired by Eastalco Aluminum Company, a Delaware corporation, from Eastalco Venture, a Maryland general partnership, by a deed in dissolution dated December 3, 1997, and recorded among the Land Records of Frederick County, Maryland, in Liber 2371 at folio 341 (as to a 30.5% interest); also being part of the property acquired by Eastalco Aluminum Company, a Delaware corporation, from Mitalco Inc., a Delaware corporation, by a deed dated June 30, 2006, and recorded among the Land Records of Frederick County, Maryland, in Liber 6247 at folio 485 (as to a 32% interest); and also being part of the property acquired by Eastalco Aluminum Company, a Delaware corporation, from Alumerica Inc., a Delaware corporation, by a deed dated June 30, 2006, and recorded among the Land Records of Frederick County, Maryland, in Liber 6247 at folio 508 (as to a 7% interest); and that the work reflected hereon was prepared under my direct responsible charge and is in accordance with COMAR Title 09, Subtitle 13, Chapter 06, Regulation .12.

Date

For: Rodgers Consulting, Inc.
By: Aaron Eugene Worley
Professional Land Surveyor
Maryland Registration No. 21539
(License Expiration Date: 12-23-2017)

Line Table		
Line	Bearing	Length
L1	S28°46'42"E	391.16'
L2	S23°29'57"E	128.71'
L3	S09°01'34"E	195.97'
L4	S24°04'49"E	224.29'
L5	S64°32'17"W	326.94'
L6	N25°32'14"W	992.40'
L7	N73°53'21"E	375.87'
L8	N66°40'30"E	240.41'
L9	S41°24'16"E	599.97'
L10	S65°59'05"W	410.25'
L11	N24°57'20"W	575.52'

Legend

L.# F.#	Liber and folio
P.B.# Pg.#	Plat Book and Page
(Svy)	Boundary Line as now Surveyed

Datum Note:

Horizontal datum is NAD83/91, State Plane Coordinate System zone 1900 (Maryland), US Survey Feet, established using Real Time Kinematic (RTK) GPS measurements incorporating Frederick County survey control monuments "MANOR" and "MANOR Az". The average combined (grid x elevation) scale factor for the site is 0.99996971.

MANOR N 609711.855, E 1176932.699
MANOR AZ N 608931.125, E 1179259.157

RODGERS CONSULTING
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Sketch of
Easement Areas
Across the Property of the
Eastalco Aluminum Company
Buckeystown (1st) Election District
Frederick County, Maryland
Scale: N/A December, 2016

Job No.: 1127A1

Environmental Covenant
5601 Manor Woods Road, Frederick, Maryland 21701.
Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
Tax Parcels: District: 01, Account Number: 000152, 005383, and 005405

EXHIBIT D
SITE MANAGEMENT PLAN

SITE MANAGEMENT PLAN

EASTALCO ALUMINUM COMPANY
Frederick, Maryland

October 30, 2017

Prepared for:

Eastalco Aluminum Company
Alcoa Corporate Center
201 Isabella Street
Pittsburgh, Pennsylvania 15212

Prepared by:

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GTA Project No: 081198x2

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1.0 SITE OVERVIEW

1.1 Introduction

This Site Management Plan (SMP) applies to known areas of residual contamination within the former Eastalco Aluminum Company primary aluminum smelting facility located at 5601 Manor Woods Road, in Frederick, Frederick County, Maryland. The former aluminum smelting plant was curtailed in December 2005 and formally closed in March 2010. Demolition related activities (removal of equipment, buildings and foundations) began in May 2011 and is complete.

In anticipation of future property redevelopment and pursuant to the Uniform Environmental Covenants Act (UECA), effective on October 1, 2005, in Maryland; an Environmental Covenant (EC) has been prepared that places restrictions on land and groundwater use, and requires current and future owners of the property to follow this Maryland Department of the Environment (MDE)-approved SMP as a means of managing contamination and protecting human health and the environment during current and future activities/redevelopment. Accordingly, this SMP addresses the remediation and future management of known and potential environmental concerns associated with the operations at the former facility, including contaminated groundwater and surface water, permitted industrial waste landfills, waste disposal sites (WDSs), and contaminated former process areas. The implementation of this SMP is a requirement of the EC and all future purchasers of the site or portions thereof shall agree in writing to comply with the plan.

Institutional controls have been implemented in conjunction with the remedial actions for the former plant site. The EC describes the institutional controls that have been recorded on the property title and will run with the land for the "Property" defined in the EC. *Figure 1 (Property Location Map)* shows the boundary of the Property that is subject to the EC. *Figure 1* also shows the portion of the Property where areas of residual contamination including the permitted industrial waste landfills, WDSs, and contaminated former process areas are located, known as the "Soil Management Area". This area is where the contamination could pose an unacceptable risk under a non-residential land use scenario if not properly managed as a requirement of this SMP. Because contaminated groundwater and surface water can extend beyond the footprint of the Soil Management Area, this SMP addresses groundwater and surface water management requirements that apply to the entire Property, as defined in the EC. Separate metes and bounds descriptions of the Property and the Soil Management Area are attached to the EC.

1.2 General Property Description

1.2.1 Former Plant Area, Adjacent Properties

The Former Plant Area contained numerous buildings housing an anode production plant (Carbon Plant), a Cathode Plant, aluminum reduction potlines (Potlines), a casting facility (Casthouse), and several maintenance shops, office buildings, and utility buildings. Immediately surrounding the manufacturing area were two state-permitted industrial landfills, grassed areas, and vacant land. A *Property Location Map* is included as *Figure 1*, and a *Former Plant Area Plan* is included as *Figure 2.*

1.2.2 The Property and Soil Management Area

This SMP and the EC place restrictions on the use and development of the Soil Management Area and the Property shown on *Figure 1.* The Property includes all areas of the Site where groundwater monitoring is ongoing and where land use controls will restrict the use of the property. The Soil Management Area is a sub-portion of the Property, and includes the permitted industrial waste landfills, WDSs, and other areas containing constituents of potential concern (COPCs) in the soil that shall be managed under this SMP.

The Property boundary was delineated based on preliminary investigative activities such as interviews, records searches, and aerial photo review. Preliminary investigation findings reported in the 2005 Site-Wide Investigation Report (MFG, 2005) identified the entire Property as a potential area of concern; however, follow-up sampling data did not provide evidence of waste disposal in the area south of the Soil Management Area. Accordingly, the farm field to the south was sampled near its border with the Soil Management Area and the Soil Management Area was extensively sampled.

1.3 Environmental Background

The Soil Management Area has been extensively evaluated in several phased investigations. Former plant operations and previous environmental investigations are discussed in *Appendix A, Environmental Background Summary.* Former plant processes and potential contamination sources are discussed in *Appendix A* and summarized in *Table A1 – Smelting Waste Streams and Contaminants.* Although previous environmental investigations have targeted known or suspected contamination in areas of the Former Plant Area where fluoride, cyanide, polycyclic aromatic hydrocarbons (PAHs), solvents, oils, and polychlorinated biphenyls (PCBs) were known to have been utilized or released, areas of the Former Plant Area were not completely evaluated because they were either covered by plant buildings or other obstructions, or not suspected to be contaminated. To facilitate implementation of the SMP, evaluation of the

remaining areas was deemed necessary prior to redevelopment to establish areas where remediation or capping may be required as part of the redevelopment. Accordingly, MDE approved a Sampling Plan (GTA, 2014) so that additional data could be collected to address data gaps regarding the presence or suspected presence of hazardous substances in soils in these previously-uninvestigated areas and to determine whether remediation or capping may be required prior to redevelopment.

As described in the Sampling Plan, the constituents of concern for each process area were based on institutional knowledge and are illustrated on *Figure 3* (*Process Area Sampling Overview*). The data generated from the implementation of the sampling plan, provided to MDE in a *Sampling Plan Completion Report,* (GTA, 2016) along with the historical data collected to date served as the basis for delineating the Soil Management Area and the development of the SMP presumptive remedies (see *Section 4*). A summary of the sampling results presented in the *Sampling Plan Completion Report* can be found in *Appendix A*.

In general, the sampling did not identify new COPCs. As expected, areas where PAHs were associated with the industrial process showed concentration of PAHs above the MDE Non-Residential Clean-up Standard (NRCSs) for soil. These former areas include the Former SPL Building, Pads, and Ponds, the Anode Block Annex, Bake Oven and Rod Shop, the Carbon Dust Storage Areas, the Paste Plant, the Railroad Offloading Area, the Surface Water Lagoons and Ponds. COPCs were not found above the MDE NRCS in several other former process areas including the Potlines, Rectifier/Substation, Maintenance Shops, Cast House, and Cathode Plant.

1.3.1 Administrative Consent Order

In 1992, Alcoa entered into Administrative Consent Order (ACO) CO-92-149, amended in 1997, with MDE. The primary elements of the ACO, as amended, included the following:

- Investigate off-site migration of contaminants (tetrachloroethene [PCE], fluoride, and free cyanide) in groundwater and surface water;
- Operate a vacuum extraction system at the Substation to remediate the PCE;
- Perform a benthic survey and water balance study;
- Conduct groundwater and surface water monitoring/reporting; and
- Pump and treat groundwater near the Former SPL Pad and Closed Industrial Landfill for fluoride plume control.

In 2007, a new ACO (CO-07-026, dated April 23, 2007) was signed between Eastalco and MDE. CO-07-026 requires that Eastalco conduct groundwater monitoring for fluoride and surface water monitoring for free cyanide in accordance with the revised MDE-approved monitoring plan (*Groundwater and Surface Water Monitoring Plan*, Tetra Tech, 2011). Semiannual monitoring and reporting has been conducted since the original plan was submitted in May 2007.

Section 4 of this SMP and the EC requires the owner and any future owner of the landfills to continue groundwater monitoring in accordance with the *Groundwater and Surface Water Monitoring Plan* (Tetra Tech, February 2011).

1.4 Plan Organization

Section 1 provides background information about this plan. *Section 2* presents an analysis of the complete or potentially complete exposure pathways, and *Section 3* includes the cleanup criteria to be utilized during future activities. *Section 4* describes response activities to be implemented by Eastalco, including capping the WDS areas, maintaining a fence around the Soil Management Area, and recording an EC on the Property restricting its future use and mandating long term monitoring of soil and groundwater.

Section 5 outlines construction management requirements for initial development activities including implementing a presumptive remedy or a Pre-Development Assessment (PDA) when a presumptive remedy is not used, site security and management of excavation waste and stormwater. *Section 6* discusses the long-term monitoring and maintenance requirements of the Property and Site Management Area. *Section 7* outlines the permits and the contingency plan. *Section 8* outlines administrative requirements. *Section 9* outlines procedures for obtaining regulatory closure for development areas. *Section 10* lists the cited references.

2.0 EXPOSURE ASSESSMENT

2.1 Current and Future Land Use/Occupants

The future use of the Property shall be restricted to Tier 2B or Tier 3B, commercial or industrial restricted uses as specified in the EC. The Tier 2B or Tier 3B classification is used for properties with one or more land use controls that are imposed as a condition of commercial or industrial use of the property. Tier 2B use allows exposure and access by the general public, workers, and other expected users, including customers, patrons or visitors. Tier 2B properties typically include shopping centers, retail businesses, vehicle service stations, medical offices, hotels, office space, religious institutions, and restaurants. Tier 3B use allows exposure by

workers over the age of 18, adult workers and construction workers, and other potential expected users. Industrial purposes allow access to the property at a frequency and duration constituent with a typical business day. Tier 3B properties typically include manufacturing facilities, maritime facility, metal working shops, oil refineries, chemical and other material plants. As there will be no residential use, potentially exposed populations are expected to include construction workers, adult on-site workers, and adult, child, and youth intermittent visitors.

2.2 Media of Concern

Site-related COPCs in surface and subsurface soil include several PAHs and PCBs. These compounds have been detected above their NRCSs for soil. Although not related to the smelting process, arsenic was also detected in soils above the NRCS and the Anticipated Typical Concentration (ATCs) values. However, as explained in *Appendix A*, the detections of arsenic are considered naturally occurring and do not pose a risk.

Fluoride is a site-related COPC in groundwater. Free cyanide has also been detected in surface water above its regulatory threshold.

Eastalco Aluminum Company acknowledges potential future exposure risks may exist within the Soil Management Area. A site-specific human health risk assessment has not been prepared as exposure pathways to future occupants will be managed under this plan. *Table 1* summarizes the potentially exposed populations.

2.3 Exposure pathways

2.3.1 Groundwater and Surface Water

Overburden and bedrock groundwater beneath some areas of the Property have been impacted by fluoride above 4 milligrams per liter (mg/L, equivalent to parts per million, or ppm) which is the federal maximum contaminant level (MCL) for drinking water. Construction workers could be briefly exposed to groundwater through incidental ingestion and dermal contact during installation of foundations, below-grade structures, and/or utilities at the Property that may require dewatering activities. Based on the depth of groundwater observed during previous investigations, there is no direct contact exposure pathway between future occupants and the groundwater contamination, except in the vicinity of the Tuscarora Creek and its tributary where the depth to groundwater is shallow and a construction worker exposure is possible. The potential for use of the groundwater as a potable supply by off-site downgradient receptors was addressed in the 2005 *Site-Wide Investigation Report* (MFG, 2005) and no impacted receptors were identified.

Therefore, construction workers may come in contact with the groundwater or surface water during Property development. In accordance with OSHA regulations, a Health and Safety Plan (HASP) for construction workers will be developed, implemented and maintained on-site. Personnel involved with the particular construction activity will be made aware of the HASP. Future work, including construction and repair of utilities, will be performed under requirements set out in the job-specific HASP required to be prepared before development. The HASP will include measures to restrict exposure to impacted groundwater.

For other receptors, the direct contact exposure pathway to groundwater is not considered potentially complete. Additionally, the EC will prohibit the use of groundwater at the Property for potable purposes by any receptor including construction workers. Proposed Property improvements will be connected to municipal water for potable supplies and individual septic systems or private waste-water treatment plants for sewage. Based on the implementation of the proposed remedies, direct contact between future occupants or users and groundwater contamination at the Property is managed under this plan.

Surface water sampling in Tuscarora Creek and its unnamed tributary was conducted during the site-wide investigation (MFG, 2005) to determine impacts from the plant. In addition, follow-up monitoring under the ACO has been conducted because of infrequent low-level detections of cyanide that slightly exceed the ACO limit of 0.0052 mg/L, which is the Maryland limit for cyanide, based on protection of aquatic resources. The MCL for cyanide (0.2 mg/L) is orders of magnitude of above the concentration of cyanide when it is detected in surface water. Therefore, exposure by on-site workers and off-site receptors to surface water does not require mitigation.

2.3.2 Direct Contact to Soil Contamination

Surface and/or subsurface soil impacted by COPCs above the NRCS exists in Soil Management Areas. The COPCs identified consist primarily of PAHs (including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthrancene, and indeno(1,2,3-c,d)pyrene), arsenic, and PCB aroclors (Aroclor 1016, Aroclor 1242, and Aroclor 1248).

Construction worker and adult worker populations at the Property could be exposed to the impacted soil in the Soil Management Area under current conditions. This contact will be mitigated and addressed through implementation of a job-specific HASP discussed below. In

addition, future development activities in the Soil Management Area will address potential exposure pathways during development and future activities as part of project planning.

2.4 Health and Safety Plan

Potential risks to construction workers may exist through direct contact/ingestion of impacted groundwater and soil, and through inhalation of dust. *Table 2* describes general steps that will be taken to mitigate exposure. Each contractor performing work where such exposure is possible will address these steps on a case-by-case basis in their job-specific HASP and personnel involved with the particular construction activity will be made aware of the HASP. The HASP will meet the minimum requirements of OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard, 29 CFR 1910.120 or 29 CFR 1926.65, paragraph (b)(4) which addresses site-specific safety and health plans for clean-up operations conducted under HAZWOPER. This will provide satisfactory protection while allowing contractors flexibility to implement programs consistent with their experience and the then-current state of the art.

3.0 CLEANUP CRITERIA

Pursuant to MDE's *Cleanup Standards for Soil and Groundwater, Interim Final Guidance Update 2.1*, June 2008, cleanup criteria applied to the Soil Management Areas may be either the uniform numeric risk-based standards (the MDE's NRCS) or standards based on a site-specific risk assessment. The uniform standards are the Generic Numeric Cleanup Standards for Groundwater and Soil or the ATCs for soil, contained in the June 2008 MDE Cleanup Standards document cited above. Alternatively, a potential developer may elect to perform a site-specific risk assessment (SSRA) and establish site-specific cleanup standards (SSCSs) in accordance with guidelines presented in the USEPA's Risk Assessment Guidance (RAG) document. As outlined in the USEPA's RAG, the SSRA must include a numerical calculation of risks associated with all exposure pathways, which requires a detailed site assessment, an evaluation of all exposure pathways, a toxicity assessment for all COPCs, and calculation of SSCSs for each identified COPC. The SSRA must be submitted to the MDE for review and approval of the SSCSs.

The applicable generic cleanup criteria for COPCs at Soil Management Areas will be the criteria in effect at the time of Property development/use unless SSCSs have been approved.

4.0 RESPONSE ACTIONS

Eastalco will implement the following response actions to eliminate or reduce exposure pathways, which include closing the two permitted industrial landfills, capping the WDS areas,

removal of soils with greater than 50 ppm PCB from the former paste plant area, maintaining a fence and security around the Property to prevent trespassing, and recording and implementing an EC restricting the use of the Property and requiring long-term monitoring and maintenance of the caps and groundwater remedy.

The Department will issue a No Further Action letter or equivalent to Eastalco at the completion of the following response actions below. The requirement for long-term monitoring and maintenance of any engineered caps or groundwater may not delay the issuance of a No Further Action letter. Completion of the response actions below will satisfy all the requirements of ACO (CO-07-026, dated April 23, 2007).

4.1 Permitted Industrial Landfills

There are currently two MDE-permitted landfills on the Property. The South Landfill was operated between 1983 and 1994 for the disposal of various types of non-hazardous industrial wastes. Groundwater monitoring as well as routine inspections and maintenance of the South Landfill have been performed since the Landfill was closed. Closure activities for the North Landfill began in 2016 in accordance with the approved Closure and Post-Closure Care Plan (EA, 2015) and were completed in 2017. The post-closure portion of this plan, includes post-closure expectations for both Landfills, collectively. The post-closure activities summarized for both Landfills are a requirement of this SMP and are described in *Section 6*.

4.2 WDS Caps

Eastalco will implement a Soil Cap consistent with the Presumptive Remedy *Section 5* of this plan for WDS-5 through 9. *Figure 4* defines these WDSs. In general, the Presumptive Remedy will include a marker barrier and a minimum of 2 feet of clean fill.

The excavation and disposition of waste materials from the WDS-10 area occurred in 2016. The excavation area was subsequently backfilled with 3 to 5 feet of clean fill from off-site. See *Appendix A* for details.

4.3 Former Paste Plant Soils

Soils with PCB concentrations in excess of 50 ppm will be excavated from the location of the former paste plant and disposed at a regulated disposal facility as an area-specific remedy. The excavation limits will be determined through the combine use of pre-excavation investigation data and post-excavation confirmation sampling. PCB Soils will be excavated to a depth of 10 feet below the ground surface (bgs) or to bedrock. Clean fill will be obtained from

off-site to fill the excavation void. Eastalco will implement a Soil Cap for the paste plant area consistent with the Presumptive Remedy *Section 5* of this plan.

4.4 Fencing and Security

The Soil Management Area will be protected by a 6-foot chain-linked fence to limit trespassing and potential access to impacted soil. The EC will require that the fence be maintained and kept in good condition.

During any excavation activity within the Soil Management Area, the area will be secured with perimeter fencing during construction activities to prevent trespassing during non-working hours. Breaches to the fence required by construction activities must be promptly re-secured and the developer must provide adequate security to prevent trespassing during non-working hours.

After a presumptive remedy or PDA has been implemented over a particular portion of the Soil Management Area as part of its development, the fence may be removed as it will no longer be needed to prevent exposure. The EC shall be modified at that time to reflect current conditions on the Soil Management Area.

4.5 Environmental Covenant

In anticipation of future property redevelopment and pursuant to the Maryland's UECA, 1-801 *et. seq.*, Maryland Code Annotated, Environment Article, an EC will be recorded in the land records that places institutional controls on land and groundwater use of the Property, and requires current and future owners of the Property to follow this SMP as a means of managing contamination and protecting human health and the environment. The EC will include maps delineating the Property and the Soil Management Areas as the restricted portions of the Site. The EC will include the following land and groundwater use restrictions for the Property, with specific soil management requirements in the Soil Management Area:

- **Land Use Restriction:** The Property is limited to restricted commercial (Tier 2B) or restricted industrial (Tier 3B) purposes.
- **Groundwater Use**: There shall be no use of the groundwater beneath this Property for any purpose.

- **Site Management Plan:** Any activity on the Property or within the Soil Management Area shall meet the requirements of the Site Management Plan, presented as an Exhibit of the EC.

- **Fencing Requirement:** A 6' chain link fence shall be maintained surrounding the entirety of the Soil Management Area, as identified in a map attached to the EC.

- **Cap Maintenance Restriction:** The property owner shall maintain the integrity of any engineered caps identified in the Soil Management Area at all times to prevent any exposure to contaminated soil by any person on the property at any time. The MDE shall be notified within ten (10) business days after discovery of any needed repairs to a capped area. To evaluate adequacy of the cap, the owner shall perform inspections annually, each April. The property owner shall maintain written records documenting all inspections in accordance with the Inspection Checklist attached to the EC as an Exhibit. All necessary repairs to the cap within the Soil Management Area shall be completed within five (5) business days of discovery of the needed repairs, unless an alternate schedule has been approved by the MDE. The property owner shall maintain records of maintenance of the capped areas.

- **Landfill Post-Closure Care:** The landfill property owner as defined by the metes and bounds description attached to the EC as an Exhibit shall comply with the post-closure care requirements for the two permitted landfills in accordance with the 2015 Closure and Post-Closure Care Plan, attached to the EC as an Exhibit.

- **Long-Term Monitoring of Ground Water**: The landfill property owner as defined by the metes and bounds description shall maintain compliance with the long-term monitoring of groundwater on the Property in accordance with the *Groundwater and Surface Water Monitoring Plan* (Tetra Tech, 2011), attached to the EC as an Exhibit. In the event that action levels or other evaluation criteria established in the Groundwater and Surface Water Monitoring Plan are triggered, the landfill property owner will be responsible for implementing appropriate measures to remedy the situation, including implementation of any contingency plan contained in the Groundwater and Surface Water Monitoring Plan. If wells or monitoring points required for long-term and/or post-treatment monitoring are damaged or destroyed, the MDE will require replacement in order to complete the monitoring requirements.

- **Soil Disturbance:** The property owner shall submit written notification, to the attention of the Chief, State Assessment and Remediation Division, at least 30 days prior to any planned future soil disturbance within the Soil Management Area. Any soil excavation and disposal shall comply with the SMP, including complying with a HASP and soil disposal and capping requirements. In the event of an unplanned emergency excavation on the property, the property owner shall verbally or electronically notify the MDE within 24 hours following initiation of the emergency excavation activities. Within ten days following completion of an unplanned emergency excavation, the property owner shall file a detailed written report with the MDE. All excavated soil within the Soil Management Area may be placed under a cap, however, movement of excavated materials from a WDS area to other portions of the Property is prohibited. Alternatively, excavated soil may be disposed off-site; the soil shall be analyzed before disposal and the analytical results shall be the basis for appropriate disposition of the material in accordance with applicable local, State, and federal laws and regulations. No excavated material from the Soil Management Area shall be disposed in areas with current or proposed residential use or zoning.

- **Excavation Encountering Groundwater:** When conducting any excavation activities on the Property extending to the ground water table, the property owner shall implement the requirements of a site-specific health and safety plan in accordance with the SMP to ensure that worker protection measures are met. The encountered ground water shall be containerized during all dewatering activities at the property and shall be analyzed before disposal. The analytical results shall be the basis for appropriate disposition of the ground water in accordance with applicable local, State and federal laws and regulations.

- **Health and Safety Plan:** Prior to conducting any excavation activities within the Soil Management Area, a site-specific Health and Safety Plan for all personnel will be developed, implemented and maintained on-site in accordance with the SMP. The Health and Safety Plan must include appropriate dust control measures and air monitoring to ensure that all worker protection requirements are met. All personnel will be made aware of the Health and Safety Plan.

5.0 SOIL AND GROUNDWATER MANAGEMENT

During activities within the Soil Management Area, design and construction plans will consider potential contamination (see *Sections 2* and *3*) and include provisions for protection of potential occupants, construction workers, and the general public. Response actions for soil contamination may be presumptive remedies that are based on engineering (e.g. capping) and

institutional controls (e.g., land use restrictions), or area-specific remedies (e.g. soil removal) that are based on an evaluation of contamination data. Response actions for groundwater exposure will be managed through institutional controls (i.e., groundwater use restrictions).

5.1 Capping Requirements

When a portion of the Soil Management Area is selected for redevelopment, the developer has the option of either incorporating a presumptive soil remedy into the development strategy or conducting a PDA of the subject area to determine if a remedy is needed. If a developer chooses to implement a presumptive remedy for its development, the developer shall submit the development plans that include a presumptive remedy to MDE for review and approval prior to implementing the development plan. MDE shall promptly review the plan for compliance with the presumptive remedy requirements of this SMP and either approve the plan, deny the plan, or require additional information.

If a prospective developer prefers to conduct a PDA instead of using a presumptive remedy, the prospective developer shall submit the plans for review and approval by MDE prior to initiation of development. MDE may require additional information including human health and environmental risk assessment, if deemed necessary.

A prospective developer shall comply with the EC recorded on the Property. After implementing a capping remedy, the developer may seek changes to the existing EC by modifying the EC in accordance with Environment Article §§1-808 and 1-809.

5.1.1 Presumptive Remedy

Presumptive remedial actions have been developed for use under this SMP to address the potential for the presence of hazardous substances in the soils at Soil Management Areas under a commercial/industrial scenario. Presumptive remedial actions are intended to provide the developer with readily understood requirements in order to facilitate an expedited remedial action while still being protective of public health.

The SMP acknowledges that future technologies or practices developed after finalization of this SMP may prove more effective than those described in the plan. Subject to MDE approval, such technologies and practices may be substituted for the presumptive remedies outlined below.

Presumptive remedies for soil at the Soil Management Area include the engineering controls discussed below and compliance with the EC recorded on the Property. Exposure to groundwater beneath the Property will be managed through institutional controls.

Potential exposure to soil at the Soil Management Area shall be managed through the use of engineering controls. These controls entail placement of an exposure barrier over the contaminated area being developed. In general, the engineering control for impacted soil is to prevent direct soil exposure through placement of a marker barrier atop the contaminated area followed by the placement of buildings, parking areas, roadways in hardscape areas, and clean cover soils over landscape or green-space areas.

The marker barrier, which is not required beneath building foundations, will be an industry-approved barrier, which may consist of a geotextile fabric meeting the Maryland State Highway Administration specification 921.09; under Maryland application class SD Type I, woven, monofilament. Specifications for soil and asphalt marker fabric are presented, along with general details for the impervious and pervious capping, on *Figure 5 - Typical Capping Details*.

Landscaped areas will be capped with a minimum of 2 feet of clean fill in accordance with MDE's *Voluntary Cleanup Program (VCP) Clean Imported Fill Material Guidance* (Clean Fill Guidance). The thickness of the cap may be increased as necessary to accommodate the planting of different species in order to ensure the minimum clean fill requirements and accommodate the plant's root ball. The pervious capping will eliminate the direct contact exposure risk to future occupants or users of the area. A total of at least 2 feet of clean fill material above a marker barrier will be placed in areas of pervious capping. Landscape and green-space areas will be surveyed prior to and following placement of the cover soils to demonstrate a minimum cover thickness of 2 feet. Clean fill must be evaluated in accordance with MDE's VCP Clean Fill Guidance document before being relocated on-site or imported from off-site sources. This requirement shall minimize the potential of introducing unacceptable fill material into an area.

It should be noted that utilities may be installed in these areas prior to capping. Specific details regarding soil management are presented in *Section 6*.

5.1.2 Pre-Development Assessment

In lieu of performing a presumptive remedy, a prospective developer may elect to prepare a PDA for the portion of the Soil Management Area identified for development. The assessment shall include a review of the existing data, identification of data gaps (if any), and evaluation of potential for exposure to contaminants detected above their respective Cleanup Criteria (generic or SSCSs). If needed, a work plan for investigation of identified data gaps shall be prepared for review and approval by MDE Controlled Hazardous Substance program prior to initiation of work. The assessment will consider and address exposure pathways for contaminated media and may include a SSRA to establish SSCSs for the development area.

If the PDA determines that COPCs are present in the development area above Cleanup Criteria, and complete exposure pathways have been identified, appropriate remedy(ies) shall be selected and implemented. The developer could default to a presumptive remedy discussed in *Section 5.1.1* or may develop a Corrective Action Plan (CAP) with a specific remedy for approval by MDE. If the selected remedy involves the removal of contaminated soils, the CAP shall include characterization of excavated material to ensure it is managed for disposal in accordance with applicable local, state and federal regulations. The CAP will also include provisions for the collection of confirmation samples to ensure the remaining soils are below Cleanup Criteria. If the PDA determines that COPCs are not present in the development area above Cleanup Criteria, then no further remedial action shall be required under the restricted land use.

5.2 General Activities Associated with Earthwork

Contaminated soil excavated during construction of a cap or any development may either be placed beneath a cap within the Soil Management Area or disposed off-site at a regulated facility; however, any soil excavated within a WDS area must be returned to the WDS excavation of origin and capped, or characterized for proper off-site disposal. Documentation of relocated or disposed materials must be provided in a Completion Report and appended to *Appendix B* of this SMP.

Intrusive activities at the Property may or may not encounter groundwater depending on the depth of the activities and variations in the depth to the water-table across the Property. In the event that groundwater is encountered during Property earthwork activities such that it accumulates in excavations and needs to be removed to facilitate construction, characterization samples will be collected and analyzed for the appropriate parameters based on location and historical occurrence (refer to *Appendix A*). The results will be used to make appropriate water

management decisions (e.g., on-site treatment, offsite disposal, discharge to publicly owned treatment works, etc.) in accordance with applicable local, state and federal regulations. Exposure to groundwater by construction/excavation workers will be mitigated through proper health and safety and risk management practices, as outlined in a HASP prepared for each development area. Personnel will be made aware of the HASP. A copy of the HASP will be submitted to the MDE.

If on-site treatment of construction water is implemented, the developer must secure any necessary permits.

Excavating equipment used within the Soil Management Area must be decontaminated at the conclusion of the work, and before being removed from the work area.

5.3 Security and Safety

The Site Management Area will be protected by a 6-foot chain-linked fence to limit trespassing and access to impacted soil. During future development of the Soil Management Area, if a particular area being developed is not already within a larger fenced area, the area will be secured with perimeter fencing during construction activities to prevent trespassing during non-working hours. Breaches to the fence required by construction activities must be promptly re-secured and the developer must provide adequate security to prevent trespassing during non-working hours. A specific HASP for each development area for all personnel must be developed, implemented, and maintained on-site. The HASP must address the potential for exposure to contaminated soil or groundwater. All personnel must be made aware of the HASP. The HASP must be submitted to the MDE prior to the commencement of work.

After a presumptive remedy or CAP has been implemented over a particular portion of the Soil Management Area as part of its development, the fence can be removed as it will no longer be needed to prevent exposure.

5.4 Stormwater Management

Stormwater management procedures followed during development within the Property will comply with all local requirements, including preparation of the Stormwater Management (SWM) Concept Plan mapping that accounts for the location of contaminated soils, and an Erosion and Sediment Control (ESC) Plan. Frederick County guidelines require SWM structures be located outside work areas, and no infiltration of stormwater into karst areas is permitted. The County will review the proposed SWM and ESC Plans and provide comments for incorporation

with a copy to:

Friedlander Misler, PLLC
5335 Wisconsin Ave, NW, Suite 600
Washington, DC 20015
Attn: Leonard A. Sloan, Esq.
Telecopier No.: (202) 857-8343

If to the Grantor, to:

Atlas West End Patrick Center LLC
c/o West End Capital Group
2200 Pennsylvania Avenue, NW
Washington, D.C. 20037
Attn: Mr. James F. Barter, Jr.
Mr. Jeff Wainwright
Telecopier No.: (202) 719-9050

with a copy to:

Green & Pillay, PLLC
3240 Wilson Boulevard
Suite 100
Arlington, Virginia 22201
Attn: Anand M. Pillay, Esq.
Telecopier No.: (703) 890-1449

If to the Trustees, to:

Matthew B. Leydig, Trustee
Prajay Jhaveri, Trustee
c/o EagleBank
7815 Woodmont Avenue
Bethesda, Maryland 20814
Attn: Matthew B. Leydig, Senior Vice President
Telecopier No.: (240) 986-0680

with a copy to:

Friedlander Misler, PLLC
5335 Wisconsin Ave, NW, Suite 600
Washington, DC 20015
Attn: Leonard A. Sloan, Esq.
Telecopier No.: (202) 857-8343

Any notice, request, demand or other communication delivered or sent in the manner aforesaid shall be deemed given or made (as the case may be) upon the earliest of (a) the date it is actually received, provided receipt is prior to 5:00 PM Eastern time on a business day, (b) on the business day after the day on which it is delivered by hand, (c) on the business day after the day on which it is properly delivered by Federal Express (or a comparable overnight delivery service), or (d)

attached to the EC. MDE should be notified in writing if there is any change in the address of the entity responsible for the groundwater and surface water monitoring at the Property.

Future development plans that include exposure to groundwater within a Property will be addressed under the HASP. MDE may request inclusion of additional sampling parameters (other than fluoride and cyanide) in the surface water and groundwater from the Property boundary if MDE has reason to suspect that development on site is facilitating off site contamination migration. *Section 5.5* discusses the abandonment of existing monitoring wells within the Property.

6.2 Cap Monitoring and Maintenance

The SMP acknowledges that following the implementation of the response action described in *Section 4*, any future remediation/development activities conducted within the Soil Management Area defined in the EC will be tracked and updated on *Appendix B* of this SMP.

The current owner and any future owner of the Property will be responsible for inspecting and maintaining all capped WDS areas and remediated portion of the Soil Management Area where an engineering control was used as part of the remedy, in accordance with the EC. The maintenance is required to prevent degradation of the engineering control and unacceptable exposure to the underlying materials. The Property owner shall conduct inspections of all caps annually each the spring, targeting April and make available all cap inspection/maintenance records. Records to be kept will include, at a minimum, a copy of the completed inspection checklist, the date of the inspection, name of the inspector, any noted issues, and subsequent resolution of the issues.

Appendix C contains inspection checklist forms for waste disposal sites and other capped areas that are paved or landscaped. These forms will be completed by the Property owner or the owner's designee during the inspection. The inspection of caps within the Soil Management Area will check: 1) site security; 2) the integrity of soil covers by looking for evidence of burrowing mammals or root system which could jeopardize the cover system; and 3) the drainage system for evidence of deterioration, malfunctions, or improper operation of run-on and run-off control system. The inspection of capped areas that are paved or landscaped will check the condition and integrity of pavement and landscape systems. Areas of an asphalt cap that have degraded to a Pavement Condition Index of 4.0 must be repaired in a timely manner. The integrity of the pervious capped areas shall be maintained pursuant to the inspection form with adequate vegetative cover to prevent erosion. The inspection form for paved and landscaped

areas shows the Pavement Condition Index and inspection criteria for sidewalks and curbs and landscaped areas.

Cap maintenance will be performed based on conditions observed during an inspection to restore the cap to its original effectiveness. Maintenance activities will be documented on the inspection forms.

6.3 Excavation Management

This section describes the management of soils that are encountered during excavations in remediated portions of the Soil Management Area (e.g., the permitted industrial waste landfills, WDSs, and any areas where a presumptive remedy or PDA is implemented). Exposure to residual contamination by construction workers during excavation activities will be mitigated through proper health and safety and risk management practices which must be addressed in the HASP that outlines all appropriate measures to protect worker health and safety.

6.3.1 Soil

Materials excavated from beneath capped areas will be replaced beneath a cap in the Soil Management Area or disposed off-site. Excavation backfilling/restoration activities will return the cap to its original condition at the completion of cap penetration work. If new undocumented COPCs are discovered during this work, the COPC will be identified and MDE shall be notified within 48 hours and in writing within 72 hours. This SMP also will be updated as necessary.

However, any materials excavated from beneath capped areas in a WDS cannot be moved to other capped areas of the Property. If excavation beneath the cap of a WDS area is necessary, any excavated WDS material will either be returned to the WDS excavation of origin and the cap restored back to its original integrity, or characterized and disposed off-site in accordance with applicable local, State, and federal laws and regulations.

In order to ensure that remediated Soil Management Areas are returned to a condition that complies with the Cleanup Criteria outlined in *Section 3*, potentially impacted soil encountered during intrusive activities should be managed as described below:

6.3.1.1 Reuse of Soils Within Landscaped Areas

All clean soil excavated from the upper two feet of landscaped areas (above the geotextile marker fabric) should be stockpiled separately from any soils excavated from a depth greater than two feet bgs. Soil that is stockpiled from the upper two feet of landscaped areas may be used at any depth at any locations on the site. Soil that is located below the geotextile marker

fabric (i.e., at depths greater than two feet bgs) must be replaced under an appropriate engineering control such as hardscape or clean soil cover underlain by geotextile marker fabric.

6.3.1.2 Reuse of Soils Below Hardscape

All soil removed from below hardscape such as a building slab or a parking lot may be reused on-site as backfill below an appropriate engineering control such as hardscape or clean soil cover underlain by geotextile marker fabric if outside a building footprint. Alternatively, if the soil is determined to be clean fill after conducting an evaluation in accordance with the Clean Fill Guidance, the soil may be used anywhere on the Property.

6.3.2 Groundwater

In the event that intrusive activities encounter groundwater within excavations that must be dewatered, the groundwater will be sampled and analyzed for fluoride and other parameters based on the institutional knowledge and historical use of the location. If any contaminant concentrations in the groundwater exceed the Cleanup Criteria, the water must be managed and disposed in accordance with applicable local, State, and federal laws and regulations. To prevent construction delays caused by groundwater analysis and evaluation, the developer may elect to containerize the water prior to characterization and disposal.

7.0 PERMITS AND CONTINGENCIES

7.1 Permits

The property owner must comply with federal, State and local laws and regulations by obtaining necessary approvals and permits to conduct activities and implement this SMP or activities specified in a CAP.

7.2 Contingency Plan

In the event that an owner or operator discovers contaminants not included in the list of COPCs, the entity shall notify MDE within 48 hours (72 hours in writing). Notifications shall be made to the LRP Administrator at 410-537-3493.

Land Restoration Program
1800 Washington Boulevard
Baltimore, Maryland 21230
(410) 537-3493
Attention: Administrator

The MDE must be provided with documentation and analytical reports generated as a result of any previously undiscovered contamination. The property owner or prospective property owner understands that previously undiscovered contamination may require an amendment to this SMP.

8.0 ADMINISTRATIVE REQUIREMENTS

8.1 Written Agreement

The EC, as agreed to by Eastalco and MDE, requires compliance with this SMP by current and future property owners. Therefore, any developer will be required to sign a written agreement stating that if the SMP is approved, the developer agrees to comply with the provisions of the plan.

8.2 Financial Assurance

In the event that any excavation takes place within the Soil Management Area, the developer must provide MDE with financial assurance in an amount sufficient to stabilize and secure the portion of the property that is impacted. The developer shall submit to MDE its amount and mechanism of Financial Assurance for the review and approval of MDE within thirty (30) days prior to disturbing any soil. The Financial Assurance mechanism may be in the form of (a) a performance bond; (b) a letter of credit; (c) evidence of an escrow account; or (d) a trust agreement. The Financial Assurance mechanism will name MDE as sole beneficiary and shall be issued by, opened by, held by, or name a trustee that is, respectively, a financial institution rated at "A" grade (or equivalent) or above by one of the "Big Three" credit rating agencies (Standard and Poor's, Moody's, or Fitch Group). In the event that the developer fails to perform its obligations pursuant to this SMP and the EC recorded on the property, MDE may draw on the Financial Assurance to maintain the remedy on the developer's behalf. Financial assurance will be released when stabilization of the area disturbed has been achieved.

9.0 NO FURTHER ACTION DETERMINATION BY MDE

It is anticipated that the issuance of a No Further Action letter will occur in either or both of the following scenarios:

- MDE shall issue a No Further Action letter to Eastalco upon completion of all activities set forth in *Section 4*, including the recordation of the EC. The issuance of a No Further Action letter may include the requirement for long term monitoring and maintenance of the soil and groundwater at the Property and Soil Management Area.

- The issuance of a subsequent No Further Action letter by MDE shall be made for any future development activities once a developer has implemented a presumptive or area-specific remedy and has submitted a remedial action completion report containing documentation necessary to support the closure determination. Such No Further Action letter may be predicated on modifying the existing EC.

10.0 REFERENCES CITED

Atlantic Environmental Services, Inc., 1996, Eastalco Aluminum Company, Aquifer Characteristics Investigation, May 29, 1996.

EA Engineering, Science, and Technology, Inc., Phase I/II Permit Application for an Industrial Waste Landfill at Eastalco Aluminum Company, December 1991.

EA Engineering, Science, and Technology, Inc., Phase III Permit Application for an Industrial Waste Landfill at Eastalco Aluminum Company, October 1992.

EA Engineering, Science, and Technology, Inc., PBC, North Landfill Closure Plan and North/South Landfills Post-Closure Care Plan, August 2015.

GTA, 2010, Work Plan – Waste Disposal Sites 5 through 9, Alcoa Eastalco Works, August 2010.

GTA, 2012, Investigation Report, WDS 5 through 9, Alcoa Eastalco Works, April 2012.

GTA, 2014, Sampling Plan, July 2014.

GTA, 2016, Soil Sampling Completion Report, March 2016.

Maryland Geological Survey (MGS), 1968, Geologic Map of Maryland.

MGS, 1981, A Brief Description of the Geology of Maryland.

MFG, Inc. (MFG), 2003, PCE Investigation Results and Site Conceptual Model, Alcoa Eastalco Works, May 2003.

MFG, 2005, Site-Wide Investigation Report, Alcoa Eastalco Works, October 2005.

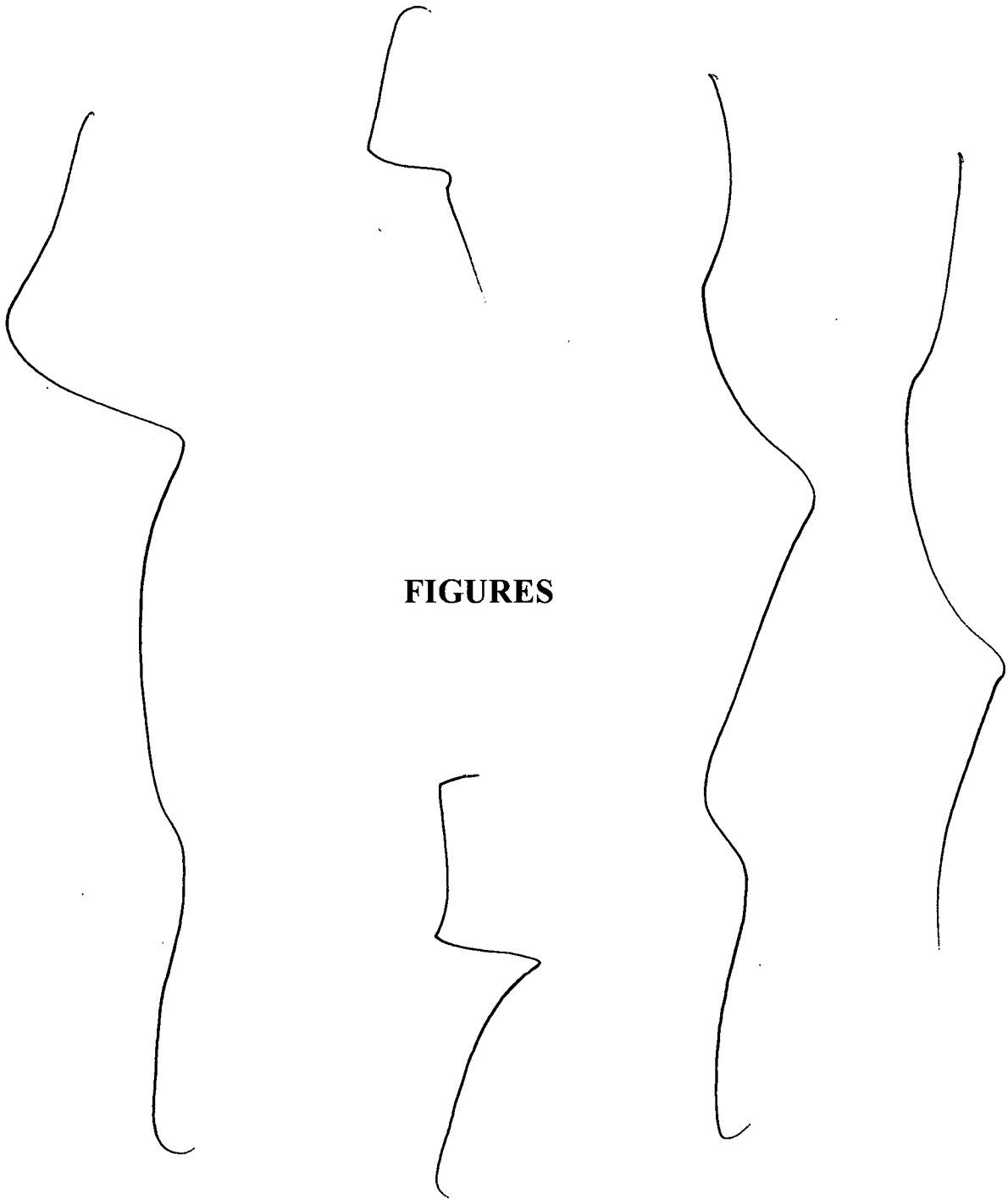
MFG, 2006, Closed Landfill Groundwater Monitoring Plan, Alcoa Eastalco Works, May 2006.

MFG, 2006, Southern Disposal Sites PCB Investigation Report, Alcoa Eastalco Works, December 2006.

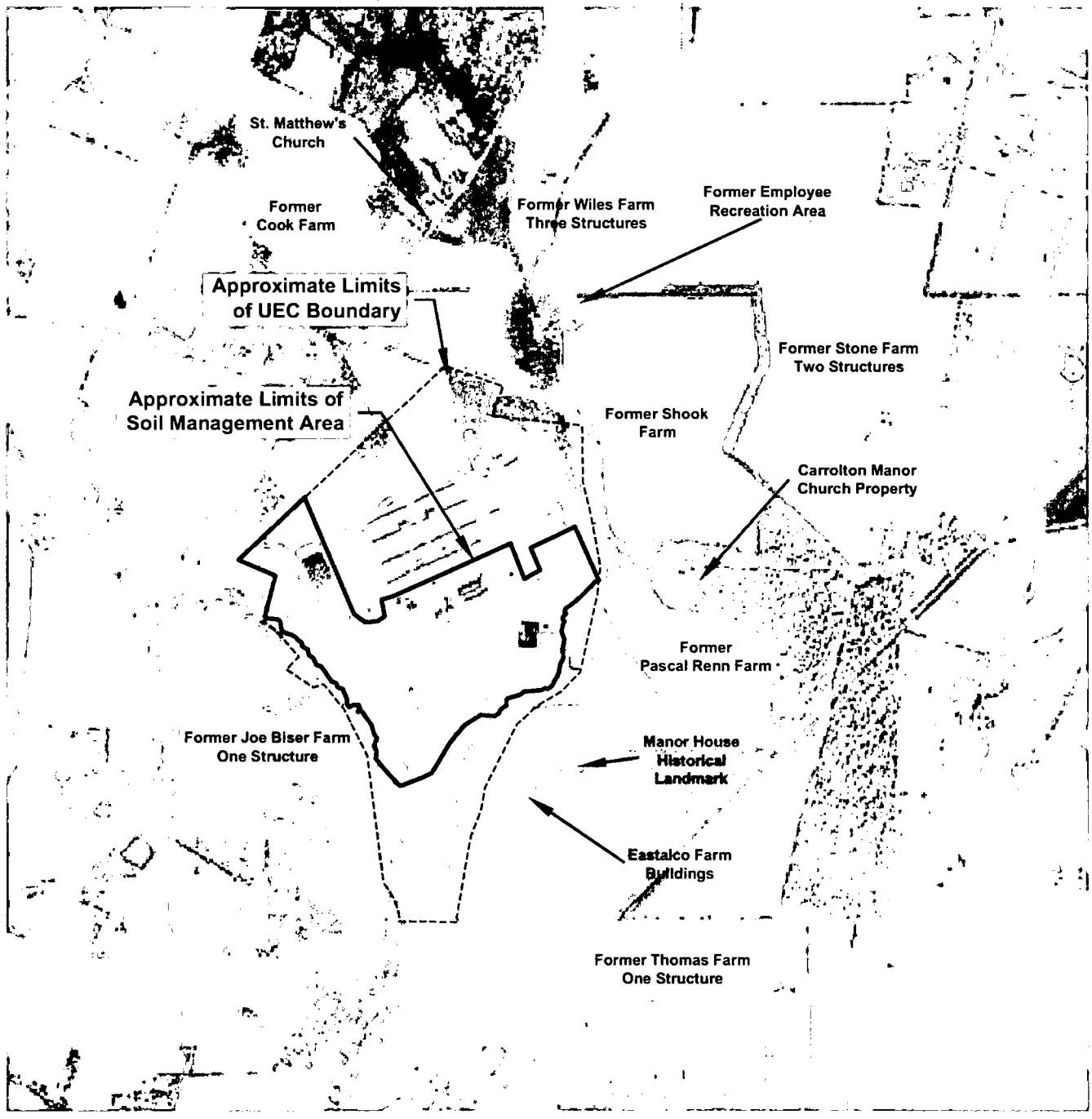
Tetra Tech, 2010, Landfill Groundwater Monitoring Plan, Alcoa Eastalco Works, May 2010.

Tetra Tech, 2011, CO-07-026 Groundwater and Surface Water Monitoring Plan, Alcoa Eastalco, February 2011.

******* END OF REPORT *******



FIGURES



Note

1. Base image obtained from Google Earth (©2016 Google).

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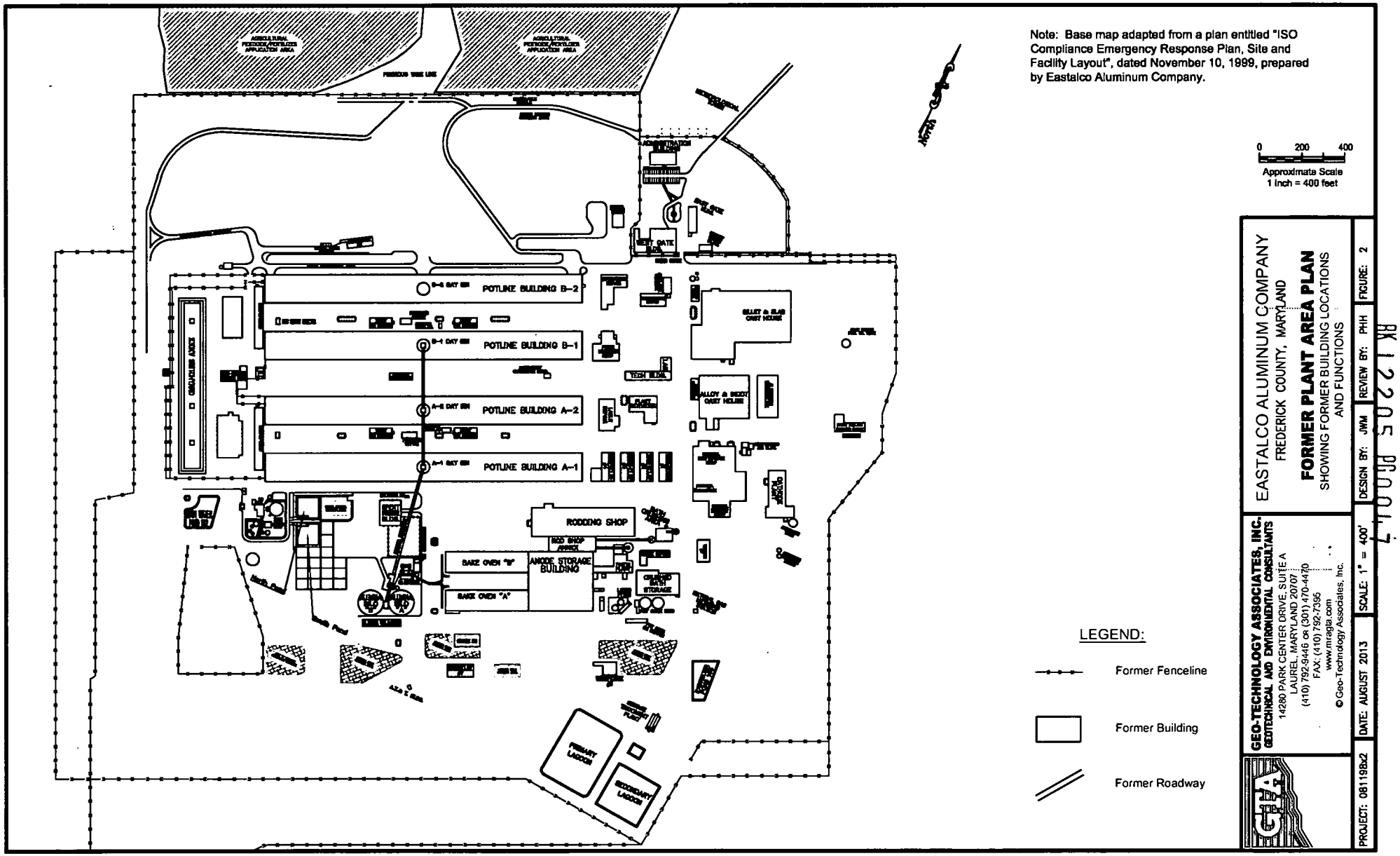
FAX: (410) 792-7395
www.mragta.com

EASTALCO ALUMINUM COMPANY

FREDERICK COUNTY, MARYLAND

PROPERTY LOCATION MAP

PROJECT: 081198x2	DATE: JUNE 2013	SCALE: 1" = 2,000'	DESIGN BY: JWM	REVIEW BY: PHH	FIGURE: 1



Note: Base map adapted from a plan entitled "ISO Compliance Emergency Response Plan, Site and Facility Layout", dated November 10, 1999, prepared by Eastalco Aluminum Company.

