PRELIMINARY DETERMINATION

PERMIT RENEWAL AND MINOR MODIFICATION

American Cast Iron Pipe Company
P.O. Box 2727
Birmingham, Alabama 35202

ACIPCO Landfill No. 2
Permit No. 37-41

August 18, 2025

American Cast Iron Pipe Company has submitted to the Alabama Department of Environmental Management (ADEM) an application for renewal and modification of the Solid Wate Disposal Facility Permit for an industrial landfill known as the ACIPCO Landfill No. 2 (Permit No. 37-41). The modification includes abandoning groundwater monitoring well MW-1RR and replacing it with groundwater monitoring well MW-1R3. The waste stream for the ACIPCO Landfill No. 2 would remain nonhazardous general foundry waste, foundry sand, dried industrial sludge, cupola slag, incinerator ash, plastics, glass, rubber items, empty crushed metal containers, wood, discarded tires, automobile shredder waste, and arc furnace/cupola emission control system dust. The service area for the ACIPCO Landfill No. 2 would remain the ACIPCO Plant located in Birmingham, Alabama. The maximum average daily volume of waste disposed at the ACIPCO Landfill No. 2 would remain 500 tons per day. All previously granted variances were requested by the applicant and would be granted in the renewed permit. All other permit conditions would remain the same.

ACIPCO Landfill No. 2 is described as being located in Sections 9 & 10, Township 17 South, Range 3 West in Jefferson County, Alabama. The ACIPCO Landfill No. 2 consists of 128.617 acres with 85.69 acres approved for disposal.

The Land Division has determined that the permit application meets the applicable requirements of ADEM's Administrative Code Division 13 regulations.

Technical Contact:

Hunter Baker
Solid Waste Engineering Section
Land Division

SOLID WASTE DISPOSAL FACILITY PERMIT

PERMITTEE:	**American Cast Iron Pipe Company**
FACILITY NAME:	**ACIPCO Landfill No. 2**
FACILITY LOCATION:	**Sections 9 & 10, Township 17 South, Range 3 West in Jefferson County, Alabama. The facility consists of 128.617 acres with 85.69 acres approved for disposal.**
PERMIT NUMBER:	**37-41**
PERMIT TYPE:	**Industrial Landfill**
WASTE APPROVED FOR DISPOSAL:	**Nonhazardous general foundry waste, foundry sand, dried industrial sludge, cupola slag, incinerator ash, plastics, glass, rubber items, empty crushed metal containers, wood, discarded tires, automobile shredder waste, and arc furnace/cupola emission control system dust.**
APPROVED WASTE VOLUME:	**Maximum Average Daily Volume of 500 tons per day.**
APPROVED SERVICE AREA:	**ACIPCO Plant located in Birmingham, Alabama**

In accordance with and subject to the provisions of the Solid Wastes & Recyclable Materials Management Act, as amended, Code of Alabama 1975, SS 22-27-1 to 22-27-27 ("SWRMMA"), the Alabama Environmental Management Act, as amended, Code of Alabama 1975, SS 22-22A-1 to 22-22A-15, and rules and regulations adopted thereunder, and subject further to the conditions set forth in this permit, the Permittee is hereby authorized to dispose of the above-described solid wastes at the above-described facility location.

ISSUANCE DATE:	**???**
EFFECTIVE DATE:	**???**
EXPIRATION DATE:	**???**

_____

Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
SOLID WASTE PERMIT

Permittee:	American Cast Iron Pipe Company P.O. Box 2727 Birmingham, Alabama 35202
Landfill Name:	ACIPCO Landfill No. 2
Landfill Location:	Sections 9 & 10, Township 17 South, Range 3 West in Jefferson County, Alabama
Permit Number:	37-41
Landfill Type:	Industrial Landfill

Pursuant to the Solid Wastes & Recyclable Materials Management Act, Code of Alabama 1975, §§22-27-1, *et seq*., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM or Department), this permit is issued to American Cast Iron Pipe Company (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the ACIPCO Landfill No. 2.

The Permittee must comply with all terms and conditions of this permit. This permit consists of the conditions set forth herein (including those in any attachments), and the applicable regulations contained in Chapters 335-13-1 through 335-13-16 of the ADEM Administrative Code (hereinafter referred to as the "ADEM Admin. Code"). Rules cited are set forth in this document for the purpose of Permittee reference. Any Rule that is cited incorrectly in this document does not constitute grounds for noncompliance on the part of the Permittee. Applicable ADEM Administrative Codes are those that are in effect on the date of issuance of this permit or any revisions approved after permit issuance.

This permit is based on the information submitted to the Department on January 9, 2019, for permit renewal, and on July 17, 2019, for permit modification, and as amended, and is known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Any inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform ADEM of any deviation from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

This permit is effective as of **?????**, and shall remain in effect until **?????** unless suspended or revoked.

_____ _____

Alabama Department of Environmental Management Date Signed

SECTION I. STANDARD CONDITIONS

A. Effect of Permit. The Permittee is allowed to dispose of nonhazardous solid waste in accordance with the conditions of this permit and ADEM Admin. Code 335-13. Issuance of this permit does not convey property rights of any sort or any exclusive privilege, nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of state or local laws or regulations. Except for actions brought under Code of Alabama 1975, Section 22-27-1, *et seq*., as amended, compliance with the conditions of this permit shall be deemed to be compliance with applicable requirements in effect as of the date of issuance of this permit and any future revisions.

B. Permit Actions. This permit may be suspended, revoked or modified for cause. The filing of a request for a permit modification or the notification of planned changes or anticipated noncompliance on the part of the Permittee, and the suspension or revocation does not stay the applicability or enforceability of any permit condition.

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

D. Definitions. For the purpose of this permit, terms used herein shall have the same meaning as those in ADEM Admin. Code 335-13, unless this permit specifically provides otherwise; where terms are not otherwise defined, the meaning associated with such terms shall be as defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

1. "EPA" for purposes of this permit means the United States Environmental Protection Agency.

2. "Permit Application" for the purposes of this permit, means all permit application forms, design plans, operational plans, closure plans, technical data, reports, specifications, plats, geological and hydrological reports, and other materials which are submitted to the Department in pursuit of a solid waste disposal permit.

E. Duties and Requirements.

1. Duty to Comply. The Permittee must comply with all conditions of this permit except to the extent and for the duration such noncompliance is authorized by a variance granted by the Department. Any permit noncompliance constitutes a violation of Code of Alabama 1975, Section 22-27-1 *et seq*., as amended, and is grounds for enforcement action, permit suspension, revocation, modification, and/or denial of a permit renewal application.

2. Duty to Reapply. If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The renewal application must be submitted to the Department at least 180 days before this permit expires.

3. Permit Expiration. This permit and all conditions therein will remain in effect beyond the permit's expiration date if the Permittee has submitted a timely, complete application as required by Section I.E.2., and, through no fault of the Permittee, the Department has not made a final decision regarding the renewal application.

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

5. Duty to Mitigate. In the event of noncompliance with this permit, the Permittee shall take all reasonable steps to minimize releases to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

6. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of control (and related appurtenances) that are installed or used by the Permittee to achieve compliance with the conditions of this permit.

7. Duty to Provide Information. If requested, the Permittee shall furnish to ADEM, within a reasonable time, any information that ADEM may reasonably need to determine whether cause exists for denying, suspending, revoking, or modifying this permit, or to determine compliance with this permit. If requested, the Permittee shall also furnish the Department with copies of records kept as a requirement of this permit.

8. Inspection and Entry. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the employees of the Department or their authorized representative to:

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

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

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

   d. Sample or monitor, at reasonable times, any substances or parameters at any location for the purposes of assuring permit compliance or as otherwise authorized by Code of Alabama 1975, Section 22-27-1 *et seq*.

9. Monitoring, Corrective Actions, and Records.

   a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from ADEM Admin. Code 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), other appropriate EPA methods, or as specified in the Application. All field tests must be conducted using approved EPA test kits and procedures.

   b. The Permittee shall retain records, at the location specified in Section I.I., of all monitoring, or corrective action information, including all calibration and maintenance records, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record or for periods elsewhere specified in this permit. These periods may be extended by the request of the Department at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.

   c. Records of monitoring and corrective action information shall include.

      i. The exact place, date, and time of sampling or measurement.

      ii. The individual(s) and company who performed the sampling or measurements.

      iii. The date(s) analyses were performed.

      iv. The individual(s) and company who performed the analyses.

v. The analytical techniques or methods used.

vi. The results of such analyses.

d. The Permittee shall submit all monitoring and corrective action results at the interval specified elsewhere in this permit.

10. Reporting Planned Changes. The Permittee shall notify the Department, in the form of a request for permit modification, at least 120 days prior to any change in the permitted service area, increase in the waste received, or change in the design or operating procedure as described in this permit, including any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

11. Transfer of Permit. This permit may be transferred to a new owner or operator. All requests for transfer of permits shall be in writing and shall be submitted on forms provided by the Department. Before transferring ownership or operation of the facility during its operating life, the Permittee shall notify the new owner or operator in writing of the requirements of this permit.

12. Certification of Construction. Before the Permittee may commence disposal of waste in any new cell or phase:

a. The Permittee must submit a letter to the Department signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with this permit.

b. The Department must inspect the new cells or phases unless the Permittee is notified that the Department will waive the inspection.

c. The Permittee may not commence disposal activities in any new cells or phases until approval of the new cells or phases is granted by the Department.

13. Noncompliance. The Permittee shall report all instances of noncompliance with the permit at the time noncompliance is discovered.

14. Other Information. If the Permittee becomes aware that information required by the Application was not submitted or was incorrect in the Application or in any report to the Department, the Permittee shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to the Department, within a reasonable time, information related to compliance with the permit.

F. Design and Operation of Facility. The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or nonsudden release of contaminants to air, soil, groundwater, or surface water, which could threaten human health or the environment.

G. Inspection Requirements,

1. The Permittee shall comply with all requirements of ADEM Admin. Code 335-13-4-.21(1)(b).

2. The Permittee shall conduct random inspections of incoming loads.

3. Records of all inspections shall be included in the operating record.

H. Recordkeeping and Reporting.

1. The Permittee shall maintain a written operating record at the location specified in Section I.I. The operating record shall include:

a. Documentation of inspection and maintenance activities.

b. Daily Volume reports.

c. Personnel training documents and records.

d. Solid/Hazardous Waste Determination Forms for Industrial Wastes, and associated ADEM disposal approval correspondence for industrial waste and special waste.

e. Groundwater monitoring records.

f. Surface water monitoring records.

g. Copies of this Permit and the Application.

h. Copies of all variances granted by the Department, including copies of all approvals of special operating conditions.

2. Quarterly Volume Report. Beginning with the effective date of this permit, the Permittee shall submit, within thirty (30) days after the end of each calendar quarter, a report summarizing the daily waste receipts for the previous (just ended) quarter. Copies of the quarterly reports shall be maintained in the operating record.

3. Monitoring and Corrective Action Reports. The Permittee shall submit reports on all monitoring and corrective activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year and the reports shall be submitted at least semi-annually. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be submitted on a yearly basis, or as directed by the Department, and the reports should be submitted to ADEM and placed in the operating record within 30 days of the monitoring event. Copies of the semi-annual groundwater and yearly explosive gas monitoring reports shall be maintained in the operating record. At this time, the Permittee shall not be required to conduct explosive gas monitoring.

4. Availability, Retention, and Disposition of Records.

a. All records, including plans, required under this permit or ADEM Admin. Code 335- 13 must be furnished upon request, and made available at reasonable times for inspection by any officer, employee, or representative of the Department.

b. All records, including plans, required under this permit or ADEM Admin. Code 335-13 shall be retained by the Permittee for a period of at least three years. The retention period for all records is extended automatically during the course of any unresolved enforcement action regarding the facility, or as requested by the Department.

c. A copy of records of waste disposal locations and quantities must be submitted to the Department and local land authority upon closure of the facility.

I. Documents to be Maintained by the Permittee. The Permittee shall maintain, at the ACIPCO Birmingham Plant office, the following documents and amendments, revisions and modifications to these documents until an engineer certifies closure of the permitted landfill.

1. Operating record.

2. Closure Plan.

J. Mailing Location. All reports, notifications, or other submissions which are required by this permit should be sent via signed mail (i.e. certified mail, express mail delivery service, etc.) or hand delivered to:

Mailing Address.
Chief, Solid Waste Branch, Land Division
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

Physical Address.
Chief, Solid Waste Branch, Land Division
Alabama Department of Environmental Management
1400 Coliseum Blvd.
Montgomery, Alabama 36110-2400

K. Signatory Requirement. All applications, reports or information required by this permit, or otherwise submitted to the Department, shall be signed and certified by the owner as follows:

1. If an individual, by the applicant.

2. If a city, county, or other municipality or governmental entity, by the ranking elected official, or by a duly authorized representative of that person.

3. If a corporation, organization, or other legal entity, by a principal executive officer, of at least the level of Vice President, or by a duly authorized representative of that person.

L. Confidential Information. The Permittee may claim information submitted as confidential pursuant to ADEM Admin. Code 335-1-1-.06.

M. State Laws and Regulations. Nothing in this permit shall be construed to preclude the initiation of any legal action or to relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation.

SECTION II. GENERAL OPERATING CONDITIONS

A. Operation of Facility. The Permittee shall operate and maintain the disposal facility consistent with the Application, this permit, and ADEM Admin. Code 335-13.

B. Open Burning. The Permittee shall not allow open burning without prior written approval from the Department and other appropriate agencies. A burn request should be submitted in writing to the Department outlining why that burn request should be granted. This request should include, but not be limited to, specifically what areas will be utilized, types of waste to be burned, the projected starting and completion dates for the project, and the projected days and hours of operation. The approval, if granted, shall be included in the operating record.

C. Prevention of Unauthorized Disposal. The Permittee shall follow the approved procedures, as provided in the Application, for detecting and preventing the disposal of free liquids, regulated hazardous waste, PCB's, regulated medical waste, and other unauthorized waste streams at the facility.

D. Unauthorized Discharge. The Permittee shall operate the disposal facility in such a manner that there will be no water pollution or unauthorized discharge. Any discharge from the disposal facility or practice thereof may require a National Pollutant Discharge Elimination System permit under the Alabama Water Pollution Control Act.

E. Industrial Waste Disposal. The Permittee shall dispose of industrial waste as required by ADEM Admin. Code 335-13-4-.21(1)(c), and as specified in the Application.

F. Boundary Markers. The Permittee shall ensure that the facility is identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

SECTION III. SPECIFIC REQUIREMENTS FOR INDUSTRIAL WASTE LANDFILLS

A. Waste Identification and Management.

1. Subject to the terms of this permit, the Permittee may accept for disposal the nonhazardous solid wastes listed in III.B. Disposal of any other wastes is prohibited, except waste granted a temporary or one-time waiver by the Director.

2. The total permitted facility for the ACIPCO Landfill No.2 is approximately 128.617 acres with 85.69 acres approved for disposal.

3. The maximum average daily volume of waste disposed at the facility shall not exceed 500 tons/day. Should the average daily volume exceed this value by 20% or 100 tons/day, whichever is less, for two (2) consecutive quarters the permittee shall be required to modify the permit in accordance with ADEM Admin. Code 335-13-5-.06(2)(b)2. The average daily volume shall be computed as specified by ADEM Admin. Code 335-13-4-.23(2)(f).

B. Waste Streams. The Permittee may accept for disposal nonhazardous general foundry waste, foundry sand, dried industrial sludge, cupola slag, incinerator ash, plastics, glass, rubber items, empty crushed metal containers, wood, discarded tires, automobile shredder waste, and arc furnace/cupola emission control system dust.

C. Service Area. The Permittee is allowed to receive for disposal waste from the ACIPCO Plant located in Birmingham, Alabama.

D. Waste Placement, Compaction, and Cover. The Permittee shall be allowed to maintain three disposal areas. The disposal areas will be the shredder fluff disposal area, arc furnace dust disposal area, and the cupola emission control system dust disposal area. The Permittee shall be allowed to place waste onto an appropriate slope not to exceed 3 to 1 (33%) (See Section VIII. 3.). All waste shall be spread in layers two feet or less in thickness and thoroughly compacted with adequate landfill equipment prior to placing additional layers of waste or placing cover. A minimum of six inches of compacted earth, or other alternative cover material approved by the Department and listed in Section VIII. shall be added at the conclusion of each month's activities (See Section VIII.2.). The permittee has been approved to use dried emission control sludge as an alternate cover. The dried emission control sludge cover may only be used in the areas identified in Figure 1 of the variance application dated August 18, 2012 for this facility (See Section VIII.6). The Permittee has been approved to use a blend of auto shredder fluff and soil in equal parts by volume (50/50) as an alternate cover in the shredder fluff disposal area. The auto shredder fluff and soil blend cover may only be used to cover interior slopes of cells. The 50/50 blend shall not be part of the final cover design. (See Section VIII. 7.).

