Mueller Property Holdings, LLC
Birmingham, Alabama
EPA I.D. Number ALD 004 017 901

FACT SHEET

A draft modification of the Alabama Hazardous Waste Management and Minimization Act (AHWMMA) permit has been prepared for the Mueller Property Holdings, LLC facility. This hazardous waste facility is located in Birmingham, Alabama. This fact sheet has been prepared to briefly advise the public of the principal permitting, legal and policy issues of the draft permit.

I. PERMIT PROCESS

The purpose of the permitting process is to allow the State and the public to evaluate Mueller Property Holdings, LLC's ability to comply with the hazardous waste management requirements of the AHWMMA, as amended. Mueller Property Holdings, LLC must comply with hazardous waste management conditions set forth in the permit during the effective period of the permit, which is ten (10) years from the last permit renewal.

II. PROCEDURES FOR REACHING A FINAL DECISION

The Alabama Department of Environmental Management (ADEM or Department) is proposing to issue Mueller Property Holdings, LLC a permit modification for post-closure care for the Closed Landfill (SWMU 21) which has been closed as a single landfill unit with wastes and/or contaminated soils remaining in-place.

ADEM Admin. Code r. 335-14-8-.08(6)(b)1. requires that the public be given at least a 45-day comment period for each draft permit. The comment period will begin on March 18, 2026, which is the date of publication of the public notice in major local newspaper(s) of general circulation, and will end on May 4, 2026. The public notice will also be broadcast over local radio station(s).

Any person interested in commenting on the application or draft permit must do so within the 45-day comment period discussed above.

All persons wishing to comment on any of the permit conditions or the permit application should submit their comments in writing to the Alabama Department of Environmental Management, Permits and Services Division, 1400 Coliseum Blvd. (ZIP 36110-2059), P.O. Box 301463 (ZIP 36130-1463) Montgomery, Alabama, ATTENTION: Mr. Russell A. Kelly.

ADEM will consider all written comments received during the comment period while making a permit decision for this facility. When the Department makes its final permit decision, notice will be given to the applicant and each person who has submitted written comments or requested notice of the final permit decision.

III. FACILITY DESCRIPTION

Mueller Property Holdings, LLC has requested for a permit modification under the requirements of AHWMMA for post-closure care including corrective action for groundwater contamination. Mueller Property Holdings, LLC is a facility that was formerly a ductile iron foundry involved in the casting and sale of water piping and associated materials. The hazardous waste which was managed in the Closed Landfill (SWMU 21) was D006, D008, D018, D027, and D039. The Closed Landfill (SWMU 21) has an approved cap and cover installed over the remaining waste. These actions are intended to mitigate the potential for future groundwater contamination. The proposed permit modification will contain provisions for post-closure care for the Closed Landfill (SWMU 21) and corrective action for groundwater contamination.

VI. SUMMARY OF PROPOSED MODIFICATIONS

The proposed modification includes: reduction of monitoring well network through abandonment, removal of certain chemicals of concern from the semi-annual and annual groundwater sampling events, allowance for the use of low-flow monitoring during the semi-annual and annual groundwater sampling events, allowance for the continued deactivation of the hydraulic control system with continued demonstration of overall plume stability, and a few typographical errors within the post-closure permit.

V. CHANGES TO THE EXISTING PERMIT

The specific changes to the permit are explained below.

Section/Appendix	**Reason**
Permit Cover Page and Signature Page	Updated major modification date
Permit Table of Contents	Updated major modification date
Section I.C.10.a, Page 3	Changed reference from Appendix F to E to be consistent with the Permit Application
Section II.C.2, Page 2	Removed “weekly after storm events…” and modify schedule to semi-annual inspections
Section II.C.2, Page 2	Changed reference from Section II to 2.0 to be consistent with the Permit Application
Section III.B.1.a., Page 1	Referenced Figure D-1 of the Revised Corrective Action Program
Section III.B.1.a.i, Page 1	Changed reference from Appendix E to D to be consistent with the Permit Application
Section III.B.1.a.ii, Page 1	Corrected reference of Permit Condition from III to I
Section III.B.1.c, Page 2	Changed reference from Appendix E to D to be consistent with the Permit Application
Section III.B.5.a, Page 4	Changed reference from Appendix F to E to be consistent with the Permit Application
Section III.B.5.b, Page 4	Removed reference from Table III..2 to retain only reference to Table III.3
Section III.B.5.c, Page 4	Changed reference from Appendix F to E to be consistent with Permit Application
Section III.B.5.d, Page 4	Changed reference from Appendix E to D to be consistent with the Permit Application

Section III.E.1.a, Page 5	Removed wells MW-7, MW-8B, MW-14R, and MW-17
Table III.1, Pages 9-11	Removed monitoring wells MW-7, MW-8B, MW-10, MW-11, MW-14R, MW-17, and TW-1 through TW-4
Table III.2, Page 12	Removed Bis(2-ethylhexyl)phthalate
Table III.3, Page 13	Removed Bis(2-chloro-1-methylethyl)ether, Bis(2-ethylhexyl)phthalate, 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, pentachlorophenol, and 1,2,3-Trichloropropane.
Table III.3, Page 14	Updated concentration limits to reflect current MCLs and RSLs established by EPA.
Section VI, Page 1	Updated the summary of deadlines for Permit Condition II.C.2
Appendix D of the permit application	Updated Corrective Action Program to allow for the suspension of the hydraulic control system if the plume remains stable.
Appendix E of the permit application	Reduced the amount of purge water required for subsequent management and disposal
Appendix F of the permit application	Updated post-closure care cost estimate

VI. TECHNICAL CONTACT

Amber Hicks
Engineering Services Section
Industrial Hazardous Waste Branch, Land Division
Alabama Department of Environmental Management
1400 Coliseum Blvd (ZIP 36110-2059)
P.O. Box 301463 (ZIP 36130-1463)
Montgomery, Alabama
334-270-5608

Alabama Department of Environmental Management

HAZARDOUS WASTE FACILITY PERMIT

PERMITTEE:	**Mueller Property Holdings, LLC** **Former North Birmingham Pipe Plant**
ADDRESS:	**3000 30th Avenue North** **Birmingham, Alabama**
PERMIT NUMBER:	**ALD 004 017 904**
UNITS PERMITTED:	**Post-Closure Care Landfill (SWMU 21)**
ISSUANCE DATE:	**October 11, 2019** **XX, 2026 - Major Modification 1**
EFFECTIVE DATE:	**October 11, 2019**
EXPIRATION DATE:	**October 10, 2029**

This Permit is issued pursuant with the Code of Alabama 1975, §§ 22-30-1-et. seq., as amended, and regulations adopted thereunder and the Hazardous Wastes Management and Minimization Act and in accordance with the plans and specifications and applications filed with the Department subject to the conditions appended hereto, all of which are considered a part of this Permit. This Permit shall be subject to all applicable laws of the State of Alabama, rules and regulations and orders of the Department of Environmental Management and shall be effective from the date of issuance.

Alabama Department of Environmental Management

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
HAZARDOUS WASTE PERMIT

Permittee:		Permit Number:	ALD 004 017 901
	OWNER/OPERATOR:	Identification Number:	ALD 004 017 901
	Mueller Property Holding, LLC	Modification 1:	XX, 2026
	3000 30th Avenue North		
	Birmingham, Alabama 35207A		
	Jefferson County		

Pursuant to the Alabama Hazardous Wastes Management and Minimization Act (AHWMMA), Code of Ala. 1975, Section 22-30-1, et. seq., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM or the Department), a permit is issued to Mueller Property Holdings, LLC for the facility located in Birmingham, Alabama, at latitude N 33º 33' 15" and longitude W 86º 48' 45".

The Permittee must comply with all terms and conditions of this permit, which consists of the conditions set forth herein (including those in any attachments), and the regulations applicable to the Permittee's facility contained in Chapters 335-14-1, 335-14-2, 335-14-5, 335-14-8, and 335-14-9 of the ADEM Administrative Code of Regulations (hereinafter referred to as the "ADEM Admin. Code r."). Applicable regulations are those which are in effect on the date of issuance of this permit.

This permit is based on the assumption that the information submitted in the permit application attached to the Permittee's letter dated March 21, 2018 as modified by subsequent amendments dated July 10, 2018 and December 2, 2025 (hereby incorporated by reference and hereafter referred to as the Application) is accurate and that the facility will be constructed and operated as specified in the Application. Any inaccuracies found in this information could lead to the termination or modification of this permit in accordance with ADEM Admin. Code r. 335-14-8-.04(2), 335-14-8-.04(3), and 335-14-8-.04(4) and could lead to potential enforcement action. The Permittee must inform ADEM of any deviation from or changes in the information provided in the Application that would affect the Permittee's ability to comply with the applicable regulations or permit conditions.

This permit is effective as of October 11, 2019 as modified XX, 2026 and shall remain in effect until October 10, 2029 unless revoked and reissued, or terminated under ADEM Admin. Code r. 335-14-8-.04(2) and 335-14-8-.04(4) or continued in accordance with ADEM Admin. Code r. 335-14-8-.05(2).

Alabama Department of Environmental Management

Date Signed

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Documents Incorporated By Reference:

Part A and Part B Permit Application submitted on March 21, 2018, as modified by subsequent amendments dated July 10, 2018, and December 2, 2025.

PART I

STANDARD AND GENERAL FACILITY CONDITIONS

I.A. EFFECT OF PERMIT

Issuance of this permit does not authorize any injury to persons or property, any invasion of other private rights, or any infringement of state or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under the AHWMMA, or any other law governing protection of public health or the environment, for any imminent and substantial endangerment to human health, welfare, or the environment.

I.B. SEVERABILITY

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

I.C. DUTIES AND REQUIREMENTS

1. Duty to Comply

   The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of the AHWMMA, and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

2. Duty to Reapply

   a. 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.

   b. The Permittee must submit an application for a new permit for both post-closure and Solid Waste Management Unit (SWMU) corrective action at least 180 calendar days before the expiration of this permit. The Permittee must reapply in order to fulfill the 30-year post-closure care period required by ADEM Admin. Code Rule 335-14-5-.07(8)(a)1. The Department may shorten or extend the post-closure care period applicable to the hazardous waste facility in accordance with ADEM Admin. Code Rules 335-14-5-.07(8)(a)2. and 335-14-8-.03(1)(b).

3. 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 in order to maintain compliance with the conditions of this permit.

4. 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.

5. Proper Operation and Maintenance

The Permittee shall, at all times, properly operate and maintain all facilities and systems of treatment, monitoring, and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance (O&M) includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this permit.

6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause as specified in ADEM Admin. Code Rules 335-14-8-.04(2), 335-14-8-.04(3) and 335-14-8-.04(4). The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay any permit condition.

7. Property Rights

Issuance of this permit does not convey any property rights of any sort, nor any exclusive privilege.

8. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time as determined by the Department, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

9. Inspection and Entry

The Permittee shall allow duly designated officers and employees of the Department or their authorized representative, upon the presentation of credentials and other documents as may be required by law to:

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

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

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

d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the AHWMMA, any substances or parameters at any location. The Permittee shall have the opportunity to split samples during sampling.

10. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed must be the appropriate method from ADEM Admin. Code Rule 335-14-2-Appendix I or the methods specified in Appendix F of the permit application. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846 (latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Standard Methods for the Examination of Water and Wastewater (latest edition), the methods specified in Appendix E of the permit application, or an alternative method approved by ADEM. [ADEM Admin. Code Rule 335-14-8-.03(1)(j)1.]

b. The Permittee shall maintain at the facility records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, the certification required by 335-14-5-.05(4)(b)9., records of all data used to prepare documents required by this permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or record, or until corrective action is completed, whichever date is later. This period may be extended by the Department at any time and is automatically extended during the course of any unresolved enforcement action regarding this facility. [ADEM Admin. Code Rules 335-14-5-.05(5)(b) and 335-14-8-.03(1)(j)2.]

c. The Permittee shall maintain at the facility records for all groundwater monitoring wells, piezometers and associated groundwater surface elevations throughout the post-closure care period. These records shall include the surveyed location, surveyed elevation, surveyed elevation reference point, total depth, screened interval, construction details, well log, and all other pertinent information for each well and piezometer.

d. Records for monitoring information shall include:

i. The date(s), exact place, and times of sampling or measurements;

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

iii. The date(s) analyses were performed;

iv. The individual(s) who performed the analyses;

v. The analytical techniques or methods used; and,

vi. The results of such analyses.

e. The following documents and information shall be maintained throughout the post-closure care period at the facility environmental coordinator office at Mueller Property Holdings, LLC office in Atlanta, Georgia.

i. Complete copy of this permit and the permit application.

ii. Operating record as required by ADEM Admin. Code Rule 335-14-5-.05(4) and this permit.

iii. Copies of all plans, reports, inspection schedules, inspection logs as required by ADEM Admin. Code Rule 335-14-5 and this permit.

11. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with ADEM Admin. Code Rules 335-14-8-.02(2) and 335-14-8-.03(1)(k).

12. Reporting Requirements

a. Planned Changes

The Permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility and any solid waste management units identified under Part IV of this permit.

b. Anticipated Noncompliance

The Permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

c. Transfer of Permits

This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to ADEM Admin. Code Rule 335-14-8-.04(1) or ADEM Admin. Code Rule 335-14-8-.04(3)(a)1.(vii). Before transferring ownership or operation of the facility during its post-closure period, the Permittee shall notify the new owner or operator, in writing, of the requirements of ADEM Admin. Code Rules 335-14-5 and 335-14-8 and this permit.

d. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

e. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Department no later than 14 calendar days following each schedule date.

f. Twenty-Four Hour Reporting

i. The Permittee shall report to the Department any noncompliance with this permit that may endanger human health or the environment. Any such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances. This report shall include, but is not limited to, the following:

(I) Information concerning the release of any hazardous waste which may endanger public drinking water supplies; and,

(II) Information concerning the release or discharge of any hazardous waste, or hazardous waste constituents, or of a fire or explosion at the facility, which could threaten the environment or human health outside the facility.

ii. The description of the occurrence and its cause shall include:

(I) Name, address, and telephone number of the owner or operator;

(II) Name, address, telephone number, and EPA Identification Number of the facility;

(III) Date, time, and type of incident;

(IV) Name and quantity of material(s) involved;

(V) The extent of injuries, if any;

(VI) An assessment of actual or potential hazards to the environment and human health outside the facility, where this is applicable; and,

(VII) Estimated quantity and disposition of recovered material that resulted from the accident.

iii. A written submission shall also be provided within 5 calendar days of the time that the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the periods of noncompliance (including exact dates and times); whether the noncompliance has been corrected, and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

g. Other Noncompliance

The Permittee shall report to the Department all instances of noncompliance not otherwise required by Permit Conditions I.C.12.d., I.C.12.e., or I.C.12.f. at the time any other reports required by this permit are submitted. The reports shall contain the information required by Permit Condition I.C.12.f.

h. Other Information

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information. In addition, upon request, the Permittee shall furnish to the Department any information related to compliance with this permit.

13. Certification of Construction

The Permittee may not commence treatment, storage or disposal of hazardous waste or contaminated media at any new or modified portion of the facility until the Permittee has submitted to the Department by certified mail or hand-delivery a letter (together with the certification by the construction quality assurance officer required by ADEM Admin. Code R. 335-14-5-.02(10)(d) and any other certifications required by this permit or ADEM Admin. Code Rule 335-14) signed by the Permittee and a professional engineer registered in the State of

Alabama stating that the facility has been constructed or modified in compliance with this permit where appropriate; and,

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

b. The Department has either waived the inspection or has not notified the Permittee, within 15 calendar days of the notification from the Permittee, of its intent to inspect. [ADEM Admin. Code Rule 335-14-8-.03(1)(1)2.]

14. The Permittee shall assure that all measures necessary to maintain and/or achieve compliance with all applicable requirements of ADEM Admin. Code Rules 335-14 are taken during the active life of the facility, and throughout the post-closure care period, corrective action period, and the term of this permit.

15. In the event that circumstances beyond the Permittee's control arise to prevent achievement of any deadline set forth by this permit, the Permittee may immediately, upon the occurrence thereof, request an extension by sending a written request to the Department explaining the need for the extension. The Department may, after consideration of the circumstances, grant the extension. Requests for extensions may require a permit modification pursuant to ADEM Admin. Code Rule 335-14-8-.04(2) or (3).

I.D. DEFINITIONS

For the purposes of this permit, terms used herein shall have the same meaning as those in ADEM Admin. Code Rules 335-14-1, 335-14-2, 335-14-5, and 335-14-8, unless this permit specifically provides otherwise. Where terms are not defined in the regulations or this permit, a standard dictionary reference or the generally accepted scientific or industrial meaning of the term shall define the meaning associated with such terms.

"Area of concern" (AOC), for the purposes of this permit, includes any area having a probable release of a hazardous waste or hazardous constituent which is not from a solid waste management unit and is determined by the Department to pose a current or potential threat to human health or the environment. Such areas of concern may require investigations and remedial action as required under Section 3005(c)(3) of the Resource Conservation and Recovery Act and ADEM Admin. Code Rule 335-14-8-.03(3)(b)2. in order to ensure adequate protection of human health and the environment.

"Contamination," for the purposes of this permit, refers to the presence of any hazardous constituent in a concentration that exceeds the naturally occurring concentration of that constituent in the immediate vicinity of the facility (*i.e.*, areas not affected by the facility).

"Extent of contamination," for the purposes of this permit, is defined as the horizontal and vertical areas in which the concentrations of hazardous constituents in the environmental media being investigated are above detection limits or background concentrations indicative of the region, whichever is appropriate as determined by the Department.

"Hazardous constituents," for the purposes of this permit, are those substances listed in ADEM Admin. Code Rule 335-14-2-Appendix VIII and/or ADEM Admin. Code Rule 335-14-5-Appendix IX and include hazardous constituents released from solid waste, hazardous waste, and hazardous waste constituents that are reaction by-products.

“Land Use Controls,” for the purposes of this permit, is as defined by ADEM Admin. Code Rule 335-15-1-.02.

“Method detection limit” (MDL), for the purposes of this permit, means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

“Mixed waste,” for the purposes of this permit, means a solid waste that is a mixture of hazardous waste (as defined in ADEM Admin. Code Rule 335-14-2-.01(3)) and radioactive waste (as defined in 10 CFR 61.2). The radioactive component of mixed waste is subject to regulation by the Atomic Energy Act (AEA)/Nuclear Regulatory Commission (NRC). The non-radioactive chemically hazardous component of mixed waste is subject to regulation by the AHWMMA and ADEM Admin. Code Rule 335-14.

“Operating day,” for the purposes of this permit, means any day on which hazardous waste is treated, stored, or disposed of in a unit. For example, each day that a hazardous waste storage unit contains hazardous waste is an operating day; as is each day that a disposal unit contains or receives hazardous waste, or each day that hazardous waste is treated in a treatment unit.

"Release," for the purposes of this permit, includes any spilling, leaking, pouring, emitting, emptying, discharging, injecting, escaping, leaching, pumping, or disposing into the environment of any hazardous waste or hazardous constituent.

"Solid waste management unit" (SWMU), for the purposes of this permit, includes any unit that has been used for the treatment, storage or disposal of solid waste at any time, irrespective of whether the unit is or ever was intended for the management of solid waste. RCRA-regulated hazardous waste management units are also solid waste management units. SWMUs include areas that have been contaminated by routine and systematic releases of hazardous waste or hazardous constituents, excluding one-time accidental spills that are immediately remediated and cannot be linked to solid waste management activities (*e.g.*, product or process spills).

“Storm event,” for the purposes of this permit, is defined as a 1-year, 24-hour storm event or rainfall that measures 1-inch or greater in 1 hour or less. Rainfall measurements may be taken at the site, or the closest official weather monitoring station may be used.

I.E. EXPIRATION AND CONTINUATION OF PERMIT

This permit and all conditions herein will remain in effect beyond this permit's expiration date if the Permittee has submitted a new application as required by Permit Condition I.C.2. and, through no fault of the Permittee, the Department has not issued a new permit.

I.F. WASTE MINIMIZATION

1. Certification Requirements

   Pursuant to ADEM Admin. Code Rule 335-14-5-.05(4)(b)9. the Permittee must certify, no less often than annually, that:

   a. The Permittee has a program in place to reduce the volume and toxicity of hazardous waste to the degree determined by the Permittee to be economically practicable; and,

   b. The proposed method of treatment, storage or disposal is the most practicable method available to the Permittee and that it minimizes the present and future threat to human health and the environment.

2. Recording Requirements

   The Permittee shall maintain copies of this certification in the facility operating record as required by ADEM Admin. Code Rule 335-14-5-.05(4).

I.G. COST ESTIMATES

1. The Permittee shall maintain detailed written cost estimates, in current dollars, at the location specified in Permit Condition I.C.10.e. and on file with ADEM in accordance with ADEM Admin. Code Rules 335-14-5-.08(3), (5), and (10).

2. All cost estimates must be updated annually as required by ADEM Admin. Code Rule 335-14-5-.08(3)(b), (5)(b), and (10)(b).

3. The cost estimate shall be maintained and submitted in the form designated by the Department.

4. The Permittee must update the cost estimate no later than 30 calendar days after the Department has approved a modification to the Closure Plan, Post-Closure Plan, or Corrective Action Plan, or any other plan required or referenced by this permit, if the change in the plan results in an increase in the amount of the cost estimate.

I.H. FINANCIAL ASSURANCE

1. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code Rule 335-14-5-.08 by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in financial assurance mechanisms must be approved by the Department.

2. The Permittee shall submit itemized statements for all capital expenditures and a complete, revised post-closure cost estimate to the Department when requesting approval for a reduction in the financial assurance mechanism.

I.I. PERMIT MODIFICATIONS

The Permittee shall request a permit modification whenever changes in operating plans or facility design affect any plan (*e.g.,* closure, groundwater monitoring, post-closure, or corrective action) required or referenced by this permit. The Permittee must submit a written request for a permit modification pursuant to the requirements of ADEM Admin. Code Rule 335-14-8-.04(2) at least 60 calendar days prior to the proposed change in facility design or operation.

I.J. REPORTS, NOTIFICATIONS, AND SUBMISSIONS TO THE DEPARTMENT

All reports, notifications, or other submissions that are required by this permit should be sent via certified mail or given to:

Chief, Land Division
Alabama Department of Environmental Management
P.O. Box 301463 (Zip 36130-1463)
1400 Coliseum Boulevard (Zip 36110-2059)
Montgomery, Alabama

PART II

POST-CLOSURE CARE

II.A. POST-CLOSURE CARE PERIOD

The post-closure care period shall extend for a period of 30 years from the date of initial post-closure permit issuance unless shortened or extended pursuant to ADEM Admin. Code Rule 335-14-5-.07(8). The post-closure care period shall automatically extend through the end of the compliance period specified in Section III of this permit.