EASTALCO ALUMINUM COMPANY
FREDERICK COUNTY, MARYLAND

FORMER PLANT AREA PLAN
SHOWING FORMER BUILDING LOCATIONS AND FUNCTIONS

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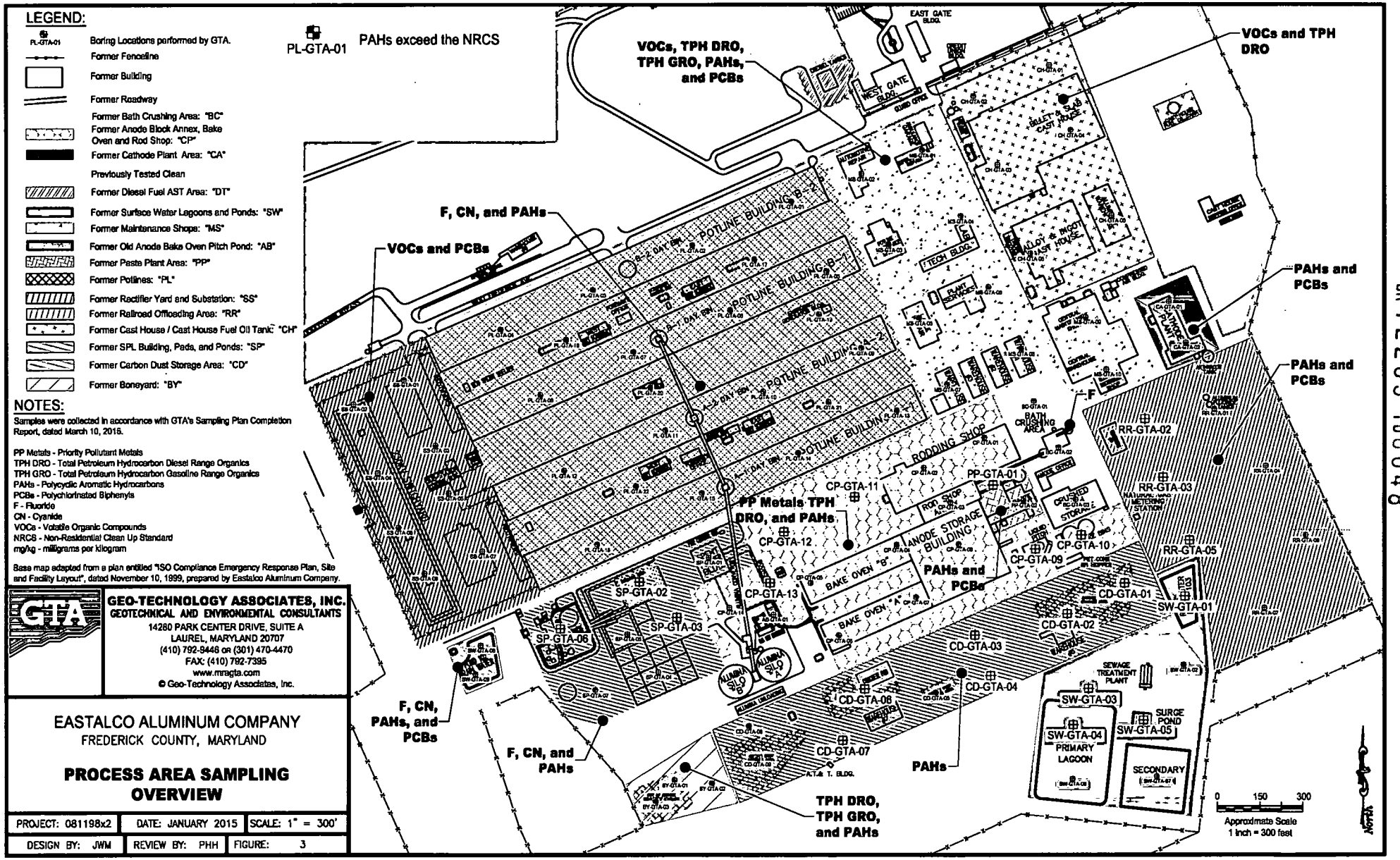
FAX: (410) 792-7395
www.mragta.com

PROJECT: 08119Bx2 | DATE: AUGUST 2013 | SCALE: 1" = 400' | DESIGN BY: JWM | REVIEW BY: PHH | FIGURE: 2



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1. LATITUDE AND LONGITUDE ARE REPRESENTED IN THE MARYLAND STATE PLANE COORDINATE SYSTEM. NORTHING AND EASTING ARE REPRESENTED IN U.S. SURVEY FEET.
2. BOUNDARIES OF WASTE ARE APPROXIMATE AND BASED ON INTERPRETATION OF OBSERVED SITE CONDITIONS

LIMITS OF PASTE PLANT EXCAVATION				
WAYPOINT ID	LATITUDE[1]	LONGITUDE[1]	NORTHING[1]	EASTING[1]
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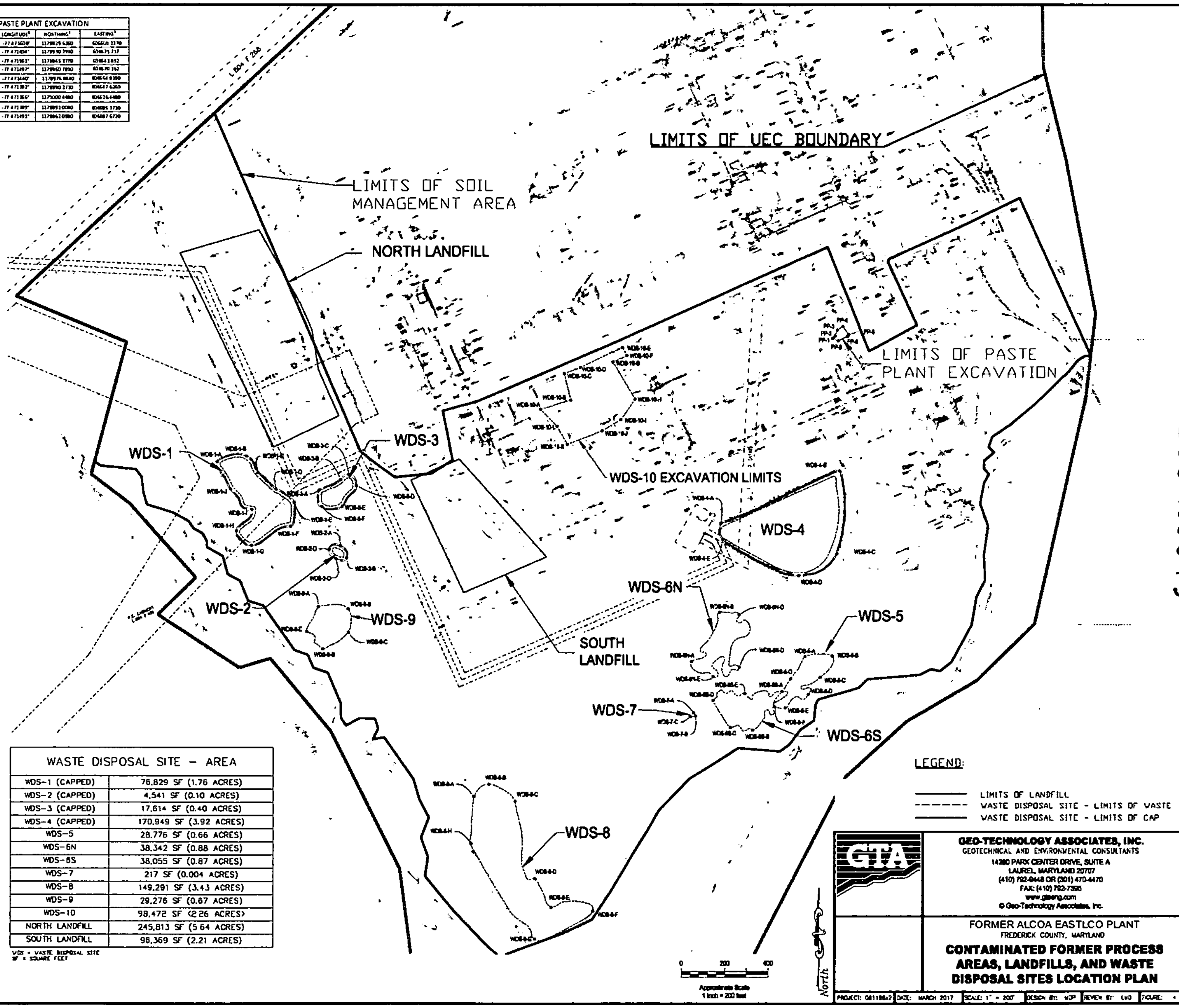

WASTE DISPOSAL SITE	AREA
WDS-1 (CAPPED)	76,829 SF (1.76 ACRES)
WDS-2 (CAPPED)	4,541 SF (0.10 ACRES)
WDS-3 (CAPPED)	17,614 SF (0.40 ACRES)
WDS-4 (CAPPED)	170,949 SF (3.92 ACRES)
WDS-5	28,776 SF (0.66 ACRES)
WDS-6N	38,342 SF (0.88 ACRES)
WDS-6S	38,055 SF (0.87 ACRES)
WDS-7	217 SF (0.004 ACRES)
WDS-8	149,291 SF (3.43 ACRES)
WDS-9	29,276 SF (0.67 ACRES)
WDS-10	98,472 SF (2.26 ACRES)
NORTH LANDFILL	245,813 SF (5.64 ACRES)
SOUTH LANDFILL	96,369 SF (2.21 ACRES)

WDS = WASTE DISPOSAL SITE
SF = SQUARE FEET

LEGEND:

- LIMITS OF LANDFILL
- WASTE DISPOSAL SITE - LIMITS OF WASTE
- WASTE DISPOSAL SITE - LIMITS OF CAP

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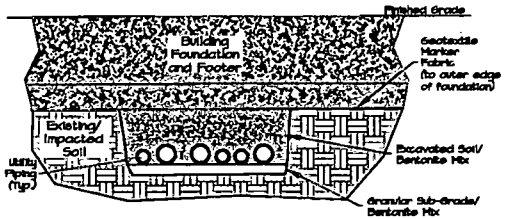
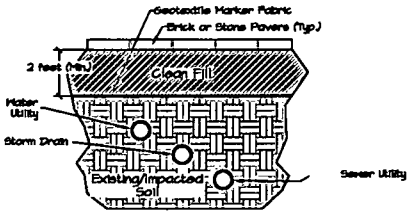
FORMER ALCOA EASTLCO PLANT
FREDERICK COUNTY, MARYLAND

CONTAMINATED FORMER PROCESS AREAS, LANDFILLS, AND WASTE DISPOSAL SITES LOCATION PLAN

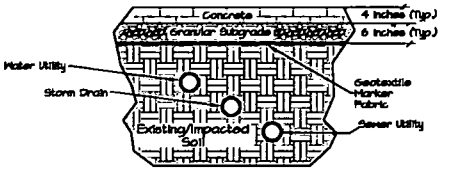
PROJECT: 0811862	DATE: MARCH 2017	SCALE: 1" = 200'	DESIGN BY: WDP	REVIEW BY: LWD	FIGURE: 4



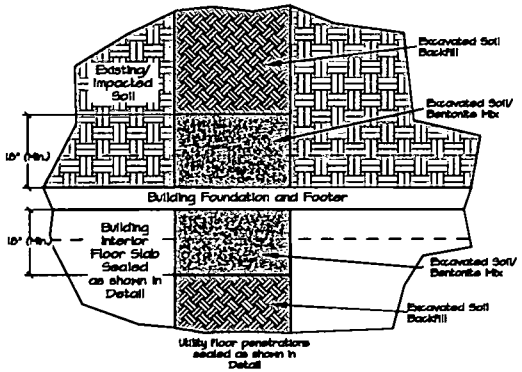
UTILITY TRENCH BUILDING PENETRATION*
Typical Section



LANDSCAPED AREA (SOIL)
Typical Section

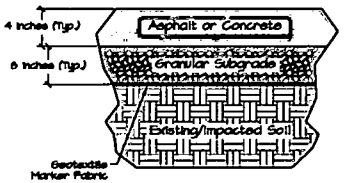


HARDSCAPED AREA (STABLE SOIL)
Typical Section

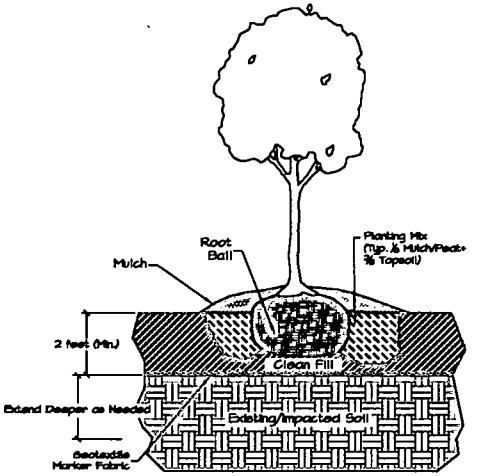


UTILITY TRENCH BUILDING PENETRATION*
Typical Plan View

* Only required if vapor intrusion is a concern.



PAVED AREA (STABLE SOIL)
Typical Section



LANDSCAPE AREA (PLANTING)
Typical Section

TABLE 1
MINIMUM PHYSICAL REQUIREMENTS FOR MARKER GEOTEXTILE

PROPERTY	UNITS	ACCEPTABLE VALUES	TEST METHOD
Grab Strength	lbs	205	ASTM D 4632
Seam Strength	lbs	195	ASTM D 4884
CBR Puncture	lbs	300	ASTM D 4833
Trapezoid Tear	lbs	80	ASTM D 4533
Apparent Opening Size	U.S. sieve	80	ASTM D 4751
Permittivity	Sec -1	1.1	ASTM D 4491
Ultraviolet Degradation	Percent	70 at 500 hrs	ASTM D 4355
Color		Orange or Black	

Notes

1. Depth/width of utility trench will vary.
2. Details are not for construction.
3. Details are provided for informational purposes only and are subject to final design.
4. Granular subgrade beneath asphalt/concrete may include MDE approved clean stone/fill.

Geotextile Marker Fabric Specifications

The geotextile marker fabric should be nonwoven pervious sheet of polypropylene material. Add stabilizers and/or inhibitors to the base material, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Regrind material, which consists of edge trimmings and other scraps that have never reached the consumer, may be used to produce the geotextile. Post-consumer recycled material may be used. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values in the weakest principal direction. Values for Apparent Opening Size (AOS) represent maximum average roll values.

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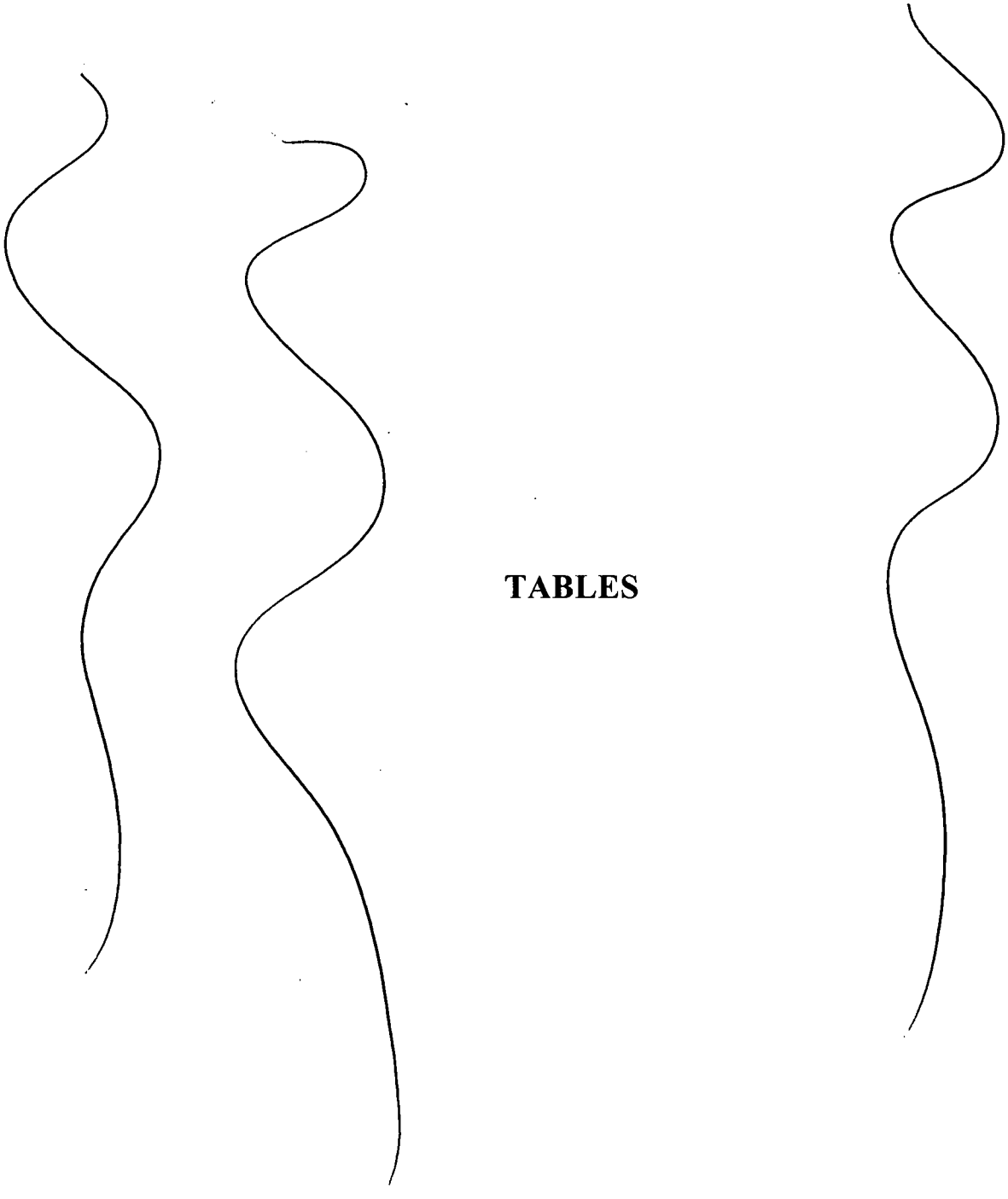
EASTALCO ALUMINUM COMPANY
FREDERICK COUNTY, MARYLAND

TYPICAL CAPPING DETAILS

PROJECT: 081198x2	DATE: AUGUST 2013	Not to Scale	DESIGN BY: JWM	REVIEW BY: PHH	FIGURE: 5



TABLES

Table 1
Potentially Exposed Populations
Eastalco Aluminum Company

MEDIA	EXPOSURE PATHWAY	POTENTIALLY EXPOSED POPULTATION	CONTAMINANTS
Groundwater	Dermal Exposure	Construction Worker	Fluoride
	Incidental Ingestion	Construction Worker	Fluoride
	Inhalation	None	Fluoride
Surface Soil	Dermal Exposure, Ingestion, Inhalation	Child, Youth, or Adult Intermittent Visitor, Adult On-Site Worker, Construction Worker	PAHs (specifically benzo(a)pyrene), priority pollutant metals (specifically arsenic), PCBs (specifically Aroclor 1016, Aroclor 1242, and Aroclor 1248)
Subsurface Soil	Dermal Exposure, Ingestion, Inhalation	Construction Worker	PAHs (specifically benzo(a)pyrene), priority pollutant metals (specifically arsenic), PCBs (specifically Aroclor 1016, Aroclor 1242, and Aroclor 1248)
Surface Water	Dermal Exposure, Ingestion	Child, Youth, or Adult Intermittent Visitor, Adult On-Site Worker, Construction Worker	Cyanide
	Inhalation	None	Cyanide

Table 2
Risk Mitigation
Eastalco Aluminum Company

POTENTIAL EXPOSURE PATHWAY	PATHWAY CONTROL MEASURE
Fugitive dust exposure to soil by on-site construction workers.	Implement a site-specific HASP and institute construction monitoring. Dust control mechanisms will follow local and/or State issued construction permits
Direct contact between on-site construction workers and soil and groundwater contamination.	Implement a site-specific HASP to protect construction personnel.
Direct contact (dermal and ingestion) between on-site workers and visitors and soil contamination.	Install pervious or impervious capping areas at the subject property.
Ingestion of contaminated groundwater.	Establish a groundwater potable use prohibition for the site by establishing an EC.

APPENDIX A

ENVIRONMENTAL BACKGROUND SUMMARY

1.0 GENERAL PROPERTY DESCRIPTION

1.1 Former Plant Area, Adjacent Properties

The Site is currently vacant, cleared land. Previously, the Site was occupied by a primary aluminum smelting plant, which was demolished in 2014. The Site contained numerous buildings housing an anode production plant (Carbon Plant), a Cathode Plant, aluminum reduction potlines (Potlines), a casting facility (Casthouse), and several maintenance shops, office buildings, and utility buildings. Immediately surrounding the manufacturing area were two state-permitted industrial landfills, grassed areas, and vacant land. A *Property Location Map* showing the Site location and surrounding land use is attached as *Figure A1*.

1.2 Site Setting

1.2.1 Topography

The Site is located in the Frederick Valley, a synclinal structure characterized by gently rolling topography. Natural elevations at the site range from approximately 300 feet above mean sea level in the low areas to about 400 feet in the higher areas. Overall, the original topography has been altered due to the placement of fill during plant construction and the on-site disposal of waste.

1.2.2 Surface Water

The Site is drained by Tuscarora Creek, a tributary of the Potomac River, located east of the plant. There is also an unnamed tributary to the west that flows south to join Tuscarora Creek. Tuscarora Creek then flows south into the Potomac River. Several man-made drainage ditches serving the site drainage systems, and monitored through the National Pollutant Discharge Elimination System, flow into Tuscarora Creek or the unnamed tributary.

1.3 Geology

1.3.1 Regional Geology

The Site is located in the southwest corner of a geologic feature known as the Frederick Valley. The Valley is the topographic expression of a subsurface asymmetrical synclinorium

composed of folded Cambro-Ordovician carbonates and siltstones of the Araby, Frederick, and Grove Formations. The elongated western limb of the synclinorium is truncated by an angular unconformity and overlain by Triassic "redbed" sedimentary strata of the Newark Group, which includes the New Oxford Formation and the Gettysburg Shale. The eastern limb of the synclinorium is foreshortened and in some cases overturned. It is bounded to the east by Precambrian metasedimentary rocks of the Western Piedmont.

The Site straddles the contact between the Triassic siltstones, sandstones, and shale of the New Oxford Formation and the Cambrian limestone of the Adamstown member of the Frederick Formation. The bedrock surface expression of this contact trends north-northeast by south-southwest and dips west-northwest. The contact surface is irregular, reflecting the erosional nature of the angular unconformity, which defines the contact between these formations in the subsurface, but, in general, the depth to the contact increases westward.

The Frederick Formation is a thin-bedded, laminated limestone with argillaceous partings and shaley zones. Estimated thickness is approximately 500 feet. The Frederick Formation has been subdivided into three members designated in ascending order: Spring Station, Adamstown, and Lime Kiln. The Adamstown member underlies the south and eastern portion of the plant site and consists of laminated, fine-grained, thinly bedded, argillaceous, dark gray limestone. The beds have a north-northeast strike and dip about 40 degrees to the east.

The New Oxford Formation consists of interbedded red and gray arkosic sandstone, red shale, and siltstone. A distinctive limestone/quartz pebble conglomerate at the base of the unit displays a mottled red and gray texture. Sandstone beds in this formation are lenticular and prone to pinching out over short distances. The total estimated thickness of the unit is 4,500 feet. In the vicinity of the Site, beds of the New Oxford Formation underlie the western and northern portion of the property. The strike of these beds is north to south and dip is to the west at 5 degrees.

1.3.2 Site Geology

Lithologic logs generated during installation of soil borings and monitoring wells at the facility show that unconsolidated materials above bedrock (overburden) are comprised of clay and silt with varying amounts of sand, gravel, and angular rock fragments. Near surface materials are composed of reddish orange to reddish brown, dense, compact silty clay, with occasional sandstone and shale fragments, gravel, and cobbles. Poorly graded limestone gravel is present at the surface at some locations.

Site boring logs indicate that deeper unconsolidated materials (weathered bedrock) are composed of reddish brown to yellowish orange silt, clay, and occasional zones of clayey gravel. The boring logs note relict bedding (inclined 20 to 30 degrees from horizontal), micaceous inclusions, and quartzite fragments. Several past reports identify this unconsolidated residual material as saprolite; which is derived from the in-situ weathering of bedrock and may retain many of the visual characteristics of the parent rock. The deeper unconsolidated materials at the site retain some of the characteristics of the parent rock; derived from in-situ weathering of limestone. The thickness of this highly weathered limestone, which grades into the overlying silty clay unit, varies but averages about 5 feet.

The Site is located within the northeast-trending Frederick syncline. According to geologic maps prepared by the Maryland Geological Survey (MGS), two bedrock formations are present beneath the site: the New Oxford and Frederick Limestone Formations (MGS, 1968). The New Oxford Formation is composed of interbedded red and gray arkosic sandstone, red shale and siltstone, with a basal conglomerate containing a red and gray calcareous matrix (MGS, 1981). The New Oxford Formation overlies the Frederick Formation. The Upper Cambrian bedrock beneath the eastern portion of the site is the Frederick Limestone Formation, which consists of highly jointed and fractured, thinly bedded, argillaceous limestone with minor shale (MGS, 1981).

Previous reports (see MFG, 2005) describe the bedrock as having an undulating surface that slopes from north to south with a bedrock trough that starts north of the Closed Industrial Landfill and appears to extend southward to the property boundary.

1.4 Hydrogeology

1.4.1 Regional Hydrogeology

Information on the regional hydrogeology was obtained from the Groundwater Atlas of the United States (U.S.) published by the U.S. Geological Survey (USGS). In the Frederick Valley area, significant sources of groundwater exist in the carbonate rock aquifers. The Frederick Limestone, which underlies most of the site, has a typical well yield of 120 to 170 gallons per minute (gpm) and can yield up to 275 gpm in some areas. The carbonate rocks of the Piedmont have virtually no primary porosity, and water in these rocks moves through secondary openings such as fractures, bedding planes, joints and faults. Water moving through the secondary openings dissolves the carbonate rock and forms dissolution channels to create an interconnected network of openings, greatly increasing the porosity of the rock. Most of the water obtained from bedrock in this area is found in fractures and dissolution channels.

1.4.2 Site Hydrogeology

The groundwater system beneath the site consists of two water-bearing units: an overburden water-bearing zone and a bedrock zone. Depth to water varies across the site and typically ranges from approximately 3 to 24 feet below ground surface (bgs). Based on lithologic descriptions of the overburden materials, most groundwater flow likely occurs in the highly fractured zone (weathered bedrock) located directly above the competent bedrock (Eastalco Aluminum Company, Aquifer Characteristics Investigation, May 29, 1996 (Atlantic, 1996). Groundwater movement in bedrock beneath the site typically occurs through fractures. In both the overburden and bedrock zones, the general direction of horizontal groundwater flow is toward the southeast.

The undulating bedrock surface, including the closed depressions and the trough, as well as the discontinuous presence of relatively impermeable materials may locally control the horizontal flow direction and the vertical migration of groundwater.

2.0 PLANT PROCESSES, WASTE STREAMS, AND CONTAMINANTS

The Site was an aluminum smelting and casting facility that began operations in 1969. Aluminum production was curtailed at the smelter in December 2005, and the plant was formally closed in March 2010.

The facility consisted of an anode production plant (Carbon Plant), a Cathode Plant, aluminum reduction potlines (Potlines), a casting facility (Casthouse), several maintenance shops as well as various offices and utility buildings.

Aluminum was created from alumina (refined bauxite ore) using an electrochemical reduction process. Primary raw materials include aluminum oxide (alumina), calcium fluoride, aluminum fluoride, cryolite, calcined petroleum coke, calcined anthracite coal, coal tar pitch, refractory bricks, and cast iron, used in the manufacture of anodes; and aluminum fluoride and cryolite, used in the aluminum Potlines. These materials were brought in by truck and rail. In addition, tetrachloroethene (PCE) was historically used to clean electrical components at the on-site electrical substation and trichloroethene (TCE) was used in the Rod Shop.

The aluminum oxide is reduced to pure aluminum in carbon-lined steel pots containing molten cryolite. Both anodes and cathodes are made of carbon. The replaceable carbon anodes, which are consumed during the smelting process, were made on-site in the Carbon Plant by molding coal tar pitch and coke into blocks that were then baked in gas-fired furnaces. Purchased pre-baked cathodes were rodded with iron bars in the Cathode Plant.

Molten aluminum was siphoned from the pots and transported in the molten state to the Cast House facility, and casted into the various products (e.g., ingots, billets) that were shipped off-site by truck. *Table A1* identifies the major waste streams and their associated contaminants.

3.0 SITE INVESTIGATION / REMEDIATION HISTORY

There have been several site investigation and remediation efforts performed at Eastalco. Some of these efforts, plus groundwater and surface water monitoring, were performed under a consent order with Maryland Department of the Environment (MDE), while others were performed on a voluntary basis. GTA has generated or reviewed the following documents relating to the Site:

- *Aquifer Characteristics Investigation, Eastalco Aluminum Company,* prepared by Atlantic Environmental Services, Inc., dated May 29, 1996.
- *Site-Wide Investigation Report, Alcoa Eastalco Works*, prepared by MFG, dated October 2005.
- *Southern Disposal Sites PCB Investigation Report, Alcoa Eastalco Works*, prepared by MFG, dated December 2006.
- *Work Plan – Waste Disposal Sites 5 through 9, Alcoa Eastalco Works*, prepared by GTA, dated August 2010.
- *Investigation Report, WDS 5 through 9*, prepared by GTA, dated March 2012, revised April 2012.
- *Sampling Plan Completion Report,* prepared by GTA, dated March 2016.

In 1992, Alcoa entered into Administrative Consent Order (ACO) CO-92-149, amended in 1997, with the MDE. The primary elements of the ACO, as amended, included the following:

- Investigate off-site migration of contaminants (tetrachloroethene [PCE], fluoride, and free cyanide) in groundwater and surface water;
- Operate a vacuum extraction system at the Substation to remediate the PCE;
- Perform a benthic survey and water balance study;

- Conduct groundwater and surface water monitoring/reporting; and
- Pump and treat groundwater near the Former SPL Pad and Closed Industrial Landfill for fluoride plume control.

The PCE source was known to be the Plant's electrical substation, where this chlorinated solvent had been used historically to clean electrical components. The vacuum extraction system was operated from 1996 to 1997 to remove contaminants from the subsurface. At MDE's request, Alcoa conducted a three-phase investigation of the substation area in 2002 and 2003 to further evaluate post-remediation conditions. A report, *PCE Investigation Results and Site Conceptual Model, Alcoa Eastalco Works*, (MFG, 2003) documenting the results of the investigation was provided to MDE in May 2003.

A voluntary multi-phase site-wide investigation was performed by Alcoa at the Eastalco plant from 2003 to 2005 to better understand the potential sources of the fluoride contaminant plume in groundwater. The results of the *Site-Wide Investigation Report* (MFG, 2005) were provided to the MDE in October 2005. The investigation determined that the source of fluoride was the North and South Ponds (which were used prior to curtailment for treating potline wet scrubber water that was heavily contaminated with fluoride). The ponds were removed from service when the plant was curtailed at the end of 2005.

In 2007, a new ACO (CO-07-026, dated April 23, 2007) was signed between Eastalco and MDE. CO-07-026 noted that:

- Alcoa had complied fully with the terms of CO-92-149, as amended and had no ongoing obligations with the requirements therein;
- CO-92-149, as amended, was terminated and superseded by the 2007 Order;
- No further action was necessary to address the PCE contamination emanating from the facility's electrical substation; and

- Groundwater monitoring for cyanide, surface water monitoring for fluoride, and groundwater pumping can be terminated effective December 16, 2005.
-

CO-07-026 requires that Eastalco conduct groundwater monitoring for fluoride and surface water monitoring for free cyanide in accordance with the revised MDE-approved monitoring plan (see Tetra Tech, 2011). Semiannual monitoring and reporting has been conducted since the original plan was submitted in May 2007.

4.0 AREAS OF ENVIRONMENTAL CONCERN

There are several landfills, historical waste disposal sites, and contaminated process areas that are required to be managed under an Environmental Covenant (EC). The subsections below summarize these areas of environmental concern.

4.1 Permitted Industrial Landfills

4.1.1 South Landfill

The South Landfill (see Figure A2) was constructed in 1983 and was permitted to receive various types of non-hazardous industrial wastes including fluoridated wastes, carbon wastes, refractory wastes and miscellaneous trash. The landfill (formerly referred to as the Closed Industrial Waste Landfill) was lined with 18 inches of clay, a 30-mil polyvinyl chloride (PVC) liner, and an additional 18-inch layer of clay.

The last permit issued by the MDE for the landfill prior to its closure in 1994 was Refuse Disposal Permit No. 90-IW-0042 (dated June 12, 1990). The final volume of disposed waste at the 3.6-acre landfill was approximately 62,500 cubic yards. A closure plan detailing the construction specifications was submitted to MDE in November 1993 and was approved by MDE in June 1994. A copy of the approval letter is included as Attachment A1 of this Appendix. The landfill was closed and capped with a PVC liner, clay cover, and vegetation at the end of 1994. As part of the closure, a leachate collection system was constructed to direct leachate to the South Pond.

A leak was detected in the landfill liner in 1990, and measures were taken to address the suspected leakage of leachate at the southeast corner of the Industrial Landfill in 1991. The liner in this area was replaced with a double liner, the leachate removal system was modified to enhance the efficiency of operation, and a leachate collection tank was installed. Leachate entering the holding tank flowed to a wet scrubber system bypassing the South Pond. In mid-2002, a leak was found in the containment tank lining. The tank was removed from service and the piping was rerouted to the SO2 process water supply tank. From there the leachate was directed to the SO2 scrubber system. In December 2005, the plant curtailed operations and the wet scrubber system ceased to operate. As a result, the containment tank lining was rehabilitated and the tank is now used to store leachate, which is periodically pumped from the tank to a tanker truck and transported to an off-site treatment and disposal facility.

Groundwater monitoring is performed at wells surrounding the landfill under the Closed Landfill Groundwater Monitoring Plan (MFG, 2006).

4.1.2 North Landfill

The North Landfill (see Figure A2) was constructed in 1993 and was permitted to receive various types of non-hazardous industrial wastes including fluoridated wastes, carbon wastes, refractory wastes, and miscellaneous trash. The last permit issued by the MDE for the landfill was Refuse Disposal Permit No. 2009-WIF-0537 dated October 2, 2009. The landfill (formerly referred to as the Active Industrial Waste Landfill) was constructed to hazardous waste landfill standards as a conservative measure, although it was never permitted or used for hazardous waste disposal. Cells 1 and 2 were constructed in 1993 and 2012, respectively, with a 24" re-compacted subgrade that underlies a double liner system (geocomposite clay liner in between two HDPE liners). Details regarding the construction specifications of the Landfill can be found in permit applications developed by EA Engineering Science and Technology, Inc. ([EA], 1991 and 1992). Together Cells 1 and 2 have an area of about 9.7 acres. Both the primary and secondary liners are continuously monitored for leachate. Generated leachate is piped to a containment tank and periodically transferred to a tanker truck for transport to an off-site treatment and disposal facility.

Closure activities for the North Landfill began in 2016 in accordance with the approved Closure and Post-Closure Care Plan (EA, 2015) and were completed in 2017. Groundwater monitoring is performed at wells surrounding the landfill under the Landfill Groundwater Monitoring Plan (Tetra Tech, 2010).

4.2 Historical Waste Disposal Sites

There are several historical waste disposal sites at the former plant site. The subsections below discuss the locations, contents, associated contaminants, and current disposition.

Clayey soils are present below the waste disposal sites to the top of the bedrock. The low permeability clayey soils provide a barrier between the waste and the underlying groundwater.

Impacts to groundwater from these waste sites are minor based on contaminant concentrations in nearby downgradient monitoring wells (minimal fluoride and no PCBs or PAHs). In addition, surface soil, sediment, and the surface water in the seepage pits, farm fields, and surface water bodies adjacent to the southern disposal sites were not significantly impacted as a result of the waste disposal. This suggests that the contamination is tightly bound to the waste materials and is not migrating appreciably.

4.1.1 WDS-1 through WDS-4

Plant records show three waste disposal sites (WDS-1, -2, and -3) located near the western fence line and indicate that these sites were used for the one-time disposal of spent potlining (SPL) carbon ("first-cut", K088) and bricks ("second-cut"), and tarry scrubber solids in 1973 before the K088 designation. The records also contained information on a disposal site referred to as WDS-4 which is located south of the former Bake Ovens (see Figure A2) and was a landfill used from the late 1970's to the early/mid 1980's for the disposal of various kinds of fluoridated waste, excluding SPL, before the now closed South Landfill was constructed. The operation of WDS-4 was not constructed under a state permit, and has no liner or leachate collection system. In 1986, WDS-1 through 4 were each covered with 2 feet of compacted soil and vegetation. In a letter dated

February 23, 2009, the MDE Controlled Hazardous Substance program eliminated WDS-1 through WDS-4 from further consideration due to historical records indicating that MDE was involved with closing these WDS in the 1980s. The covers on these sites are subject to the maintenance requirements described in the SMP.

4.1.2 WDS-5 through WDS-9

As discussed in the 2005 Site-Wide Investigation Report, large grassy fields located south and west of the main plant operations area were found to contain several historical waste disposal sites (WDS-5 through WDS-9) which contained various types of waste materials including carbon, bricks, and construction debris. The field containing the southern disposal sites is referred to as the C-Line Area because construction of a third pot line (the "C-Line") on a portion of this field was considered in the 1970s but was never constructed.

As noted earlier, the Site-Wide Investigation was performed to better understand the potential sources of the fluoride contaminant plume in groundwater. The investigation determined that the 53-acre grassy field located south of the main plant operations, contains a large amount of fill material that was deposited in the 1970's. While most of this material is clean fill, four distinct areas of buried waste (WDS-5 through WDS-8) were identified. Additionally, WDS-9 was identified near the western fence line (south of a former barn at the Old Biser Farm).

WDS-5 through WDS-8 were found to contain waste consisting mainly of carbon materials (mostly anodes and pitch with some isolated pieces of SPL), as well as cryolite and construction debris. Combined, WDS-5 through WDS-8 contain about 35,000 cubic yards of waste, and occupy approximately 5 acres of the 53-acre field (WDS-4 occupies another 4.5 acres). In addition to WDS-5 through WDS-8, scattered buried debris (e.g., virgin cathode blocks and a furnace brick wall section) was encountered in other portions of the grassy field. Subsequent investigations determined that the northern portion of WDS-6 is physically separate from the southern portion (former trench landfill), and that the disposed wastes and levels of contamination in the two

portions are significantly different. Therefore, the northern and southern portions are referred to as WDS-6(N) and WDS-6(S), respectively.

WDS-9 was found to contain about 6,000 cubic yards of buried waste (mostly high-carbon cryolite with some anode chunks) over an area that covers approximately 0.7 acres.

In addition to fluoride, the wastes at WDS-5 through 9 as well as surrounding environmental media (soil, groundwater, surface water and sediment) were tested for other parameters during the Site-Wide investigation (and subsequent follow-up investigations requested by MDE) including metals, volatile organic compounds, semi-volatile organic compounds, and polychlorinated biphenyls (PCBs) to characterize the waste sites and evaluate their impact on the environment. Surrounding environmental media included groundwater, surface water and sediment in nearby streams and soil from an adjacent farm field, and from former seepage pits located around the perimeter of the C-Line grassy field which were likely used to capture runoff when WDS-5 through 8 were active.

In general, PCBs and polycyclic aromatic hydrocarbons (PAHs) are the primary waste-derived contaminants of concern at these waste sites. Table A2 summarizes the range of PCB and PAH contamination detected during the various site investigations. As expected, the greatest levels of PCB and PAH contamination resides in the waste itself.

While the disposed wastes at WDS-5, 7, and 8 are covered by significant layers of clayey soils and are not readily accessible for exposure, the wastes at WDS-6 (north and south) and WDS-9 were found to have waste materials near the surface that could be accessible for exposure, especially if activities are performed in the area that disturb the ground surface. In particular, WDS-6(S) was found to have wastes with high levels of PCBs at the surface with nearly no soil cover.

Because PCBs were detected in soil samples from WDS-5 through 8, the time in which the disposal occurred is important with regards to the Toxic Substances Control Act (TSCA) regulations. Based on a review of historical records and an analysis of aerial photographs, the wastes at WDS-5 through WDS-8 were apparently deposited between 1973 and 1974. Because these wastes were disposed of prior to April 18, 1978 and the wastes are not believed to present an unreasonable risk of injury to health or the environment, these sites are not required to be cleaned up in accordance with TSCA regulations.

4.1.3 WDS-10

WDS-10 was identified within the former plant in the vicinity of Building 55. This site was found to contain approximately 17,300 cubic yards of buried waste materials over an area that covers approximately 2.26 acres. During demolition of Building 55, located on the central portion of the facility, waste materials were encountered below the building slab. This material was originally believed to be spent potliner waste (SPL waste), but after laboratory testing (see details below) and a review of historical records, this material was determined to be a combination of water treatment pond sludge and other plant debris. According to historic documentation, the State of Maryland approved the placement of this waste materials with an asphalt cover in the location of existing WDS-10 in January 1974.

The waste materials were encountered beneath and surrounding former Building 55 to depths up to 5 feet bgs. The wastes encountered was composed of light to dark gray, fine to medium grain material. Large bricks, were also encountered in the majority of the test pits. Test pits were conducted to delineate WDS-10 and composite soil samples were collected to characterize the waste. The soil samples collected from the waste indicated elevated concentrations of PAHs, PCBs, and metals. Additional grab soil samples were collected from the native material beneath the waste materials. The soil samples collected from the native soil beneath the waste materials did not report concentrations of PAHs or PCBs above the reporting limits. The sampling results for the composite and grab samples are presented in Table A3.

Between August and November 2016, approximately 17,300 cubic yards of soil and waste was removed from WDS-10. In a letter dated July 5, 2016, the MDE approved the placement of the waste and soil in the Eastalco Aluminum Waste North Landfill located on the subject property. Approximately 6,300 cubic yards of waste was placed within this landfill. The remaining wastes (approximately 11,000 cubic yards) were transported to an offsite disposal facility, located in King George, Virginia. Once the waste materials were removed and disposed of, 13 confirmatory soil samples from the sidewalls and base of the excavation area were collected. The confirmatory soil samples collected from the sidewalls and the base of the excavation indicated concentrations of PAHs, PCBs, TAL metals, fluoride, and cyanide above the laboratory reporting limits. The sampling results for the confirmatory soil samples are presented in Table A4.

The excavation area was backfilled with soil borrow material from the Lifetime Fitness stockpile located in Gaithersburg, Maryland and from the Chevy Chase Lakes stockpile located in Chevy Chase, Maryland. The soil borrow material was backfilled and placed on the native material at depths ranging from two to five feet bgs. This material was reportedly from earth moving activities associated with new construction. Several soil samples were collected from these stockpile locations prior to being relocated to the subject property. Details pertaining to the soil borrow are included in *Attachment A2 – Material Evaluation of the Alcoa Eastalco Works*.

4.1.4 Former Operations Areas

Environmental investigations of the former operations areas occurred after the plant was shut down and underwent demolition.

Within the former plant operations area, the primary contaminants that resulted from past smelting operations are: fluoride and cyanide, resulting from the historical use and storage or disposal of SPL carbon ("first-cut") and bricks ("second-cut"), cryolite, and other fluoridated wastes; PCBs, resulting from the historical use of Therminol (heat transfer medium) in the Paste Plant; and PAHs, resulting from the historical use of carbon materials such as pitch and anodes.

The process areas included in Figure A3 (such as Potlines, former maintenance shops etc.) and other areas shown on Figure A2 (such as ponds [North and South] and lagoons that handled process and/or storm water, and waste storage areas, an area where wastes were historically buried) were found to have concentrations of PAHs above the NRCS.

The aforementioned former North and South Ponds are located on the western portion of the subject property (see Figure A2). These ponds were sampled to determine the extent of fluoride contamination. Samples were collected from four different locations at the North Pond at depths of 0 to 2 feet bgs and 2 to 4 feet bgs. Samples were collected from two different locations at the South Pond at depths of 0 to 2 feet bgs and 2 to 4 feet bgs. In addition, one more sample was taken at a depth of 0 to 2 feet bgs at two other locations in the South Pond. The surface composition at the sample locations consisted primarily of asphalt. Below the asphalt, visual observation of the borings indicated silty clay and silt. These samples were analyzed for fluoride. Fluoride concentrations in soil from the North Pond ranged from 15 milligrams/kilogram (mg/kg) to 280 mg/kg. Fluoride concentrations in soil from the South Pond ranged from 160 mg/kg to 480 mg/kg. The fluoride concentrations decreased with depth in each sample in the North Pond except for one sample location. Fluoride concentrations decreased with depth in the two samples that were collected at two different depths in the South Pond.

With the demolition of the plant, additional evaluation of process areas for contaminants of potential concern (COPCs) was deemed necessary prior to redevelopment to establish areas where remediation or capping may be required as part of the redevelopment. The findings based on the sampling results presented in the Sampling Plan Completion Report is incorporated into the summary below.

The former process areas included in Figure A3 were evaluated by performing soil borings in an approximate grid pattern within each designated area, with locations biased toward previous site features as appropriate. Samples were collected from 0-1 foot bgs and 4-5 feet bgs in each

boring, and were analyzed for the potential contaminants identified for the area of concern being evaluated (see Table A5 and figure A3).

The former railroad offloading area, former surface water lagoons and ponds, the former carbon dust storage area, the former SPL building, pads, and ponds, the former paste plant area, the former anode block annex, bake oven, and rod shop all had detections of PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene) above the MDE NRCS up to depths of five feet bgs (see Figure A3). Although there are no cleanup standards for fluoride, the former bath crushing area and the former SPL Building, SPL Pad, and North and South Ponds had detections of fluoride greater than 100 mg/kg in soil to depths up to five feet bgs. These fluoride concentrations are in line with samples collected during the 2005 site-wide investigation in which it was determined that such concentration in soils were not a significant source of fluoride to groundwater.

The COPCs were not found above the MDE NRCS in several process areas, including the Potlines, Rectifier/Substation, Maintenance Shops, Cast House, and Cathode Plant.

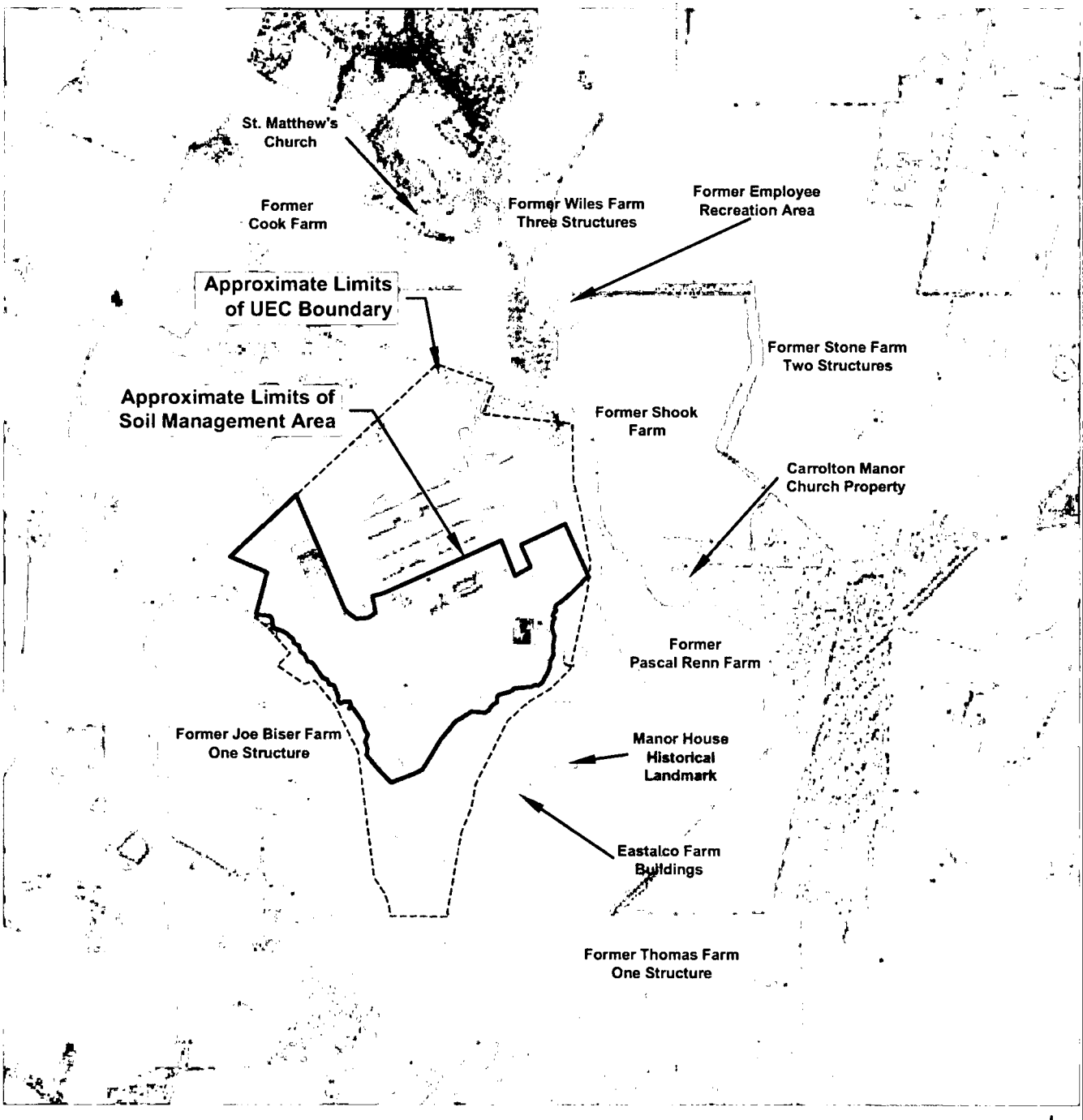
Although not related to the smelting process, arsenic was also detected in soils above the NRCS and the Anticipated Typical Concentration (ATCs) values in the former anode block annex, bake oven and rod shop area. Arsenic is naturally occurring in soil and concentrations can vary widely. The ATC values represent a statistical analysis of analyzed background soil samples previously collected throughout the state. The arsenic concentrations identified in western Maryland in this study ranged from 0.055 mg/kg to 27 mg/kg. The nationwide average of arsenic concentrations, as published by the USGS is 7.2 mg/kg.

Additionally, arsenic can be compared to risk-derived values, developed from standard risk assessment calculations using United States Environmental Protection Agency (USEPA) and MDE guidance for risk assessments, and incorporating a relative bioavailability value of 0.6 (60%), rather than the default relative bioavailability of 1.0 (100%), an approach approved by

USEPA and MDE in 2013. By using this risk assessment approach, an alternate arsenic remedial goal for a residential and commercial use is 10.1 mg/kg. Using this concentration as the comparison value, none of the samples from the process areas analyzed for priority pollutant metals contained arsenic above 10.1 mg/kg. A soil sample from a 2004 test pit sample at WDS-9 contained arsenic at 30 mg/kg which is above the alternate arsenic remedial goal of 10.1 mg/kg, but is close to the statistical maximum in the above-mentioned western Maryland study.