E. Liner Requirements. At this time, the Permittee is not required to install a liner system. If it is determined that a liner system is necessary, the Permittee must install a liner that meets the requirements of the Department. The base of the landfill shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-4-.11(2)(a).

F. Security. The Permittee shall provide artificial and/or natural barriers, which prevent entry of unauthorized vehicular traffic to the facility.

G. All Weather Access Roads. The Permittee shall provide an all-weather access road to the dumping face that is wide enough to allow passage of collection vehicles.

H. Adverse Weather Disposal. The Permittee shall provide for disposal activities in adverse weather conditions.

I. Personnel. The Permittee shall maintain adequate personnel to ensure continued and smooth operation of the facility.

J. Environmental Monitoring and Treatment Structures. The Permittee shall provide protection and proper maintenance of environmental monitoring and treatment structures.

K. Vector Control. The Permittee shall provide for vector control as required by ADEM Admin. Code 335-13.

L. Bulk or Noncontainerized Liquid Waste. The Permittee shall not dispose of bulk or noncontainerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin. Code 335-13-4-.23(1)(j) are met.

M. Empty Containers. Empty containers larger than 10 gallons in size must be rendered unsuitable for holding liquids prior to disposal in the landfill unless otherwise approved by the Department.

N. Other Requirements. The Department may enhance or reduce any requirements for operating and maintaining the landfill as deemed necessary by the Land Division.

O. Other Permits. The Permittee shall operate the landfill according to this and any other applicable permits.

P. Scavenging and Salvaging Operations. The Permittee shall prevent scavenging and salvaging operations, except as part of a controlled recycling effort. Any recycling operation must be in accordance with plans submitted and approved by the Department.

Q. Signs. If the landfill is available to the public or commercial haulers, the Permittee shall provide a sign outlining instructions for use of the site. The sign shall be posted and have the information required by ADEM Admin. Code 335-13-4-.23(1)(f).

R. Litter Control. The Permittee shall control litter.

S. Fire Control. The Permittee shall provide fire control measures.

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS

A. The Permittee shall install and/or maintain a groundwater monitoring system, as specified below.

1. The permittee shall maintain the groundwater monitoring wells and piezometers identified in Table IV.1. at the locations specified in the Application, and any other groundwater monitoring wells which are added (Section IV.A.3.) during the active life and the post closure care period.

2. The Permittee shall maintain groundwater monitoring MW-1R3 as the background groundwater monitoring well for the entire facility.

3. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of any plume of contamination or as otherwise deemed necessary to maintain compliance with the ADEM Admin. Code 335-13.

4. Prior to installing any additional groundwater monitoring wells, the Permittee shall submit a plan to the Department with a permit modification request specifying the design, location and installation of any

additional monitoring wells. This plan shall be submitted within one-hundred and twenty (120) days prior to the installation which, at a minimum, shall include.

a. Well construction techniques including proposed casing depths, proposed total depth, and proposed screened interval of well(s);

b. Well development method(s);

c. A complete analysis of well construction materials;

d. A schedule of implementation for construction; and

e. Provisions for determining the lithologic characteristics, hydraulic conductivity and grain-size distribution for the applicable aquifer unit(s) at the location of the new well(s).

B. Groundwater Monitoring Requirements.

1. The Permittee shall determine the groundwater surface elevation at each monitoring well and piezometer identified in Table IV.1. each time the well or piezometer is sampled during the active life and post-closure care period.

2. The Permittee shall determine the groundwater flow rate and direction in the first zone of saturation at least semi- annually or each time groundwater is sampled and submit as required by ADEM Admin. Code 335-13.

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample, and analyze for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27, and/or any other parameters specified by the Department in Table IV. 2., all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code 335-13-4-.27(2)(j) and 335-13-4-.27(2)(a)(1).

4. The Permittee shall sample, and analyze all monitoring wells identified in Table IV.1 for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27(3), and/or any other parameters specified by the Department in Table IV.2, on a semi- annual basis throughout the active life of the facility and the post-closure care period in accordance with ADEM Admin. Code 335-13-4-.27(3). Sampling shall be conducted during March and September of each year, beginning with the effective date of this permit. The records and results of this sampling and analysis activity shall be submitted to the Department, within ninety (90) days of the date of sampling.

5. In addition to the requirements of Section IV.B.1., B.2., B.3. and B.4., the Permittee shall record water levels, mean sea level elevation measuring point, depth to water, and the results of field tests for pH and specific conductance at the time of sampling for each well.

C. Sampling and Analysis Procedures. The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in Section IV.A. to provide a reliable indication of the quality of the groundwater.

1. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Application. Monitoring wells shall be bailed or pumped to remove at least four times the well volume of water. Slow recharge wells shall be bailed until dry. Wells shall be allowed to recharge prior to sampling.

2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or

other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.

3. Interwell statistical analysis will be performed for all constituents, except cobalt, to test for statistically significant increases. Intrawell statistical analysis will be utilized for cobalt.

4. Samples shall be tracked and controlled using the chain-of-custody and QA/QC procedures specified in the Application.

D. Recordkeeping and Reporting Requirements.

1. Recording of Results. For each sample and/or measurement taken pursuant to the requirements of this permit, the Permittee shall record the information required by Section I.E.9.c.

2. Recordkeeping. Records and results of all groundwater monitoring, sampling, and analysis activities conducted pursuant to the requirements of this permit shall be included in the operating record required by Section I.I.1.

E. Permit Modification. If at any time the Permittee or the Department determines that the groundwater monitoring system no longer satisfies the requirements of ADEM Admin. Code 335-13-4-.14 or Section IV.A. of this permit, the Permittee must, within 120 days, submit an application for a permit modification to make any necessary and/or appropriate changes to the system.

TABLE IV.1.
GROUNDWATER MONITORING WELLS

Monitoring Well Number	Top of Casing (feet msl)	Part Monitored
UPGRADIENT/BACKGROUND MONITORING WELLS		
MW 1R3	655.62	Entire
DOWNGRADIENT MONITORING WELLS		
MW-2	608.00	Entire
MW-3	605.91	Entire
MW-4	569.97	Entire

TABLE IV.2.
BACKGROUND AND SEMI-ANNUAL GROUNDWATER MONITORING PARAMETERS

The parameters in this Table are those listed in Appendix I of ADEM Admin. Code 335-13-4.

SECTION V. GAS MONITORING REQUIREMENTS

At this time, gas monitoring is not being required at this landfill. If at any time the Department determines that an explosive gas monitoring system is deemed necessary for the protection of human health and the environment, the Permittee must, within 120 days, submit an application for a permit modification for the installation of an explosive

gas monitoring system that meets the proper regulatory requirements of the Alabama Department of Environmental Management (See Section VIII. 4.).

SECTION VI. SURFACE WATER MANAGEMENT REQUIREMENTS

The Permittee shall construct and maintain run-on and run-off control structures. Any discharges from drainage control structures shall be permitted through a discharge permit issued by the ADEM Water Division.

SECTION VII. CLOSURE AND POST-CLOSURE REQUIREMENTS

The Permittee shall close the landfill and perform post-closure care of the landfill in accordance with ADEM Admin. Code 335-13.

A. Final Cover. The Permittee shall grade final soil cover such that surface water does not pond over the permitted area as specified in the Application. The final cover system shall comply with ADEM Admin. Code 335-13.

B. Vegetative Cover. The Permittee shall establish a vegetative or other appropriate cover, as approved by the Department, within 90 days after completion of final grading requirements in the Application. Preparation of a vegetative cover shall include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

C. Notice of Intent. The Permittee shall place in the operating record and notify the Department of their intent to close the landfill prior to beginning closure.

D. Completion of Closure Activities. The Permittee must complete closure activities of each landfill unit in accordance with the Closure Plan within 180 days of the last known receipt of waste.

E. Certification of Closure. Following closure of each unit, the Permittee must submit to the Department a certification, signed by a registered professional engineer, verifying the closure has been completed according to the Closure Plan.

F. Post-Closure Care Period. Post-closure care activities shall be conducted after closure of each unit throughout the life of this permit and continuing for a period of a minimum of thirty (30) years following closure of the facility. The Department may shorten or extend the post-closure care period applicable to the solid waste disposal facility.

G. Post-Closure Maintenance. The Permittee shall provide post closure maintenance of the facility to include regularly scheduled inspections. This shall include maintenance of the cover, vegetation, monitoring devices and pollution control equipment and correction of other deficiencies that may be observed by ADEM. Monitoring requirements shall continue throughout the post closure period as determined by the Department unless all waste is removed and no unpermitted discharge to waters of the State have occurred.

H. Post-Closure Use of Property. The Permittee shall ensure that post closure use of the property never be allowed to disturb the integrity of the final cover, liner, or any other component of the containment system. This shall preclude the growing of deep-rooted vegetation on the closed area.

I. Certification of Post-Closure. Following post-closure of each unit, the Permittee must submit to the Department a certification, signed by an independent registered professional engineer, verifying the post-closure has been completed according to the Post-Closure Plan.

J. Recording Instrument. The Permittee must provide documentation of compliance with the requirements of the Uniform Environmental Covenants Program in ADEM Admin. Code 335-5 and shall execute the following:

1. Record a notation onto the land deed within 90 days from the certification of closure. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility, and beginning and closure dates of the disposal activity.

2. File the covenant at the courthouse where the land deed is held within thirty (30) days of receipt of the covenant signed by ADEM's Land Division Chief.

3. The Permittee shall submit a certified copy of the recording instrument to ADEM within 120 days after permit expiration, revocation, or as directed by ADEM as described in the application.

K. Removal of Waste. If the Permittee, or any other person(s), wishes to remove waste, waste residues, or any liner or contaminated soils, the owner must request and receive prior approval from the Department.

SECTION VIII. VARIANCES AND SPECIAL CONDITIONS

1. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.12(2)(f) requiring a 100 foot buffer zone. Disposal plans must be submitted to the Department for approval prior to disposal operations.

2. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.23(1)(a)1. requiring weekly cover. All exposed waste shall be covered by the conclusion of each month's activities. (See Section III. D.).

3. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.23 (1)(c) requiring all waste be confined to an area small as possible and placed onto an appropriate slope not to exceed 4 to 1 (25%) or as approved by the department. The Permittee shall be allowed to maintain three disposal areas. The disposal areas will be the shredder fluff disposal area, arc furnace dust disposal area, and the cupola emission control system dust disposal area. The Permittee shall be allowed to place waste onto an appropriate slope not to exceed 3 to 1 (33%) (See Section III. D.).

4. The Permittee is granted a variance from ADEM Admin. Code 335-13-4-.16 requiring explosive gas monitoring. (See Section V).

5. The Permittee has been approved for reclamation activities at the ACIPCO Landfill No. 2. The Permittee will extract and process existing landfill material concurrently with ongoing daily disposal of shredder fluff from the shredder operation.

6. The Permittee has been approved to use dried emission control sludge as an alternate cover in the areas identified in Figure 1 of the variance application dated August 18, 2012, and included as part of the renewal application dated January 7, 2018, for the ACIPCO Landfill No. 2. The Permittee is required to cover all other portions of the landfill with a minimum of six inches of compacted earth or other alternative cover material approved by the Department. (See Section III. D).

7. The Permittee has been approved to use a blend of auto shredder fluff and soil in equal parts by volume (50/50) as an alternate cover in the shredder fluff disposal area. The 50/50 blend cover may only be used to cover interior slopes of cells. The 50/50 blend shall not be part of the final cover design. (See Section III.D.).

Any variance granted by the Department may be terminated by the Department whenever the Department finds, after notice and opportunity for hearing, that the petitioner is in violation of any requirement, condition, schedule, limitation or any other provision of the variance, or that operation under the variance does not meet the minimum requirements established by state and federal laws and regulations or is unreasonably threatening the public health

Permit Application

Highland Technical Services, Inc.

January 7, 2018

Alabama Department of Environmental Management
Post Office Box 301463
Montgomery, Alabama 36130-1463

Attention: Mr. Eric Sanderson, Chief
Solid Waste Branch

RE: American Cast Iron Pipe Company Landfill No. 2
Solid Waste Permit No.: 37-41 Renewal
Birmingham, Jefferson County, Alabama

Dear Mr. Sanderson:

On behalf of American Cast Iron Pipe Company (ACIPCO) **Highland Technical Services, Inc. (HTSI)** is submitting three copies of the enclosed Solid Waste Disposal Permit Renewal application for the above-referenced landfill. The applicable permit fees will be submitted under separate cover. The enclosed permit application documents include the following:

- Solid Waste Permit Application
- Permit Application Narrative, including Petition to Extend a Prior or Existing Variance
- Figure 1 - Site Location Map

Please note, pursuant to previous discussions with members of your staff, the list of Adjacent Landowners and the coincidental map will be submitted at a later date under separate cover, so as to provide as current a list as possible for the facility prior to a final decision by the Department on this application.

Highland Technical Services, Inc. appreciates your consideration in this matter. If you have questions concerning this submittal or require any additional information, please contact our office at (205) 985-4874.

Sincerely,
HIGHLAND TECHNICAL SERVICES, INC.

William W, Cooch, P.G.
Principal Geologist

attachment

Highland Technical Services, Inc.
528 Mineral Trace
Hoover, Alabama 35244

Rowe Engineering & Surveying, Inc.
3502 Laughlin Drive, Suite B
Mobile, Alabama 36693

HTSI

SOLID WASTE APPLICATION

PERMIT APPLICATION
SOLID WASTE DISPOSAL FACILITY
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
(Submit in Triplicate)

1. **Facility type:**
   - _____ Municipal Solid Waste Landfill (MSWLF)
   - __X__ Industrial Landfill (ILF)
   - _____ CCR Landfill (CCRLF)
   - _____ CCR Surface Impoundment (CCR SI)
   - _____ Other (explain) _____

2. **Facility Name** American Cast Iron Pipe Company – Landfill #2

3. **Applicant:**

   Name: American Cast Iron Pipe Company (ACIPCO)

   Address: P.O. Box 2727
   Birmingham, Alabama 35202

   Telephone: (205) 325-7069

4. **Location: (include county highway map or USGS map)**

   Township 17 South **Range** 3 West
   Section 9 & 10 **County** Jefferson

5. **Land Owner:**

   Name: American Cast Iron Pipe Company

   Address: 2200 Coalburg Road
   Birmingham, Jefferson County, Alabama

   Telephone: (205) 325-7069

   (Attach copy of agreement from landowner if applicable.)

Solid Waste Permit
Application Page 2

6. Contact Person:

Name Heath Washington

Position or
Affiliation Environmental Engineer

Address: P.O. Box 2727
Birmingham, Alabama 35202

Telephone: (205) 325-7069

7. Size of Facility: 128.617 Acres

Size of Disposal Area(s): 85.69 Acres

8. Identify proposed service area or specific industry that waste will be received from:

ACIPCO, Birmingham, Alabama facility

9. Proposed maximum average daily volume to be received at landfill (choose one):

500 Tons/Day _____ Cubic Yards/Day

10. List all waste streams to be accepted at the facility (i.e., household solid waste, wood boiler ash, tires, trees, limbs, stumps, etc.):

Non-hazardous general foundry waste, foundry sand, dried industrial wastewater sludge, cupola slag, incinerator ash, plastic, glass, rubber items, empty crushed metal containers, wood, scrap tires, automobile shredder waste, and arc furnace/cupola emission control system dust.

Jere M. Kitchens 1-7-19

JERE M. KITCHENS, VICE PRESIDENT – ENGINEERING DATE

SOLID WASTE DISPOSAL FACILITY PERMIT RENEWAL APPLICATION

AMERICAN CAST IRON PIPE COMPANY
ACIPCO LANDFILL #2
COALBURG ROAD
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA

PERMIT NO.: 37-41
HTSI PROJECT NO.: 18-011305A.07

PREPARED FOR:
AMERICAN CAST IRON PIPE COMPANY
POST OFFICE BOX 2727
BIRMINGHAM, ALABAMA 35202

JANUARY 7, 2019

PREPARED BY:

HIGHLAND TECHNICAL SERVICES, INC.
528 MINERAL TRACE
BIRMINGHAM, ALABAMA 35244
PHONE: (205) 985-4874 FAX: (205) 987-6080

William W. Cooch, P.G.
Principal Geologist

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FIGURES

APPENDICES

1.0 OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Jere M. Kitchens 1-7-19

Jere M. Kitchens, Vice President - Engineering — Date
American Cast Iron Pipe Company

2.0 FACILITY DESCRIPTION

American Cast Iron Pipe Company (ACIPCO) requests a renewal of its Solid Waste Disposal Facility Permit (Permit No. 37-41) for its Industrial Solid Waste Landfill #2, located in Birmingham, Jefferson County, Alabama. The landfill is located on Coalburg Road, within Sections 9 & 10, Township 17 South, Range 3 West. (See Figure 1)

ACIPCO requests the total permitted area remain 128.617 acres, with 85.69 acres approved for disposal, the maximum average daily volume of waste remain at 500 tons per day, and the approved service area remain the ACIPCO plant located in Birmingham, Jefferson County, Alabama. ACIPCO also requests the waste streams approved for disposal continue to be nonhazardous general foundry waste, foundry sand, dried industrial sludge, cupola slag, incinerator ash, plastic, glass, rubber items, empty crushed metal containers, wood, scrap tires, automobile shredder waste, arc furnace/cupola emission control system dust.