II.B. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

1. Post-Closure Activities

   The Permittee shall conduct post-closure care activities, in accordance with Section 2.0 of the permit application and as required by ADEM Admin. Code Rules 335-14-5-.07 and 335-14-5-.14(11)(d), for each hazardous waste management unit listed in Table II.1. Post-closure care shall commence upon the effective date of this permit and shall continue throughout the post-closure care period.

2. Security

   The Permittee shall comply with the security provisions of ADEM Admin. Code Rules 335-14-5-.02(5) and as described in Section 1.0 of the permit application.

3. Disturbance of Closed Unit(s)

   The Permittee shall not allow the disturbance of the integrity of the final cover, liners, any components of the containment system, or the function of the facility's monitoring systems during the post-closure care period for any unit identified in Table II.1.

4. The Permittee shall:

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

   b. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of ADEM Admin. Code Rule 335-14-5-.06 and Part III of this permit;

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

   d. Protect and maintain surveyed benchmarks used in complying with the surveying and recordkeeping requirements of ADEM Admin. Code Rule 335-14-5-.14(10).

II.C. INSPECTIONS

1. The Permittee shall inspect the components, structures, and equipment at the site in accordance with the inspection schedule as described in Section 2.0 of the permit application, the post-closure care plan as described in Section 2.0 of the permit application, and as required by ADEM Admin. Code Rule 335-14-5-.07.

2. Monitoring and Inspection

   The Permittee shall inspect the closed hazardous waste management unit listed in Table II.1 at least semi-annually to detect any evidence of deterioration or improper operation as described in Section 2.0 of the permit application and as required under ADEM Admin. Code Rules 335-14-5-.07 and 335-14-5-.14. The inspections shall specifically include evaluation of the following items:

   a. Integrity of the final cover (erosion, ponding, subsidence, cracking, *etc.*);

   b. Growth and stabilization of vegetative cover;

   c. Run-on and run-off control system;

   d. Groundwater monitoring wells; and,

   e. Survey benchmarks.

TABLE II.1

POST-CLOSURE CARE UNITS

UNIT NAME	UNIT DESCRIPTION	CLOSED-IN-PLACE CAPACITY (QUANTITY)	DESCRIPTION OF UNIT*	LOCATION OF UNIT*
Landfill	Closed on Site Foundry Landfill	78,000 cubic yards	Section 2.0	Figure 3

*Location in permit application containing description (text) and location (figure) of unit.

PART III

GROUNDWATER MONITORING AND CORRECTIVE ACTION

III.A. REQUIRED PROGRAM(S)

1. Groundwater monitoring shall consist of the General Groundwater Monitoring Program of Permit Condition III.B. and the Corrective Action Monitoring Program contained in Permit Condition III.E.

2. The Permittee shall commence groundwater monitoring as required by this permit not later than 120 calendar days after the effective date of this permit.

III.B. GENERAL GROUNDWATER MONITORING PROGRAM

1. Well Location, Installation and Construction

   The Permittee shall install and/or maintain a groundwater monitoring system to comply with the requirements of ADEM Admin. Code Rules 335-14-5-.06(8), 335-14-5-.06(9), 335-14-5-.06(10), and 335-14-5-.06(11) as applicable and as specified below:

   a. The Permittee shall maintain all groundwater monitoring wells at the facility as identified in Table III.1. of this permit, at the locations specified on Figure D-1 of the Revised Corrective Action Program (included as Appendix D of this Permit Modification), and any other groundwater monitoring wells specified by Permit Condition III.B.1.d.

      i. All groundwater monitoring wells shall be maintained in accordance with the plans and specifications presented in Appendix D of the permit application and in accordance with ADEM Admin. Code Rule 335-14-5-.06.

      ii. A groundwater monitoring well shall not be removed from any monitoring program specified in this permit without an approved permit modification pursuant to Permit Condition I.I.

      iii. If a groundwater monitoring well is damaged, the Permittee shall immediately notify the Department in writing, which includes a description of the well repair activities to be conducted. The well repair procedures must be approved by the Department prior to implementation. Within 30 calendar days after the well is repaired, the Permittee shall submit a written notification to the Department that the well repair activities were conducted in accordance with the approved procedures.

iv. If a groundwater monitoring well is deleted from the monitoring program(s) required by this permit in accordance with Permit Conditions III.B.1.a.ii. and I.I., it shall be abandoned within 90 calendar days after deletion using procedures to be approved by the Department. Within 30 calendar days after the well is abandoned, the Permittee shall submit a written notification to the Department that the well abandonment activities were conducted in accordance with the approved procedures.

b. Groundwater monitoring wells MW-1R, MW-2R, MW-2BR, MW-2C, and MW-3R shall define the point of compliance for the closed landfill.

c. The Permittee shall maintain groundwater monitoring well(s) MW-5R, as the background monitoring well(s) for the entire facility as specified in Appendix D of the permit application.

d. 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 ADEM Admin. Code Rules 335-14-5-.06(6), 335-14-5-.06(8), 335-14-5-.06(9), 335-14-5-.06(10), and 335-14-5-.06(11), as applicable. A plan in the form of a permit modification request specifying the design, location and installation of any additional monitoring wells should be submitted to the Department at least 90 calendar days prior to installation which, at a minimum, shall include:

i. Well construction techniques including casing depths and proposed total depth of well(s);

ii. Well development method(s);

iii. A complete description of well construction materials;

iv. A schedule of implementation for construction; and,

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

2. General Groundwater Monitoring Requirements

   a. The Permittee shall determine the groundwater surface elevation from all monitoring wells listed in Table III.1. of this permit at least semi-annually and each time a sampling event is conducted. The results of these determinations should be submitted in accordance with Permit Condition III.B.6. Elevation data should be recorded and reported as mean sea level (MSL) and referenced to an appropriate national geodetic vertical datum (NGVD) benchmark.

   b. The Permittee shall determine the groundwater flow rate and direction in the underlying aquifer(s) at least annually and submit the results in accordance with Permit Condition III.B.6.

   c. The Permittee shall determine background concentrations of hazardous constituents and other chemical parameters required to be monitored by this permit in accordance with Section 3.0 of the permit application and ADEM Admin. Code Rule 335-14-5-.06(8)(g).

3. Groundwater Protection Standard

   a. The groundwater protection standard, as required under ADEM Admin. Code Rule 335-14-5-.06(3), shall consist of Table III.3 of this permit which lists the hazardous constituents and their respective concentration limits.

   b. The groundwater protection standard applies to all hazardous waste or hazardous constituent releases as deemed appropriate by the Department to protect human health and the environment.

4. Compliance Period

   a. The compliance period, during which the groundwater protection standard specified in Permit Condition III.B.3. applies, shall begin at the time of the first sampling event of the compliance monitoring program (Permit Condition III.D.), or the corrective action monitoring program (Permit Condition III.E.), whichever is earlier.

   b. The compliance period shall continue (after beginning pursuant to Permit Condition III.B.4.a.) until the groundwater protection standard as defined by Permit Condition III.B.3.a. has not been exceeded for a period of three consecutive years.

c. If the Permittee is engaged in a corrective action program pursuant to Permit Condition III.E., then the compliance period shall continue as required by ADEM Admin. Code Rule 335-14-5-.06(7)(c) until the groundwater protection standard has not been exceeded for a period of three consecutive years after corrective action has been terminated and this permit has been modified, in accordance with Permit Condition I.I., to implement a compliance monitoring program pursuant to Permit Condition III.D. or a detection monitoring program pursuant to Permit Condition III.C., as required by ADEM Admin. Code Rule 335-14-5-.06(11)(f).

5. 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 Permit Condition III.B.1. to provide a reliable indication of the quality of the groundwater as required under ADEM Admin. Code Rules 335-14-5-.06(8)(d), (e), and (g):

a. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in Appendix E of the permit application.

b. Samples shall be analyzed according to the procedures specified in Appendix F of the permit application, the most recent edition of SW-846 or other appropriate methods approved by the Department. Analytical method detection limits shall be less than, or equal to, the concentration limits specified in Table III.3.

c. Samples shall be tracked and controlled using the chain-of-custody procedures specified in Appendix E of the permit application.

d. Statistical analyses used to evaluate the groundwater monitoring data shall be as described in Appendix D of the permit application and ADEM Admin. Code Rule 335-14-5-.06(8)(h).

e. All samples taken in accordance with this permit shall not be filtered prior to analysis.

6. Recordkeeping and Reporting

a. The Permittee shall keep and maintain all monitoring, testing, and analytical data obtained in accordance with Permit Conditions III.B., III.C., III.D., and III.E. as required by Permit Condition I.C.10.

b. The Permittee shall submit to the Department a written report to include all analytical sampling data, established background values, statistical evaluations, groundwater

elevations, associated potentiometric maps, and the annual groundwater flow rate and direction determinations. The analytical method and the method detection limit (MDL) for each constituent must be integrated into all reports of analysis. The report shall be submitted within 60 calendar days after the first sampling event and on an annual basis thereafter. Copies of this report shall be kept at the facility in accordance with Permit Conditions I.C.10.c. and I.C.10.e.

c. The Permittee shall submit progress reports to the Department describing implementation of groundwater monitoring and/or corrective action activities at the site as required by Part III of this permit on a quarterly basis. The first progress report shall be submitted to the Department within 90 calendar days after the effective date of this permit. The progress reports shall continue until such time as the required monitoring and/or corrective action systems and activities required by this permit are fully constructed and operational. In the event that additional monitoring and/or corrective action requirements are imposed through a permit modification, the quarterly reporting requirement shall resume, commencing upon the effective date of the permit modification and continuing until the required monitoring and/or corrective action systems and activities are again fully constructed and operational.

III.C. DETECTION MONITORING PROGRAM (RESERVED)

III.D. COMPLIANCE MONITORING PROGRAM (RESERVED)

III.E. CORRECTIVE ACTION MONITORING PROGRAM

The requirements of this Condition are applicable to the closed on-site landfill (SWMU 21). Except as specified otherwise in this permit, the Corrective Action Monitoring Program shall be implemented in accordance with Appendix E of the permit application and ADEM Admin. Code Rule 335-14-5-.06(11).

1. Monitoring Systems

In addition to the point of compliance and background monitoring well systems identified in Permit Conditions III.B.1.b. and III.B.1.c., the Permittee shall:

a. Maintain groundwater monitoring wells MW-8C, MW-9, MW-9B, MW-15, and MW-16 as boundary wells for the entire facility as specified in Table III.1. of this permit and as shown on Figure D-2 of the permit application.

b. Maintain groundwater monitoring wells MW-6, MW-8, MW-12, and MW-13 as effectiveness wells as specified in Table III.1. of this permit and as shown on Figure D-2 of the permit application.

c. Maintain wells RW-1, RW-4, and RW-5 as recovery wells as specified in Table III.1. of this permit and as shown on Figure D-2 of the permit application.

d. Maintain wells MW-1R, MW-2R, MW-2BR, MW-2C, and MW-3R as point of compliance wells as specified in Table III.1. of this permit and as shown on Figure D-2 of the permit application.

2. Corrective Action Program

a. The Permittee shall conduct a Corrective Action Program, as described in Appendix E of the permit application, to remove or treat in place all hazardous constituents that exceed their respective groundwater protection standards as described in Table III.3. of this permit at the point of compliance, between the point of compliance and the down-gradient facility property boundary, and beyond the facility boundary in accordance with ADEM Admin. Code Rule 335-14-5-.06(11)(e)2.

b. Pursuant to ADEM Admin. Code Rules 335-14-5-.06(11)(c) and 335-14-5-.06(11)(e)3., the Permittee shall continue to implement the corrective action program as described in Appendix E of the permit application within 120 calendar days after the effective date of this permit.

c. The Permittee shall handle or treat groundwater in accordance with Appendix E of the permit application and with the applicable requirements of NPDES, SID, and AIR permit number(s) AL0075388, IU39-37-00666, and 4-07-0360-01, as issued by the Department.

3. Monitoring Requirements

In addition to the general groundwater monitoring requirements specified in Permit Condition III.B.2., the Permittee shall:

a. Sample all background, point of compliance and effectiveness monitoring wells shown in Table III.1. of this permit and analyze for the constituents listed in Table III.2. of this permit on a semi-annual basis beginning within 120 calendar days of the effective date of this permit and continuing through the end of the compliance period.

b. Sample all background, point of compliance, effectiveness, and boundary monitoring wells shown in Table III.1. of this permit and analyze for the constituents listed in

Table III.3. of this permit on an annual basis beginning within 120 calendar days of the effective date of this permit and continuing through the end of the compliance period.

c. Sample all background, point of compliance, effectiveness, and boundary monitoring wells shown in Table III.1. of this permit and analyze for temperature (degrees F or C), specific conductance (Mhos/cm), and pH (standard units) each time the well is sampled. The data obtained should be submitted as raw data in the reports required by Permit Condition III.B.6.

d. When evaluating the monitoring results to determine the effectiveness of the corrective measures, in accordance with Permit Condition III.E.4., the Permittee shall:

i. Determine if the corrective action system effectively addresses the entire plume of contamination;

ii. Determine if the concentration of the hazardous constituents are decreasing (pH increasing or decreasing toward neutrality, as applicable) in the effectiveness wells specified in Permit Condition III.A.1.;

iii. Determine if hazardous waste or hazardous constituents are being released into the environment; and,

iv. Determine if hazardous constituents have been detected in the boundary wells specified in Permit Condition III.A.1.

4. Reporting and Response Requirements

In addition to the recordkeeping and reporting requirements specified in Permit Condition III.B.6.:

a. The Permittee shall report the effectiveness of the corrective action program semi-annually, as required under ADEM Admin. Code Rule 335-14-5-.06(11)(g). These reports shall be submitted to the Department within 60 calendar days of each semi-annual anniversary of this permit after corrective action is initiated and continue until corrective action is completed. The Permittee must provide data from groundwater monitoring along with an analysis of that data and any conclusions regarding the effectiveness of the program in accordance with Permit Condition III.E.3.d. If the analysis of the data warrants any change to the corrective action program, the Permittee must include these revisions in the semi-annual report, which will be

followed-up within 90 calendar days with an application for permit modification in accordance with Permit Condition I.I.

b. If corrective action is terminated under Permit Condition III.B.4.c., the Permittee must sample all background, point of compliance, effectiveness and boundary sampling locations for the compounds listed in ADEM Admin. Code Rule 335-14-5-Appendix IX. Based upon the sampling results, the Permittee may petition the Department, in accordance with Permit Condition I.I., for a permit modification to implement either a detection monitoring program or a compliance monitoring program.

TABLE III.1

MONITORING WELL DESIGNATIONS

WELL NUMBER	WELL TYPE *	WELL LATITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft)	GROUND ELEVATION (ft. MSL)	TOP-OF-RISER ELEVATION (ft. MSL)	SCREENED INTERVAL (ft. MSL)	MONITORED ZONE
MW-1R	POC	33 33 18.21N	86 48 33.46W	Landfill	23.46	573.52	576.51	11-21	Shallow-Intermediate/Knox-Shady
MW-2R	POC	33 33 16.30N	86 48 33.67W	Landfill	31.12	574.30	576.95	19-29	Shallow-Intermediate/Knox-Shady
MW-2BR	POC	33 33 16.07N	86 48 34.02W	Landfill	129.97	574.30	575.28	125-130	Deep-Bedrock/Knox-Shady
MW-2C	POC	33 33 15.88N	86 48 33.58W	Landfill	124.95	574.43	576.90	202.8-222.8	Deep-Bedrock/Knox-Shady
MW-3R	POC	33 33 17.07N	86 48 37.36W	Landfill	32.68	576.49	579.69	21-31	Shallow-Intermediate/Knox-Shady
MW-5R	BKG	33 33 24.79N	86 48 35.84W	Landfill	26.80	577.54	580.39	13-29	Shallow-Intermediate/Knox-Shady
MW-6	EFF	33 33 13.35N	86 48 33.37W	Landfill	23.72	572.79	574.58	12-22	Shallow-Intermediate/Knox-Shady
MW-8	EFF	33 33 14.30N	86 48 35.25W	Landfill	23.64	574.20	577.19	11.5-21.5	Shallow-Intermediate/Knox-Shady

TABLE III.1

MONITORING WELL DESIGNATIONS (Contuned)

WELL NUMBER	WELL TYPE *	WELL LATITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft)	GROUND ELEVATION (ft. MSL)	TOP-OF-RISER ELEVATION (ft. MSL)	SCREENED INTERVAL (ft. MSL)	MONITORED ZONE
MW-8C	BDY	33 33 14.35N	86 48 35.64W	Landfill	224.82	575.00	577.02	215-225	Deep-Bedrock/Knox-Shady
MW-9	BDY	33 33 15.90N	86 48 32.22W	Landfill	23.74	571.79	574.73	11.5-21.5	Shallow-Intermediate/Knox-Shady
MW-9B	BDY	33 33 15.95N	86 48 32.11W	Landfill	124.46	572.15	574.11	115-125	Deep-Bedrock/Knox-Shady
MW-12	EFF	33 33 11.14N	86 48 34.95W	Landfill	28.18	572.93	572.78	19-29	Shallow-Intermediate/Knox-Shady
MW-13	EFF	33 33 12.82N	86 48 37.41W	Landfill	27.84	576.06	579.15	16.5-26.5	Shallow-Intermediate/Knox-Shady
MW-15	BDY	33 33 12.12N	86 48 31.43W	Landfill	26.56	569.44	571.38	15-25	Shallow-Intermediate/Knox-Shady

TABLE III.1

MONITORING WELL DESIGNATIONS (Continued)

WELL NUMBER	WELL TYPE *	WELL LATITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft)	GROUND ELEVATION (ft. MSL)	TOP-OF-RISER ELEVATION (ft. MSL)	SCREENED INTERVAL (ft. MSL)	MONITORED ZONE
MW-16	BDY	33 33 16.98N	86 48 30.99W	Landfill	27.20	572.81	575.03	15-25	Shallow-Intermediate/Knox-Shady
RW-1	REC	33 33 16.361N	86 48 33.545W	Landfill	40	574.16	572.68	10-40	Shallow-Intermediate/Knox-Shady
RW-4	REC	33 33 16.740N	86 48 32.820W	Landfill	40	573.32	572.93	10-40	Shallow-Intermediate/Knox-Shady
RW-5	REC	33 33 16.500N	86 48 33.060W	Landfill	40	573.40	572.98	10-40	Shallow-Intermediate/Knox-Shady

* Well Type:
POC - Point of Compliance Wells
EFF - Effectiveness Monitoring Wells
PGM - Piezometers and/or General Monitoring Wells
BKG - Background Wells
BDY - Boundary Monitoring Wells
REC - Recovery Well

TABLE III.2

GROUNDWATER QUALITY MONITORING CONSTITUENTS*

HAZARDOUS CONSTITUENT	UNIT*
Arsenic	Landfill
Barium	Landfill
Beryllium	Landfill
Cadmium	Landfill
Chromium	Landfill
Copper	Landfill
Lead	Landfill
Nickel	Landfill
Zinc	Landfill
1,1-Dichloroethane	Landfill
1,2-Dichloroethane	Landfill
1,1-Dichloroethylene	Landfill
cis-1,2-Dichloroethylene	Landfill
trans-1,2-Dichloroethylene	Landfill
1,1,1-Trichloroethane	Landfill
1,1,2-Tichloroethane	Landfill
Trichloroethylene	Landfill
Vinyl Chloride	Landfill

The constituents listed herein are the subset of the Groundwater Protection Standard listed in Table III.3 for which monitoring is required.

* Identifies the unit(s) at which the given constituent must be monitored.

TABLE III.3

GROUNDWATER PROTECTION STANDARD

HAZARDOUS CONSTITUENT	UNIT*	CONCENTRATION LIMIT (mg/L)
Arsenic	Landfill	0.01
Barium	Landfill	2
Beryllium	Landfill	0.004
Cadmium	Landfill	0.005
Chromium	Landfill	0.1
Copper	Landfill	1.3
Lead	Landfill	0.01
Nickel	Landfill	0.039
Zinc	Landfill	0.6
Acrolein	Landfill	0.0000042
Acrylonitrile	Landfill	0.000052
Dibenzo(A,H)Anthracene	Landfill	0.000025
1,1-Dichlorethane	Landfill	0.0028
1,2-Dichloroethane	Landfill	0.005
1,1-Dichlorethene	Landfill	0.007
cis-1,2-Dichlorethene	Landfill	0.07
trans-1,2-Dichloroethene	Landfill	0.1
Indeno (123-CD) Pyrene	Landfill	0.00025
Vinyl Chloride	Landfill	0.002
Naphthalene	Landfill	0.00012
1,1,2,2-Tetrachloroethane	Landfill	0.000076
1,1,1-Trichloroethane	Landfill	0.2
1,1,2-Trichloroethane	Landfill	0.005
Trichloroethene	Landfill	0.005

PART IV

SOLID WASTE MANAGEMENT UNIT IDENTIFICATION AND EVALUATION

IV.A. APPLICABILITY

The Conditions of this Part apply to:

1. The solid waste management units (SWMUs) and areas of concern (AOCs) identified in Table IV.1, which require investigation and/or remediation;

2. The SWMUs identified in Table IV.2, which require no further investigation under this permit at this time;

3. Any additional SWMUs or AOCs discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means; and,

4. Contamination beyond the facility boundary, if applicable. The Permittee shall implement corrective actions beyond the facility boundary where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Department that, despite the Permittee's best efforts, as determined by the Department, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied. On-site measures to address such releases will be determined on a case-by-case basis. Assurances of financial responsibility for completion of such off-site corrective action will be required.

IV.B. NOTIFICATION AND ASSESSMENT REQUIREMENTS FOR NEWLY IDENTIFIED SWMUs AND AOCs

1. The Permittee shall notify the Department in writing, within 15 calendar days of discovery, of any additional AOC(s) as described under Permit Condition IV.A.3. The notification shall include, at a minimum, the location of the AOC(s) and all available information pertaining to the nature of the release (*e.g.,* media affected, hazardous constituents released, magnitude of release, *etc.*). If the Department determines that further investigation of an AOC is required, the permit will be modified in accordance with ADEM Admin. Code Rule 335-14-8-.04(2).

2. The Permittee shall notify the Department in writing, within 15 calendar days of discovery, of any additional SWMUs as described under Permit Condition IV.A.3.

3. The Permittee shall prepare and submit to the Department, within 90 calendar days of notification, a SWMU Assessment Report (SAR) for each SWMU identified under Permit Condition IV.B.2. At a minimum, the SAR shall provide the following information:

   a. Location of unit(s) on a topographic map of appropriate scale such as required under ADEM Admin. Code Rule 335-14-8-.02(5)(b)19.

b. Designation of type and function of unit(s).

c. General dimensions, capacities and structural description of unit(s) (supply any available plans/drawings).

d. Dates that the unit(s) was operated.

e. Specification of all wastes that have been managed at/in the unit(s) to the extent available. Include any available data on hazardous constituents in the wastes.

f. All available information pertaining to any release of hazardous waste or hazardous constituents from such unit(s) (to include groundwater data, soil analyses, air, and/or surface water data).