APPENDIX A

FIGURES



Note

1. Base image obtained from Google Earth (©2016 Google).

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EASTALCO ALUMINUM COMPANY

FREDERICK COUNTY, MARYLAND

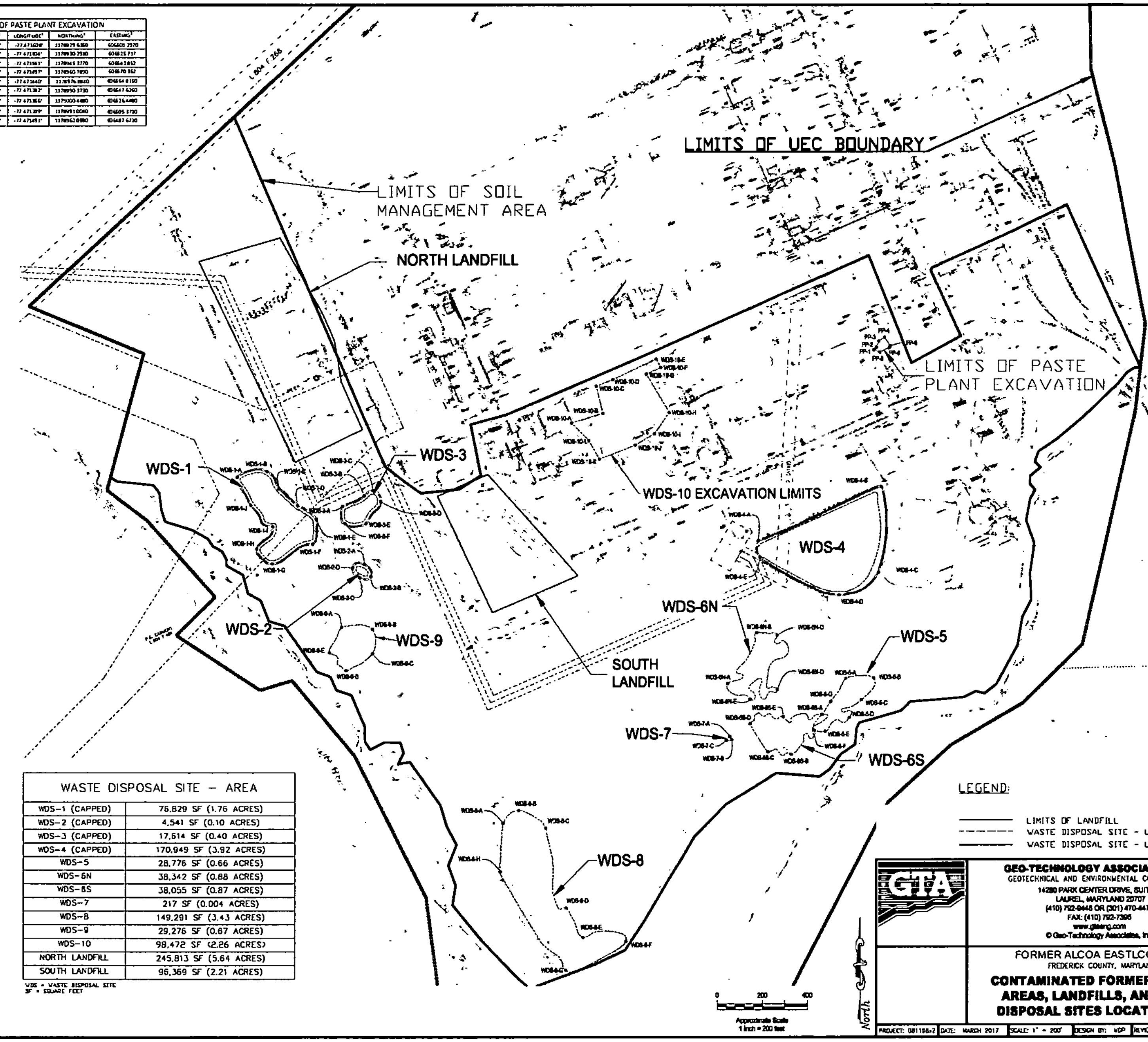
PROPERTY LOCATION MAP

PROJECT: 081198x2	DATE: JUNE 2013	SCALE: 1" = 2,000'	DESIGN BY: JWM	REVIEW BY: PHH	FIGURE: A1

	LATITUDE[1]	LONGITUDE[1]	NORTHING[1]	EASTING[1]
WDS - 1				
WDS-1-A	39.3794683°	-77.4815308°	605980.9140	1176136.5490
WDS-1-B	39.3795183°	-77.4820717°	605966.0024	1176249.3157
WDS-1-C	39.3791238°	-77.4808867°	[illegible]	1176301.7332
WDS-1-D	39.3791306°	-77.4805807°	606813.9067	1176306.0475
WDS-1-E	39.3289535°	-77.4807907°	606752.7175	1176466.0459
WDS-1-F	39.3286605°	-77.4807649°	606642.4332	1176490.2092
WDS-1-G	39.3284066°	-77.4805675°	606554.5428	1176277.2051
WDS-1-H	39.3286092°	-77.4812268°	606621.7002	1176203.5693
WDS-1-I	39.3790604°	-77.4809779°	606739.0117	1176234.3632
WDS-1-J	39.3791248°	-77.4813167°	606816.6406	1176176.4317
WDS - 2				
WDS-2-A	39.3284053°	-77.4795459°	606561.9145	1176670.6112
WDS-2-B	39.3282570°	-77.4794450°	606450.0309	1176706.0647
WDS-2-C	39.3282436°	-77.4796170°	606493.1171	1176680.3632
WDS-2-D	39.3281607°	-77.4797358°	606535.9436	1176627.6133
WDS - 3				
WDS-3-A	39.3281137°	-77.4790013°	606010.1796	1176682.2961
WDS-3-B	39.3792429°	-77.4795637°	606657.0213	1176670.3038
WDS-3-C	39.3793074°	-77.4794167°	606080.3136	1176717.0080
WDS-3-D	39.3791723°	-77.4792967°	606031.5126	1176750.6716
WDS-3-E	39.3285090°	-77.4795320°	606734.2209	1176606.3393
WDS-3-F	39.3285003°	-77.4790673°	606733.0001	1176532.0043
WDS - 4				
WDS-4-A	39.3287167°	-77.4734013°	606646.3689	1178417.3645
WDS-4-B	39.3293067°	-77.4734704°	606869.9354	1178962.5032
WDS-4-C	39.3203167°	-77.4735170°	606514.5964	1178949.4579
WDS-4-D	39.3180990°	-77.4721264°	606435.1507	1178776.7605
WDS-4-E	39.3205113°	-77.4723607°	606502.0626	1178435.9325
WDS - 5[2]				
WDS-5-A	39.3270380°	-77.4720194°	606042.4033	1178806.1301
WDS-5-B	39.3270432°	-77.4715847°	606043.9856	1178940.2050
WDS-5-C	39.3262766°	-77.4717751°	604946.0652	1178073.7407
WDS-5-D	39.3266372°	-77.4719637°	604967.5800	1178020.2400
WDS-5-E	39.3268070°	-77.4721350°	604806.1711	1178734.4378
WDS-5-F	39.3263968°	-77.4728029°	604809.0711	1178667.2164
WDS-5-G	39.3267507°	-77.4732530°	604930.5187	1178720.5021
WDS - 6N[2]				
WDS-6N-A	39.3280663°	-77.4730607°	606019.0131	1178381.5276
WDS-6N-B	39.3279534°	-77.4734179°	605364.4384	1178410.6530
WDS-6N-C	39.3275387°	-77.4730898°	605734.7374	1178503.3092
WDS-6N-D	39.3268964°	-77.4730640°	604992.8701	1178503.0856
WDS-6N-E	39.3267787°	-77.4735178°	604990.2515	1178380.7507
WDS - 6S[2]				
WDS-6S-A	39.3266943°	-77.4723859°	604881.6613	1178700.5890
WDS-6N-B	39.3263032°	-77.4720694°	604703.5462	1178566.7264
WDS-6S-C	39.3261340°	-77.4732257°	604736.2571	1178462.3113
WDS-6S-D	39.3264743°	-77.4735154°	604830.6622	1178380.7567
WDS-6S-E	39.3266663°	-77.4729015°	604871.5796	1178529.3217
WDS - 7[2]				
WDS-7-A	39.3263150°	-77.4738757°	604782.4231	1178291.7999
WDS-7-B	39.3262783°	-77.4737957°	604768.6470	1178301.3953
WDS-7-C	39.3262704°	-77.4738808°	604766.9660	1178277.0516
WDS - 8[2]				
WDS-8-A	39.3252457°	-77.4773708°	604387.0538	1177287.9306
WDS-8-B	39.3254045°	-77.4773209°	604456.3605	1177356.9873
WDS-8-C	39.3251899°	-77.4762051°	604376.5790	1177476.0847
WDS-8-D	39.3242139°	-77.4762807°	604020.4567	1177546.3435
WDS-8-E	39.3238513°	-77.4763147°	603890.8476	1177640.7161
WDS-8-F	39.3238034°	-77.4754487°	603871.3643	1177629.0156
WDS-8-G	39.3234523°	-77.4763630°	603741.3108	1177564.3817
WDS-8-H	39.3246630°	-77.4774077°	604383.6135	1177276.2957
WDS - 9[2]				
WDS-9-A	39.3276395°	-77.4798964°	605277.0476	1176677.9206
WDS-9-B	39.3276130°	-77.4796347°	605162.7005	1176734.3695
WDS-9-C	39.3273120°	-77.4794097°	605153.8035	1176736.3944
WDS-9-D	39.3275076°	-77.4798234°	605097.8526	1176597.6380
WDS-9-E	39.3246130°	-77.4800629°	605357.6617	1176635.3417
WDS - 10[2]				
WDS-10-A	39.331349°	-77.476238°	606382.276	1177589.929
WDS-10-B	39.331267°	-77.475849°	606224.537	1177727.932
WDS-10-C	39.331601°	-77.479853°	606306.344	1177699.120
WDS-10-D	39.331681°	-77.4757°	606375.830	1177770.86
WDS-10-E	39.331937°	-77.479227°	606467.354	1177963.117
WDS-10-F	39.330632°	-77.47494°	606428.990	1177984.436
WDS-10-G	39.331758°	-77.475273°	606400.922	1177930.067
WDS-10-H	39.331288°	-77.474817°	606229.2	1178023.566
WDS-10-I	39.330027°	-77.479039°	606234.471	1177956.576
WDS-10-J	39.329879°	-77.475345°	606087.472	1177868.744
WDS-10-K	39.329700°	-77.479899°	606031.005	1177732.707
WDS-10-L	39.329937°	-77.474064°	606334.663	1177646.336

1. LATITUDE AND LONGITUDE ARE REPRESENTED IN THE MARYLAND STATE PLANE COORDINATE SYSTEM. NORTHING AND EASTING ARE REPRESENTED IN U.S. SURVEY FEET.
2. BOUNDARIES OF WASTE ARE APPROXIMATE AND BASED ON INTERPRETATION OF OBSERVED SITE CONDITIONS

LIMITS OF PASTE PLANT EXCAVATION				
WAYPOINT ID	LATITUDE[1]	LONGITUDE[1]	NORTHING[1]	EASTING[1]
PP1	39.333063°	-77.473604°	1178079.6350	606601.2370
PP2	39.333111°	-77.473804°	1178030.2930	606625.717
PP3	39.333163°	-77.473563°	1178945.3770	606642.852
PP4	39.333238°	-77.473497°	1178960.7850	606670.362
PP5	39.333225°	-77.473440°	1178976.8840	606664.8150
PP6	39.333172°	-77.473382°	1178990.3730	606647.6260
PP8	39.333134°	-77.473356°	1179000.4400	606626.4400
PP9	39.333056°	-77.473359°	1178995.0040	606605.3730
PP10	39.333007°	-77.473491°	1178962.0980	606487.6730



WASTE DISPOSAL SITE – AREA	
WDS–1 (CAPPED)	76,829 SF (1.76 ACRES)
WDS–2 (CAPPED)	4,541 SF (0.10 ACRES)
WDS–3 (CAPPED)	17,614 SF (0.40 ACRES)
WDS–4 (CAPPED)	170,949 SF (3.92 ACRES)
WDS–5	28,776 SF (0.66 ACRES)
WDS–6N	38,342 SF (0.88 ACRES)
WDS–6S	38,055 SF (0.87 ACRES)
WDS–7	217 SF (0.004 ACRES)
WDS–8	149,291 SF (3.43 ACRES)
WDS–9	29,276 SF (0.67 ACRES)
WDS–10	98,472 SF (2.26 ACRES)
NORTH LANDFILL	245,813 SF (5.64 ACRES)
SOUTH LANDFILL	96,369 SF (2.21 ACRES)

WDS = WASTE DISPOSAL SITE
SF = SQUARE FEET

LEGEND:

LIMITS OF LANDFILL
VASTE DISPOSAL SITE – LIMITS OF WASTE
VASTE DISPOSAL SITE – LIMITS OF CAP

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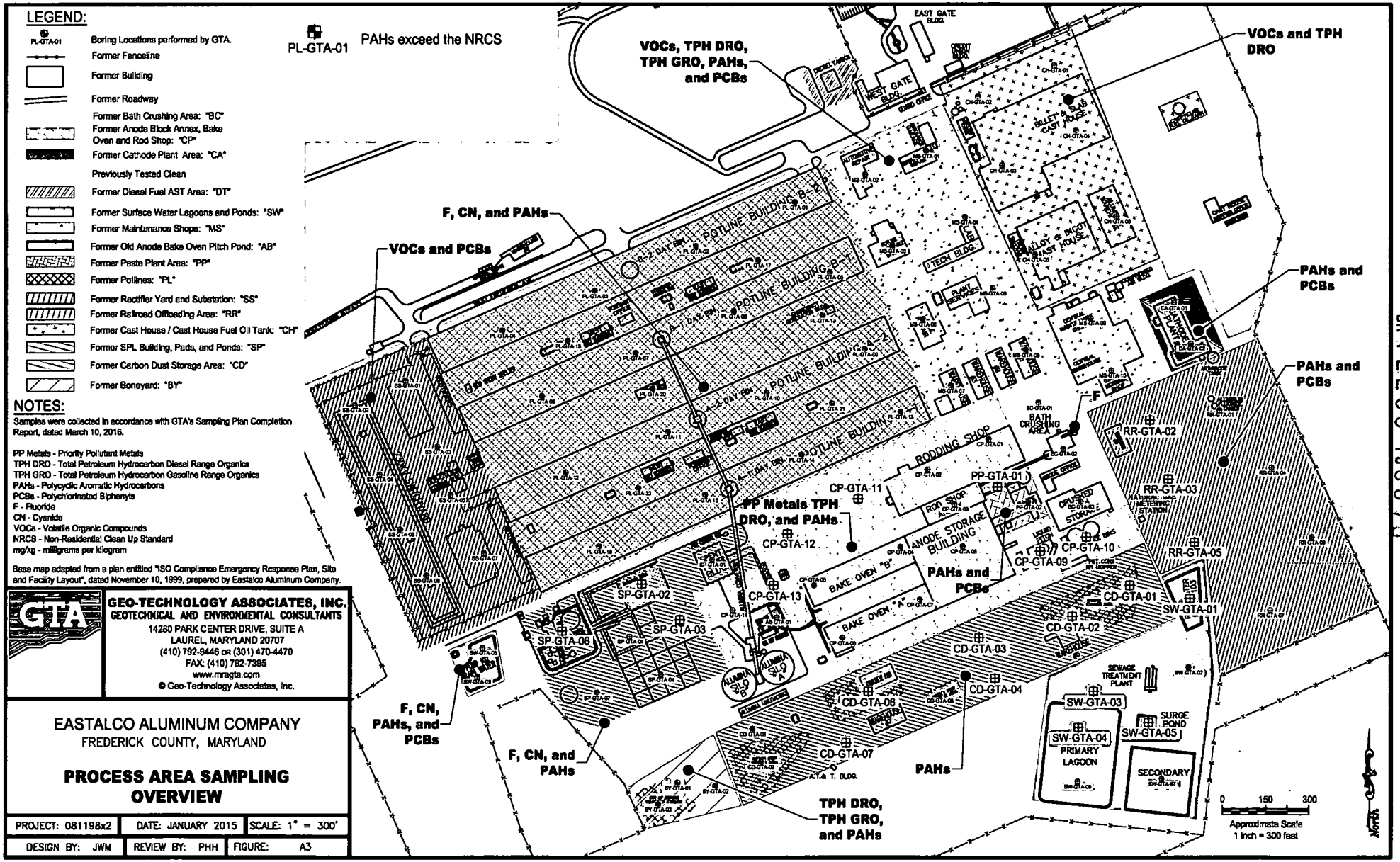
FORMER ALCOA EASTLCO PLANT
FREDERICK COUNTY, MARYLAND

CONTAMINATED FORMER PROCESS AREAS, LANDFILLS, AND WASTE DISPOSAL SITES LOCATION PLAN

PROJECT: 081186x2	DATE: MARCH 2017	SCALE: 1" = 200'	DESIGN BY: MDP	REVIEW BY: LWD	FIGURE: A2



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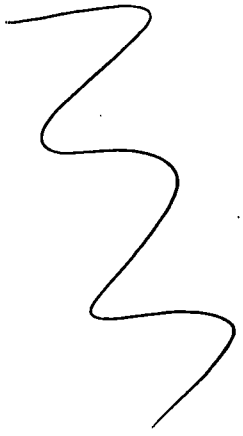
EASTALCO ALUMINUM COMPANY
FREDERICK COUNTY, MARYLAND

PROCESS AREA SAMPLING OVERVIEW

PROJECT: 081198x2	DATE: JANUARY 2015	SCALE: 1" = 300'
DESIGN BY: JWM	REVIEW BY: PHH	FIGURE: A3



APPENDIX A

TABLES

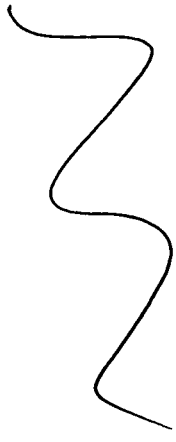


Table A1

Smelting Waste Streams and Contaminants

Eastalco Aluminum Company

Process Waste Material	General Characteristics	Major Constituents					
		Organics		Inorganics			Misc.
		PAHs	PCBs	CN	F	RCRA Metals	
Misc. Carbon:							
Unused Cathode Block	Baked Anthracite & Pitch	x				low	
Spent Potliner 1st Cut	Anthracite, Graphite, Pitch, Bath	x		x	x	low	Na, Al, Ca, S, N
Unused Anode	Petroleum Coke, Pitch	x				low	
Anode Butts	Petroleum Coke, Pitch, Bath	x			x	low	Na, Al, Ca
Pitch Waste	Pitch, Dirt	x				low	
Pitch Pond Sludge	Pitch, Petroleum Coke, Anode	x				low	
HTM Carbon Dust/Sludge	Petroleum Coke, Pitch Dust, PCBs	x	x			low	HTM oils
Bake Oven Brick	Tongue & Grove Refractory Brick	low				low	Inert Al silicates
Spent Potliner 2nd Cut	Refractory Brick			low	x	low	
Cryolitic Bath	Bath, Alumina, Carbon			low	x	low	Na, Al, Ca
Dry Scrubber Dust (Reacted Alumina)	Alumina from Dry Scrubber				x	low	Al2O3
High Carbon Cryolite (Potline Scrubber	Alumina, Bath, Carbon	x		x	x	low	Na, Al, Ca, S, N
Dross	Salt, Aluminum, Bath, Nitrides					low	Al, Cl, K, Na, N

Notes: PAHs = Polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
CN = Cyanide
F = Fluoride
RCRA = Recource Conservation and Recovery Act
Na = Sodium
Al = Aluminum
CA = Calcium
S = Sulfer
N = Nitrogen

Table A2

PCB and PAH Concentrations in WDS-5 through WDS-9

Eastalco Aluminum Company

Location	Depth (feet)	Areal Extent (square feet)	Maximum PCB Concentration (ppm)	Maximum PAH Concentration Using Benzo(a)pyrene as Indicator (ppm)
WDS-5	4 to 16	28,776	510	460
WDS-6N	0.25 to 5	38,342	28	350
WDS-6S	0 to 12	38,055	5,700	530
WDS-7	4 to 5	216	Below laboratory reporting limits	Below laboratory reporting limits
WDS-8	4 to 18	149,291	56	280
WDS-9	0 to 13	29,276	0.026	0.56

Notes: PCB = polychlorinated biphenyls
PAH = polycyclic aromatic hydrocarbons

Table A3
Grab and Composite Soil Analysis Summary - (WDS-10)

Sample Identification	WDS10-TP-33-Comp	WDS10-TP-33	WDS10-TP-34-Comp	WDS10-TP-34	WDS10-TP-35-Comp	WDS10-TP-35	WDS10-TP-36-Comp	WDS10-TP-36	WDS10-TP-37-Comp	WDS10-TP-37
Depth (feet)	NA	3-4	NA	3-4	NA	3.5-4.5	NA	4.5-5.5	NA	3-4
PAHs										
Acenaphthene	1.9	--	2.2	--	1.8	--	2.3	--	4.2	--
Anthracene	1.5	--	1.6	--	1.4	--	2.1	--	3.1	--
Benzo(a)anthracene	5.0	--	5.7	--	5.4	--	4.7	--	11.0	--
Benzo(a)pyrene	6.4	--	7.0	--	7.2	--	5.3	--	12.0	--
Benzo(b)fluoranthene	6.0	--	6.4	--	6.6	--	5.4	--	15.0	--
Benzo(ghi)perylene	4.3	--	4.2	--	4.5	--	3.2	--	7.6	--
Benzo(k)fluoranthene	4.7	--	4.5	--	4.8	--	3.3	--	4.2	--
Chrysene	5.4	--	5.7	--	5.6	--	4.6	--	11.0	--
Dibenz(a,h)anthracene	1.6	--	1.7	--	1.8	--	1.2	--	2.9	--
Fluoranthene	7.6	--	8.1	--	8.2	--	8.5	--	15.0	--
Fluorene	--	--	--	--	--	--	--	--	1.1	--
Indeno(1,2,3-cd)Pyrene	5.0	--	5.2	--	5.3	--	3.8	--	9.6	--
Phenanthrene	5.4	--	5.6	--	5.4	--	7.4	--	11.0	--
Pyrene	7.6	--	8.2	--	8.5	--	8.1	--	16.0	--
All Remaining PAHs	--	--	--	--	--	--	--	--	--	--
PCBs										
PCB-1242	5.5	--	15	--	1.2	--	24	--	6.2	--
All Remaining PCBs	--	--	--	--	--	--	--	--	--	--
TCLP VOCs										
All TCLP VOCs	--		--		--		--		--	
TCLP SVOCs										
All TCLP SVOCs	--		--		--		--		--	
TCLP Organochlorine Pesticides										
All TCLP Organochlorine Pesticides	--		--		--		--		--	
TCLP Chlorinated Herbicides										
All TCLP Chlorinated Herbicides	--		--		--		--		--	
VOCs										
All VOCs	--		--		--		--		--	
TAL Metals										
Aluminum	100,000		86,000		100,000		120,000		91,000	
Arsenic	16		24		27		14		12	
Barium	180		96		100		150		150	
Beryllium	24		20		20		28		19	
Calcium	45,000		59,000		50,000		29,000		120,000	
Chromium (Total)	35		40		31		46		28	
Cobalt	26		33		40		26		16	
Copper	31		35		35		26		21	
Iron	13,000		34,000		10,000		19,000		15,000	
Lead	31		39		42		38		25	
Magnesium	4,200		3,400		3,400		4,000		7,600	
Manganese	450		570		230		480		530	
Nickel	250		380		580		230		140	
Potassium	4,500		2,200		2,800		4,700		8,100	
Sodium	79,600		65,000		93,000		110,000		66,000	
Vanadium	170		240		360		210		100	
Zinc	55		63		69		53		34	
Remaining TAL Metals	--		--		--		--		--	
TCLP Metals										
All TCLP Metals	--	--	--	--	--	--	--	--	--	--
Other										
TOC	88,000		128,000		133,000		120,000		103,000	
Silica	9,380		17,100		14,200		17,200		14,000	
Chloride	--		--		--		100		--	
Sulfate	570		780		540		1,300		310	
Loss on Ignition (Volatile Solids)	8.1 %		6.0 %		6.8 %		6.4 %		5.8 %	
Cyanide (Total)	32	0.81	2.5	8.1	2.9	0.80	10	0.14	12	11
Fluoride	2,100	1,300	1,800	79	2,100	200	1,900	14	2,100	510
Reactive Sulfide	--		--		--		--		--	
Reactive Cyanide	--		--		--		--		--	
Flash Point	>200		>200		>200		>200		>200	
pH	8.8		8.7		8.6		8.8		9.3	

Notes:
Samples collected on April 8, 2015
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
TAL = Target Analyte List
SVOCs = Semi-Volatile Organic Compounds
TCLP = Toxic Characteristics Leaching Procedure
VOCs = Volatile Organic Compounds
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
Blank Cell = Not analyzed
TOC = Total Organic Carbon

Table A4
Confirmatory Soil Analysis Summary - (WDS-10)

Sample Identification	WDS-10-B1	WDS-10-B2	WDS-10-B3	WDS-10-B4	WDS-10-B5	WDS-10-E1	WDS-10-E2	WDS-10-W1	WDS-10-W2	WDS-10-N1	WDS-10-N2	WDS-10-S1	WDS-10-S2
PAHs													
Benzo(a)anthracene	--	0.24	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	--	0.34	0.031	--	--	0.091	0.061	--	--	--	0.11	--	0.028
Benzo(b)fluoranthene	--	0.3	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	--	0.25	--	--	--	--	--	--	--	--	--	--	--
Chrysene	--	0.24	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	--	0.046	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	--	0.44	--	--	--	--	--	--	--	--	0.23	--	--
Indeno(1,2,3-c,d)Pyrene	--	0.24	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	--	0.24	--	--	--	--	--	--	--	--	--	--	--
Pyrene	--	0.41	--	--	--	--	--	--	--	--	0.22	--	--
Remaining PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs													
PCB-1242	--	0.96	--	--	--	--	--	--	--	--	0.16	--	--
Remaining PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--
Target Analyte List (TAL) Metals													
Aluminum	30,000	72,000	33,000	43,000	49,000	38,000	39,000	38,000	36,000	51,000	67,000	34,000	29,000
Arsenic	3.7	6.1	4.2	4.8	4.4	7.2	4.7	3.9	4.1	3.2	5.1	--	2.4
Barium	61	220	61	69	70	96	88	66	57	78	97	5.6	60
Beryllium	--	2.7	--	--	--	--	--	--	--	--	--	120	--
Calcium	310	3,300	15,000	420	310	1,000	7,000	350	120	4,900	3,300	170,000	14,000
Chromium (Total)	16	27	19	21	19	48	28	23	18	21	30	33	17
Cobalt	35	7.1	5.7	9.7	4.9	13	8.1	5.4	4.3	11	12	7.8	9.1
Copper	24	22	22	24	26	18	15	25	24	17	20	20	11
Iron	35,000	42,000	34,000	58,000	56,000	47,000	40,000	42,000	50,000	57,000	70,000	19,000	23,000
Lead	12	19	16	14	20	35	15	17	14	14	19	100	8.7
Magnesium	1,600	6,900	4,400	3,500	2,100	3,900	3,500	2,600	1,600	3,300	3,700	14,000	6,300
Manganese	250	100	91	150	73	790	460	80	95	510	440	280	420
Mercury	--	0.14	--	--	0.11	--	0.095	--	--	0.12	0.10	--	--
Nickel	27	36	21	22	26	20	19	23	18	20	33	29	17
Potassium	2,400	12,000	1,800	2,300	2,400	1,900	2,400	2,600	1,800	2,400	3,700	4,200	1,500
Sodium	2,500	12,000	1,600	3,600	3,100	590	1,000	4,100	1,300	580	2,000	1,500	1,500
Vanadium	31	85	46	43	38	50	49	47	35	42	72	37	26
Zinc	42	46	46	--	--	34	--	--	--	--	--	100	--
Remaining TAL Metals	--	--	--	--	--	--	--	--	--	--	--	--	--
Other													
Fluoride	240	950	19	150	290	53	160	310	250	66	310	210	170
Cyanide (Total)	1.7	2.8	0.47	0.44	2.8	0.31	0.14	1.6	0.97	0.12	0.41	0.10	0.11

Notes:
Samples collected on August 29 and 30, 2016, October 20, 2016, and November 9, 2016
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	AB-GTA-01 (0-1)	AB-GTA-01 (4-5)	BC-GTA-01 (0-1)	BC-GTA-01 (3-4)	BC-GTA-02 (0-1)	BC-GTA-02 (4-5)	BC-GTA-03 (0-1)	BC-GTA-03 (2.5-3.5)	BY-GTA-01 (0-1)	BY-GTA-01 (4-5)	BY-GTA-02 (0-1)	BY-GTA-02 (4-5)	BY-GTA-03 (0-1)	BY-GTA-03 (4-5)	CA-GTA-01 (0-1)	CA-GTA-01 (4-5)	CA-GTA-02 (0-1)	CA-GTA-02 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Old Anode Bake Oven Pitch Pond		Former Bath Crushing Area						Former Boneyard						Former Cathode Plant Area				NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	3-4	0-1	4-5	0-1	2.5-3.5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	11/12/15						12/18/15		9/22/14				9/24/14	9/22/14	11/11/15					
PAHs																				
Anthracene	–	1.8							–	–	–	–	–	–	–	–	–	–	31,000	NA
Benzo(a)pyrene	–	0.35							–	–	–	–	–	–	–	–	–	–	0.39	NA
Benzo(b)fluoranthene	–	–							–	–	0.19	–	–	–	–	–	–	–	3.9	NA
Benzo(g,h,i)perylene	–	0.35							–	–	–	–	–	–	–	–	–	–	3,100	NA
Benzo(k)fluoranthene	–	0.72							–	–	–	–	–	–	–	–	–	–	39	NA
Chrysene	–	8.8							–	–	–	–	–	–	–	–	–	–	390	NA
Fluoranthene	–	53							–	–	–	–	–	–	–	–	–	0.42	4,100	NA
Indeno(1,2,3-c,d)Pyrene	–	0.29							–	–	–	–	–	–	–	–	–	–	3.9	NA
Phenanthrene	–	9.6							–	–	–	–	–	–	–	–	–	0.29	31,000	NA
Pyrene	–	35							–	–	–	–	–	–	–	–	–	0.34	3,100	NA
All other PAHs	–	–							–	–	–	–	–	–	–	–	–	–	varies	NA
PCBs																				
All PCBs															–	–	–	–	varies	NA
TPH																				
TPH GRO									–	–	–	–	–	–					620	NA
TPH DRO									5.4	–	4.8	54	8.2	–					620	NA
Priority Pollutant Metals																				
Arsenic	2.9	2.6																	1.9	4.9
Chromium	17	10																	310	30
Copper	10	7.8																	4,100	42
Lead	14	11																	1,000	61
Nickel	14	7.6																	2,000	22
Zinc	28	22																	31,000	73
All other PPMs	–	–																	varies	73
Fluoride and Cyanide																				
Fluoride	31	3	9.3	8.5	440	2.7	40	41											NE	NE
Cyanide	–	–																	1,600	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
– = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NE = Maryland Department of the Environment (MDE) standard not established
Blank Cell = Not analyzed
NRCS = MDE Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics
GRO = Gasoline Range Organics

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	CD-GTA-01 (0-1)	CD-GTA-01 (4-5)	CD-GTA-02 (0-1)	CD-GTA-02 (4-5)	CD-GTA-03 (0-1)	CD-GTA-03 (4-5)	CD-GTA-04 (0-1)	CD-GTA-04 (4-5)	CD-GTA-05 (0-1)	CD-GTA-05 (4-5)	CD-GTA-06 (0-1)	CD-GTA-06 (4-5)	CD-GTA-07 (0-1)	CD-GTA-07 (4-5)	CD-GTA-08 (0-1)	CD-GTA-08 (4-5)	CD-GTA-09 (0-1)	CD-GTA-09 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Carbon Dust Storage Area																		NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	9/22/14																			
PAHs																				
Acenaphthene	1.8	--	--	--	0.42	--	--	--	--	--	--	--	--	--	--	--	--	--	6,100	NA
Anthracene	1.4	--	--	--	0.42	--	0.28	--	--	--	0.23	--	0.22	--	--	--	--	--	31,000	NA
Benzo(a)anthracene	**11**	0.46	0.98	0.49	3.3	0.25	1.8	--	0.2	--	**6.7**	--	2.1	--	--	--	--	--	3.9	NA
Benzo(a)pyrene	**15**	**0.58**	**1.1**	**0.46**	4.9	0.34	**2**	--	0.22	--	**7.4**	--	**2.3**	--	--	--	--	--	0.39	NA
Benzo(b)fluoranthene	**21**	0.83	1.5	0.62	**8.3**	0.49	2.7	--	0.33	--	**20**	--	3.8	--	--	--	--	--	3.9	NA
Benzo(g,h,i)perylene	10	0.45	0.77	0.29	4.0	0.3	1.5	--	0.18	--	6.6	--	1.9	--	--	--	--	--	3,100	NA
Benzo(k)fluoranthene	8.3	0.28	0.56	0.24	2.5	--	--	--	--	--	5.4	--	1.3	--	--	--	--	--	39	NA
Chrysene	12	0.48	0.94	0.48	3.5	0.26	1.8	--	0.21	--	9.6	--	2.3	--	--	--	--	--	390	NA
Dibenz(a,h)anthracene	**2.3**	--	--	--	**0.98**	--	0.34	--	--	--	**2.3**	--	**0.5**	--	--	--	--	--	0.39	NA
Fluoranthene	19	0.57	1.4	0.74	4.8	0.43	2.1	--	0.26	--	5.5	--	--	--	--	--	--	--	4,100	NA
Fluorene	0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,100	NA
Indeno(1,2,3-c,d)Pyrene	**11**	0.47	0.87	0.32	**4.2**	0.32	1.6	--	0.18	--	**7.3**	--	2.0	--	--	--	--	--	3.9	NA
Naphthalene	0.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	NA
Phenanthrene	7.1	0.24	0.48	0.32	1.6	--	1.1	--	--	--	1.2	--	0.85	--	--	--	--	--	31,000	NA
Pyrene	17	0.68	1.3	0.79	6.3	0.55	2.3	--	0.3	--	6.8	--	2.5	--	--	--	--	--	3,100	NA
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NRCS = MDE Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	CH-GTA-01 (0-1)	GTA-Dup-10 [Duplicate of CH-GTA-03(4-5)]	CH-GTA-01 (4-5)	CH-GTA-02 (0-1)	CH-GTA-02 (4-5)	CH-GTA-03 (0-1)	CH-GTA-03 (4-5)	GTA-Dup-12 [Duplicate of CH-GTA-03(4-5)]	CH-GTA-04 (0-1)	GTA-Dup-11 [Duplicate of CH-GTA-04(0-1)]	CH-GTA-04 (4-5)	CH-GTA-05 (0-1)	CH-GTA-05 (4-5)	CH-GTA-06 (0-1)	CH-GTA-06 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Cast House/Cast House Fuel Oil Tank															**NRCS**	**ATC Central**
Depth (ft.)	0-1	0-1	4-5	0-1	4-5	0-1	4-5	4-5	0-1	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	12/18/15																
VOCs																	
Acetone	0.005	--	0.054	0.074	--	--	0.022	0.025	0.025	0.036	0.038	0.05	--	0.028	--	92,000	NA
Benzene	0.0006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	52	NA
All other VOCs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
TPH																	
TPH DRO	--	--	--	--	--	68	--	--	63	--		15	52	--	--	620	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
Blank Cell = Not analyzed
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
VOCs = Volatile Organic Compounds
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	CP-GTA-02 (0-1)	CP-GTA-02 (4-5)	CP-GTA-03 (0-1)	GTA-Dup-15 [Duplicate of CP-GTA-03(0-1)]	CP-GTA-03 (4-5)	GTA-Dup-16 [Duplicate of CP-GTA-03(4-5)]	CP-GTA-04 (0-1)	CP-GTA-04 (4-5)	CP-GTA-05 (0-1)	CP-GTA-05 (4-5)	CP-GTA-06 (0-1)	CP-GTA-06 (4-5)	CP-GTA-07 (0-1)	CP-GTA-07 (4-5)	CP-GTA-08 (0-1)	CP-GTA-08 (4-5)	CP-GTA-09 (0-1)	GTA-Dup-8 [Duplicate of CP-GTA-09(0-1)]	CP-GTA-09 (4-5)	GTA-Dup-9 [Duplicate of CP-GTA-09(4-5)]	CP-GTA-10 (0-1)	CP-GTA-10 (4-5)	CP-GTA-11 (0-1)	CP-GTA-11 (4-5)	CP-GTA-12 (0-1)	CP-GTA-12 (4-5)	CP-GTA-13 (0-1)	CP-GTA-13 (4-5)	CP-GTA-14 (0-1)	CP-GTA-14 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Anode Block Annex, Bake Oven and Rod Shop																														NRCS	ATC Central
Depth (ft.)	0-1	1.5-2	0-1	0-1	4-5	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	0-1	4-5	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	11/12/15		12/18/15				9/24/14								12/18/15						11/12/15											
PAHs																																
Acenaphthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.88	0.55	--	--	0.56	--	--	--	--	--	--	--	--	--	6,100	NA
Anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.59	0.61	--	--	0.49	--	--	--	--	--	--	--	--	--	31,000	NA
Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.1	2.9	0.51	7.2	2.1	--	0.37	--	0.5	--	1.5	--	--	--	3.9	NA
Benzo(a)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.9	3.5	0.5	9.7	2.6	--	0.48	--	0.69	--	1.4	--	--	--	0.39	NA
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.5	3.5	0.52	9.9	3.2	--	0.62	--	1.2	--	5.8	--	--	--	3.9	NA
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.8	2.5	0.38	7.3	1.5	--	0.33	--	0.52	--	1.9	--	--	--	3,100	NA
Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.1	1.3	0.42	7	1.2	--	0.23	--	0.37	--	1.2	--	--	--	39	NA
Chrysene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	2.7	0.6	8.1	1.9	--	0.38	--	0.81	--	3.6	--	--	--	390	NA
Dibenz(a,h)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1	0.8	--	2.3	0.37	--	--	--	--	--	0.59	--	--	--	0.39	NA
Fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.8	4.9	1.4	12	4.9	--	0.59	--	0.7	--	1.1	--	--	--	4,100	NA
Fluorene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.19	--	--	--	--	--	--	--	--	--	--	--	--	--	4,100	NA
Indeno(1,2,3-c,d)Pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.2	2.8	0.38	8	1.9	--	0.37	--	0.57	--	1.9	--	--	--	3.9	NA
Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.8	1.9	0.22	3.8	3.1	--	0.2	--	0.23	--	--	--	--	--	31,000	NA
Pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.3	4.5	1.8	12	3.9	--	0.51	--	0.81	--	1.5	--	--	--	3,100	NA
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
TPH																																
TPH DRO																	45	100	31	150	230	--									620	NA
Priority Pollutant Metals																																
Arsenic	2.8	2.2	3.1	5.7	5.3	5.5	3.7	3.4	5.6	2.9	4.2	6.7	2.2	7.5	4.5	5.8	4	2.6	5	3.2	3.7	5.1	3.8	7.6	3	6.1	4.1	9.3	2	2.4	1.9	4.9
Chromium	17	23	14	20	17	23	28	35	32	14	28	24	34	20	24	25	22	47	24	13	18	32	20	34	12	23	17	29	6.7	7.7	310	30
Copper	9.7	7.4	8.4	18	24	23	18	18	17	5.6	21	22	18	22	21	22	10	9.6	18	9.9	9.8	20	15	20	7.3	20	11	26	5.3	4.5	4,100	42
Lead	10	6.8	7.3	17	14	15	21	20	19	5.4	20	17	19	19	18	18	11	17	14	9.9	12	13	32	17	11	18	23	20	8.4	8	1,000	61
Mercury	--	--	--	--	--	--	0.17	--	--	--	--	--	--	0.13	--	--	--	--	--	--	--	0.1	--	--	--	--	--	0.15	--	--	31	0.14
Nickel	12	8.7	17	28	30	31	24	30	26	12	31	29	24	24	24	26	22	39	22	18	13	18	17	23	15	25	21	47	8.4	7.7	2,000	22
Zinc	33	22	18	51	44	51	36	39	40	19	43	44	37	48	37	50	110	130	40	43	63	33	30	45	25	48	50	73	17	14	31,000	73
All other PPMs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	73

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
Blank Cell = Not analyzed
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
DRO = Diesel Range Organics

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	MS-GTA-01 (0-1)	MS-GTA-01 (4-5)	MS-GTA-02 (0-1)	MS-GTA-02 (4-5)	MS-GTA-02 (0-1)	MS-GTA-02 (4-5)	MS-GTA-03 (0-1)	MS-GTA-03 (4-5)	MS-GTA-04 (0-1)	MS-GTA-04 (4-5)	MS-GTA-05 (0-1)	MS-GTA-05 (4-5)	MS-GTA-06 (0-1)	MS-GTA-06 (4-5)	MS-GTA-07 (0-1)	MS-GTA-07 (4-5)	MS-GTA 08 (0-1)	MS-GTA 08 (4-5)	MS-GTA-09 (0-1)	MS-GTA-09 (4-5)	MS-GTA-09 (0-1)	GTA-Dup-13	MS-GTA-09 (4-5)	MS-GTA-10 (0-1)	MS-GTA-10 (4-5)	MS-GTA-10 (0-1)	GTA-Dup-14 (Duplicate of MS-GTA-10(0-1))	MS-GTA-10 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Maintenance Shops																												NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	0-1	4-5	0-1	4-5	0-1	0-1	4-5		
Date Sampled	9/24/14				11/11/15		9/24/14												11/11/15		12/18/15			11/11/15		12/18/15				
PAHs																														
All PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
VOCs																														
Acetone	--	0 083	0 094	--	--	--	0 19	--	0 053	0 13	0 060	0 040	0 14	0 036	--	0 055	--	0 57	0 034	0 10	--	0 032	--	0 009	--	--	0 047	--	92,000	NA
Butanone, 2- (MEK)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0 067	--	--	--	--	--	--	--	--	--	--	81,000	NA
Ethylbenzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0 017	--	--	--	--	--	--	--	--	--	--	10,000	NA
Methyl Acetate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0 12	--	--	--	--	--	--	--	--	--	--	NE	NA
Naphthalene	--	--	--	--	--	--	--	--	--	--	--	0 015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	NA
Total Xylenes	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1 25	--	--	--	--	--	--	--	--	--	--	20,000	NA
Tetrachloroethene	--	--	--	--	--	--	--	--	--	--	--	0 0083	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5 3	NA
All other VOCs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
TPH																														
TPH GRO	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	620	NA
TPH DRO	11	29	--	--	--	--	6 6	15	--	5 9	150	180	--	--	--	--	6 2	27	--	--	--	35	--	--	--	--	--	--	620	NA

Notes:
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Only detected compounds shown
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NA = Not applicable
NE = Maryland Department of the Environment (MDE) standard not established
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No 2 1, June 2006)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No 2 1, June 2006)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
VOCs = Volatile Organic Compounds
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	PL-GTA-01 (0-1)	PL-GTA-01 (4-5)	PL-GTA-04 (Duplicate)	PL-GTA-02 (0-1)	PL-GTA-02 (4-5)	PL-GTA-03 (0-1)	PL-GTA-01 (Duplicate)	PL-GTA-03 (4-5)	PL-GTA-04 (0-1)	PL-GTA-04 (4-5)	PL-GTA-05 (0-1)	PL-GTA-05 (4-5)	PL-GTA-06 (0-1)	PL-GTA-06 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Potlines														NRCS	ATC Central
Depth (ft.)	0-1	4-5	4-5	0-1	4-5	0-1	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	9/23/14															
PAHs																
All PAHs	--	--	--	--	--	--		--	--	--	--	--	--	--	varies	varies
Fluoride and Cyanide																
Fluoride	35	6.1	26	12	24	11	9.2	5.8	21	14	14	15	11	8.2	NE	NE
Cyanide	--	0.068	--	--	--	--	--	--	--	--	--	--	--	--	1,600	NA

Sample Identification	PL-GTA-07 (0-1)	PL-GTA-07 (4-5)	PL-GTA-08 (0-1)	PL-GTA-08 (4-5)	PL-GTA-09 (0-1)	PL-GTA-09 (4-5)	PL-GTA-10 (0-1)	PL-GTA-10 (4-5)	PL-GTA-11 (0-1)	PL-GTA-11 (4-5)	PL-GTA-12 (0-1)	PL-GTA-12 (4-5)	PL-GTA-13 (0-1)	PL-GTA-13 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Potlines														NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	9/23/14															
PAHs																
All PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	varies
Fluoride and Cyanide																
Fluoride	56	23	17	4.8	20	67	32	13	--	1.2	13	9.4	11	27	NE	NE
Cyanide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,600	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NE = Maryland Department of the Environment (MDE) standard not established
Blank Cell = Not analyzed
NRCS = MDE Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	PL-GTA-14 (0-1)	PL-GTA-14 (4-5)	PL-GTA-15 (0-1)	PL-GTA-15 (4-5)	PL-GTA-16 (0-1)	PL-GTA-16 (4-5)	PL-GTA-17 (0-1)	PL-GTA-03 (Dup)	PL-GTA-17 (4-5)	PL-GTA-18 (0-1)	PL-GTA-02 (Dup)	PL-GTA-18 (4-5)	PL-GTA-19 (0-1)	PL-GTA-19 (4-5)	PL-GTA-20 (0-1)	PL-GTA-20 (4-5)	PL-GTA-21 (0-1)	PL-GTA-21 (4-5)	PL-GTA-22 (0-1)	PL-GTA-22 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Potlines																				NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	0-1	4-5	0-1	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	9/23/15																					
PAHs																						
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
Fluoride and Cyanide																						
Fluoride	22	16	26	13	4.4	--	8.5	5.7	12	47	56	28	23	3.4	49	6.7	27	47	6.7	5.5	NE	NE
Cyanide (Total)	--	--	--	--	--	--	--	--	--	--	--	--	0.29	--	--	--	--	--	--	--	1,600	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NE = Maryland Department of the Environment (MDE) standard not established
Blank Cell = Not analyzed
NRCS = MDE Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	PP-GTA-01 (0-1)	GTA-Dup-5 [Duplicate of PP-GTA-01(0-1)]	PP-GTA-01 (4-5)	GTA-Dup-6 [Duplicate of PP-GTA-01(4-5)]	PP-GTA-02 (0-1)	PP-GTA-02 (4-5)	GTA-Dup-7 [Duplicate of PP-GTA-02(4-5)]	Comparison Values (mg/kg)	
Area of Concern	Former Paste Plant Area							NRCS	ATC Central
Depth (ft.)	0-1	0-1	4-5	4-5	0-1	4-5	4-5		
Date Sampled	12/18/15								
PAHs									
Anthracene	0.35	–	--	--	--	--	–	31,000	NA
Benzo(a)anthracene	1.2	1	--	--	--	--	–	3.9	NA
Benzo(a)pyrene	1.3	1.3	--	--	--	--	–	0.39	NA
Benzo(b)fluoranthene	1.2	1.2	--	--	--	--	–	3.9	NA
Benzo(g,h,i)perylene	0.93	0.96	--	--	--	--	–	3,100	NA
Benzo(k)fluoranthene	0.96	1.1	--	--	--	--	–	39	NA
Chrysene	1.4	1.2	--	--	--	--	–	390	NA
Dibenz(a,h)anthracene	0.34	0.24	--	--	--	--	–	0.39	NA
Fluoranthene	1.7	1.6	--	--	--	--	–	4,100	NA
Indeno(1,2,3-c,d)Pyrene	1.00	1.1	--	--	--	--	–	3.9	NA
Phenanthrene	0.75	0.61	--	--	--	--	–	31,000	NA
Pyrene	1.7	1.7	--	--	--	--	–	3,100	NA
All other PAHs	--	–	--	--	--	--	–	varies	NA
PCBs									
PCB-1248	0.12	0.16	--	--	--	--	–	1.4	NA
All other PCBs	--	–	--	--	--	--	–	varies	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
– = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	RR-GTA-01 (0-1)	RR-GTA-01 (4-5)	RR-GTA-02 (0-1)	RR-GTA-02 (4-5)	RR-GTA-03 (0-1)	RR-GTA-03 (4-5)	RR-GTA-04 (0-1)	RR-GTA-04 (4-5)	RR-GTA-05 (0-1)	RR-GTA-05 (4-5)	RR-GTA-06 (0-1)	RR-GTA-06 (4-5)	RR-GTA-07 (0-1)	RR-GTA-07 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Railroad Off loading Area														NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	11/11/15															
PAHs																
Acenaphthene	--	--	--	--	0.53	--	--	--	--	--	--	--	--	--	6,100	NA
Anthracene	--	--	--	--	0.55	--	--	--	--	--	--	--	--	--	31,000	NA
Benzo(a)anthracene	--	--	0.4	--	2.5	0.25	--	--	0.56	0.27	--	--	--	--	3.9	NA
Benzo(a)pyrene	--	--	**0.54**	--	**2.8**	0.34	--	--	**0.82**	0.38	--	--	--	--	0.39	NA
Benzo(b)fluoranthene	--	--	0.66	--	3.3	0.39	--	--	1.1	0.52	--	--	--	--	3.9	NA
Benzo(g,h,i)perylene	--	--	0.4	--	2.3	0.25	--	--	0.63	0.29	--	--	--	--	3,100	NA
Benzo(k)fluoranthene	--	--	0.25	--	1.5	--	--	--	0.36	--	--	--	--	--	39	NA
Chrysene	--	--	0.39	--	2.4	0.22	--	--	0.63	0.31	--	--	--	--	390	NA
Dibenz(a,h)anthracene	--	--	--	--	**0.58**	--	--	--	--	--	--	--	--	--	0.39	NA
Fluoranthene	--	--	0.66	--	3.1	0.38	--	--	0.88	0.43	--	--	--	--	4,100	NA
Indeno(1,2,3-c,d)Pyrene	--	--	0.45	--	2.8	0.27	--	--	0.65	0.33	--	--	--	--	3.9	NA
Phenanthrene	--	--	0.37	--	3.1	--	--	--	0.37	--	--	--	--	--	31,000	NA
Pyrene	--	--	0.58	--	3	0.35	--	--	0.8	0.38	--	--	--	--	3,100	NA
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
PCBs																
PCB-1242	--	0.058	--	--	--	--	--	--	--	--	--	--	--	--	1.4	NA
PCB-1248	--	--	0.24	--	--	--	--	--	--	--	--	--	--	--	1.4	NA
All other PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	SP-GTA-01 (0-1)	SP-GTA-01 (4-5)	SP-GTA-02 (0-1)	SP-GTA-02 (4-5)	SP-GTA-03 (0-1)	SP-GTA-03 (4-5)	SP-GTA-04 (0-1)	SP-GTA-04 (4-5)	SP-GTA-05 (0-1)	SP-GTA-05 (4-5)	SP-GTA-06 (0-1)	SP-GTA-06 (4-5)	SP-GTA-07 (0-1)	SP-GTA-07 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former SPL Building, Pads, and Ponds														NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	11/12/15															
PAHs																
Acenaphthene	--	--	--	--	--	--	--	--	--	--	0.29	--	--	--	6,100	NA
Anthracene	--	--	--	--	0.84	--		--	--	--	0.29	--	--	--	31,000	NA
Benzo(a)anthracene	--	--	0.69	--	**21**	--	0.18	--	0.23	--	1.1	--	--	--	3.9	NA
Benzo(a)pyrene	--	--	**0.69**	--	13	--	0.23	--	0.25	--	**1.6**	--	--	--	0.39	NA
Benzo(b)fluoranthene	--	--	1.3	--	**39**	--	0.39	--	0.55	--	1.8	--	--	--	3.9	NA
Benzo(g,h,i)perylene	--	--	0.35	--	5.6	--	--	--	0.21	--	0.8	--	--	--	3,100	NA
Benzo(k)fluoranthene	--	--	0.46	--	11	--	--	--	--	--	0.76	--	--	--	39	NA
Chrysene	--	--	0.78	--	36	--	0.35	--	0.35	--	1	--	--	--	390	NA
Dibenz(a,h)anthracene	--	--	--	--	**2.3**	--	--	--	--	--	0.22	--	--	--	0.39	NA
Fluoranthene	--	--	0.57	--	50	--	0.22	--	0.31	--	1.7	--	--	--	4,100	NA
Indeno(1,2,3-c,d)Pyrene	--	--	0.37	--	**6.6**	--	--	--	0.21	--	1.2	--	--	--	3.9	NA
Phenanthrene	--	--	0.25	--	1.2	--	--	--	--	--	1.3	--	--	--	31,000	NA
Pyrene	--	--	0.62	--	46	--	0.23	--	0.3	--	1.6	--	--	--	3,100	NA
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
Fluoride and Cyanide																
Fluoride	6.1	230	160	260	110	36	31	18	170	15	160	--	100	200	NE	NE
Cyanide (Total)	--	0.2	0.11	1.8	0.23	0.068	--	--	--	0.081	0.59	3.8	2	0.79	1,600	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
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Blank Cell = Not analyzed
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ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	SS-GTA-01 (0-1)	SS-GTA-01 (4-5)	SS-GTA-02 (0-1)	SS-GTA-02 (4-5)	SS-GTA-03 (0-1)	SS-GTA-03 (4-5)	SS-GTA-04 (0-1)	SS-GTA-04 (4-5)	SS-GTA-05 (0-1)	SS-GTA-05 (4-5)	SS-GTA-06 (0-1)	SS-GTA-06 (4-5)	SS-GTA-07 (0-1)	SS-GTA-07 (4-5)	SS-GTA-08 (0-1)	SS-GTA-08 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Rectifier Yard and Substation																**NRCS**	**ATC Central**
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	11/11/15																	
PCBs																		
All PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCs																		
Acetone	0.11	0.14	0.025	--	0.14	0.042	0.052	0.038	0.11	0.059	0.026	--	--	--	--	0.028	92,000	NA
Butanone, 2- (MEK)	--	0.025	--	--	0.022	--	--	--	--	--	--	--	--	--	--	--	61,000	NA
Tetrachloroethene	--	--	--	--	0.061	0.06	--	--	--	--	--	--	--	0.0072	--	--	5.3	NA
Trichloroethene	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01	--	--	7.2	NA
All other VOCs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds

Table A5
Soil Analysis Summary of Former Process Areas
Eastalco Aluminum Company

Sample Identification	SW-GTA-1 (0-1)	SW-GTA-1 (4-5)	SW-GTA-02 (0-1)	SW-GTA-02 (4-5)	SW-GTA-03 (0-1)	SW-GTA-3 (4-5)	SW-GTA-4 (0-1)	SW-GTA-4 (4-5)	SW-GTA-5 (0-1)	SW-GTA-5 (4-5)	SW-GTA-6 (0-1)	SW-GTA-6 (4-5)	SW-GTA-7 (0-1)	SW-GTA-7 (4-5)	Comparison Values (mg/kg)	
Area of Concern	Former Surface Water Lagoons and Ponds														NRCS	ATC Central
Depth (ft.)	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5	0-1	4-5		
Date Sampled	10/22/15		9/22/15				12/10/15									
PAHs																
Acenaphthene	--	--	--	--	--	0.37	--	--	--	--	--	--	--	--	6,100	NA
Anthracene	--	--	--	--	--	0.37	--	--	--	--	--	--	--	--	31,000	NA
Benzo(a)anthracene	--	--	0.81	--	1	1.5	0.34	--	0.87	--	--	--	--	--	3.9	NA
Benzo(a)pyrene	--	--	**1.1**	--	**1.2**	**2.0**	**0.47**	--	**1.2**	--	--	--	--	--	0.39	NA
Benzo(b)fluoranthene	--	--	1.5	--	1.8	1.5	0.6	--	1.3	--	0.28	--	--	--	3.9	NA
Benzo(g,h,i)perylene	--	--	0.82	--	0.87	1.3	0.26	--	0.72	--	--	--	--	--	3,100	NA
Benzo(k)fluoranthene	--	--	0.53	--	0.58	1.5	0.23	--	0.47	--	--	--	--	--	39	NA
Chrysene	--	--	0.91	--	1.0	1.5	0.35	--	0.81	--	--	--	--	--	390	NA
Dibenz(a,h)anthracene	--	--	--	--	0.21	0.46	--	--	--	--	--	--	--	--	0.39	NA
Fluoranthene	--	--	1.1	--	1.6	2.2	0.54	--	1.6	--	0.3	--	--	--	4,100	NA
Fluorene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,100	NA
Indeno(1,2,3-c,d)Pyrene	--	--	0.87	--	0.9	1.5	0.31	--	0.84	--	--	--	--	--	3.9	NA
Phenanthrene	--	--	0.34	--	0.5	1.2	--	--	0.43	--	--	--	--	--	31,000	NA
Pyrene	--	--	1.2	--	1.4	2.1	0.45	--	1.3	--	0.28	--	--	--	3,100	NA
All other PAHs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	varies	NA
PCBs																
PCB-1242									0.17	0.8	--	--			1.4	NA
All other PCBs									--	--	--	--			varies	NA
Fluoride and Cyanide																
Fluoride	93	20	16	2.3	31	54	90	85	180	83	83	40	31	32	NE	NE
Cyanide (Total)	0.11	0.068	0.11	--	1.5	0.15	0.35	0.082	0.38	0.08	0.24	0.087	0.16	--	1,600	NA

Notes:
Results in milligrams per kilogram (mg/kg), or parts per million (ppm)
Only detected compounds shown
-- = Not detected at or above the laboratory's reporting limit
NA = Not applicable
NE = Maryland Department of the Environment (MDE) standard not established
Blank Cell = Not analyzed
NRCS = Maryland Department of the Environment (MDE) Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 2.1, June 2008)
ATC = Anticipated Typical Concentrations/Reference Levels for soils in Central Maryland (MDE Interim Final Guidance Update No. 2.1, June 2008)
Shaded and bold values represent exceedance of MDE NRCS and/or ATC
PAHs = Polycyclic Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls

APPENDIX A

ATTACHMENT A1

KD→ 4A →D20

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

William Donald Schaefer
Governor

David A.C. Carroll
Secretary

June 9, 1994

CERTIFIED MAIL
Return Receipt Requested

Ms. Margaret P. Convey
Environmental Superintendent
Eastalco Aluminum Company
5601 Manor Woods Road
Frederick, Maryland 21701-7999

Dear Ms. Convey:

The Maryland Department of the Environment, Waste Management Administration, has completed the review of the closure plan for Eastalco Aluminum Company's Industrial Waste Landfill located in Frederick, Maryland, which has been operating under Refuse Disposal Permit Number 90-IW-0042.

The closure plan, which encompasses CH2M HILL Drawings G-1, C-1 through C-7 and Construction Specifications for this closure, dated November 1993, has been approved. Other required permits such as erosion and sediment control permit must be obtained from Frederick County Government.

Please advise this office at least three (3) business days prior to initiating closure activities on the site. If you have any questions regarding this matter, please contact Dr. Richard Champney at (410) 631-3364.

Sincerely,

[redacted] Chief
Solid Waste Compliance Division

EMD:lak

cc: The Honorable J. Anita Stup
Secretary Torrey Brown, M.D.
Dr. James Bowes
Mr. Robert M. Hayes
Mr. Richard W. Collins

APPENDIX A

ATTACHMENT A2

EA Engineering, Science, and Technology, Inc., PBC

Mid and South Atlantic Region
225 Schilling Circle, Suite 400
Hunt Valley, MD 21031
Telephone: 410-584-7000
Fax: 410-771-1625

1 December 2016

Mr. Ryan Wemyss
Alcoa Primary Metals
5601 Manor Woods Rd.
Frederick, MD 21703

Re: Material Evaluation for the Alcoa Eastalco Works
Lifetime Fitness Stockpile, Gaithersburg, Maryland
Chevy Chase Lakes Stockpile, Chevy Chase, Maryland

Dear Mr. Wemyss:

EA Engineering, Science, and Technology, Inc., PBC (EA) has completed the assessment of soil borrow material from the Lifetime Fitness stockpile site in Gaithersburg, Maryland and the Chevy Chase Lakes stockpile in Chevy Chase, Maryland. The material is proposed for use as common borrow soil at the Alcoa Eastalco Works site in Buckeystown, Maryland. EA evaluated the source sites and stockpiles, and developed a scope of work to characterize soil. The following provides the evaluation of the material:

Clean fill Material Evaluation Lifetime Fitness Stockpile:

The soil stockpile is located on a parcel of land southwest of the Lifetime Fitness Center on Washingtonian Boulevard in Gaithersburg, Maryland. Nearby or adjacent properties include commercial use including hotels, offices, retail centers and restaurants. Per historical aerial photos, this site appears to have been clear open land since 2002. Prior to this the site was mostly clear but with some scattered areas of forest. In the late 1950s the site was farmland. The 26,000 cubic yard (CY) of material is a combination of a small, approximately 1,000 cy bare stockpile and a 25,000 CY larger stockpile which was constructed to approximately 20 feet above grade with grass and a parking lot on the top of the compacted pile. The stockpiles of soil was reportedly created from earth moving activities associated with new construction and demolition of a concrete pad. A sales trailer for the Lifetime Fitness property was formerly located adjacent to the current parking lot. There was also a debris pile located adjacent to the large 25,000 CY stockpile. Refer to Attachment A for a site diagram of the area.

In accordance with the scope of work, 33 soil samples were collected from the stockpiles.

Four samples were collected from the 1,000 CY stockpile and 29 were collected from the 25,000 CY pile. Samples for the 1,000 CY stockpile were collected from the perimeter of the stockpile, approximately 4 feet (ft) above grade at depths of 2 to 4 ft into the side using hand tools (shovel, dig bar, and hand auger). Hand tools were decontaminated with de-ionized water, nitric acid, and liquinox between sampling locations. Visual inspection of the stockpile during sampling activities revealed that the material appeared consistent as brown, sandy silt with large and medium sized rock. Large boulders as well as remnants of silt fence were observed. No staining or unusual odors were identified. During the sampling the material was screened with a photo ionization detector (PID) for indications of volatile organic compounds. No readings above typical background were recorded for any of the sample locations.

Twenty nine samples were taken from the 25,000 CY stockpile. Twenty five samples were collected around perimeter of the stockpile at grade and between 6 and 10 ft above grade at depths between 2.0 and 4.0 ft into the side of the slope. Eight samples were collected from the top of the stockpile in bare soil or grassy areas adjacent to the parking lot at depths of 1.5-2.0 ft below ground surface (bgs). Hand tools were used to obtain samples from both areas of the larger stockpile. Hand tools were decontaminated with de-ionized water, nitric acid, and liquinox between sampling locations. Visual inspection of the stockpile during sampling activities revealed that the material appeared consistent as brown, sandy silt with large and medium sized rock. The sides of the stockpile have been weathered and most of the surface silt has been washed away exposing bare rock. In general, the larger stockpile was very rocky on and below the surface. No staining or unusual odors were identified. During the sampling the material was screened with a photo ionization detector (PID) for indications of volatile organic compounds. No readings above typical background were recorded for any of the sample locations.

Clean fill Material Evaluation Chevy Chase Lakes Stockpile:

The soil stockpile is located on a parcel of land along Chevy Chase Lakes Drive in Chevy Chase, Maryland. Nearby or adjacent properties include commercial use including apartment complexes, retail centers and restaurants. Per historical aerial photos, this site appears to have been a commercial area similar to as it appears today since at least 1949. The site directly south of the site was developed more between 1970 and 1988. There is a creek that runs through the site since approximately 1945, prior to then it appears that the site was mostly vegetated. The excavation area totals approximately 49,000 CY of material, generated from earth moving activities associated with new construction, from which 5,000 CY of material was made available for Alcoa. Material is available in situ and earth moving equipment and operations were onsite. The approximate 5,000 CY of material available for Alcoa, varied in elevation from grade at the top of the hill to the west along the wood/fence line to 33 ft bgs at the base, east of the woodland near Chevy Chase Lakes Drive. The excavation is currently sloped at different elevations. A drill rig was located atop the upper most plateau approximately 6 ft below grade, a roadway/pipe storage area is present at the next plateau at approximately 20 feet below grade,

and an excavator was present at the bottom of the excavated area approximately 35-40 ft below grade. Refer to Attachment A for a site diagram of the area.