3.0 LANDFILL SITING STANDARDS

The ACIPCO Landfill #2 meets the siting standards required by ADEM Administrative Code 335-13-4-.01, as originally permitted and based on the most-recent permit application prepared and submitted to ADEM for the current permit effective on July 6, 2014, and modified on February 27, 2018. Therefore, the pertinent information regarding the siting of this landfill facility as contained in those previous permit applications is incorporated by reference, herein.

4.0 GENERAL OPERATIONAL STANDARDS

The facility will continue to be operated and maintained in a manner consistent with this permit application and in accordance with the applicable requirements of the ADEM Solid Waste Program regulations (Division 335-13), so as to be protective of human health and the environment. No changes to the daily operational procedures of the landfill from those of previous permit period are requested as part of this renewal application, and those previous operational procedures are incorporated by reference, herein.

4.1 ON-SITE CONTROL POINTS

The ACIPCO #2 Landfill has been constructed with adequate horizontal and vertical control points for the site. Ground and aerial survey points, along with the property corner markers have provided accurate horizontal and vertical control points for construction, operation and closure activities at the landfill for several years. These control points will continue to be maintained on-site throughout the active life of the facility to ensure that construction, operation, and closure are completed in accordance with approved plans.

4.2 BUFFER ZONES

ACIPCO has been granted a permit variance from the requirement to establish a 100 foot buffer zone at Landfill #2.

4.3 FINAL TOPOGRAPHIC CONTOURS

The final topographic design contours for the Solid Waste Landfill have been previously provided to the Department as part of past permit applications. No changes to the final closure design is

proposed as part of this requested permit renewal, and therefore, the previous closure design elevations are incorporated by reference, herein.

4.4 WASTE SCREENING

Wastes accepted for disposal at the ACIPCO Landfill #2 are strictly controlled so as to only allow waste stipulated in the permit and in the permit application. Disposal at this landfill is not available to the public or commercial waste haulers, making it unlikely that prohibited items such as household garbage, medical waste, regulated PCB and hazardous wastes, or any wastes generated by entities other than ACIPCO would be transported to the facility. In order to further control the disposal of waste, ACIPCO restricts entry to the landfill and performs 24-hour security monitoring of its property, including the landfill. Further, all vehicles entering the landfill for disposal are subject to inspection by ACIPCO Environmental personnel.

4.5 EXISTING AND PROPOSED SURFACE DRAINAGE

The drainage system is part of a site-wide system which controls site runoff to meet the applicable storm-water runoff requirements. The drainage system at the landfill is shown on facility construction drawings previously submitted to the Department as part of past permitting actions. Surface runoff is diverted to existing sedimentation ponds via a series of ditches around the landfill. There are no proposed changes to the drainage system being made as part of this renewal.

4.5.1 Run-On Control Systems

The landfill drainage system is part of a site-wide system which controls site runoff to meet the applicable storm-water runoff requirements. Surface runoff is diverted through existing stormwater control structures around the landfill. There are no proposed changes to the existing surface drainage system.

4.5.2 Runoff Control Systems

The control of stormwater runoff from the site is also required by ADEM Administrative Code, Rule 335-13-4-.17(2 and 3). This rule requires that runoff control structures be designed, constructed, and maintained to collect and control water resulting from a 24-hour, 25-year storm. On-site drainage structures are designed to carry incident precipitation from the disposal site so as to minimize the generation of leachate, erosion, and sedimentation. Appropriately designed and operated sedimentation ponds and best management practices (BMPs) are utilized as needed across the site to control sediment

4.5.3 NPDES Permit

Through grading, ditches, and control devices stormwater on the site is captured by a pond system. The pond system has no discharge due to evaporation and permeation

5.0 PERMIT VARIANCES

Pursuant to the requirements of Chapter 8, of ADEM Admin. Code Division 335-13, Section VIII of Solid Waste Disposal Facility Permit No. 37-41, as issued on June 4, 2014, effective on July 7, 2014, and modified on February 27, 2018, includes certain variances. In accordance with ADEM Admin. Code Rule 335-13-8-.03(1), ACIPCO requests the following prior or existing variances be granted as part of this permit renewal:

1. The Permittee is granted a variance from ADEM Rule 335-13-4-.12(2)(f) requiring a 100 foot buffer zone. Disposal plans must be submitted to the Department for approval prior to disposal operations.

2. The Permittee is granted a variance from ADEM Rule 335-13-4.23(1)(a)1 requiring weekly cover. All exposed waste shall be covered by the conclusion of each month's activities.
3. The Permittee is granted a variance from ADEM Rule 335-13-4-.23(1)(c) requiring all waste to be confined to as small an area as possible and placed onto an appropriate slope not to exceed 4 to 1 (25%) or as approved by the Department. The Permittee shall be allowed to maintain three disposal areas. The disposal areas will be the shredder fluff disposal area, arc furnace dust disposal area, and the cupola emission control system dust disposal area. The Permittee shall be allowed to place waste onto an appropriate slope not to exceed 3 to 1 (33%).

4. The Permittee is granted a variance from ADEM Rule 335-13-4-.16 requiring explosive gas monitoring.

5. The Permittee has been approved for reclamation activities at the ACIPCO Landfill No. 2. The Permittee will extract and process existing landfill material concurrently with ongoing daily disposal of shredder fluff from the shredder operation.

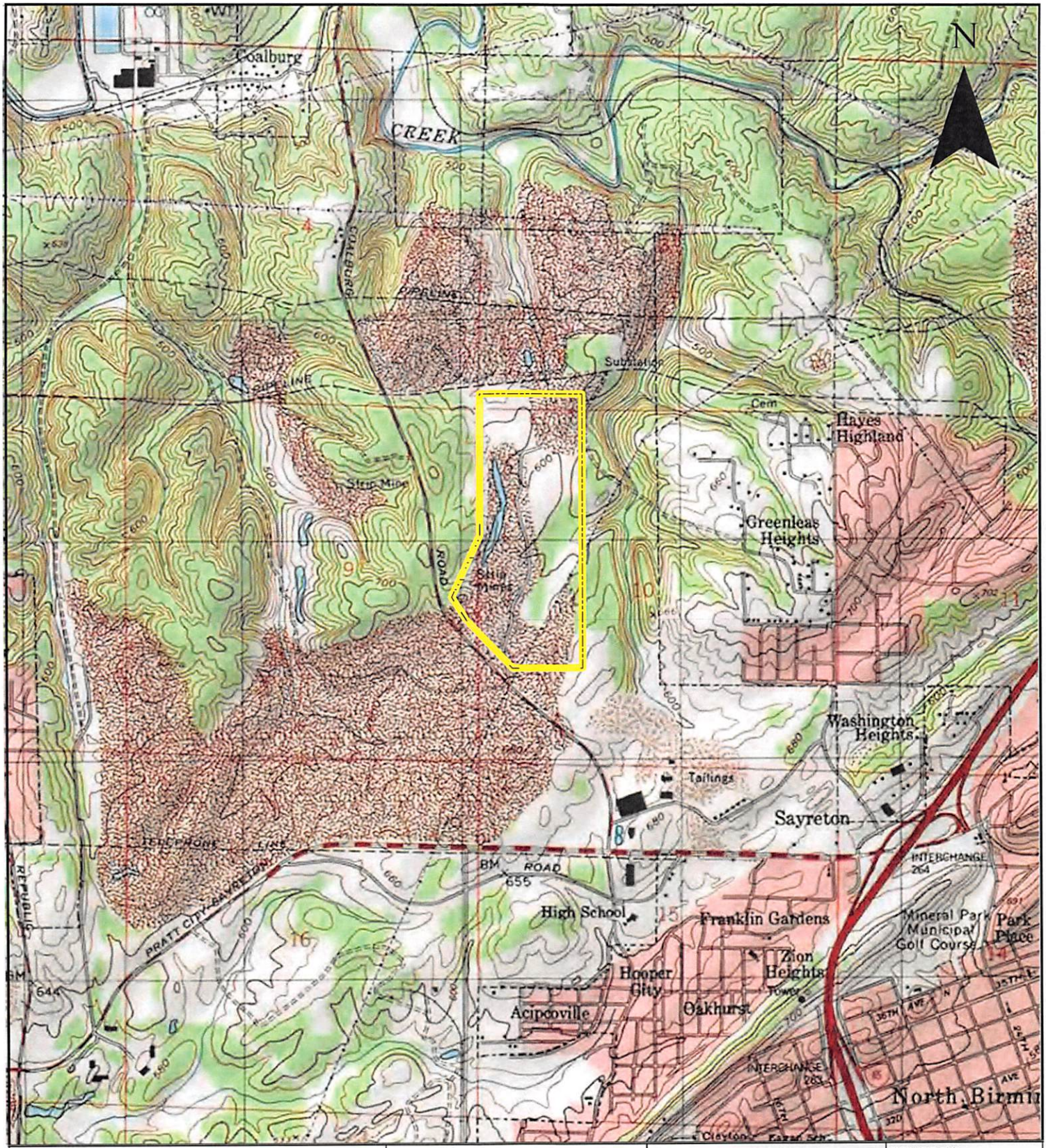
6. The Permittee has been approved to use dried emission control sludge as an alternate cover in the areas identified in Figure 1 of the variance application dated August 24, 2012 for the ACIPCO Landfill No. 2. The Permittee is required to cover all other portions of the landfill with a minimum of six inches of compacted earth or other alternative cover material approved by the Department.

7. The Permittee has been approved to use a blend of auto shredder fluff and soil in equal parts by volume (50/50) as an alternate cover in the shredder fluff disposal area. The 50/50 blend cover may only be used to cover interior slopes of cells. The 50/50 blend shall not be part of the final cover design.

American Cast Iron Pipe Company requests that the record, opinion and order made pursuant to ADEM Admin. Code Rule 335-13-8-.02, for each of these prior and existing variances previously approved by the Department, be incorporated herein into this petition for extension as part of this permit renewal.

FIGURES

APPENDICES



Legend

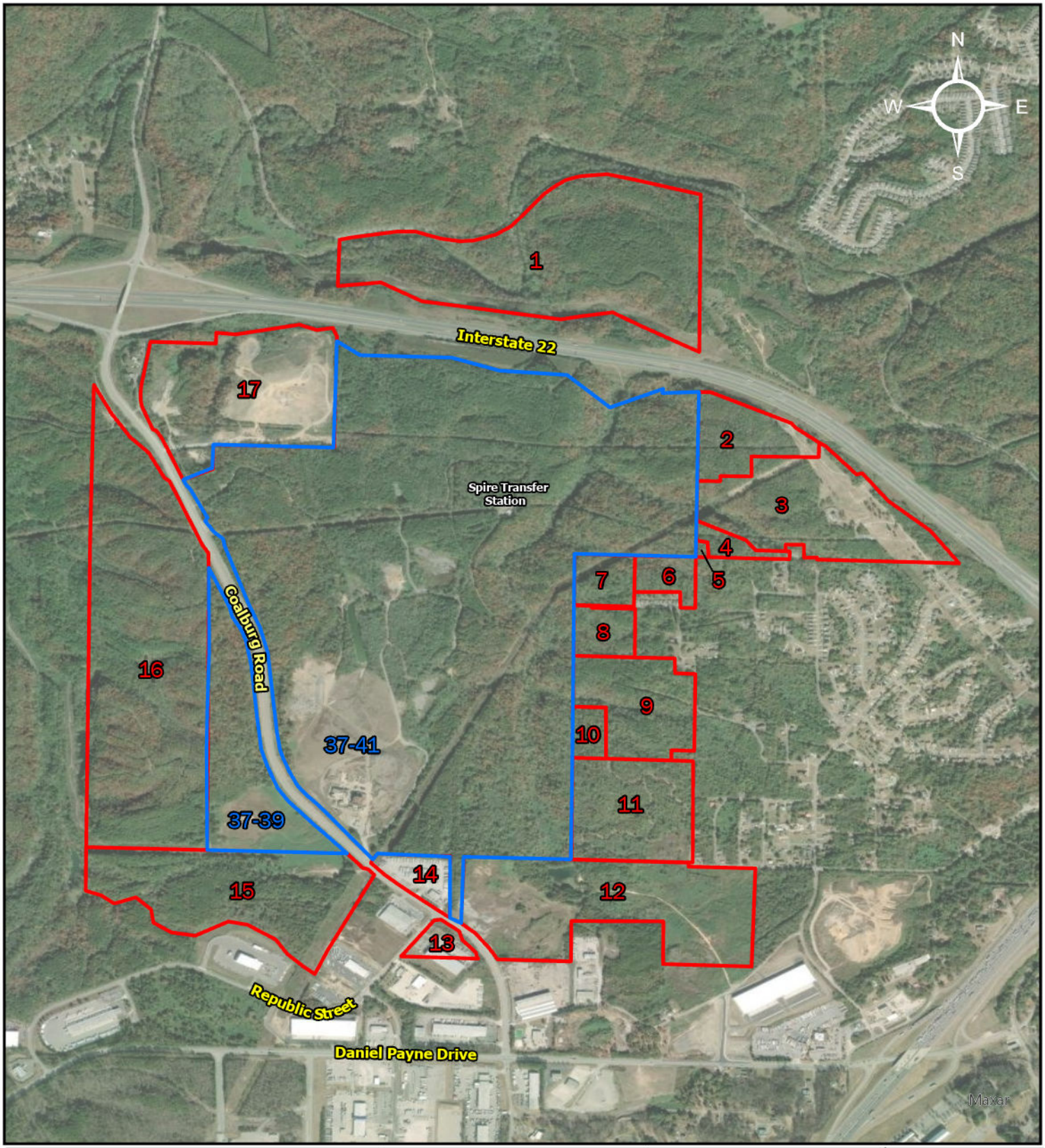
Permit Boundary (Approximate)

USGS Quad ID: 33086-E7
Birmingham North, Alabama

Highland Technical Services, Inc.

528 MINERAL TRACE
HOOVER, AL 35244
(205) 985-4874

TITLE:	Site Location Map American Cast Iron Pipe Company (ACIPCO) Landfill #2 Permit No. 37-41 Birmingham, Alabama
FIGURE NO.	1
PROJECT NO.	18-011305A.07
DRAWN BY	PDD
SCALE:	0 1,000 2,000 1 inch = 2,000 feet
DATE DRAWN	12-31-2018



Legend

- ACIPCO Parcels
- Adjacent Parcels

LaBella
Powered by partnership.

528 MINERAL TRACE
HOOVER, AL 35244
(205) 985-4874

TITLE:
Adjacent Land Owners Map

ACIPCO Landfills
37-39 & 37-41

Birmingham, Alabama

SCALE:
0 1,000 2,000
(feet)

FIGURE NO.
1

PROJECT NO.
2251620

DRAWN BY
AJH

DATE DRAWN
07/14/2025

Adjacent Landowner Information

ACIPCO Landfills

Permit Nos.: 37-39 & 37-41

1- Waste Management
PO Box 1450
Chicago, IL 60690

2- Live Oak Lands LLC
429 Greensprings Highway
Birmingham, AL 35209

3- Joe Jones
2000 Smithfield Lane North
Birmingham, AL 35207

4- Tom Dowell
2000 1st Avenue North Suite 424-26
Birmingham,, AL 35203

5- Samuel Saiia
212 Sykes Point Lane
Merritt Island, FL 32953

6- Greater Birmingham Habitat for Humanity
PO Box 540
Fairfield, AL 35064

7- Franklin Wilson
4465 Northridge Trail
Ellenwood, GA 30294

8- Alex Kontos Fruit Company Inc.
PO Box 10003
Birmingham,, AL 35202

9- James Johnson
1000 Bramble Lane
Irondale, AL 35210

10- Telhaniel Wallace
1325 7th Place
Pleasant Grove, AL 35127

11- North Town Properties, LLC
120 Bishop Circle
Pelham, AL 35124

12- Saiia Coalburg, LLC
3424 Brook Mountain Lane
Mountain Brook, AL 35223

13- Adjust Your Sail, LLC
2827 Cherokee Road
Birmingham, AL 35223

14- Xtralease Inc.
7911 Forsyth Boulevard Suite 600
Saint Louis, MO 63105

15- Ramar Land Corp
600 Gillam Road
Wilmington, OH 45177

16- United States Steel Corporation
One PPG Place Suite 2810
Pittsburgh, PA 15222

17- Think Pink, Inc.
PO Box 86
West Point, GA 31833

LaBella
Powered by partnership.