4. Based upon the results of the SAR, the Department shall determine the need for further investigations at the SWMUs covered in the SAR. If the Department determines that such investigations are needed, the Permittee shall initiate an investigation as outlined in Permit Condition IV.D.1 immediately upon receiving notification of the Department's determination.

IV.C. NOTIFICATION REQUIREMENTS FOR NEWLY DISCOVERED RELEASES AT PREVIOUSLY IDENTIFIED SWMUs or AOCs

1. The Permittee shall notify the Department in writing of any newly discovered release(s) of hazardous waste or hazardous constituents discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, within 15 calendar days of discovery. Such newly discovered releases may be from SWMUs or AOCs identified in Permit Condition IV.A.2 or SWMUs or AOCs identified in Permit Condition IV.A.3 for which further investigation was not required.

2. If the Department determines that further investigation of the SWMUs or AOCs is needed, the Permittee shall initiate an investigation as outlined in Permit Condition IV.D. immediately upon receiving notification of the Department's determination.

IV.D. RCRA FACILITY INVESTIGATION (RFI)

1. The Permittee must perform a RCRA Facility Investigation (RFI) for any SWMU and AOC identified by the Department in accordance with Permit Conditions IV.A.1, IV.B.4, and IV.C.2.

2. The RFI must completely identify the concentration of hazardous constituents released from each SWMU and AOC and fully delineate the area where such hazardous constituents have come to be located.

3. The RFI must fully characterize the nature and extent of contamination released from each SWMU or AOC under investigation.

4. The RFI must be performed in a manner consistent with the most recent edition of the Alabama Environmental Investigation and Remediation Guidance.

5. Except as provided by Permit Condition IV.D.6., the RFI must be completed within 180 calendar days from the effective date of this permit or, for SWMUs or AOCs identified pursuant to Permit Condition IV.B. and C., within 180 calendar days from the receipt of notification from the Department that an RFI is required. If, prior to the effective date of this permit, the Department has approved a work plan that includes a schedule for completing the RFI, the RFI shall be completed in accordance with the approved schedule.

6. RFI Schedule of Compliance

    a. For RFIs expected to require greater than 180 calendar days to complete, the Permittee may submit a schedule of compliance subject to Departmental approval and/or modification.

    b. Submittal of an RFI Schedule of Compliance does not delay or otherwise postpone the Permittee's obligation to initiate the RFI.

    c. The Schedule of Compliance must include:

        i. A detailed narrative discussion, which explains why the RFI cannot be completed within 180 days; and,

        ii. A detailed and chronological listing of milestones with estimated durations that provides sufficient information to track the progress of the investigation.

    d. The RFI Schedule of Compliance shall be reviewed by the Department in accordance with Permit Condition IV.G.

    e. The Permittee shall complete the RFI in accordance with the approved RFI Schedule of Compliance.

7. RFI Progress Reports

    a. For an RFI being conducted in accordance with the approved RFI Schedule of Compliance, the Permittee must submit progress reports on a monthly basis.

    b. The RFI Progress Reports must include:

        i. A description of the RFI activities completed during the reporting period;

        ii. Summaries of any problems or potential problems encountered during the reporting period;

        iii. Actions taken to rectify problems;

        iv. Changes in relevant personnel;

        v. Projected work for the next reporting period;

vi. Any proposed revisions to the RFI Schedule of Compliance. Modifications of the RFI Schedule of Compliance are subject to approval by the Department; and,

vii. A summary of any data collected during the reporting period, including:

A. The location of each sampling point identified on a site map;

B. The concentration of each hazardous constituent detected at each sampling point; and,

C. Submittal of RFI Progress Reports, work plans, or other documents during the RFI does not alter the approved RFI Schedule of Compliance.

8. RFI Reports

a. The Permittee shall prepare and submit to the Department an RFI Report within 60 calendar days from the completion of investigation activities in accordance with the approved RFI Schedule of Compliance, if applicable.

b. The RFI Report must provide a detailed description of all required elements of the investigation as described in the most recent edition of the Alabama Environmental Investigation and Remediation Guidance.

c. The RFI Report shall be reviewed by the Department in accordance with Permit Condition IV.G.

IV.E. SELECTION OF CORRECTIVE MEASURES AND PERMIT MODIFICATION

1. The Permittee shall develop and submit to the Department a Corrective Measures Implementation (CMI) Plan for any areas of the Permittee's site where hazardous constituents have come to be located at concentrations exceeding those appropriate for the protection of human health and the environment. The CMI Plan must include all applicable elements of the proposed remedy pursuant to the most recent edition of the Alabama Environmental Investigation and Remediation Guidance.

2. The CMI Plan shall be submitted to the Department within 120 calendar days following the Permittee's submittal of the RFI Report indicating that hazardous constituents have come to be located at any area of the Permittee's facility, or beyond the facility, at concentrations exceeding those appropriate for the protection of human health and the environment, or within 120 calendar days following notification from the Department that a CMI Plan is required, whichever occurs earlier.

3. The CMI Plan shall be submitted along with a request for permit modification pursuant to ADEM Admin. Code R. 335-14-8-.04(2), and shall include any applicable fees pursuant to ADEM Admin. Code R. 335-1-6. This modification will serve to incorporate the proposed final remedy, including all procedures necessary to implement and monitor the remedy, into this permit.

4. Within 120 calendar days after this Permit has been modified in accordance with Permit Condition IV.E.3., the Permittee shall demonstrate financial assurance for completing the approved remedy.

IV.F. INTERIM MEASURES (IM)

1. IM Work Plan(s)

   a. Upon notification by the Department, the Permittee shall prepare and submit an Interim Measures (IM) Work Plan for any SWMU or AOC that the Department determines is necessary. IM are necessary in order to minimize or prevent further migration of contaminants and limit human and environmental exposure to contaminants while long-term corrective measures are evaluated and, if necessary, implemented. The IM Work Plan shall be submitted within 30 calendar days of such notification and shall include the elements listed in Permit Condition IV.F.1.b. Such IM may be conducted concurrently with investigations required under the terms of this permit. The Permittee may initiate IM by submitting an IM Work Plan for approval and reporting in accordance with the requirements under Permit Condition IV.F.

   b. The IM Work Plan shall ensure that the IM are designed to mitigate any current or potential threat(s) to human health or the environment and is consistent with and integrated into any long-term solution at the facility. The IM Work Plan shall include: the IM objectives, procedures for implementation (including any designs, plans, or specifications), and schedules for implementation.

   c. The IM Work Plan must be approved by the Department, in writing, prior to implementation. The Department shall specify the start date of the IM Work Plan schedule in the letter approving the IM Work Plan.

   d. The IM Report shall be reviewed by the Department in accordance with Permit Condition IV.G.

2. IM Implementation

   a. The Permittee shall implement the IM in accordance with the approved IM Work Plan.

   b. The Permittee shall give notice to the Department as soon as possible of any planned changes, reductions or additions to the IM Work Plan.

   c. Final approval of corrective action required under ADEM Admin. Code Rule 335-14-5-.06(12), which is achieved through IM, shall be in accordance with ADEM Admin. Code Rule 335-14-8-.04(2) and Permit Condition IV.E.

3. IM Reports

   a. If the time required for completion of IM is greater than one year, the Permittee shall provide the Department with Progress Reports at intervals specified in the approved work plan. The Progress Reports shall, at a minimum, contain the following information:

i. A description of the portion of the IM completed;

ii. Summaries of any deviations from the IM Work Plan during the reporting period;

iii. Summaries of any problems or potential problems encountered during the reporting period;

iv. Projected work for the next reporting period; and,

v. Copies of laboratory/monitoring data.

b. The Permittee shall prepare and submit the IM Report to the Department within 90 calendar days of completion of IM conducted under Permit Condition IV.F. The IM Report shall, at a minimum, contain the following information:

i. A description of IM implemented;

ii. Summaries of results;

iii. Summaries of all problems encountered;

iv. Summaries of accomplishments and/or effectiveness of IM; and,

v. Copies of all relevant laboratory or monitoring data, *etc.*, in accordance with Permit Condition I.C.10.

IV.G. SUBMITTALS

1. All work plans, reports, schedules, and other documents ("submittals") required by this permit shall be subject to approval by the Department to assure that such submittals and schedules are consistent with the requirements of this Permit and with applicable regulations and guidance. The Permittee shall revise all submittals and schedules as directed by the Department.

2. The Department will review all submittals in accordance with the conditions of this permit. The Department will notify the Permittee in writing of any submittal that is disapproved, and the basis therefore. If the Department disapproves a submittal, the Department shall: (1) notify the Permittee in writing of the submittal's deficiencies and specify a due date for submission of a revised submittal, (2) revise the submittal and notify the Permittee of the revisions, or (3) conditionally approve the submittal and notify the Permittee of the conditions. Permit Condition IV.H. shall apply only to submittals that have been disapproved and revised by the Department, or that have been disapproved by the Department, then revised and resubmitted by the Permittee, and again disapproved by the Department.

3. All submittals shall be submitted within the time frame specified by the Department and in accordance with the approved schedule of compliance. Extensions of the due date for submittals may be granted by the Department based on the Permittee's demonstration that sufficient justification for the extension exists.

4. All submittals required by this permit shall be signed and certified in accordance with ADEM Admin. Code Rule 335-14-8-.02(2).

5. Two (2) copies of all submittals shall be provided by the Permittee to the Department in accordance with Permit Condition I.J.

IV.H. DISPUTE RESOLUTION

Notwithstanding any other provision in this permit, in the event the Permittee disagrees, in whole or in part, with the Department's revision of a submittal or disapproval of any revised submittal required by this Part, the following may, at the Permittee's discretion, apply:

1. In the event that the Permittee chooses to invoke the provisions of this section, the Permittee shall notify the Department in writing within 30 calendar days of receipt of the Department's revision of a submittal or disapproval of a revised submittal. Such notice shall set forth:

   a. The specific matters in dispute;

   b. The position the Permittee asserts should be adopted as consistent with the requirements of this permit;

   c. The basis for the Permittee's position; and,

   d. Any matters considered necessary for the Department's determination.

2. The Department and the Permittee shall have additional 30 calendar days from the Department's receipt of the notification provided for in Permit Condition IV.H.1. to meet or confer to resolve any disagreement.

3. In the event agreement is reached, the Permittee shall submit and implement the revised submittal in accordance with and within the time frame specified in such agreement.

4. If agreement is not reached within the 30-day period, the Department will notify the Permittee in writing of his/her decision on the dispute, and the Permittee shall comply with the terms and conditions of the Department's decision in the dispute. For the purposes of this provision in this permit, the responsibility for making this decision shall not be delegated below the Land Division Chief.

5. With the exception of those conditions under dispute, the Permittee shall proceed to take any action required by those portions of the submission and of this permit that the Department determines are not affected by the dispute.

Table IV.1

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring a RCRA Facility Investigation (RFI):

SWMU/AOC NUMBER*	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA

Table IV.2

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring no further action at this time:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
1	Raw Material Storage Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
2	Raw Material Storage Pile	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
3	Emission Control System Afterburner	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
4	Heat Exchangers	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
5	Heat Exchangers	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
6	Emission Control System Quench Tank	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
7	Cupola Baghouse	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
8	Baghouse Dust Treatment System	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
9	Basement	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
10	Scrap Reclaiming Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
11	Ductile Baghouse	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water

Table IV.2 (Continued)

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring no further action at this time:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
12	Cement Lining Settling Basin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
13	Cement Lining Settling Basin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
14	Scalping Basin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
15A	Scalping Basin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
15B	Scalping Basin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
16	Primary Treatment Pond	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
17	Secondary Treatment Pond	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
18	Used Oil Accumulation Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
19	Used Oil Storage Tank	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water

Table IV.2 (Continued)

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring no further action at this time:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
20	Empty Drum Storage Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
21	Landfill	NFA per RFA dated, September 21, 2007	Air, Soil, Ground Water, Surface Water, Subsurface Gas
22	Spray Pond	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
23	Core Mold Containers	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
24	Paint Leak Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
25	De-Sulfurized Slag Pit	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
26	Cupola Slag Pit	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
27	Slag Cooling Bin	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
28	Bottom Drop Sand Pit	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
29	Quench Cleanout/Spent Baghouse Bags Rolloffs	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water

Table IV.2 (Continued)

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring no further action at this time:

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
30	West Side Drum Storage	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
31	Waste Paint Storage	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
32	Pit and Trench for # 1 Paint Machine	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
33	Pit and Trench for # 2 Paint Machine	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
34	Packaging Hydraulic Pit (West)	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
35	Packaging Hydraulic Pit (East)	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
36	Cement Lining Staging Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
37	Used Oil Storage Tank	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
38	Shot Blast	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
39	New Scrap Reclamation Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water
A	Outside Paint Storage Area	NFA per RFA dated, September 21, 2007	Soil, Ground Water, Surface Water

Table IV.3

The following Solid Waste Management Unit(s) (SWMU) and/or Area(s) of Concern (AOC) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs regulated by Parts II and III of this permit.

SWMU/AOC NUMBER	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA
21	Landfill	Post-Closure Care Landfill	Soil, Ground Water, Surface Water

PART V

CORRECTIVE MEASURES IMPLEMENTATION

V.A. APPLICABILITY

The conditions of this Part apply to SWMUs and AOCs identified in Table V.1.

V.B. GENERAL CONDITIONS

1. The Permittee is required to perform corrective measures for the SWMUs and AOCs identified in Condition V.A. The approved remedy for these defined units, waterway areas, or land parcels, includes any and all actions set forth in this permit and in the approved Interim Measures Plans, Corrective Measures Studies (CMSs), and Corrective Measures Implementation (CMI) Plans approved by the Department, as noted below:

Applicable SWMU/AOC*	CMS/CMI	Approval Date

*There are no CMI activities required at this time

2. Remedial Cleanup Levels (RESERVED)

3. Groundwater Monitoring and Remediation

Where required pursuant to Conditions V.B.1. and V.C. of this permit, the Permittee shall comply with the general groundwater monitoring requirements of Part III of this permit.

4. Land Use Controls

Where required pursuant to Conditions V.B.1. and V.C. of this permit, the Permittee shall establish appropriate land use controls to achieve protection of human health and the environment. The Permittee shall comply with Conditions V.B.5. and V.B.6. of this permit when implementing corrective measures requiring land use controls. Where the owner of such property will not allow a deed restriction to be imposed, the Permittee shall notify the Department within 14 calendar days of receipt of written notification by the property owner. In such cases, the Department may allow the Permittee to propose an alternate area-specific land use control, subject to the Department's review and approval.

5. Survey Plat

For corrective measures where residual concentrations of contaminants will remain in-place at levels greater than those appropriate for unrestricted land use, or for corrective measures that rely on land use controls, the Permittee must:

a. Within 90 calendar days following the effective date of a permit modification addressing remedy selection, submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Department, a survey plat indicating the location and dimensions of the SWMUs, AOCs, and capped or partially remediated areas with respect to permanently surveyed benchmarks, the locations of sampling points, and the concentrations of hazardous constituents detected. This plat must be prepared and certified by a professional land surveyor registered in the State of Alabama. The plat must be filed with the local zoning authority or the authority with jurisdiction over local land use and must contain a note, prominently displayed, which states the Permittee's obligation to limit the property to the specified non-residential uses.

b. Maintain the survey plat as described in Condition V.B.5.a. of this permit and in the CMS Report until the Permittee has demonstrated, to the satisfaction of the Department, that the levels of hazardous constituents in all contaminated media are within limits appropriate for unrestricted residential land uses.

6. Notice to Title of Real Property

No later than the submission of the survey plat required in Condition VI.B.5., the Permittee must:

a. Record in the probate judges office of the county in which the property is located or a portion thereof a deed, restrictive covenant or some other instrument that is normally examined during a title search that will in perpetuity notify any potential purchaser of the property that:

i. The land is contaminated with hazardous constituents in concentrations that exceed residential standards;

ii. The use of the property is restricted by this permit for certain residential, municipal, or industrial purposes and may lead to an increased risk of exposure to hazardous constituents depending upon the activities initiated at the site. Such activities may yield an increased level of human health risk to the owner;

iii. iii. The potential purchaser or entity that desires to work in the contaminated area should notify the Permittee before mobilizing to the area covered by the institutional control.

b. Submit to the Department a certification, signed by the Permittee in accordance with Permit Condition I.C.11., that the notice specified in this part has been performed. This certification must include a copy of the document in which the notation has been placed.

c. Maintain the deed notice described in Permit Condition V.B.6. until the Permittee has demonstrated, to the satisfaction of the Department, that the levels of hazardous constituents in all contaminated media are within limits appropriate for unrestricted residential land uses.

7. Security

Security measures, where required by Conditions V.B.1. and V.C. of this permit, will be conducted in accordance with ADEM Admin. Code R. 335-14-5-.02(5) and as prescribed in the approved CMI Plan.

8. Inspection

Where corrective measures addressed in Conditions V.B.1. include provisions to cap in place or partially remediate properties or land areas, whether owned or not owned by the Permittee, the Permittee shall specify inspection protocols on a scheduled basis to ensure continued integrity of the remedy and to ensure that land use remains appropriately restricted per the deed notice established pursuant to Permit Condition V.B.6. Inspection provisions shall be as prescribed in the approved CMI Plan

V.C. AREA SPECIFIC CONDITIONS (RESERVED)

V.D. CORRECTIVE MEASURES IMPLEMENTATION (CMI) REPORTS

1. CMI Progress Reports

If the time required to complete implementation of a specific set of corrective measures, as described in the CMI Plan approved by the Department, is greater than 180 calendar days, the Permittee shall provide ADEM with progress reports according to the schedule approved by ADEM in the CMI Plan. The progress reports shall, at a minimum, contain the following information:

a. A description of the portion of CMI completed;

b. Summaries of and deviations from the approved CMI during the reporting period;

c. Summaries of current and potential problems, including recommended solutions and alternatives as well as corrective actions undertaken;

d. Any monitoring data (soil, air, dust, water) collected for any reason during the construction period for the purposes of monitoring potential for human and ecological exposure; and,

e. Projected work for the next period and impacts to the approved schedule.

2. Final CMI Reports

Upon completion of construction of corrective measures systems, implementation of land use controls, interim removal actions, or other short-term activities required by this permit and/or the approved CMI Plan, the Permittee shall submit to the Department a Final CMI Report containing, at a minimum, the following:

a. A description of activities completed;

b. For cap and cover remedies, as-built construction drawings presenting the final in-place three-dimensional location of contaminated material. A plan view of the remediated areas shall be presented in addition to a cross section of the in-place capped areas;

c. Hazardous waste manifests indicating the handling of any excavated material that has been shipped off-site to a Department-approved, certified landfill;

d. For remedies involving land use controls, a copy of the survey plat and notice to deed required by Condition V.B. of this permit;

e. Monitoring data (soil, air, dust, water) collected for any reason during the construction period for the purposes of monitoring potential for human and ecological exposure; and

f. Certification, prepared in accordance with ADEM Admin. Code Rule 335-14-8-02 (2)(d) by the Permittee and an independent professional engineer registered in the State of Alabama, that the corrective measures implementation phase (*i.e.,* construction) required by this permit is complete and that the approved system and/or facilities are ready for operation in accordance with the intended design (*i.e.,* CMI Plan).

3. Corrective Measures (CM) Effectiveness Reports

a. For corrective measures that have been fully implemented and where the corrective measures system must operate for a period of time to achieve cleanup goals or levels, the Permittee shall submit CM Effectiveness Reports on a semi-annual basis, unless otherwise approved by the Department, beginning 180 calendar days following the Department's approval of the Final CMI Report. The CM Effectiveness Reports shall include, at a minimum, the following:

i. A detailed narrative presenting an evaluation of the effectiveness of the selected remedy;

ii. Summaries of compliance with and progress toward achieving cleanup goals;

iii. Any significant revisions, adjustments, or proposed modifications to the selected remedy;

iv. Tabulated environmental sampling and monitoring data including, but not limited to, groundwater quality, elevation data, and a graphical representation of all constituents detected during each sampling event from recovery wells, monitoring wells, drinking water wells, and other locations;

v. Chain of custody, field reports, and laboratory data sheets to include the date of collection, the date the sample was extracted, and the date of sample analysis for samples collected during the reporting period;

vi. Any monitoring data (soil, air, dust, water) collected for any reason during the post-construction period for the purposes of monitoring potential for human and ecological exposure;

vii. Isoconcentration maps depicting the distribution of parameters for each sampling event;

viii. Time versus concentration plots for each monitoring parameter for each recovery well and a representative number of effectiveness wells;

ix. Tabulated volumetric data on groundwater pumped and pumping rates (monthly and cumulative) for each recovery well;

x. Records of any groundwater recovery system operation time, including shutdown periods, not including any minor (less than 24 hours) shutdowns for repairs, maintenance, etc.;

xi. Potentiometric surface maps;

xii. Description of land use during the reporting period at the designated area requiring corrective measures; and,

xiii. Findings of the Permittee's investigation into the continued effectiveness of institutional controls per Condition V.C.

b. If, at any time, the Permittee determines that any remedy selection specified in Condition V.B or V.C. of this permit no longer satisfies the applicable requirements of ADEM Admin. Code R. 335-14-5-.06(12) or this permit for releases of hazardous waste or hazardous constituents originating from SWMUs or AOCs, the Permittee must, within 90 calendar days, submit an application for a permit modification, pursuant to Permit Condition I.I, to make any appropriate changes to the CMI Plan.

c. The application for changes in the CMI Plan, including changes in inspection and monitoring provisions of the CMI Plan, shall be submitted as an application for a permit modification pursuant to the requirements of ADEM Admin. Code R. 335-14-8-.04.

4. Final Report of Corrective Measures

Within 90 calendar days following attainment of cleanup levels or goals as outlined in this Permit and the approved CMI Plan, the Permittee shall submit to the Department a Final Report of Corrective Measures (FRCM). The FRCM shall contain a certification by the Permittee and an independent professional engineer registered in the State of Alabama that all remedial measures required by this permit and the approved CMI Plan have been completed. The FRCM shall outline any procedures and schedules for dismantling of corrective measures systems, groundwater monitoring or recovery systems, removal of land use controls, and any other remedial systems or controls required by this permit or the approved CMI Plan.

Table V.1.

The following Solid Waste Management Unit(s) (SWMUs) and/or Area(s) of Concern (AOCs) numbers and descriptions correspond with those noted in the RCRA Facility Assessment (RFA) Report. Where discrepancies exist, the permit will take precedence.

List of SWMUs and AOCs requiring Corrective Measures.

SWMU/AOC NUMBER*	SWMU/AOC NAME	UNIT COMMENT	POTENTIALLY AFFECTED MEDIA

*There are no CMI activities required at this time

PART VI

SUMMARY OF DEADLINES

The summary information provided herein is intended only as a guide to the requirements of this permit. It is not intended to be all inclusive, nor is it intended to be used as a substitute for the full text of this permit.