Twelve soil samples were collected from the excavation area designated for use by Alcoa. This area was approximately 25 ft wide and 33 ft below grade. Three samples were collected approximately 8 ft apart from approximately 6 ft below grade along the higher elevation near the drill rig. Moving east, towards Chevy Chase Lakes Drive, three samples were collected from approximately 15 feet below the western grade along a slope of the excavation, these were also collected approximately 8 ft apart. Three samples were collected from a depth of approximately 30 feet from cuttings obtained from current drilling. Three samples were collected approximately 8 ft apart from a depth of approximately 33 ft bgs from the top grade along a slope of the excavation. Hand tools were decontaminated with de-ionized water, nitric acid, and liquinox between sampling locations. Soil at the samples 1-3 (collected at 6 ft bgs) was red, dense, compacted silt. Samples collected at the remaining sample points (15, 30, and 33 ft bgs) was light brown/brown sandy silt. The soil appeared to be in-situ virgin material and no rocks were present. No staining or unusual odors were identified. During the sampling the material was screened with a photo ionization detector (PID) for indications of volatile organic compounds. No readings above typical background were recorded for any of the sample locations.

Analytical Results:

Soil samples were delivered to HamptonClarke-Veritech for analysis. The 45 total soil samples from both sites were analyzed for semi volatile organic compounds (SVOCs) via United States Environmental Protection Agency (USEPA) Method 8270B-SIM, volatile organic compounds (VOCs) via USEPA Method 8260, priority pollutant list (PPL) metals via USEPA Method 6010/6020 organophosphorous pesticides via USEPA Method 8081, herbicides via USEPA Method 8151, and polychlorinated biphenyls (PCBs) via USEPA Method 8082. It should be noted that a total of five (5) VOC samples were collected between the two sites; three (3) at Lifetime Fitness and two (2) at Chevy Chase Lakes. All laboratory analysis was performed with low detection limits so that comparison can be conducted against the State of Maryland MDE Cleanup Standards for Soil and Groundwater (Update No. 2.1) dated June 2008 (non-residential clean-up standards).

Analytical results for soil samples collected from the stockpiled material reported no detections of herbicides, PAHs, VOC's, or PCBs above the respective laboratory reporting limits at either site and no pesticides were detected above the reporting limit and the Lifetime Fitness Site. Reported concentrations of arsenic at the Lifetime Fitness Site were above the MDE generic clean-up value of 3 mg/kg in thirty two of the thirty three samples. Arsenic also exceeded the MDE Anticipated Typical Concentration (ATC) for Central Maryland of 4.9 mg/kg in fourteen samples. The average concentration of arsenic reported in the sample population was 6.1 mg/kg. The calculated average is above the Generic MDE Non-residential standard but below what MDE would consider as acceptable for an industrial/commercial use scenario given that there are no other contaminants of concern identified. Detections of chromium exceeded the ATC value of 30 mg/L

in all twenty six samples at the Lifetime Fitness Site with values ranging from 31 to 110 mg/kg but was less than the MDE Cleanup Standard for industrial sites.

There was only one exceedance of the MDE Cleanup Standard at the Chevy Chase Lakes Site. The pesticide aldrin was detected in sample CC-12-33 at 0.52 mg/kg and the MDE cleanup standard is 0.17 mg/kg. A calculated average for aldrin would fall below the MDE Criteria. Based on the fact that no other analytes exceeded criteria and the absence of adrin exceedances in other samples, the material should be considered acceptable for industrial/commercial use purposes.

In conclusion, the material from both sites should be considered appropriate for use as common borrow at an industrial/commercial use facility. If you have any questions or require additional information, please do not hesitate to call me at (410) 329- 5125.

Sincerely,

Jim Hulbert
Project Manager

Attachments:
Figures
Tables

ATTACHMENT A2 - A

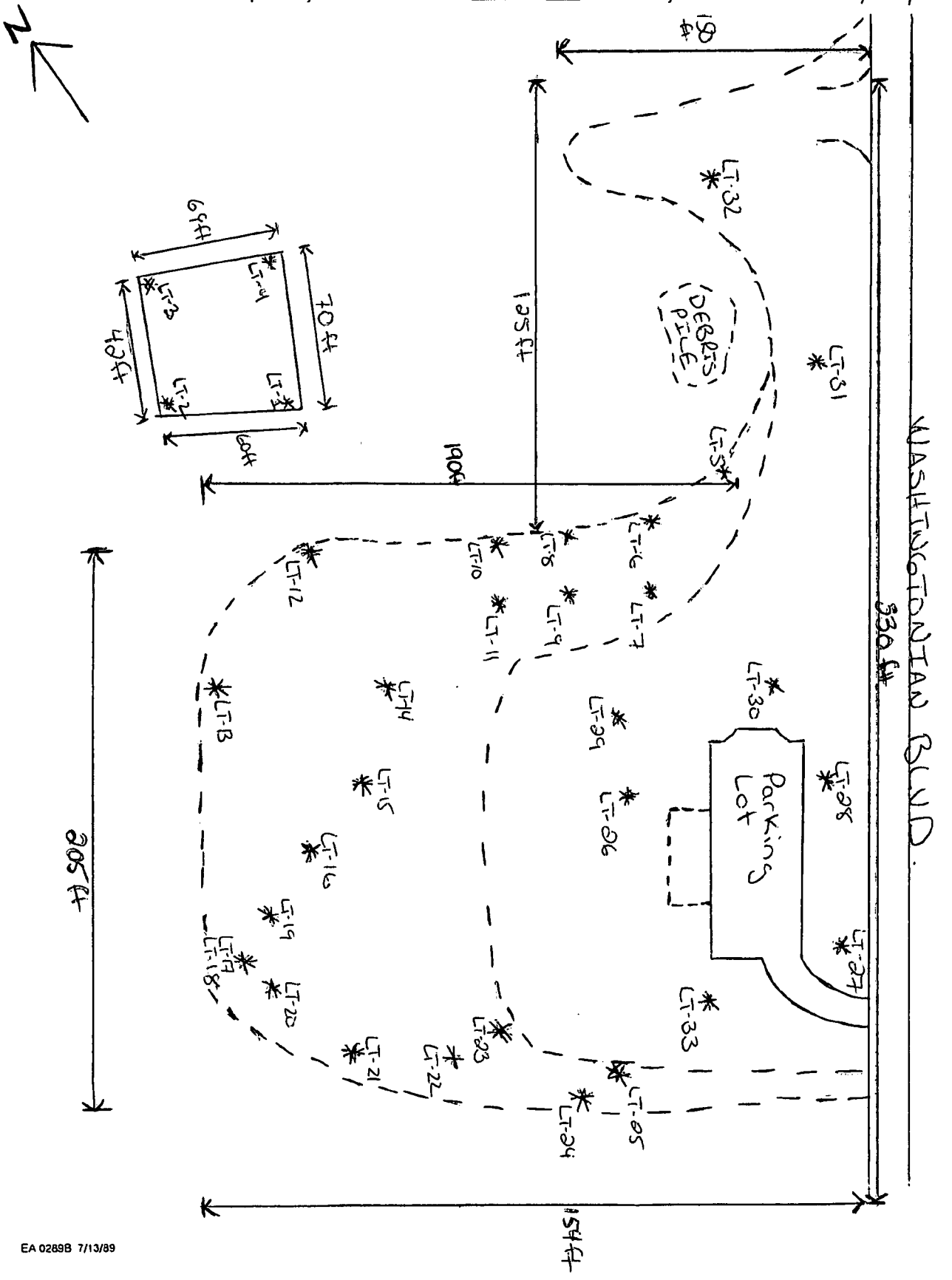
FIGURES

Project Alcoa - Lifetime Fitness Project No.

Subject Sheet No. 1 of 1

Drawing No.

Computed by Date Checked by Date 11/17/16



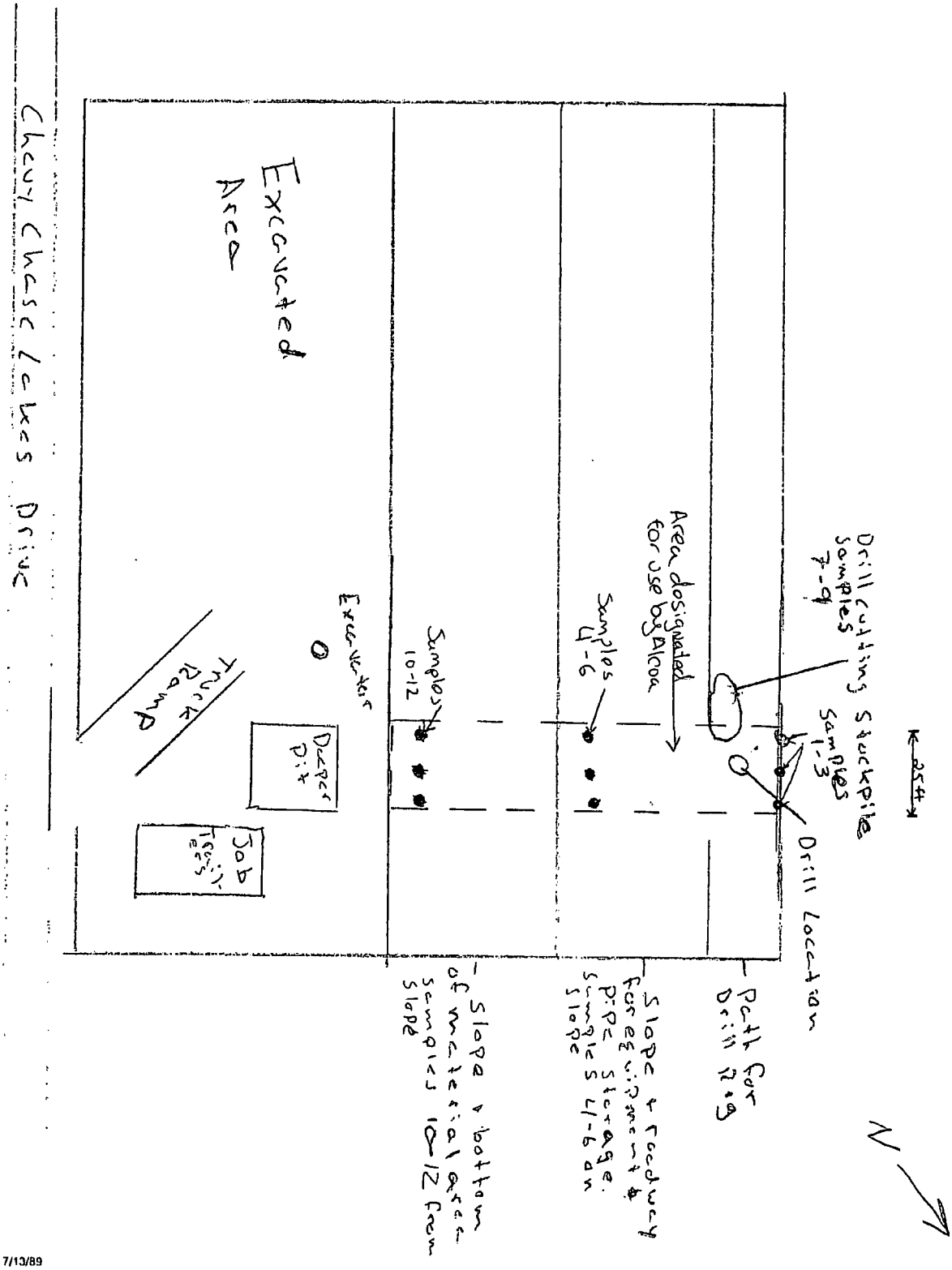
EA 0289B 7/13/89

Project Alcoa - Chevy Chase Lakes Project No. _____

Subject _____ Sheet No. 1 of 2

_____ Drawing No. _____

Computed by _____ Date _____ Checked by _____ Date 11/17



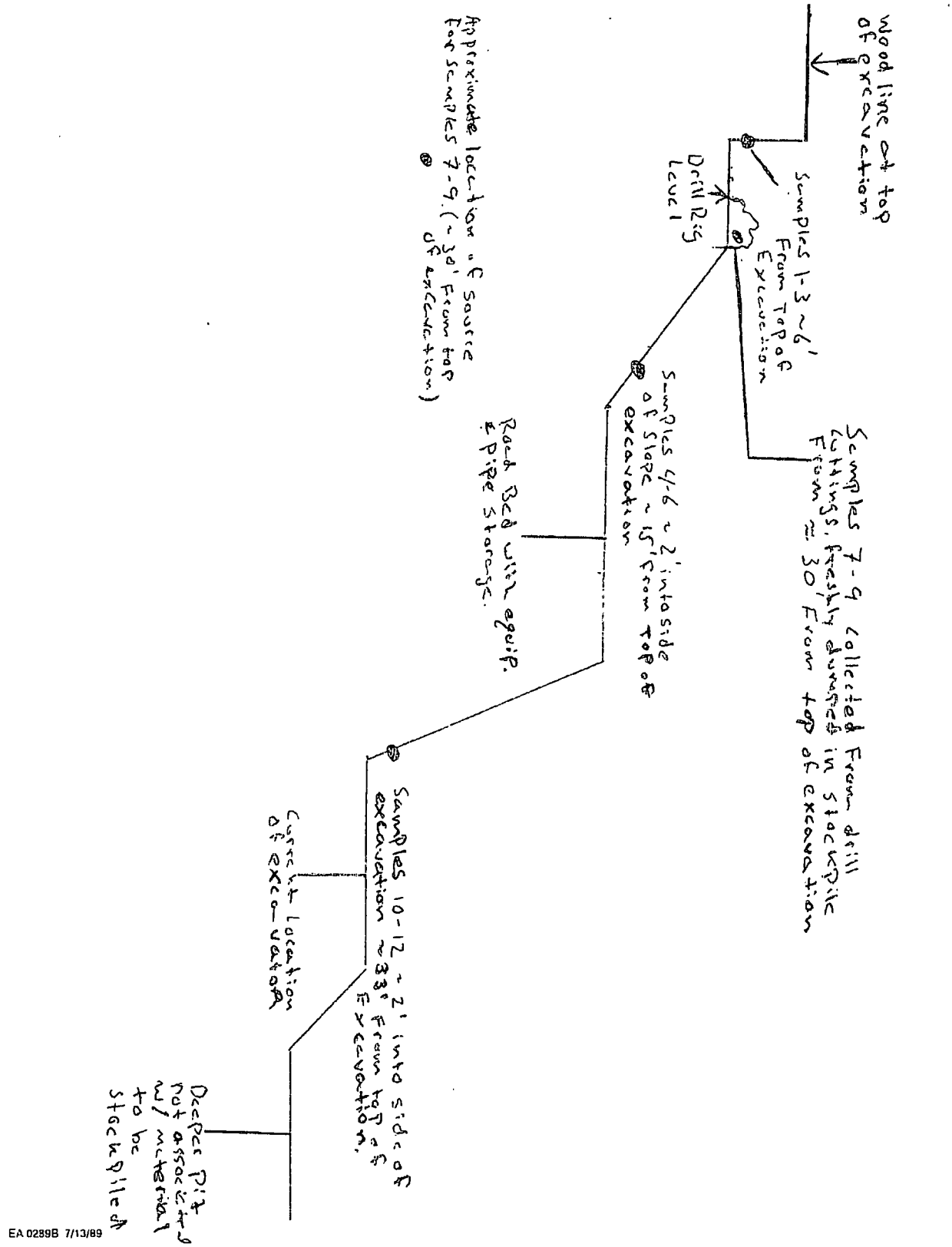
EA 02893 7/13/89

Project Alcoa - Chevy Chase Lakes Project No. _____

Subject _____ Sheet No. 2 of 2

_____ Drawing No. _____

Computed by _____ Date _____ Checked by _____ Date 11/17



EA 0289B 7/13/89

ATTACHMENT A2 - A

TABLES

Summary of Analytical Results
Lifetime Fitness Stockpile
Gaithersburg, Maryland

			CLIENT ID:	LT-1-2.0	LT-2-3.0	LT-3-2.0	LT-4-4.0	LT-5-2.0	LT-6-3.0	LT-7-7.0	LT-8-7.5	LT-9-2.0	LT-10-2.5	LT-11-2.0	LT-12-3.0	LT-13-2.0	LT-14-2.0	LT-15-2.0	LT-16-2.0	LT-17-2.0	LT-18-4.0	LT-19-2.5
			LAB ID:	ACS47150-001	ACS47150-002	ACS47150-003	ACS47150-004	ACS47150-005	ACS47150-006	ACS47150-007	ACS47150-008	ACS47150-009	ACS47150-010	ACS47150-011	ACS47150-012	ACS47150-013	ACS47150-014	ACS47150-015	ACS47150-016	ACS47150-017	ACS47150-018	ACS47150-019
			COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
			SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Herbicides																						
2,4,5-T	NA	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
2,4-D	1000	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Dicamba	NA	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Silvex	1000	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.012 U	0.012 U	0.011 U	0.012 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Metals																						
Antimony	41	NA	mg/kg	0.86 U	0.89 U	0.88 U	0.87 U	0.95 U	0.94 U	0.94 U	0.92 U	0.93 U	0.87 U	0.9 U	0.92 U	0.89 U	0.87 U	0.91 U	0.85 U	0.91 U	0.91 U	0.88 U
Arsenic	3	49	mg/kg	3.9	4.8	3.3	3.7	4.6	4.1	13	3.7	5.1	4.7	4.6	3.3	4.2	5.8	6	5.8	19	17	5.2
Barium	20000	NA	mg/kg	55	71	51	55	87	72	85	95	96	62	76	90	81	71	110	66	47	43	51
Beryllium	200	NA	mg/kg	0.64	0.74	0.63	0.64	0.87	0.99	1.6	0.92	0.83	0.83	0.86	0.9	0.74	0.78	0.98	0.95	1	0.93	0.83
Cadmium	51	NA	mg/kg	0.43 U	0.44 U	0.44 U	0.43 U	0.48 U	0.47 U	0.47 U	0.46 U	0.47 U	0.43 U	0.45 U	0.46 U	0.44 U	0.43 U	0.45 U	0.44 U	0.45 U	0.45 U	0.44 U
Chromium	310	30	mg/kg	35	37	29	30	37	37	48	55	69	34	39	44	45	47	51	34	23	23	24
Copper	4100	NA	mg/kg	40	53	41	38	58	57	80	72	81	41	46	59	47	48	65	45	33	42	35
Lead	1000	NA	mg/kg	12	15	11	13	19	24	18	20	39	15	19	19	26	13	18	12	12	13	11
Mercury	10	NA	mg/kg	0.09 U	0.093 U	0.092 U	0.091 U	0.099 U	0.098 U	0.098 U	0.098 U	0.097 U	0.091 U	0.094 U	0.096 U	0.093 U	0.091 U	0.095 U	0.092 U	0.095 U	0.095 U	0.092 U
Nickel	2000	NA	mg/kg	25	31	23	43	35	36	45	39	35	29	33	34	32	32	39	41	21	20	20
Selenium	510	NA	mg/kg	2.8	3.7	3.3	2.8	4	4.1	4.5	8.2	5.3	3.6	4	3.7	3	3.6	3.4	4.3	4.8	4.4	4.3
Silver	510	NA	mg/kg	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U	0.24 U	0.24 U	0.23 U	0.25 U	0.22 U	0.23 U	0.23 U	0.22 U	0.22 U	0.23 U	0.22 U	0.23 U	0.23 U	0.22 U
Thallium	7.2	15	mg/kg	0.43 U	0.44 U	0.44 U	0.43 U	0.48 U	0.53	0.73	0.84	0.47 U	0.44	0.51	0.53	0.44 U	0.51	0.53	0.5	0.45 U	0.45 U	0.44
Zinc	31000	NA	mg/kg	88	110	84	78	130	96	130	150	130	99	160	120	130	96	120	91	150	140	79
Pesticides																						
a-Chlordane	NA	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.00593	0.0054 U	0.0196	0.0057 U	0.0056 U	0.021	0.0057 U	0.00674	0.0057 U	0.0057 U	0.015
Aldrin	0.17	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Alpha-BHC	0.45	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0012 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
beta-BHC	1.6	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0012 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Chlordane (Total)	8.2	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0093	0.0054 U	0.0136	0.0057 U	0.0056 U	0.034	0.0057 U	0.013	0.0057 U	0.0057 U	0.025
delta-BHC	2.2	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Dieldrin	0.18	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.00148	0.0012 U	0.0012 U	0.0012 U	0.0011 U	0.0012 U	0.0011 U	0.0027	0.0011 U	0.0011 U	0.0037	0.0011 U	0.0015	0.0011 U	0.0011 U	0.0021
Endosulfan I	610	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Endosulfan II	610	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Endosulfan Sulfate	610	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Endrin	31	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Endrin Aldehyde	31	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Endrin Ketone	31	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
gamma-BHC	2.2	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0012 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Heptachlor	0.64	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Heptachlor Epoxide	0.31	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
Methoxychlor	510	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.0056 U	0.0057 U	0.0056 U	0.0054 U	0.0057 U	0.0055 U	0.0057 U	0.0057 U	0.0055 U
o,p'-DDD	12	NA	mg/kg	0.0027 U	0.0028 U	0.0027 U	0.0027 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.0029 U	0.0027 U	0.0028 U	0.0029 U	0.0028 U	0.0027 U	0.0028 U	0.0027 U	0.0028 U	0.0028 U	0.0027 U
o,p'-DDE	84	NA	mg/kg	0.0027 U	0.0028 U	0.0027 U	0.0027 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.0029 U	0.0027 U	0.0028 U	0.0029 U	0.0028 U	0.0027 U	0.0028 U	0.0027 U	0.0028 U	0.0028 U	0.0027 U
o,p'-DDT	84	NA	mg/kg	0.0027 U	0.0028 U	0.0027 U	0.0027 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.0029 U	0.0027 U	0.0028 U	0.0029 U	0.0028 U	0.0027 U	0.0028 U	0.0027 U	0.0028 U	0.0028 U	0.0027 U
Toxaphene	20	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.029 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
g-Chlordane	NA	NA	mg/kg	0.0054 U	0.0056 U	0.0055 U	0.0054 U	0.006 U	0.0059 U	0.0059 U	0.0057 U	0.0058 U	0.0054 U	0.017	0.0057 U	0.0056 U	0.013	0.0057 U	0.0067	0.0057 U	0.0057 U	0.01
PCBs																						
Aroclor (Total)	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1016	41	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1221	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1232	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1242	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1248	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1254	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1260	1.4	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1262	NA	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Aroclor-1268	NA	NA	mg/kg	0.027 U	0.028 U	0.027 U	0.027 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.027 U	0.028 U	0.028 U	0.027 U
Semi-Volatiles																						
1,1'-Biphenyl	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
1,2,4,5-Tetrachlorobenzene	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2,3,4,6-Tetrachlorophenol	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2,4,5-Trichlorophenol	10000	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2,4,6-Trichlorophenol	260	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2,4-Dichlorophenol	310	NA	mg/kg	0.099 U	0.025 U	0.092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
2,4-Dimethylphenol	2000	NA	mg/kg	0.009 U	0.028 U	0.0092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
2,4-Dinitrophenol	200	NA	mg/kg	0.18 U	0.56 U	0.18 U	0.54 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.18 U	0.19 U	0.19 U	0.18 U
2,6-Dinitrotoluene	200	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2,6-Dinitrotoluene	100	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2-Chloronaphthalene	6200	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2-Chlorophenol	510	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2-Methylnaphthalene	410	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2-Methylphenol	5100	NA	mg/kg	0.099 U	0.028 U	0.092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
2-Nitroaniline	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
2-Nitrophenol	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
3&4-Methylphenol	510	NA	mg/kg	0.099 U	0.028 U	0.092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
3,3'-Dichlorobenzidine	0.4	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
3-Nitroaniline	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
4,6-Dinitro-2-methylphenol	NA	NA	mg/kg	0.18 U	0.56 U	0.18 U	0.54 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.18 U	0.19 U	0.19 U	0.18 U
4-Bromophenyl-phenylether	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
4-Chloro-3-methylphenol	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
4-Chloroaniline	410	NA	mg/kg	0.099 U	0.028 U	0.092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
4-Chlorophenyl-phenylether	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
4-Nitroaniline	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
4-Nitrophenol	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Acenaphthene	6100	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Acenaphthylene	6100	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Acetophenone	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Anthracene	31000	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Atrazine	13	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzaldehyde	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzo(a)anthracene	3.9	NA	mg/kg	0.036 U	0.11	0.037 U	0.15	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzo(a)pyrene	0.39	NA	mg/kg	0.036 U	0.11	0.037 U	0.22	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzo(b)fluoranthene	3.9	NA	mg/kg	0.047	0.18	0.055	0.42	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.055	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzo(g,h,i)perylene	3100	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.19	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Benzo(k)fluoranthene	39	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.13	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
bis(2-Chloroethoxy)methane	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
bis(2-Chloroethyl)ether	20	NA	mg/kg	0.099 U	0.028 U	0.092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
bis(2-Chloroisopropyl)ether	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
bis(2-Ethylhexyl)phthalate	200	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.045	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U
Butylbenzylphthalate	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.039 U	0.039 U	0.038 U	0.039 U	0.036 U	0.037 U	0.038 U	0.037 U	0.036 U	0.038 U	0.037 U	0.038 U	0.038 U	0.037 U

Summary of Analytical Results
Lifetime Fitness Stockpile
Gaithersburg, Maryland

			CLIENT ID:	LT-1-2.0	LT-2-3.0	LT-3-2.0	LT-4-4.0	LT-5-2.0	LT-6-3.0	LT-7-2.0	LT-8-2.5	LT-9-2.0	LT-10-2.5	LT-11-2.0	LT-12-3.0	LT-13-2.0	LT-14-2.0	LT-15-2.0	LT-16-2.0	LT-17-2.0	LT-18-4.0	LT-19-2.5
			LAB ID:	AC94750-001	AC94750-002	AC94750-003	AC94750-004	AC94750-005	AC94750-006	AC94750-007	AC94750-008	AC94750-009	AC94750-010	AC94750-011	AC94750-012	AC94750-013	AC94750-014	AC94750-015	AC94750-016	AC94750-017	AC94750-018	AC94750-019
			COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
			SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Caprolactam	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Carbazole	140	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Chrysene	390	NA	mg/kg	0.036 U	0.10	0.042	0.25	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.05	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Dibenz(a,h)anthracene	0.39	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Dibenzofuran	100	NA	mg/kg	0.036 U	0.028 U	0.0092 U	0.027 U	0.0099 U	0.0098 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
Diethylphthalate	82000	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Dimethylphthalate	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Di-n-butylphthalate	10000	NA	mg/kg	0.0091 U	0.028 U	0.0092 U	0.027 U	0.0099 U	0.021	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.019	0.021	0.0092 U
Di-n-octylphthalate	NA	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Fluoranthene	4100	NA	mg/kg	0.036 U	0.26	0.037 U	0.22	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.051	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Fluorene	4100	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Hexachlorobenzene	1.8	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Hexachlorobutadiene	37	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Hexachlorocyclopentadiene	610	NA	mg/kg	0.064 U	0.26 U	0.066 U	0.26 U	0.094 U	0.092 U	0.092 U	0.09 U	0.091 U	0.085 U	0.068 U	0.09 U	0.067 U	0.065 U	0.069 U	0.066 U	0.069 U	0.089 U	0.066 U
Hexachloroethane	200	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Indeno(1,2,3-cd)pyrene	3.9	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.17	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Isophorone	3600	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Naphthalene	2000	NA	mg/kg	0.009 U	0.028 U	0.0092 U	0.027 U	0.0099 U	0.0096 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
Nitrobenzene	51	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
N-Nitroso-di-n-propylamine	0.41	NA	mg/kg	0.009 U	0.028 U	0.0092 U	0.027 U	0.0099 U	0.0096 U	0.0098 U	0.0096 U	0.0097 U	0.0091 U	0.0094 U	0.0096 U	0.0093 U	0.0091 U	0.0095 U	0.0092 U	0.0095 U	0.0095 U	0.0092 U
N-Nitrosodiphenylamine	580	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Pentachlorophenol	24	NA	mg/kg	0.18 U	0.56 U	0.18 U	0.54 U	0.2 U	0.2 U	0.2 U	0.19 U	0.19 U	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.18 U	0.19 U	0.19 U	0.18 U
Phenanthrene	31000	NA	mg/kg	0.036 U	0.16	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Phenol	31000	NA	mg/kg	0.036 U	0.11 U	0.037 U	0.11 U	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.036 U	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Pyrene	3100	NA	mg/kg	0.059	0.23	0.047	0.3	0.04 U	0.035 U	0.035 U	0.038 U	0.035 U	0.061	0.037 U	0.035 U	0.037 U	0.036 U	0.035 U	0.037 U	0.038 U	0.035 U	0.037 U
Volatiles																						
1,1,1-Trichloroethane	200000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,1,2,2-Tetrachloroethane	14	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,1,2-Trichloroethane	50	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,1-Dichloroethane	26000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,1-Dichloroethene	5100	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2,3-Trichlorobenzene	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2,4-Trichlorobenzene	1000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2-Dibromo-3-chloropropane	3.6	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2-Dibromoethane	1.4	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
1,2-Dichlorobenzene	9200	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2-Dichloroethane	31	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,2-Dichloropropane	42	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,3-Dichlorobenzene	310	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,4-Dichlorobenzene	120	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
1,4-Dioxane	NA	NA	mg/kg	0.093 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.12 U	NS
2-Butanone	61000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
2-Hexanone	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
4-Methyl-2-pentanone	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Acetone	92000	NA	mg/kg	0.0093 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.012 U	NS
Benzene	51	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
Bromochloromethane	34	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Bromodichloromethane	46	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Bromoform	360	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Bromomethane	140	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Carbon disulfide	10000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Carbon tetrachloride	22	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Chlorobenzene	2000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Chloroethane	990	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Chloroform	1000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Chloromethane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
cis-1,2-Dichloroethene	1000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
cis-1,3-Dichloropropene	29	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Cyclohexane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Dibromochloromethane	34	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Dichlorodifluoromethane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Ethylbenzene	10000	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
Isopropylbenzene	10000	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
m&p-Xylenes	NA	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
Methyl Acetate	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Methylcyclohexane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Methylene chloride	380	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Methyl-t-butyl ether	NA	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
o-Xylene	NA	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
Styrene	20000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Tetrachloroethene	53	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Toluene	8700	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
trans-1,2-Dichloroethene	2000	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
trans-1,3-Dichloropropene	29	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Trichloroethene	7.2	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Trichlorofluoromethane	NA	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Vinyl chloride	4	NA	mg/kg	0.0019 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0023 U	NS
Xylenes (Total)	20000	NA	mg/kg	0.00095 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.0012 U	NS
Wet Chemistry					NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% Solids	NA	NA	%	93	90	91	92	84	85	85	87	86	92	89	87	90	92	88	91	88	85	91

Notes:
MDE Non-Residential Soil = Maryland Department of Environment June 2008 non-residential cleanup standards for soil.
ATC Central = Maryland Dept. of Environment Anticipated Typical Concentration.
mg/kg = Milligrams per kilogram.
NA = No screening level.
NS = Not sampled.
U = Not detected.
Gray shaded values equal or exceed the MDE Non-Residential Soil standard.
Bolded values exceed the ATC.

Summary of Analytical Results
Lifetime Fitness Stockpile
Gaithersburg, Maryland

				CLIENT ID:	LT-20-2.0	LT-21-3.0	LT-22-3.0	LT-23-2.0	LT-24-2.0	LT-25-3.0	LT-26-2.0	LT-27-1.5	LT-28-2.0	LT-29-1.5	LT-30-1.5	LT-31-2.0	LT-32-2.0	LT-33-2.0
				LAB ID:	AC94780-020	AC94780-021	AC94780-022	AC94780-023	AC94780-024	AC94780-025	AC94780-026	AC94780-027	AC94780-028	AC94780-029	AC94780-030	AC94780-031	AC94780-032	AC94780-033
				COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
				SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Control	Unit		Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Herbicides																		
2,4,5-T	NA	NA	mg/kg		0.011 U	ND	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
2,4-D	1000	NA	mg/kg		0.011 U	ND	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Dicamba	NA	NA	mg/kg		0.011 U	ND	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Silvex	1000	NA	mg/kg		0.011 U	ND	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Metals																		
Antimony	41	NA	mg/kg		0.87 U	0.94 U	0.88 U	0.85 U	0.92 U	0.88 U	0.88 U	0.87 U	0.91 U	0.91 U	0.91 U	0.9 U	0.91 U	0.89 U
Arsenic	3	4.9	mg/kg		3.9	2.8	3.1	4.9	3.8	4.6	3.7	3.4	4.6	4.5	5	3.1	5.7	3.4
Barium	20000	NA	mg/kg		55	140	72	110	130	71	88	52	86	76	110	95	120	61
Beryllium	200	NA	mg/kg		0.63	1.7	0.83	1.5	1.6	0.69	0.7	0.58	0.96	0.84	1	0.91	1	0.7
Cadmium	51	NA	mg/kg		0.43 U	0.47 U	0.44 U	0.44U	0.46 U	0.44 U	0.44 U	0.43 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.44 U
Chromium	310	30	mg/kg		27	60	34	43	58	35	110	30	43	41	49	44	41	31
Copper	4100	NA	mg/kg		36	66	42	40	73	47	84	28	59	43	78	81	100	54
Lead	1000	NA	mg/kg		11	26	16	17	24	14	17	9.5	19	24	30	18	46	13
Mercury	10	NA	mg/kg		0.091 U	0.096 U	0.092 U	0.093 U	0.096 U	0.092 U	0.092 U	0.091 U	0.095 U	0.12	0.11	0.094 U	0.095 U	0.27
Nickel	2000	NA	mg/kg		23	40	31	31	41	30	38	23	39	50	43	32	90	22
Selenium	510	NA	mg/kg		2.7	2.4	2.2 U	2.6	2.8	3.3	2.5	2.2 U	3.5	2.4	3.1	4	4.7	2.3
Silver	510	NA	mg/kg		0.22 U	0.24 U	0.22 U	0.22U	0.23 U	0.22 U	0.22 U	0.22 U	0.23 U	0.23 U	0.23 U	0.22 U	0.23 U	0.22 U
Thallium	7.2	1.5	mg/kg		0.43 U	0.47 U	0.44 U	0.44U	0.46 U	0.49	0.44 U	0.43 U	0.45 U	0.45 U	0.49	0.49	0.54	0.44 U
Zinc	31000	NA	mg/kg		82	120	87	97	130	97	140	61	120	93	130	150	140	74
Pesticides					0	0	0	0	0	0	0	0	0	0	0	0	0	0
a-Chlordane	NA	NA	mg/kg		0.0054 U	0.194	0.0542	0.166	0.234	0.021d	0.015d	0.019d	0.0057 U	0.161d	0.013d	0.0056 U	0.0057 U	0.025d
Aldrin	0.17	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Alpha-BHC	0.45	NA	mg/kg		0.0011 U	0.0024 U	0.0011 U	0.0022U	0.0057 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Beta-BHC	1.6	NA	mg/kg		0.0011 U	0.0024 U	0.0011 U	0.0022U	0.0057 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Chlordane (Total)	8.2	NA	mg/kg		0.054 U	0.30	0.1	0.34	0.41	0.029	0.035	0.023	0.057 U	0.092	0.023	0.056 U	0.057 U	0.047
Delta-BHC	2.2	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Dieldrin	0.18	NA	mg/kg		0.0011 U	0.012	0.0036	0.0094	0.012	0.0016	0.0049	0.003	0.0011 U	0.0073	0.0018	0.0011 U	0.0011 U	0.0026
Endosulfan I	610	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Endosulfan II	610	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Endosulfan Sulfate	610	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Endrin	31	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Endrin Aldehyde	31	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Endrin Ketone	31	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
gamma-BHC	2.2	NA	mg/kg		0.0011 U	0.0024 U	0.0011 U	0.0022U	0.0057 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Heptachlor	0.64	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Heptachlor Epoxide	0.31	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
Methoxychlor	510	NA	mg/kg		0.0054 U	0.012 U	0.0055 U	0.011U	0.029 U	0.0055 U	0.0055 U	0.0054 U	0.0057 U	0.0057 U	0.0057 U	0.0056 U	0.0057 U	0.0056 U
p,p'-DDD	12	NA	mg/kg		0.0027 U	0.0059 U	0.0027 U	0.0056U	0.014 U	0.0027 U	0.0027 U	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U
p,p'-DDE	8.4	NA	mg/kg		0.0027 U	0.0059 U	0.0027 U	0.0056U	0.014 U	0.0027 U	0.0027 U	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U
p,p'-DDT	8.4	NA	mg/kg		0.0027 U	0.0059 U	0.0027 U	0.0056U	0.014 U	0.0027 U	0.0027 U	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U	0.0028 U
Toxaphene	2.6	NA	mg/kg		0.027 U	0.059 U	0.027 U	0.056U	0.14 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
g-Chlordane	NA	NA	mg/kg		0.0054 U	0.17	0.048	0.16	0.24	0.02	0.014	0.019	0.0057 U	0.041	0.01	0.0056 U	0.0057 U	0.027
PCBs					0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aroclor (Total)	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1016	41	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1221	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1232	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1242	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1248	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1254	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1260	1.4	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1262	NA	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Aroclor-1268	NA	NA	mg/kg		0.027 U	0.027 U	0.027 U	0.028 U	0.027 U	0.027 U	0.027 U	0.027 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U
Semi Volatiles									0	0	0	0	0	0	0	0	0	0
1,1'-Biphenyl	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
1,2,4,5-Tetrachlorobenzene	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2,3,4,6-Tetrachlorophenol	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2,4,5-Trichlorophenol	10000	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2,4,6-Trichlorophenol	760	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2,4-Dichlorophenol	310	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
2,4-Dimethylphenol	2000	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
2,4-Dinitrophenol	200	NA	mg/kg		0.18 U	0.2 U	0.18 U	0.19U	0.19 U	0.18 U	0.18 U	0.18 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
2,4-Dinitrotoluene	200	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2,6-Dinitrotoluene	100	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2-Chloronaphthalene	8200	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2-Chlorophenol	510	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2-Methylnaphthalene	410	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2-Methylphenol	5100	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
2-Nitroaniline	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
2-Nitrophenol	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
3&4-Methylphenol	510	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
3,3'-Dichlorobenzidine	0.4	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
3-Nitroaniline	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
4,6-Dinitro-2-methylphenol	NA	NA	mg/kg		0.18 U	0.2 U	0.18 U	0.19U	0.19 U	0.18 U	0.18 U	0.18 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
4-Bromophenyl-phenylether	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
4-Chloro-3-methylphenol	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
4-Chloroaniline	410	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
4-Chlorophenyl-phenylether	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
4-Nitroaniline	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
4-Nitrophenol	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Acenaphthene	6100	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Acenaphthylene	6100	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Acetophenone	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Anthracene	31000	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Atrazine	15	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Benzaldehyde	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Benzo(a)anthracene	3.9	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Benzo(a)pyrene	0.39	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Benzo(b)fluoranthene	3.9	NA	mg/kg		0.036 U	0.052	0.049	0.087U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.047	0.046	0.037 U	0.038 U	0.099
Benzo(g,h,i)perylene	3100	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Benzo(k)fluoranthene	39	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
bis(2-Chloroethoxy)methane	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
bis(2-Chloroethyl)ether	2.6	NA	mg/kg		0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
bis(2-Chloroisopropyl)ether	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
bis(2-Ethylhexyl)phthalate	200	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.086	0.037 U	0.038 U	0.037 U
Butylbenzylphthalate	NA	NA	mg/kg		0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U

Summary of Analytical Results
Litsenberg Fitness Stockpile
Gaithersburg, Maryland

			CLIENT ID:	LT-20-2.0	LT-21-3.0	LT-22-3.0	LT-23-2.0	LT-24-2.0	LT-25-3.0	LT-26-2.0	LT-27-1.5	LT-28-2.0	LT-29-1.5	LT-30-1.5	LT-31-2.0	LT-32-2.0	LT-33-2.0
			LAB ID:	AC94780-020	AC94780-021	AC94780-022	AC94780-023	AC94780-024	AC94780-025	AC94780-026	AC94780-027	AC94780-028	AC94780-029	AC94780-030	AC94780-031	AC94780-032	AC94780-033
			COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
			SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Caprolactam	NA	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Carbazole	140	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U
Chrysene	390	NA	mg/kg	0.036 U	0.041	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Dibenz(a,h)Anthracene	0.39	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Dibenzofuran	100	NA	mg/kg	0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
Diethylphthalate	57000	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Dimethylphthalate	NA	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Di-n-butylphthalate	10000	NA	mg/kg	0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.026	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
Di-n-octylphthalate	NA	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Fluoranthene	4100	NA	mg/kg	0.036 U	0.068	0.051	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.039	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Fluorene	4100	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Hexachlorobenzene	1.8	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Hexachlorobutadiene	37	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Hexachlorocyclopentadiene	610	NA	mg/kg	0.085 U	0.092 U	0.086 U	0.087U	0.09 U	0.086 U	0.086 U	0.085 U	0.089 U	0.089 U	0.089 U	0.088 U	0.089 U	0.088 U	0.089 U	0.087 U
Hexachloroethane	200	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Indeno(1,2,3-cd)pyrene	3.9	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Isophorone	3600	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Naphthalene	2600	NA	mg/kg	0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
Nitrobenzene	51	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
N-Nitroso-di-n-propylamine	0.41	NA	mg/kg	0.0091 U	0.0098 U	0.0092 U	0.0093U	0.0096 U	0.0092 U	0.0092 U	0.0091 U	0.0095 U	0.0095 U	0.0095 U	0.0094 U	0.0095 U	0.0093 U
N-Nitrosodiphenylamine	560	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Pentachlorophenol	24	NA	mg/kg	0.18 U	0.2 U	0.18 U	0.19U	0.19 U	0.18 U	0.18 U	0.18 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Phenanthrene	31000	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Phenol	31000	NA	mg/kg	0.036 U	0.039 U	0.037 U	0.037U	0.038 U	0.037 U	0.037 U	0.036 U	0.038 U	0.038 U	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Pyrene	3100	NA	mg/kg	0.036 U	0.056	0.051	0.037U	0.041	0.037 U	0.037 U	0.036 U	0.038 U	0.038	0.038 U	0.038 U	0.037 U	0.038 U	0.037 U	0.037 U
Volatiles																			
1,1,1-Trichloroethane	200000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2,2-Tetrachloroethane	14	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,1,2-Trichloroethane	50	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethane	20000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,1-Dichloroethene	5100	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2,3-Trichlorobenzene	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2,4-Trichlorobenzene	1000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromo-3-chloropropane	3.6	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dibromoethane	1.4	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00087 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichlorobenzene	9200	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloroethane	31	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,2-Dichloropropane	42	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,3-Dichlorobenzene	310	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dichlorobenzene	120	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
1,4-Dioxane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.087 U	NS	NS	NS	NS	NS	NS	NS	NS
2-Butanone	61000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
2-Hexanone	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
4-Methyl-2-pentanone	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Acetone	92000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0087 U	NS	NS	NS	NS	NS	NS	NS	NS
Benzene	52	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00067 U	NS	NS	NS	NS	NS	NS	NS	NS
Bromochloromethane	34	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Bromodichloromethane	46	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Bromoform	360	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Bromomethane	140	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Carbon disulfide	10000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Carbon tetrachloride	22	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Chlorobenzene	2000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Chloroethane	990	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Chloroform	1000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Chloromethane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,2-Dichloroethene	1000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
cis-1,3-Dichloropropene	29	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Cyclohexane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Dibromochloromethane	34	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Dichlorodifluoromethane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Ethylbenzene	10000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00067 U	NS	NS	NS	NS	NS	NS	NS	NS
Isopropylbenzene	10000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00067 U	NS	NS	NS	NS	NS	NS	NS	NS
m&p-Xylenes	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00087 U	NS	NS	NS	NS	NS	NS	NS	NS
Methyl Acetate	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Methylcyclohexane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Methylene chloride	380	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Methyl-t-butyl ether	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00087 U	NS	NS	NS	NS	NS	NS	NS	NS
o-Xylene	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00087 U	NS	NS	NS	NS	NS	NS	NS	NS
Styrene	20000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Tetrachloroethene	53	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Toluene	8200	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene	2000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,3-Dichloropropene	29	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Trichloroethene	7.2	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Trichlorofluoromethane	NA	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Vinyl chloride	4	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.0017 U	NS	NS	NS	NS	NS	NS	NS	NS
Xylenes (Total)	20000	NA	mg/kg	NS	NS	NS	NS	NS	NS	NS	0.00087 U	NS	NS	NS	NS	NS	NS	NS	NS
Wet Chemistry				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
% Solids	NA	NA	%	92	85	91	90	87	91	91	92	88	88	88	89	88	90		

Notes:
MDE Non-Residential Soil = Maryland Department of Environment June 2008 non-residential c
ATC Central = Maryland Dept. of Environment Anticipated Typical Concentration.
mg/kg = Milligrams per Kilogram.
NA = No screening level.
NS = Not sampled.
U = Not detected.
Gray shaded values equal or exceed the MDE Non-Residential Soil standard.
Bolded values exceed the ATC.

Summary of Analytical Results
Chevy Chase Lakes Stockpile
Chevy Chase, Maryland

			CLIENT ID:	CC-1-6.0	CC-2-6.0	CC-3-6.0	CC-4-15	CC-5-15	CC-6-15	CC-7-30	CC-8-30	CC-9-30	CC-10-33	CC-11-33	CC-12-33
			LAB ID:	AC94785-001	AC94785-002	AC94785-003	AC94785-004	AC94785-005	AC94785-006	AC94785-007	AC94785-008	AC94785-009	AC94785-010	AC94785-011	AC94785-012
			COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
			SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Herbicides															
2,4,5-T	NA	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U	0.012 U	0.011 U
2,4-D	1000	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U	0.012 U	0.011 U
Dicamba	NA	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U	0.012 U	0.011 U
Silvex	1000	NA	mg/kg	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.012 U	0.011 U	0.011 U	0.012 U	0.012 U	0.011 U
Metals															
Antimony	41	NA	mg/kg	0.86 U	0.89 U	0.9 U	0.9 U	0.88 U	0.89 U	0.98 U	0.92 U	0.92 U	0.93 U	0.95 U	0.92 U
Arsenic	3	4.9	mg/kg	2	2.6	1.6	2.6	1.5	2.7	0.94	0.61	0.53	1.1	0.7	1.8
Barium	20000	NA	mg/kg	250	290	180	200	230	160	410	440	310	480	260	460
Beryllium	200	NA	mg/kg	1.1	1.2	0.89	1.9	1	2.2	1.5	1.1	1.1	3.7	4	2
Cadmium	51	NA	mg/kg	0.43 U	0.44 U	0.45 U	0.45 U	0.44 U	0.44 U	0.49 U	0.46 U	0.46 U	0.47 U	0.48 U	0.46 U
Chromium	310	30	mg/kg	74	91	54	85	94	60	130	230	160	92	28	110
Copper	4100	NA	mg/kg	72	96	52	440	55	40	60	110	89	110	82	78
Lead	1000	NA	mg/kg	33	47	26	18	19	13	19	8.3	6.9	15	6 U	170
Mercury	10	NA	mg/kg	0.09 U	0.093 U	0.094 U	0.094 U	0.092 U	0.093 U	0.1 U	0.096 U	0.096 U	0.097 U	0.099 U	0.096 U
Nickel	2000	NA	mg/kg	37	50	25	46	120	35	51	80	60	52	24	68
Selenium	510	NA	mg/kg	3	3.6	2.3	3.9	2.2	4.1	2.4 U	2.3 U	2.3 U	2.3 U	2.4 U	2.3 U
Silver	510	NA	mg/kg	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U	0.23 U	0.23 U	0.23 U	0.24 U	0.23 U
Thallium	7.2	1.5	mg/kg	0.68	0.73	0.61	0.78	0.48	0.78	0.8	0.75	0.81	0.6	0.48 U	0.69
Zinc	31000	NA	mg/kg	120	200	74	110	110	84	99	94	71	140	88	130
Pesticides															
a-Chlordane	NA	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.1	0.059d	0.099	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Aldrin	0.17	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0077	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.04	0.0072	[redacted] 0.52
Alpha-BHC	0.45	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0057 U
beta-BHC	1.6	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0057 U
Chlordane (Total)	8.2	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.17	0.12	0.17	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
delta-BHC	2.2	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Dieldrin	0.18	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0045	0.0074	0.0037	0.0012 U	0.0011 U	0.0011 U	0.02	0.011	0.1
Endosulfan I	610	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Endosulfan II	610	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Endosulfan Sulfate	610	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Endrin	31	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Endrin Aldehyde	31	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Endrin Ketone	31	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
gamma-BHC	2.2	NA	mg/kg	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0012 U	0.0057 U
Heptachlor	0.64	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Heptachlor Epoxide	0.31	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
Methoxychlor	510	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.0056 U	0.0055 U	0.0056 U	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
p,p'-DDD	12	NA	mg/kg	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0027 U	0.0028 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.003 U	0.014 U
p,p'-DDE	8.4	NA	mg/kg	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0027 U	0.0028 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.003 U	0.014 U
p,p'-DDT	8.4	NA	mg/kg	0.0027 U	0.0028 U	0.0028 U	0.0028 U	0.0027 U	0.0028 U	0.003 U	0.0029 U	0.0029 U	0.0029 U	0.003 U	0.014 U
Toxaphene	2.6	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.14 U
y-Chlordane	NA	NA	mg/kg	0.0054 U	0.0056 U	0.0056 U	0.068	0.063	0.072	0.0061 U	0.0057 U	0.0057 U	0.0058 U	0.006 U	0.029 U
PCBs															
Aroclor (Total)	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1016	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1221	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1232	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1242	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1248	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1254	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1260	0.2	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1262	NA	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
Aroclor-1268	NA	NA	mg/kg	0.027 U	0.028 U	0.028 U	0.028 U	0.027 U	0.028 U	0.03 U	0.029 U	0.029 U	0.029 U	0.03 U	0.029 U
SemiVolatiles															
1,1'-Biphenyl	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
1,2,4,5-Tetrachlorobenzene	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2,3,4,6-Tetrachlorophenol	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2,4,5-Trichlorophenol	10000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2,4,6-Trichlorophenol	260	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2,4-Dichlorophenol	310	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
2,4-Dimethylphenol	2000	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
2,4-Dinitrophenol	200	NA	mg/kg	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U
2,4-Dinitrotoluene	200	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2,6-Dinitrotoluene	100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U

Summary of Analytical Results
Chevy Chase Lakes Stockpile
Chevy Chase, Maryland

			CLIENT ID:	CC-1-6.0	CC-2-6.0	CC-3-6.0	CC-4-15	CC-5-15	CC-6-15	CC-7-30	CC-8-30	CC-9-30	CC-10-33	CC-11-33	CC-12-33
			LAB ID:	AC94785-001	AC94785-002	AC94785-003	AC94785-004	AC94785-005	AC94785-006	AC94785-007	AC94785-008	AC94785-009	AC94785-010	AC94785-011	AC94785-012
			COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
			SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
2-Chloronaphthalene	8200	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2-Chlorophenol	510	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2-Methylnaphthalene	410	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2-Methylphenol	5100	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
2-Nitroaniline	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
2-Nitrophenol	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
3&4-Methylphenol	510	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
3,3'-Dichlorobenzidine	6.4	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
3-Nitroaniline	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
4,6-Dinitro-2-methylphenol	NA	NA	mg/kg	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U
4-Bromophenyl-phenylether	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
4-Chloro-3-methylphenol	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
4-Chloroaniline	410	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
4-Chlorophenyl-phenylether	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
4-Nitroaniline	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
4-Nitrophenol	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Acenaphthene	6100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Acenaphthylene	6100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Acetophenone	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Anthracene	31000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Atrazine	13	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzaldehyde	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzo[a]anthracene	3.9	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzo[a]pyrene	0.39	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzo[b]fluoranthene	3.9	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzo[g,h,i]perylene	3100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Benzo[k]fluoranthene	39	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
bis(2-Chloroethoxy)methane	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
bis(2-Chloroethyl)ether	2.6	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
bis(2-Chloroisopropyl)ether	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
bis(2-Ethylhexyl)phthalate	200	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.041
Butylbenzylphthalate	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Caprolactam	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Carbazole	140	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Chrysene	390	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Dibenzo[a,h]anthracene	0.39	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Dibenzofuran	100	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
Diethylphthalate	82000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Dimethylphthalate	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Di-n-butylphthalate	10000	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.028	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.024
Di-n-octylphthalate	NA	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Fluoranthene	4100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Fluorene	4100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Hexachlorobenzene	1.8	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Hexachlorobutadiene	37	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Hexachlorocyclopentadiene	610	NA	mg/kg	0.084 U	0.087 U	0.088 U	0.088 U	0.086 U	0.087 U	0.096 U	0.09 U	0.09 U	0.091 U	0.094 U	0.09 U
Hexachloroethane	200	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Indeno[1,2,3-cd]pyrene	3.9	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Isophorone	3000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Naphthalene	2000	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
Nitrobenzene	51	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
N-Nitroso-di-n-propylamine	0.41	NA	mg/kg	0.009 U	0.0093 U	0.0094 U	0.0094 U	0.0092 U	0.0093 U	0.01 U	0.0096 U	0.0096 U	0.0097 U	0.0099 U	0.0096 U
N-Nitrosodiphenylamine	580	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Pentachlorophenol	24	NA	mg/kg	0.18 U	0.19 U	0.19 U	0.19 U	0.18 U	0.19 U	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U
Phenanthrene	31000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Phenol	31000	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Pyrene	3100	NA	mg/kg	0.036 U	0.037 U	0.037 U	0.037 U	0.037 U	0.037 U	0.041 U	0.038 U	0.038 U	0.039 U	0.04 U	0.038 U
Volatiles															
1,1,1-Trichloroethane	200000	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,1,2,2-Tetrachloroethane	14	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,1,2-Trichloroethane	50	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,1-Dichloroethane	20000	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,1-Dichloroethene	5100	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,2,3-Trichlorobenzene	NA	NA	mg/kg	NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS

Summary of Analytical Results
Chevy Chase Lakes Stockpile
Chevy Chase, Maryland

				CLIENT ID:	CC-1-6.0	CC-2-6.0	CC-3-6.0	CC-4-15	CC-5-15	CC-6-15	CC-7-30	CC-8-30	CC-9-30	CC-10-33	CC-11-33	CC-12-33
				LAB ID:	AC94785-001	AC94785-002	AC94785-003	AC94785-004	AC94785-005	AC94785-006	AC94785-007	AC94785-008	AC94785-009	AC94785-010	AC94785-011	AC94785-012
				COLLECTION DATE:	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016	11/17/2016
				SAMPLE MATRIX:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	MDE Non-Residential Soil	ATC Central	Unit		Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
1,2,4-Trichlorobenzene	1000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,2-Dibromo-3-chloropropane	3.6	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,2-Dibromoethane	1.4	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
1,2-Dichlorobenzene	9200	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,2-Dichloroethane	31	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,2-Dichloropropane	42	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,3-Dichlorobenzene	310	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,4-Dichlorobenzene	120	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
1,4-Dioxane	NA	NA	mg/kg		NS	NS	NS	0.11 U	NS	NS	NS	NS	NS	0.12 U	NS	NS
2-Butanone	61000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
2-Hexanone	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
4-Methyl-2-pentanone	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Acetone	92000	NA	mg/kg		NS	NS	NS	0.011 U	NS	NS	NS	NS	NS	0.012 U	NS	NS
Benzene	52	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
Bromochloromethane	34	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Bromodichloromethane	46	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Bromoform	360	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Bromomethane	140	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Carbon disulfide	10000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Carbon tetrachloride	22	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Chlorobenzene	2000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Chloroethane	990	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Chloroform	1000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Chloromethane	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
cis-1,2-Dichloroethene	1000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
cis-1,3-Dichloropropene	29	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Cyclohexane	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Dibromochloromethane	34	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Dichlorodifluoromethane	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Ethylbenzene	10000	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
Isopropylbenzene	10000	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
m&p-Xylenes	NA	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
Methyl Acetate	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Methylcyclohexane	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Methylene chloride	380	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Methyl-t-butyl ether	NA	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
o-Xylene	NA	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
Styrene	20000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Tetrachloroethene	5.3	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Toluene	8200	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
trans-1,2-Dichloroethene	2000	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
trans-1,3-Dichloropropene	29	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Trichloroethene	7.2	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Trichlorofluoromethane	NA	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Vinyl chloride	4	NA	mg/kg		NS	NS	NS	0.0022 U	NS	NS	NS	NS	NS	0.0023 U	NS	NS
Xylenes (Total)	20000	NA	mg/kg		NS	NS	NS	0.0011 U	NS	NS	NS	NS	NS	0.0012 U	NS	NS
Wet Chemistry																
% Solids	NA	NA	%		93	90	89	89	91	90	82	87	87	86	84	87

Notes:
MDE Non-Residential Soil = Maryland Department of Environment June 2008 non-residential cleanup standards for soil.
ATC Central = Maryland Dept. of Environment Anticipated Typical Concentration.
mg/kg = Milligrams per kilogram
NA = No screening level.
NS = Not sampled.
U = Not detected.
Gray shaded values equal or exceed the MDE Non-Residential Soil standard.
Bolded values exceed the ATC.