GROUNDWATER MONITORING PLAN

AMERICAN CAST IRON PIPE COMPANY (ACIPCO)
LANDFILL NO. 2
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
PERMIT NO.: 37-41
PROJECT NO.: 2243583.00 PHASE 01

PREPARED FOR:

AMERICAN CAST IRON PIPE COMPANY
1501 31ST AVENUE NORTH
BIRMINGHAM, ALABAMA 35207

AUGUST 13, 2024

PREPARED BY:

LABELLA ASSOCIATES, D.P.C.
528 MINERAL TRACE
BIRMINGHAM, ALABAMA 35244
PHONE: (205) 985-4874

Lori K. Norton

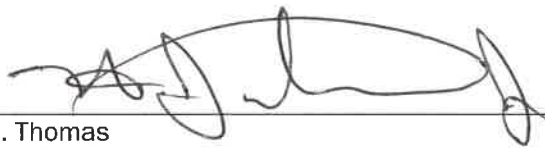
Lori K. Norton, P.G.
Senior Project Geologist

Adam J. Hughes

Adam J. Hughes, P.G.
Project Geologist

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



8/23/24

Henry J. Thomas
Vice President, Engineering
American Cast Iron Pipe Company

Date

GEOLOGIST CERTIFICATION

I certify under penalty of law that I am a Registered Professional Geologist, licensed to practice in the State of Alabama and experienced in conducting hydro-geological investigations. The information submitted herein, to the best of my knowledge and belief is true, accurate and complete.

Adam J. Hughes, P.G.
Project Geologist
LaBella Associates, D.P.C.

August 13, 2024
Date

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FIGURES

APPENDICES

1.0 PURPOSE AND SCOPE

The American Cast Iron Pipe Company (ACIPCO) has prepared this *Groundwater Monitoring Plan* (GWMP) for the ACIPCO Landfill No. 2 located in Birmingham, Jefferson County, Alabama, Solid Waste Facility Disposal Permit Number 37-41. This GWMP has been prepared in accordance with the Alabama Department of Environmental Management (ADEM) Administrative Code 335-13. Included in this GWMP is a discussion of the environmental setting, description of the monitoring requirements, and activities to be conducted over the life of the permitted facility.

2.0 SITE LOCATION AND STATUS

The ACIPCO Landfill No. 2 is described as being located in the Sections 9 and 10, Township 17 South, Range 3 West in Jefferson County, Alabama.. The facility is approximately 128.617 acres in size, and the landfill permitted area is approximately 85.69 acres with all acres permitted for disposal by the ACIPCO Plant located in Birmingham, Alabama. The landfill is permitted as an industrial landfill. The site location is shown in Figure 1.

3.0 ENVIRONMENTAL SETTING

3.1 SITE GEOLOGY AND HYDROGEOLOGY

According to geologic information published by the Geological Survey of Alabama, the ACIPCO Landfill is underlain by the Pottsville Formation which typically consists of tightly cemented sandstone and shale. As a result, the Pottsville Formation generally has very low primary porosity and permeability. Groundwater is found in secondary features such as fractures and bedding planes. Where fractures intersect the surface, groundwater seeps can occur, providing base flow for streams in the area.

According to the *Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama; Area 3,* 1989 prepared by the United States Geological Survey (USGS), the site is located in the Appalachian Plateau Physiographic District. The major aquifer in the area of the ACIPCO Landfill is identified as the Pottsville Aquifer. The Pottsville Aquifer is not a significant source of potable water in north central Alabama. Groundwater in the Pottsville Aquifer typically occurs under confined conditions due to the sharp contrast in permeability within the aquifer. At depths less than 200 feet, groundwater in the Pottsville usually occurs in secondary features such as openings along fractures and bedding planes and in weathered sandstone and conglomerate beds. Only small amounts of groundwater suitable for domestic use are available in the weathered deposits. The quantity of water available from the Pottsville aquifer is dependent on the size and extent of the water-bearing openings.

3.2 SURFACE WATER

Based on an interpretation of topographic features presented on the Birmingham North, Alabama USGS 7.5 minute quadrangles (Figure 1), surface water flow from the subject site is generally to the north into an unnamed tributary of Five Mile Creek located 0.6 miles north-northeast of the property. Five Mile Creek is located approximately 1.3 miles north of the subject property.

4.0 MONITORING WELL NETWORK AND GROUNDWATER FLOW

4.1 MONITORING WELL NETWORK

Currently, the ACIPCO Landfill maintains nine (9) monitoring wells at the site (MW-1R3, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, PZ-1, and PZ-2). Of the nine monitoring wells, four (MW-1R3, MW-2, MW-3, and MW-4) are used for the collection of groundwater samples for the purpose of monitoring groundwater quality at the subject facility. Wells MW-5, MW-6, MW-7, PZ-1, and PZ-2 are used for the collection of water level measurements during each semi-annual monitoring event. Well MW-1R3 is designated as the background well for groundwater quality comparisons and is located in the southern portion of the landfill property. Wells MW-2, MW-3, and MW-4 are designated as compliance wells. The monitoring well locations are shown in Figure 2. The available well construction details for monitoring wells at the site are included in Table 4.1 below.

TABLE 4.1 – MONITORING WELL CONSTRUCTION DETAILS

WELL ID	WELL DESIGNATION	MEASURING POINT ELEVATION (FT-AMSL)	MEASURED TOTAL DEPTH (FT-BTOC)	CASING DIAMETER	SCREENED LENGTH (FEET)
MW-1R3	BACKGROUND	655.62	96.93	2-inch	56.50-96.50
MW-2	COMPLIANCE	608.00	39.15	2-inch	NA
MW-3	COMPLIANCE	605.91	36.65	2-inch	NA
MW-4	COMPLIANCE	569.97	31.55	2-inch	NA
MW-5	WATER LEVEL	590.20	36.31	2-inch	13.0 – 33.0
MW-6	WATER LEVEL	602.64	61.10	2-inch	38.0 – 58.0
MW-7	WATER LEVEL	598.18	60.72	2-inch	38.0 – 58.0
PZ-1	WATER LEVEL	648.89	74.14	2-inch	61.0 – 71.0
PZ-2	WATER LEVEL	653.93	64.04	2-inch	52.5 – 62.5

ft-amsl – feet above mean sea level
ft-btoc – feet below top of casing
NA – not available

4.2 HISTORICAL SITE INFORMATION

In October 2004, ACIPCO installed four groundwater monitoring wells surrounding the active cell of the Landfill. Monitoring well MW-1, located near the southern boundary of the Landfill, was designated as the background (upgradient) well in the monitoring well network. Monitoring wells MW-2, MW-3, and MW-4 were designated as the compliance (downgradient) monitoring wells in the monitoring well network.

In March 2006, background well MW-1 was decommissioned from service due to increased turbidity levels in groundwater samples resulting from the collapse of the well screen. Replacement background well MW-1R was installed in March 2006 approximately 150 feet west of former MW-1. Field and analytical data confirmed that monitoring well MW-1R was screened within the same water-

bearing zone (first zone of saturation) as former monitoring well MW-1. Four rounds of replicate samples were collected from MW-1R in March of 2006.

Background well MW-1R was decommissioned from service in March of 2007 due to insufficient groundwater present in the well. Replacement well MW-1RR was installed at a location approximately 700 feet to the southeast from existing well MW-1R. The replacement well was completed at a depth of 89.20 feet below ground surface (ft-bgs) and constructed with a well screen interval of 60 feet (from 89.20 to 29.29 ft-bgs). MW-1RR served until recently as the background well for this facility. MW-1RR was damaged by heavy equipment on the site. A Monitoring Well Abandonment and Replacement Plan was submitted to the ADEM on July 17, 2019 and subsequently approved. A Monitoring Well Abandonment and Replacement Report detailing the abandonment of MW-1RR and the installation of replacement background well MW-1R3 was submitted to the ADEM on August 21, 2019.

Monitoring wells MW-5, MW-6, MW-7, and piezometers PZ-1 and PZ-2 were installed as part of a hydrogeological study in 2009. Water levels collected from these wells and piezometers during the semi-annual monitoring events are used to develop the potentiometric surface map (Figure 2) and to calculate the groundwater flow velocity at the site. However, these wells are not designated as compliance wells in the current permit and samples were not collected from these wells during this monitoring event.

During a site inspection completed by the ADEM on January 10, 2017, it was noted that monitoring well MW-3 had been damaged after being struck by a piece of equipment. A Compliance Assistance letter dated February 9, 2017 was sent to ACIPCO by the ADEM. On January 19, 2017, Smith Drilling mobilized to the site and completed repairs to monitoring well MW-3 as indicated in a letter response to ADEM from ACIPCO dated February 27, 2017.

4.3 GROUNDWATER FLOW

During each semi-annual monitoring event, static water level depth will be measured in each of the monitoring wells prior to purging. For reference, groundwater elevations measured during the March 2024 semi-annual groundwater monitoring event ranged from 559.47 to 600.64 feet above mean sea level (ft-amsl). Groundwater elevation data is included in Table 4.3. A map depicting the potentiometric surface and flow direction for shallow groundwater beneath the site at the time of the March 2024 event is provided as Figure 3.

TABLE 4.3 – GROUNDWATER MEASUREMENTS AND ELEVATIONS – MARCH 2024

WELL ID	MEASURING POINT ELEVATION (FT-AMSL)	MEASURED TOTAL DEPTH (FT-BTOC)	MEASURED DEPTH TO GW (FT-BTOC)	GROUNDWATER ELEVATION (FT-AMSL)
MW-1R3	655.62	96.93	54.98	600.64
MW-2	608.00	38.22	12.46	595.54
MW-3	605.91	36.16	9.93	595.98
MW-4	569.97	31.16	3.43	566.54
MW-5	590.20	36.42	9.84	580.36
MW-6	602.64	61.03	43.17	559.47
MW-7	598.18	60.90	32.05	566.13
PZ-1	648.89	73.98	54.50	594.39
PZ-2	653.93	64.03	61.09	592.84

ft-btoc = feet below top of casing
ft-amsl = feet above mean sea level
GW = groundwater

During each semi-annual monitoring event, static water level depth will be measured in each of the monitoring wells prior to purging to aid in the creation of the potentiometric map. The locations of the above-mentioned wells are shown on Figure 3.

As illustrated by the potentiometric surface map from the March 2024 semi-annual groundwater monitoring event, the direction of groundwater flow beneath the Landfill at the time of the March 2024 groundwater monitoring event was generally to the north-northeast, with mounding evident in the area of the stormwater retention pond. The calculated hydraulic gradient (dh/dl) during the event was estimated to be approximately 0.0216 feet per foot (ft/ft). Groundwater flow velocity in the subsurface materials underlying the Landfill was calculated using the formula V = (K) (dh/dl)/ne, where K is hydraulic conductivity and ne is effective porosity. Aquifer tests conducted by separate contractor in March of 2006 indicated that the hydraulic conductivity of the subsurface in the vicinity of the Landfill is approximately 9.6 x 10^{-4} centimeters per second (cm/sec). Using this estimated hydraulic conductivity, an effective porosity of 15% (Freeze, p. 29), and the calculated hydraulic gradient of 0.0216 ft/ft, the groundwater flow rate is estimated to be approximately 143.09 feet per year (ft/year). An example of the groundwater flow rate calculations (March 2024) is provided in Appendix A.

Since the calculated gradient and flow rate are derived under the assumption that groundwater flow occurs through a homogeneous, isotropic, porous medium, these calculations should only be considered a rough estimate of actual groundwater flow. This seepage velocity does not take into account the effects of vertical flow gradients, flow along secondary fracture pathways, or other conditions caused by lateral heterogeneity.

It should be noted that the potentiometric surface elevation map (Figure 3) is a model of the groundwater potentiometric surface based upon available measured groundwater levels and should be considered only a general depiction of groundwater flow direction for the local area of the Landfill. While the potentiometric surface typically parallels surface topography, the accuracy of the potentiometric surface map is limited to available data from the control points and may conflict with surface topography and/or the actual groundwater potentiometric surface at certain locations.

4.4 MONITORING WELL INSPECTION

During each semi-annual monitoring event the monitoring wells will be inspected for damage. If it is determined that a well should be replaced for any reason, a *Monitoring Well Abandonment and Installation Plan* will be prepared for submittal to ADEM within 60 days of making the determination. The *Monitoring Well Abandonment and Installation Plan* will be accompanied by a request for a Minor Permit Modification to update the facility Permit, a revised *Groundwater Monitoring Plan* to include the proposed new well into the Permit compliance well network, and payment of the appropriate ADEM fee. The Plan will include, at a minimum, consideration of the following:

- The appropriate method for abandonment.
- The need for relocation to protect the replacement well from future damage.
- The anticipated replacement well type, depth, screened interval, casing diameter and surface completion in accordance with ADEM Admin Code 335-13-4-.27(2)(c).
- The need for background sample collection and, if required, the number of background samples and a schedule for completing sample collection.

Upon approval of the *Monitoring Well Abandonment and Installation Plan*, and the subsequent replacement of the new well, a report documenting the abandonment and replacement activities will be prepared and submitted to the ADEM along with a revised *Groundwater Monitoring Plan* which will include monitoring well construction details for the newly installed wells. Background sampling and analysis will be conducted in accordance with Section 4.5 of this GWMP to determine if pooling data from the abandoned well with the new well is appropriate. Once this analysis is complete, the results will be submitted to the ADEM in the semi-annual report following completion of the background sampling activities.

4.5 Background Sampling

Four background sampling events will be conducted for newly installed background wells and compliance wells on a quarterly basis. An additional four background samples will be collected on a semi-annual basis. Samples collected will be analyzed for Appendix I VOCs and Appendix I metals, as required by the Permit. Statistical analysis will be conducted for the newly installed monitoring wells as follows:

- For replacement wells installed in close proximity to an original well, an Analysis of Variance (ANOVA) test will be conducted in order to determine if pooling data from the abandoned well with the replacement well is appropriate following the collection and analysis of a minimum of eight background groundwater samples for Appendix I parameters. Either a parametric or non-parametric ANOVA test will be conducted, depending on normality. The results from these tests will be submitted to the ADEM in the semi-annual report following the completion of the background sampling activities, along with the groundwater analytical data and field sampling logs from each of the sampling events.

- For a newly installed monitoring well, or a replacement well that was not installed in close proximity to an original well that it is replacing, at least eight background sampling events will be conducted for Appendix I parameters prior to conducting statistical analysis. Groundwater analytical data and field sampling logs from each of the sampling events will be submitted to the ADEM in the semi-annual report following completion of the background sampling activities.

5.0 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples will be collected on a semi-annual basis throughout the active life of the facility and the post-closure care period in accordance with ADEM Administrative Rule 335-13-4-.27. Unless otherwise specified by the ADEM, groundwater sampling will be conducted during March and September of each year.

During the semi-annual groundwater monitoring events, and prior to sample collection, static water level measurements will be taken in each monitoring well using an electronic water-level indicator to determine the depth of water and the measured water level as it relates to the screened interval of the well.

All groundwater samples will be collected using either a peristaltic or bladder pump following low-flow sampling protocols. In order to collect water in the screened interval, low-flow purging will be conducted by situating the pump-intake in the middle or slightly above the middle of the screened interval of the well. The intake velocity of the pump will then be set to a flow rate that minimizes draw-down inside the well casing, thereby reducing turbidity and agitation of the water column in the well in order to prevent volatilization of VOCs, if present, and the introduction of suspended sediment into the water column. The pumping rate will be maintained between 200 to 500 milliliters per minute and the water level will be monitored every three to five minutes to determine steady-state flow. An attempt will be made to maintain a draw-down of one foot or less during purging.

Prior to sample collection, groundwater will be purged from each well at a rate approximately equal to the well recharge rate. The turbidity, temperature, specific conductance, dissolved oxygen (DO), oxidation-reduction (redox) potential, and pH of groundwater will be monitored and recorded every three to five minutes as the wells are purged. Samples will be collected when stabilization of these indicator parameters is recorded in three consecutive readings. The three successive readings should be within ± 0.1 for pH, ± 3% for conductivity, ± 10 mv for redox potential, and ± 10% for turbidity and DO. DO and turbidity usually require the longest time for stabilization. Conductivity, DO, and turbidity are the most sensitive parameters. The above stabilization guidelines are provided as estimates and may not always be achieved. Samples will be collected after field indicator parameters have stabilized and will be placed directly into the laboratory containers with minimal agitation to minimize volatilization of chemicals of concern (COCs), if present. The field indicator parameters will be recorded for each well on a field sampling log. An example field sampling log is included as Appendix B and an example of a monitoring well sampling record is provided as Appendix C.