PERMIT CONDITION	ITEM	DUE DATE
I.C.2.b.	Reapply for a renewal	180 calendar days from the expiration of the current permit.
I.C.12.	Give notice to the Department of any planned physical alterations or additions to the permitted facility and any solid waste management units.	As soon as possible
I.C.12.	Report any noncompliance with this permit that may endanger human health or the environment.	Orally within 24 hours from the time the Permittee becomes aware of the circumstances. Written submission shall also be provided within 5 calendar days of the time that the Permittee becomes aware of the circumstances
I.F.	Waste Minimization Certification	Annually
I.G.	Update cost estimates	No later than 30 calendar days after the Department has approved a modification to the Closure Plan, Post-Closure Plan, or Corrective Action Plan, or any other plan required or referenced by this permit, if the change in the plan results in an increase in the amount of the cost estimate and annually as required by ADEM Admin. Code Rules 335-14-5-.08(3)(b), (5)(b), and (10)(b)
I.I.	Submit a written request for a permit modification pursuant to the requirements of ADEM Admin. Code Rule 335-14-8-.04(2).	At least 60 calendar days prior to a proposed change in facility design or operation.
II.C.2	Inspect closed unit(s).	At least semi-annually
III.B.1.a.iii.	Notification of damaged groundwater monitoring wells.	Immediately in writing. The well must be repaired within 30 calendar days of damage, and repair report must be submitted within 30 calendar days of repair.
III.B.1.d.	Install additional groundwater monitoring wells	As necessary to assess changes in the rate and extent of any plume of contamination, or as otherwise deemed necessary. Note: a permit modification request must be submitted within 90 calendar days prior to installation of additional groundwater monitoring well(s).
III.B.2.a.	Determine groundwater surface elevation.	At least semi-annually and each time a well is sampled.

PERMIT CONDITION	ITEM	DUE DATE
III.B.2.b.	Determine groundwater flow rate and direction.	At least annually.
III.B.6.b.	Submit groundwater monitoring report	Within 60 calendar days of the first sampling event and annually thereafter.
III.B.6.c.	Submit progress reports.	Within 90 calendar days after the effective date of this permit and quarterly thereafter. See permit condition for start/stop/resume provisions.
III.E.2.b.	Implement corrective action plan	No later than 120 calendar days after the effective date of this permit.
III.E.4.a.	Semi-annual corrective action effectiveness reports.	Within 60 calendar days of each semi-annual anniversary of this permit after corrective action is initiated, and until corrective action is completed.
IV.B.1.	Notify the Department, in writing, of the discovery of any additional AOCs	Within 15 calendar days of discovery
IV.B.2.	Notify the Department, in writing, of the discovery of any additional SWMUs	Within 15 calendar days of discovery
IV.B.3.	Submit a SWMU Assessment Report (SAR) for each SWMU identified under IV.B.2.	Within 90 calendar days of notification.
IV.C.1.	Notify the Department, in writing, of any newly discovered release(s) of hazardous waste or hazardous constituents from SWMUs or AOCs discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means.	Within 15 calendar days of discovery
IV.D.7.	Submit RFI progress reports.	Monthly beginning in the second month following the initiation of the RFI
IV.D.8.	Submit RFI Report	Within 60 calendar days from the completion of investigation activities.
IV.E.2.	Submit CMI Plan	Within 120 calendar days following the Permittee's submittal of the RFI Report indicating that hazardous constituents have come to be located at any area of the Permittee's facility, or beyond the facility, at concentrations exceeding those appropriate for the protection of human health and the environment, or within 120 days following notification from the Department that a CMI Plan is required, whichever occurs earlier.
IV.E.4	Demonstrate financial assurance for completing the approved remedy.	Within 120 calendar days after this Permit has been modified in accordance with Permit Condition IV.E.2

PERMIT CONDITION	ITEM	DUE DATE
IV.F.1.	Submit IM Work Plan	Within 30 calendar days upon notification by the Department.
IV.F.3.	Submit IM Report	Within 90 calendar days of completion of IM
V.B.5.a.	Submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Department, a survey plat indicating the location and dimensions of the SWMUs, AOCs, and capped or partially remediated areas with respect to permanently surveyed benchmarks, the locations of sampling points, and the concentrations of hazardous constituents detected	Within 90 calendar days following the effective date of a permit modification addressing remedy selection.
V.D.3.	Begin submitting semi-annual CM Effectiveness Reports	180 calendar days following the Department's approval of the Final CMI Report
V.D.4.	Submit a Final Report of Corrective Measures (FRCM)	Within 90 calendar days following attainment of cleanup levels or goals

Mueller Water Products, Inc.
1220 Abernathy Rd., NE
Suite 1200
Atlanta, GA 30328

phone: 770-206-4200
muellerwaterproducts.com

December 2, 2025

TRANSMITTED ELECTRONICALLY

Ms. Sonja B. Favors, Chief
Alabama Department of Environmental Management
Industrial Hazardous Waste Branch
Land Division
1400 Coliseum Blvd. 36110-2400
Montgomery, Alabama 36130-1463

Subject: **Response to Comments on Permit Modification Request**
Mueller Property Holdings, LLC (Former U.S. Pipe North Birmingham Property)
3000 30th Avenue North
Birmingham, Alabama 35207
USEPA I.D. Number ALD 004 017 901

Dear Ms. Favors:

Mueller Property Holdings, LLC (Mueller) acknowledges receipt of the Alabama Department of Environmental Management (ADEM) letter dated November 3, 2025, regarding the Permit Modification Request submitted on November 20, 2024 for the closed landfill located in Birmingham, Alabama. ADEM's comments are presented below followed by our response.

ADEM Comment No. 1: The facility proposed to remove monitoring wells from the groundwater monitoring program. MW-15 was proposed to be removed due to no COC detections above Groundwater Protection Standards (GWPSs) since installation and located downgradient of well MW-6. However, MW-15 is the most downgradient well and has detections of cis-1,2-DCE an order of magnitude above MW-6 in 2025 and 2024. Therefore, MW-15 should not be removed from the monitoring program.

Mueller Response to Comment No. 1: MW-15 will remain in the monitoring program. The applicable revisions have been made to the permit modification request provided with this response.

ADEM Comment No. 2: The facility proposed to remove constituents from the groundwater monitoring program due to non-detects since monitoring commenced in 1997. However, acrolein was detected above the GWPS in 2022. Also, acrolein and acrylonitrile have method detection limits above their respective GWPS for the last three events. Therefore, acrolein and acrylonitrile should not be removed from the monitoring program.

OSP Response: Acrolein is typically used for chemical processes and making resins, polymers, and methionine (an animal feed supplement). Acrylonitrile is typically used for acrylic fibers for textiles, carbon fibers, and building blocks for plastics. Based on the contents of the landfill and the activities that took place on the site, neither acrolein nor acrylonitrile are considered constituents of inherent concern. The detection of acrolein in 2022 is suspected to be a laboratory artifact. Additionally, the laboratory has confirmed that there currently is no analytical method that can achieve minimum detection limits below the GWPS for acrolein and acrylonitrile. Per ADEM's request, Mueller will continue to analyze for acrolein and acrylonitrile and report the results to the method detection limits. The permit modification request has been revised accordingly.

The permit modification request has been revised according to ADEM's comment and is included with this response letter. If you have any questions or need additional information, please do not hesitate to contact Rebecca Kennedy at (404) 263-2301 or Sherri Harvey at (404) 782-5165.

Sincerely,

Rebecca Kennedy
Senior Environmental Project Manager

Sherri B. Harvey, P.E.
Senior Director, EH&S

cc/via email: Amber Hicks – ADEM: amber.hicks@adem.alabama.gov
Austin Pierce – ADEM: austin.pierce@adem.alabama.gov
Wade Reeves – ADEM: wade.reeves@adem.alabama.gov
Doug Bullock – Bullock Environmental: doug.bullock@bullockenvironmental.com

Enclosures:
Revised - Permit Modification Request

MUELLER

bullock environmental, llc 4924 5th avenue south, birmingham, alabama 35222 t 205.876.1715 f 205.443.9413

December 2, 2025

Alabama Department of Environmental Management
Industrial Hazardous Waste Branch
Land Division
Post Office Box 301463
Montgomery, Alabama 36130-1463

Attention: Ms. Sonja B. Favors, P.E., Chief

Subject: ***REVISED PERMIT MODIFICATION REQUEST***
Mueller Property Holdings, LLC - Former U.S. Pipe North Birmingham Property
SWMU 21 - Closed Landfill
3000 30th Avenue North
Birmingham, Jefferson County, Alabama
USEPA ID ALD 004 017 901
Bullock Environmental, LLC Project #: 23-MUEL01

Dear Ms. Favors:

In accordance with Alabama Department of Environmental Management (ADEM) Administrative Code of Regulations (hereinafter referred to as ADEM Admin. Code Rule) 335-14-8-.04(2), Bullock Environmental, LLC. (Bullock), on behalf of Mueller Property Holdings, LLC (Mueller), hereby provides this revised Permit Modification Request (Mod-Request) for the above-referenced Alabama Hazardous Wastes Management and Minimization Act (AHWMMA) Post-Closure Permit, located at 3000 30th Avenue North, Birmingham, Alabama ("Site" or "Facility"). **Attachment 1** provides the signed certification statement, in accordance with Section I.C.11 Signatory Requirements of the Permit. The remainder of this Mod-Request provides the cause for modification, changes to the Site's monitoring program, and other proposed modifications of the Permit conditions.

CAUSE FOR MODIFICATION

Through this Mod-Request (prepared in accordance with ADEM Admin. Code Rule 335-14-8-.04(2)(a)1), Mueller desires to address the Site's groundwater monitoring and inspection program while also correcting certain typographical errors contained in the 2019 AHWMMA Final Permit. The proposed modifications to the Permit include the following:

1. Reduction of monitoring well network through the abandonment of monitoring wells MW-7, MW-8B, MW-10, MW-11, MW-14R, MW-17, and TW-1 through TW-4;
2. Removal of certain chemicals of concern (COCs) from the regular semi-annual and annual groundwater sampling events (currently listed in Tables II.2 and III.3 of the Permit);

3. Allowance for the use of low-flow monitoring during the regular semi-annual and annual groundwater sampling events;
4. Correction of certain references to the Permit Application Appendices and other minor topographical items in the permit; and
5. Allowance for the continued deactivation of the hydraulic control system, provided the regular semi-annual and annual groundwater monitoring demonstrate overall plume stability.

Subsequent sections provide further detail regarding each of the Permit modifications enumerated above.

I. Reduction of Existing Groundwater Monitoring Well Network

Mueller proposes to abandon monitoring wells MW-7, MW-8B, MW-10, MW-11, MW-14R, MW-17, and TW-1 through TW-4 in an effort to eliminate redundancies, streamline future sampling activities, and eliminate conduits for potential contaminant transfer to the subsurface. As further illustrated in the Monitoring Well Abandonment Plan (**Attachment 2)**, Mueller proposes to abandon these monitoring wells based on the following criteria:

1. No COC concentrations above Groundwater Protection Standards (GWPSs);
2. Location of monitoring well relative to the landfill and overall groundwater flow;
3. Location of monitoring well in separate water-bearing unit which is not representative of underlying groundwater formation (i.e., groundwater elevations always differ from the other monitoring wells by approximately 100 feet);
4. Monitoring well not used for sampling purposes (i.e., used only for water table elevation measurements); and
5. Location of monitoring well relative to other monitoring wells within the existing network.

As indicated in the revised Monitoring Well Abandonment Plan (**Attachment 2)**, abandonment activities will be conducted consistent with Appendix B, Section B.5.2.c of the Alabama Environmental Investigation and Remediation Guidance (AEIRG, revised February 2017). Prior to casing removal, water level and total depth of well measurements will be collected. Permanent monitoring wells will have the well casing over-drilled to remove the grout and filter pack material, and the cleaned borehole will be sealed with cement-bentonite grout placed from the bottom to the top via pressure grouting with the positive displacement (tremie tube) method. The top two feet of the borehole will be sealed with concrete to ensure a secure surface seal (plug).

II. Removal of Certain COCs from Table II.2 and Table III.3 of the Permit

Mueller proposes to remove the following constituents from the Permit as they have not been detected in onsite groundwater since monitoring activities commenced in 1997:

1. Bis(2-chloro-1-methylethyl)ether;
2. Bis(2-ethylhexyl)phthalate;
3. 1,2-Dibromo-3-chloropropane;
4. 1,2-Dibromoethane;

5. cis-1,3-Dichloropropene;
6. trans-1,3-Dichloropropene;
7. Pentachlorophenol, and
8. 1,2,3-Trichloropropane.

Removal of these compounds will streamline the sampling activities, reducing the number of analytical methods required while maintaining a focus on the target COCs in onsite groundwater. All other constituents listed in the Permit will continue to be monitored under the regular semi-annual and annual sampling events. **Attachment 3** includes the proposed revisions to Tables III.2 and III.3 of the Permit, removing the COCs listed above (Table III.2 and Table III.3) and incorporation of updated GWPSs for each compound (Table III.3).

III. Use of Low-Flow Sampling Techniques

A revised Sampling and Analysis Plan (SAP), to replace **Appendix E** in the Permit application, presented as an attachment hereto, includes allowances for low-flow sampling techniques to be employed during future semi-annual and annual monitoring events. Mueller proposes to include this sampling technique to reduce the volume of purge water generated during sampling while ensuring reliable analytical results from each sample.

IV. Corrections to Typographical Errors and Incorrect References to the Permit Application

Attachment 4 includes a listing of proposed changes to certain sections of the Permit. Comments 1, 3, 5, 7, 8, 9, 10, and 11 in this attachment request the correction of certain typographical errors or incorrect references to the Permit Application. The remainder of the comments propose changes to:

1. The inspection schedule (with associated corrections to other references to inspections);
2. The current monitoring well network (abandonment of certain monitoring well locations and removal of certain COCs from the monitoring program) as referenced in **Attachment 2** and **Attachment 3**;
3. Use of low-flow groundwater monitoring (incorporated in revised SAP, **Revised Appendix E**);
4. Revisions to Table III.2 and Table III.3 of the Permit to reflect the removal of certain COCs in the monitoring program and update the GWPSs; and
5. Suspension of operation of the groundwater recovery system, provided the groundwater plume remains stable and consistent with historical trends.

Regarding Item 5, Mueller has experienced significant difficulties in maintaining the groundwater recovery system onsite. These difficulties include the continued functional problems and vandalism/theft of onsite equipment (which has interrupted operation in recent years) and have been documented to ADEM in previous correspondence in June 2023, August 2023, and May 2024.

In an email correspondence dated June 23, 2023, Mueller provided the following notification to ADEM, in response to the direction provided by Ms. Sonja Favors (ADEM, Industrial Hazardous Waste Section) during an in-person meeting with ADEM on June 22, 2023:

> "As Ms. Favors suggested yesterday, Mueller Property Holdings hereby requests that our groundwater recovery system at the site be allowed to remain off while we reevaluate and update our optimization report. I expect to have the revised numbers, results, and report to you within the next couple of weeks. If you have any questions or would like any additional information, please let me know."

In its August 2023 Updated Natural Attenuation Report, Mueller requested to leave the system off, as a result of the above challenges and evidence of favorable conditions for natural attenuation.

> "…based on the limited recovery efficiency of the extraction wells and the potential for drawing the plume further from the source area, it appears that maintaining the wells online will not enhance contaminant removal and may be detrimental to the stabilization of the plume. In other words, the containment of the groundwater plumes at the facility may be achieved without dependence on the groundwater recovery system.
>
> Based on the evidence presented since the preliminary analysis, discontinued operation of recovery wells RW-1, RW-4, and RW-5 will not adversely affect the containment of the groundwater contamination at this site. If approved by ADEM, Mueller would continue to collect groundwater samples from these wells while they remain offline during future semi-annual events to verify the constituents remain below the GWPS. However, should concentrations of VOCs increase above the GWPS in the REC wells, RW-4 would be turned on to prevent migration offsite. A permit modification that will also include conditions for turning on/off the groundwater system (i.e., RW-4) will be submitted…"

Finally, in its May 16, 2024, Semi-Annual Groundwater Monitoring Report, Mueller provided the following analysis and recommendations regarding the continued operation of the groundwater recovery system:

> "ADEM approved discontinuing operation of RW-1 and RW-5 on August 2, 2021, because of previously determined limited recovery efficiency of the extraction wells and the potential for drawing the plume further from the source area. RW-4 has not been operational since at least September 2022 due to maintenance issues; the compressor was replaced in March 2022. Multiple unsuccessful attempts have been made to try to get this well running again. However, despite the dormancy of the recovery system, the containment of the groundwater plumes at the facility has been achieved without dependence on the groundwater recovery system as demonstrated by the analytical results. Time-series graphs of concentrations of daughter products cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride in the three REC wells indicate concentrations are decreasing or stable (Appendix D). These continued results further support Mueller's request to leave RW-4 offline which was submitted to ADEM via email on June 23, 2023."

Copies of the Time-Series graphs referenced in the May 16, 2024, Semi-Annual Groundwater Monitoring Report are included in **Attachment 5** of this Modification Request.

Based on the proposed changes included in this Mod-Request, certain appendices of the Permit application have been revised as well. These appendices include **Appendix B (Inspection Schedule), Appendix D (Corrective Action Program), Appendix E (Sampling and Analysis Plan),** and **Appendix F (Financial Assurance)**. The revised appendices are also attached.

CLOSING

The applicable Permit Fees of $25,190 were received by ADEM on August 28, 2025. Bullock appreciates ADEM's attention to this matter. If you have any questions or comments concerning the contents of this report, please call us at (205) 876-1715.

Sincerely,
BULLOCK ENVIRONMENTAL, LLC

Douglas A. Bullock
Principal

Attachments:
Attachment 1 Certification Statement
Attachment 2 Monitoring Well Abandonment Plan
Attachment 3 Updated Target Analyte Lists (Tables III.2 and III.3)
Attachment 4 Corrections and Modifications to Permit Sections
Attachment 5 Time-Series Graphs (March 2024 Monitoring Event)

Revised Appendices from Permit Application:
Appendix B Inspection Schedule
Appendix D Corrective Action Program
Appendix E Sampling and Analysis Plan
Appendix F Financial Assurance

cc/via email Ms. Amber Hicks – ADEM: amber.hicks@adem.alabama.gov
Mr. Ben King – ADEM: ben.king@adem.alabama.gov
Mr. John Johnston – USEPA Region 4: Johnston.John@epa.gov
Sherri Harvey – Mueller Property Holdings, LLC: SHarvey@muellerwp.com
Rebecca Kennedy – Mueller Property Holdings, LLC: RHatfield@muellerwp.com

ATTACHMENT 1

CERTIFICATION STATEMENT

CERTIFICATION PAGE

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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."

MUELLER PROPERTY HOLDINGS, LLC

Signed: Sherri B. Harvey Date: 12/2/2025

Printed: Sherri B. Harvey Title: Sr. Director, EH&S

ATTACHMENT 2

MONITORING WELL ABANDONMENT PLAN

bullock environmental, llc 4924 5th avenue south, birmingham, alabama 35222 t 205.876.1715 f 205.443.9413

November 20, 2024,
Revised December 2, 2025

Alabama Department of Environmental Management
Industrial Hazardous Waste Branch
Land Division
Post Office Box 301463
Montgomery, Alabama 36130-1463

Attention: Ms. Sonja B. Favors, P.E., Chief

Subject: ***REVISED MONITORING WELL ABANDONMENT PLAN***
Mueller Property Holdings, LLC - Former U.S. Pipe North Birmingham Property
SWMU 21 - Closed Landfill
3000 30th Avenue North
Birmingham, Jefferson County, Alabama
USEPA ID ALD 004 017 901
Bullock Environmental, LLC Project #: 23-MUEL01

Dear Ms. Favors:

Bullock Environmental, LLC (Bullock), on behalf of Mueller Property Holdings, LLC (Mueller) hereby provides to the Alabama Department of Environmental Management (ADEM) this revised Monitoring Well Abandonment Plan (Plan) for the above-referenced Facility. This Plan is provided in accordance with the proposed Modification of Hazardous Waste Facility Post-Closure Care Permit (PCCP) condition III.B.1.a.ii., which specifies that monitoring wells shall not be removed without approval by ADEM under a Permit Modification. This Plan is designed to consolidate the monitoring well network while maintaining a technically sound corrective action monitoring well network.

Figure 1 depicts the monitoring wells proposed for abandonment which include wells MW-7, MW-8B, MW-10, MW-11, MW-14R, MW-17, and TW-1 through TW-4.

This Plan is organized as follows:

- **Groundwater Data Review** – provides the groundwater potentiometric surface and isoconcentration contour maps, summary of the monitoring analytical data, and identifies the monitoring well locations in relation to the area of potentially impacted groundwater;
- **Monitoring Well Network Review** – discusses the original purpose of the wells, the current monitoring network, proposed wells to be abandoned and their construction details, the rationale and justification for abandoning each well, the proposed monitoring well network, and the proposed groundwater monitoring program; and

- **Abandonment Methods** – discusses the method(s) and approach for abandonment of the monitoring wells in accordance with the applicable ADEM regulations.

GROUNDWATER DATA REVIEW

Groundwater data has been collected and reviewed from the Site for more than 20 years. All of this information has been presented in previous submittals to ADEM. This information formed the basis of the corrective actions implemented at the Facility. **Figures 2A through 2E** illustrate the most recent potentiometric surface contour data for March 2022, September 2022, March 2023, September 2023, and March 2024, respectively. **Figures 3A through 3E** depict concentrations of chemicals of concern (COC) in groundwater exceeding Groundwater Protection Standards (GWPS) over the same periods.

As illustrated on **Figures 3A through 3E**, the groundwater plume has remained stable and shows evidence of reduced overall mass. The highest COC concentrations in groundwater are consistently detected in monitoring well MW-2R, located in the north-central section of the permitted area, with lower-level detections of certain COCs (above the GWPS). As evidenced by the information summarized in these figures (and supported by semi-annual groundwater monitoring events over the past 20 years), the monitoring wells proposed for removal/ abandonment have remained below applicable GWPSs. Likewise, removal of these monitoring wells will not interfere with the measurement of groundwater flow across the permitted area. The removal of these unneeded monitoring wells will streamline the sampling process while eliminating numerous conduits for potential contaminant transfer to the subsurface which are unrelated to the activities covered under the Permit.

MONITORING WELL NETWORK REVIEW

The hydrogeology and extent of constituents in groundwater have been defined and are well understood. As shown on **Figure 3A through Figure 3E**, the extent of constituents in groundwater is limited to the north-central section of the permitted area and, intermittently, in certain monitoring wells immediately downgradient from this area. Many of the existing monitoring wells are upgradient (or sidegradient) and are distal to the groundwater plume. Others (e.g., MW-10, MW-11, TW-1 through TW-4) are used only for measurement of water table elevations. Therefore, these wells can be abandoned while maintaining a technically sound monitoring well network.