APPENDIX B

ENVIRONMENTAL REMEDIATION COMPLETION REPORTS

APPENDIX C

EXAMPLE CAP INSPECTION FORM

CAP INSPECTION FORM

Location:		**Date/Time:**	
Inspector:		**Weather:**	

PAVEMENT

Overall Condition	

Specific Areas of Note (use PCI, below, and attach sketches/ photographs, as needed)

Area	PCI	Comments

Pavement Condition Index (PCI)

Response?	PCI	Characterization	Description
Optional	1	New, crack-free surface	Black in color, smooth texture
	2	Oxidation has started	Short hairline cracks start to develop. Dark gray color.
	3	Oxidation in advanced state	Hairline cracks are longer and wider. Gray in color.
Required	4	Oxidation complete	Crack area ¼" wide and crack lines have found base faults.
	5	Moisture penetrating through ¼" cracks. Loose material (stone and sand) evident.	Texture of surface becoming rough. Preventive maintenance.
	6	Cracks widen and join.	Cracks and shrinkage evident at curb and gutter lines.
	7	Potholes develop in low spots.	Gatoring areas begin to break up. Overall texture very rough.
	8	Potholes developing.	Pavement breaking up.
	9	Heaving due to excessive moisture in base.	Distorts entire surface.
	10	General breakup of surface.	

SIDEWALKS/CURBS

	Sidewalks	Curbs and Gutters
Overall Condition		
Check all that apply	☐ Sound ☐ Cracked ☐ Deteriorated ☐ Root Intrusion	☐ Sound ☐ Cracked ☐ Deteriorated ☐ Root Intrusion
Other Comments		

LANDSCAPED AREAS

Overall Condition	
Check all that apply	☐ Sound ☐ Erosion ☐ Healthy Plant Condition ☐ Mortality ☐ Animal Burrows
Trees	☐ Healthy ☐ Poor Health ☐ Dead ☐ Fallen ☐ Other_____
Shrubs	☐ Healthy ☐ Poor Health ☐ Dead ☐ Fallen ☐ Other_____
Vent Risers and Piping at Light Poles	☐ Good Condition ☐ Cracked ☐ Broken/ Damaged ☐ Other_____

RESPONSE ACTIONS

Responses Required	
Work Completed (Description, Date, Contractor, etc.)	
List Attached Photographs/Sketches	

Attach additional sheets as necessary

Environmental Covenant
5601 Manor Woods Road, Frederick, Maryland 21701.
Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
Tax Parcels: District: 01, Account Number: 000152, 005383, and 005405

EXHIBIT E
LANDFILL POST CLOSURE CARE PLAN

North and South Landfills
Closure and Post-Closure Care Plan

Eastalco Aluminum Company
Frederick, Maryland

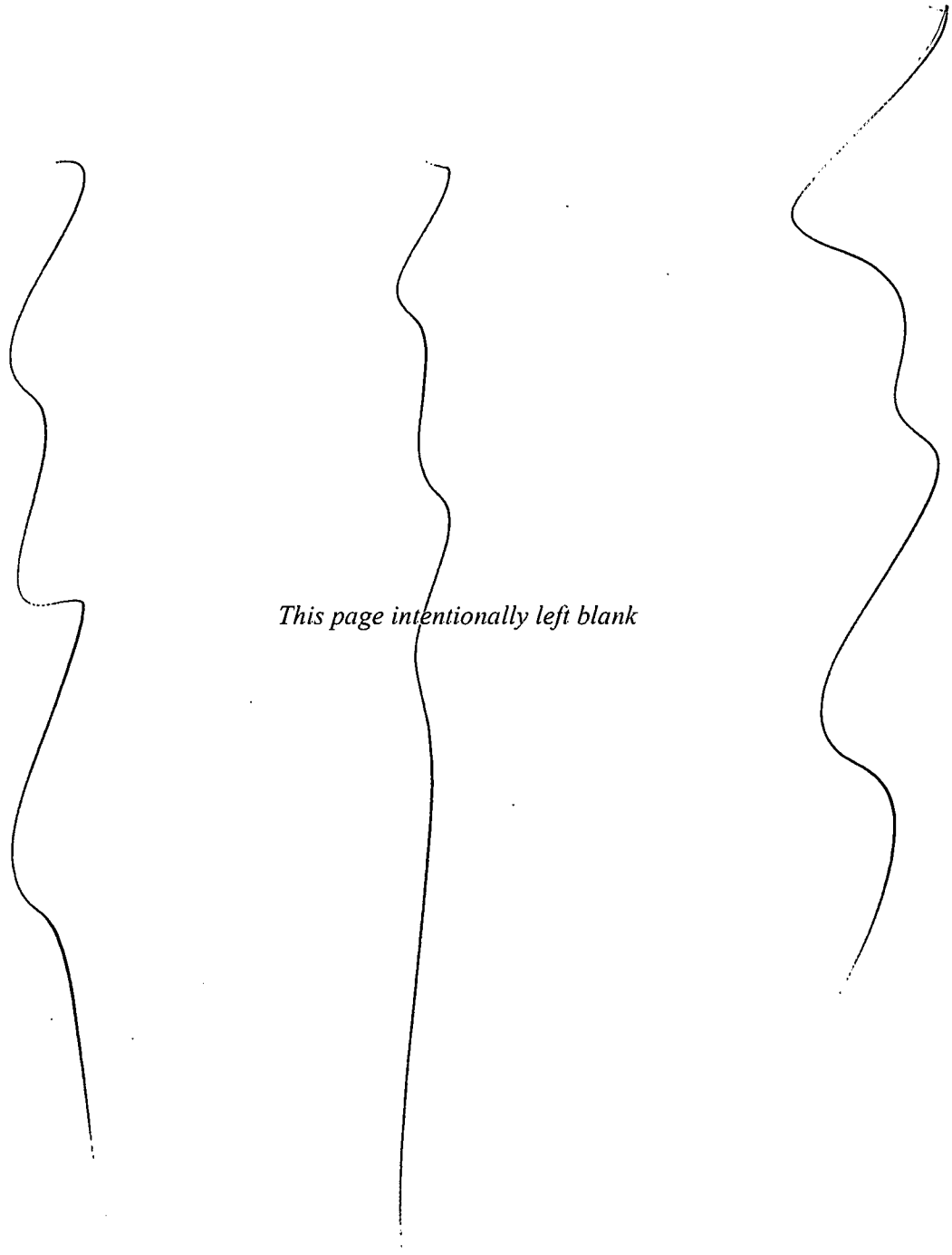
Prepared for

Eastalco Aluminum Company
5601 Manor Woods Road
Frederick, Maryland 21703

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031
(410) 584-7000

October 2017 EA Project No. 14359.05



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North and South Landfills
Closure and Post-Closure Care Plan

Eastalco Aluminum Company
Frederick, Maryland

Prepared for

Eastalco Aluminum Company
5601 Manor Woods Road
Frederick, Maryland 21703

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
225 Schilling Circle, Suite 400
Hunt Valley, Maryland 21031
(410) 584-7000

October 2017 EA Project No. 14359.05

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TABLE OF CONTENTS

Appendix A - D, pertaining to the closure of the North Landfill, are not included in the Environmental Covenant Exhibit as the Exhibit specifically pertains to the Post-closure care.

LIST OF ACRONYMS AND ABBREVIATIONS

COMAR	Code of Maryland Annotated Regulations
EA	EA Engineering, Science, and Technology, Inc., PBC
EAC	Eastalco Aluminum Company
ft	Foot (feet)
in.	Inch(es)
LLDPE	Linear low density polyethylene
MDE	Maryland Department of the Environment
O&M	Operations and maintenance
oz	Ounce(s)
PLC	Programmable logic controller
SCD	Soil Conservation District
QA	Quality assurance
QC	Quality control

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1. CLOSURE PLAN

EA Engineering, Science, and Technology, Inc., PBC (EA) has prepared this report for the Eastalco Aluminum Company (EAC) to document the closure and post-closure care plan of the North and South Landfills, located in Frederick, Maryland. Closure (membrane liner and vegetative soil) of the South Landfill was completed in 1994. Therefore, closure care plans will address the North Landfill, while post-closure care plans will address the North and South Landfill.

1.1 GENERAL

This plan describes closure activities including final cover, site drainage, and a schedule for completing all activities necessary to satisfy the closure and post-closure criteria identified in the Code of Maryland Annotated Regulations (COMAR) 26.04.07.21 and 26.04.07.22, respectively.

The EAC facility, located in Frederick, Maryland started operations in 1969 and occupies approximately 400 acres of a 2,200-acre parcel. Disposal of Industrial wastes in the northernmost landfill is operated under EAC's 2014-WIF-0537 Refuse Disposal Permit. The facility formerly manufactured aluminum using the electrolysis process. The facility ceased aluminum production on 31 December 2005, was shut down on 31 March 2010, and is currently in final stages of demolition.

The EAC site currently has two distinct and separate non-hazardous industrial waste landfills onsite with internal designations as the North Landfill and closed South Landfill. The South Landfill consists of a 2.9-acre cell that was closed and capped with a membrane liner in 1994 (CH2M Hill 1993). The North Landfill was permitted to encompass a 10.2-acre fill area on a 20-acre site to consist of five cells; however, only two cells were constructed and occupy approximately 4.1 acres. Cell 1 of the North Landfill accepted waste from 1994 to 2006 and was covered with a synthetic rain barrier thereafter. Cell 2 of the North Landfill was constructed in 2012 and is currently accepting site demolition waste. Prior to closure, additional wastes will be added to Cell 1 within design capacity. Both of these non-hazardous waste landfills contain only waste generated onsite as specified within the disposal permit or later authorized by the Maryland Department of the Environment (MDE) Solid Waste Operations Division.

Closure of the North Landfill Cells 1 and 2 will commence upon completion of waste acceptance, anticipated in 2015. Closure will be in accordance with COMAR and the landfill permit requirements. As the closure area is relatively small and side slopes are only 4H:1V, slope stability and erosion and sediment can be maintained with standard engineering controls. A linear low density polyethylene (LLDPE) textured membrane, geocomposite drainage layer, and vegetative cover will be utilized to cap the North Landfill cells. Erosion and sediment control during construction will be as approved by the Frederick County Soil Conservation District (SCD).

Leachate is collected from both the North and South Landfill areas and is currently conveyed to an existing 200,000-gallon leachate collection tank. Leachate is transferred from this tank to a

tanker truck and hauled offsite for treatment and disposal at a permitted facility. Leachate levels are monitored and pumping controlled by instrumentation contained within the Control Building located at the North Landfill. Pumped leachate volumes, cell liner sump and leachate tank level data are electronically collected and stored on a remote fileserver located at Alcoa Massena Works in Massena, New York. The data are computer-displayed at the Security and EHS Manager's offices. In order to improve long-term leachate management, local leachate storage tanks were installed near each respective landfill area. A 12,000-gallon tank has been constructed near the North Landfill area and will begin accepting that area's leachate upon closure and capping of the North Landfill area. The South Landfill has a newly installed 2,200-gallon leachate storage tank, with connection planned to be completed by the fall of 2015, as approved by MDE (MDE 2013).

The following report has been prepared in accordance with the Closure Report Outline provided by MDE. Chapter 1 describes the Closure Plan, and Chapter 2 describes the Post-Closure Plan. The following supplemental information is provided in appendices to the report:

- Appendix A: Slope Stability Calculations – North Landfill Closure
- Appendix B: Erosion and Sediment Control Calculations
- Appendix C: Technical Specifications – North Landfill Closure
- Appendix D: Contract Drawings – North Landfill Closure
- Appendix E: North Landfill Post-Closure Forms
- Appendix F: South Landfill Post-Closure Forms
- Appendix G: Groundwater Monitoring North and South Landfills

1.2 SCHEDULE AND DESCRIPTION

1.2.1 Performance Standards

The performance standards for closure as defined by COMAR 26.04.07.21, Sanitary Landfill – Closure, have been incorporated into the design of the closure system and are further discussed in the following sections.

1.2.2 Closure Activities

The South Landfill is already capped and closed, and the North Landfill is expected to be capped and in the Spring of 2016 or to begin within 24 months of cessation of waste acceptance as required by COMAR. EAC will solicit competitive bids and provide construction quality assurance during closure in accordance with the specifications.

1.2.2.1 Closure After Landfill Reaches Permitted Capacity

The North Landfill Cells 1 and 2 are being filled with industrial waste, and are nearing capacity and will require closure. Additional waste will be placed in the cells prior to final closure in compliance with permitted side slopes and maximum height of filling. It is anticipated that

waste closure grades will be reached in the fall of 2015 and capping will begin the same year. The North Landfill has been designed to the maximum permitted capacity although waste actually placed may be less.

1.2.2.2 Contact for Final Closure

EAC contact regarding closure activities:

Alcoa, Inc.
Attn: Robyn L. Gross
201 Isabella St
Pittsburgh, PA 15212
412-553-4303

1.3 NOTIFICATION PROCEDURES

EAC will notify MDE prior to beginning closure construction.

1.4 RESTRICTED ACCESS ASSURANCE

Vehicular access to the facility is restricted from the public via a chain-link perimeter fence that has five non-motorized gates and one motorized gate. Of the five non-motorized gates, three are locked at all times and the fourth (North Gate) and fifth (RR Gate) only unlocked when at least one Alcoa representative is present and/or CSX is accessing the site. The electric gate (East Gate) is operated remotely from within the scale house that is in direct line of site, by Northstar personnel or a Security Guard. This gate is maintained in a closed position on weekends and holidays except to allow authorized personnel access. Within the facility there is no unrestricted roadway to the landfill. Additional fencing needs and specific restricted access to the landfill post-closure area are being evaluated.

1.4.1 Deed Notation

EAC retains the property for the North and South Landfills. The current deed is notated for the presence of a landfill. Should property be transferred to another Owner, EAC will notify the succeeding owner by certified mail of the existence of the 2014-WIF-0537 Refuse Disposal Permit and any outstanding noncompliance a minimum of 30 days prior to transfer. A copy of the notification shall be forwarded to MDE at the same time.

1.4.2 Closure Cost Estimate and Financial Assurance

The Engineer's Cost Estimate for construction of the closure system of the North Landfill is approximately $1 million. No additional closure costs are required for the South Landfill as it is already constructed and in place. Financial Assurance for Closure of the North Landfill is provided by the Eastalco Aluminum Company.

1.4.3 Closure System Design

1.4.3.1 General

The objective of the landfill closure design is to minimize the impact of the landfill on the surrounding environment to the greatest extent possible. Therefore, elements of the North Landfill closure system design include:

- Landfill capping to minimize the infiltration of stormwater through the waste and the potential migration of leachate
- Leachate collection, storage, and disposal to effectively manage the leachate that will continue to be generated, albeit at a reduced rate
- Erosion and sediment control and stormwater management to prevent erosion on the landfill itself, and impacts to surrounding water bodies.

The closure design was prepared in accordance with the applicable local, state, and federal regulations to ensure each of the elements identified above was incorporated and that the landfill will remain in compliance throughout closure and post-closure. Specific details of each element are addressed in the subsequent sections of this report.

1.4.3.2 Cover System Design

Final cover of the North Landfill will be placed over the industrial waste and will be graded to comply with the site permit. Technical Specifications for construction are located in Appendix C.

A 10-ounce (oz) nonwoven needle-punched geotextile will be placed between the final cover and geomembrane. While not required by COMAR, this layer provides a higher interface friction angle with the final cover and serves to protect the geomembrane from any debris, stones, or refuse that may exist within the final cover. Although a geocomposite drainage layer for gas is not required below the membrane, two gas vents are planned to be provided at the top of the landfill in case there is gas present from organics.

The geomembrane serves as the impermeable barrier of the cap to prevent transfer of materials both into and out of the closed landfill. COMAR 26.04.07.21 requires a low permeability layer within the closure cap and specifies that when using a synthetic material as the cap's low permeability layer, the material must have a minimum thickness of 20 mil and a maximum permeability of 1×10^{-10} centimeters per second installed with a minimum slope of 4 percent. A 40-mil textured LLDPE geomembrane is specified in Technical Specification Section 06010, Geomembrane Liner, Linear Low Density Polyethylene to satisfy this requirement. It meets the requirements for thickness and permeability, and has the needed characteristics for slope stability and durability.

A drainage layer is required in a closure cap to provide a high-transmissivity layer through which precipitation can quickly flow over the geomembrane to prevent an unacceptable buildup of pore pressure in the vegetative support soil. Increased pore pressure can create instability between cap components and lead to sloughing. COMAR 26.14.07.21 requires that a drainage layer be installed immediately above the low-permeability layer and allows for filter fabrics and drainage blankets to be used for this purpose. Based on drainage layer capacity calculations, an 8-oz, 250-mil geocomposite has been specified in Technical Specification Section 06030, Geocomposite Drainage Layer.

A depiction of the cover system is provided on Drawing Sheet 49 (83.628M0049) of the Contract Drawings.

1.4.3.3 Slope Stability Analysis

Care must be taken when selecting components of the landfill cap to prevent sloughing. Areas most prone to sloughing are the interfaces between each cap layer. EA has designed the capping system of the North Landfill with a minimum factor of safety of 1.5 for slope stability of each interface, as is typical for projects of this nature and magnitude. All slopes included in the design of the North Landfill closure are in accordance with these recommendations. The South Landfill has been closed for over 20 years and no evidence of slope stability issues is evident.

1.4.3.4 Barrier Layer Integrity

It is imperative that the geomembrane not be punctured when installing the closure cap, as this will cause unacceptable material transfer between the landfill and the exterior environment. Minimum puncture strength requirements and procedures for care during the installation of closure cap materials during construction are specified in Technical Specification Section 06010, Geomembrane Liner, Linear Low Density Polyethylene. The addition of a layer of 10-oz nonwoven needle-punched geotextile beneath the geomembrane adds additional puncture protection.

1.4.3.5 Quality Assurance/Quality Control (QA/QC) for Cover System Materials

QA/QC of cover materials for the North Landfill will be performed in accordance with the Contract Specifications.

QA/QC for the closure cap's geosynthetics consists of manufacturer's testing, field testing, and laboratory analysis, and is included in Technical Specification Section 06030, Geotextiles, and Technical Specification Section 06010, Geomembrane Liner, Linear Low Density Polyethylene.

QA/QC for the closure cap's soil materials consists of pre-construction testing and in-place field testing, and is included in Technical Specification Section 02200, Earthwork.

1.4.3.6 QA/QC for Cover System Inspection

Cover system inspection will be performed by the Contractor's field superintendent who will be keeping Daily QC Logs, as well as the Resident Engineer/Resident Inspector, on behalf of EAC, as detailed in the Technical Specifications.

1.4.3.7 Final Cover Availability and Suitability

EAC has stockpiled borrow soil onsite that will be tested for compliance with the Technical Specifications. Offsite borrow, if required, will also require testing prior to placement as final cover or topsoil. EAC will provide the contractor with screened borrow (< 1-in stones, USCS Classification SM) for use in the initial 1-ft layer over the geocomposite. Topsoil will be in compliance with MD SHA 920. TOPSOIL.

1.4.3.8 Construction QA/QC

A full-time experienced Resident Inspector will be utilized during construction. The Resident Inspector will be competent and experienced in the area of construction oversight and landfill closure construction, including geosynthetic lining installation.

In general, the Engineer and Resident Inspector will act as EAC's representative, providing assistance with construction contract administration, interpretation of contract documents and design, and general oversight of the construction contractor's work to ensure conformance with the project plans and specifications and MDE's construction QA requirements. Specifically, the Engineer and Resident Inspector will provide the following services:

- Aid in the resolution of field problems.
- Maintain a log of materials delivered to the site and the progress of daily work activities, for use in the review of progress payment applications submitted to EAC by the Contractor.
- Assist in the negotiation and review of Change Order requests resulting from variations in site conditions or discrepancies in the Contract Documents.
- Review the erosion and sediment control provisions and notify the Contractor of nonconformance issues to ensure compliance with the approved plans.
- Monitor the placement of compacted fills to ensure compliance with the Contract Documents, including development of moisture-density relations for dominant soil types used in the fill and measurement of in-place density using standard techniques. The Resident Inspector will provide QA testing on compacted lifts.
- Oversee testing and review results of the Contractor's field testing of soil materials.

- Oversee installation and review results of the Contractor's placement, seaming, and field testing of geomembrane liner for the landfill closure cap.

- Review Contractor sampling and laboratory testing to verify the Contractor's compliance with the approved specifications. Maintain a record of test reports.

The required material testing of the geosynthetics will be performed by the liner/geosynthetics subcontractor retained by the Contractor. The Resident Inspector will be responsible for reviewing the Contractor's testing of geosynthetics and their respective laboratory analyses. Further, the Resident Inspector will coordinate the responsibilities of both the Contractor and any subcontractors involved with the work. These tests will be conducted in accordance with the specifications and compared to the required values. Should discrepancies exist, the Resident Inspector will recommend to EAC that the Contractor correct these discrepancies.

The required material testing of the soil materials will be the responsibility of and will be performed by the Contractor at the frequencies identified in the Technical Specifications. The Resident Inspector will provide oversight of the testing performed by the Contractor. Further, the Resident Inspector will be responsible for reviewing the Contractor's testing of soil materials and their respective laboratory analyses of soil material conducted to meet compliance with MDE's requirements for construction QA. Additional QA testing will be performed at EAC's or Engineer's request.

1.4.3.9 Erosion and Sediment Control

EAC has obtained Frederick County Community Development Division approval to use existing stormwater management facilities. In addition, EAC is currently in the process of obtaining Frederick County SCD approval. This approval will be provided to MDE prior to construction. Erosion and Sediment Control calculations are included in Appendix B.

1.4.3.10 Vegetation

COMAR 26.04.07.21 states that a minimum of 2 ft of earthen cover shall be placed over the drainage layer with a minimum cover slope of 4 percent. The material is required to contain sufficient organic material and nutrients to sustain a vegetative cover over time. A Vegetative Support Soil layer of thickness 1 foot (ft), 6 inches (in.) with a 6-in. layer of topsoil is specified in Technical Specification Section 02200, Earthwork, and Technical Specification Section 02933, Lawns and Grasses.

COMAR 26.04.07.21 also requires that within 30 days of the final earthen cover installation, the area shall be vegetatively stabilized using a perennial cover species recommended by the Soil Conservation District. Cover species have been chosen following the procedure laid out by Section B-4-5 of the *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control* (MDE 2011 and all subsequent revisions).

1.4.3.11 Temporary Seeding

Temporary seeding shall be installed as shown on the Contract Drawings in accordance with Technical Specification Section 02933, Lawns and Grasses.

1.4.3.12 Permanent Seeding

Permanent seeding shall be installed as shown on the Contract Drawings in accordance with Technical Specification Section 02933, Lawns and Grasses.

1.4.3.13 Mulching

Mulching shall be installed as shown on the Contract Drawings in accordance with Technical Specification Section 02933, Lawns and Grasses.

1.4.3.14 Certification of Closure

After proper closure of the North landfill, EAC shall obtain certification from a Maryland Registered Professional Engineer that the North Landfill closure cap construction was completed in accordance with all approved closure plans, COMAR, and federal regulations. The Engineer's Certification Statement will be included in the final Closure Report along with as-built drawings and a discussion of any field changes to the approved Closure Plan.

2. POST-CLOSURE CARE PLAN

2.1 GENERAL

The elements of the final Post-Closure Care Plan are consistent with the requirements of COMAR 26.04.07.22 for Sanitary Landfills – Post-Closure Monitoring and Maintenance.

The post-closure care period refers to that period of time following the completion of final site closure activities during which the landfill and the landfill surroundings will be inspected, monitored, and maintained. Post-closure care for EAC is proposed for a minimum 5-year period, after which the need for continued monitoring should be reassessed by Alcoa and a proposal made to MDE regarding continuing, decreasing, or ceasing monitoring activities for consideration. The anticipated post-closure care activities at Eastalco Aluminum Company include inspections, monitoring, and maintenance.

The South Landfill was closed in 1994 and the North Landfill was closed in Fall 2016 in accordance with the approved closure plan.

2.2 POST-CLOSURE CARE

2.2.1 Site Maintenance Plan

Site maintenance during post-closure will consist of semi-annual inspections with irregularities and problems corrected within 30 days and that include at a minimum:

- Inspection of landfill cover and correction of any damage, including that from burrowing animals
- Identification of drainage irregularities or signs of erosion, and reparation thereof
- Determination that leachate collection and transmission systems are intact and operational
- Determination that leachate storage tanks and monitoring systems are functioning properly
- Inspection of monitoring wells and determination of water level readings.

2.2.2 Post-Closure Activity

Post-closure use of the property will not disturb the integrity of the final cover, liner(s), or other components of the containment system, leachate storage or transfer systems, or the function of the monitoring systems.

2.3 MONITORING PLAN

2.3.1 Surface Water Management System

Surface water will flow through the benches and swales into the permitted stormwater management ponds. EAC will monitor the stormwater management systems in accordance with the Site Inspection Checklist and correct any stormwater management defects within 30 days.

2.3.2 Groundwater Monitoring

Groundwater monitoring for the North and South Landfill's respectively will be performed in accordance with the *North Industrial Landfill Post-Closure Groundwater Monitoring Plan – June 2015 and Closed Landfill Monitoring Plan- May 2006* for EAC by others.

2.3.3 Leachate Collection and Storage System

Currently, leachate is pumped to a 2,200-gallon double-walled steel tank that has been constructed adjacent to the South Landfill area for management of leachate.

Copies of North and South Landfill As-Builts, Operations and Maintenance (O&M) Manuals, and control equipment specifications are kept within the North Landfill Control building and at Alcoa Pittsburgh, Pennsylvania.

An above-ground 12,000-gallon storage tank was installed adjacent to the North Landfill site at the time of Cell 2 construction and its operation approved by an MDE representative on 7 January 2013. Storage tank leachate levels and landfill sump data will be monitored electronically via a programmable logic controller (PLC) and parameters outside of acceptable ranges will result in an issuance of an electronic alarm message to designated O&M personnel. High level sensors are integrated in the storage tank, secondary containment, and the North Landfill meter vault whose respective signals will cause the PLC to de-energize pumping systems to prevent overflow.

Leachate will be hauled offsite for treatment or disposal. Alcoa will monitor leachate levels in storage tanks and schedule additional tanker trucks as necessary to maintain tank storage capacity. Access roads and connection points will be maintained during post-closure.

2.3.4 Cover System

The final cover will be inspected semi-annually (fall/spring) for evidence of erosion and settlement as well as after major storm events (2-year, 24-hour – 3.2 in.). The inspection will include observation of the cover at the landfill, notation of any settlement of the landfill surface or subsidence of slopes, and notation of any drainage irregularities or signs of cover erosion. Following high intensity rainfall events, such as hurricanes or flash floods, inspections will also be required.

Inspections will be performed and documented in accordance with the example Landfill Site Inspection Checklist included in Appendix E.

2.4 POST-CLOSURE SECURITY

2.4.1 Site Security

Site security post-closure will be provided via a chain-link perimeter fence with gates chained and locked.

2.4.2 Entry Control

All vehicles must enter the site through Manor Woods Road. After hours the facility is locked.

2.5 POST-CLOSURE MAINTENANCE ACTIVITIES

This section of the plan details the requirements for inspecting, reporting, and implementing corrective actions for any of the landfill's infrastructure or systems that may need repair. Each of the following sub-sections is included in the example Landfill Site Inspection Checklist included in Appendices E and F for the North and South Landfills, respectively. Corrective action of problems or deficiencies will be documented on the example Landfill Site Maintenance Log included in the above-referenced appendices and stored in the Landfill Control building located at the North Landfill.

2.5.1 Repair of Security Devices

The fence and/or access gate will be examined during onsite inspections and repairs as needed to maintain site security, which will be performed by an external contractor (e.g., Frederick Fence Co.).

2.5.2 Vegetation Management

The cap grasses will be mowed at least annually to inhibit growth noxious weeds and woody vegetation that could negatively impact the integrity of the cap.

2.5.3 Repair of Erosion or Cracking of Final Cover

The erosion and sediment controls at the site will be inspected in accordance with the Landfill Site Inspection Checklists. Erosion can be mitigated by constructing berms or ditches, or spreading straw mulch over the eroded sections until the eroded soil is replaced and the site re-vegetated. Repair of erosion of the final cover will be made if needed.

2.5.4 Repair of Settlement Depressions

Because the EAC Landfill is an industrial waste landfill, settlement that is commonly seen in municipal landfills will not occur. If significant differential settlement becomes apparent, EAC

will investigate the integrity of the liner system. If areas of significant settlement (e.g., greater than 2 ft) are detected that impede surface water runoff, the affected area will also be brought back to grade, with depressed areas graded to facilitate drainage. EAC will have settlement repaired by approved Alcoa contractors within 30 days.

2.5.5 Repair of Leachate Control Systems

EAC will inspect the shared leachate control systems in accordance with landfill inspection checklists for the North and South Landfill in Appendix E and Appendix F, respectively. Monitoring of functions of automated liquid level indicators in the storage tanks and North Landfill, pumping performance, and control mechanisms can be done remotely through data transmission. Repairs of leachate control and pumping systems will be made if needed by EAC maintenance contractors.

2.5.6 Maintenance of Groundwater Monitoring System

EAC will inspect the integrity of the groundwater monitoring well casings, etc. during routine monitoring activities in accordance with the approved groundwater monitoring plan. Repair of the groundwater monitoring well structures will be made if needed.

2.5.7 Post-Closure Personnel Training

All landfill personnel responsible for post-closure maintenance will be trained in their specific assigned duties by EAC. Personnel will be provided with instructions on inspection frequency, forms, and corrective action to ensure the landfill is maintained in adherence with the applicable post-closure requirements.

2.5.8 Post-Closure Contact

EAC Aluminum Company shall be contacted regarding post-closure activities:

Eastalco Aluminum Company
Attn: Ryan Wemyss
201 Isabella Street Suite 500
Pittsburgh, PA 15212

2.5.9 Post-Closure Site Use

EAC has no current plans for future development of the site beyond what is currently permitted. MDE will be notified for approval should any future development of the site be proposed. The Landfill Areas will remain grassed open spaces.

2.5.10 Post-Closure Cost Estimate and Financial Assurance

The EAC Cost Estimate for the 5-yr post-closure O&M of the North and South Landfill is approximately $500k. A Letter of Credit for the required Financial Assurance will be provided by the Eastalco Aluminum Company.

3. REFERENCES

CH2M Hill. 1993. Industrial Landfill Closure. Eastalco Aluminum Company. Frederick, Maryland. Project No. WDC35015.L1. Design Drawings. September.

Maryland Department of the Environment (MDE). 2011. *2011 Maryland Standards and Specifications for Soil Erosion and Sediment Control.* Revised January 2012.

———. 2013. *Amendment to Refuse Disposal Permit No. 2009-WIF-0537.* Letter from the Solid Waste Operations Division. 28 October.

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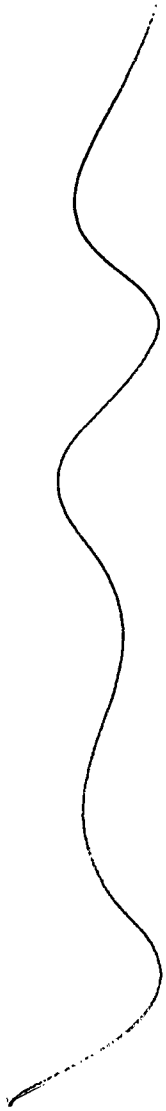
Appendix E

North Landfill Post-Closure Forms



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NORTH LANDFILL - SITE INSPECTION CHECKLIST

INSPECTOR: _____

DATE/TIME: _____

WEATHER: _____

I. SITE INSPECTION

		GOOD	FAIR	POOR	N/A
A.	Site Security (Condition of Gate/Lock)	☐	☐	☐	☐
B.	Access Road Condition	☐	☐	☐	☐
C.	Landfill Cover Soil	☐	☐	☐	☐
D.	Surface Drainage Control	☐	☐	☐	☐
E.	Gas Vent Condition	☐	☐	☐	☐
F.	Leachate Tanker Hookup	☐	☐	☐	☐
G.	Leachate Control Valves	☐	☐	☐	☐
H.	Condition of Leachate Storage Tank	☐	☐	☐	☐

		YES	NO
I.	Settlement of Landfill Surface	☐	☐
J.	Subsidence of Side Slopes	☐	☐
K.	Erosion of Cover Soil	☐	☐
L.	Presence of Exposed Waste	☐	☐
M.	Evidence of Animal Burrowing	☐	☐
N.	Evidence of Storage Tank Leakage	☐	☐
O.	Evidence of Piping Leakage	☐	☐
P.	Control Building Components Properly Functioning	☐	☐
Q.	Valves and Flow Meters Properly Functioning	☐	☐

II. COMMENTS/RECOMMENDATIONS/ACTION ITEMS

_____

_____

_____

_____

NORTH LANDFILL - SITE MAINTENANCE LOG

INSPECTOR: _____

DATE/TIME: _____

WEATHER: _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
1. Landfill Cover			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
2. Cover Settlement			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
3. Pumping Systems			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
4. Surface/Swale Drainage			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
5. Erosion of Cover Soil			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
6. Valve Vault Drainage			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
7. Access Road/Site Security			

Description of Corrective Action _____

Comments _____

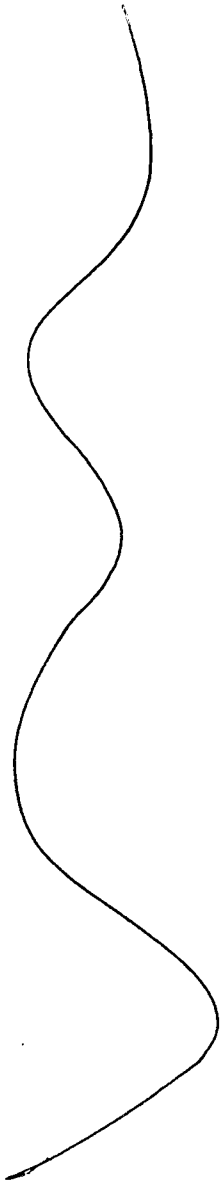
	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
8. Other			

Description of Corrective Action _____

Comments _____

Appendix F

South Landfill Post-Closure Forms



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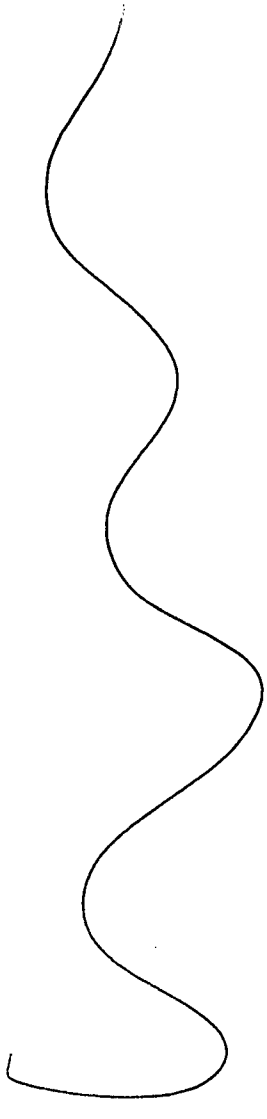

SOUTH LANDFILL - SITE INSPECTION CHECKLIST

INSPECTOR: _____

DATE/TIME: _____

WEATHER: _____

			GOOD	FAIR	POOR	N/A
I.	SITE INSPECTION					
	A.	Site Security (Condition of Gate/Lock)	☐	☐	☐	☐
	B.	Access Road Condition	☐	☐	☐	☐
	C.	Landfill Cover Soil	☐	☐	☐	☐
	D.	Surface Drainage Control	☐	☐	☐	☐
	E.	Leachate Tanker Hookup	☐	☐	☐	☐
	F.	Leachate Control Valves	☐	☐	☐	☐
	G.	Condition of Leachate Storage Tank	☐	☐	☐	☐

			YES	NO
	H.	Settlement of Landfill Surface	☐	☐
	I.	Subsidence of Side Slopes	☐	☐
	J.	Erosion of Cover Soil	☐	☐
	K.	Presence of Exposed Waste	☐	☐
	L.	Evidence of Animal Burrowing	☐	☐
	M.	Evidence of Storage Tank Leakage	☐	☐
	N.	Evidence of Piping Leakage	☐	☐
	O.	Control Building Components Properly Functioning	☐	☐
	P.	Valves Properly Functioning	☐	☐

II. COMMENTS/RECOMMENDATIONS/ACTION ITEMS

_____

_____

_____

_____

SOUTH LANDFILL - SITE MAINTENANCE LOG

INSPECTOR: _____

DATE/TIME: _____

WEATHER: _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
1. Landfill Cover			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
2. Cover Settlement			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
3. Pumping Systems			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
4. Surface/Swale Drainage			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
5. Erosion of Cover Soil			

Description of Corrective Action

Comments

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
6. Remote Telemetry			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
7. Access Road/Site Security			

Description of Corrective Action _____

Comments _____

	Date Problem Identified	Date Scheduled for Corrective Action	Date Problem Corrected
8. Other			

Description of Corrective Action _____

Comments _____

Appendix G

Groundwater Monitoring
North and South Landfills

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TETRA TECH

North Industrial Landfill
Post-Closure Groundwater Monitoring Plan

Industrial Waste Disposal
Permit No. 2014-WIF-0537

Eastalco Aluminum Company
Frederick, MD

June 2015

complex world CLEAR SOLUTIONS™

North Industrial Landfill
Post-Closure Groundwater Monitoring Plan

Eastalco Aluminum Company

Frederick, MD

June 2015

Prepared for:

Eastalco Aluminum Company
5601 Manor Wood Road
Frederick, MD 21703

Prepared by:

Tetra Tech, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, PA 15220

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APPENDICES

1.0 INTRODUCTION

This monitoring plan was prepared by Tetra Tech for Alcoa Eastalco (Eastalco) to provide the scope of work and procedures for post-closure monitoring of groundwater in the vicinity of the closed North Landfill (formerly referred to as the Active Industrial Waste Landfill). The Alcoa Eastalco facility is a closed aluminum smelter located in Frederick, Maryland (Figure 1-1). Aluminum production was curtailed at the Eastalco smelter in December 2005. The plant was formally closed in March 2010. Facility demolition activities began in May 2011 and are expected to be completed by the end of September 2015.

1.1. OVERVIEW

The North Landfill was operated between 1993 and 2015 for the disposal of non-hazardous industrial waste. Post-closure monitoring and maintenance of the Landfill is required per the regulations set forth in the Code of Maryland (COMAR) 26.04.07.22. Groundwater monitoring, and routine inspections and maintenance of the landfill will be performed after the closure of the Landfill is completed. This plan specifies:

1. Number and location of the monitoring points (including a map of the Landfill area depicting its boundary and monitoring wells);
2. Frequency of the analyses;
3. Sampling and analyses procedures;
4. Chemical parameters to be monitored and practical quantitation limits; and
5. Reporting requirements.

1.2. BACKGROUND

Cells 1 and 2 of the North Landfill were constructed in 1993 and 2012, respectively, with a 24-inch re-compacted subgrade that underlies a double liner system (geocomposite clay liner in between two high density polyethylene [HDPE] liners). The last permit issued by the Maryland Department of the Environment (MDE) for the Landfill prior to its closure was Refuse Disposal Permit Number 2014-WIF-0537 on December 1, 2014. The North Landfill had been permitted to receive various types of non-hazardous industrial wastes including fluoridated wastes, carbon wastes, refractory wastes and

miscellaneous trash. The Landfill was constructed to hazardous waste landfill standards as a conservative measure, although it was never permitted or used for hazardous waste disposal.

The final volume of disposed waste at the 4.2-acre Landfill will be approximately 122,000 cubic yards. Both the primary and secondary liners are continuously electronically monitored for leachate. Generated leachate is piped to a containment tank and periodically transferred to a tanker truck for transport to an off-site treatment and disposal facility.

1.3. DOCUMENT ORGANIZATION

Section 2 provides a description the site setting, and Section 3 discusses the post-closure monitoring and maintenance tasks that will be performed to monitor groundwater quality in the vicinity of the North Landfill.

2.0 SITE SETTING

2.1. TOPOGRAPHY

The Eastalco plant site is located in the Frederick Valley, a synclinal structure characterized by gently rolling topography. Natural elevations at the site range from approximately 300 feet above sea level in the low areas, to about 400 feet in the higher areas (Figure 1-1). The closed landfill is located northwest of the former operations area (Figure 2-1).

2.2. SURFACE WATER

There is an unnamed tributary to the west of the former plant site which flows south to join Tuscarora Creek. Tuscarora Creek then flows south into the Potomac River. To the east of the Landfill, there is a drainage ditch that receives stormwater runoff from the western portion of the plant property, and then joins the unnamed tributary via the plant's Discharge Point 004. The landfill stormwater management pond, located south of the landfill, discharges into this drainage ditch and subsequently the unnamed tributary.

2.3. GEOLOGY

The following description of regional and site-specific geology was obtained from EA Engineering Science and Technology, Inc. (EA, 1991), and incorporates information from boring logs of existing monitoring wells.

2.3.1. Regional Geology

The Eastalco facility is located in the southwest corner of a geologic feature known as the Frederick Valley. The valley is the topographic expression of a subsurface asymmetrical synclinorium composed of folded Cambro-Ordovician carbonates and siltstones of the Araby, Frederick, and Grove Formations. The elongated western limb of the synclinorium is truncated by an angular unconformity and overlain by Triassic "redbed" sedimentary strata of the Newark Group, which includes the New Oxford Formation and the Gettysburg Shale. The eastern limb of the synclinorium is foreshortened and in some cases overturned. It is bounded to the east by Precambrianian metasedimentary rocks of the Western Piedmont.

The Eastalco property straddles the contact between the Triassic siltstones, sandstones, and shale of the New Oxford Formation and the Cambrian limestone of the Adamstown member of the Frederick Formation. The bedrock surface expression of this contact trends north-northeast by south-southwest and dips west-northwest. On the Eastalco property, it is located approximately 200 feet southeast of the

Landfill. From east to west across the Eastalco property, the depth to the contact between the New Oxford and Frederick Formations varies from 0 feet at the bedrock surface contact to 90 feet beneath the Landfill. The contact surface is irregular, reflecting the erosional nature of the angular unconformity, which defines the contact between these formations in the subsurface; however, in general, the depth to the contact increases westward.

The Frederick Formation is a thin-bedded, laminated limestone with argillaceous partings and shaley zones. Estimated thickness is approximately 500 feet. The Frederick Formation has been subdivided into three members designated in ascending order: Spring Station, Adamstown, and Lime Kiln. The Adamstown member underlies the south and eastern portion of the plant site and consists of laminated, fine grained, thinly bedded, argillaceous, dark gray limestone. The beds have a north-northeast strike and dip about 40° to the east.

The New Oxford Formation consists of interbedded red and gray arkosic sandstone, red shale, and siltstone. A distinctive limestone/quartz pebble conglomerate at the base of the unit displays a mottled red and gray texture. Sandstone beds in this formation are lenticular and prone to pinching out over short distances. The total estimated thickness of the unit is 4,500 feet. In the vicinity of Eastalco's property, beds of the New Oxford Formation underlie the western and northern portion of the property. The strike of these beds is north to south, and dip is to the west at 5°.

2.3.2. Site Geology

2.3.2.1. Bedrock

Bedrock underlying the Landfill consists of up to 45 feet of brownish- red siltstone and limestone pebble conglomerate of the New Oxford Formation, which overlies the Adamstown limestone member of the Frederick Formation. Boring logs of monitoring wells installed around the perimeter of the Landfill (MW-64 and MW 74 through MW-77, see Figure 2-1) show that the depth to bedrock ranges from 24 feet below ground surface (bgs) on the east side, to over 40 feet bgs on the west side. The bedrock surface is irregular but generally slopes to the south-southeast.

2.3.2.2. Soils

Data from the test borings and monitoring wells indicate that the Landfill is underlain by a sequence of reddish-brown clayey silt and fine sand. Siltstone and shale fragments are present and found in increasing abundance with depth. The clayey silt and fine sand apparently have formed in situ by weathering of the underlying bedrock, and in some instances show relic texture similar to the parent material. A more detailed description of the soils and their properties can be found in EA (1991).

2.4. HYDROGEOLOGY

2.4.1. Regional Hydrogeology

Information on the regional hydrogeology was obtained from the Groundwater Atlas of the United States published by the US Geological Survey. In the Frederick Valley area, significant sources of groundwater exist in the carbonate rock aquifers. The Frederick Limestone, which underlies most of the site, has a typical well yield of 120 to170 gallons per minute (GPM) and can yield up to 275 GPM in some areas. The carbonate rocks of the Piedmont have virtually no primary porosity, and water in these rocks moves through secondary openings such as fractures, bedding planes, joints and faults. Water moving through the secondary openings dissolves the carbonate rock and forms dissolution channels to create an interconnected network of openings, greatly increasing the porosity of the rock. Most of the water obtained from bedrock in this area is found in fractures and dissolution channels.

2.4.2. Site Hydrogeology

The groundwater system beneath the site consists of two water-bearing units: an overburden water bearing zone and a bedrock zone. Based on lithologic descriptions of the overburden materials, most groundwater flow likely occurs in the highly fractured zone (weathered bedrock) located directly above the competent bedrock (Atlantic, 1996). Groundwater movement in bedrock beneath the site typically occurs through fractures. In both the overburden and bedrock zones, the general direction of horizontal groundwater flow is toward the southeast (Tetra Tech, 2010). Figure 2-2, based on June 2014 field measurements (Tetra Tech, 2014), presents typical groundwater elevation contours in the closed North Landfill area.

3.0 MONITORING AND MAINTENANCE PROGRAM

This section discusses the elements of the post-closure monitoring program for the North Landfill.

3.1. POST-CLOSURE GROUNDWATER MONITORING

The monitoring frequency and parameters will be similar to those required by MDE at the South Landfill, which was the plant's first permitted industrial waste landfill. The post-closure monitoring program will include the collection of semi-annual water levels and samples for fluoride analysis from the six monitoring wells that surround the closed Landfill: MW-63, MW-64, MW-76, MW-77, MW-74, and MW-75. MW-63 (bedrock well) will eventually be abandoned and replaced with a new overburden well that is closer to the upgradient side of the North Landfill. This monitoring plan will be modified accordingly once the new well is available.

Although the landfill monitoring program in place during the operating period of the landfill included volatile organic compounds (VOCs) and metals, the groundwater and leachate data from that 22-year program show that VOCs are not waste-derived constituents. While there have been a few isolated occurrences of VOCs in both upgradient and downgradient wells, the detections were always below maximum contaminant levels (MCLs), and always determined and noted in the monitoring reports to not be attributable to the landfill (e.g., detections were attributable to lab contaminants, or residual contamination from the remediation project at the former adjacent substation that was closed by MDE under Consent Order CO-07-026). Additionally, detections of metals above MCLs were rare; and when they occurred, they were determined to be the result of excess turbidity that typically occurs in the aquifer during periods of low water table conditions. Such detections are not attributable to the landfill, as they have occurred in groundwater both upgradient and downgradient of the landfill. It should be noted that such detections have not occurred since the sampling method was changed to the low-flow method described below.

The primary source of cyanide at aluminum smelters is first cut spent pot lining (SPL) which is a listed hazardous waste (K088). SPL is not a waste stream deposited in either the North or South Landfills. Cyanide testing is no longer performed under Consent Order CO-07-026, or the South Landfill post-closure monitoring program because concentrations were found to be below the MCL across the site. The same situation exists at the North Landfill. That is, cyanide concentrations, when detected during the landfill's operating period, were always at least an order of magnitude lower than the MCL.

Based on the above information, and consistent with the monitoring program at the South Landfill (which received similar industrial waste), groundwater samples collected during the post-closure period will be analyzed for fluoride, which is the primary contaminant associated with the permitted wastes. Qualified environmental technicians under the oversight of a facility representative will perform the monitoring activities.

3.1.1. Sampling and Analysis

Groundwater samples will be collected using a low-flow sampling method (Environmental Protection Agency [EPA], 2010) according to the standard operating procedure (SOP) provided in Appendix A. The SOP provides details regarding well purging, sample collection, sample containers, sample preservation, sample labeling and documentation, equipment decontamination, and quality control blanks. Eastalco's contracted environmental technicians will perform field analyses at the wells, and will prepare samples for laboratory analysis. The following field measurements will be recorded: water level, pH, dissolved oxygen (DO), conductivity, turbidity, and temperature.

Fluoride will be analyzed by EPA method 300.0. Samples will be shipped off-site to a qualified laboratory.

3.1.2. Reporting

A semi-annual water quality report will be prepared (similar to pre-closure monitoring reports) and submitted to MDE within 90 days of the close of every first and third calendar quarter. The reports will contain the following, some of which may be in electronic format:

1. A complete copy of the laboratory data;
2. A table comparing the results against Maximum Contaminant Levels (MCLs) for those parameters that have an associated MCL;
3. Concentration maps depicting total fluoride concentrations measured during the semi-annual monitoring event;
4. Charts showing the concentration of total fluoride at each well;
5. Historical data in tabular form and charts depicting historical concentration trends total fluoride;

6. A summary of all groundwater elevations measured at the wells included in this plan;

7. A topographic map of the Landfill showing well locations;

8. Contour maps showing the semi-annual overburden groundwater elevations surrounding the Landfill (these maps will include elevations from upgradient [background] well MW-63 which is screened below the overburden);

9. A narrative discussion concerning background information, sampling procedures, and results; and

10. An interpretive discussion on water quality, which will include a trend analysis, an evaluation of groundwater levels and recharge, etc.

3.2. PROGRAM DURATION

As stated in COMAR 26.04.07.22.A (Sanitary Landfills--Post-Closure Monitoring and Maintenance): "Landfills in Maryland shall be subject to post-closure monitoring and maintenance by the permittee as specified in this regulation, for a period of time not less than 5 years after the complete installation of the landfill cap."

At the end of the 5-year post closure period, Alcoa will consult with the MDE to determine the appropriate future course of action (e.g., continue monitoring under the existing plan, modify the plan, or terminate the program).

4.0 REFERENCES

Atlantic Environmental Services, Inc., 1996, Eastalco Aluminum Company, Aquifer Characteristics Investigation, May 29, 1996.

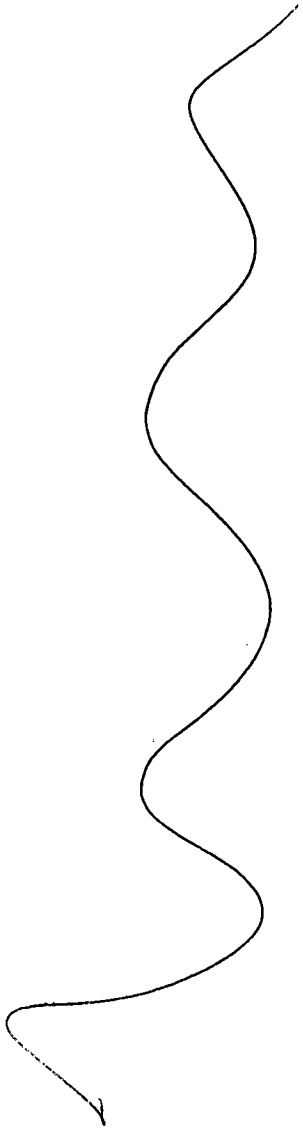
EA Engineering Science and Technology, Inc., 1991. Phase I/II Permit Application for an Industrial Waste Landfill at Eastalco Aluminum Company, December 1991.

EPA, 2010. Low Stress (Low Flow) Purging And Sampling Procedure For The Collection Of Groundwater Samples From Monitoring Wells, U.S. Environmental Protection Agency - Region 1 EQASOP-GW 001, Revision 3, January 19, 2010.

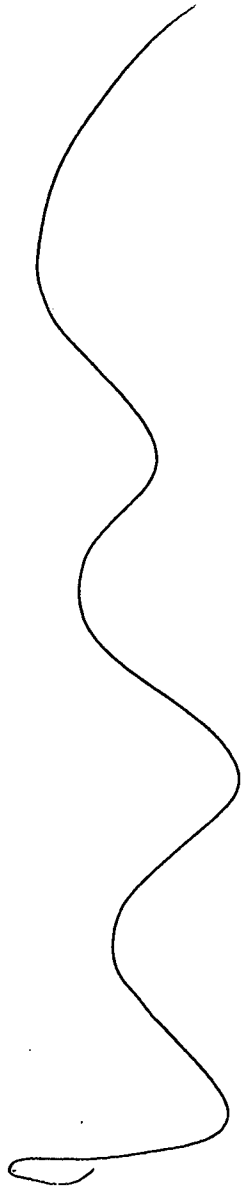
Tetra Tech, Inc., 2010. Landfill Groundwater Monitoring Plan. Eastalco Aluminum Company, Frederick, Maryland. May 2010.

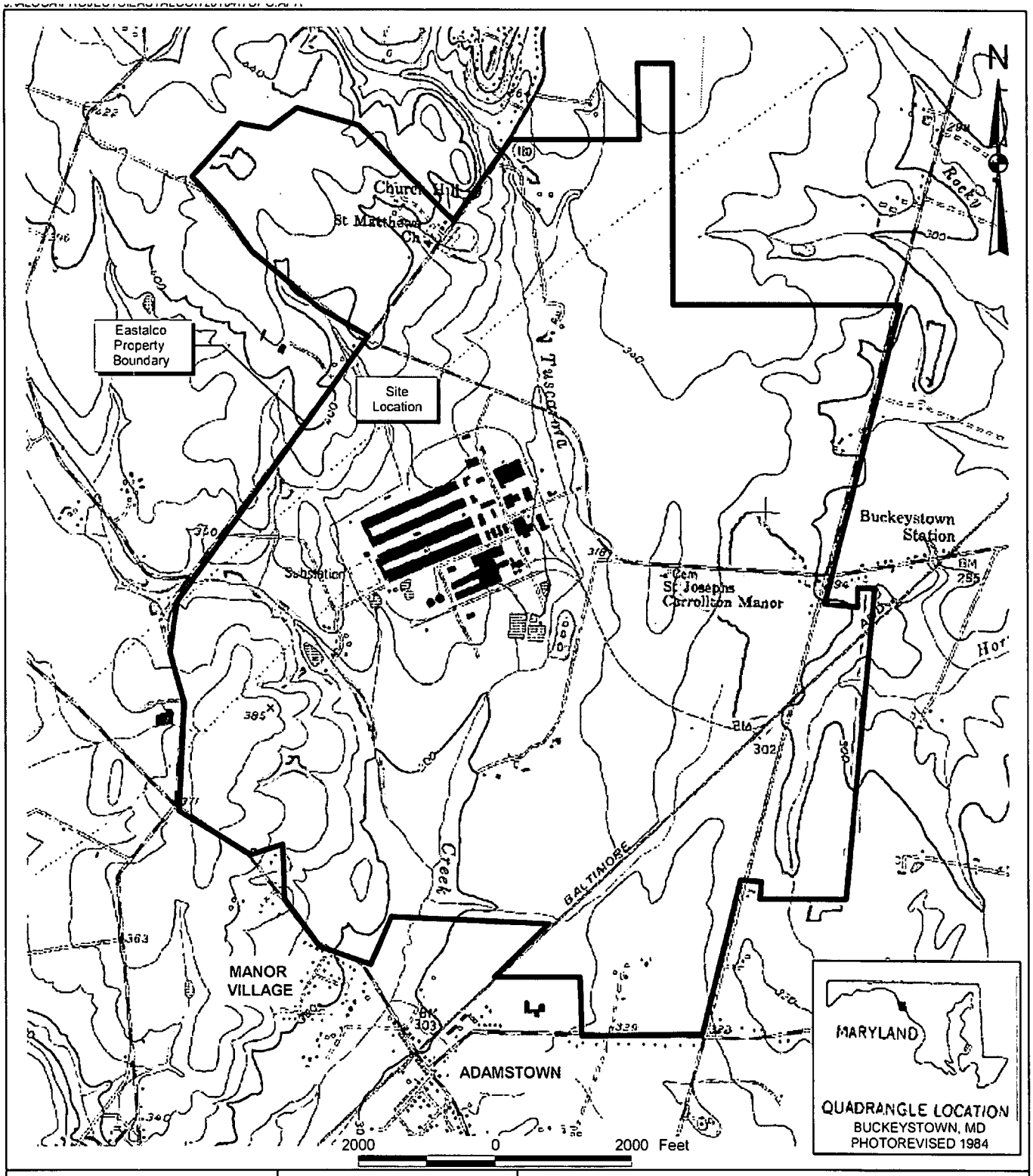
Tetra Tech, 2014. North Industrial Landfill, Semiannual Water Quality Report, Industrial Waste Disposal Permit No. 2014-WIF-0537, Eastalco Aluminum Company, December 2014.

Tetra Tech, 2015. North Industrial Landfill, Groundwater Monitoring Plan, Industrial Waste Disposal Permit No. 2014-WIF-0537, Eastalco Aluminum Company, Frederick, MD, March 2015.