Groundwater samples will be obtained by filling appropriate laboratory-prepared sample containers directly from the discharge tubing connected to the pump or from disposable polyethylene bailers. New tubing will be used for each sample and the pump will be decontaminated prior to use at each sample location. Subsequent to sample collection, the containers will be labeled and placed in a cooler with ice in an effort to achieve and maintain a sample temperature of < 6 °Celcius (C). In the event one or more wells is purged dry, those wells will be allowed to recharge sufficiently prior to sampling. Once recharged, samples from those wells will be collected using a disposal bailer.

The samples will be delivered to a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory, along with proper chain of custody documentation including project name and number; sampler's name and signature; sample identification numbers; sample date, time, and location; requested analyses; and sample container type and quantity.

The samples collected from the site monitoring well network will be analyzed for Appendix I metals and Appendix I VOCs using the EPA Methods shown in Table 5.0 below.

TABLE 5.0 – LABORATORY ANALYTICAL METHODS

PARAMETER	SAMPLE MATRIX	EPA METHOD
Appendix I Metals	Water	6010B or 6020
Mercury	Water	7470
Appendix I VOCs	Water	8260

The laboratory analysis will follow the protocols provided in the *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846* (SW-846), *Standard Methods for the Examination of Water and Wastewater (latest edition),* or other appropriate methods approved by the ADEM.

5.1 GROUNDWATER SAMPLE MANAGEMENT

In accordance with this GWMP, each groundwater sample will be tracked from the time of collection by completing sample custody documentation. The sample custody documentation will include the field documentation and the chain of custody report. All samples will be placed in laboratory provided containers and preserved in a manner appropriate to the analytical method requested. Sample containers will be stored in a clean, secure area prior to use. Containerized samples will be labeled

as they are collected and placed in a cooler with ice to maintain a sample temperature of < 6°C until delivered to the analytical laboratory. Sample criteria are summarized in the Table 5.1 below.

TABLE 5.1 – GROUNDWATER SAMPLING CRITERIA

ANALYSIS	SAMPLE MATRIX	BOTTLE TYPE	PRESERVATIVE	HOLDING TIMES
Appendix I Metals	Water	(1) 250 ml Plastic	6°C / HNO_3	180 Days Mercury 28 Days
Appendix I VOCs	Water	(2) 40 ml Vials	6°C / HCL	14 Days

ml – Milliliter
C – Celsius
HNO_3 – Nitric Acid
HCL – Hydrochloric Acid

Sample labels will be filled out and affixed to appropriate containers immediately prior to or following sample collection, as appropriate. The label will be filled out in indelible ink and will include the following information on the portion affixed to the sample container: sample ID number; analyses requested; project name; the person's name collecting the sample; and, sample location number.

The field data recorded at the time of sample collection provides an unambiguous identification of each sample. These field data will be recorded on groundwater monitoring well field logs. Field notes will include the date and time of sampling; name(s) of field personnel conducting sampling; name(s) of any observers at the sampling site; purpose of sampling; description of sample point; number and size(s) of sample(s) taken; field sample identification number(s); deviation from sampling plan, if any; field observations; references (such as maps) of sampling site; and sample handling and shipping information.

Sample handling and shipping procedures will assure that samples are properly preserved, protected, and secured until delivered to the analytical laboratory. After sample containers are labeled, they will be sealed in plastic air cushion bags and wrapped in clear plastic bags to protect sample bottles and labels from potential moisture damage. Ice packs will be sealed in plastic bags and placed on top of samples in order to maintain an optimum temperature of 4°C until the samples are delivered to the laboratory. Any remaining void space in the ice chest will be filled with appropriate bubble-wrap packing material.

Samples will be hand delivered or shipped via overnight delivery service to the laboratory. Shipped samples will be accompanied by an appropriate freight (shipment) bill of lading form with the completed freight bill number recorded on the Chain of Custody accompanying each cooler shipment.

The Chain of Custody will be sealed in a plastic bag and taped to the underside of the cooler lid. Coolers will be sealed with tape and a custody seal that will be initialed and dated to prevent any tampering during shipping and handling. The laboratory will be notified prior to shipment of samples that would arrive at the laboratory on a weekend or holiday to assure that the samples are properly received.

Sample custody documentation procedures will be maintained throughout initial sample collection; transportation from sample collection site to analytical laboratory; receipt and preparation of laboratory sample extracts and digestives; storage at laboratory until an evaluation of analytical results determines that re-analysis is not required; and final sample disposition.

At the time of sample collection, samples will be labeled and a record of the sampling activity will be recorded in the daily field log. Sample labeling procedures were discussed previously. Information required to identify sample custody and to request sample analyses are then entered on the Chain of Custody. The information recorded on the Chain of Custody will include the project name and number; sampler's name and signature; sample identification numbers; sample date, time, and location; requested analyses; sample container type and quantity; requested analytical turnaround time; and person to receive results and a contact telephone number to call in case problems arise.

A Sample Chain of Custody is included as Appendix D.

6.0 DECONTAMINATION OF EQUIPMENT

All non-disposable equipment and tools will be decontaminated in accordance with the most recent edition of the *Alabama Environmental Investigation and Remediation Guidance* (AEIRG). Personnel decontamination will be performed on an as-needed basis only. Sampling equipment will be either disposable or decontaminated prior to use and between sampling locations. New disposable nitrile gloves will be used during the collection each groundwater sample. Disposable polyethylene tubing will be used with the purge-pump during well purging. The water level indicator and bladder pump will be decontaminated by washing with distilled water and laboratory grade detergent wash, followed by rinsing with distilled water.

7.0 SEMI-ANNUAL REPORTING

Upon receipt of the laboratory analytical results, and within ninety (90) days of the date of sampling, a semi-annual report will be submitted to the ADEM discussing groundwater quality beneath the subject facility. The report will include a statistical analysis of groundwater in accordance with ADEM Administrative Code R. 335-13-4-.27(2)(l) and the Environmental Protection Agency (EPA) standards referenced in the *Statistical Analysis of Groundwater Monitoring Data at Resource Conservation Recovery Act (RCRA) Facilities Unified Guidance*, U.S. EPA, 2009 (Unified Guidance).

7.1 STATISTICAL PROCEDURES

In the application of statistics to groundwater monitoring data from this site, all data will be treated as independent and representative of the quality of groundwater at the site. Statistical methods used, and their application to data from this site, will be in general accordance with the EPA standards referenced in the Unified Guidance. The groundwater monitoring data will be analyzed statistically using the Sanitas statistical software or comparable statistical software.

Upon receipt of the laboratory analytical results, the results will be reviewed to assess the potential for SSIs of metals in groundwater samples collected from the monitoring well network. Statistical analysis will only be conducted for parameters that were reported in groundwater samples collected during each groundwater monitoring event.

Monitoring well MW-1R3 will be designated as the background groundwater quality monitoring locations used for statistical evaluations. Monitoring wells MW-2, MW-3, and MW-4 will be used as compliance wells. Additional historical data from former background well MW-1RR will be used for statistical analysis as discussed in Section 7.3.1.

7.2 TARGET CHEMICALS OF CONCERN

Target COCs for will include each of the Appendix I VOCs and metals.

7.2.1 Double Quantification Rule

Historically, one (1) of the forty-seven (47) Appendix I VOCs has been detected in compliance well MW-2 (1,2-Dibromoethane) during the March 2004 sampling event and represents the only time any VOC constituent has been detected in any sample collected from the ACIPCO Landfill monitoring well network. The detected constituents, as well as the date of their last detection, are provided in Appendix E (Data Screening). Appendix I VOCs have not been detected in samples collected from background well MW-1R3 or compliance wells MW-3 and MW-4. Pursuant to the Unified Guidance,

when background sample data consists entirely of non-detects for a specific constituent, but there are detections above the laboratory detection limit in samples collected from compliance wells, then the Double Quantification Rule (DQR) can be applied. The DQR states that an SSI is declared when a constituent/compliance well pair displays consecutive quantified detections above the detection limit and the background contains only non-detects. Therefore, when the DQR is applied, further analysis to determine a SSI is not warranted. If there are no consecutive detects (either from scheduled events and/or sampling following a detection), then the constituent/compliance well pair is not subjected to statistical analysis.

In the event an Appendix I VOC is detected in a compliance monitoring well that has a history of non-detects, the DQR will be applied. If the constituent is detected during a retesting event, to be completed within two months of the original event, then that constituent/well pair will be subjected to statistical analysis as discussed in Section 7.3.2.

7.3 STATISTICAL ANALYSIS

7.3.1 Statistical Method for Detection Monitoring

An inter-well statistical analysis will be completed for the determination of SSIs in constituent concentrations in groundwater samples collected from the compliance wells during each semi-annual event with the exception of cobalt which will be analyzed using intra-well statistical analysis. Based on an analysis of variance (ANOVA) that was conducted between former background well MW-1RR and current background well MW-1R3, historical data from background well MW-1R3 will be used in the statistical analysis for antimony, arsenic, barium, beryllium, cadmium, chromium, lead, silver, thallium, and vanadium. The remaining Appendix I metals (with the exception of cobalt) will be analyzed using pooled data from MW-1RR and MW-1R3 (copper, nickel, selenium, and zinc). The ANOVA results dated May 4, 2023 were submitted to the ADEM under separate cover. A copy is provided as Appendix F. It should be noted that the Sanitas statistical software did not conduct an ANOVA test for mercury as this constituent has not been detected in MW-1RR or MW-1R3; therefore, only historical data from background well MW-1R3 will be used for statistical analysis for this constituent.

The Intra-Well Parametric or Non-Parametric Prediction Limit statistical analysis compares later results of a constituent in a well to earlier results of the same constituent in the same well. Intra-well comparisons allow for consideration of the natural spatial variation of the constituents across the study area. Based on actual evidence or supported justification of spatial variation in constituent concentrations for cobalt, an intra-well evaluation is recommended for determining the presence of an

SSI for this constituent. The rational for the use of an intra-well analysis is provided in the following discussion.

The bedrock underlying the permitted landfill area is composed of Pennsylvanian Pottsville sandstone, coal and shale. The majority of the property occupied by the landfill is a reclaimed coal strip mine that was surface mined in the 1960's. Overburden materials encountered in the landfill area consist of sandstone bedrock, silty to clayey sandy mine spoil and local sandstone boulders resulting from mining operations historically completed on the property. The southern, eastern and central portion of the landfill contain areas up to a fifty three foot thickness of silty sand mine spoil overburden above sandstone and shale bedrock. The soils in the northern portion of the landfill area consist of five to eleven feet of sandy clay above sandstone and shale bedrock.

During a hydrogeologic evaluation completed for the site in 2008, two piezometers (PZ-1 and PZ-2) were installed in the center of the property through the strip mine spoil footprint and into underlying bedrock, and three monitoring wells (MW-5 through MW-7) were installed on the northern portion of the property, just outside the permitted footprint. MW-5 is located southwest of MW-4, and MW-6 and MW-7 are located southeast of MW-4. Monitoring wells MW-2 and MW-3 are located in the north central portion of the subject property. A review of the boring log completed for abandoned background well MW-1RR, and the boring logs completed for MW-5 through MW-7 located in the vicinity of MW-4, indicate that coal seams were identified in MW-5 from 20-23 ft-bgs, in MW-6 from 50-52 ft-bgs, and in MW-7 from 41-42 ft-bgs. Each of these wells is screened across a coal seam. Though background well MW-1RR was constructed with a total depth of 89.20 ft-btoc, the total depth of the original boring was 231 ft-bgs and coal seams were observed in the original boring for MW-1RR at approximately 118 ft-bgs, 163 ft-bgs, 190 ft-bgs, and 219 ft-bgs, below the screened interval of the well, though, some minor coal seams were observed from 33-89 ft-bgs.

As evidenced above, the composition of subsurface materials in which the wells are screened varies widely across the study area. These variations in composition are expected to influence groundwater geochemistry differently from one well to the next. As such, LaBella is of the opinion that spatial variability exists with respect to cobalt and, therefore, intra-well analysis is appropriate for determining if SSIs exist for cobalt in samples collected from the compliance wells.

The type of statistical method that will be used for evaluating groundwater data will be the Parametric or Non-Parametric Prediction Limit analysis in accordance with ADEM Administrative Code R. 335-13-4-.27(2)(l)3. As discussed in Section 7.3.3, the decision to use Parametric or Non-Parametric analysis will depend on the percentage of non-detects for each constituent, and if required, the results of tests for normality for constituents with a non-detect rate of less than 50%.

7.3.2 Sen's Slope/Mann-Kendall Statistical Evaluation

According to the Unified Guidance, the Sen's Non-Parametric Estimator of Slope is a method of estimating the true slope (change over time) of analytical data. If the data shows an upward slope, there is evidence of an upward trend or increase in a constituent concentration. No identifiable trend would indicate no significant increase or decrease in a particular constituent concentration over time. A decreasing trend would indicate decreasing constituent concentrations over time. Since this method is non-parametric, it is considered suitable for a high percentage of non-detects and is not significantly affected by outliers.

During each semi-annual groundwater monitoring event, samples are collected from the monitoring well network for analysis of Appendix I VOCs. In the event there is an initial exceedance, the procedures discussed in Section 7.4 of this Plan will be initiated and will include a notification to the ADEM, as well as, retesting of the well to confirm the presence of the constituent, if needed.

A Sen's Slope/Mann-Kendall statistical evaluation will be performed for each detected constituent/well pair that has been designated as an SSI to determine if there is an identifiable trend in the target constituent concentration over time. Confidence intervals will also be generated in compliance wells as discussed in Section 7.4.2 of this Plan.

7.3.3 Test For Normality

In accordance with the EPA Unified Guidance, a test for normality should be conducted to determine the appropriate statistical method to be used to evaluate groundwater analytical data as it relates to the distribution of the data. A test for normality will be completed for the appropriate constituents and will satisfy the performance standards required for the selection of the statistical procedures to be used at a facility in accordance with ADEM Administrative Code R. 335-13-4-.27(2)(m)1.

Typically, groundwater analytical data is subjected to a distribution analysis to determine if the data is normally distributed or can be transformed to a normal distribution using either log-normal or ladder of powers data transformations. If data is normally distributed, or can be transformed to create a

normal distribution, a parametric statistical analysis is recommended. However, when the data contains a large percentage of non-detects (greater than 50%), the validity of distribution tests are questionable, suggesting that a non-parametric statistical analysis be used.

In order to determine if a parametric or non-parametric statistical analysis should be conducted, a test for normality will be completed for the detected constituent(s) with less than 50% non-detects in an effort to determine if the data set for the detected constituent(s) is normally distributed or can be transformed to a normal distribution. The Shapiro-Wilks Test for Normality will be used for constituents with less than 50 measurements and the Shapiro-Francia Test for Normality will be used for constituents with greater than 50 measurements, as discussed in Chapter 10 of the Unified Guidance.

If data is normally distributed, or can be transformed to create a normal distribution, a parametric statistical method will be used. When the data is not normally distributed, or cannot be transformed to create a normal distribution, a non-parametric statistical method will be used. Additionally, when the data contains a large percentage of non-detects (greater than 50%), the validity of distribution tests are questionable and it is suggested that a non-parametric method be used. The results for the tests for normality will be submitted in each semi-annual groundwater monitoring report.

7.3.4 Tests for Outliers

Tests for outliers will be conducted in accordance with the Unified Guidance. In order to screen for outliers a Tukey's Outlier Screening, or either a Dixon's Test or a Rosner's Test will be conducted. In the event a outlier is identified, an attempt will be made to determine the cause of the outlier, i.e. lab error, field error, etc., if possible. If outliers are identified within a constituent's dataset, a determination will be made as to whether the outlier(s) should remain in, or be removed, from the dataset prior to completing the statistical analysis. Outliers removed will be identified with an (o) on the historical analytical summary pages in each semi-annual report.

7.3.5 Updating Background Datasets

Background screening will be conducted in accordance with the Unified Guidance. Updating background datasets will be completed after four new compliance observations have been collected (every 2 years for sites undergoing semi-annual groundwater monitoring). Following receipt of the results of the fourth monitoring event, either a t-test (non-detects $\leq$ 75%) or Wilcoxon rank-sum comparison (non-detects $\geq$ 75%) will be conducted.

For constituents evaluated using inter-well analysis, historical data in the background well(s) will be evaluated. Should the comparison indicate no significant difference between the newer data and the existing background data, the newer data will be re-classified as background measurements and added to background. Should the comparison indicate a significant difference between the newer data and the existing background data, either background will not be updated or further investigation, which may include trend tests, will be conducted to determine if there has been a natural shift in background groundwater quality. Should an investigation indicate that there has been a natural shift in background quality, the newer data will not be re-classified as background measurements and added to background without prior ADEM approval.