Table 1 presents the construction details of the wells proposed to be abandoned and the rationale for abandoning each well. As previously indicated, six of the wells proposed for abandonment are not used for sample collection purposes; they are currently only used for gauging of groundwater elevations. The remainder have contained no COC concentrations above GWPSs for more than ten years or are not representative of the underlying groundwater formation (MW-8B). **Figure 4** presents the proposed monitoring well network for the Facility. **Table 2** identifies the type (e.g., point of compliance, effectiveness, background, boundary, or recovery well), location, and construction details for each of the remaining monitoring wells.

Table 3 presents the groundwater monitoring program summary, which identifies the monitoring well, analytical parameters, and monitoring frequency for the wells remaining after the abandonment is complete. Monitored natural attenuation (MNA) has been conducted at the Site. The MNA data provide sufficient information for demonstrating the occurrence of natural attenuation. Therefore, MNA monitoring is not proposed for future monitoring. Additionally, the groundwater contamination at the Site is primarily defined by chlorinated VOCs in the central and north-central section of the Site; however, arsenic has been detected in certain locations above GWPS. As reflected in **Table 3**, the following compounds have been proposed for removal as they have not been detected in onsite groundwater since monitoring activities commenced in 1997:

1. Bis(2-chloro-1-methylethyl)ether;
2. Bis(2-ethylhexyl)phthalate;
3. 1,2-Dibromo-3-chloropropane;
4. 1,2-Dibromoethane;
5. cis-1,3-Dichloropropene;
6. trans-1,3-Dichloropropene;
7. Pentachlorophenol; and
8. 1,2,3-Trichloropropane.

WELL ABANDONMENT PROCEDURES AND METHODS

Monitoring well abandonment will be conducted consistent with Appendix B, Section B.5.2.c of the Alabama Environmental Investigation and Remediation Guidance (AEIRG, revised February 2017). Prior to casing removal, water level and total depth of well measurements will be collected. Permanent monitoring wells will have the well casing over-drilled to remove the grout and filter pack material, and the cleaned borehole will be sealed with cement-bentonite grout placed from the bottom to the top via pressure grouting with the positive displacement (tremie tube) method. The top two feet of the borehole will be sealed with concrete to ensure a secure surface seal (plug).

The following information will be included in the final well abandonment report to be submitted to ADEM upon completion of approved activities:

- Site name and address;
- Type of wells being abandoned and reason for abandonment;
- Well identification;
- Topographic map and site map identifying wells;
- Diameter and length of wells including length of screen and intervals screened prior to abandonment;
- Latitude and longitude of wells;
- Description of abandonment method – including type of grout used, method of grout placement, quantity of grout used to seal well, amount of concrete used to seal the well surface;
- Photographs of abandoned wells and activities; and,

- Date wells are abandoned and name of oversight personnel.

CLOSING

On behalf of Mueller, Bullock provides this revised Plan for consideration by ADEM for monitoring well abandonment (located within and surrounding SWMU-21) at the former U.S. Pipe Landfill in Birmingham, Alabama. If you have any questions regarding this revised Plan or need additional information, please contact us at the sources provided on the cover page of this document. You can also respond by email to doug.bullock@bullockenvironmental.com.

Sincerely yours,
BULLOCK ENVIRONMENTAL, LLC

Douglas A. Bullock
Principal

Attachments:

Table 1	Monitoring Well Construction Details and Abandonment Rationale
Table 2	Proposed Monitoring Well Designations
Table 3	Groundwater Monitoring Program Summary
Figure 1	Proposed Monitoring Wells for Removal
Figure 2A	Potentiometric Surface Map (March 2022)
Figure 2B	Potentiometric Surface Map (September 2022)
Figure 2C	Potentiometric Surface Map (March 2023)
Figure 2D	Potentiometric Surface Map (September 2023)
Figure 2E	Potentiometric Surface Map (March 2024)
Figure 3A	Chemicals of Concern in Groundwater (March 2022)
Figure 3B	Chemicals of Concern in Groundwater (September 2022)
Figure 3C	Chemicals of Concern in Groundwater (March 2023)
Figure 3D	Chemicals of Concern in Groundwater (September 2023)
Figure 3E	Chemicals of Concern in Groundwater (March 2024)
Figure 4	Proposed Monitoring Well Network

cc/via email Ms. Amber Hicks – ADEM: amber.hicks@adem.alabama.gov
Mr. Ben King – ADEM: ben.king@adem.alabama.gov
Mr. John Johnston – USEPA Region 4: Johnston.John@epa.gov
Sherri Harvey – Mueller Property Holdings, LLC: SHarvey@muellerwp.com
Rebecca Kennedy – Mueller Property Holdings, LLC: RHatfield@muellerwp.com

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS AND ABANDONMENT RATIONALE
Former North Birmingham Pipe Plant
USEPA I. D. Number ALD 004 017 901
Birmingham, Alabama

WELL NUMBER	WELL TYPE	WELL LATTITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft.)	GROUND ELEVATION (ft. AMSL)	TOP-OF-RISER ELEVATION (ft. AMSL)	SCREENED INTERVAL (ft. AMSL)	MONITORED ZONE	RATIONALE FOR ABANDONMENT
MW-7	BDY	33 33 11.98N	86 48 32.91W	LANDFILL	28.13	571.67	574.72	16-26	Shallow-Intermediate/ Knox Shady	No COC detections above GWPSs since installation and downgradient of BDY well MW-6, which has contained arsenic slightly above GWPS in only five of the past 28 sampling events (no evidence of plume migration noted in BDY well MW-6 since installation).
MW-8B	BDY	33 33 14.35N	86 48 35.47W	LANDFILL	123.94	574.86	576.81	115-125	Deep-Bedrock/ Knox Shady	Not representative of underlying groundwater formation (i.e., groundwater elevations always differ from the other monitoring wells by approximately 100 feet).
MW-10	PGM	33 33 16.63N	86 48 32.04W	LANDFILL	21.33	571.29	574.65	7-17	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.
MW-11	PGM	33 33 14.66N	86 48 32.66W	LANDFILL	19.92	572.24	575.51	8-18	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.
MW-14R	BDY	33 33 11.26N	86 48 38.05W	LANDFILL	22.34	575.22	575.38	13-23	Shallow-Intermediate/ Knox Shady	Contains no COCs above applicable GWPSs.
MW-17	BDY	33 33 10.31N	86 48 35.16W	LANDFILL	26.91	571.77	573.81	15-25	Shallow-Intermediate/ Knox Shady	No COC detections above GWPSs since installation and located downgradient of BDY well MW-12, which has shown no evidence of COC impacts or plume migration since installation.
TW-1	BDY	33 33 19.42N	86 48 33.44W	LANDFILL	15.18	574.79	574.39	6-16	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.
TW-2	PGM	33 33 20.47N	86 48 33.42W	LANDFILL	15.04	574.91	574.9	6-16	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.
TW-3	PGM	33 33 21.81N	86 48 33.43W	LANDFILL	13.66	575.27	575.24	6-16	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.
TW-4	PGM	33 33 24.16N	86 48 33.46W	LANDFILL	19.2	575.62	575.32	11-21	Shallow-Intermediate/ Knox Shady	Not used for sampling purposes. Redundant for potentiometric surface measurements and not needed for overall hydrogeologic understanding.

BDY - Boundary Monitoring Well
PGM - Piezometer and/or General Monitoring Well
GWPS - Groundwater Protection Standard
ft. AMSL - feet above mean sea level
COC - chemical of concern

TABLE 2

PROPOSED MONITORING WELL DESIGNATIONS

Former North Birmingham Pipe Plant

USEPA I. D. Number ALD 004 017 901

Birmingham, Alabama

WELL NUMBER	WELL TYPE	WELL LATTITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft.)	GROUND ELEVATION (ft. AMSL)	TOP-OF-RISER ELEVATION (ft. AMSL)	SCREENED INTERVAL (ft. AMSL)	MONITORED ZONE
MW-1R	POC	33 33 18.21N	86 48 33.46W	LANDFILL	23.46	573.52	576.51	11-21	Shallow-Intermediate/ Knox Shady
MW-2R	POC	33 33 16.30N	86 48 33.67W	LANDFILL	31.12	574.3	576.95	19-29	Shallow-Intermediate/ Knox Shady
MW-2BR	POC	33 33 16.07N	86 48 34.02W	LANDFILL	129.97	574.3	575.28	125-130	Deep-Bedrock/ Knox Shady
MW-2C	POC	33 33 15.88N	86 48 33.58W	LANDFILL	124.95	574.43	576.9	202.8-222.8	Deep-Bedrock/ Knox Shady
MW-3R	POC	33 33 17.07N	86 48 37.36W	LANDFILL	32.68	576.49	579.69	21-31	Shallow-Intermediate/ Knox Shady
MW-5R	BKG	33 33 24.79N	86 48 35.84W	LANDFILL	26.8	577.54	580.39	13-29	Shallow-Intermediate/ Knox Shady
MW-6	EFF	33 33 13.35N	86 48 35.37W	LANDFILL	23.72	572.79	574.58	12-22	Shallow-Intermediate/ Knox Shady
MW-8	EFF	33 33 14.30N	86 48 33.25W	LANDFILL	23.64	574.2	577.19	11.5-21.5	Shallow-Intermediate/ Knox Shady
MW-8C	BDY	33 33 14.35N	86 48 35.64W	LANDFILL	224.82	575	577.02	215-225	Deep-Bedrock/ Knox Shady
MW-9	BDY	33 33 15.90N	86 48 32.22W	LANDFILL	23.74	571.79	574.73	11.5-21.5	Shallow-Intermediate/ Knox Shady
MW-9B	BDY	33 33 15.95N	86 48 32.11W	LANDFILL	124.46	572.15	574.11	115-125	Deep-Bedrock/ Knox Shady
MW-12	EFF	33 33 11.14N	86 48 34.95W	LANDFILL	28.18	572.93	572.78	19-29	Shallow-Intermediate/ Knox Shady
MW-13	EFF	33 33 12.82N	86 48 37.41W	LANDFILL	27.84	576.06	579.15	16.5-26.5	Shallow-Intermediate/ Knox Shady
MW-15	BDY	33 33 12.12N	86 48 31.43W	LANDFILL	26.56	569.44	571.38	15-25	Shallow-Intermediate/ Knox Shady

TABLE 2

PROPOSED MONITORING WELL DESIGNATIONS

Former North Birmingham Pipe Plant

USEPA I. D. Number ALD 004 017 901

Birmingham, Alabama

WELL NUMBER	WELL TYPE	WELL LATTITUDE	WELL LONGITUDE	UNIT(S) MONITORED	WELL DEPTH (ft.)	GROUND ELEVATION (ft. AMSL)	TOP-OF-RISER ELEVATION (ft. AMSL)	SCREENED INTERVAL (ft. AMSL)	MONITORED ZONE
MW-16	BDY	33 33 16.98N	86 48 30.99W	LANDFILL	27.2	572.81	575.03	15-25	Shallow-Intermediate/ Knox Shady
RW-1	REC	33 33 16.361N	86 48 33.545W	LANDFILL	40	574.16	572.68	10-40	Shallow-Intermediate/ Knox Shady
RW-4	REC	33 33 16.740N	86 48 32.820W	LANDFILL	40	573.32	572.93	10-40	Shallow-Intermediate/ Knox Shady
RW-5	REC	33 33 16.500N	86 48 33.060W	LANDFILL	40	573.4	572.98	10-40	Shallow-Intermediate/ Knox Shady

POC - Point of Compliance Well

EFF - Effectiveness Monitoring Well

BKG - Background Well

BDY - Boundary Monitoring Well

REC - Recovery Well

ft. AMSL - feet above mean sea level

TABLE 3
GROUNDWATER MONITORING PROGRAM SUMMARY
Former North Birmingham Pipe Plant
USEPA I. D. Number ALD 004 017 901
Birmingham, Alabama

Monitoring Well	Analytical Parameter	Monitoring Frequency
Background Well (BKG)	Arsenic	Semi-annually
MW-5R	Barium	Semi-annually
	Beryllium	Semi-annually
Point of Compliance Wells (POC)	Cadmium	Semi-annually
MW-1R	Chromium	Semi-annually
MW-2R	Copper	Semi-annually
MW-2BR	Lead	Semi-annually
MW-2C	Nickel	Semi-annually
MW-3R	Zinc	Semi-annually
	1,1-Dichloroethane	Semi-annually
Effectiveness Wells (EFF)	1,2-Dichloroethane	Semi-annually
MW-6	1,1-Dichloroethene	Semi-annually
MW-8	cis-1,2-Dichloroethene	Semi-annually
MW-12	trans-1,2-Dichloroethene	Semi-annually
MW-13	1,1,1-Trichloroethane	Semi-annually
	1,1,2-Trichloroethane	Semi-annually
	Trichloroethene	Semi-annually
	Vinyl Chloride	Semi-annually
Background Well (BKG)	Arsenic	Annually
MW-5R	Barium	Annually
	Beryllium	Annually
Point of Compliance Wells (POC)	Cadmium	Annually
MW-1R	Chromium	Annually
MW-2R	Copper	Annually
MW-2BR	Lead	Annually
MW-2C	Nickel	Annually
MW-3R	Zinc	Annually
	Acrolein	Annually
Effectiveness Wells (EFF)	Acrylonitrile	Annually
MW-6	1,1-Dichloroethane	Annually
MW-8	1,2-Dichloroethane	Annually
MW-12	1,1-Dichloroethene	Annually
MW-13	cis-1,2-Dichloroethene	Annually
	trans-1,2-Dichloroethene	Annually
Boundary Wells (BDY)	1,1,2,2-Tetrachloroethane	Annually
MW-8C	1,1,1-Trichloroethane	Annually
MW-9	1,1,2-Trichloroethane	Annually
MW-9B	Trichloroethene	Annually
MW-15	Vinyl Chloride	Annually
MW-16	Dibenz(a,h)anthracene	Annually
	Indeno(1,2,3-cd)pyrene	Annually
	Naphthalene	Annually

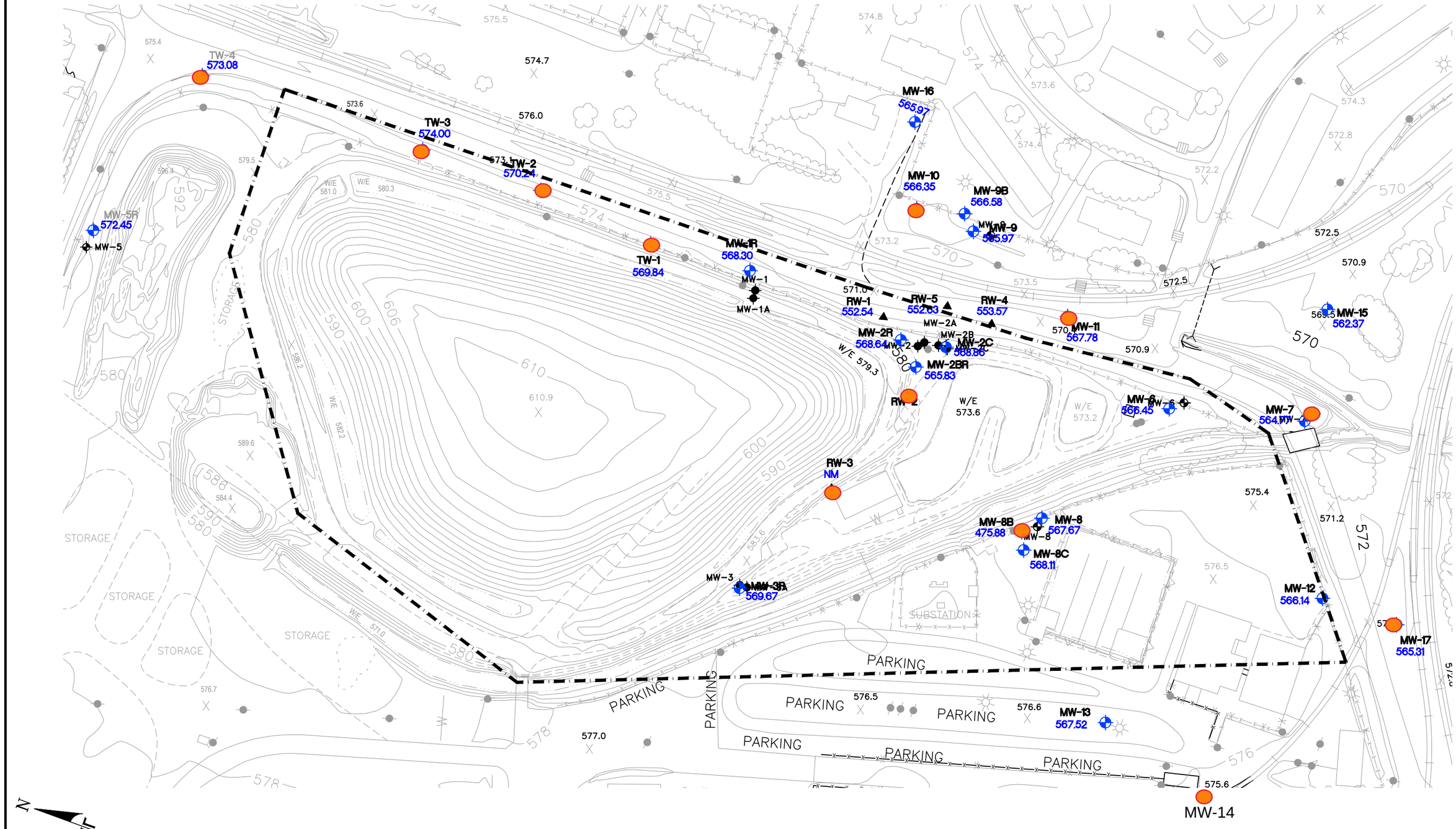
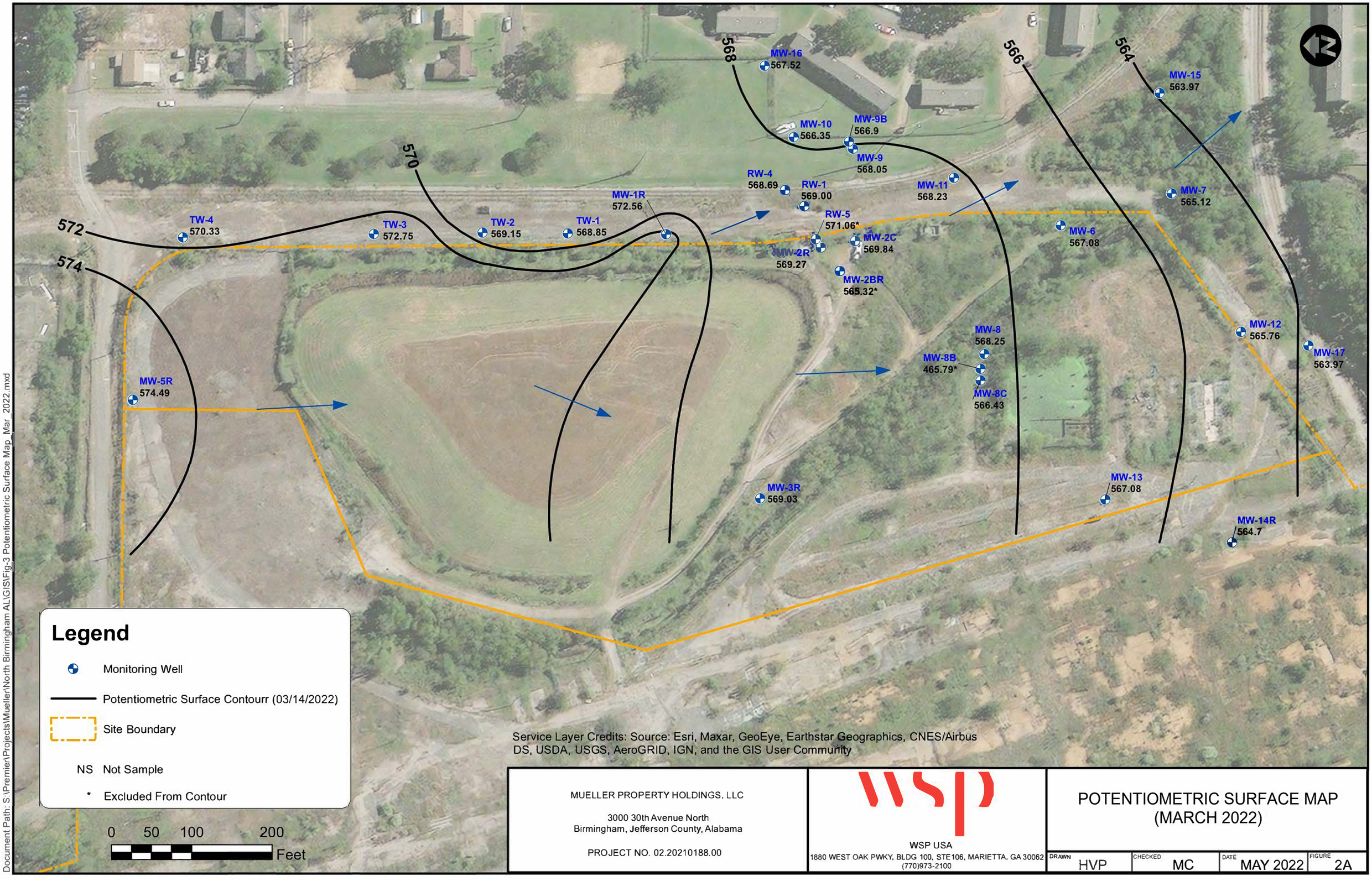


FIGURE 1: PROPOSED MONITORING WELLS FOR REMOVAL



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MUELLER PROPERTY HOLDINGS, LLC