FIGURES





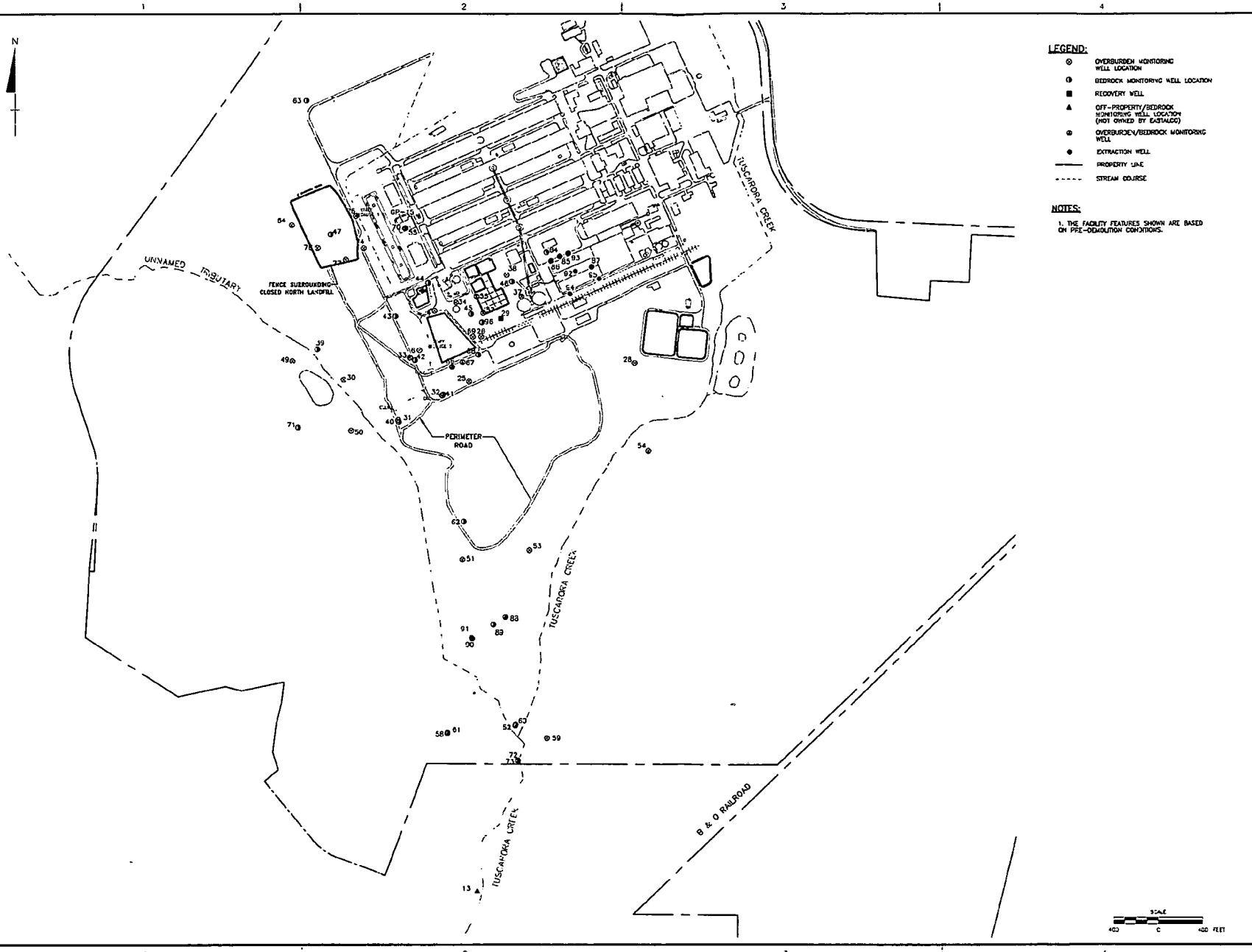
NOTE:
Eastalco property line adapted from "Geologic Map", Figure 4-1, Phase I/II Permit Application, EA Engineering, Science, and Technology, Inc., Sparks, MD, Dated Dec. 1991.

This map shows pre-demolition plant conditions

ALCOA EASTALCO
Buckeystown, Maryland

SITE LOCATION

FIGURE 1-1



LEGEND:

- OVERBURDEN MONITORING WELL LOCATION
- BEDROCK MONITORING WELL LOCATION
- RECOVERY WELL
- OFF-PROPERTY/BEDROCK MONITORING WELL LOCATION (NOT OWNED BY EASTALCO)
- OVERBURDEN/BEDROCK MONITORING WELL
- EXTRACTION WELL
- PROPERTY LINE
- STREAM COURSE

NOTES:

1. THE FACILITY FEATURES SHOWN ARE BASED ON PRE-DEMOLITION CONDITIONS.

TETRA TECH

661 ANDERSEN DRIVE
FOSTER PLAZA 7
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NO.	REVISIONS	BY	DATE
0	ISSUE FOR REVIEW	-	-

DESIGNED BY	---
DRAWN BY	MW
CHECKED BY	PC
APPROVED BY	PC
PCP/PCS	MFG-STD
VIEW NAME	
ORIGINATION DATE	04/28/05
PLOT SCALE	1:1
DATE	MAY 2005

EASTALCO ALUMINUM COMPANY

FREDERICK, MD

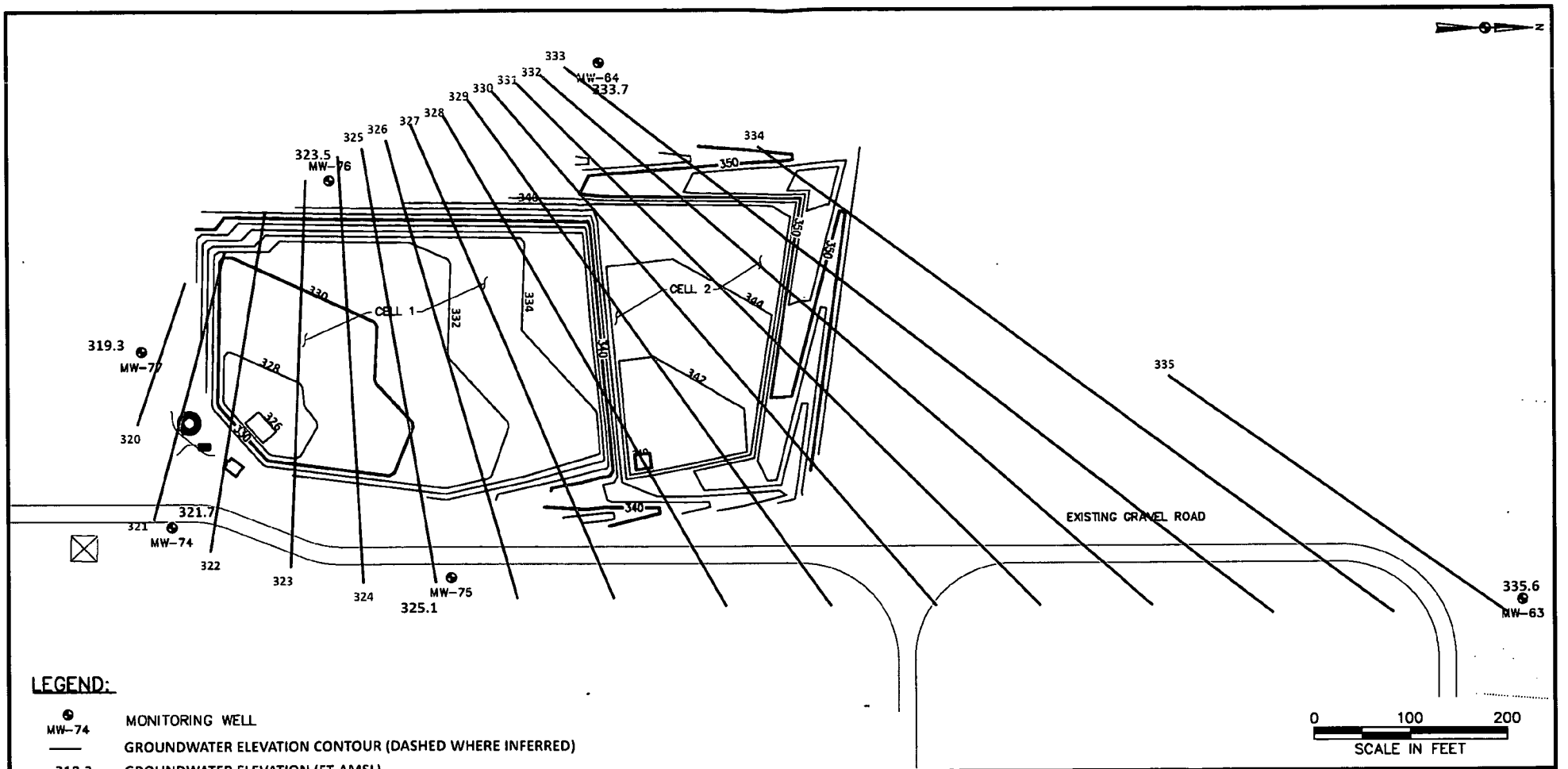
FIGURE 2-1

LOCATION OF CLOSED NORTH LANDFILL

DRAWING NO. ---

REV NO 0

SHEET 1 OF 1



LEGEND:

- MW-74 — MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- 319.3 — GROUNDWATER ELEVATION (FT AMSL)
- 340 — INDEX CONTOUR (TOP OF LINER)
- INTERMEDIATE CONTOUR (TOP OF LINER)
- EXISTING ROAD

NOTE:

GRADES SHOWN DEPICT LINER CONSTRUCTION PLAN FOR CELLS 1 AND 2.

EASTALCO ALUMINUM COMPANY
FREDERICK, MARYLAND

FIGURE 2-2
LANDFILL GROUNDWATER ELEVATIONS
June 2014

Adapted from: EA Engineering, Science and Technology, Cells 1 and 2 Site Plan.
Based on pre-closure topography.

APPENDIX A

GROUNDWATER SAMPLING SOP

Standard Operating Procedure
Low Flow Groundwater Sampling from Monitoring Wells
Eastalco Aluminum Company Closed North Landfill

Scope: This SOP is for collecting groundwater samples from wells used to monitor the North Landfill at the Alcoa Eastalco Works. The procedures described here were derived from USEPA's EQASOP-GW-001, Region 1 Low-Stress (Low Flow) SOP dated January 19, 2010 and Tetra Tech's SOP SA-1.1 Groundwater Sample Acquisition and Onsite Water Quality Testing

Purpose: The purpose of describing this procedure is to provide a uniform methodology for the collection of good quality and representative groundwater samples.

Equipment Needed:

- Personal protective equipment; field logbooks or sampling forms; A copy of the current Health and Safety Plan,
- water level indicator (measuring to 0.01 foot accuracy);
- pH, temperature, oxidation/reduction potential (ORP), dissolved oxygen (DO), conductivity, and turbidity meters;
- Power source, portable submersible pump (e.g., centrifugal, bladder, etc.);
- polyethylene tubing; polypropylene rope; plastic trash bags; properly preserved and labeled sample containers; and
- decontamination equipment/supplies (e.g. non-phosphase deteregent, distilled/deionized water, isopropyl alcohol).

Equipment/Instrument Calibration:

Prior to the sampling event, perform maintenance checks on the equipment and instruments according to the manufacturer's manual. The monitoring instruments must also be calibrated at the beginning of each day and the calibration documented.

Low Flow Purging and Sampling Procedures:

1. Locate and identify the well to be sampled. Record pertinent information in the logbook or sampling form, including:

   Sample identification (i.e., name)
   Sample date
   Sample time (24-hour clock)
   Sampler's initials
   Analysis required
   Preservation if any used (e.g., amount used and lot #)
   Comments (e.g., weather, observations)
   Contract laboratory name and date sent if a sample is not analyzed in-house.

2. Measure Initial Water Levels.
   Unlock protective casing and remove well cap. Measure the depth to water and total well depth with an electronic water level. Measurement should be referenced from the top of

the PVC well riser (metal casing if no inner PVC riser exists). Record the measurements in the in the logbook or sampling form.

3. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well so that the pump intake is located at the center of the saturated screen length of the well. If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures.

4. Measure Water Level

Before starting pump, measure water level to initialize starting condition.

5. Purge Well

Start with the initial pump rate set at approximately 0.1 liter per minute. Use a graduated cylinder and stopwatch to measure the pumping rate. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Adjust the pumping rates as necessary to prevent drawdown from exceeding 0.3 feet during purging. If no drawdown is noted, the pump rate may be increased (to a maximum of 0.4 liter per minute) to expedite the purging and sampling event. The pump rate will be reduced if turbidity is greater than 10 NTUs after all other field parameters have stabilized.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. Well recovery to 75 percent is necessary prior to sampling. Slow-recovering wells should be identified and purged at the beginning of the workday to maximize

field work efficiency. If possible, samples should be collected from these wells within the same workday and no later than 24 hours after the end of purging. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP.

6. Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow- through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell in order to minimize particulate buildup in the cell. Water level drawdown measurements should be made as usual.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging, emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters.

Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

Turbidity	10% for values > 5 NTU (if 3 Turbidity values < 5 NTU, consider the values as stabilized),
Dissolved Oxygen	10% for values > 0.5 mg/L (if 3 Dissolved Oxygen values < 0.5 mg/L, consider the values as stabilized),
Specific Conductance	3%,
Temperature	3%,
pH	± 0.1 unit,
Oxidation/Reduction Potential	± 10 millivolts.

If the above conditions have not been met after the well has been purged for 4 hours, purging will be considered complete and sampling can begin.

All during the measurement process, the flow-through-cell must remain free of any gas bubbles. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

7. Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

For VOC or dissolved gas samples, it is recommended that the bladder pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial. Ensure VOA vials have no head space by inverting and tapping the vial after capping.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods (e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation. Store samples in a cooler with ice while in the field.

8. All sample containers will be labeled with the following information:

Sample identification (i.e., name)
Sample date
Sample time (24-hour clock)
Sampler's initials
Analysis required & method #
Preservation used (if any)
Site name

9. Collect one duplicate sample and one equipment blank during each monitoring event. The equipment blank will be collected after decontamination to monitor the potential for cross contamination resulting from incomplete decontamination. Collect the equipment blank by placing the decontaminated pump and decontaminated or new tubing into a clean bucket containing DI water and operating the pump to fill the appropriate sample jars. Label and prepare quality control samples for shipment as described above.

Standard Operating Procedure
Low Flow Groundwater Sampling from Monitoring Wells
Eastalco Aluminum Company Closed North Landfill

Sample Handling:

Complete the laboratory-supplied chain of custody and include with sample shipment. Re-ice coolers for prior to shipment to the laboratory.

Decontamination:

Decontaminate sampling equipment between uses to prevent cross contamination between wells. Remove gross contamination (if any) with brushes, paper towels, etc. Place pump (and tubing if to be reused) in bucket containing water and detergent (e.g., Alconox or Liquinox) and scrub the exterior of the equipment. With the pump inlet submerged, turn pump on to run soapy water through the pump (and tubing). Turn pump off and transfer to a second bucket containing de-ionized (DI) water. Submerse equipment and turn pump on again to rinse the equipment. Containerize all decontamination water for appropriate disposal by the plant.

CLOSED LANDFILL GROUNDWATER MONITORING PLAN

ALCOA EASTALCO
Frederick, MD

May 2006

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MFG Project No. 120408

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APPENDICES

1.0 INTRODUCTION

This monitoring plan was prepared by MFG, Inc. (MFG) for Alcoa Eastalco (Eastalco) to provide the scope of work and procedures for monitoring groundwater in the vicinity of the Closed Aluminum Industrial Waste Landfill. The Alcoa Eastalco facility is an aluminum smelter located in Frederick, Maryland (Figure 1-1).

1.1. OVERVIEW

The Closed Industrial Landfill was operated between 1983 and 1994 for the disposal of various types of non-hazardous industrial wastes. Post-closure monitoring and maintenance of the landfill is required per the regulations set forth in the Code of Maryland (COMAR) 26.04.07.22. Groundwater monitoring as well as routine inspections and maintenance of the landfill have been performed since the landfill was closed. Numerous investigations have also been performed at the plant during this time.

This monitoring plan was developed to formalize the post-closure monitoring and maintenance program for the Closed Industrial Landfill and accounts for the knowledge gained from the environmental investigations. This plan specifies:

1. Number and location of the monitoring points (including a map of the landfill area depicting its boundary and monitoring wells);
2. Frequency of the analyses;
3. Sampling and analyses procedures;
4. Chemical parameters to be monitored and practical quantitation limits; and
5. Reporting requirements.

1.2. BACKGROUND

The landfill was constructed in 1983 and was permitted to receive various types of non-hazardous industrial wastes including fluoridated wastes, carbon wastes, refractory wastes and miscellaneous trash. The landfill was lined with 18 inches of clay, a 30-mil polyvinyl chloride (PVC) liner, and an additional 18-inch layer of clay.

The last permit issued by the Maryland Department of the Environment (MDE) for the landfill prior to its closure in 1994 was Refuse Disposal Permit No. 90-IW-0042 (dated June 12, 1990). The final volume of disposed waste at the 3.6-acre landfill was approximately 62,500 cubic yards. A closure plan detailing the construction specifications was submitted to MDE in November 1993 and was approved by MDE in June 1994 (Appendix A contains a copy of the approval letter). The landfill was closed and capped with a PVC liner, clay cover, and vegetation at the end of 1994. As part of the closure, a leachate collection system was constructed to direct leachate to the South Pond.

A leak was detected in the landfill liner in 1990; therefore, actions were taken to address the suspected leakage of leachate at the southeast corner of the Industrial Landfill in 1991. The liner in this area was replaced with a double liner, the leachate removal system was modified to enhance the efficiency of operation, and a leachate collection tank was installed. Leachate entering the holding tank flowed to a wet scrubber system bypassing the South Pond. In mid 2002, a leak was found in the containment tank lining. The tank was taken out of service and the piping was rerouted to the SO_2 process water supply tank. From there the leachate was directed to the SO_2 scrubber system. In December 2005, the plant curtailed operations and as such the wet scrubber system ceased to operate. As a result, the containment tank lining was rehabilitated and the tank is now used to store leachate which is periodically pumped from the tank to a tanker truck which transports the leachate to an off-site treatment and disposal facility.

Previous reports suggest the landfill produces approximately 100 gallons of leachate per day which translates to about 0.07 gallons per minute (gpm). However, a recently-installed flow totalizer on the leachate line shows a leachate generation rate of approximately 47 gallons per day (0.03 gpm) for the period of January 1 to April 24, 2006.

The plant is not required to sample the leachate under the regulatory program; however, leachate samples were collected in August and September 2005 to support the evaluation of the landfill's potential impact on groundwater. Fluoride concentrations in the leachate ranged from approximately 2,800 to 3,100 mg/L, while free cyanide concentrations ranged from approximately 0.004 to 0.027 mg/L.

1.3. DOCUMENT ORGANIZATION

Section 2 provides a description the site setting, and Section 3 describes the groundwater conceptual site model developed on the basis of a recent site-wide investigation. Section 4 discusses the post-closure monitoring and maintenance tasks for the Closed Industrial Landfill.

2.0 SITE SETTING

2.1. TOPOGRAPHY

The Eastalco plant site is located in the Frederick Valley, a synclinal structure characterized by gently rolling topography. Natural elevations at the site range from approximately 300 feet above sea level in the low areas to about 400 feet in the higher areas (Figure 1-1). The Landfill is located in the southwestern corner of the plant smelting operations area (Figure 2-1).

2.2. SURFACE WATER

The site is drained by Tuscarora Creek, a tributary of the Potomac River, located east of the plant. There is also an unnamed tributary to the west that flows south to join Tuscarora Creek. Tuscarora Creek then flows south into the Potomac River. Several man-made drainage ditches such as National Pollutant Discharge Elimination System (NPDES) outfalls flow into Tuscarora Creek or the unnamed tributary. Surface runoff from the landfill is directed to NPDES Outfall 004.

2.3. GEOLOGY

2.3.1. Regional Geology

The Eastalco facility is located in the southwest corner of a geologic feature known as the Frederick Valley. The valley is the topographic expression of a subsurface asymmetrical synclinorium composed of folded Cambro-Ordovician carbonates and siltstones of the Araby, Frederick, and Grove Formations. The elongated western limb of the synclinorium is truncated by an angular unconformity and overlain by Triassic "redbed" sedimentary strata of the Newark Group, which includes the New Oxford Formation and the Gettysburg Shale. The eastern limb of the synclinorium is foreshortened and in some cases overturned. It is bounded to the east by Precambrianian metasedimentary rocks of the Western Piedmont.

The Eastalco property straddles the contact between the Triassic siltstones, sandstones, and shale of the New Oxford Formation and the Cambrian limestone of the Adamstown member of the Frederick Formation. The bedrock surface expression of this contact trends north-northeast by south-southwest and dips west-northwest. On the Eastalco property, it is located approximately 200 feet southeast of the Landfill. From east to west across the Eastalco property, the depth to the contact between the New Oxford and Frederick Formations varies from zero at the bedrock surface contact to 90 feet beneath the Landfill. The contact surface is irregular, reflecting the erosional nature of the angular unconformity, which defines

the contact between these formations in the subsurface, but, in general, the depth to the contact increases westward.

The Frederick Formation is a thin-bedded, laminated limestone with argillaceous partings and shaley zones. Estimated thickness is approximately 500 feet. The Frederick Formation has been subdivided into three members designated in ascending order: Spring Station, Adamstown, and Lime Kiln. The Adamstown member underlies the south and eastern portion of the plant site and consists of laminated, fine grained, thinly bedded, argillaceous, dark gray limestone. The beds have a north-northeast strike and dip about 40° to the east.

The New Oxford Formation consists of interbedded red and gray arkosic sandstone, red shale, and siltstone. A distinctive limestone/quartz pebble conglomerate at the base of the unit displays a mottled red and gray texture. Sandstone beds in this formation are lenticular and prone to pinching out over short distances. The total estimated thickness of the unit is 4,500 feet. In the vicinity of Eastalco's property, beds of the New Oxford Formation underlie the western and northern portion of the property. The strike of these beds is north to south and dip is to the west at 5°.

2.3.2. Site Geology

Based on lithologic logs generated during installation of soil borings and monitoring wells at the facility, unconsolidated materials above bedrock (overburden) are comprised of clay and silt with varying amounts of sand, gravel, and angular rock fragments. Near surface materials are composed of reddish orange to reddish brown, dense, compact silty clay, with occasional sandstone and shale fragments, gravel, and cobbles. Poorly graded limestone gravel is present at the surface at some locations.

Site boring logs indicate that deeper unconsolidated materials (weathered bedrock) are composed of reddish brown to yellowish orange silt, clay, and occasional zones of clayey gravel. The logs note relict bedding (inclined 20 to 30 degrees from horizontal), micaceous inclusions, and quartzite fragments. Several past reports identify this unconsolidated residual material as saprolite; however, saprolite is derived from the in-situ weathering of igneous or metamorphic material retaining many of the visual characteristics of the parent rock. The deeper unconsolidated materials at the site retain some of the characteristics of the parent rock; but they are derived from in-situ weathering of limestone. The thickness of this highly weathered limestone, which grades into the overlying silty clay unit, varies but averages about 5 feet.

The Alcoa Eastalco property is located within the northeast-trending Frederick syncline. According to geologic maps prepared by the Maryland Geological Survey (MGS), two bedrock formations are present beneath the site: the New Oxford and Frederick Limestone Formations (MGS, 1968). The New Oxford Formation is composed of interbedded red and gray arkosic sandstone, red shale and siltstone, with a basal conglomerate containing a red and gray calcareous matrix (MGS, 1981). The New Oxford Formation overlies the Frederick Formation. To the northwest of the Substation Area, the New Oxford Formation is reportedly about 90 feet thick (beneath the new industrial landfill) and thicknesses of the New Oxford increase to the west (Atlantic, 1996). The Upper Cambrian bedrock beneath the eastern portion of the Site is the Frederick Limestone Formation, which consists of highly jointed and fractured, thinly bedded, argillaceous limestone with minor shale (MGS, 1981).

Figure 2-2 shows the bedrock topography from the western portion of the plant to the southern property boundary based on survey data and logs of existing wells and former construction borings. The undulating bedrock surface slopes from north to south with a bedrock trough that starts north of the Closed Industrial Landfill and appears to extend southward to the property boundary.

2.4. HYDROGEOLOGY

2.4.1. Regional Hydrogeology

Information on the regional hydrogeology was obtained from the Groundwater Atlas of the United States published by the US Geological Survey. In the Frederick Valley area, significant sources of groundwater exist in the carbonate rock aquifers. The Frederick Limestone, which underlies most of the site, has a typical well yield of 120 to170 gpm and can yield up to 275 gpm in some areas. The carbonate rocks of the Piedmont have virtually no primary porosity, and water in these rocks moves through secondary openings such as fractures, bedding planes, joints and faults. Water moving through the secondary openings dissolves the carbonate rock and forms dissolution channels to create an interconnected network of openings, greatly increasing the porosity of the rock. Most of the water obtained from bedrock in this area is found in fractures and dissolution channels.

2.4.2. Site Hydrogeology

The groundwater system beneath the site consists of two water-bearing units: an overburden water bearing zone and a bedrock zone. Based on lithologic descriptions of the overburden materials, most groundwater flow likely occurs in the highly fractured zone (weathered bedrock) located directly above the competent bedrock (Atlantic, 1996). Groundwater movement in bedrock beneath the site typically

occurs through fractures. In both the overburden and bedrock zones, the general direction of horizontal groundwater flow is toward the southeast (Figures 2-3 and 2-4).

The undulating bedrock surface, including the closed depressions and the trough, as well as the discontinuous presence of relatively impermeable materials may locally control the horizontal flow direction and the vertical migration of groundwater.

3.0 GROUNDWATER CONCEPTUAL SITE MODEL

The plant entered into Administrative Consent Order (ACO) CO-92-149 for groundwater investigation and remediation with the MDE in 1992. The ACO was later amended in 1997. The elements of the ACO included requirements to investigate and potentially remediate off-site migration of contaminants at concentrations exceeding the United States Environmental Protection Agency (EPA) drinking water maximum contaminant levels (MCLs). Based on MCLs, the ACO sets property boundary action levels for fluoride and free cyanide at 4 mg/L and 0.2 mg/L, respectively. The 1992 ACO also required Eastalco to implement a groundwater and surface water monitoring program. The 1997 amendment required the plant to pump and treat groundwater to control the fluoride plume near areas suspected at the time to be potential sources (i.e., the Former Spent Potliner [SPL] Pad and the Closed Industrial Landfill) shown on Figure 2-1. Consequently, groundwater was pumped from monitoring wells MW-56, 57 and 68 and ultimately treated for fluoride. MW-57 was later replaced in the pumping program with recovery well RW-29.

A site-wide investigation was performed in phases from October 2003 to June 2005 to identify and evaluate potential sources of contamination across the plant. The primary contaminants evaluated were fluoride and cyanide. Potential contaminant sources investigated included ponds and lagoons that handle process and/or storm water, historical and current waste storage areas, and areas where wastes were buried (e.g., landfills). The investigation started with a site visit, interviews with plant personnel, record searches at the plant and at MDE, and an analysis of aerial photographs. This was followed by geophysical surveys, test pit excavations, and sampling of soil, sediment, and surface water to evaluate impacts from potential sources. The last phase included the strategic placement of monitoring wells and a site-wide round of sampling to characterize the groundwater plume.

The results were submitted to MDE (Environmental Restoration and Redevelopment Program – Waste Management Administration) in October 2005 (MFG, 2005) and were discussed with MDE during a meeting at the plant in November 2005. A summary of the investigation results and conclusions is presented below.

3.1. SITE-WIDE INVESTIGATION SUMMARY

3.1.1. Results

3.1.1.1. Groundwater Contamination

Groundwater samples were collected during this investigation from all monitoring wells across the site. The samples were analyzed for fluoride and free cyanide to evaluate the extent of the contaminant plumes. The fluoride and free cyanide analyses were performed by the Eastalco laboratory. Samples from certain wells across the site were also analyzed by an off-site laboratory for water quality parameters (i.e., alkalinity, total suspended solids (TSS), total dissolved solids (TDS), and major cations/anions). The laboratory results are provided on Table 3-1. Field water quality parameters including pH, conductivity, turbidity, dissolved oxygen, and oxidation reduction potential (ORP) were monitored with field instruments as described in the Work Plan (MFG, 2004). The field measurements are summarized on Table 3-2.

Free cyanide was detected in 50 of the 65 wells sampled with a concentration range of 0.0002 to 0.06 mg/L. The two highest concentrations occurred in the pumping wells RW-29 and MW-68; however across the site, all detections of free cyanide were below the ACO limit of 0.2 mg/L.

Fluoride was detected in all 65 wells sampled with a concentration range of 0.06 to 87 mg/L. The results are plotted on Figure 3-1 for the overburden wells and Figure 3-2 for the bedrock wells. These maps show that the fluoride plume has a linear shape and extends from the main plant operations area to the southern property boundary.

Two process water ponds (the North Pond, and possibly the South Pond) were identified as the primary sources. As shown on Figures 3-1 and 3-2, the origin of the plume is in the vicinity of the North and South Ponds where the highest fluoride concentrations (40-87 mg/L range) occurred during the investigation. From there, the concentrations decrease (17-54 mg/L range) as the plume migrates in a south/southwest direction toward the southern end of the Closed Industrial Landfill. The plume tends to become more narrow south of the landfill as the concentrations decrease substantially (5-10 mg/L range) and the orientation becomes more to the south. The narrow linear shape extends to the southern property boundary, with relatively consistent concentrations along the center of its long axis. The rapid decrease in fluoride concentrations within a few hundred feet of the source area is likely due to factors such as dilution, adsorption, and chemical precipitation.

The North and South Ponds were originally lined with asphalt during their construction in the 1970's. Only the lining of the North Pond has been rehabilitated since its original construction. The North Pond had historically been used to capture runoff from a waste pile of fluoridated alumina and some SPL. Until mid 2005, the pond was used for purging the clarifier or the thickener tank.

The South Pond formerly received leachate containing elevated fluoride concentrations directly from the Closed Industrial Landfill and via direct runoff from the Former SPL Pad. It was also sometimes used as a process tank for handling wet scrubber water. Cracks in the lining were reportedly repaired by filling them with tar, and the pad was last relined with asphalt in 1996. Up until the plant curtailed operations in December 2005, the South Pond was used for collecting runoff from the brick pad (Former SPL Pad) and for purging the clarifier or the thickener tank.

In 2004, the North Pond was observed to be in communication with the subsurface and based on fluoride concentrations in the process waste, which were in excess of 1,300 mg/L, it was determined to be a significant source of groundwater contamination. Contaminant flux calculations demonstrated that the contaminant loading from the North Pond was capable of sustaining the fluoride concentrations measured in local groundwater. As noted, the North and South Ponds were removed from service shortly after the site-wide investigation when the plant curtailed operations, thereby eliminating the primary source to groundwater.

3.1.1.2. Concentration Trends

Fluoride

In terms of temporal trends, Figure 3-3 shows the average annual fluoride concentrations in wells near the primary source area (i.e., North and South Ponds) where elevated fluoride concentrations (<1000 mg/L) were observed in the 1980's. This was thought to be due principally to the storage of SPL on the Former SPL Pad which drained leachate to the South Pond. Beginning in 1988 when SPL was no longer being stored on the pad, fluoride concentrations in groundwater near the pad began to decrease sharply from nearly 1000 mg/L in 1988 to less than 200 mg/L in 1996. Since 1996, fluoride concentrations have continued to decrease, albeit at a slower rate. During the site-wide sampling round in June 2005, the concentrations fluctuated within a range of 41 to 72 mg/L.

Concentrations have also been declining in downgradient groundwater including near the southern property boundary, and the off-site well, MW-13, has had relatively stable concentrations far below the ACO limit.

Cyanide

Cyanide contamination of groundwater has also resulted from past waste disposal and storage practices, but to a lesser extent. In terms of temporal trends, Figure 3-4 shows the average annual free cyanide concentrations in wells near the primary source area. The concentrations peaked in the late 1980's and early 1990's with maximum concentrations in MW-29 (now RW-29), MW-56, MW-57, and MW-68 ranging from approximately 1.5 to 3 mg/L, which were above the ACO limit of 0.2 mg/L. After peaking, the concentrations dropped to below 0.1 mg/L during the mid-1990's. From 1998 to 2002, the concentrations rose again in MW-29, MW-57, and MW-68 to levels at or above the ACO limit with concentrations in MW-57 rising to as high as 0.45 mg/L. In 2003 the concentrations in MW-57 and MW-68 returned to the lower levels observed during the mid-1990's. The cause of the rise in free cyanide concentrations in MW-29, MW-57, and MW-68 from 1998 to 2002 is uncertain but may be due to variations in process water concentrations discharged to the North and South Ponds. The concentrations in RW-29 increased again near the end of 2003 and early 2004 likely as a result of the well reconstruction and 3-month pumping test that was performed during that period. The free cyanide concentrations in these wells during the 2005 site-wide sampling round ranged from 0.02 to 0.06 mg/L, which is well below the ACO limit.[Are "these wells" referred to here the ones mentioned above: MW-29,-56,57 and -68? If so, the cyanide range for these on Table 3-1 is 0.016-0.06 mg/L]

Downgradient of the primary source areas, including the property boundary, the free cyanide concentrations have never exceeded the ACO limit and continue to decline.

3.1.2. Conclusions

Two process water ponds (the North Pond, and possibly the South Pond) were identified as the primary sources based on the results of the investigation which included box model flux calculations. Other investigated sources, including the Closed Industrial Landfill were not found to be significant contributors to the fluoride plume.

The ACO required groundwater to be pumped from one of the Closed Industrial Landfill's monitoring wells (MW-68) because of the liner leak discussed above. Fluoride concentrations are declining in MW-68 but are still elevated above the ACO limit. At the start of the site-wide investigation, it was believed that the elevated concentrations in MW-68 were related to either residual effects from the 1990 liner leak or possibly from other leaks. However, an analysis of fluoride concentrations in bedrock pumping wells RW-29 and MW-68 (Figure 3-5) show that the temporal trends for fluoride concentrations in both wells are very similar even though RW-29 is upgradient of MW-68. This suggests, and is supported by the

groundwater flow maps, that the elevated concentrations in MW-68 and other nearby monitoring wells are not related to the Closed Industrial Landfill, but are instead related to the same upgradient source that is responsible for the elevated concentrations in RW-29 (i.e., the North Pond and possibly the South Pond).

Based on the results of the site-wide investigation and the elimination of the North and South Ponds as sources with the December 2005 curtailment, MDE and Eastalco agreed during the November 2005 meeting to modify the ACO with regards to the groundwater monitoring program, and the pump and treat program. Eastalco submitted a letter to MDE dated 11/22/05 with proposed modifications. MDE approved the proposed changes to the groundwater monitoring and pump and treat programs in a letter dated 12/16/05. Appendix A contains copies of both letters. MDE is currently in the process of creating an amendment to the ACO. The general proposed ACO modifications are listed below.

- Remove the groundwater pumping requirement due to the elimination of the primary sources (North and South Ponds) as a part of the plant curtailment.

- Continue groundwater monitoring to track the plume and monitor the on-going decline in concentrations which are expected to continue under non-pumping conditions. It was recommended that the monitoring be continued for 2 years, at which time Alcoa will consult with the MDE to determine the appropriate future course of action (e.g., continue monitoring under the existing plan, modify the plan, or terminate the monitoring program).

- Update the existing monitoring program based on monitoring data that have been collected over the years per the ACO, as well as the enhanced understanding of groundwater flow. In general, the revised monitoring program was proposed as follows:

  - General Groundwater – Remove cyanide from the monitoring program as concentrations are below the ACO limit across the site.

  - Primary Source Area Wells - Reduce the frequency of monitoring wells in the immediate vicinity of the former primary source to semi-annually.

  - Downgradient Wells - Reduce the frequency of monitoring downgradient wells to annually. Add selected new wells to the monitoring program.

  - Property Boundary Wells – Reduce the frequency of monitoring property boundary wells to semi-annually for the first year and then annually if the current trends continue.

4.0 MONITORING AND MAINTENANCE PROGRAM

This section discusses the elements of the post-closure monitoring and maintenance program for the Closed Industrial Landfill.

4.1. GROUNDWATER MONITORING

4.1.1. Existing Monitoring Program

The last permit for the landfill was issued in 1990 before the landfill was closed in 1994. Section I.6 of the permit identified monitoring wells (MW-4, 6, 25, and 26) for monitoring and provided the following monitoring schedule.

Quarterly	Annually	
pH	Total alkalinity	Total dissolved solids
Temperature	Bicarbonate alkalinity	Iron
Fluoride	Carbonate alkalinity	Sulfate
Water levels	Calcium	
Free Cyanide	Chloride	
Total Cyanide	Conductivity	

Although the permit stated that the above monitoring schedule was to be followed during the period of operation at the landfill, the monitoring continued according to the same schedule after the landfill was closed, with the exception that three additional monitoring wells (MW-66, 67, and 68) located along the downgradient edge of the landfill were added to the program. The results of the groundwater monitoring have been submitted to MDE in routine quarterly reports.

4.1.2. Revised Monitoring Program

As stated in COMAR 26.04.07.22.A (Sanitary Landfills--Post-Closure Monitoring and Maintenance): "Landfills in Maryland shall be subject to post-closure monitoring and maintenance by the permittee as specified in this regulation, for a period of time not less than 5 years after the complete installation of the landfill cap." Post-closure monitoring has been performed for approximately 12 years at the Closed Industrial Landfill since it was capped in 1994. The results of the monitoring were assessed during the

site-wide investigation which, as discussed in Section 3, concluded that the areas such as the Closed Industrial Landfill were not contributing significantly to groundwater contamination. Given the increased understanding of the site conceptual model that resulted from the site-wide investigation and 12 years of monitoring, the monitoring program for the Closed Industrial Landfill has been modified as described below to be consistent with the revised MDE Administrative Consent Order (CO-92-149).

As shown on Table 2 of the 11/22/05 letter submitted to MDE (Appendix A), the revised monitoring schedule under the ACO, reduced the frequency of monitoring from monthly to semi-annually at MW-68, and from quarterly to annually at MW-4, 6, 25, and 26. The rationale for this reduction is that fluoride concentrations are declining, and concentrations at most wells are below the MCL. Thus, the reduced frequency is considered sufficient to monitor the declining concentrations. Therefore, the same monitoring schedule will be incorporated into this post-closure monitoring plan for the Closed Industrial Landfill. MW-66 and MW-67 are not monitored per the ACO but are included in this plan. The monitoring frequency for MW-66 and MW-67 will be semi-annually to be consistent with MW-68 which is also immediately adjacent to the downgradient edge of the landfill.

As was the case with the ACO, the wells will be tested for fluoride, but cyanide has been removed from the monitoring program because concentrations are below the MCL across the site. Water levels, as well as field parameters including pH, temperature, conductivity, and turbidity will be measured and recorded during each monitoring event.

4.1.2.1. Sampling and Analysis

Groundwater samples will be collected by qualified environmental technicians according to the standard operating procedure (SOP) that is provided in Appendix B and is based on Eastalco's Work Instruction WI10245. The SOP provides details regarding well purging, sample collection, sample containers, sample preservation, sample labeling and documentation, equipment decontamination, quality control blanks, and derived waste management, etc.

The environmental technicians will perform the field analyses at the well and prepare samples for laboratory analysis. Samples will be collected in 100 mL polyethylene bottles or other containers provided by the laboratory. The samples will be shipped off-site to Microbac Laboratories, Inc., Gascoyne Division in Baltimore, Maryland or another qualified laboratory for the analysis of fluoride using Standard Method 4500 or EPA Method 340.2. Samples must be analyzed within 28 days from the time of sampling. The reporting limit for fluoride will be 0.1 mg/L or ppm. The results reported by the

laboratories will include all data that are qualified with a "J" indicating the result was estimated because it was detected below the PQL.

One duplicate sample and one equipment blank (quality control samples) will be collected during each monitoring event. The equipment blank will be collected as described in the SOP found in Appendix B.

4.1.2.2. Reporting

A semiannual report will be prepared and submitted to MDE within 90 days of the close of every first and third calendar quarters. The reports will contain the following:

1. A complete copy of the laboratory data;
2. A comparison of the results against MCLs for those parameters that have an associated MCL;
3. Concentration maps depicting total fluoride concentrations measured during the semi-annual monitoring event;
4. Charts showing the concentration total fluoride at each well;
5. Charts depicting historical concentration trends for total fluoride;
6. A summary of all groundwater elevations measured at the wells included in this plan;
7. A narrative discussion concerning background information, sampling procedures, and results/trends, etc.

4.2. LANDFILL MAINTENANCE

COMAR 26.04.07.22.B and C (Sanitary Landfills--Post-Closure Monitoring and Maintenance) provides the following regulations concerning post-closure inspections and maintenance:

"B. Inspections. The closed landfill shall be inspected at least twice per year by the permit holder or the permit holder's authorized representative. The inspection shall include:

(1) Observation of the cover at the landfill;

(2) Notation of any drainage irregularities or signs of erosion of the cover;

(3) Notation of any surface expressions of leachate at the landfill; and

(4) Checking the status of the monitoring wells.

C. Maintenance. Irregularities or problems noted during the inspections shall be corrected within 30 days of their observance unless otherwise directed by the Department."

Landfill inspections and maintenance have been performed since the landfill was closed in 1994 and will continue to be performed under this plan as described in the above regulations relative to both scope and frequency.

4.3. PROGRAM DURATION

As stated earlier, COMAR (26.04.07.22.A) requires post-closure monitoring and maintenance for at least 5 years after the complete installation of the landfill cap. Post-closure monitoring and maintenance has been performed for 12 years after the landfill was closed. Therefore, to be consistent with the monitoring program in the revised ACO, the post-closure monitoring and maintenance for the Closed Industrial Landfill will continue for a period of 2 years, at which time Alcoa will consult with the MDE to determine the appropriate future course of action (e.g., continue monitoring under the existing plan, modify the plan, or terminate the program).

5.0 REFERENCES

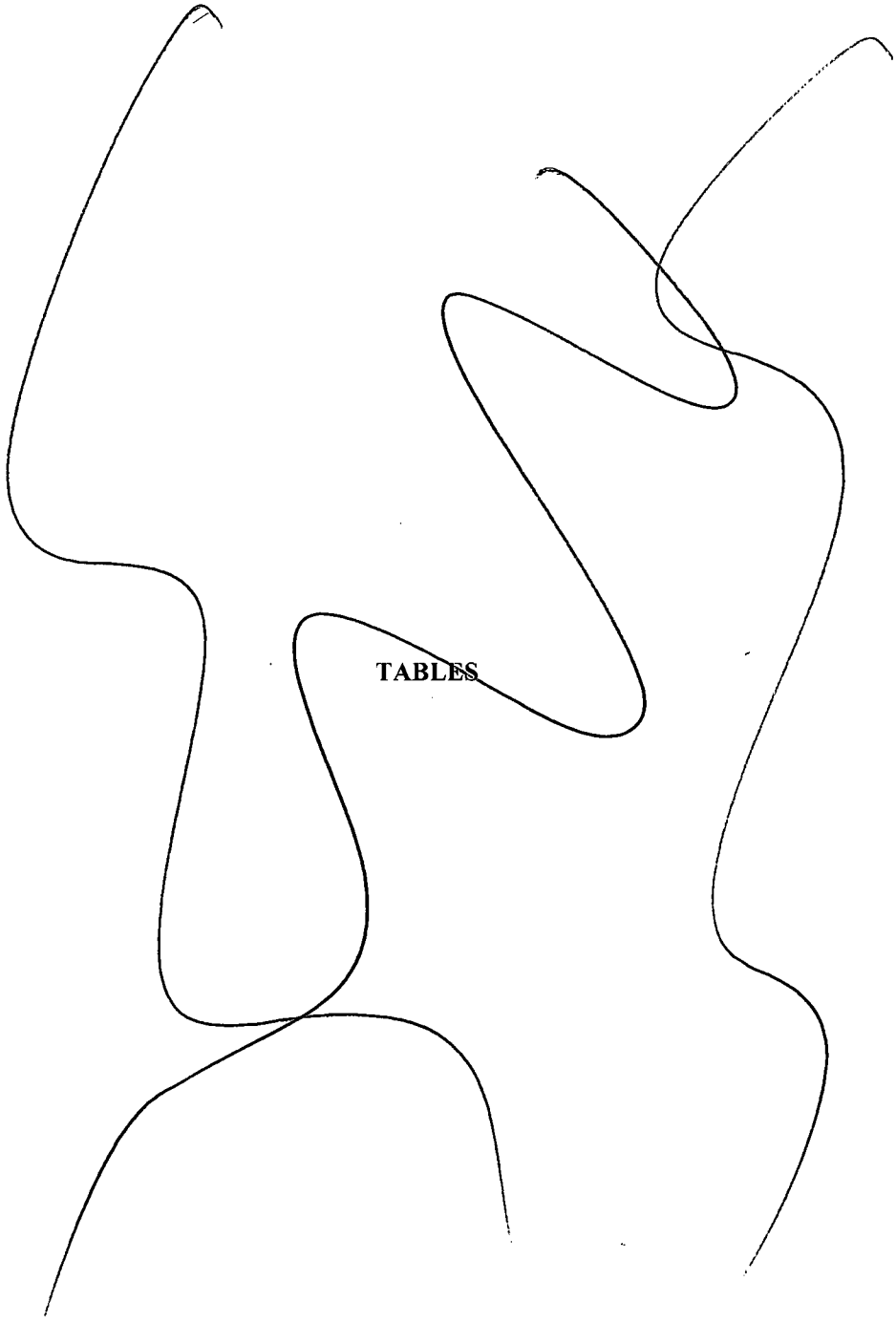
Atlantic Environmental Services, Inc., 1996, Eastalco Aluminum Company, Aquifer Characteristics Investigation, May 29, 1996.

Maryland Geological Survey (MGS), 1968. Geologic Maps of Maryland, Frederick County, Detail 12.

Maryland Geological Survey (MGS), 1981. A Brief Description of the Geology of Maryland.

MFG, Inc. 2004. Site-Wide Investigation Work Plan, Alcoa Eastalco, August 2004.

MFG, Inc. 2005. Site-Wide Investigation Report, Alcoa Eastalco, October 2005.



TABLES

Table 3-1
Site-Wide Groundwater Analytical Results
Alcoa Eastalco

Well ID	MW-4	MW-6	MW-13	MW-25	MW-26	MW-28	RW-29	MW-30	MW-31	MW-32
Sample Date	06/21/05	06/14/05	06/22/05	06/20/05	06/16/05	06/17/05	06/22/05	06/22/05	06/20/05	06/21/05
Parameter (mg/L)										
Free Cyanide	0.01 U	**0.001**	**0.0014**	0.01 U	**0.0146**	**0.0052**	**0.0615**	**0.0002**	0.01 U	0.01 U
Total Fluoride	**1.92**	**3.5**	**0.26**	**16.98**	**7.63**	**3.73**	**59.14**	**1.07**	**0.33**	**1.97**
Water Quality										
Calcium	49.2	--	--	--	--	--	7.14	--	43.7	--
Magnesium	4.43 B	--	--	--	--	--	3.01 B	--	7.19	--
Potassium	5.4 J	--	--	--	--	--	4.32 B J	--	0.589 B J	--
Sodium	71.4	--	--	--	--	--	883	--	12.2	--
Total Dissolved Solids	299	--	--	--	--	--	2400	--	168	--
Total Suspended Solids	10	--	--	--	--	--	3.6 B	--	14.8	--
Chloride	39.2	--	--	--	--	--	212	--	1.9	--
Nitrate as N	3.8	--	--	--	--	--	3.6	--	3	--
Nitrite as N	0.05 U	--	--	--	--	--	1.2	--	0.05 U	--
Sulfate	119	--	--	--	--	--	647	--	41.2	--
Total Alkalinity	79.3	--	--	--	--	--	749	--	90.6	--

Well ID	MW-33	MW-34	MW-39	MW-40	MW-41	MW-42	MW-43	MW-44	MW-45	MW-46
Sample Date	06/14/05	06/14/05	06/16/05	06/20/05	06/20/05	06/14/05	06/21/05	06/21/05	06/14/05	06/14/05
Parameter (mg/L)										
Free Cyanide	**0.003**	**0.005**	**0.0541**	0.01 U	**0.0016**	**0.0024**	**0.0005**	**0.001**	**0.046**	**0.0137**
Total Fluoride	**0.95**	**7.36**	**0.06**	**0.42**	**2.76**	**2.53**	**0.91**	**2.22**	**4.83**	**2.39**
Water Quality										
Calcium	--	--	--	104	--	--	--	--	--	--
Magnesium	--	--	--	7.77	--	--	--	--	--	--
Potassium	--	--	--	0.63 B	--	--	--	--	--	--
Sodium	--	--	--	26.3	--	--	--	--	--	--
Total Dissolved Solids	--	--	--	354	--	--	--	--	--	--
Total Suspended Solids	--	--	--	7.6	--	--	--	--	--	--
Chloride	--	--	--	9.4	--	--	--	--	--	--
Nitrate as N	--	--	--	3.6	--	--	--	--	--	--
Nitrite as N	--	--	--	0.05 U	--	--	--	--	--	--
Sulfate	--	--	--	66.8	--	--	--	--	--	--
Total Alkalinity	--	--	--	208	--	--	--	--	--	--

Table 3-1
Site-Wide Groundwater Analytical Results
Alcoa Eastalco

Well ID	MW-49	MW-50	MW-51	MW-52	MW-53	MW-54	MW-55	MW-56	MW-57	MW-58
Sample Date	06/21/05	06/21/05	06/17/05	06/20/05	06/17/05	06/17/05	06/22/05	06/14/05	06/14/05	06/22/05
Parameter (mg/L)										
Free Cyanide	**4E-04**	**0.003**	**0.0033**	**0.007**	0.01 U	0.01 U	0.01 U	**0.02**	**0.019**	0.01 U
Total Fluoride	**0.47**	**1.27**	**1.3**	**7.53**	**1.43**	**0.11**	**2.12**	**40.65**	**71.46**	**0.54**
Water Quality										
Calcium	--	--	96	--	--	--	--	--	--	--
Magnesium	--	--	8.57	--	--	--	--	--	--	--
Potassium	--	--	1.19 B J	--	--	--	--	--	--	--
Sodium	--	--	111	--	--	--	--	--	--	--
Total Dissolved Solids	--	--	570	--	--	--	--	--	--	--
Total Suspended Solids	--	--	4 U	--	--	--	--	--	--	--
Chloride	--	--	63.9	--	--	--	--	--	--	--
Nitrate as N	--	--	3.5	--	--	--	--	--	--	--
Nitrite as N	--	--	0.05 U	--	--	--	--	--	--	--
Sulfate	--	--	152	--	--	--	--	--	--	--
Total Alkalinity	--	--	214	--	--	--	--	--	--	--

Well ID	MW-59	MW-60	MW-61	MW-62	MW-63	MW-64	MW-66	MW-67	MW-68	MW-69
Sample Date	06/22/05	06/20/05	06/21/05	06/20/05	06/21/05	06/16/05	06/16/05	06/16/05	06/16/05	06/16/05
Parameter (mg/L)										
Free Cyanide	**8E-04**	**0.003**	**0.0003**	**0.0067**	0.01 U	**0.0016**	**0.0028**	**0.01**	**0.0574**	**0.0171**
Total Fluoride	**0.47**	**5.29**	**0.1**	**4.38**	**0.21**	**0.11**	**8.14**	**10.23**	**53.86**	**10.25**
Water Quality										
Calcium	--	--	--	83.2	47	--	--	--	--	--
Magnesium	--	--	--	8.65	13.8	--	--	--	--	--
Potassium	--	--	--	1.55 B	3.66 B	--	--	--	--	--
Sodium	--	--	--	149	3.14 B	--	--	--	--	--
Total Dissolved Solids	--	--	--	627	211	--	--	--	--	--
Total Suspended Solids	--	--	--	4 U	218	--	--	--	--	--
Chloride	--	--	--	74.1	7.2	--	--	--	--	--
Nitrate as N	--	--	--	3.7	10.3	--	--	--	--	--
Nitrite as N	--	--	--	0.05 U	0.05 U	--	--	--	--	--
Sulfate	--	--	--	178	22.6	--	--	--	--	--
Total Alkalinity	--	--	--	221	72.5	--	--	--	--	--

Table 3-1
Site-Wide Groundwater Analytical Results
Alcoa Eastalco

Well ID	MW-70	MW-71	MW-72	MW-73	MW-74	MW-75	MW-76	MW-77	MW-88	MW-89
Sample Date	06/22/05	06/21/05	06/21/05	06/21/05	06/20/05	06/20/05	06/16/05	06/16/05	06/22/05	06/22/05
Parameter (mg/L)										
Free Cyanide	**4E-04**	0.01 U	**0.0311**	**0.0139**	**0.0004**	**0.0007**	**0.0013**	**0.0013**	**0.0024**	**0.0008**
Total Fluoride	**1.55**	**0.61**	**7.38**	**7.85**	**0.5**	**0.55**	**0.07**	**0.08**	**6.54**	**2.22**
Water Quality										
Calcium	--	--	70.3	72.5	--	--	--	--	--	--
Magnesium	--	--	7.85	8.13	--	--	--	--	--	--
Potassium	--	--	1.6 B J	1.61 B	--	--	--	--	--	--
Sodium	--	--	178	186	--	--	--	--	--	--
Total Dissolved Solids	--	--	664	671	--	--	--	--	--	--
Total Suspended Solids	--	--	3.6 B	4 U	--	--	--	--	--	--
Chloride	--	--	74	75.2	--	--	--	--	--	--
Nitrate as N	--	--	4.4	4.4	--	--	--	--	--	--
Nitrite as N	--	--	0.05 U	0.05 U	--	--	--	--	--	--
Sulfate	--	--	180	182	--	--	--	--	--	--
Total Alkalinity	--	--	218	238	--	--	--	--	--	--

Well ID	MW-90	MW-91	MW-94	MW-96	MW-97	MW-98	MW-101	MW-101D	MW-103	MW-104
Sample Date	06/22/05	06/22/05	06/23/05	06/22/05	06/22/05	06/16/05	06/17/05	06/17/05	06/21/05	06/21/05
Parameter (mg/L)										
Free Cyanide	**5E-04**	**0.003**	**0.0021**	**0.0437**	**0.0342**	**0.0124**	0.01 U	–	**0.0009**	**0.0002**
Total Fluoride	**1.44**	**0.07**	**3.27**	**86.67**	**3.13**	**1.22**	**1.55**	–	**3.46**	**8.09**
Water Quality										
Calcium	--	--	--	--	66.5	--	70.8	73.1	79.7	118
Magnesium	--	--	--	--	10.9	--	9.39	9.59	10.2	14.1
Potassium	--	--	--	--	2.13 B	--	1.71 B J	1.72 B	2.21 B J	1.79 B J
Sodium	--	--	--	--	102	--	35.9	37.1	72.9	37.1
Total Dissolved Solids	--	--	--	--	542	--	364	337	443	462
Total Suspended Solids	--	--	--	--	4 U	--	11.6	9.2	8.8	98.4
Chloride	--	--	--	--	40.8	--	29.4	29.3	42.3	10.7
Nitrate as N	--	--	--	--	4	--	0.36	0.35	4.2	0.28
Nitrite as N	--	--	--	--	0.05 U	--	0.05 U	0.05 U	0.05 U	0.05 U
Sulfate	--	--	--	--	152	--	61.4	61.3	130	75.2
Total Alkalinity	--	--	--	--	166	--	158	158	154	252

Table 3-1
Site-Wide Groundwater Analytical Results
Alcoa Eastalco

Well ID	MW-105	MW-106	MW-107	MW-108	MW-109	MW-110
Sample Date	06/21/05	06/22/05	06/21/05	06/21/05	05/18/05	05/18/05
Parameter (mg/L)						
Free Cyanide	0.01 U	**0.013**	**0.0007**	**0.0137**	0.01 U	0.01 U
Total Fluoride	**0.77**	**4.42**	**2.04**	**11.63**	**0.29**	**0.08**
Water Quality						
Calcium	94.8	--	--	--	--	--
Magnesium	10.6	--	--	--	--	--
Potassium	1.57 B	--	--	--	--	--
Sodium	14.7	--	--	--	--	--
Total Dissolved Solids	320	--	--	--	--	--
Total Suspended Solids	4 U	--	--	--	--	--
Chloride	18.7	--	--	--	--	--
Nitrate as N	6.3	--	--	--	--	--
Nitrite as N	0.05 U	--	--	--	--	--
Sulfate	33.9	--	--	--	--	--
Total Alkalinity	178	--	--	--	--	--

BOLD indicates detections.

Inorganic Data Qualifiers:

B = Estimated Concentration

J = Method Blank Contamination. Associated method blank contains the target analyte at a reportable level.