For constituents evaluated using intra-well analysis (cobalt), historical data in the background well will be evaluated. Should the comparison indicate no significant difference between the newer data and the existing background data, the newer data will be re-classified as background measurements and added to background. Should the comparison indicate that a significant difference exists between the historical data and new data, the datasets will not be updated.

Results of the background screening will be submitted to the ADEM for review with the semi-annual groundwater report following the results of the fourth monitoring event.

7.4 IDENTIFICATION OF AN SSI (OR INITIAL EXCEEDANCE)

Should the statistical analysis confirm the presence of an initial exceedance for one or more target constituents over background groundwater quality, the landfill will comply with the requirements of ADEM Admin. Code 335-13-4-.27(2)(n)3 and notify the Department within 14 days of the finding, and a retesting plan will be initiated in accordance with the Unified Guidance and this GWMP as discussed in Section 7.4.1 below, if needed.

7.4.1 Retesting Plan

In the event there is an initial exceedance over background, the results will be verified by conducting one retesting event (1 of 2). The retesting event will be completed for each of the constituents in each of the monitoring wells that returned an initial exceedance, if needed, and will be completed within 30-90 days of the initial groundwater sampling event.

In order to determine the retesting schedule for detected COCs with initial exceedances within the compliance wells, power curves were generated to determine the proper number of retesting events that would be needed in order to meet the EPA recommended power requirements for determining if

a release has occurred at the facility. Power curves are provided in Appendix G and indicate that in the event there is an initial exceedance over background, the results will be verified by conducting one retesting event (1 of 2).

The results of the retesting events will be submitted to the ADEM as part of the semi-annual report or as an addendum to the semi-annual report. If the results of the retesting event indicate an SSI for a constituent/well pair, statistical analysis using confidence intervals will be conducted for those constituent/well pairs as discussed in Section 7.4.2.

7.4.2 Confidence Intervals

Confidence intervals will be generated for each constituent in each well that has been identified as an SSI. The compliance limits (Groundwater Protection Standards [GWPS]) will be set at the EPA Maximum Contaminant Level (MCL), the EPA Regional Screening Level (RSL) for tap water if an MCL is not available, or at an alternate background concentration with the approval of ADEM. If the constituent is in assessment monitoring, the lower confidence limit (LCL) will be compared to the GWPS.

If the results of the confidence intervals indicate an LCL above the GWPS, an assessment of corrective measures (ACM) will be initiated within 90 days unless a determination can be made that a source other than the landfill unit caused the exceedance, or there was an error in sampling, analytical testing, or statistical analysis. When conducting the ACM, the upper confidence limit (UCL) will be compared to the GWPS. In the event there is a determination of an alternate source, a report will be submitted to the ADEM for approval and placed in the operating record.

7.5 Reporting

In addition to statistical analysis discussed above, the semi-annual report will also include, at a minimum, the following information:

- A discussion of the environmental setting of the facility.
- Summary tables of the laboratory analysis.
- Monitoring well sampling records.
- A table of historic groundwater elevations.
- Historical groundwater analytical results.

- Copies of the laboratory reports.
- Potentiometric surface map(s) illustrating groundwater elevation and flow direction.
- Time versus Concentration Graphs for each detected constituent.
- Other supporting figures, such as site and well location maps.

8.0 REFERENCES

Alabama Department of Environmental Management, Administrative Code R. 335-13-x-xx.

Alabama Department of Environmental Management, American Cast Iron Pipe Company (ACIPCO) Landfill No. 2, Solid Waste Disposal Permit No. 37-41.

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US EPA Region II, Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling, September 2001.

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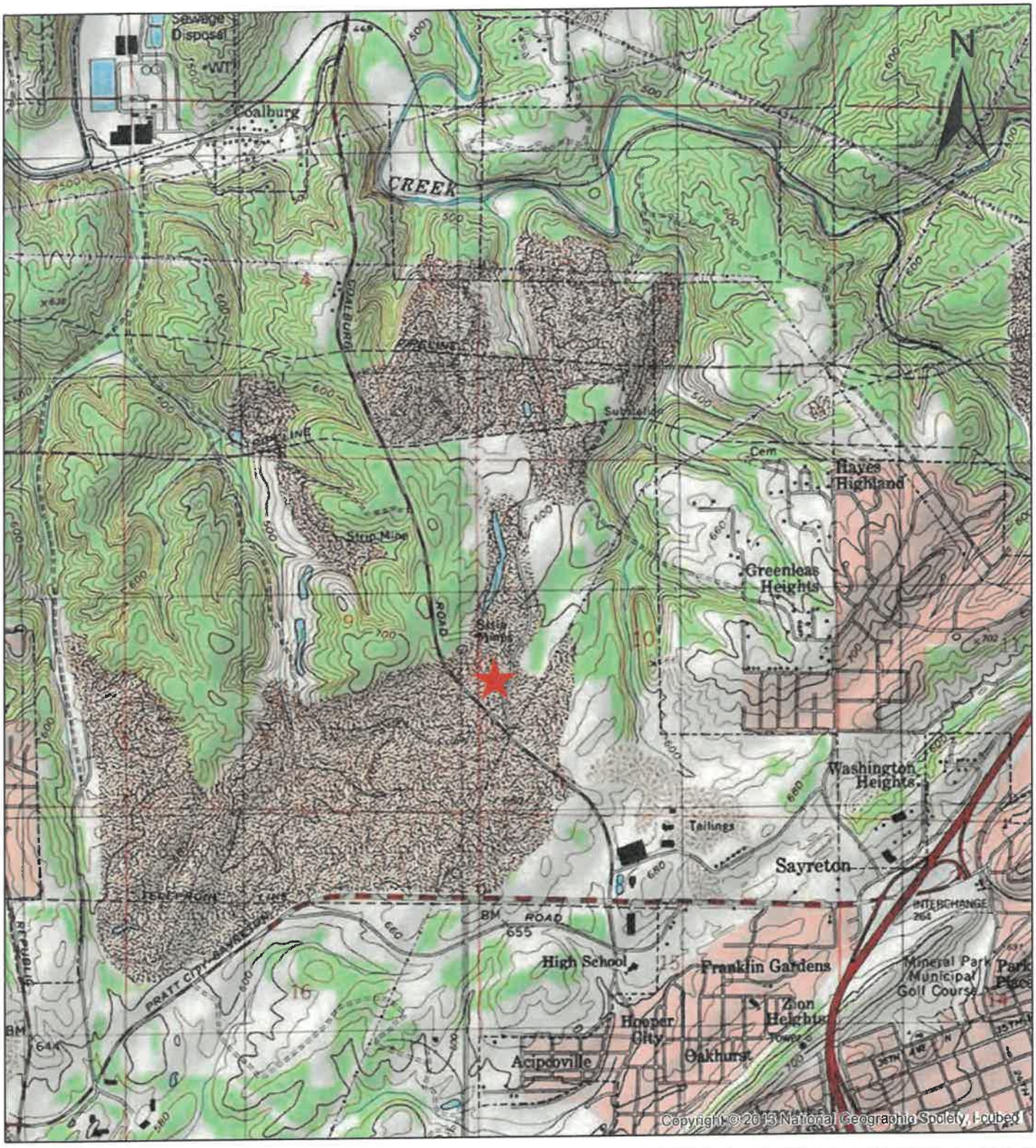
FIGURES



Legend

★ Site Location

LaBella
Powered by partnership

528 MINERAL TRACE
HOOVER, AL 35244
(205) 985-4874

TITLE

Site Location Map

ACIPCO Landfill
Birmingham, Alabama

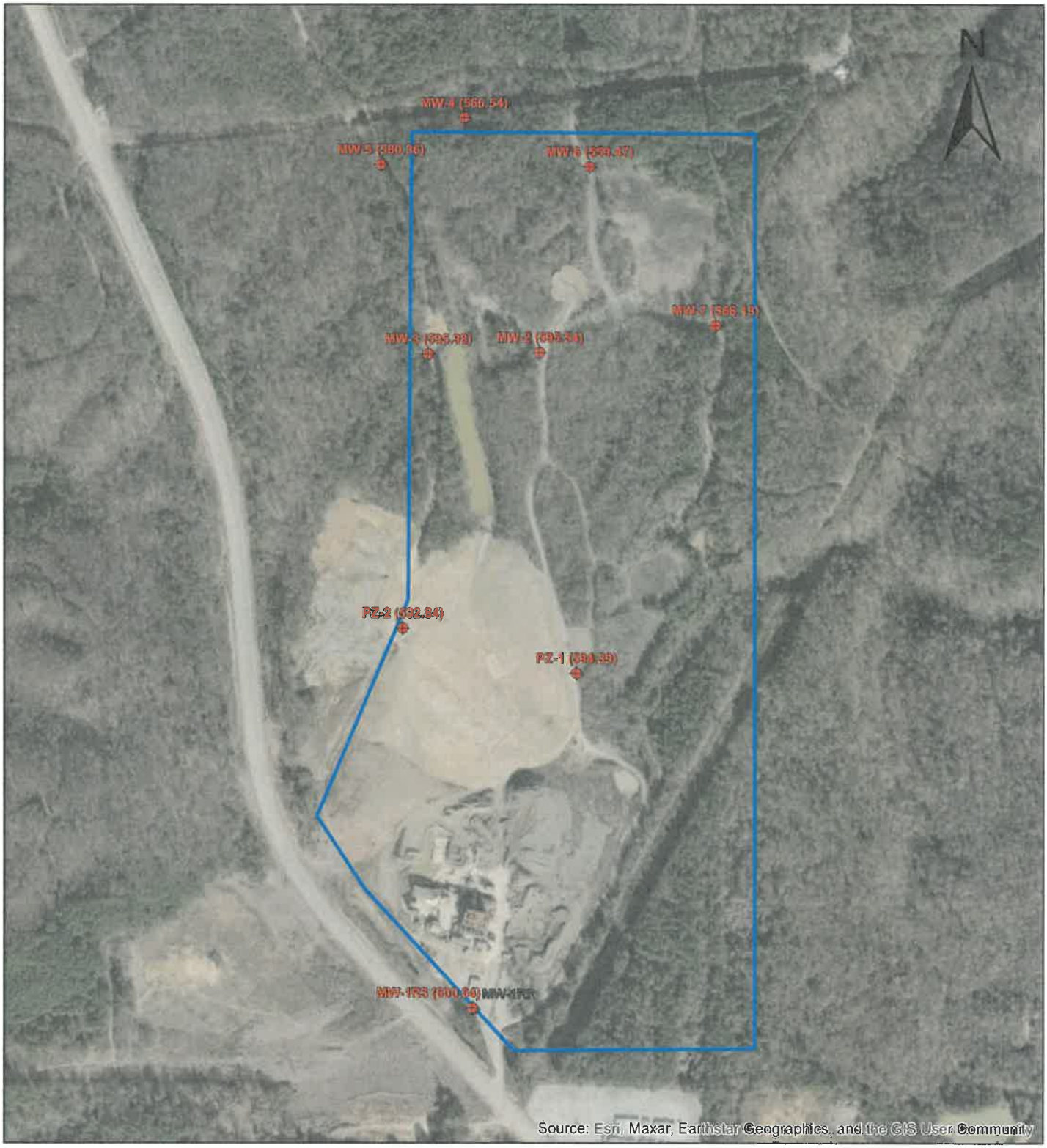
SCALE: 0 1,000 2,000
1 inch = 2,000 feet

FIGURE NO.
1

PROJECT NO.
General Map

DRAWN BY:
AJH

DATE DRAWN:
04-08-2021



Legend

- Groundwater Monitoring Well
- Abandoned Monitoring Wells
- A pproximate Property Boundary

LaBella
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528 MINERAL TRACE
HOOVER, AL 35244
(205) 985-4874

TITLE

Site Plan &
Monitoring Well
Location Map

ACIPCO Landfill No. 2
Birmingham, Alabama

SCALE: 0 300 600
1 inch = 600 feet

FIGURE NO.
2

PROJECT NO.
GENERAL

DRAWN BY:
AJH

DATE DRAWN:
04-09-2024

Legend

- Groundwater Monitoring Well
- Abandoned Monitoring Wells
- Potentiometric Contour Line
- Approximate Property Boundary
- Groundwater Flow Direction
- (600.64) Measured Groundwater Elevation

LaBella
Powered by partnership

528 MINERAL TRACE
HOOVER, AL 35244
(205) 985-4874

TITLE
Potentiometric Surface Map

March 11, 2024
Semi-Annual Groundwater Monitoring Event

ACIPCO Landfill No. 2
Birmingham, Alabama

SCALE: 0 300 600
1 inch = 600 feet

FIGURE NO. 2

PROJECT NO. 2231666

DRAWN BY: AJH

DATE DRAWN: 04-09-2024

APPENDIX A

Appendix A
Calculated Groundwater Flow Velocities
March 11, 2024

Monitoring Well	Groundwater Elevation (ft-amsl)	Distance from up- to down- gradient well (feet)	Gradient (i)	Hydraulic Conductivity (cm/sec)	effective porosity (ne)	Estimated Flow Velocity (feet/year)
PZ-2	592.84	2550		0.00096	0.15	
MW-7	566.13		0.0105	0.00096	0.15	69.36
MW-3	595.98	1115		0.00096	0.15	
MW-6	559.47		0.0327	0.00096	0.15	216.82
		average gradient	0.0216		average velocity	143.09

Notes:

1. Effective porosity values from Freeze & Cherry (1979) Table 2.4.
2. Hydraulic conductivity value was obtained from aquifer tests completed by others.

ft-amsl - feet above mean sea level
cm/sec - centimeters per second

APPENDIX B

LaBella
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SITE NAME: ACIPCO Landfill	PROJECT:	PROJECT:
FIELD PERSONNEL/SAMPLER:	WEATHER CONDITIONS:	DATE:
WELL NO:	WELL DIAMETER (in):	PURGE PUMP TYPE OR BAILER:
TOTAL WELL DEPTH (feet):	SCREEN (FT-BGS):	
STATIC WATER LEVEL (feet):	TIME:	
DEPTH TO FREE PRODUCT (feet):		
LENGTH OF WATER COLUMN:		
WELL VOLUME (gallons):	WELL VOLUME X 4 (gallons):	
Calculation: 1 well volume = (total well depth - static water level) x well capacity [0.16 for 2" well]		

PURGING DATA

INITAIL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	
PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	DEPTH TO WATER (feet)	Volume Purged (gallons)	Cumulative Volume Purged (gallons)	pH (standard units)	COND. (mS/cm)	TURBIDITY (NTUs)	DISSOLVED OXYGEN (mg/L)	TEMP. (°C)	REDOX (ORP) (mV)	COLOR	ODOR

REMARKS:

SAMPLING DATA

SAMPLE DATE:	SAMPLE TIME:	SAMPLE METHOD:

ANALYSIS AND/OR METHOD	VOLUME	#CONTAINERS	PRESERVATIVE USED:	COMMENTS:

REMARKS:

Verify Well Cap Secured and Locked*	Yes:		

CALIBRATION INFORMATION:

SAMPLED BY (PRINT):	SAMPLER(S) SIGNATURES:

LaBella Associates, D.P.C.
528 Mineral Trace
Hoover, Alabama 35244
Phone (205) 985-4874 Fax (205) 987-6080

APPENDIX C

MONITORING WELL SAMPLING RECORD

PROJECT NO:
PROJECT NAME: ACIPCO Landfill No. 2
SITE LOCATION: Birmingham, Alabama
RECORDED BY:

WELL NUMBER	MW-1RR	MW-1R3	MW-2	MW-3	MW-4
GENERAL WELL DATA					
Top of Casing (TOC) Elevation (ft)	658.25	655.62	608.00	605.91	569.97
Original Total Depth (feet)	91.50	97.10	NA	NA	NA
TOC Height (ft above/below grade)	~ 3'	0.1	~ 3'	~ 3'	~ 3'
Screened Interval (ft-bgs)	29.20-89.20	56.50-96.50	NA	NA	NA
Well Diameter (in)/Material	2 in, PVC	2 in, PVC	2 in, PVC	2 in, PVC	2 in, PVC
Current Well Condition					
WATER LEVEL DATA					
Date (mm/dd/yyyy)					
Time (military)					
Measured Total Depth (ft below TOC)					
Static Water Level (ft below TOC)					
Static Elevation (ft - AMSL)					
WELL PURGE DATA					
Purge Date (mm/dd/yyyy)					
Purge Time (military)					
Minimum Purge Volume (gal)					
Actual Purge Volume (gal)					
Equipment Used					
WELL SAMPLING DATA					
Sampling Date (mm/dd/yyyy)					
Sampling Time (military)					
Weather Conditions					
Equipment Used					
Groundwater pH (std units)					
Specific Conductance (mS/cm)					
Turbidity (NTU)					
Dissolved Oxygen (mg/L)					
Groundwater Temperature (degrees C)					
Oxidation-Reduction Potential (mV)					
Number of Containers Filled					
Water Clarity					
Parameters to be Analyzed					