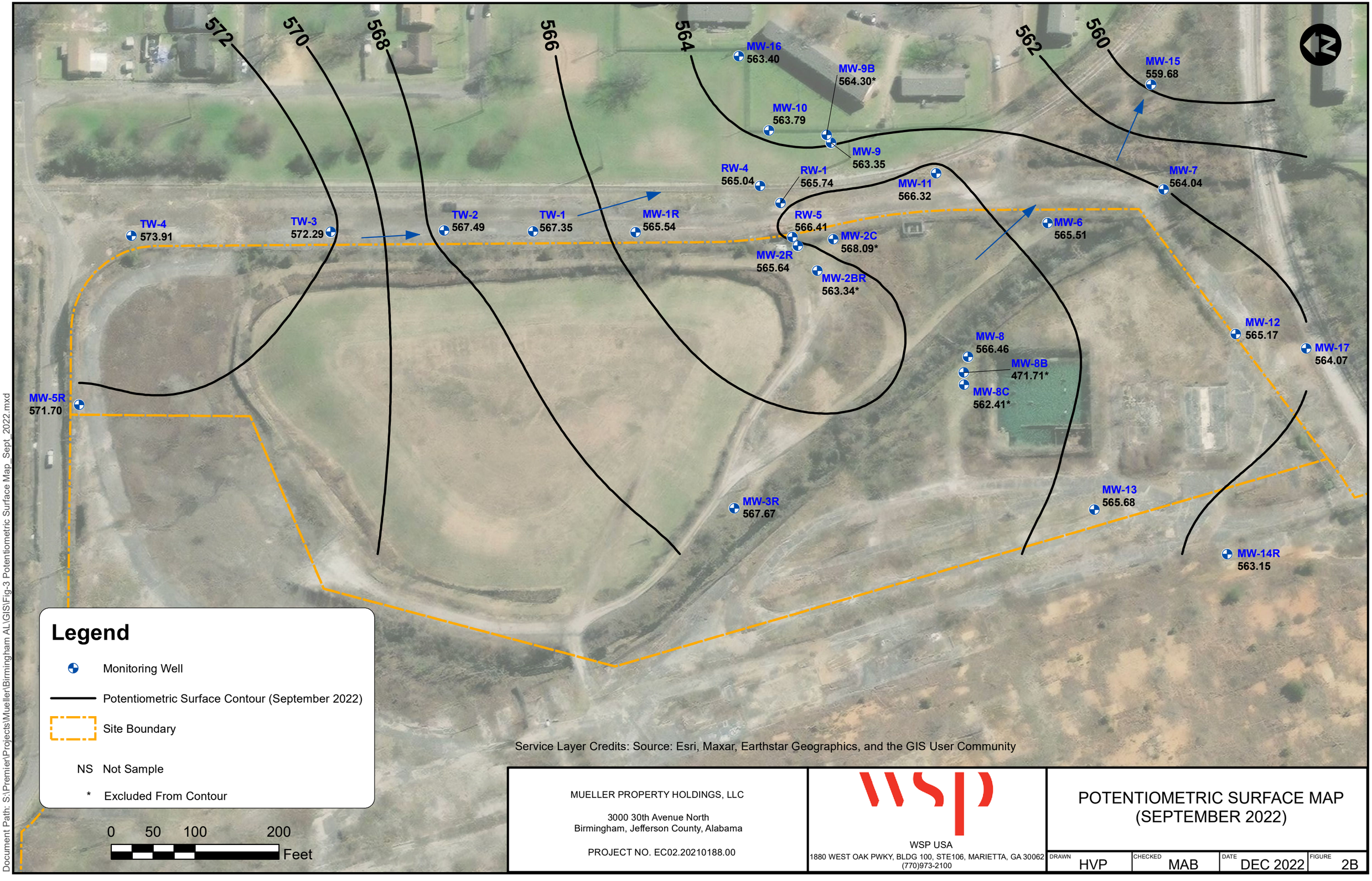
3000 30th Avenue North
Birmingham, Jefferson County, Alabama

PROJECT NO. 02.20210188.00

WSP USA
1880 WEST OAK PWKY, BLDG 100, STE106, MARIETTA, GA 30062
(770)973-2100

POTENTIOMETRIC SURFACE MAP (MARCH 2022)

DRAWN	CHECKED	DATE	FIGURE
HVP	MC	MAY 2022	2A



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MUELLER PROPERTY HOLDINGS, LLC

3000 30th Avenue North
Birmingham, Jefferson County, Alabama

PROJECT NO. EC02.20210188.00

WSP USA
1880 WEST OAK PWKY, BLDG 100, STE106, MARIETTA, GA 30062
(770)973-2100

POTENTIOMETRIC SURFACE MAP (SEPTEMBER 2022)

DRAWN	CHECKED	DATE	FIGURE
HVP	MAB	DEC 2022	2B

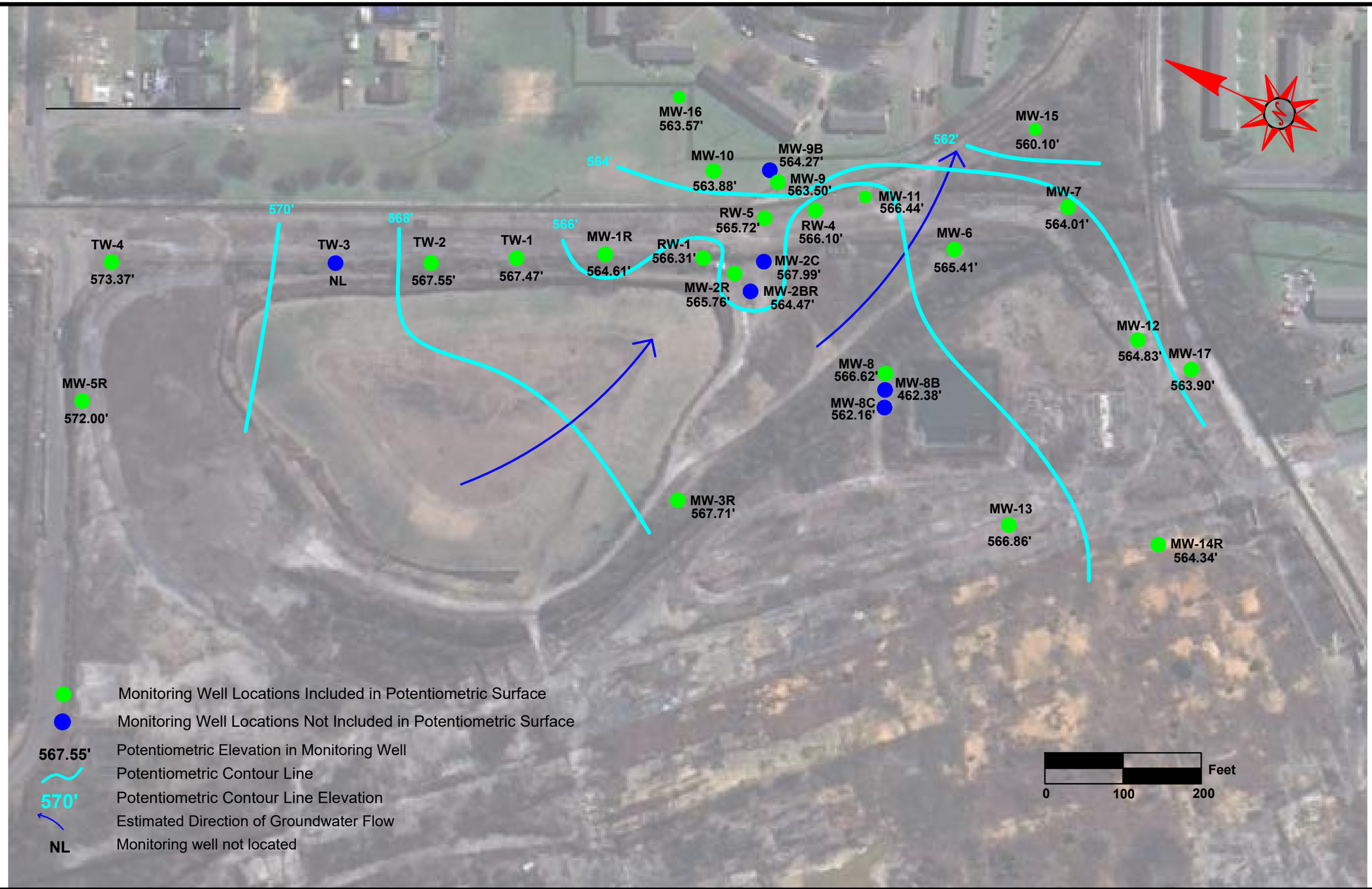
bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2023 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 2C

POTENTIOMETRIC SURFACE MAP
(MARCH 2023)



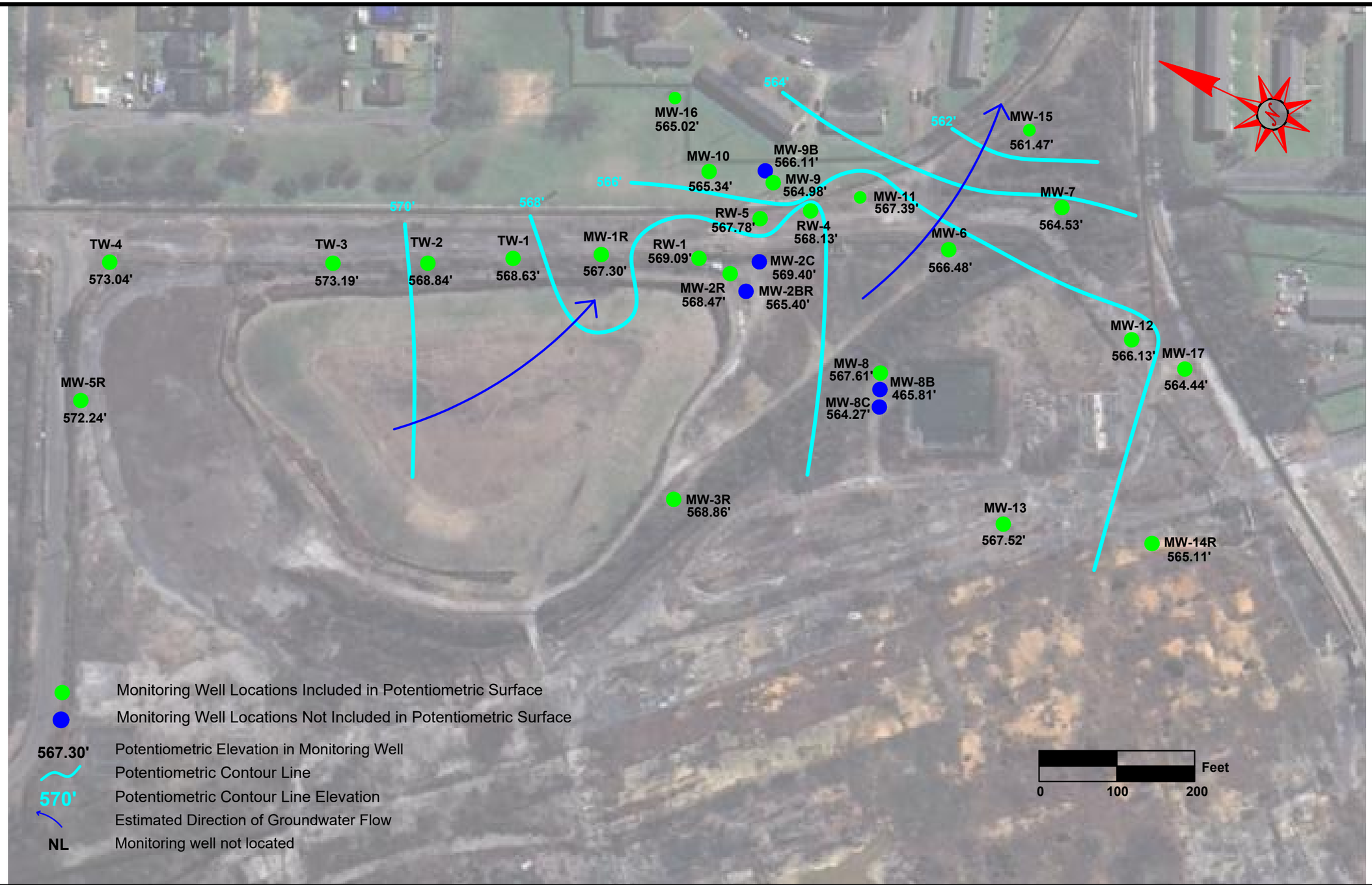
bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
SEPTEMBER 2023 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 2D

POTENTIOMETRIC SURFACE MAP
(SEPTEMBER 2023)



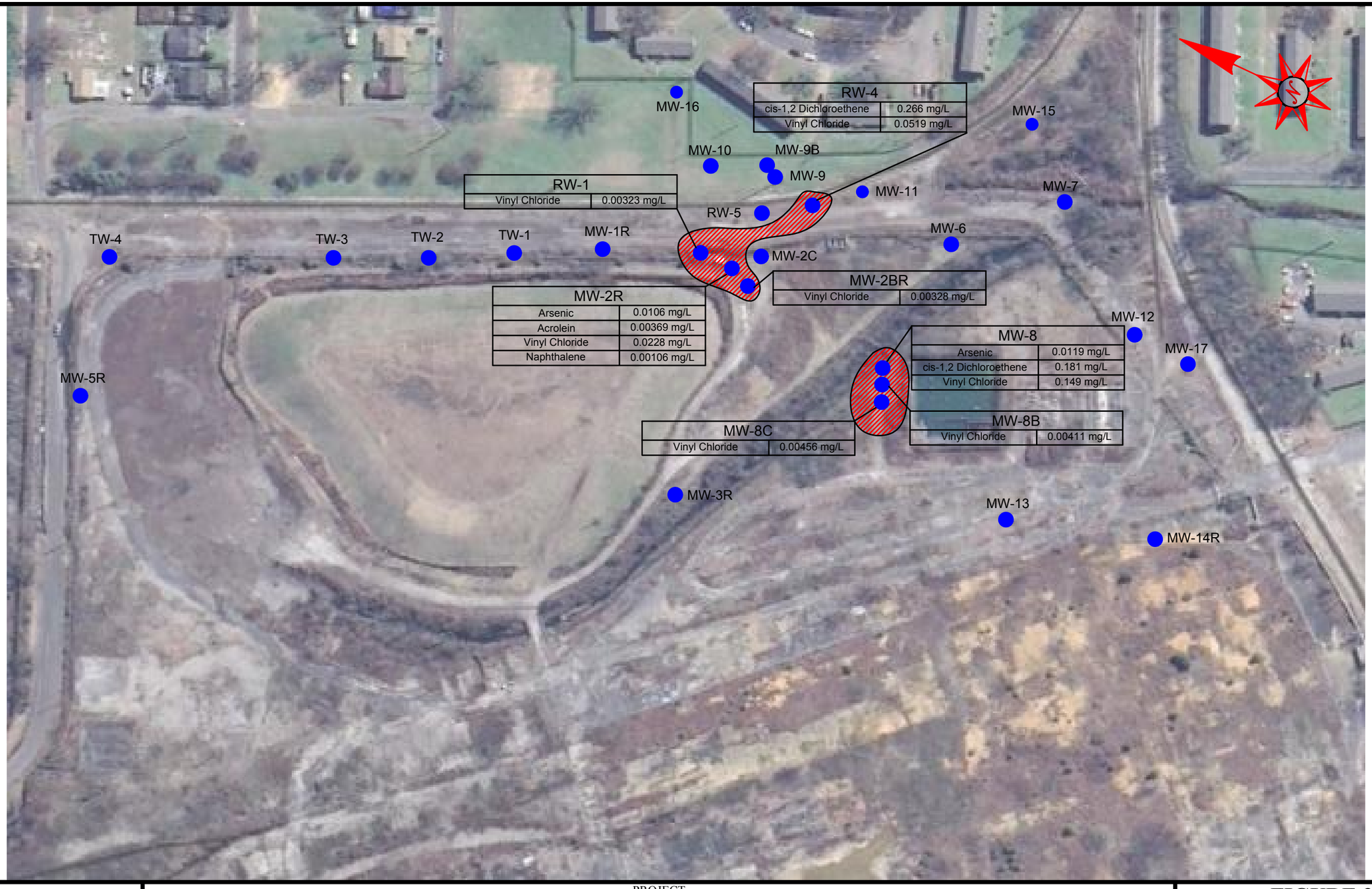
bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2024 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 2E

POTENTIOMETRIC SURFACE MAP
(MARCH 2024)



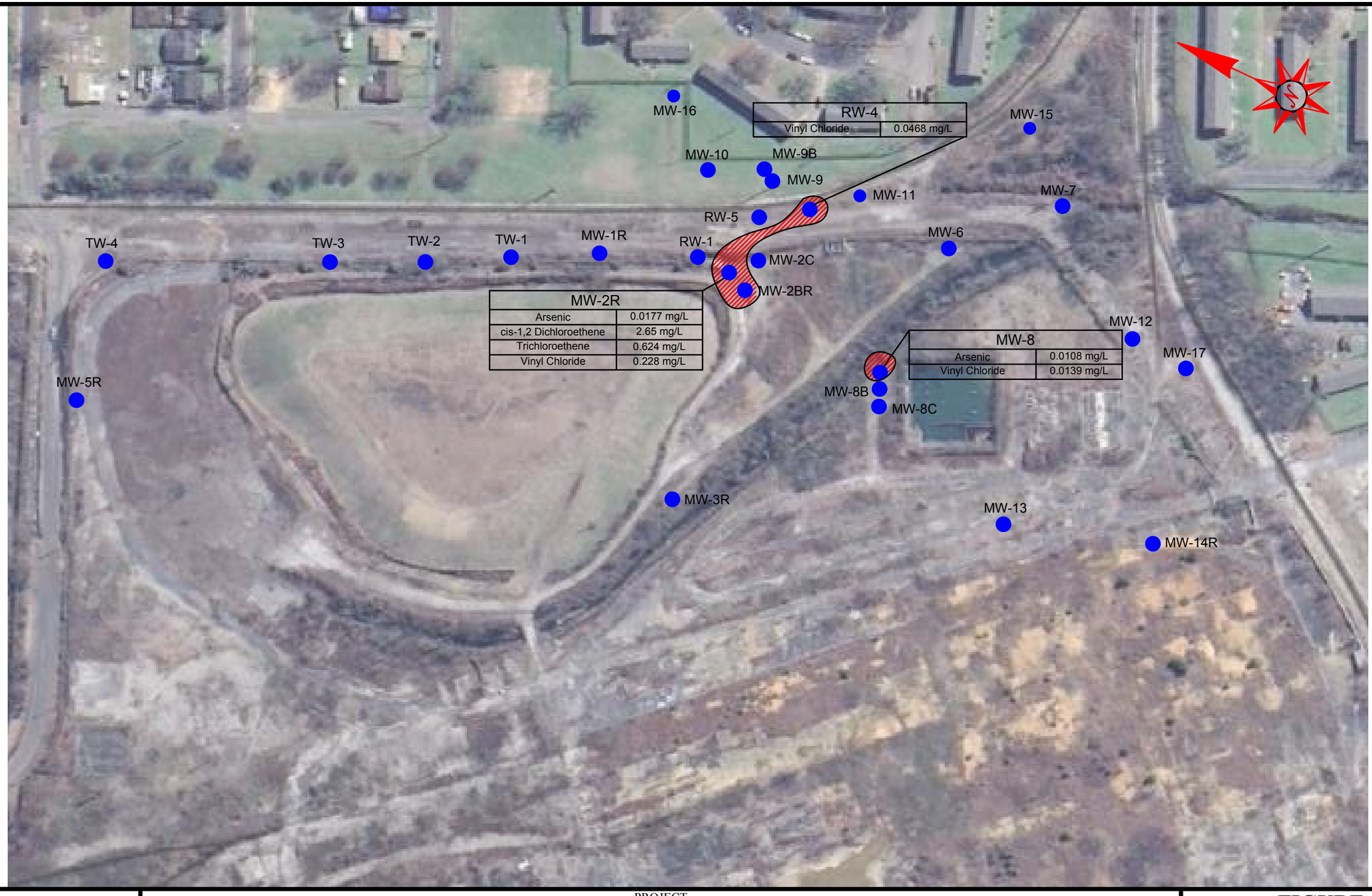
bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2022 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 3A

CHEMICALS OF CONCERN IN GROUNDWATER
(MARCH 2022)



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PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
SEPTEMBER 2022 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 3B

CHEMICALS OF CONCERN IN GROUNDWATER
(SEPTEMBER 2022)

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PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2023 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 3C

CHEMICALS OF CONCERN IN GROUNDWATER
(MARCH 2023)

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PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
SEPTEMBER 2023 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 3D

CHEMICALS OF CONCERN IN GROUNDWATER
(SEPTEMBER 2023)

bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2024 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 3E

CHEMICALS OF CONCERN IN GROUNDWATER
(MARCH 2024)

bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2024 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE 4

PROPOSED MONITORING WELL NETWORK

ATTACHMENT 3

UPDATED TARGET ANALYTE LISTS (TABLES III.2 AND III.3)

PROPOSED TABLE III.2

GROUNDWATER QUALITY MONITORING CONSTITUENTS

HAZARDOUS CONSTITUENT	UNIT
Arsenic	Landfill
Barium	Landfill
Beryllium	Landfill
Cadmium	Landfill
Chromium	Landfill
Copper	Landfill
Lead	Landfill
Nickel	Landfill
Zinc	Landfill
1,1-Dichloroethane	Landfill
1,2-Dichloroethane	Landfill
1,1-Dichloroethene	Landfill
cis-1,2-Dichloroethene	Landfill
trans-1,2-Dichloroethene	Landfill
1,1,1-Trichloroethane	Landfill
1,1,2-Trichloroethane	Landfill
Trichloroethene	Landfill
Vinyl Chloride	Landfill

*All constituents are to be analyzed semi-annually, per Section III.E.3.a of the Permit.