U = Not Detected above Reporting Limit

Organic Data Qualifiers

J = Estimated Concentration.

U = Not Detected above Reporting Limit

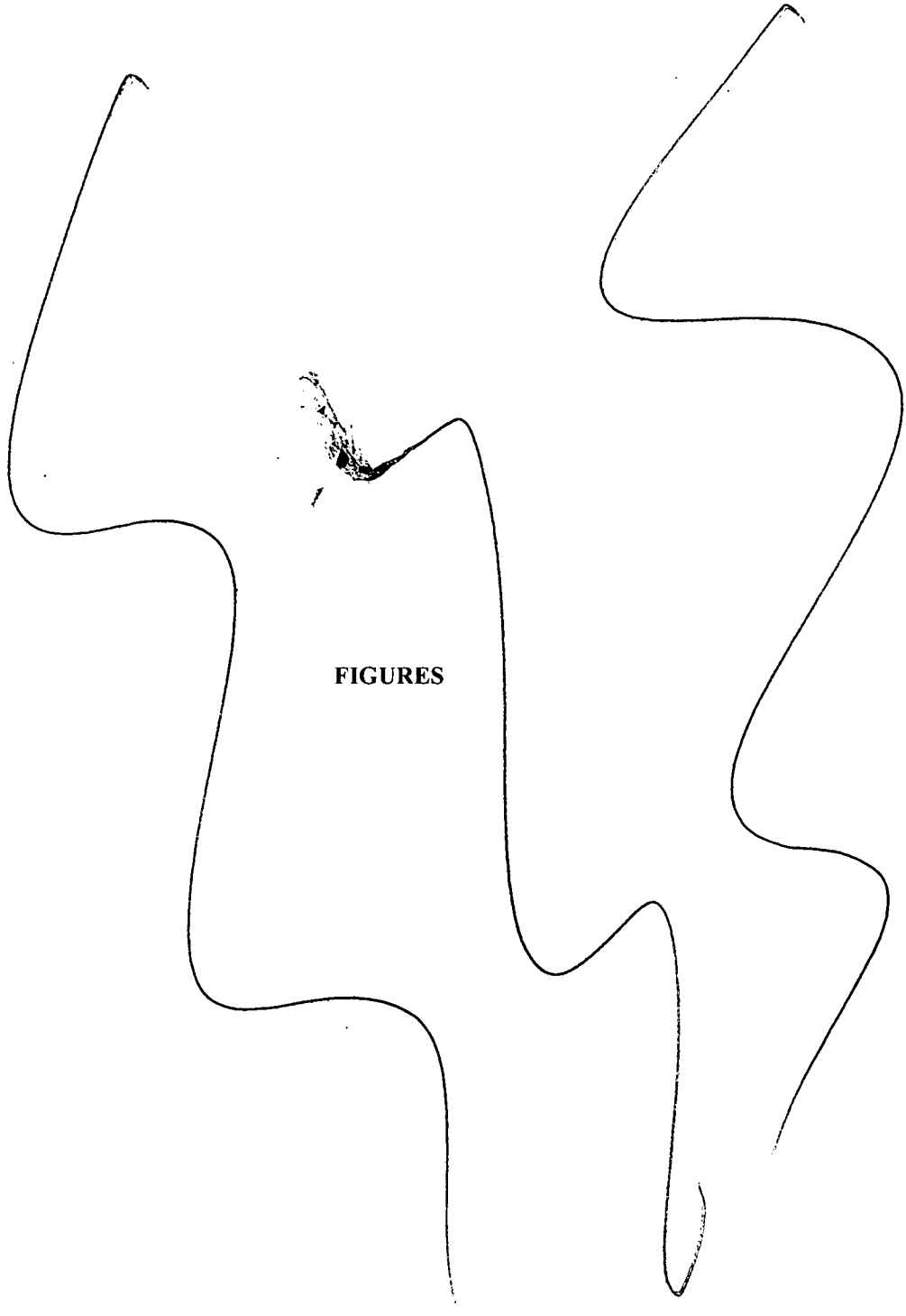
PG = The percent difference between the original & confirmation analysis is >40%.

Table 3-2
Groundwater Field Data
Alcoa-Eastalco

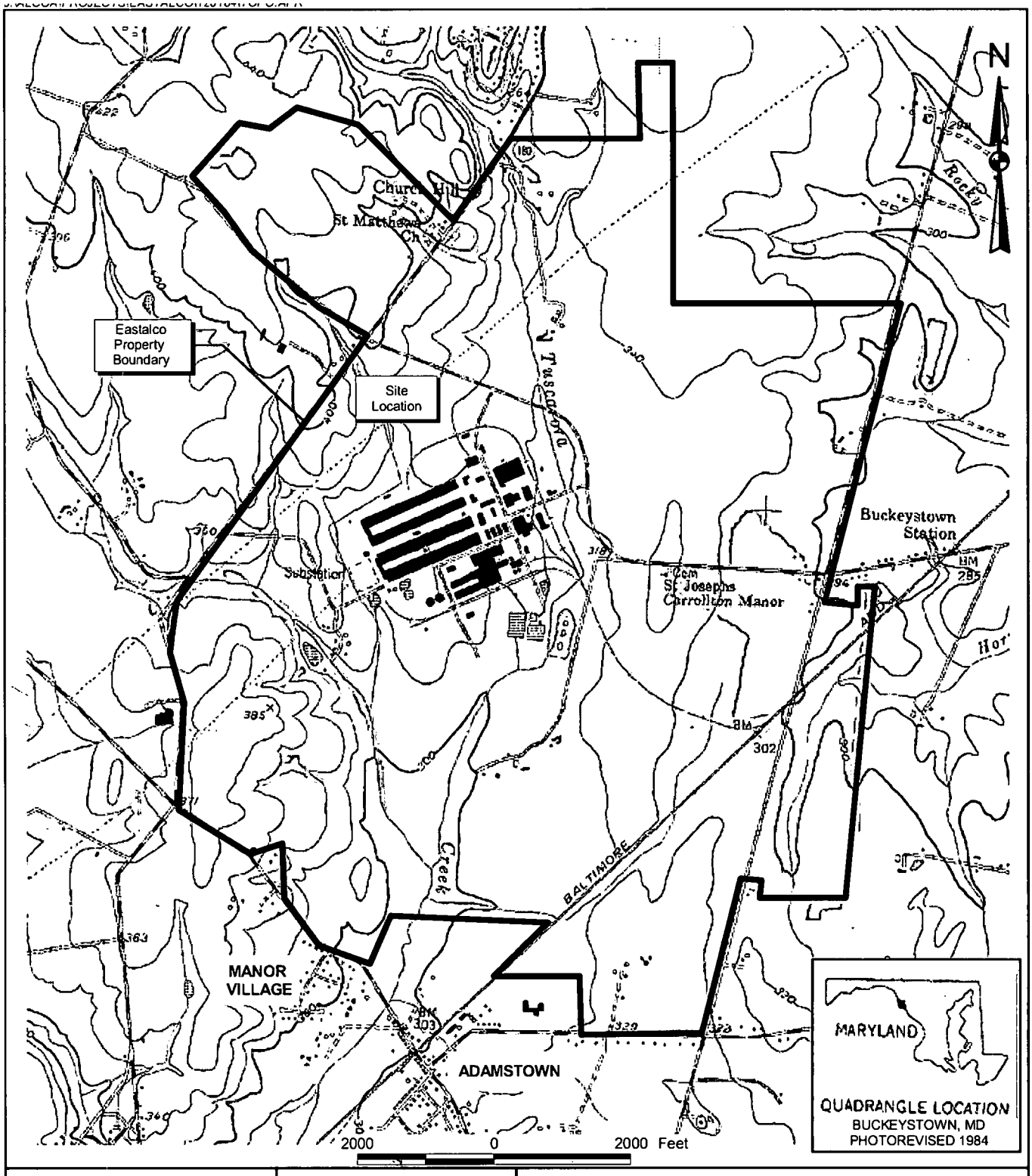
Well ID#	Date	Temp (deg C)	pH (SU)	DO (mg/l)	Conductivity (µS/cm)	Turbidity (NTUs)	ORP (mv)
4	21-Jun-05	17.9	9	2.29	599	13.3	29
6	14-Jun-05	19.6	7.06	1.87	742.5	1.1	163
13	22-Jun-05	20.7	7.85	6.21	443.5	6	201
25	20-Jun-05	21.4	7.24	1.68	1236	15.4	NM
26	16-Jun-05	17.4	7.72	1.77	1036	9.1	233
28	17-Jun-05	14.4	7.03	1.03	499	9.22	64
29	14-Jun-05	22.5	9.52	2.5	3579	1.7	118
30	22-Jun-05	15.2	6.85	NM	724	12.2	-64
31	20-Jun-05	20.2	6.36	3.45	110	20	172
32	21-Jun-05	27.2	7.05	3.37	418.8	14.6	49
33	14-Jun-05	16.8	6.91	2.1	599	18	92
34	14-Jun-05	21	6.76	0.86	1273	12	170
39	16-Jun-05	17.9	7.16	0.83	1045	13	217
40	20-Jun-05	13.4	7.63	2.64	720	20	15
41	21-Jun-05	18.2	7.23	1.67	561.7	3.16	NM
42	14-Jun-05	17.8	7.03	2.41	718.2	20	223
43	21-Jun-05	16.3	7.10	3.7	552	16.6	158
44	21-Jun-05	23.2	7.09	2.63	727	3	238
45	14-Jun-05	18.9	7.08	2.18	1076	1.2	228
46	14-Jun-05	21.9	7.43	1.59	735.4	3.5	153
49	21-Jun-05	14.4	6.39	4.72	350	10.5	172
50	21-Jun-05	15.4	6.79	NM	523	81.6	0
51	17-Jun-05	16	7.18	1.06	927	1.92	160
52	20-Jun-05	15.7	7.15	3.68	1114	4.06	NM
53	17-Jun-05	20.8	7.19	1.8	552	116	147
54	17-Jun-05	14.4	7.04	304	427	18	142
55	22-Jun-05	20.9	6.88	NM	593	12.4	199
56	14-Jun-05	22.6	9.00	3.49	2649	0.5	159
57	14-Jun-05	20.6	9.26	0.64	5190	2.7	154
58	22-Jun-05	14.2	7.12	NM	435	14.7	230
59	22-Jun-05	16.8	6.94	NM	524	3.23	204
60	20-Jun-05	15.5	7.14	3.05	990	1.49	NM
61	21-Jun-05	15.3	7.29	NM	429	8.19	7
62	20-Jun-05	18.6	7.61	2.83	110	3.6	172
63	21-Jun-05	22.9	7.16	3.86	327.4	167	95
64	16-Jun-05	18	5.67	5.6	88.91	700	246
66	16-Jun-05	18.7	6.91	1.62	1538	1.6	239
67	16-Jun-05	17.2	7.23	2.7	1494	4	252
68	16-Jun-05	19.8	9.11	2.97	3023	3.5	161
69	16-Jun-05	16.4	7.09	1.19	1200	17	247
70	22-Jun-05	19.7	7.03	NM	629	12.9	181
71	21-Jun-05	15.4	7.07	NM	349	2.97	30
72	21-Jun-05	14.5	7.21	1.08	1150	11.7	152
73	21-Jun-05	13.5	7.20	1.87	1165	2.69	167
74	20-Jun-05	18.6	7.10	2.96	493.6	5.34	NM
75	20-Jun-05	19.4	7.15	1.27	449.7	1.37	NM
76	16-Jun-05	21.6	5.62	4.69	131.2	55	257
77	16-Jun-05	18.6	6.62	3.55	460.1	14	206
88	22-Jun-05	15.7	7.17	1.71	1082	5.7	250
89	22-Jun-05	16.2	7.24	2.01	850	5.7	234
90	22-Jun-05	16.5	7.29	1.63	876	1.26	262
91	22-Jun-05	17	7.11	0.79	561.5	10.2	225
96	22-Jun-05	19.1	9.43	6.54	650	533	-3

Table 3-2
Groundwater Field Data
Alcoa-Eastalco

Well ID#	Date	Temp (deg C)	pH (SU)	DO (mg/l)	Conductivity (µS/cm)	Turbidity (NTUs)	ORP (mv)
97	22-Jun-05	17.1	7.32	3.11	850	40.5	162
98	16-Jun-05	15.3	6.51	2.51	1490	13	225
101	17-Jun-05	15.5	7.34	0.91	549	18.4	0
103	21-Jun-05	19.8	7.36	173	754.6	183	17
104	21-Jun-05	25.6	7.32	0.92	682	264	42
105	21-Jun-05	19	7.23	1.97	571	8.02	0
106	22-Jun-05	16	7.95	8.15	52	20	149
107	21-Jun-05	24.3	6.72	1	536	42	0
108	21-Jun-05	20	7.18	0.89	479.6	4.59	1
109	18-May-05	16	6.71	2.3	344	20	29
110	18-May-05	16.3	6.13	2.8	463	15	16



FIGURES



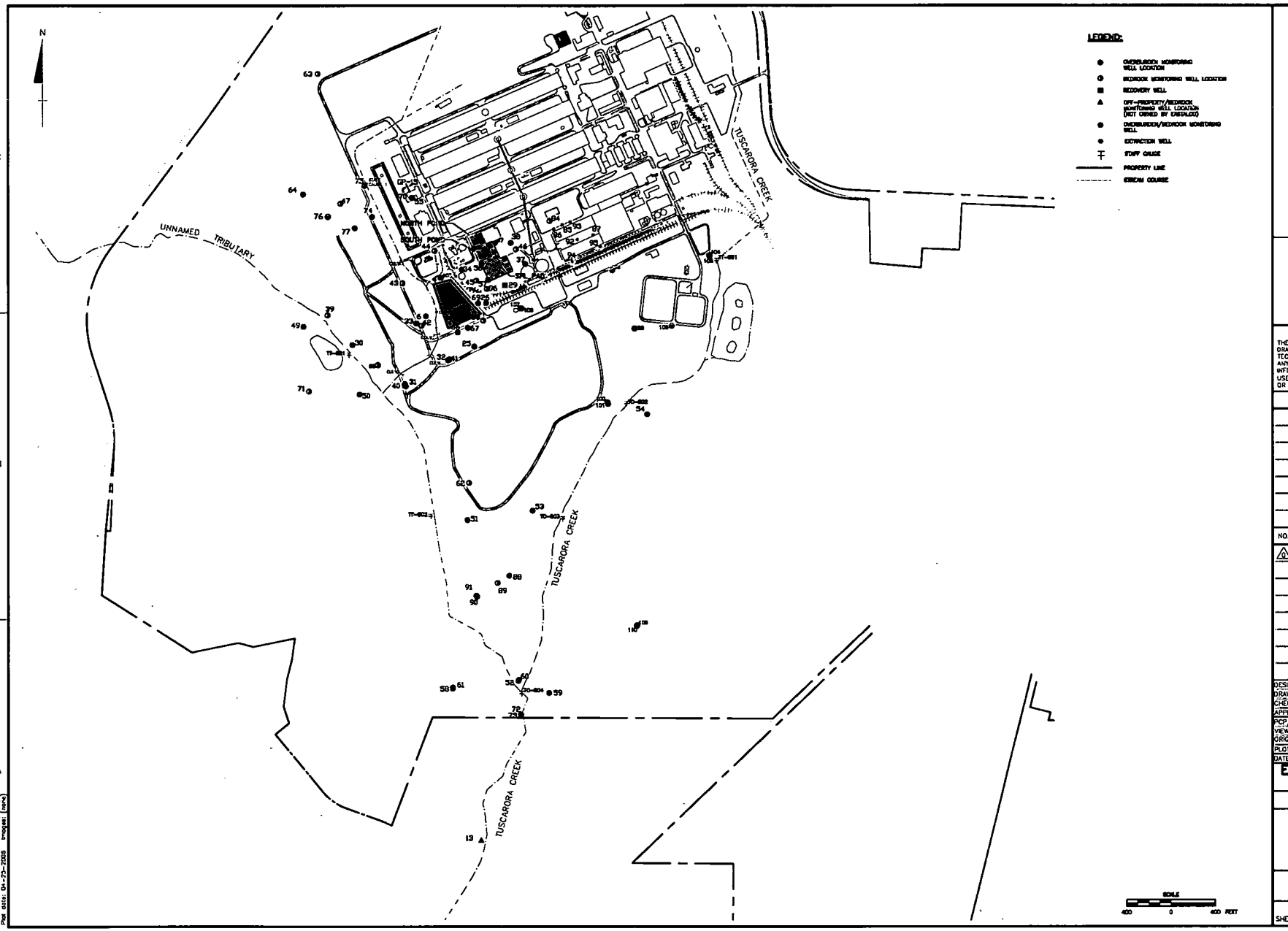
REV.:	
PROJ. NO.:	120353
DATE:	Sep 2004
LAYOUT NAME:	SITE LOC.
DRAWN BY:	JA
CHECKED BY:	PDC

NOTE:
Eastalco property line adapted from "Geologic Map", Figure 4-1, Phase I/II Permit Application, EA Engineering, Science, and Technology, Inc., Sparks, MD, Dated Dec. 1991.

ALCOA EASTALCO
Buckeystown, Maryland

SITE LOCATION

FIGURE
1-1



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Pittsburgh, Pennsylvania 15212
Phone (412) 321-2278
Fax (412) 321-2283

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APPROVED BY:	PC
PCF/PC2:	MTG-STD
VIEW NAME:	---
ORIGINATION DATE:	04-25-2006
PLOT SCALE:	1:1
DATE:	APRIL 2006

EASTALCO ALUMINUM COMPANY
FREDERICK, MD

FIGURE 2-1
LANDFILL LOCATION MAP

DRAWING NO.
REV.NO. 0
SHEET 1 OF 1

MAW G:\AutoCAD\Vol\120405\2006\120405-FIGURE 2-1 LF LOCS.dwg 04-25-2006 12:02 pm
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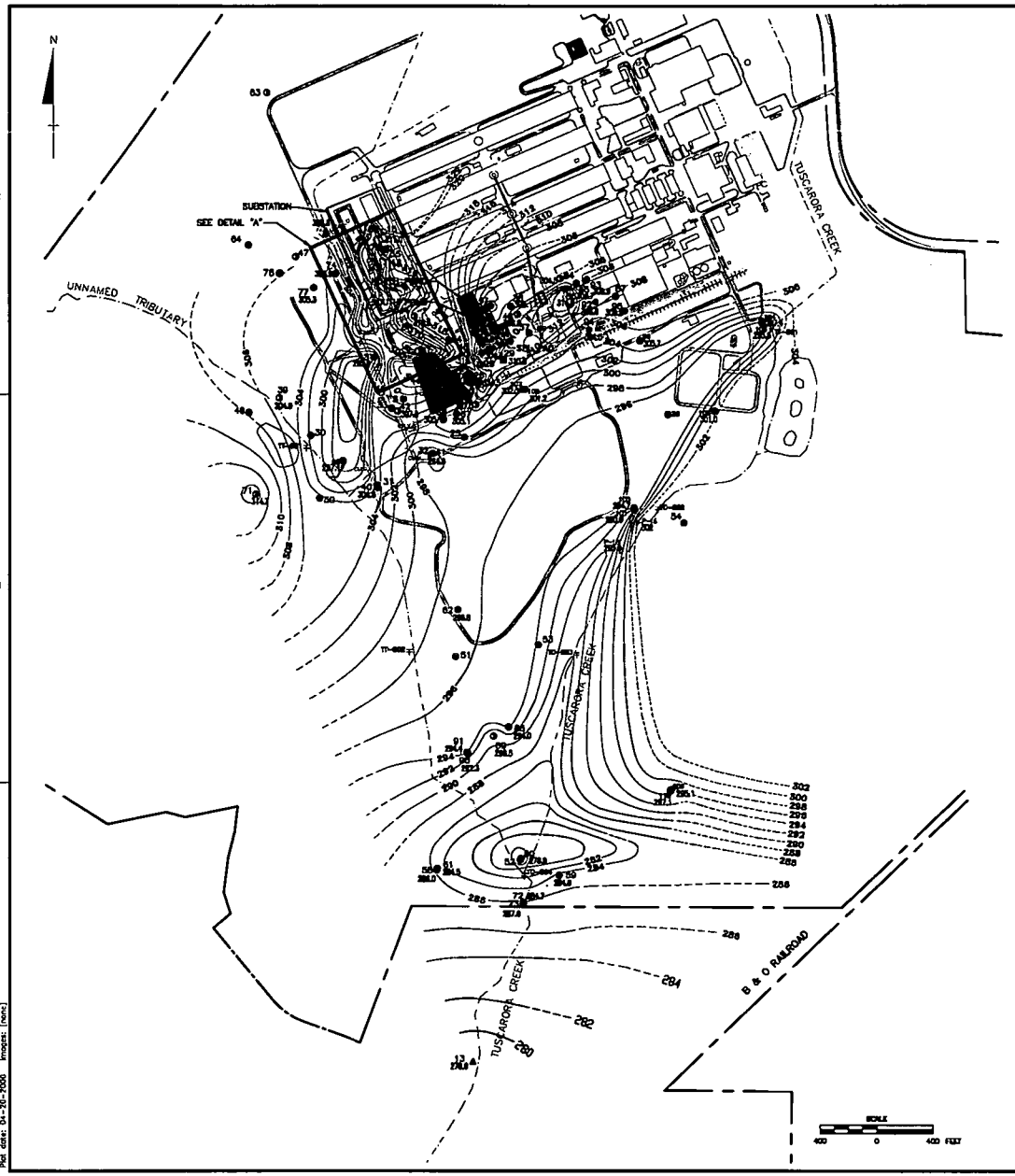
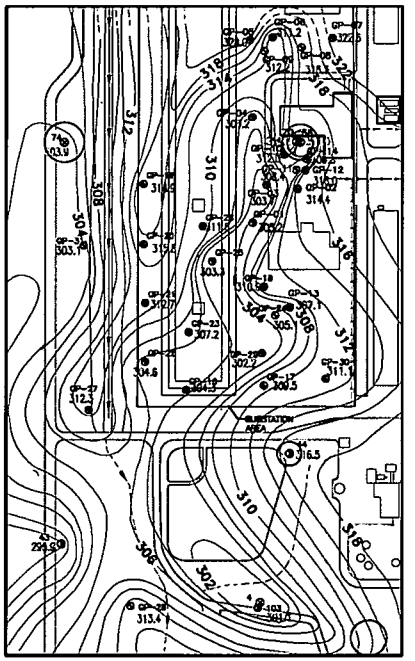


LEGEND:

- TOP OF BEDROCK CONTOUR (FT-MSL)
- GEOPROBE BORING LOCATION FROM PCE INVESTIGATION
- OVERBURDEN MONITORING WELL LOCATION
- BEDROCK MONITORING WELL LOCATION
- RECOVERY WELL
- OFF-PROPERTY/BEDROCK MONITORING WELL LOCATION (NOT OWNED BY EASTALCO)
- OVERBURDEN/BEDROCK MONITORING WELL
- EXTRACTION WELL
- STAFF GAUGE
- PROPERTY LINE
- STREAM COURSE



DETAIL "A"

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APPROVED BY:	PC
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VIEW NAME:	
ORIGINATION DATE:	04-13-2005
PLOT SCALE:	1:1
DATE:	APRIL 2008

EASTALCO ALUMINUM COMPANY

FREDERICK, MD

FIGURE 2-2

SITE MAP AND BEDROCK CONTOURS

DRAWING NO. | REV.NO. 0

SHEET 1 OF 1

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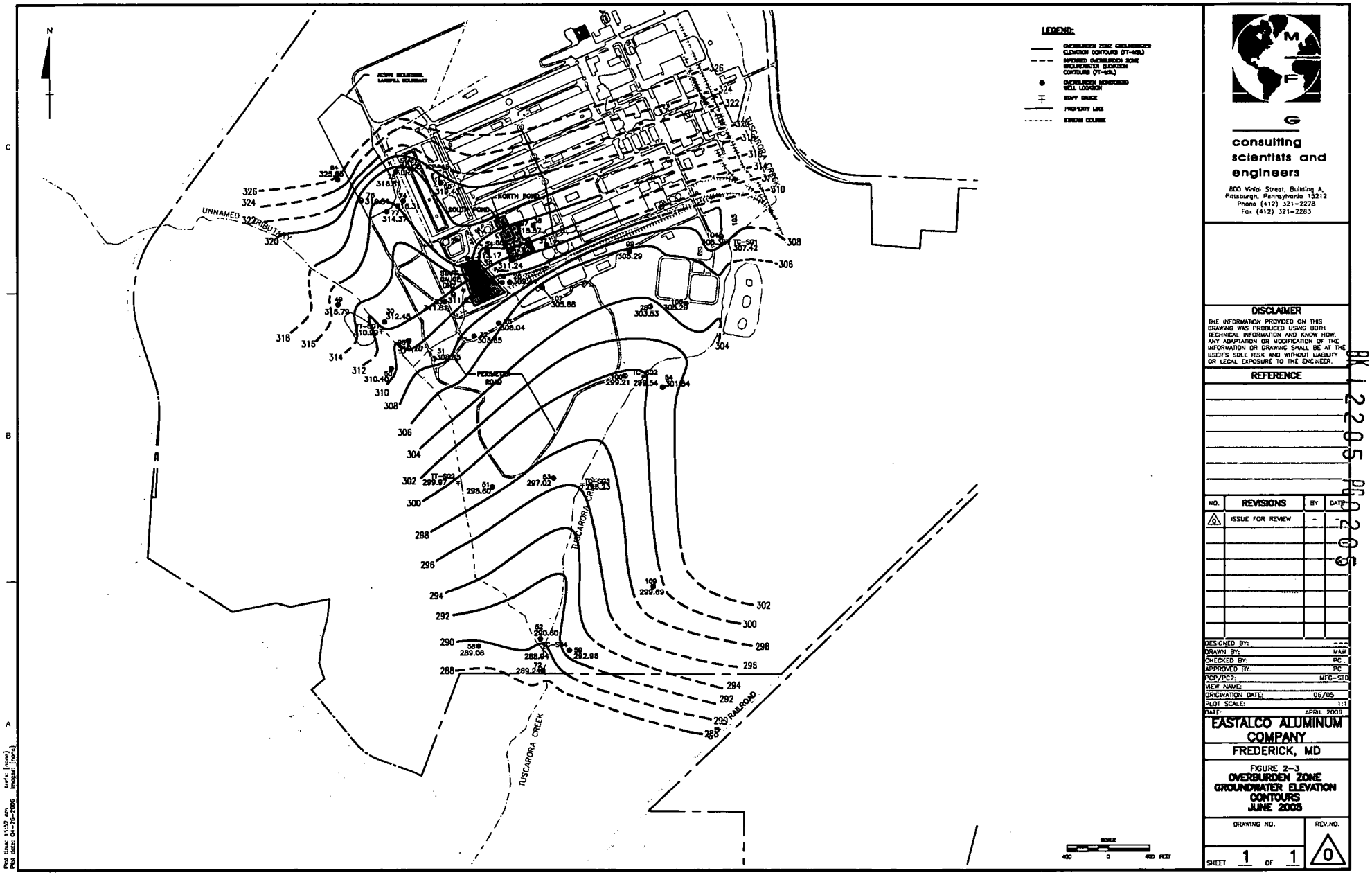

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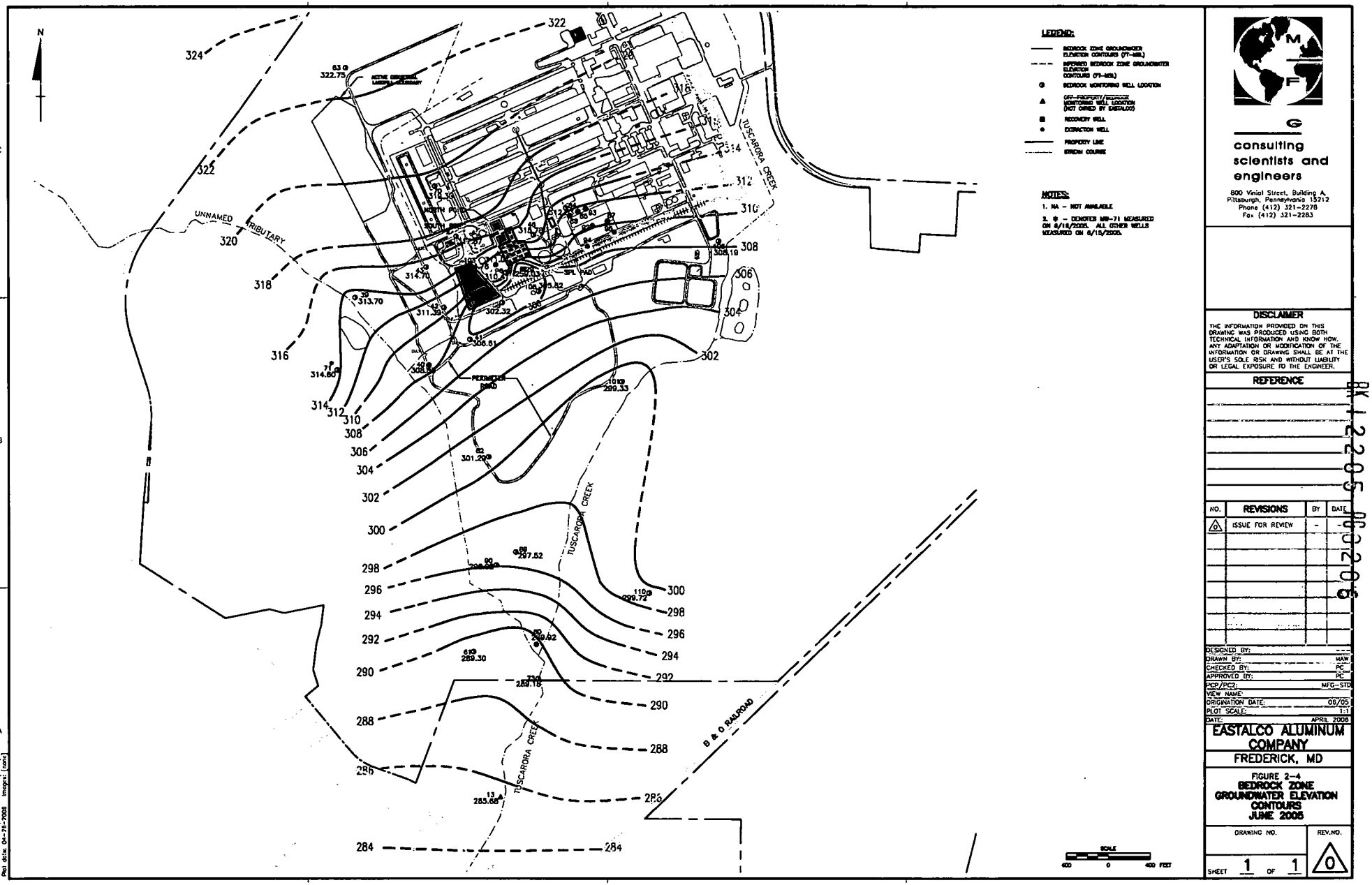

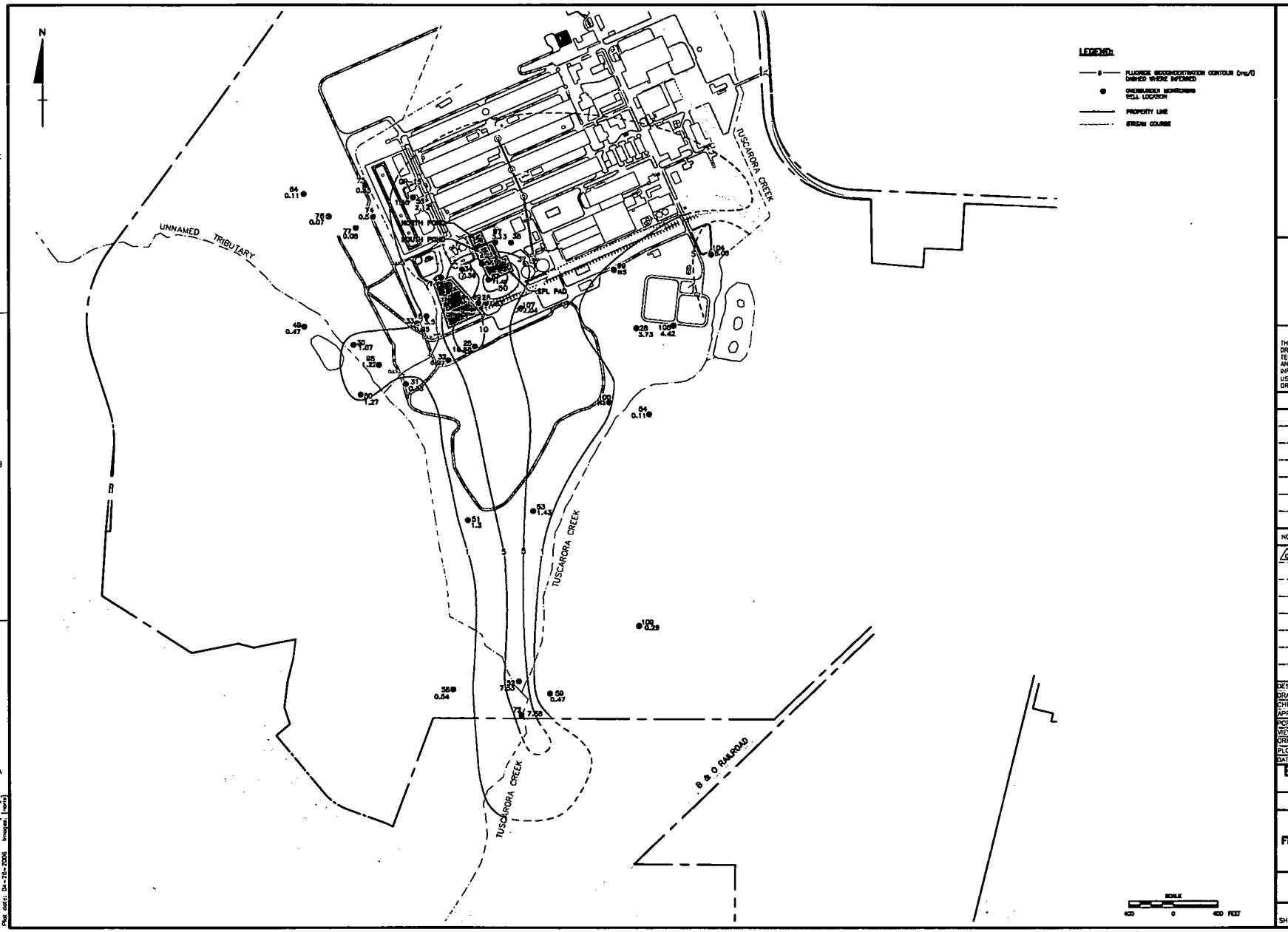

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DRAWN BY:	NAW
CHECKED BY:	PC
APPROVED BY:	PC
PCP/PCZ:	MFG-STD
VIEW NAME:	
ORIGINATION DATE:	04-13-2005
PLOT SCALE:	1:1
DATE:	APRIL 2006

EASTALCO ALUMINUM COMPANY

FREDERICK, MD

FIGURE 3-1

FLUORIDE CONCENTRATIONS IN OVERBURDEN GROUNDWATER

DRAWING NO. | REV.NO. 0

SHEET 1 OF 1

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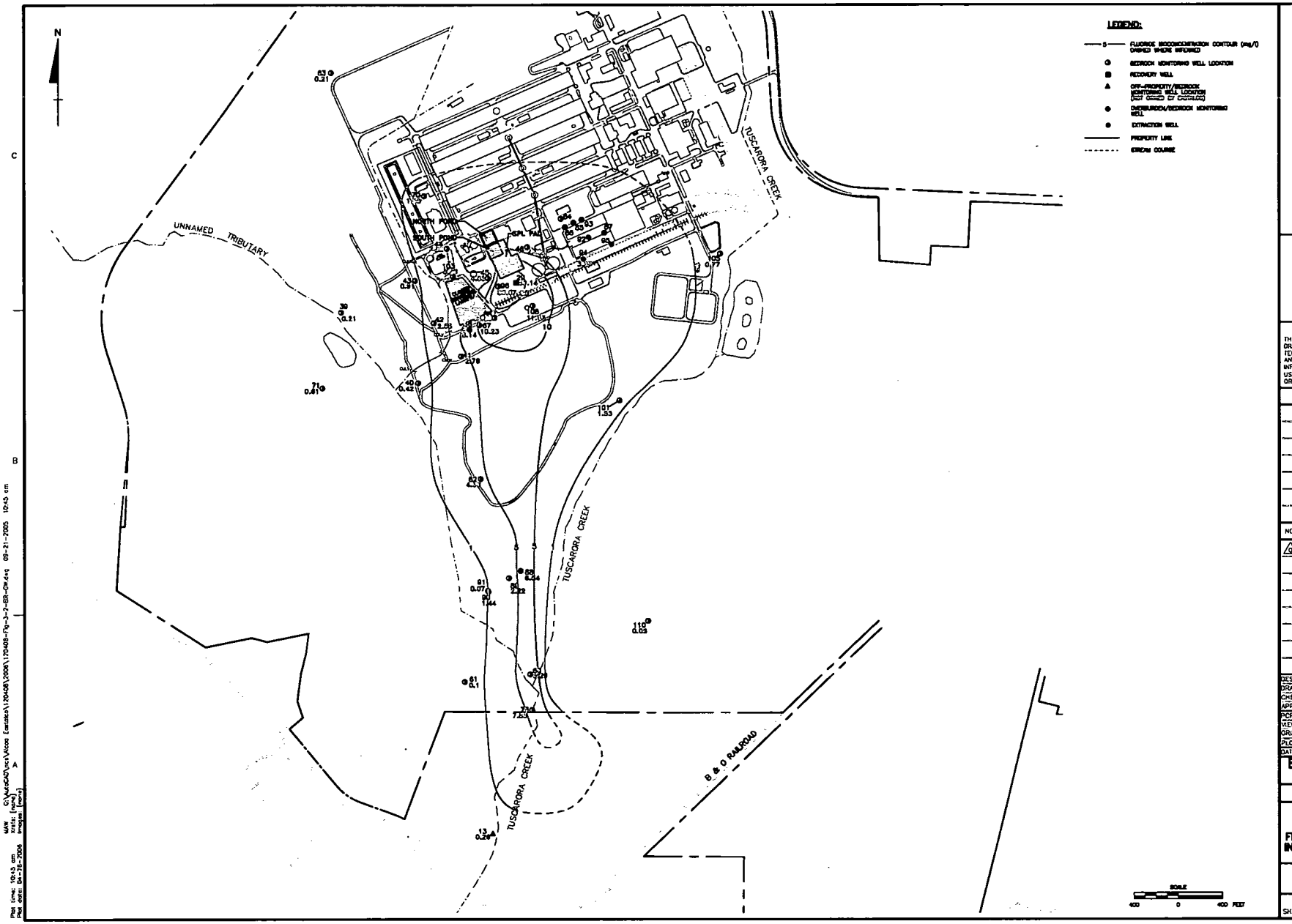

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APPROVED BY:	PC
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VIEW NAME:	
ORIGINATION DATE:	04-13-2005
PLOT SCALE:	1:1
DATE:	APRIL 2008

EASTALCO ALUMINUM COMPANY

FREDERICK, MD

FIGURE 3-2

FLUORIDE CONCENTRATIONS IN BEDROCK GROUNDWATER

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SHEET 1 OF 1

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Fluoride in Groundwater near Primary Source Area

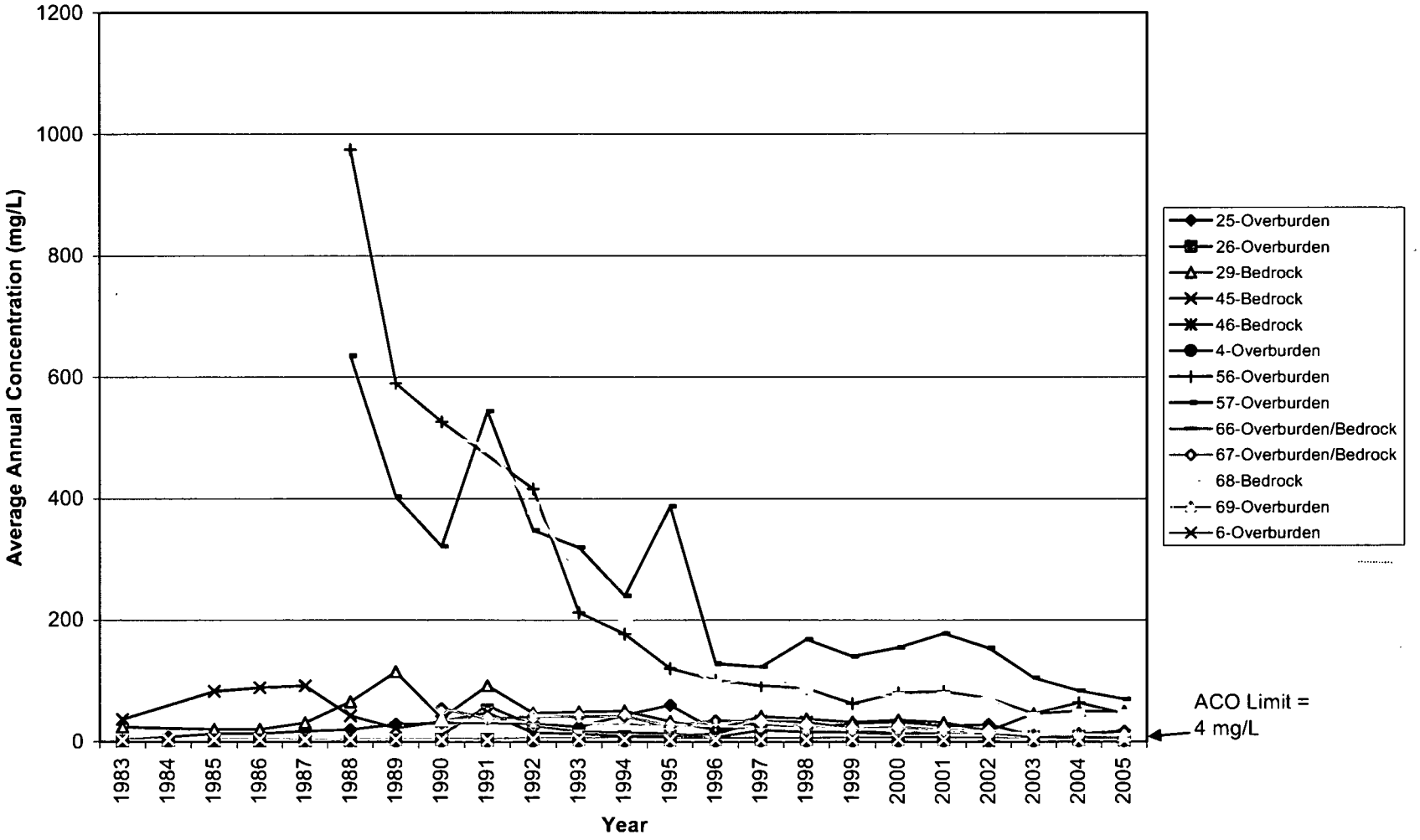

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Figure 3-3

Free Cyanide in Groundwater near Primary Source Area

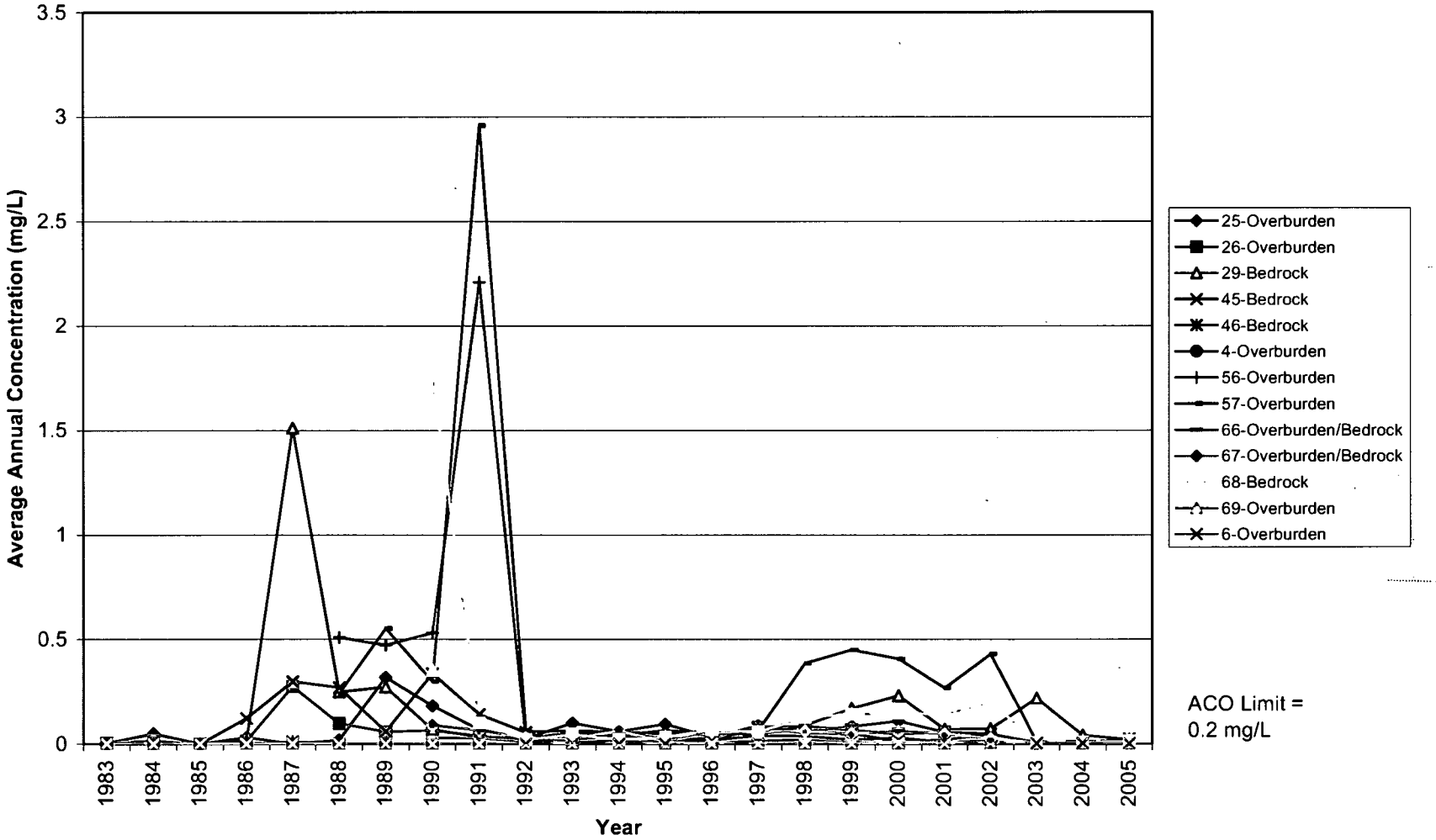

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Figure 3-4

Comparison of Fluoride Concentrations in Former Recovery Wells

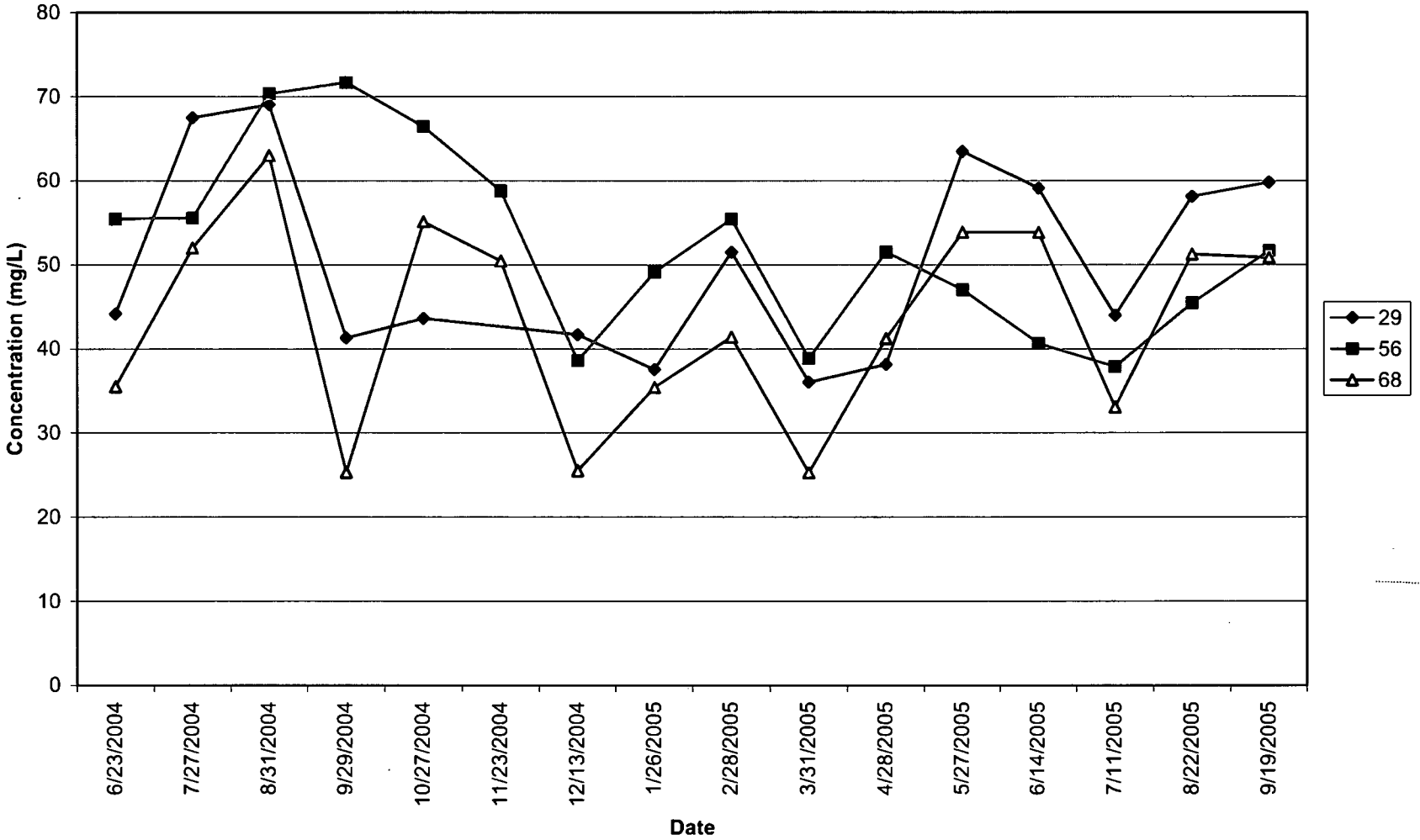

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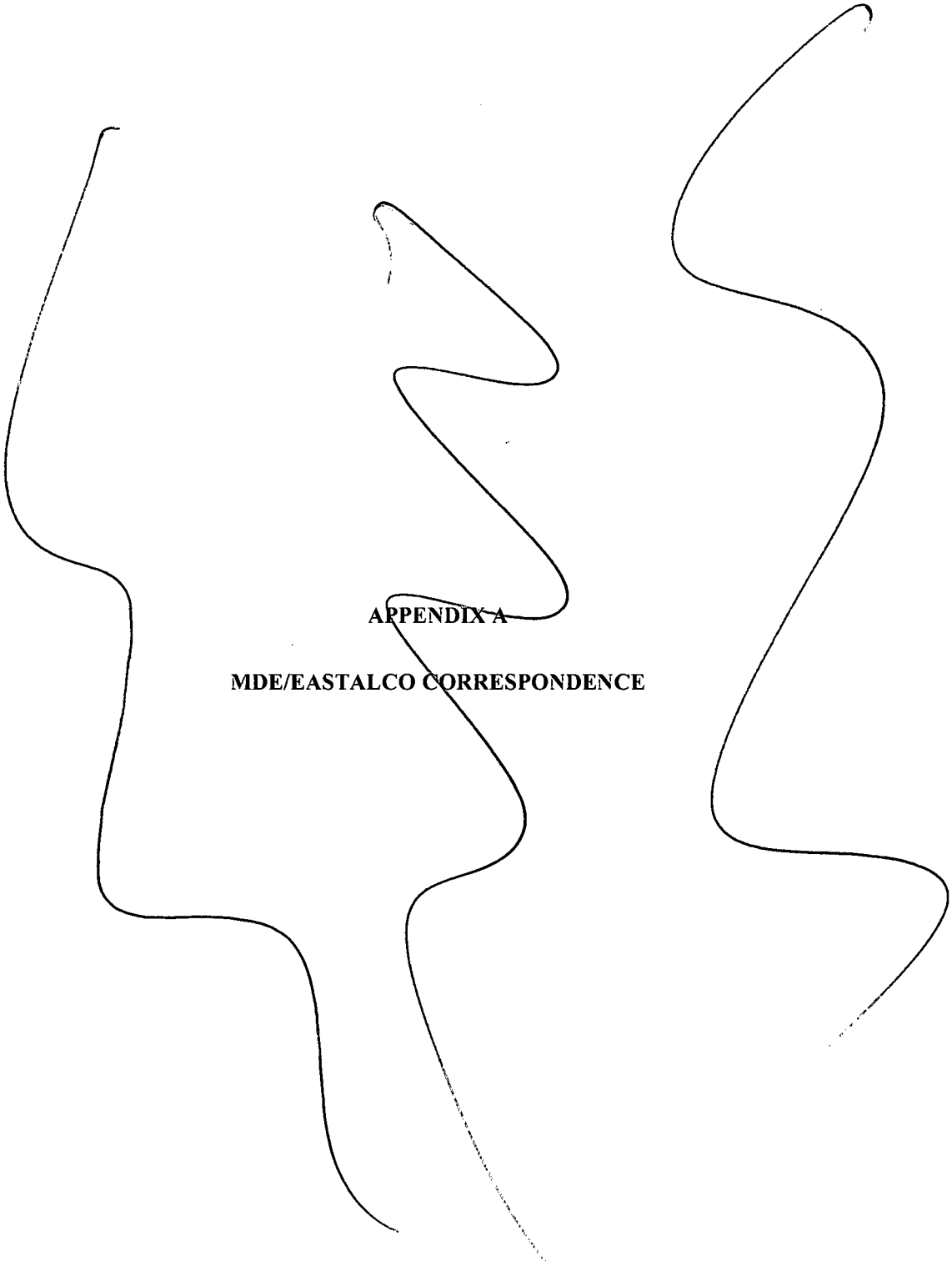
Figure 3-5



APPENDIX A

MDE/EASTALCO CORRESPONDENCE

KD→ AA →020

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

William Donald Schaefer
Governor

David A.C. Carroll
Secretary

June 9, 1994

CERTIFIED MAIL
Return Receipt Requested

Ms. Margaret P. Convey
Environmental Superintendent
Eastalco Aluminum Company
5601 Manor Woods Road
Frederick, Maryland 21701-7999

Dear Ms. Convey:

The Maryland Department of the Environment, Waste Management Administration, has completed the review of the closure plan for Eastalco Aluminum Company's Industrial Waste Landfill located in Frederick, Maryland, which has been operating under Refuse Disposal Permit Number 90-IW-0042.

The closure plan, which encompasses CH2M HILL Drawings G-1, C-1 through C-7 and Construction Specifications for this closure, dated November 1993, has been approved. Other required permits such as erosion and sediment control permit must be obtained from Frederick County Government.

Please advise this office at least three (3) business days prior to initiating closure activities on the site. If you have any questions regarding this matter, please contact Dr. Richard Champney at (410) 631-3364.

Sincerely,

[redacted] Chief
Solid Waste Compliance Division

EMD:lak

cc: The Honorable J. Anita Stup
Secretary Torrey Brown, M.D.
Dr. James Bowes
Mr. Robert M. Hayes
Mr. Richard W. Collins

Alcoa Primary Metals

Alcoa Eastalco Works
5601 Manor Woods Road
Frederick, MD 21703-7999 USA
Tel: 1 301 662 6100
Fax: 1 301 874 2062

November 22, 2005

Ms. Peggy Smith, Project Manager
Maryland Department of the Environment
Waste Management Administration
Environmental Restoration and Redevelopment Program
CHS Enforcement/Fund Lead Site Assessment Division
1800 Washington Blvd., Suite 625
Baltimore, MD 21230-1710

Subject: **Proposed Administrative Consent Order Modifications**
Alcoa Eastalco Works – Frederick, Maryland
Administrative Consent Order CO-92-149

Dear Ms. Smith:

As we discussed during our meeting at the Alcoa Eastalco Works on November 17, 2005, Alcoa proposed several modifications to the Administrative Consent Order (ACO). These modifications relate to groundwater monitoring of the Substation tetrachloroethene (PCE) plume, groundwater pumping and monitoring associated with fluoride and cyanide contamination, and the definition of the site covered by the various ACO requirements. The specific proposed modifications are described below.