I certify that all water level measurement devices, purging equipment, and sampling equipment were properly cleaned prior to use in each well. Signature

REMARKS
NA = Not Applicable/Not Available

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Hoover, Alabama 35244
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APPENDIX D

LABELLA ASSOCIATES, D.P.C.
528 MINERAL TRACE
BIRMINGHAM, ALABAMA 35244
PHONE: (205) 985-4874
FAX: (205) 987-6080
EMAIL:

Analysis Required

Collected By:	Project Name:	Laboratory Name:
Signature:	Project No.:	Laboratory Address:

Sample ID	Lab ID	Comp/ Grab	Sample Matrix	Sample Date	Sample Time	Sample Preservative	Remarks:

Matrix: **SS** – Soil/Solid **GW** – Groundwater **WW** – Waste Water
DW – Drinking Water **SW** – Stormwater **OT** - Other

Special Instructions:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Samples Shipped Via:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Lab Remarks:
Relinquished By:	Date:	Time:	Received for Lab By:	Date:	Time:	

APPENDIX E

VOC Screening

Analysis Run 8/13/2024 2:33 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

A listing of detects and trace values for 47 constituents in 5 wells on 52 dates:

1,2-Dibromoethane, MW-2, 9/21/2004: 0.03

APPENDIX F

Analysis of Variance

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data Printed 5/4/2023, 4:03 PM

Constituent	Well	Calc.	Crit.	Sig.	Alpha	Transform	ANOVA Sig.	Alpha	Method
Antimony (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Arsenic (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	Param.
Barium (ug/l)	n/a	n/a	n/a	n/a	n/a	ln(x)	Yes	0.05	Param.
Beryllium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Cadmium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Chromium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Cobalt (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Copper (ug/l)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Lead (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (normality)
Nickel (ug/l)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)
Selenium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (NDs)
Silver (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Thallium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Vanadium (ug/l)	n/a	n/a	n/a	n/a	n/a	No	Yes	0.05	NP (NDs)
Zinc (ug/l)	n/a	n/a	n/a	n/a	n/a	No	No	0.05	NP (normality)

Non-Parametric ANOVA

Constituent: Antimony Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 15.43

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 13.68
Adjusted Kruskal-Wallis statistic (H') = 15.43

Non-Parametric ANOVA

Constituent: Antimony (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<1	
3/8/2008	<1	
9/3/2008	<1	
3/3/2009	<1	
9/1/2009	1.3	
3/1/2010	<0.1	
9/1/2010	<1	
3/1/2011	<1	
9/2/2011	<1	
3/1/2012	<1	
9/4/2012	<1	
3/1/2013	<1	
9/9/2013	<1	
3/31/2014	<1	
9/15/2014	<1	
3/20/2015	<2	
9/10/2015	<2	
3/18/2016	<2	
9/2/2016	<2	
3/3/2017	<2	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<4
3/16/2021		<4
9/10/2021		<4
3/8/2022		<4
9/1/2022		<4
3/29/2023		<4

Parametric ANOVA

Constituent: Arsenic Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023 the parametric analysis of variance test indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 9.615

Tabulated F statistic = 4.18 with 1 and 29 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	216.5	1	216.5	9.615
Error Within Groups	653	29	22.52	
Total	869.5	30		

The Shapiro Wilk normality test on the residuals passed on the raw data. Alpha = 0.01, calculated = 0.9184, critical = 0.902. Levene's Equality of Variance test passed. Calculated = 2.489, tabulated = 4.18.

Parametric ANOVA

Constituent: Arsenic (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	8.8	
3/8/2008	12	
3/3/2009	4.1	
9/1/2009	12	
3/1/2010	7	
9/1/2010	7.8	
3/1/2011	<1	
9/2/2011	11	
3/1/2012	11	
9/4/2012	11	
3/1/2013	7.9	
9/9/2013	9.3	
3/31/2014	<5	
9/15/2014	9.8	
3/20/2015	10	
9/10/2015	9.32	
3/18/2016	6.97	
9/2/2016	<2	
3/3/2017	18.3	
9/8/2017	9.37	
3/22/2018	23.7	
9/7/2018	14.7	
3/7/2019	2.12	
9/10/2019		3.48
3/13/2020		5.55
9/2/2020		4.12 (B)
3/16/2021		<2
9/10/2021		5.4
3/8/2022		3.24
9/1/2022		<2
3/29/2023		<2

Parametric ANOVA

Constituent: Barium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 3/8/2008 and 3/29/2023 the parametric analysis of variance test (after natural log transformation) indicates VARIATION at the 5% significance level. Because the calculated F statistic is greater than the tabulated F statistic, the hypothesis of a single homogeneous population is rejected.

Calculated F statistic = 18.59

Tabulated F statistic = 4.2 with 1 and 28 degrees of freedom at the 5% significance level.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Groups	2.259	1	2.259	18.59
Error Within Groups	3.403	28	0.1215	
Total	5.662	29		

The Shapiro Wilk normality test on the residuals passed after natural log transformation. Alpha = 0.01, calculated = 0.9291, critical = 0.9. Levene's Equality of Variance test passed. Calculated = 1.129, tabulated = 4.2.

Parametric ANOVA

Constituent: Barium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
3/8/2008	53	
3/3/2009	190	
9/1/2009	230	
3/1/2010	200	
9/1/2010	190	
3/1/2011	190	
9/2/2011	160	
3/1/2012	120	
9/4/2012	180	
3/1/2013	120	
9/9/2013	150	
3/31/2014	200	
9/15/2014	190	
3/20/2015	210	
9/10/2015	143	
3/18/2016	124	
9/2/2016	189	
3/3/2017	192	
9/8/2017	140	
3/22/2018	215	
9/7/2018	157	
3/7/2019	146	
9/10/2019		277
3/13/2020		562
9/2/2020		578
3/16/2021		302
9/10/2021		214
3/8/2022		260
9/1/2022		258
3/29/2023		168

Non-Parametric ANOVA

Constituent: Beryllium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 8.037

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 5.939
Adjusted Kruskal-Wallis statistic (H') = 8.037

Non-Parametric ANOVA

Constituent: Beryllium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<2	
3/8/2008	<1	
9/3/2008	<1	
3/3/2009	<1	
9/1/2009	<1	
3/1/2010	<1	
9/1/2010	<1	
3/1/2011	<1	
9/2/2011	<1	
3/1/2012	<1	
9/4/2012	<1	
3/1/2013	<1	
9/9/2013	<1	
3/31/2014	<1	
9/15/2014	<1	
3/20/2015	<2	
9/10/2015	<2	
3/18/2016	<2	
9/2/2016	<2	
3/3/2017	<2	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<2
3/16/2021		<2
9/10/2021		<2
3/8/2022		<2
9/1/2022		<2
3/29/2023		<2

Non-Parametric ANOVA

Constituent: Cadmium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 6.677

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 5.121
Adjusted Kruskal-Wallis statistic (H') = 6.677

Non-Parametric ANOVA

Constituent: Cadmium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<5	
3/8/2008	<0.5	
9/3/2008	<0.5	
3/3/2009	<0.5	
9/1/2009	<0.5	
3/1/2010	<0.5	
9/1/2010	<0.5	
3/1/2011	<0.5	
9/2/2011	<0.5	
3/1/2012	<0.5	
9/4/2012	<0.5	
3/1/2013	<0.5	
9/9/2013	<0.5	
3/31/2014	<0.5	
9/15/2014	<0.5	
3/20/2015	<1	
9/10/2015	<1	
3/18/2016	<1	
9/2/2016	<1	
3/3/2017	<1	
9/8/2017	<1	
3/22/2018	<1	
9/7/2018	<1	
3/7/2019	<1	
9/10/2019		<1
3/13/2020		<1
9/2/2020		<1
3/16/2021		<1
9/10/2021		<1
3/8/2022		<1
9/1/2022		<1
3/29/2023		<1

Non-Parametric ANOVA

Constituent: Chromium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 9.853

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 8.002
Adjusted Kruskal-Wallis statistic (H') = 9.853

Non-Parametric ANOVA

Constituent: Chromium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<10	
3/8/2008	<10	
9/3/2008	<10	
3/3/2009	<10	
9/1/2009	<10	
3/1/2010	2 (J)	
9/1/2010	<10	
3/1/2011	<10	
9/2/2011	<10	
3/1/2012	<10	
9/4/2012	12	
3/1/2013	<10	
9/9/2013	<10	
3/31/2014	<10	
9/15/2014	<10	
3/20/2015	<10	
9/10/2015	<10	
3/18/2016	<10	
9/2/2016	<10	
3/3/2017	<10	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		2.58
3/13/2020		2.18 (B)
9/2/2020		2.41
3/16/2021		<2
9/10/2021		2.54
3/8/2022		<2
9/1/2022		<2
3/29/2023		3.07

Non-Parametric ANOVA

Constituent: Cobalt Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 8.291

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 1 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.818
Adjusted Kruskal-Wallis statistic (H') = 8.291

Non-Parametric ANOVA

Constituent: Cobalt (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	14	
3/8/2008	<10	
9/3/2008	<10	
3/3/2009	<10	
9/1/2009	<10	
3/1/2010	4.2 (J)	
9/1/2010	<10	
3/1/2011	<10	
9/2/2011	<10	
3/1/2012	<10	
9/4/2012	<10	
3/1/2013	<10	
9/9/2013	<10	
3/31/2014	<10	
9/15/2014	<10	
3/20/2015	<10	
9/10/2015	<10	
3/18/2016	<10	
9/2/2016	<10	
3/3/2017	<10	
9/8/2017	1.72 (J)	
3/22/2018	2.25	
9/7/2018	0.746 (J)	
3/7/2019	14.4	
9/10/2019		2.52
3/13/2020		1.09 (J)
9/2/2020		3.94
3/16/2021		3.02
9/10/2021		9.52
3/8/2022		3.08
9/1/2022		1.68
3/29/2023		0.302

Non-Parametric ANOVA

Constituent: Copper Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 2.218

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 1.939
Adjusted Kruskal-Wallis statistic (H') = 2.218

Non-Parametric ANOVA

Constituent: Copper (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<20	
3/8/2008	1.2	
9/3/2008	<5	
3/3/2009	2.6	
9/1/2009	37	
3/1/2010	<10	
9/1/2010	<10	
3/1/2011	2.4	
9/2/2011	4.5	
3/1/2012	3.6	
9/4/2012	6.9	
3/1/2013	<2	
9/9/2013	4.8	
3/31/2014	<10	
9/15/2014	<2	
3/20/2015	19	
9/10/2015	<5	
3/18/2016	<5	
9/2/2016	<5	
3/3/2017	<5	
9/8/2017	<5	
3/22/2018	5.26	
9/7/2018	<5	
3/7/2019	<5	
9/10/2019		<5
3/13/2020		<5
9/2/2020		<5
3/16/2021		<5
9/10/2021		<5
3/8/2022		<5
9/1/2022		<5
3/29/2023		<5

Non-Parametric ANOVA

Constituent: Lead Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 15.59

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 14.38
Adjusted Kruskal-Wallis statistic (H') = 15.59

Non-Parametric ANOVA

Constituent: Lead (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<5	
3/8/2008	<5	
9/3/2008	<5	
3/3/2009	8.3	
9/1/2009	<5	
3/1/2010	<5	
9/1/2010	6.3	
3/1/2011	8.5	
9/2/2011	<5	
3/1/2012	<5	
9/4/2012	15	
3/1/2013	5.4	
9/9/2013	5.9	
3/31/2014	<5	
9/15/2014	<5	
9/10/2015	7.79	
3/18/2016	8.72	
9/2/2016	<5	
3/3/2017	<5	
9/8/2017	2.42	
3/22/2018	2.16	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<2
3/16/2021		<2
9/10/2021		<2
3/8/2022		<2
9/1/2022		<2
3/29/2023		<2

Non-Parametric ANOVA

Constituent: Nickel Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.387

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.03
Adjusted Kruskal-Wallis statistic (H') = 3.387

Non-Parametric ANOVA

Constituent: Nickel (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<20	
3/8/2008	<20	
9/3/2008	<20	
3/3/2009	<20	
9/1/2009	<20	
3/1/2010	<20	
9/1/2010	30	
3/1/2011	<20	
9/2/2011	<20	
3/1/2012	<20	
9/4/2012	<20	
3/1/2013	<20	
9/9/2013	<20	
3/31/2014	<20	
9/15/2014	<20	
3/20/2015	<20	
9/10/2015	<10	
3/18/2016	<10	
9/2/2016	<10	
3/3/2017	<10	
9/8/2017	2.29	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	1.18	
9/10/2019		3.5
3/13/2020		<2
9/2/2020		3.98
3/16/2021		7.8
9/10/2021		12.9
3/8/2022		3.66
9/1/2022		3.86
3/29/2023		5.68

Non-Parametric ANOVA

Constituent: Selenium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 3/8/2008 and 3/29/2023, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.04353

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.03519
Adjusted Kruskal-Wallis statistic (H') = 0.04353

Non-Parametric ANOVA

Constituent: Selenium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
3/8/2008	3.2	
9/3/2008	<5	
3/3/2009	<1	
3/1/2010	<5	
9/1/2010	<5	
3/1/2011	<1	
9/2/2011	1.2	
3/1/2012	<1	
9/4/2012	1.1	
3/1/2013	<1	
9/9/2013	<1	
3/31/2014	<5	
9/15/2014	<1	
3/20/2015	<2	
9/10/2015	<2	
3/18/2016	<2	
9/2/2016	<2	
3/3/2017	<2	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<2
3/16/2021		<2
9/10/2021		<2
3/8/2022		<2
9/1/2022		<2
3/29/2023		<2

Non-Parametric ANOVA

Constituent: Silver Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 14.76

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 12.12
Adjusted Kruskal-Wallis statistic (H') = 14.76

Non-Parametric ANOVA

Constituent: Silver (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<10	
3/8/2008	<10	
9/3/2008	<10	
3/3/2009	<10	
9/1/2009	<10	
3/1/2010	<10	
9/1/2010	<10	
3/1/2011	<10	
9/2/2011	<10	
3/1/2012	<10	
9/4/2012	<10	
3/1/2013	<10	
9/9/2013	<10	
3/31/2014	<10	
9/15/2014	<10	
3/20/2015	<10	
9/10/2015	<5	
3/18/2016	<5	
9/2/2016	<5	
3/3/2017	<5	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<2
3/16/2021		<2
9/10/2021		<2
3/8/2022		<2
9/1/2022		<2
3/29/2023		<2

Non-Parametric ANOVA

Constituent: Thallium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 4.68

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.667
Adjusted Kruskal-Wallis statistic (H') = 4.68

Non-Parametric ANOVA

Constituent: Thallium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<1	
3/8/2008	<1	
9/3/2008	<5	
3/3/2009	<1	
9/1/2009	<1	
3/1/2010	<5	
9/1/2010	<1	
3/1/2011	<1	
9/2/2011	<1	
3/1/2012	<1	
9/4/2012	<1	
3/1/2013	<1	
9/9/2013	<1	
3/31/2014	<1	
9/15/2014	<1	
3/20/2015	<2	
9/10/2015	<2	
3/18/2016	<2	
9/2/2016	<2	
3/3/2017	<2	
9/8/2017	<2	
3/22/2018	<2	
9/7/2018	<2	
3/7/2019	<2	
9/10/2019		<2
3/13/2020		<2
9/2/2020		<2
3/16/2021		<2
9/10/2021		<2
3/8/2022		<2
9/1/2022		<2
3/29/2023		<2

Non-Parametric ANOVA

Constituent: Vanadium Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates a DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is greater than the Chi-squared value, we conclude that at least one group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 13.46

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 12.12
Adjusted Kruskal-Wallis statistic (H') = 13.46

Non-Parametric ANOVA

Constituent: Vanadium (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<10	
3/8/2008	<10	
9/3/2008	<10	
3/3/2009	<10	
9/1/2009	16	
3/1/2010	<10	
9/1/2010	<10	
3/1/2011	<10	
9/2/2011	11	
3/1/2012	<10	
9/4/2012	16	
3/1/2013	<10	
9/9/2013	<10	
3/31/2014	<10	
9/15/2014	<20	
3/20/2015	<20	
9/10/2015	<20	
3/18/2016	<20	
9/2/2016	<20	
3/3/2017	<20	
9/8/2017	<5	
3/22/2018	<5	
9/7/2018	<5	
3/7/2019	<5	
9/10/2019		<5
3/13/2020		<5
9/2/2020		<5
3/16/2021		<5
9/10/2021		<5
3/8/2022		<5
9/1/2022		<5
3/29/2023		<5

Non-Parametric ANOVA

Constituent: Zinc Analysis Run 5/4/2023 4:04 PM View: Target Metals
ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

For observations made between 9/13/2007 and 3/29/2023, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.07323

Tabulated Chi-Squared value = 3.841 with 1 degree of freedom at the 5% significance level.