PROPOSED TABLE III.3

GROUNDWATER PROTECTION STANDARD

HAZARDOUS CONSTITUENT	UNIT	CONCENTRATION LIMIT (mg/L)
Arsenic	Landfill	0.01
Barium	Landfill	2
Beryllium	Landfill	0.004
Cadmium	Landfill	0.005
Chromium	Landfill	0.1
Copper	Landfill	1.3
Lead	Landfill	0.015
Nickel	Landfill	0.039
Zinc	Landfill	0.6
Acrolein	Landfill	0.0000042
Acrylonitrile	Landfill	0.000052
Dibenz(a,h)anthracene	Landfill	0.000025
1,1-Dichloroethane	Landfill	0.0028
1,2-Dichloroethane	Landfill	0.005
1,1-Dichloroethene	Landfill	0.007
cis-1,2-Dichloroethene	Landfill	0.07
trans-1,2-Dichloroethene	Landfill	0.1
Indeno(1,2,3-cd)pyrene	Landfill	0.00025
Vinyl Chloride	Landfill	0.002
Naphthalene	Landfill	0.00012
1,1,2,2-Tetrachloroethane	Landfill	0.000076
1,1,1-Trichloroethane	Landfill	0.2
1,1,2-Trichloroethane	Landfill	0.005
Trichloroethene	Landfill	0.005

*All constituents are to be analyzed annually, per Section III.E.3.b of the Permit.
mg/L - milligrams per liter

ATTACHMENT 4

CORRECTIONS AND MODIFICATIONS TO PERMIT SECTIONS

Permit Changes and Rationale

Former North Birmingham Pipe Plant
USEPA I.D. Number ALD 004 017 901
Birmingham, Jefferson County, Alabama

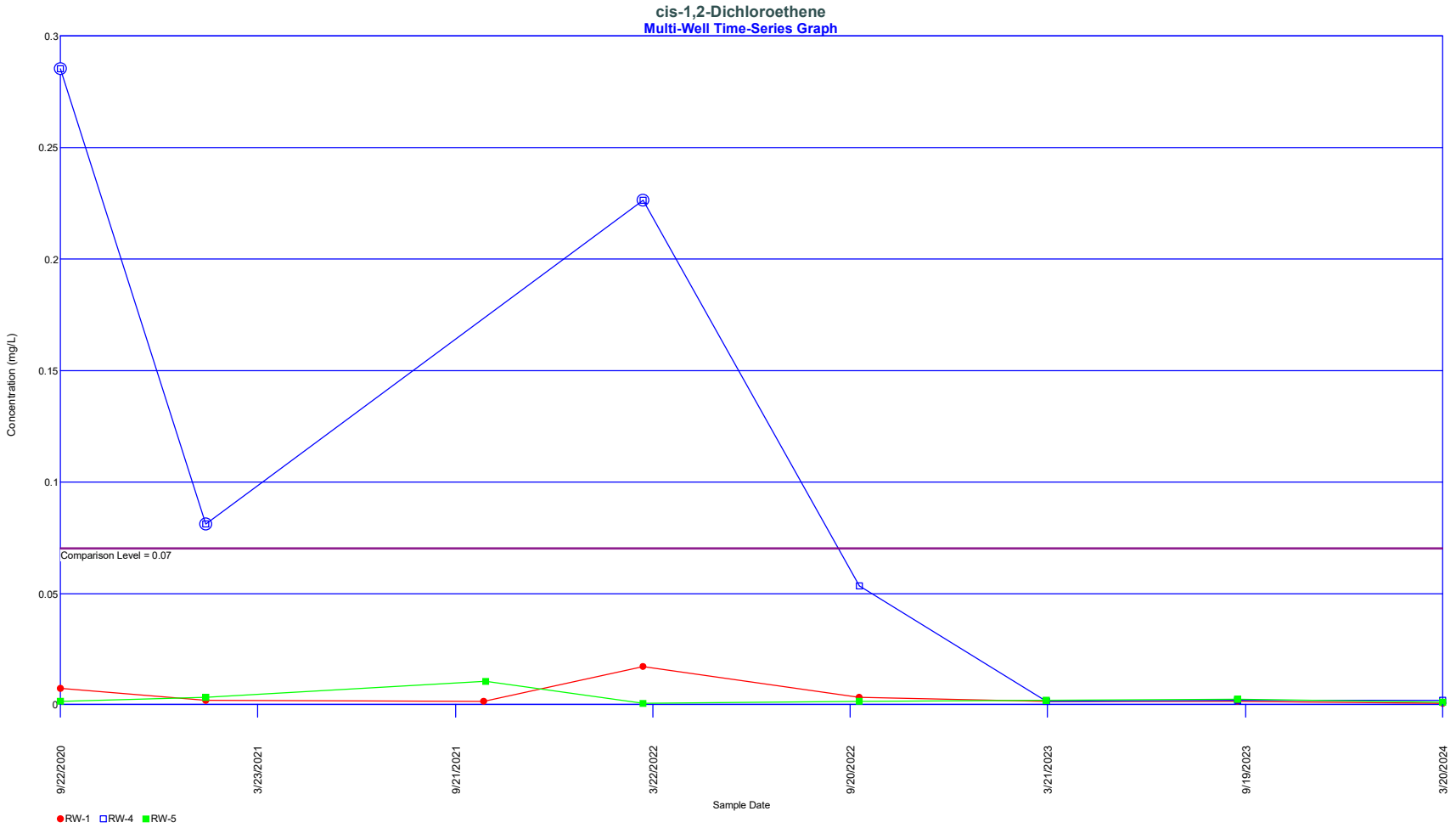
#	Location	Changes	Rationale
1	Section I.C.10.a, Page 3	Correct reference to Appendix F and change to Appendix E of the Permit Application.	Change reference from Appendix F to Appendix E to match the Permit Application.
2	Section II.C.2, Page 2	Remove "weekly after storm events…" and modify schedule to semi-annual inspections of the: a. Integrity of the final cover…; b. Growth and stabilization of vegetative cover; c. Run-on and run-off control system; d. Groundwater monitoring wells; and e. Survey benchmarks.	335-14-5-.12(h) stipulates runoff control requirements, which are consistent with the Permit Application. The inspection within a week following storms only appears to apply to active landfills/waste piles and other elements unrelated to the closed landfill. This is not applicable to this facility.
3	Section II.C.2, Page 2	Change reference from Section II to Section 2.0 of Permit Application.	Change of this reference makes the inspection schedule consistent with that described in the Permit Application.
4	Section III.B.1.a., Page 1	Reference Figure D-1 of the Revised Corrective Action Program (included as Appendix D of this Permit Modification Request).	Required to reflect changes to the groundwater monitoring program.
5	Section III.B.1.a.i, Page 1	Change reference from Appendix E to Appendix D.	Change reference from Appendix E to Appendix D to be consistent with Permit Application.
6	Section III.B.1.a.ii, Page 1	Delete/abandon certain monitoring wells following ADEM approval of the Permit modification.	A monitoring well abandonment plan is included as Attachment 2 of the Permit Modification (See item 13 below).
7	Section III.B.1.c, Page 2	Change reference from Appendix E to Appendix D.	Change reference from Appendix E to Appendix D to be consistent with Permit Application.
8	Section III.B.5.a, Page 4	Remove reference to Appendix F and cite Appendix E (SAP).	The Permit should reference Appendix E in this section. Appendix F was incorrectly cited in this section.
9	Section III.B.5.b, Page 4	Remove reference to Table III.2, retaining only reference to Table III.3.	There are no references to concentration limits in Table III.2.
10	Section III.B.5.c, Page 4	Remove reference to Appendix F and cite Appendix E (SAP).	The Permit should reference Appendix E in this section. Appendix F was incorrectly cited in this section.
11	Section III.B.5.d, Page 4	Change reference from Appendix E to Appendix D.	Change reference from Appendix E to Appendix D to be consistent with Permit Application.

#	Location	Changes	Rationale
12	Section III.B.5, Page 4	Modify SAP to allow for low-flow groundwater sample collection in accordance with Section C.3.3.a.iv of the AEIRG (Revised Appendix E).	Reduce the amount of purge water required for subsequent management and disposal.
13	Table III.1, Page 9-12	Delete monitoring wells MW-7, MW-8B, MW-10, MW-11, MW-14R, and MW-17, and TW-1 through TW-4.	Removal of these monitoring wells will not alter the evaluation of plume stability or measurement of groundwater flow. Likewise, none have contained COCs above established Groundwater Protection Standards in more than ten years. Additionally, wells TW-1 through TW-4, MW-10, and MW-11 are not included in the semi-annual or annual monitoring regimes.
14	Table III.2, Page 13	Remove Bis(2-ethylhexyl)phthalate from Table III.2.	This compound has not been detected in onsite groundwater since monitoring activities commenced in 1997.
15	Table III.3, Page 14	Remove Bis(2-chloro-1-methylethyl)ether, Bis(2-ethylhexyl)phthalate; 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, Pentachlorophenol, and 1,2,3-Trichloropropane from Table III.3.	None of these compounds have been detected in onsite groundwater since monitoring activities commenced in 1997.
16	Table III.3, Page 14	Modify GWPSs to reflect current MCLs and RSLs (HQ-0.1 and EILCR-1.0E^{-6}) established by U.S. EPA with adherence to changes in RSLs incorporated into future monitoring events.	Certain GWPSs contained in the Permit do not reflect existing RSLs. ADEM utilizes U.S. EPA's biannual RSL Table as the basis for evaluating COCs in groundwater. This process should be incorporated into the Permit to be consistent with ADEM policies and procedures. Table 5 of the Revised SAP contains the current GWPSs, based on the most recent EPA RSL Table (May 2024).
17	Section III.E.2, Page 6	Modify the corrective action requirements to allow for monitoring only, provided the groundwater plume remains stable or decreasing in size.	Recent sampling events after the corrective action system had been inactive for more than one year showed no appreciable changes to the onsite COC concentrations in groundwater. Due to the continued theft of components and damage to the onsite remedial equipment, ongoing maintenance is not possible. Provided the onsite plume remains stable relative to historic trends, continued maintenance and operation of the corrective action system does not appear warranted. Mueller proposes to add a provision to this section allowing for the suspension of corrective action activities if the plume remains stable. Likewise, Appendix D of the Permit application has been changed accordingly.

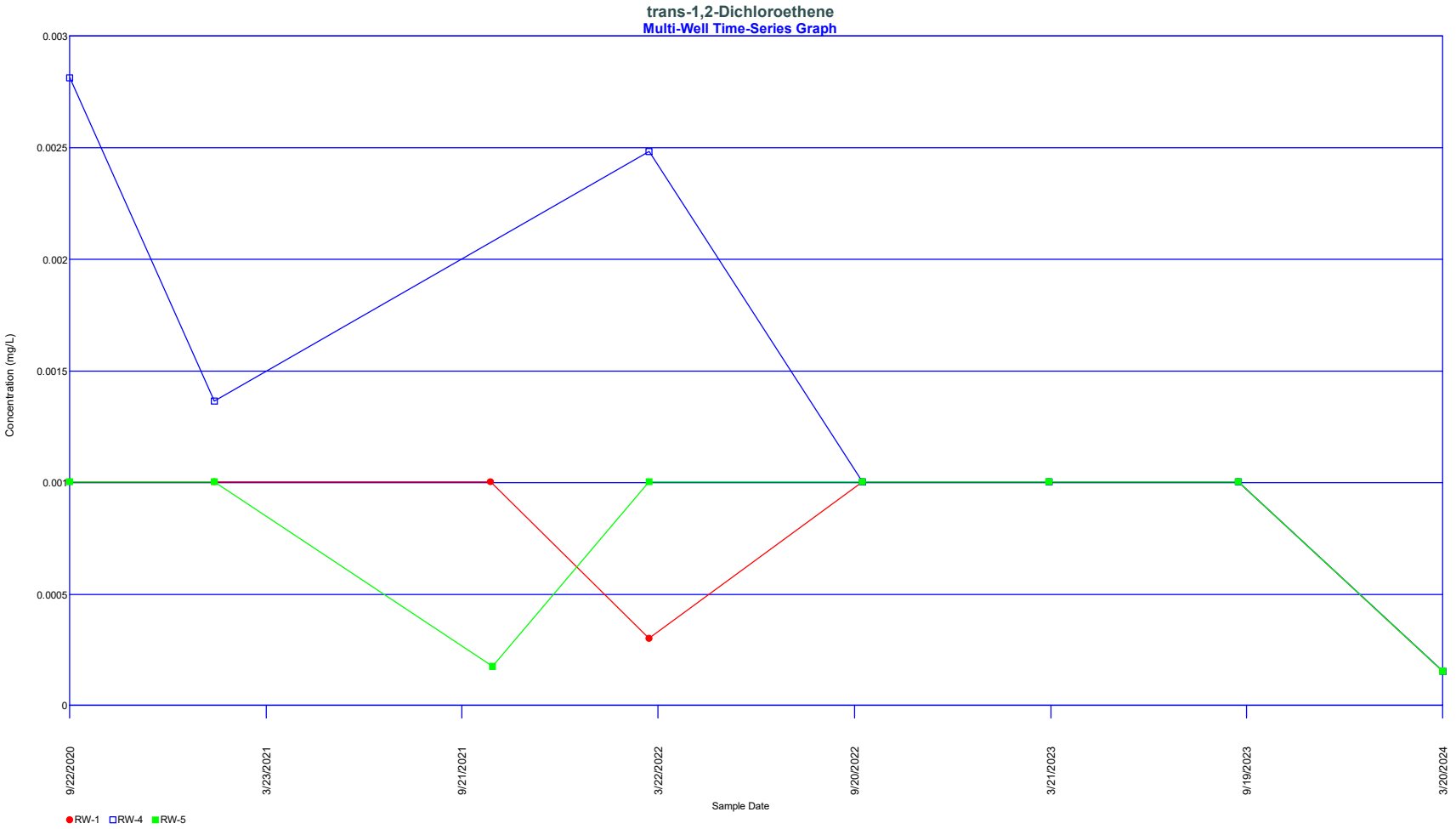
ATTACHMENT 5

TIME-SERIES GRAPHS (MARCH 2024 MONITORING EVENT)

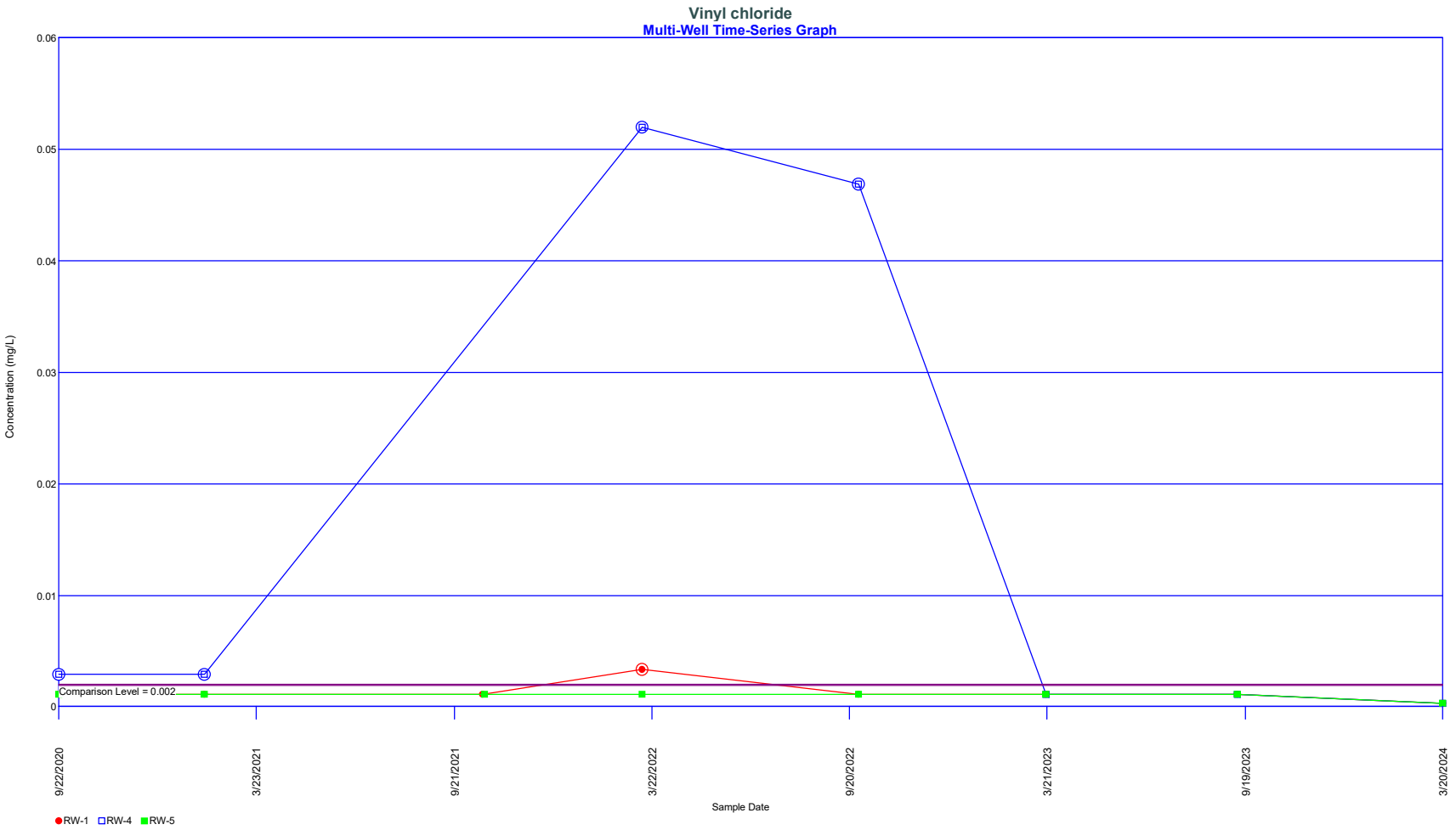
N. Birmingham Landfill



N. Birmingham Landfill



N. Birmingham Landfill



APPENDIX B

INSPECTION SCHEDULE

APPENDIX B - INSPECTION SCHEDULE

Regular inspections of the landfill will be conducted for cover deterioration, settlement, discharges, and equipment failure that could cause or lead to the release of hazardous waste constituents and adversely affect the environment or threaten human health. Table B-1 presents the schedule for inspecting monitoring equipment, security devices, and the landfill area. Since the landfill has been closed since 1995, a copy of the inspection schedule will be kept at the Mueller Property Holdings, LLC headquarters in Atlanta, Georgia and their consultant's office.

In compliance with Alabama Administrative Code Rule 335-14-5-.14(11)(d) which is applicable to closed landfills, an important requirement of this inspection process will be the inspection of the landfill slopes for evidence of settling, subsidence, erosion, or other events expected to limit the integrity or effectiveness of the landfill cover. The results of each inspection will be recorded on inspection log sheets. Upon completion of the inspection log sheets, they will be scanned and filed electronically at the Mueller Property Holdings, LLC headquarters. The inspector should note the presence of any cracks, bulges, or surface movement of material on the inspection form. The inspector should also:

- Describe the approximate width and length of each crack found on the slope or crest;
- Record the size of any bulging;
- Record the overall size of any surface displacement; and
- Record the location of each sign of instability on a sketch of the landfill.

Another condition that will be observed and noted by the inspector while inspecting the landfill is surface erosion. To ensure the integrity of the landfill cover, it will be necessary to catch the formation of erosion gullies at their earliest stage of development to prevent deep cutting into the landfill.

In addition to inspecting the landfill to ensure its integrity, it will also be necessary to inspect the monitoring and recovery wells located around the landfill and the security barriers and signs. The inspector will report any evidence of tampering or damage that is observed during his routine inspections.

TABLE B-1
POST-CLOSURE INSPECTION SCHEDULE

Area/Equipment	Specific Item	Potential Problems	Inspection Frequency
Monitoring Equipment	Groundwater Monitoring Wells	Damage to inner casing, functioning locks, cracked or damaged well pad Absent or damaged protective housing Missing well cap Vandalized equipment	Semi-annually
Security Devices	Facility fence Entrance Gates Warning signs	Corrosion, collision damage, holes Corrosion, collision damage, holes Vandalism, damage	Semi-annually
Landfill Area	Crest, slopes, and berms Cap	Cracks, erosion gullies Cracks in the cap, erosion gullies, bulging or other signs of movement	Semi-annually
Hydraulic Control (as applicable, per criteria set forth in Section 3.2.5 of Appendix D)	Groundwater Pumps	Functioning properly, pipelines damaged, vandalism	Monthly, only when operating

APPENDIX D
CORRECTIVE ACTION PROGRAM
SWMU 21 – CLOSED LANDFILL

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

Appendix D – Corrective Action Program – SWMU 21 – Landfill

Mueller Property Holdings, LLC
Birmingham, Alabama
USEPA ID No. ALD 004 017 901

1. BACKGROUND AND GENERAL OVERVIEW

The *Corrective Action Program*, described herein, consists of:

- Institutional Controls; and
- Hydraulic Control.

Implementation of the Institutional Controls was described in the previously submitted *Landfill Closure Certification* [Environmental Management & Engineering (EME), revised 1993]. Hydraulic Control was initiated under the proposed *Interim Measures (IM) Workplan*, *IM Workplan (Revision 1.0),* and *IM Workplan (Revision 2.0)* previously submitted to the Alabama Department of Environmental Management (ADEM).

Corrective Action Monitoring is part of this Corrective Action Program. The Corrective Action Monitoring includes the collection and analysis of groundwater samples, as well as reporting requirements. In addition, the Corrective Action Monitoring includes:

- Collection of several monitored natural attenuation parameters (e.g., temperature, conductivity, pH, and turbidity) and groundwater elevation data; and
- Comparison of groundwater concentrations for constituents-of-concern (COCs) to the Groundwater Protection Standards (GWPS) at the Point-of-Compliance (POC) and boundary (BDY) wells.

2. OBJECTIVE

The following Corrective Action Program has been prepared for the permitted unit (closed landfill) that will meet the requirements of ADEM Administrative Code R. 335-14-5.06(11). The objective of the Corrective Action Program is to devise a strategy that, when implemented, will minimize or prevent the further migration of monitored volatile organic contaminants and limit human and environmental exposure to acceptable risk levels of these contaminants.

3. CORRECTIVE ACTION PROGRAM

The Corrective Action Program was initiated in response to the presence of several volatile organic compounds (VOCs) in groundwater in concentrations that exceeded their respective GWPS listed in the Post-Closure Care Permit.

The Corrective Action Program consists of:

Institutional Controls:

- Active institutional controls; and
- Passive institutional controls;

Hydraulic Control:

- Implement hydraulic control of the groundwater in the vicinity of the POC;
- Perform semi-annual Corrective Action Monitoring to demonstrate the effectiveness of the corrective action measures;
- Conduct a comparison of the groundwater analytical data to the GWPS referenced in the Post-Closure Care Permit Condition III.B.3.a.;
- Perform statistical analysis on the Corrective Action Monitoring data on an annual basis to determine the effectiveness of the corrective action; and
- Prepare a semi-annual report documenting the corrective action, in general accordance with ADEM Administrative Code R. 335-14-5-.06(11).

Implementation of the Institutional Controls was described in the previously submitted *Landfill Closure Certification*. Hydraulic Control was initiated under the proposed *Interim Measures (IM) Workplan*, *IM Workplan (Revision 1.0),* and *IM Workplan (Revision 2.0)* which were previously submitted to ADEM.

3.1. Institutional Controls

Institutional controls implemented at the former North Birmingham Pipe Plant include two types: active institutional controls and passive institutional controls. Active institutional controls include: (a) installation and maintenance of the landfill cap; (b) control of access to the landfill; and (c) a maintained security fence. Passive institutional controls include: (a) signs; (b) deed restrictions; and (c) land-use controls.

Specific information on the landfill closure is presented in the previously submitted *Landfill Closure Certification* (EME, revised 1993). The initial active institutional control implemented for this site was installation of a final cover (landfill cap) on the landfill and the landfill closure. The final closure surface of the landfill was constructed utilizing the general foundry waste produced at the North Birmingham Pipe Plant. Tests on this material indicated that it had a permeability of 5.86×10^{-6} centimeters per second (cm/sec), which is less than the permeability of the local subsoil (calculated to be 1.64×10^{-5} cm/sec). These values indicate that the compacted waste material complied with requirements of 40 CFR 265.310(a) (per EME, revised 1993). A minimum of three (3) feet of final cover material was placed on the landfill for closure. Other active institutional controls include an 8-foot-high security fence that encompasses the landfill.

Passive institutional controls have also been implemented at the site. Signs are placed around the landfill, which read: “Danger, Unauthorized Personnel Keep Out” and “Danger, Authorized Personnel Only.” In addition, a certified survey plat has been filed with the Birmingham Zoning

Board, and a "Declaration of Restriction" regarding land use was recorded with the property deed at the Jefferson County Probate Court.

3.2. Hydraulic Control

3.2.1. Hydraulic Control Wells

Five hydraulic control/recovery (REC) wells designated RW-1 through RW-5 were installed at the site between January 1999 and January 2001. These wells were installed using the air rotary method of drilling at the locations illustrated on **Figure D-1**. Boring logs for the hydraulic control wells, including construction data, are presented in **Appendix D-A**. **Table D-1** includes the hydraulic control well number, type, latitude, longitude, regulatory unit(s) recovered, depth, ground elevation, top-of-casing elevation, and screened interval.