PCE MONITORING

Groundwater at the Eastalco Works is currently monitored under the 1992 ACO for PCE contamination that resulted from historical releases at the plant's Substation. After implementing active source remediation in 1996-1997 and conducting a post-remediation investigation in 2002-2003, MDE and Alcoa agreed in August of 2003 to continue groundwater monitoring for 2 years to monitor the natural attenuation process and to identify any changes in the site conceptual model. A letter from MFG, Inc. containing the PCE monitoring data collected over the last 2 years was submitted to the MDE on November 3, 2005. A summary of those data and the key findings was presented at the November 17, 2005 meeting. Based on the declining trends in the low overall PCE concentrations, it was concluded during the meeting that groundwater monitoring associated with the historical releases at the Substation is no longer warranted. As such, Alcoa proposes that the ACO be amended to include a statement that no further action is required for PCE.

FLUORIDE & CYANIDE MONITORING, AND GROUNDWATER PUMPING

Per the ACO, Alcoa currently pumps groundwater from select monitoring wells as a means of fluoride source control. The original pumping program, as defined in the 1997 ACO Amendment, requires Alcoa to pump groundwater from monitoring wells 56, 57, and 68. With the MDE's approval, the pumping program was enhanced in 2004 and currently includes monitoring wells 29, 56, and 68. Groundwater and surface water monitoring is also performed per the ACO. Table 1 summarizes the current monitoring program and Figure 1 shows the monitoring point locations.

Alcoa submitted a report (MFG, 2005) summarizing the data and key findings of a site-wide investigation of potential sources of fluoride and cyanide groundwater contamination. A summary of the investigation findings and conclusions was presented at the November 17, 2005 meeting. As a result of the investigation and years of monitoring data, it was determined that the cyanide contamination has diminished as concentrations across the site are below the ACO limit. It was also determined that fluoride contamination observed during the recent investigation was primarily due to releases from the North Pond and possibly the South Pond. As discussed during the meeting, it was concluded that removing these ponds from active service will eliminate the continuing source of fluoride to groundwater. It was also concluded that after the ponds are removed from service, natural attenuation will continue to diminish the already declining fluoride concentrations throughout the plume.

Most active operations at the Eastalco Works are scheduled to be curtailed by December 19, 2005. Because the ponds will be removed from service as a part of the plant curtailment, Alcoa recommended during the meeting that the ACO be amended to remove the groundwater pumping requirement. Alcoa also recommended during the meeting that groundwater monitoring be continued to track the plume and monitor the on-going decline in concentrations which are expected to continue under non-pumping conditions. This recommendation was based on the site conceptual model that includes groundwater flow, current plume concentrations across the site, and declining concentration trends that result through natural attenuation. The understanding of groundwater flow was further refined by installing monitoring wells southeast of the plant during the site-wide investigation, and the plume concentrations have been monitored in the on-site wells and an off-site well identified in the ACO.

It was recommended that the monitoring be continued for 2 years at which time Alcoa will consult with the MDE to determine the appropriate future course of action (e.g., continue monitoring under the existing plan, modify the plan, or terminate the monitoring program). Decisions on which type of further action will be based on the data collected during the 2-year period. While specific recommendations for a future course of action cannot be made at this time, if the current trends continue and after consulting with the MDE, it may be possible to terminate the monitoring program or continue monitoring based on the actual concentrations. On the other hand, if the current trends appear to have reversed during the 2-year period, it may be necessary to take additional actions which could include modifying the monitoring plan to include additional on-site or off-site wells as conditions warrant.

It was also recommended that the current monitoring program be updated based on monitoring data that have been collected over the years per the ACO and the enhanced understanding of groundwater flow. The proposed revised monitoring program is summarized on Table 2. The major revisions are described below. Figure 2 shows the well locations and identifies the proposed sampling frequencies.

- **General Groundwater** – Because free cyanide contamination levels are below the ACO limit across the site, it is proposed that this constituent be removed from the monitoring program and that the ACO be amended to include a statement that no further action is required for cyanide.

- **Primary Source Area Wells** - It is proposed that the frequency of monitoring wells in the immediate vicinity of the primary source area be reduced to semi-annually. The conceptual model is well understood as a result of the site-wide investigation and more than 16 years of monitoring. Consequently, semi-annual monitoring is considered sufficient to monitor the plume source.

- **Downgradient Wells** - As is the case with the primary source area, the downgradient plume (location, flow, trends, etc.) has been well-defined by the substantial amount of data collected under the current monitoring program. Therefore, it is proposed that the downgradient wells included in the existing program be sampled on an annual basis as this is considered sufficient to monitor the plume.

- **Property Boundary Wells** – Again, the plume characteristics are well-understood near the property boundary where the declining fluoride concentrations are either approaching or already below the ACO limit. Therefore, it is proposed that the monitoring frequency be reduced to semi-annually for the first year and then if the current trends continue, be further reduced to annually. This strategy is considered sufficient to monitor the continued decline in fluoride levels.

- **Surface Water** – Although it was proposed during the meeting that surface water monitoring be continued as part of the fluoride groundwater plume monitoring program, a subsequent review of the surface water monitoring data that have been submitted to the MDE in the routine monitoring reports showed that fluoride has not been detected above the ACO limit since 1995 and free cyanide has never been detected above the ACO limit. It is therefore proposed that surface water monitoring be eliminated from the monitoring program and that the ACO be amended to include a statement that no further action is required for surface water.

DEFINITION OF THE SITE

The last topic discussed during our meeting was the definition of the "site" as it pertains to the requirements of the ACO. As currently written, the ACO pertains to all properties owned by the Alcoa Eastalco Works which covers approximately 2,200 acres. The currently active operations area covers less than 400 acres and as such the majority of the property owned by the Eastalco Works is unaffected by the historical contamination issues addressed under the ACO. Because Alcoa is considering various land use/redevelopment scenarios, it is requested that the ACO amendment include a provision defining the parcel of land that will be subject to the requirements of the ACO. Alcoa is currently evaluating the Eastalco real estate holdings and will submit a description of the subject parcel to the MDE at a later date.

CLOSING

It is understood that an amendment to the ACO will likely not be issued before the scheduled plant curtailment (December 19, 2005). Therefore, as we discussed during the meeting, Alcoa is requesting a letter from MDE authorizing Alcoa to take the following actions pending the formal amendment to the ACO:

1. Terminate the Substation PCE monitoring,
2. Terminate the groundwater pumping program,
3. Continue monitoring the fluoride plume in groundwater in accordance with the revised monitoring program described in this letter,
4. Discontinue groundwater monitoring for free cyanide, and
5. Discontinue surface water monitoring.

Alcoa appreciates your attendance at the recent plant meetings as well as your consideration of the matters addressed in this letter. If you need additional information or have any questions, do not hesitate to contact me at (301) 696-1720.

Sincerely,

Margaret P. Convey

Margaret P. Convey
Environmental Affairs Manager

Attachments

cc: Kirk Gribben, Alcoa Inc.
Mark Stiffler, Alcoa Inc.
Doug Macauley, Alcoa Inc.
Brian Dahlberg, Alcoa Eastalco
Ron Blain, Alcoa Eastalco
Pat Cook, MFG Inc.

Reference:

MFG, Inc. 2005. Site-Wide Investigation Report, Alcoa Eastalco Works. October 2005.

Table 1
Current Fluoride and Free Cyanide Groundwater Monitoring Strategy
Alcoa Eastalco

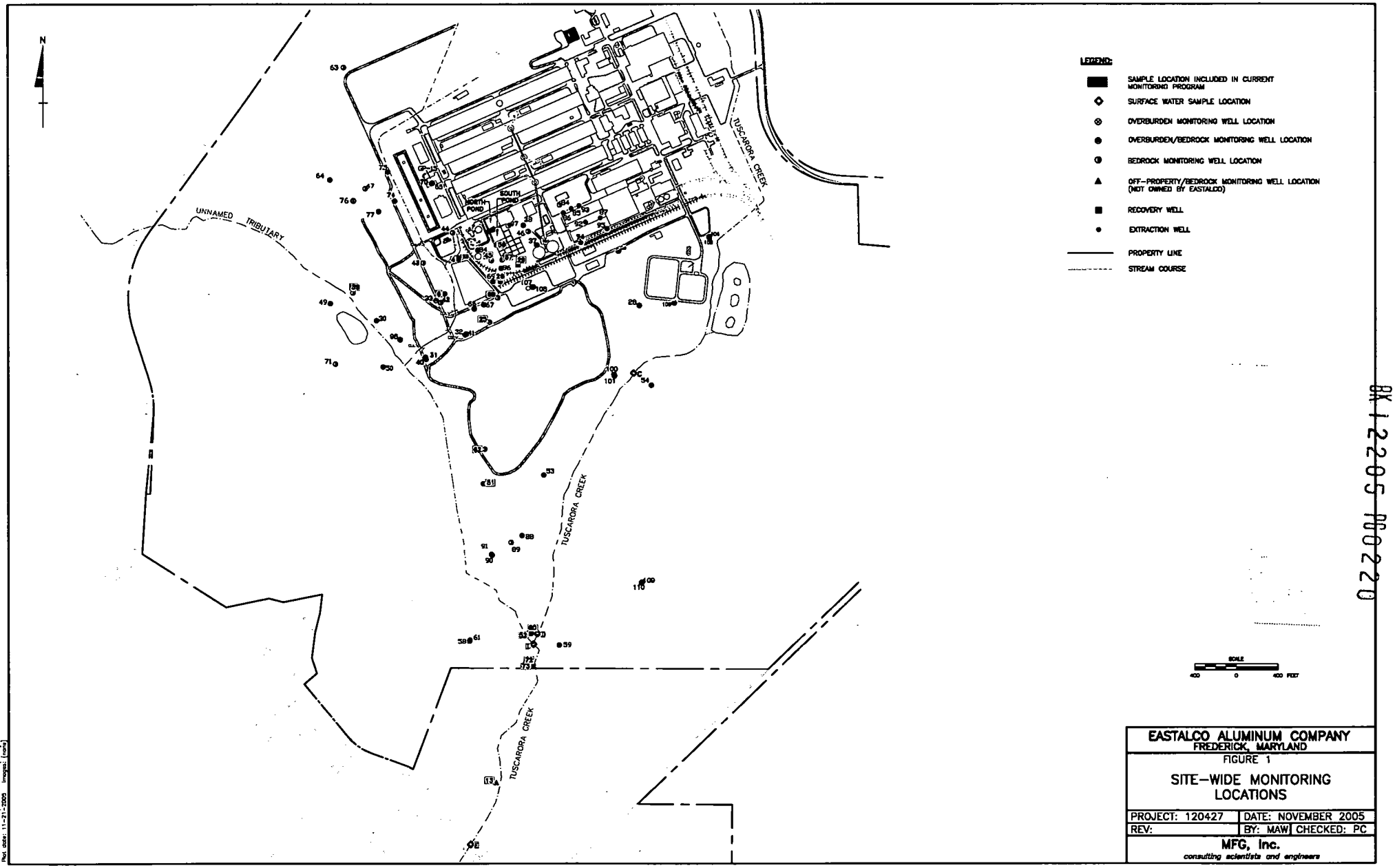
Location	Monitoring Location	Parameters/Frequency	
		Fluoride	Free Cyanide
Source Area/Pumping Wells	MW-29	M	M
	MW-56	M	M
	MW-57	M	M
	MW-68	M	M
Downgradient/Crossgradient Plume	MW-4	Q	Q
	MW-6	Q	Q
	MW-26	Q	Q
	MW-25	Q	Q
	MW-39	---	A
	MW-45	S	S
	MW-51	Q	---
	MW-62	S	---
	MW-13[1]	Q	Q
Property Boundary	MW-52	Q	Q
	MW-60	Q	Q
	MW-72	Q	Q
	MW-73	Q	Q
Tuscarora Creek	C	Q	---
	D	Q	A
	E	Q	A
	I	Q	A

-- = Not Analyzed
M = Monthly
Q = Quarterly
S = Semi-annually
A = Annually
[1]Offsite well

Table 2
Proposed Groundwater Monitoring Strategy - Fluoride Plume
Alcoa Eastalco

Location	Monitoring Location	Current Frequency	Proposed Frequency	Rationale for Change
Source Area/Pumping Wells	MW-29	M	S	Fluoride concentrations fluctuate above the ACO limit with an overall decline. Semi-annual data are sufficient to monitor the decline.
	MW-56	M	S	
	MW-57	M	S	
	MW-68	M	S	
Downgradient/Crossgradient Plume	MW-4	Q	A	Fluoride concentrations are mostly below the ACO limit. Annual data are sufficient to monitor the decline.
	MW-6	Q	A	
	MW-26	Q	A	
	MW-25	Q	A	
	MW-45	S	A	
	MW-51	Q	A	
	MW-62	S	A	
	MW-103	--	A	Added to provide bedrock data near overburden well MW-4.
	MW-107	--	A	Added to provide concentration data southeast of the primary source.
	MW-108	--	A	
Property Boundary	MW-13[(1)]	Q	S/A	Fluoride concentrations are either approaching (on-site wells) or below (off-site well) the ACO limit. Semi-annual data are sufficient to monitor the decline for the next year. Annual monitoring thereafter if current trends continue.
	MW-52	Q	S/A	
	MW-60	Q	S/A	
	MW-72	Q	S/A	
	MW-73	Q	S/A	

-- = Not Analyzed
M = Monthly
Q = Quarterly
S = Semi-annually
A = Annually
[(1)]Off-site well



EASTALCO ALUMINUM COMPANY
FREDERICK, MARYLAND

FIGURE 1

SITE-WIDE MONITORING LOCATIONS

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REV:	BY: MAW CHECKED: PC

MFG, Inc.
consulting scientists and engineers

BK 12205 PG 0220

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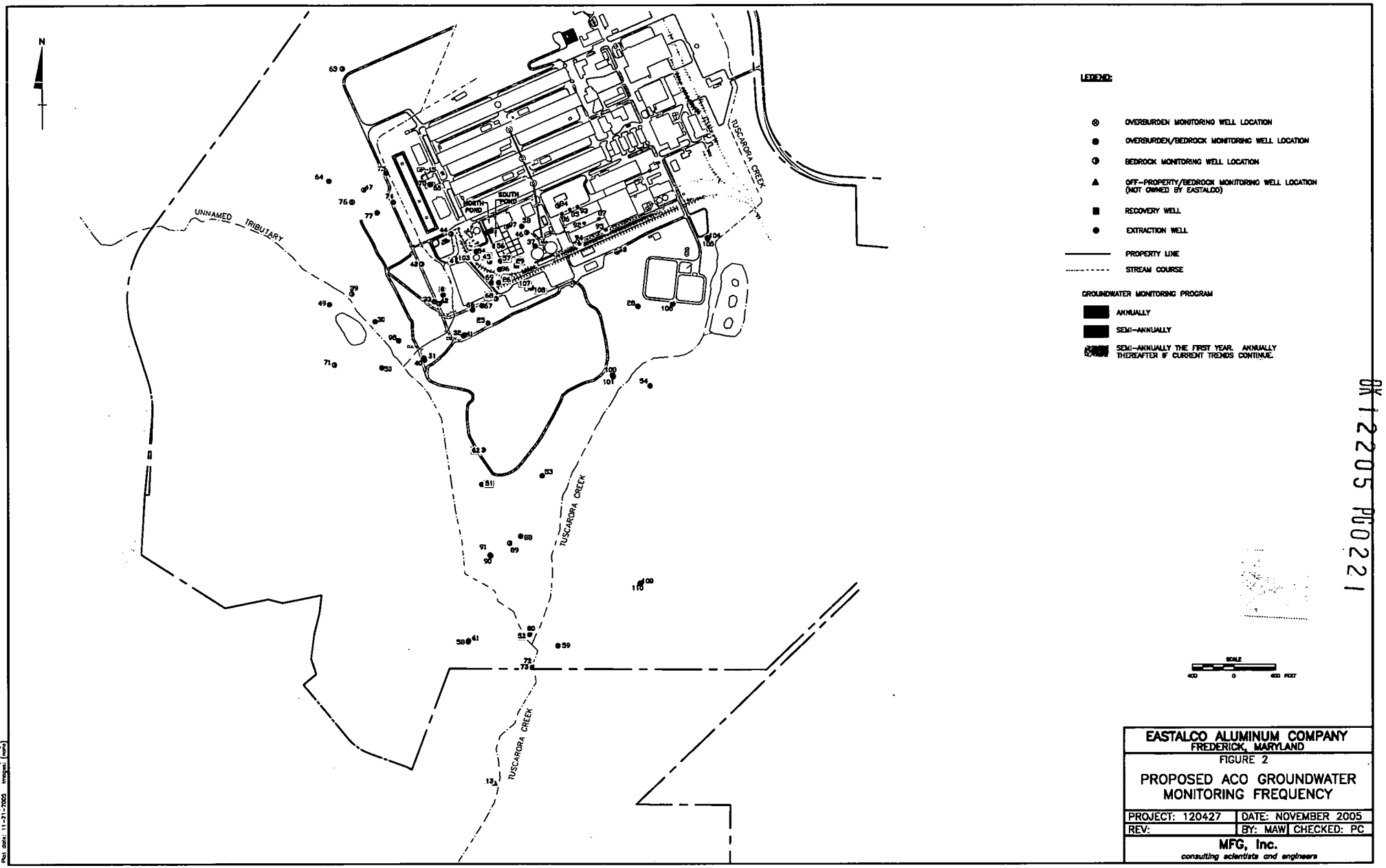


Rec'd 12/19/05 MPC

MDE

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

December 16, 2005

Ron Blain, Environmental Superintendent
Alcoa Eastalco Works
5601 Manor Woods Road
Frederick, MD 21703-7999

Re: Proposed Administrative Consent Order Modifications
Alcoa Eastalco Works – Frederick, Maryland
Administrative Consent Order CO-92-149

Dear Mr. Blain:

The Maryland Department of the Environment, CHS Enforcement/Fund Lead Site Assessment Division (the "Division") has completed its review of the Proposed Administrative Consent Order Modifications dated November 22, 2005. Our comments are as follows:

PCE Monitoring

The Division agrees with Alcoa's conclusion that no further action is necessary to address the tetrachloroethene (PCE) contamination emanating from the facility's electrical substation. Long-term groundwater monitoring results for this area of concern indicate the soil vapor extraction performed from 1996 to 1997 and cessation of PCE use in the substation in 1987 have reduced the PCE concentrations in the property boundary wells to or below the EPA Maximum Contaminant Level (MCL) of 5 parts per billion (ppb). Similarly, PCE concentrations in MW-13, the off-site sentry well, remain consistently below the MCL.

Fluoride and Cyanide Monitoring and Groundwater Pumping

The Division approves Alcoa's proposal for two additional years of fluoride monitoring and discontinuance of further cyanide monitoring in the groundwater. We agree that additional fluoride monitoring is necessary to track the continued attenuation of the fluoride contaminant plume. We also agree that cyanide monitoring is no longer necessary since the site-wide (cyanide) groundwater concentrations have diminished to below the MCL of 200 ppb.

Given that fluoride monitoring will continue, the Division also approves Alcoa's proposal to shut down the groundwater pumping operation. We reserve the right, however, to consult with you at the end of the two-year monitoring period about the most appropriate future course of action, which may include the addition of new on-site and off-site monitoring wells.

Update of Monitoring Program

The Division approves Alcoa's proposal for a reduced boundary well monitoring frequency to semi-annually; however, we request semi-annual monitoring be conducted for the entire duration of the proposed two-year monitoring period.

The Division approves Alcoa's proposal to discontinue surface water monitoring for fluoride, but not cyanide. Although the concentration of cyanide in surface water has never exceeded the limit established in the April 8, 1992 Administrative Consent Order, this Division makes regulatory decisions concerning surface water based on federal Ambient Water Quality Criteria for Toxic Substances in Surface Waters (COMAR 26.08.02.03-2). Since the surface water concentrations of cyanide still regularly exceed the chronic effects criterion of 5.2 parts per billion, the Division requests continued cyanide monitoring to establish a decreasing trend after plant shutdown.

Definition of the Site

The Division approves Alcoa's proposal to redefine the portion of land subject to the requirements of the Consent Order and awaits formal submission of Alcoa's refined site boundaries.

In closing, the Division authorizes Alcoa to take the following actions pending formal revision of the Administrative Consent Order:

1. Terminate the Substation PCE monitoring;
2. Terminate the groundwater pumping program;
3. Monitor fluoride concentrations in groundwater semi-annually for two years;
4. Discontinue groundwater monitoring for free cyanide; and
5. Discontinue surface water monitoring for fluoride.

The Division appreciates Alcoa's continued cooperation and efforts on this project. Do not hesitate to contact project manager Peggy Smith or me if you have any questions or concerns.

Sincerely,

Arthur O'Connell

Arthur O'Connell, Chief
CHS Enforcement/Fund Lead Site Assessment Division

AOC: ps
cc: Mr. Horacio Tablada
Mr. James Carroll
Mr. Brian Dietz
Ms. Peggy Smith

APPENDIX B

STANDARD OPERATING PROCEDURE - GROUNDWATER SAMPLING FROM MONITORING WELLS

Standard Operating Procedure - Groundwater Sampling from Monitoring Wells

Scope: This SOP is for collecting groundwater samples from wells used to monitor the Closed Industrial Landfill at the Alcoa Eastalco Works. The procedures described here were derived from the Eastalco Work Instruction WI-0245.

Purpose: The purpose of describing this procedure is to provide a uniform methodology for the collection of good quality and representative groundwater samples.

Equipment Needed: Personal protective equipment; Groundwater Well MSL Data Book and Groundwater Well Sample Logbook (or field logbooks or sampling forms as appropriate); water level, pH, temperature, conductivity, and turbidity meters; portable submersible pump or disposable HDPE or Teflon bailer; disposable polyethylene tubing; disposable polypropylene rope; plastic trash bags; properly preserved and labeled sample containers; and decontamination equipment.

Procedures:

1. Locate and identify the well to be sampled. Record pertinent information in the Groundwater Well MSL Data Book and Groundwater Well Sample Logbook, including:

   Sample identification (i.e., name)
   Sample date
   Sample time (24-hour clock)
   Sampler's initials
   Analysis required
   Preservation if any used (e.g., amount used and lot #)
   Comments (e.g., weather, observations)
   Contract laboratory name and date sent if a sample is not analyzed in-house.

2. Unlock protective casing and remove well cap. Measure the depth to water and total well depth with an electronic water level. Measurement should be referenced from the top of the PVC well riser (metal casing if no inner PVC riser exists). Record the measurements in the Groundwater Well MSL Data Book.

3. Calculate the volume of water initially in the well based on:

   $$V = 7.48\ \pi r^2 h$$

   where:

   7.48 = gallons per cubic foot
   V = Volume of water in well (gallons)
   r = Radius of well (feet), excluding sand pack
   h = Height of column of water (feet) [total depth minus depth to water]

4. Begin purging the well with a decontaminated submersible pump and decontaminated or disposable tubing. If a 12-volt, 2" pump is used with a rheostat controller, adjust pump rate such that the water level remains above the pump inlet. Adjust the rate so that the water level stays constant or decreases slightly. Keep pump at least 3 feet from the bottom of the well. Disposable bailers and rope may be used if needed instead of a submersible pump to purge and sample wells. Continue purging until at least three well volumes have been removed, or the well is pumped dry. Containerize all purge water for appropriate disposal as indicated by the plant's environmental manager.

5. If the well was pumped dry, allow enough time for recovery of sufficient water volume to meet sampling requirements. Sample the well within a maximum of 24 hours after purging the well dry.

6. Calibrate water quality meters according to manufacturers' instructions.

7. Collect an aliquot of water to perform field tests such as pH, specific conductance, turbidity, and temperature. Record all readings in the Groundwater Well Sample Logbook. If turbidity is > 20 NTUs, reduce flow rate and continue purging until turbidity is <.20 NTUs.

8. Fill sample containers from the discharge tubing starting with containers for organic parameters. Use a low flow rate while sampling to minimize agitation and aeration of the water. Ensure VOA vials have no head space by inverting and tapping the vial after capping.

9. Preserve samples as directed by the laboratory. Store samples in a cooler with ice while in the field.

10. All sample containers will be labeled with the following information:

    Sample identification (i.e., name)
    Sample date
    Sample time (24-hour clock)
    Sampler's initials
    Analysis required & method #
    Preservation used (if any)
    Site name (Alcoa Eastalco Works or Eastalco Aluminum Company)

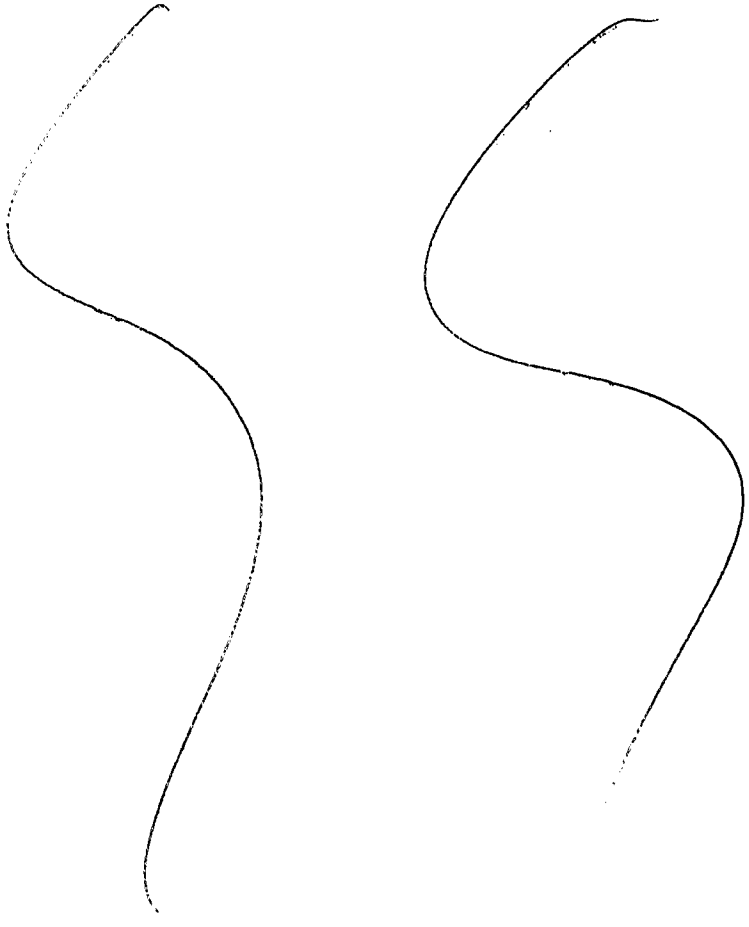
11. Complete the laboratory-supplied chain of custody and include with sample shipment. Re-ice coolers for prior to shipment to the laboratory.

12. Decontaminate sampling equipment between uses to prevent cross contamination between wells. Remove gross contamination (if any) with brushes, paper towels, etc. Place pump (and tubing if to be reused) in bucket containing water and detergent (e.g., Alconox or Liquinox) and scrub the exterior of the equipment. With the pump inlet submerged, turn pump on to run soapy water through the pump (and tubing). Turn pump off and transfer to a second bucket containing de-ionized (DI) water. Submerse equipment and turn pump on again to rinse the equipment. Containerize all decontamination water for appropriate disposal by the plant's environmental manager.

13. Collect one duplicate sample and one equipment blank during each monitoring event. The equipment blank will be collected to monitor the potential for cross contamination resulting from incomplete decontamination. Collect the equipment blank by placing the decontaminated pump and decontaminated or new tubing into a clean bucket containing DI water and operating the pump to fill the appropriate sample jars. Label and prepare quality control samples for shipment as described above.

Environmental Covenant
5601 Manor Woods Road, Frederick, Maryland 21701.
Deed References: Liber D.D.L. No. 2371, Folio 341; Liber 2531. Folio 347;
Tax Parcels: District: 01, Account Number: 000152, 005383, and 005405

EXHIBIT F
GROUNDWATER AND SURFACE WATER MONITORING PLAN



CO-07-026
GROUNDWATER AND SURFACE WATER MONITORING PLAN

ALCOA EASTALCO
Frederick, MD

May 2007 –Original Plan
February 2011 – Revised Plan

Prepared for:

ALCOA EASTALCO
5601 Manor Wood Road
Frederick, MD 21703

Prepared by:
TETRA TECH
661 Anderson Drive
Foster Plaza 7
Pittsburgh, PA 15220

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1.0 INTRODUCTION

This monitoring plan was prepared by Tetra Tech, Inc. (MFG) for Alcoa Eastalco (Eastalco) to provide the scope of work and procedures for monitoring groundwater and surface water in accordance with Administrative Consent Order CO-07-026 (ACO). The Alcoa Eastalco facility is a closed aluminum smelter located in Frederick, Maryland (Figure 1-1).

1.1. OVERVIEW

Paragraph 1 of Section I of the Administrative Consent Order CO-07-026 (ACO) signed between the Maryland Department of the Environment (MDE) and the Eastalco Aluminum Company, requires Alcoa to develop and implement a monitoring plan to track fluoride concentrations in groundwater and free cyanide concentrations in surface water. Accordingly, this plan specifies the sample collection points, sampling methods and frequency, analytical methods, quality assurance/quality control information, and reporting requirements. The monitoring scope of work was based originally on a letter from Eastalco to MDE dated November 22, 2005 which was approved with modifications by MDE in a letter to Eastalco dated December 16, 2005. Upon reviewing the Eastalco Biennial Groundwater and Surface Water Summary Report (November 2010), MDE granted a petition to reduce the frequency of monitoring at select wells in an email to Tetra Tech dated January 4, 2011. This plan was revised to account for the changes in frequency.

2.0 MONITORING PROGRAM

Groundwater monitoring for fluoride and surface water monitoring for free cyanide is required at the Alcoa Eastalco Works per the ACO. Table 2-1 summarizes the monitoring program (i.e., monitoring points and frequencies) to be implemented by Eastalco. Figure 2-1 shows the monitoring point locations and also indicates monitoring frequencies. Some monitoring points will be sampled annually whereas other points will be sampled semi-annually. Annual sampling will typically be performed in the third quarter (July – September), and semi-annual sampling will typically be performed in the first (January – March) and third quarters.

2.1. SAMPLING AND ANALYSIS METHODS

Groundwater and surface water samples will be collected by qualified environmental technicians according to the standard operating procedures (SOPs) that are provided in Appendix A and are based in general on Eastalco's Work Instruction WI10245. The SOPs provide details regarding, field parameter measurements, well purging, sample collection, sample preservation, sample labeling and documentation, equipment decontamination, quality control blanks, and derived waste management, etc.

All sampling will be performed by qualified environmental technicians. Sample containers will be provided by the laboratory. Groundwater samples for fluoride analysis and surface water samples for free cyanide analysis will be collected in 100 mL polyethylene bottles (or other containers provided by the laboratory). Samples will be preserved as indicated in the SOPs.

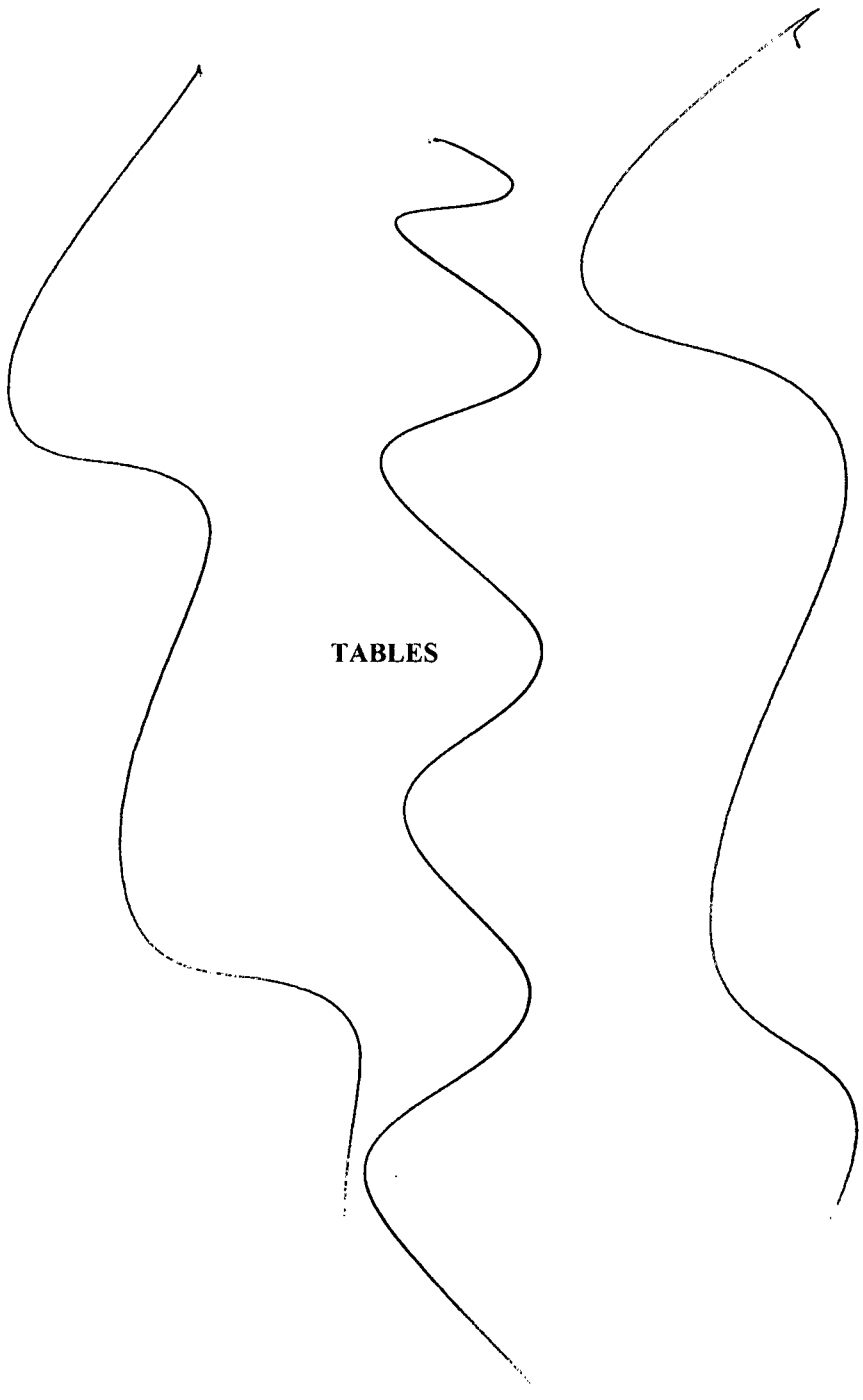
The samples will be shipped to an off-site, qualified laboratory for analysis. Groundwater samples will be analyzed for fluoride within 28 days from the time of sampling using EPA Method 300.0. Method 340.2 can be used if needed on an infrequent basis. Surface water samples will be analyzed for free cyanide within 14 days from the time of sampling using ASTM Method D4282-02. The respective reporting limits for fluoride and free cyanide will be 0.1 and 0.005 mg/L or ppm. The results reported by the laboratories will include all data that are qualified with a "J" indicating the result was estimated because it was detected below the PQL.

In terms of quality control samples, one duplicate sample and one equipment blank will be collected during each monitoring event for each medium. Equipment blanks will be collected when required and as described in the SOPs found in Appendix A.

2.2. REPORTING

A semiannual report will be prepared and submitted to MDE within 90 days of the close of every first and third calendar quarters. The reports will contain the following:

1. A complete copy of the laboratory data;
2. A comparison of the results against the Definitions of Contamination referenced in the AOC;
3. Concentration maps depicting total contaminant concentrations measured during the monitoring event;
4. Charts depicting concentration trends for fluoride in groundwater and free cyanide in surface water using linear regression to calculate a straight line that best fits the data;
5. A summary of all groundwater elevations measured at the wells included in this plan;
6. A narrative discussion concerning background information, sampling procedures, and results/trends, etc.



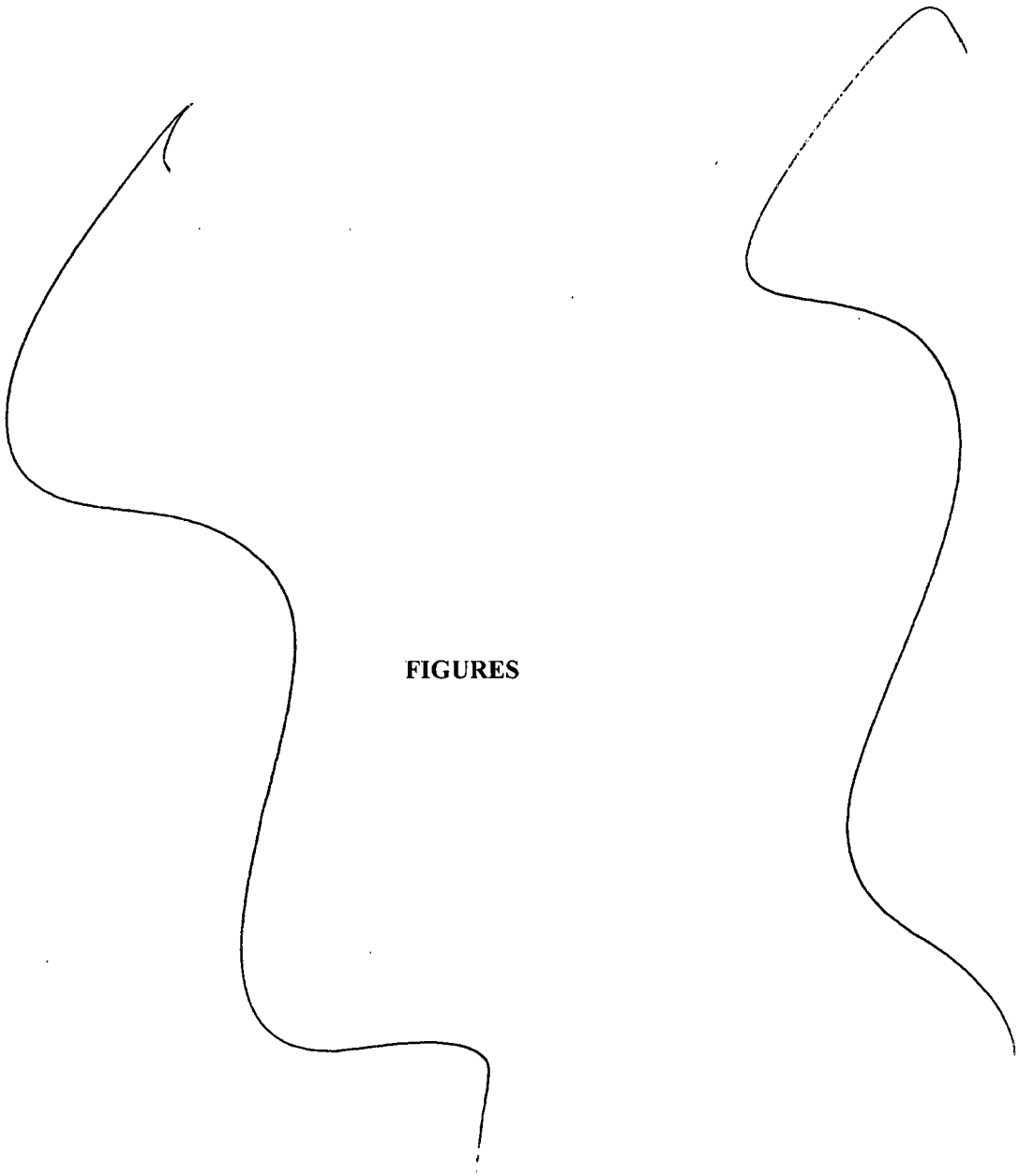
TABLES

Table 2-1
Groundwater and Surface Water Monitoring Strategy
Alcoa Eastalco

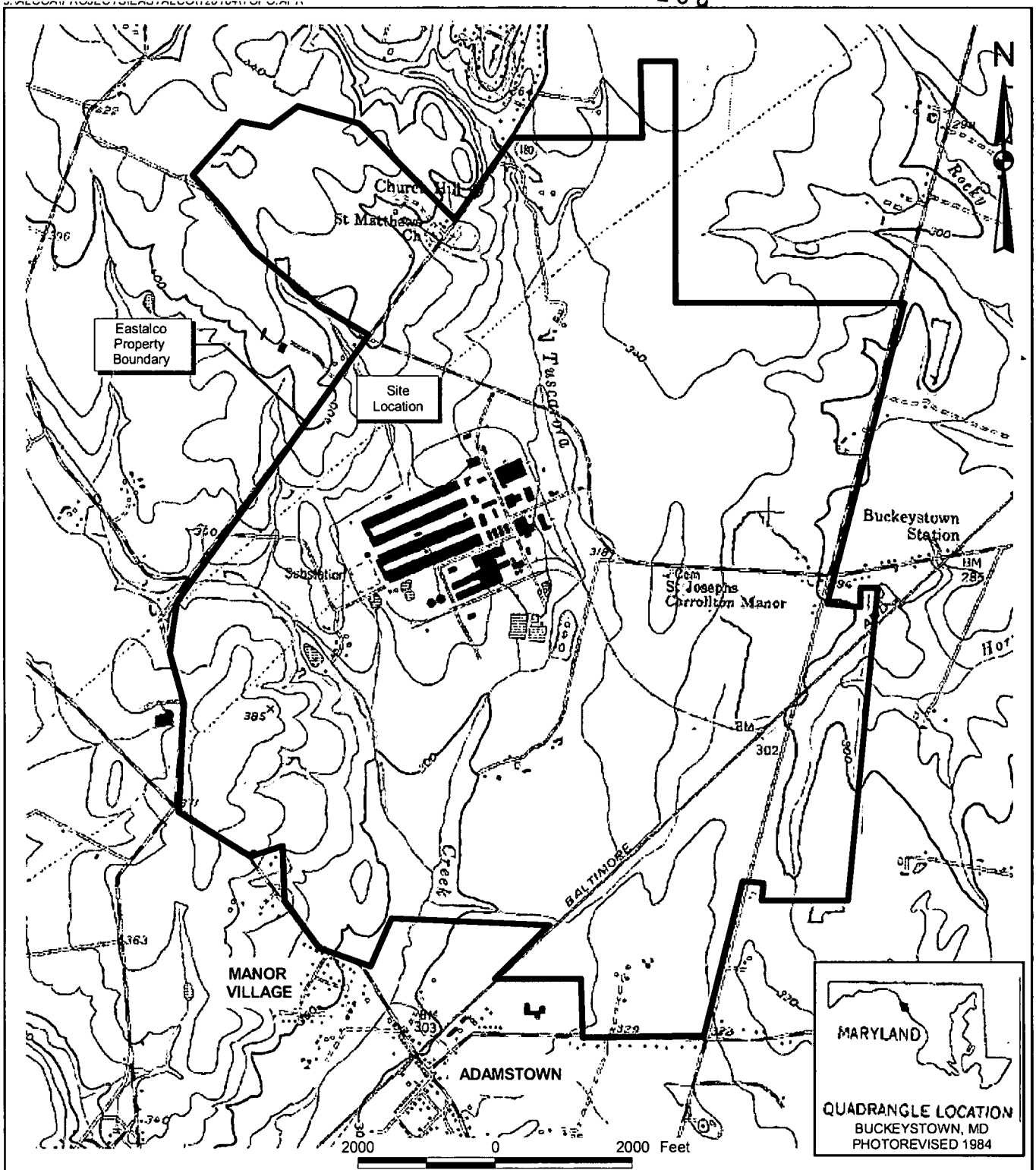
Location	Monitoring Location	Monitoring Frequency
Source Area/Pumping Wells	MW-29	A
	MW-56	A
	MW-57	A
	MW-68	A
Downgradient/Crossgradient Plume	MW-4	A
	MW-6	A
	MW-26	A
	MW-25	A
	MW-45	A
	MW-51	A
	MW-62	A
	MW-103	A
	MW-107	A
	MW-108	A
Property Boundary	MW-13[(1)]	S
	MW-52	S
	MW-60	S
	MW-72	S
	MW-73	S

Surface Water Monitoring for Free Cyanide		
Location	**Monitoring Location**	**Monitoring Frequency**
Property Boundary	D	A
	E[(1)]	A
	I	A

S = Semi-annually
A = Annually
[(1)]Off-site location



FIGURES



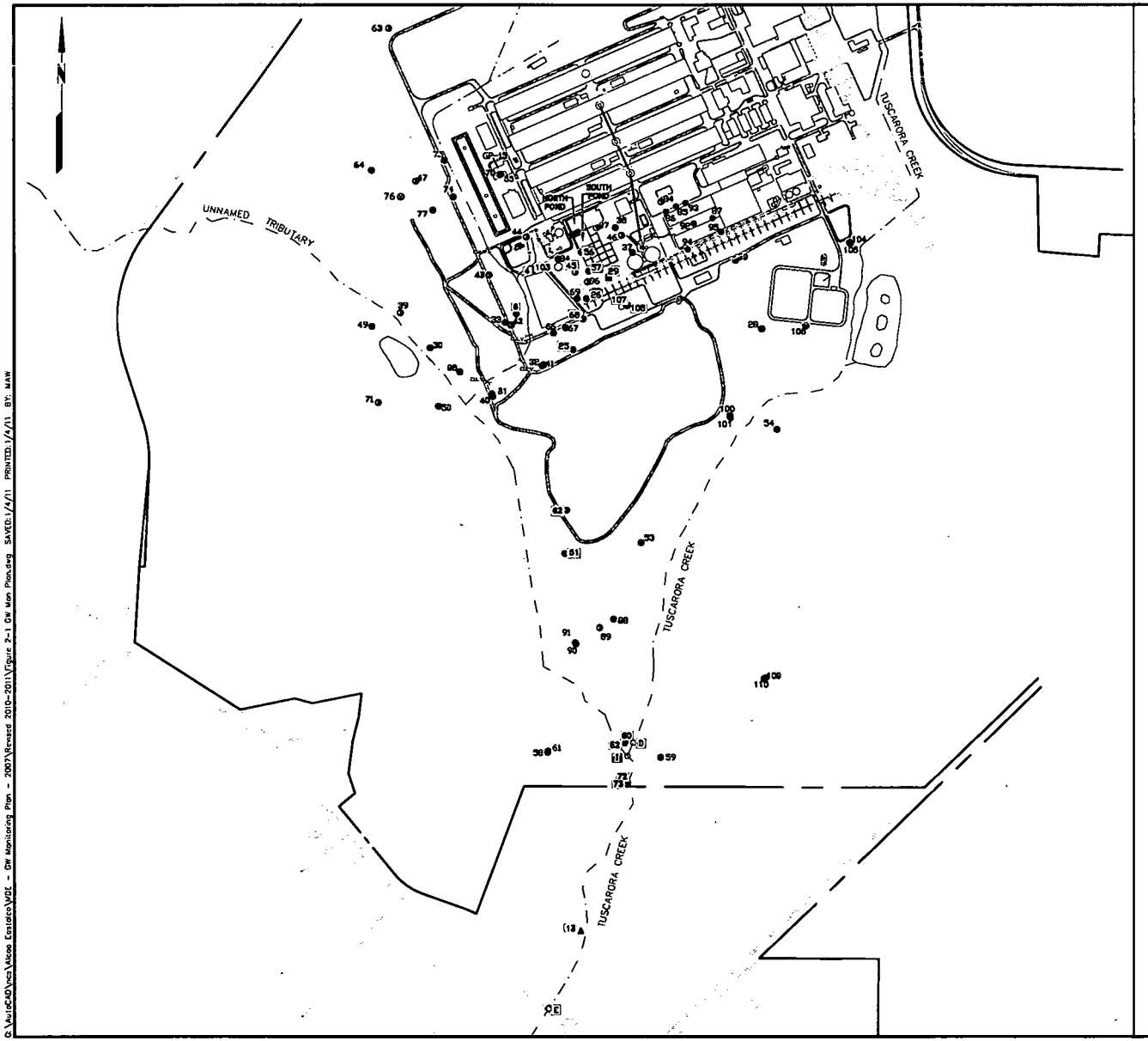
NOTE:
Eastalco property line adapted from "Geologic Map", Figure 4-1, Phase I/II Permit Application, EA Engineering, Science, and Technology, Inc., Sparks, MD, Dated Dec. 1991.

ALCOA EASTALCO
Buckeystown, Maryland

SITE LOCATION

REV.:	
PROJ. NO.:	120407
DATE:	10-17-05
LAYOUT NAME:	SITE LOC.
DRAWN BY:	JA
CHECKED BY:	PDC

FIGURE 1-1



LEGEND:

- SURFACE WATER SAMPLING LOCATION
- OVERBURDEN MONITORING WELL LOCATION
- OVERBURDEN/BEDROCK MONITORING WELL LOCATION
- BEDROCK MONITORING WELL LOCATION
- OFF–PROPERTY/BEDROCK MONITORING WELL LOCATION (NOT OWNED BY EASTALCO)
- RECOVERY WELL
- EXTRACTION WELL
- PROPERTY LINE
- STREAM COURSE

GROUNDWATER MONITORING PROGRAM

- ANNUALLY
- SEMI–ANNUALLY

SCALE IN FEET
0 800

EASTALCO ALUMINUM COMPANY
FREDERICK, MD

FIGURE 2-1
ACO CO-07-026
GROUNDWATER AND SURFACE WATER MONITORING POINTS

PROJECT:	120580
DATE:	JANUARY 2010
SCALE:	1" = 800'

TETRA TECH

G:\AutoCAD\ncs\Alcoa Eastalco\PDF - GW Monitoring Plan - 2007\Revised 2010-2011\Figure 2-1 GW Mon Plan.dwg SAVED:1/4/11 PRINTED:1/4/11 BY: MAW

BK 12205 PG0237

APPENDIX A

STANDARD OPERATING PROCEDURES

Standard Operating Procedure
CO-07-026 Groundwater Sampling from Monitoring Wells

Scope: This SOP is for collecting groundwater samples from wells used to monitor fluoride concentrations in groundwater per Administrative Consent Order CO-07-026 at the Alcoa Eastalco Works. The procedures described here were derived from the Eastalco Work Instruction WI-0245.

Purpose: The purpose of describing this procedure is to provide a uniform methodology for the collection of good quality and representative groundwater samples.

Equipment Needed: Personal protective equipment; Groundwater Well Sample Log Book (or field Log Books or sampling forms as appropriate); water level, pH, temperature, conductivity, and turbidity meters; portable submersible pump or disposable HDPE or Teflon bailer; disposable polyethylene tubing; disposable polypropylene rope; plastic trash bags; properly preserved and labeled sample containers; and decontamination equipment.

Procedures:

1. Locate and identify the well to be sampled. Record pertinent information in the Groundwater Well Sample Log Book, including:

   Sample identification (i.e., name)
   Sample date
   Sample time (24-hour clock)
   Sampler's initials
   Analysis required
   Preservation if any used (e.g., amount used and lot #)
   Comments (e.g., weather, observations)
   Contract laboratory name and date shipped.

2. Unlock protective casing and remove well cap. Measure the depth to water and total well depth with an electronic water level. Measurement should be referenced from the top of the PVC well riser (metal casing if no inner PVC riser exists). Record the measurements in the Groundwater Well Sample Log Book.

3. Calculate the volume of water initially in the well based on:

   $$V = 7.48\ \pi r^2 h$$

   where:

   7.48 = gallons per cubic foot
   V = Volume of water in well (gallons)
   r = Radius of well (feet), excluding sand pack
   h = Height of column of water (feet) [total depth minus depth to water]

4. Begin purging the well with a decontaminated submersible pump and decontaminated or disposable tubing. If a 12-volt, 2" pump is used with a rheostat controller, adjust pump rate such that the water level remains above the pump inlet. Adjust the rate so that the water level stays constant or decreases slightly. Keep pump at least 3 feet from the bottom of the well. Disposable bailers and rope may be used if needed instead of a submersible pump to purge and sample wells. Continue purging until at least three well

volumes have been removed, or the well is pumped dry. Containerize all purge water for appropriate disposal as indicated by the plant's environmental manager.

5. If the well was pumped dry, allow enough time for recovery of sufficient water volume to meet sampling requirements. Sample the well within a maximum of 24 hours after purging the well dry.

6. Calibrate water quality meters according to manufacturers' instructions.

7. Collect an aliquot of water to perform field tests such as pH, specific conductance, turbidity, and temperature. Record all readings in the Groundwater Well Sample Log Book. If turbidity is > 20 NTUs, reduce flow rate and continue purging until turbidity is < 20 NTUs.

8. Fill sample containers from the discharge tubing.

9. Preserve samples as directed by the laboratory. Store samples in a cooler with ice while in the field.

10. All sample containers will be labeled with the following information:

    Sample identification (i.e., name)
    Sample date
    Sample time (24-hour clock)
    Sampler's initials
    Analysis required & method #
    Preservation used (if any)
    Site name (Alcoa Eastalco Works or Eastalco Aluminum Company)

11. Complete the laboratory-supplied chain of custody and include with sample shipment. Re-ice coolers for prior to shipment to the laboratory.

12. Decontaminate sampling equipment between uses to prevent cross contamination between wells. Remove gross contamination (if any) with brushes, paper towels, etc. Place pump (and tubing if to be reused) in bucket containing water and detergent (e.g., Alconox or Liquinox) and scrub the exterior of the equipment. With the pump inlet submerged, turn pump on to run soapy water through the pump (and tubing). Turn pump off and transfer to a second bucket containing de-ionized (DI) water. Submerse equipment and turn pump on again to rinse the equipment. Containerize all decontamination water for appropriate disposal by the plant's environmental manager.

13. Collect one duplicate sample and one equipment blank during each monitoring event. The equipment blank will be collected to monitor the potential for cross contamination resulting from incomplete decontamination. Collect the equipment blank by placing the decontaminated pump and decontaminated or new tubing into a clean bucket containing DI water and operating the pump to fill the appropriate sample jars. Label and prepare quality control samples for shipment as described above.

Standard Operating Procedure
CO-07-026 Surface Water Sampling

Scope: This SOP is for collecting surface water samples to monitor free cyanide concentrations in Tuscarora Creek per Administrative Consent Order CO-07-026 at the Alcoa Eastalco Works. The procedures described here were derived from the Eastalco Work Instruction WI-0245.

Purpose: The purpose of describing this procedure is to provide a uniform methodology for the collection of good quality and representative surface water samples.

Equipment Needed: Personal protective equipment; Groundwater Well Sample Log Book (or field Log Books or sampling forms as appropriate); disposable or decontaminated polyethylene dipper; plastic trash bags; properly preserved and labeled sample containers; and decontamination equipment.

Procedures:

1. Locate and identify the stream segment to be sampled. Record pertinent information in the Groundwater Well Sample Log Book, including:

   Sample identification (i.e., name)
   Sample date
   Sample time (24-hour clock)
   Sampler's initials
   Analysis required
   Preservation used (e.g., amount used and lot #)
   Comments (e.g., weather, observations)
   Contract laboratory name and date shipped.

2. Collect samples by either placing the sample bottle into the sample stream or filling the sample bottle using a disposable or decontaminated polyethylene dipper. Collect a minimum sample volume of 100 mL volume for free cyanide analysis.

3. Preserve the sample in the field using NaOH pellets to a pH greater than 12.

4. Verify using a pH test strip that the proper preservation pH has been obtained and signify by placing a check in the appropriate column in the sample Log Book. Record the volume and lot number of the reagents used for preservation.

5. Store the sample in an insulated cooler at 1 - 4°C. This will reduce sample decomposition due to UV light.

6. Samples must be analyzed within 14 days from the time of sampling.

7. All sample containers will be labeled with the following information:

   Sample identification (i.e., name)
   Sample date
   Sample time (24-hour clock)
   Sampler's initials
   Analysis required & method #
   Preservation used (if any)
   Site name (Alcoa Eastalco Works or Eastalco Aluminum Company)

8. Complete the laboratory-supplied chain of custody and include with sample shipment. Re-ice coolers for prior to shipment to the laboratory.

9. Decontaminate non-disposable sampling equipment between uses to prevent cross contamination between sampling events. Remove gross contamination (if any) with brushes, paper towels, etc. Place equipment in bucket containing water and detergent (e.g., Alconox or Liquinox) and scrub the surface of the equipment. After scrubbing, transfer the equipment to a second bucket containing de-ionized (DI) water for initial rinsing. After scrubbing, transfer the equipment to a third bucket containing DI water for final rinsing. Containerize all decontamination water for appropriate disposal by the plant's environmental manager.

10. Collect one duplicate sample and one equipment blank during each monitoring event. The equipment blank will be collected only if non-disposable sampling equipment is used to monitor the potential for cross contamination resulting from incomplete decontamination. Collect the equipment blank by filling the decontaminated dipper with DI water and then transferring the water to the appropriate sample jars. Label and prepare quality control samples for shipment as described above.

BK 12205 PG 0243

LR - Covenant Recording Fee 75.00
Declarant Name: eastalco
Ref: 12205/1
LR - Covenant Surcharge 40.00
SubTotal: 115.00
Total: 115.00
12/29/2017 11:53 CC10-GS
#9620643 CC0601 - Frederick County/CC06.01.03 - Register 03

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