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.06818
Adjusted Kruskal-Wallis statistic (H') = 0.07323

Non-Parametric ANOVA

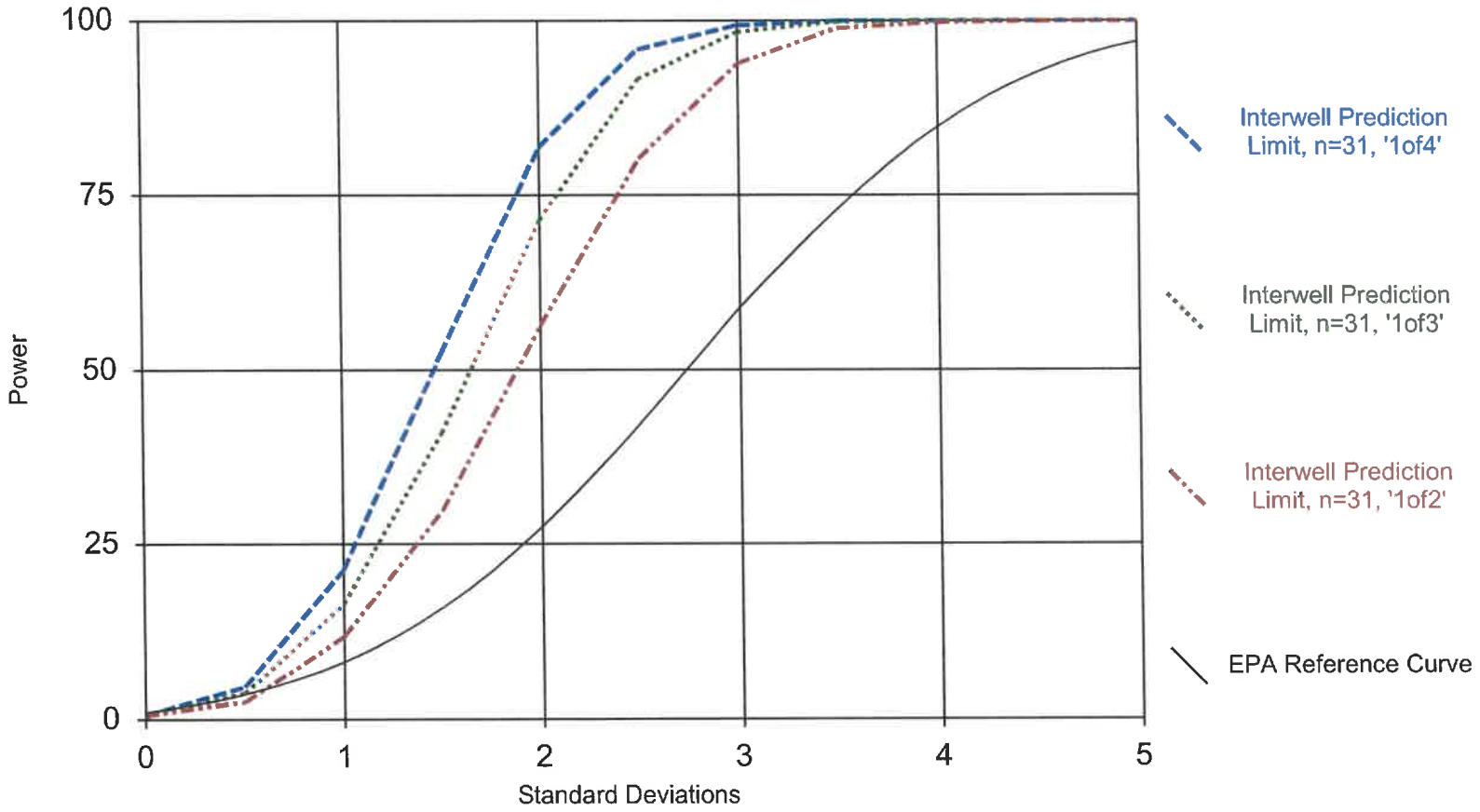
Constituent: Zinc (ug/l) Analysis Run 5/4/2023 4:04 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

	MW-1RR (bg)	MW-1R3 (bg)
9/13/2007	<30	
3/8/2008	41	
9/3/2008	<50	
3/3/2009	42	
9/1/2009	43	
3/1/2010	<50	
9/1/2010	<50	
3/1/2011	11	
9/2/2011	27	
3/1/2012	19	
9/4/2012	32	
3/1/2013	11	
9/9/2013	18	
3/31/2014	<50	
9/15/2014	20	
3/20/2015	41	
9/10/2015	<25	
3/18/2016	<25	
9/2/2016	<25	
3/3/2017	<25	
9/8/2017	<25	
3/22/2018	<25	
9/7/2018	<25	
3/7/2019	<25	
9/10/2019		<25
3/13/2020		82.1
9/2/2020		43.9
3/16/2021		<25
9/10/2021		61.4
3/8/2022		<25
9/1/2022		<25
3/29/2023		<25

APPENDIX G

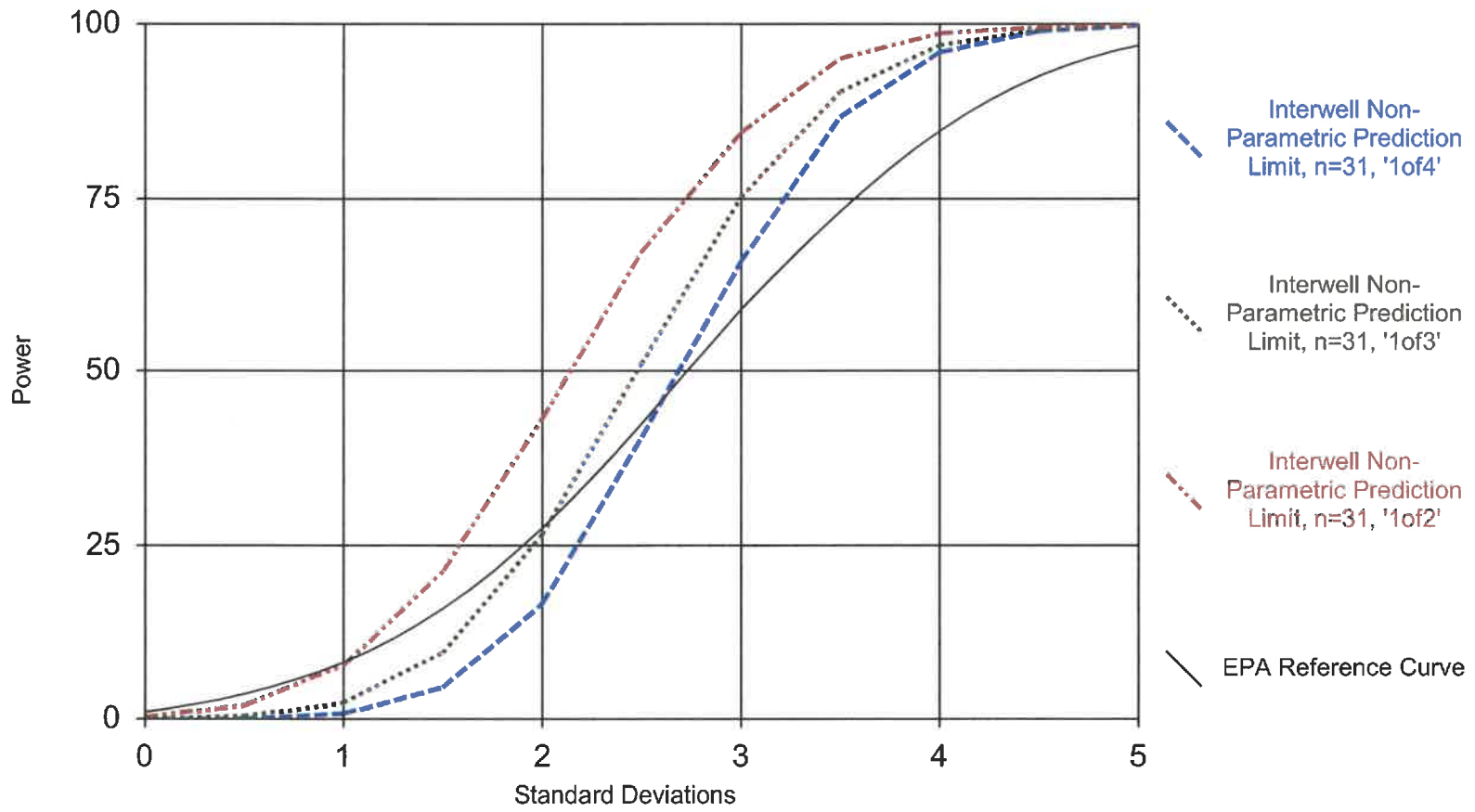
Power Curve



Analysis Run 8/9/2024 1:13 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

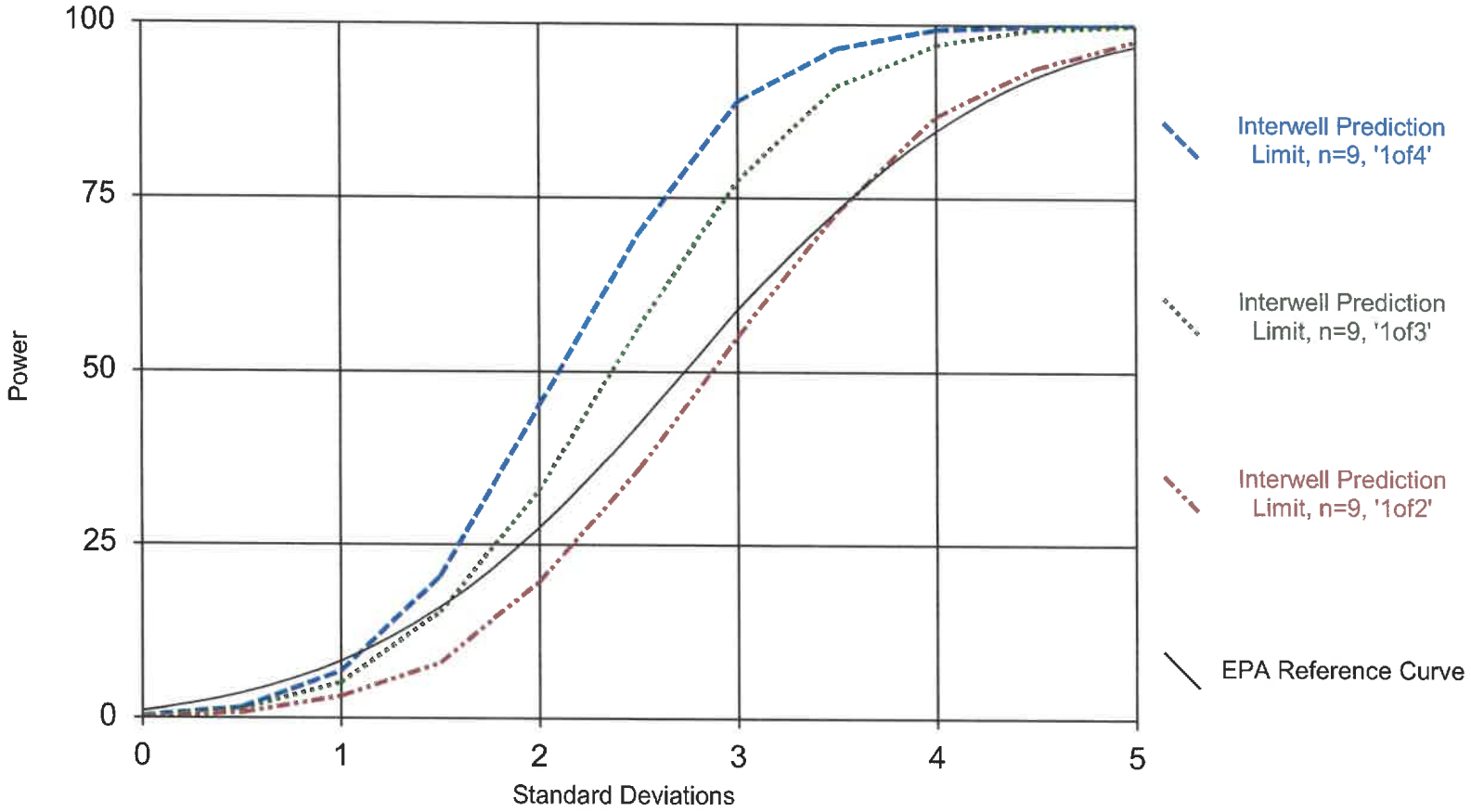
Power Curve



Analysis Run 8/9/2024 1:14 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

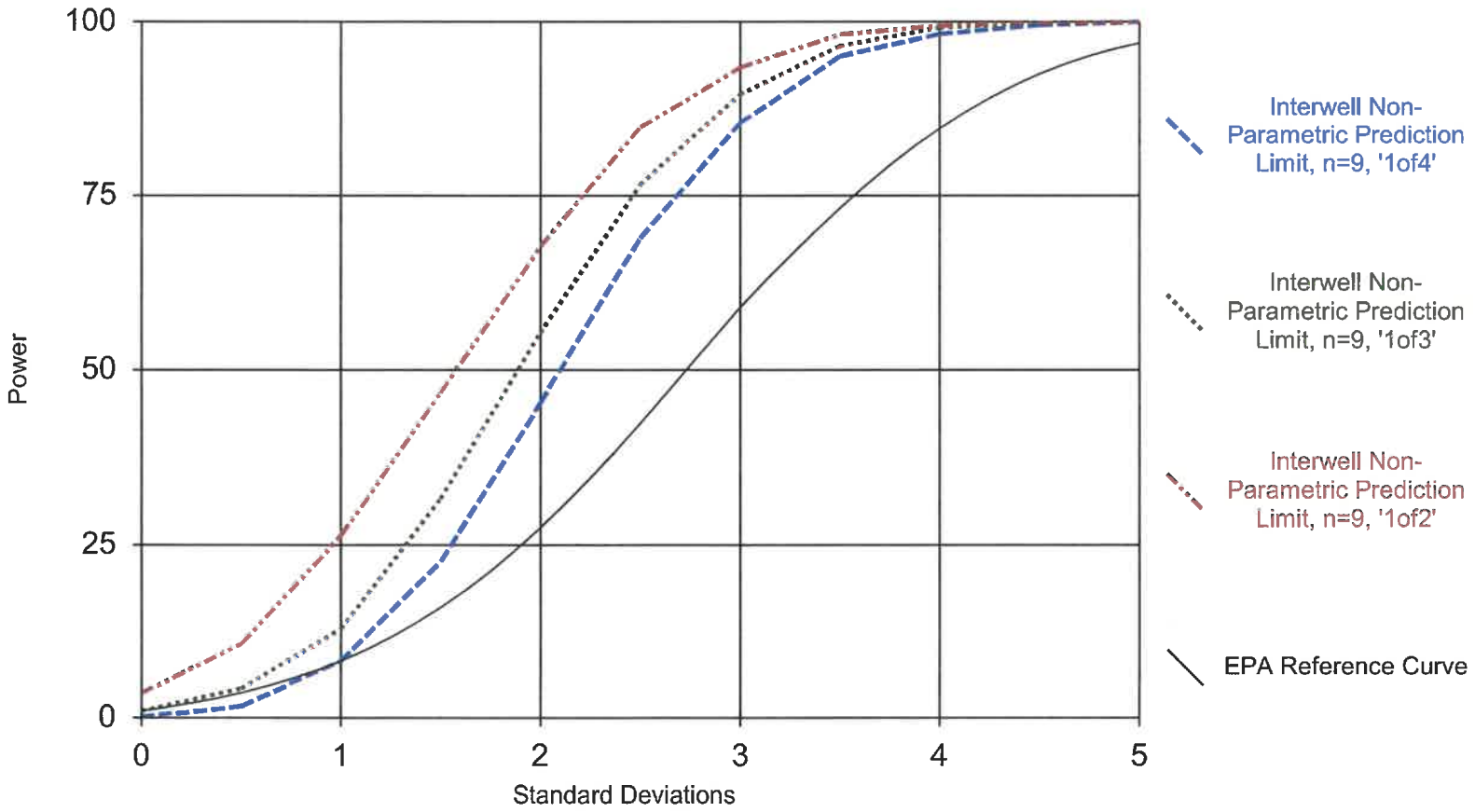
Power Curve



Analysis Run 8/9/2024 1:09 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data

Power Curve



Analysis Run 8/9/2024 1:11 PM View: Target Metals

ACIPCO Landfill Client: American Cast Iron Pipe Company Data: ACIPCO Statistics Data