It was determined that RW-2 and RW-3 were no longer necessary to maintain hydraulic control of the groundwater plume; therefore, these recovery wells were properly abandoned on October 24 and October 28, 2019, following the renewal of the permit on October 11, 2019.

3.2.2. Hydraulic Control System Equipment

The hydraulic control system consists of the following:

- Bottom-filling, pneumatic-controlled, float-activated, total fluid pumps;
- Air compressor (currently one main and one backup compressor);
- Pneumatic air intake and exhaust lines;
- Fluid discharge lines;
- Above-ground steel settling tank containing a float-activated sump pump;
- Two liquid-phase carbon filter vessels; and
- Underground piping leading to discharge point.

Two 2-inch inside-diameter (I.D.) PVC pipelines, which are buried approximately two feet below grade, run from the second carbon filter vessel to the spray pond. One pipe is currently in use, and the second line was installed for backup use.

3.2.3. Hydraulic Control System Installation

The hydraulic control system was installed January 18 through January 26, 1999, and modified in January 2001. Additional modifications were made in 2012 after the plant was closed and razed. A general layout of the hydraulic control system is provided on **Figure D-2**. The original hydraulic control system consisted of five recovery well locations (designated RW-1, RW-2, RW-3, RW-4, and RW-5). Pneumatic-controlled, total fluid pumps are used to extract groundwater and prevent groundwater contaminants from migrating off-site. Extracted groundwater is pumped to an above-ground tank that is segmented to allow for any solids to settle out. The water is periodically pumped to a bag filter followed by two carbon filters. The treated water is then discharged to the spray pond.

3.2.4. Hydraulic Control System Startup

The hydraulic control system was activated on January 27, 1999. The compressor and associated air lines, water-discharge lines, manifolds, and regulators were initially monitored on an hourly basis over an eight-hour period. The system was then checked daily for the following two weeks, with subsequent weekly checks. Operation and maintenance aspects of the overall system are described in Section 3.2.6 below. **Figure D-3** illustrates the potentiometric surface prior to system start up on January 26, 1999, and **Figure D-4** illustrates the potentiometric surface on January 28, 1999 after hydraulic control began.

3.2.5. Hydraulic Control Performance

The U.S. EPA document *Methods for Monitoring Pump-and-Treat Performance* (EPA/600/R-94/123, June 1994) presents several objectives, goals, and evaluation criteria for hydraulic control of contaminated groundwater plumes. The selection of the corrective action objectives depends on site conditions and remediation goals. Hydraulic containment was selected as the preferred remedy as restoration was determined to be technically impracticable due to the presence of buried waste (EPA/600/R-94/123, June 1994).

On December 17, 2020, the three remaining REC wells (RW- 1, RW- 4, and RW- 5) were shut down with ADEM' s permission for approximately six weeks to evaluate the effectiveness of the groundwater recovery system and conditions of the underlying aquifer. On February 4, 2021, groundwater samples were collected from the three REC wells (as well as from monitoring wells MW-2R and MW-8) and analyzed for the VOCs listed in Part B Permit Table III.2. Field parameters were also collected from the groundwater samples at the time of sample collection. After completion of the sampling event, the REC wells were brought back online.

The results of the analysis, presented in the *Preliminary Screening for Natural Attenuation* submitted May 17, 2021 and updated August 1, 2023, demonstrated that conditions in the aquifer underlying the site are conducive to intrinsic bioremediation. This was evidenced by the appearance of daughter products of site contaminants, the depletion of available electron acceptors, and the appearance of metabolic by-products. The data showed that site contaminants are undergoing several mechanisms of biodegradation.

In addition, based on the limited recovery efficiency of the extraction wells (i.e., less than half a pound of contaminants were removed each year while pumping over 1.2 million gallons of water) and the potential for drawing the plume further from the source area, it appeared that maintaining the wells online would not enhance contaminant removal and could be detrimental to the stabilization of the plume. In other words, the containment of the groundwater plume at the facility could be achieved without dependence on the groundwater recovery system. Therefore, Mueller requested to discontinue the operation of REC wells RW-1 and RW-5. ADEM approved this request on August 2, 2021.

Since September 2020, the REC wells have been sampled during each semi- annual sampling event. Copies of the analytical reports were submitted with each semi-annual corrective action monitoring report. Since sampling of the recovery wells began, the primary COC, trichloroethene

(TCE), has not been detected in any of these recovery wells. Daughter product cis-1,2-dichloroethene (DCE) has been detected at low concentrations (below the GWPS) in all three recovery wells with an exception. DCE was detected above the GWPS in RW-4 for the first three sampling events but has not been detected above the GWPS since March 2022. Vinyl chloride is the last of the daughter product chain and is an indication that natural attenuation is taking place. Vinyl chloride has only been detected once in RW-1 in March 2022. In RW-4, vinyl chloride was detected above the GWPS for the first four sampling events but has not been detected since September 2022. In RW-5, vinyl chloride has just been detected for the first time in September 2024 which indicates that attenuation of TCE has reached its final stage.

As such, the continued operation of the groundwater recovery system no longer appears necessary to contain the groundwater plume. Re-activation of these wells to active recovery locations (as required in Section III.E.2 of the current Permit) creates the potential for the REC wells to pull contaminants toward them when operating instead of preventing the migration of contaminants.

With ADEM's authorization to discontinue the operation of the groundwater recovery system, Mueller will continue to collect groundwater samples from the REC wells during future semi-annual events to monitor COC concentrations. If VOCs on the target analyte list exceed the GWPS in the BDY wells downgradient of the recovery system, one or more recovery wells will be brought back online to mitigate potential offsite contaminant migration. Mueller proposes the following criteria to reactivate the groundwater recovery system if VOC concentrations exceed the GWPS specified in the Permit application:

1. Collect a confirmation sample within thirty (30) days of discovery to validate the result;
2. Deliver the confirmation sample results to ADEM within ten (10) working days of receipt;
3. If confirmation sample validates the initial concentration(s), reactivate the hydraulic control system within thirty (30) days following submittal of the confirmation sample results to ADEM;
4. After one year of operation, re-evaluate the recovery system and groundwater concentrations to determine if one or more wells can be taken offline, provided the criteria are met.

If one or more REC wells are active during any portion of a semi-annual reporting period, the following information will be provided to ADEM:

- The operational time for the pump(s); and
- The total volume of water pumped during the period.

3.2.6. Operation and Maintenance of Hydraulic Control System

If the hydraulic control system requires reactivation (based on the criteria set forth in Section 3.2.5), it will be inspected on a regular interval over the course of the active period.

3.2.7. Health and Safety Plan

A Site-Specific Health and Safety Plan covering the activities associated with the Corrective Action Program is included as **Appendix D-C**.

3.2.8. Contingency Plan (When System is Operational)

In case of an emergency, such as broken or disconnected pipes or lines, water leaks, frayed wiring, or any unusual noise, the system will be immediately shut down, and the site will be secured.

Prior to performing repairs, personnel will review the Site-Specific Health and Safety Plan (**Appendix D-C**), and then consult the manufacturer's manuals. Repair of hydraulic control system equipment will be performed in general accordance with the manufacturer's specifications.

4. CORRECTIVE ACTION MONITORING

The Corrective Action Monitoring will be conducted in general accordance with ADEM Administrative Code R. 335-14-5-.06(11)(d). The sections presented below outline the collection and analysis of groundwater samples and the general reporting requirements of the Corrective Action Monitoring. In addition, the Corrective Action Monitoring includes:

- Collection of groundwater elevation data;
- Comparison of groundwater concentrations of constituents-of-concern at the POC to the GWPS; and
- Comparison of groundwater concentrations of constituents-of-concern at the BDY wells to the GWPS.

4.1. Monitoring Wells

Fifteen (15) monitoring wells are currently located on the site (**Figure D-1** and **Table D-2**). These wells include: one background (BKG) monitoring well MW-5R; five point-of-compliance (POC) monitoring wells MW-1R, MW-2R, MW-2BR, MW-2C, and MW3R; four effectiveness (EFF) monitoring wells MW-6, MW-8, MW-12, and MW13; and five boundary (BDY) monitoring wells MW-8C, MW-9, MW9B, MW-15, and MW-16. **Table D-2** includes the monitoring well number, type, latitude, longitude, regulatory unit(s) monitored, depth, ground elevation, top-of-casing elevation, screened interval, and monitored zone. These monitoring wells are constructed of 2-inch I.D. PVC. Boring logs, including monitoring well construction schematics, are included as **Appendix D-A**.

During the March semi-annual sampling events, the BKG, POC, EFF, and BDY wells will be sampled. During the September semi-annual sampling events, the BKG, POC, and EFF wells will be sampled. This is consistent with the current permit.

4.2. Monitored Constituents

The constituents presented in **Table D-3** are the Groundwater Quality Monitoring Constituents proposed for analysis of groundwater samples collected from the listed BKG, POC, EFF, and BDY wells during the Corrective Action Monitoring. The constituents listed in **Table D-3** are consistent with the Groundwater Quality Monitoring Constituents presented in Tables III.2. and III.3. of the current permit with the exception of the removal of the following ten constituents due to the lack of detections since groundwater monitoring activities commenced: bis(2-chloro-1-methylethyl)ether, bis(2-ethylhexyl)phthalate, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, cis-1,3-dichloropropene, trans-1,3-dichloropropene, pentachlorophenol, and 1,2,3-trichloropropane. The proposed frequency of sampling is also included in **Table D-3** with the annual event conducted in March**.**

4.3. Groundwater Protection Standards

The GWPS for the constituents are also listed in **Table D-3**. The GWPS are based on current US EPA maximum contaminant levels (MCLs) or Region 4 regional screening levels (RSLs) for tap water (May 2024).

4.4. Water-Level and Field Parameter Measurements

The depth to groundwater in each of the 15 monitoring wells and three recovery wells will be measured semi-annually using a decontaminated electronic water-level indicator. The groundwater level will be measured from the top-of-casing (TOC) of each well, which is surveyed relative to its elevation above mean sea level (AMSL). The TOC elevations are presented in **Table D-1** and **Table D-2**. A groundwater elevation will then be calculated by subtracting the measured depth to groundwater from the TOC elevation. Potentiometric surface maps illustrating onsite groundwater elevations will be prepared and submitted with each semi-annual report (Section 4.8).

Field parameters to be measured in the groundwater samples collected from the monitoring wells during the Corrective Action Monitoring include those listed in **Table D-4**. These field parameters include temperature, specific conductance, and pH as described in Condition III.E.3.c. of the current Post-Closure Care Permit. **Table D-4** also includes turbidity in accordance with Section C.3.1 of the AEIRG. Tables will be prepared for the field parameter data and submitted during reporting (Section 4.8).

4.5. Monitoring Requirements

During implementation of the Corrective Action Program, Corrective Action Monitoring will be performed. One groundwater sample will be collected during Corrective Action Monitoring from the BKG, POC, EFF, and BDY monitoring wells listed in **Table D-2** during the March sampling event and from the BKG, POC, and EFF monitoring wells during the September sampling event (as stated in the current permit). Each groundwater sample collected from the wells during Corrective Action Monitoring will be analyzed for the constituents listed in **Table D-3**, as

appropriate. The field parameters listed in **Table D-4** will also be measured for each groundwater sample collected.

In addition to the groundwater samples, a trip blank, a rinse blank, and a duplicate sample will be collected as quality assurance samples. The trip blank will be analyzed for the volatile organic compounds listed in **Table D-3**. The rinse blank and duplicate sample will be analyzed for all the constituents listed in **Table D-3**, as appropriate. Sampling and analytical procedures will follow the plan outlined in Post-Closure Care Permit Condition III.B.5 and Appendix E of the permit application.

4.6. Analytical Results

Analytical data will be tabulated upon receipt of the laboratory reports. The laboratory reports and tabulated analytical data will be prepared and submitted during reporting (Section 4.8).

4.6.1. Comparison to Groundwater Protection Standards

The analytical data from the groundwater collected from each monitoring well will be compared to the GWPS. Corrective action will continue until the constituent concentrations in the POC wells are below the GWPS for a period of three years. The comparison of groundwater analytical results to the GWPS will be included in each semi-annual monitoring report (Section 4.8).

4.6.2. Effectiveness Wells

The analytical data from the groundwater collected from each of the EFF wells will be evaluated (in each semi-annual report) to determine whether increasing or decreasing trends are present. The data obtained from these trends may be used to evaluate the continued effectiveness of natural attenuation across the groundwater plume.

4.7. Statistical Analysis

The effectiveness of the Corrective Action Program will be assessed in general accordance with ADEM Administrative Code 335-14-5-.06(11)(d) by statistical studies of the groundwater samples collected from the monitoring wells listed in **Table D-2**. Guidance on statistical procedures to be employed during the Corrective Action Program will be drawn from the EPA document *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (March 2009, *EPA 530/R-09-007*), any of its successor documents, and/or other pertinent literature. Groundwater samples will be collected and analyzed on a semi-annual sampling schedule. Annually, as presented in the EPA document *PB94-138815* (Chapter 5), both sets of semi-annual data will be statistically analyzed by methods appropriate to the characteristics of the distribution of the analytical data and the known sensitivity of the statistical methods to violations of method assumptions (i.e., parametric procedures will be employed unless otherwise indicated).

The statistical analysis conducted during the Corrective Action Monitoring (described above) is based on analysis of an annual database. The statistical analysis will be presented on an annual basis following the completion of the March semi-annual sampling event (Section 4.8).

4.8. Reporting and Response Requirements

In addition to the recordkeeping and reporting requirements specified in Condition III.B.6. of the Post-Closure Care Permit, a Corrective Action Effectiveness Report will be submitted to the Department semi-annually (approximately May and November, 60 days following receipt of the analytical results from each semi-annual groundwater monitoring event), pursuant to ADEM Administrative Code R. 335-14-5-.06(11)(g). Each semi-annual report will contain analytical data, field parameter measurements, water-level measurements, and hydraulic control information (if applicable) collected during the reporting period. Statistical analysis will be reported on an annual basis during the semi-annual report that will be submitted to ADEM following the March sampling event of each year.

5. FINANCIAL ASSURANCE

Financial assurance forms have been prepared as required by ADEM Administrative Code R. 335-14-5-.06(11)(i) and are included in Appendix F of the *Part B Post-Closure Care Permit Application*. These financial assurance calculations include implementation of the *Corrective Action Program* and include provisions for third party costs, labor rates, inspection costs, and administrative costs. The costs have been revised to reflect the proposed monitoring network and constituents. Within 90 days of the Department's approval, a letter of credit or other approved financial assurance mechanism will be secured.

6. REFERENCES

Alabama Department of Environmental Management Administrative Code R. 335-14-8 (Rev. 03/31/17).

Alabama Department of Environmental Management Administrative Code R. 335-14-5 (Rev. 03/31/17).

Alabamna Department of Environemental Management, August 2, 2021, *March 2021 Semi-Annual Corrective Action Monitoring Reprt and Preliminary Screening for Natural Attenuation.*

Alabama Environmental Investigation and Remediation Guidance (AEIRG), (Rev. 4, 2/17)

Environmental Management and Engineering, Inc., October 17, 1991, Revised November 5, 1993, *Landfill Closure Certification, U.S. Pipe and Foundry Company, North Birmingham Pipe Plant.*

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Gallet and Associates, Inc., February 18, 1998, *Interim Measures Workplan (Revision 1.0), U.S. Pipe and Foundry Company, North Birmingham Plant.*

Gallet and Associates, Inc., March 23, 1999, *Interim Measures Workplan (Revision 2.0), U.S. Pipe and Foundry Company, North Birmingham Pipe Plant.*

Pivetz, Bruce E., et. al., December 2012, *Framework for Site Characterization for Monitored Natural Attenuation of Volatile Organic Compounds in Ground Water: EPA/600/R-12/712,* U.S. Environmental Protection Agency.

Mueller Property Holdings, LLC, August 1, 2023, *Updated Natural Attenuation Report, Former North Birmingham Pipe Plant.*

Rogers, John, B. Johnson, and H. Lacayo, July 1992, *Methods for Evaluating the Attainment of Cleanup Standards, Volume 2: Ground Water*, U.S. Environmental Protection Agency, PB94-138815.

Terracon, May 17, 2021, *Preliminary Screening for Natural Attenuation, Former North Birmingham Pipe Plant.*

U.S. Environmental Protection Agency, June 1994, *Methods for Monitoring Pump-and-Treat Performance. EPA/600/R-94/123.*

U.S. Environmental Protection Agency, March 2009, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance. EPA 530/R-09-007.*

Weidemeier, T.H., et. al., September 1998, *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater: EPA/600/R-98/128*, U.S. Environmental Protection Agency.

In addition, other documents incorporated within these above-referenced documents are referenced by inclusion.

TABLES

Table D-1. Hydraulic Control Well Designation
Mueller Property Holdings, LLC - Birmingham, Alabama

Well Number	Well Type	Well Latitude	Well Longitude	Unit(s) Recovered	Well Depth (ft.)	Ground Elevation (ft. AMSL)	TOC Elevation (ft. AMSL)	Screened Interval (ft. AMSL)	Zone/Aquifer*
RW-1	REC	33 33 16.361N	86 48 33.545W	Landfill	40	574.16	572.68	10-40	Conasauga Fm./Knox-Shady
RW-4	REC	33 33 16.740N	86 84 32.820W	Landfill	40	573.32	572.93	10-40	Conasauga Fm./Knox-Shady
RW-5	REC	33 33 16.500N	86 48 33.060W	Landfill	40	573.40	572.98	10-40	Conasauga Fm./Knox-Shady

* Also referred to as the “Valley and Ridge Aquifer System”
REC - Recovery/Hydraulic Control Well
TOC - top of casing
ft. AMSL - feet above mean sea level

Table D-2. Monitoring Well Designation
Mueller Property Holdings, LLC - Birmingham, Alabama

Well Number	Well Type	Well Latitude	Well Longitude	Unit(s) Monitored	Well Depth (ft.)	Ground Elevation (ft. AMSL)	TOC Elevation (ft. AMSL)	Screened Interval (ft. AMSL)	Monitored Zone/Aquifer*
MW-1R	POC	33 33 18.21N	86 48 33.46W	Landfill	23.46	573.52	576.51	11-21	Conasauga Fm./Knox-Shady
MW-2R	POC	33 33 16.30N	86 48 33.67W	Landfill	31.12	574.3	576.95	19-29	Conasauga Fm./Knox-Shady
MW-2BR	POC	33 33 16.07N	86 48 34.02W	Landfill	129.97	574.3	575.28	125-130	Conasauga Fm./Knox-Shady
MW-2C	POC	33 33 15.88N	86 48 33.58W	Landfill	124.95	574.43	576.9	202.8-222.8	Conasauga Fm./Knox-Shady
MW-3R	POC	33 33 17.07N	86 48 37.36W	Landfill	32.68	576.49	579.69	21-31	Conasauga Fm./Knox-Shady
MW-5R	BKG	33 33 24.79N	86 48 35.84W	Landfill	26.8	577.54	580.39	19-29	Conasauga Fm./Knox-Shady
MW-6	EFF	33 33 13.35N	86 48 33.37W	Landfill	23.72	572.79	574.58	12-22	Conasauga Fm./Knox-Shady
MW-8	EFF	33 33 14.30N	86 48 35.25W	Landfill	23.64	574.2	577.19	11.5-21.5	Conasauga Fm./Knox-Shady
MW-8C	BDY	33 33 14.35N	86 48 35.64W	Landfill	224.82	575	577.02	215-225	Conasauga Fm./Knox-Shady
MW-9	BDY	33 33 15.90N	86 48 32.22W	Landfill	23.74	571.79	574.73	11.5-21.5	Conasauga Fm./Knox-Shady
MW-9B	BDY	33 33 15.95N	86 48 32.11W	Landfill	124.46	572.15	574.11	115-125	Conasauga Fm./Knox-Shady
MW-12	EFF	33 33 11.14N	86 48 34.95W	Landfill	28.18	572.93	572.78	19-29	Conasauga Fm./Knox-Shady
MW-13	EFF	33 33 12.82N	86 48 37.41W	Landfill	27.84	576.06	579.15	16.5-26.5	Conasauga Fm./Knox-Shady
MW-15	BDY	33 33 12.12N	86 48 31.43W	Landfill	26.56	569.44	571.38	15-25	Conasauga Fm./Knox-Shady
MW-16	BDY	33 33 16.98N	86 48 30.99W	Landfill	27.2	572.81	575.03	15-25	Conasauga Fm./Knox-Shady

* Also referred to as the “Valley and Ridge Aquifer System”
Monitoring wells with a "B" or "C" designation represent the deep flow zone. All other wells are installed in the shallow/intermediate flow zone.
POC - Point of Compliance Well
BKG - Background Well
EFF - Effectiveness Well
BDY - Boundary Monitoring Well
ft. AMSL - feet above mean sea level

Table D-3. Groundwater Quality Monitoring Constituents and Groundwater Protection Standards
Mueller Property Holdings, LLC - Birmingham, Alabama

Hazardous Constituent	Unit	Concentration Limit (mg/L)	Monitoring Frequency
Arsenic, total	Landfill	0.01	Semi-annual
Barium, total	Landfill	2	Semi-annual
Beryllium, total	Landfill	0.004	Semi-annual
Cadmium, total	Landfill	0.005	Semi-annual
Chromium, total	Landfill	0.1	Semi-annual
Copper, total	Landfill	1.3	Semi-annual
Lead, total	Landfill	0.015	Semi-annual
Nickel, total	Landfill	0.039	Semi-annual
Zinc, total	Landfill	0.6	Semi-annual
1,1-Dichloroethane (75-34-3)	Landfill	0.0028	Semi-annual
1,2-Dichloroethane (107-06-2)	Landfill	0.005	Semi-annual
1,1-Dichloroethene (75-35-4)	Landfill	0.007	Semi-annual
cis-1,2-Dichloroethene (156-59-2)	Landfill	0.07	Semi-annual
trans-1,2-Dichloroethene (156-60-5)	Landfill	0.1	Semi-annual
1,1,1-Trichloroethane (71-55-6)	Landfill	0.2	Semi-annual
1,1,2-Trichloroethane (79-00-5)	Landfill	0.005	Semi-annual
Trichloroethene (79-01-6)	Landfill	0.005	Semi-annual
Vinyl Chloride (75-01-4)	Landfill	0.002	Semi-annual
Acrolein (107-02-8)	Landfill	0.0000042	Annual
Acrylonitrile (107-13-1)	Landfill	0.000052	Annual
1,1,2,2-Tetrachloroethane (79-34-5)	Landfill	0.000076	Annual
Dibenz(a,h)anthracene (53-70-3)	Landfill	0.000025	Annual
Indeno(1,2,3-cd)pyrene (193-39-5)	Landfill	0.00025	Annual
Naphthalene (91-20-3)	Landfill	0.00012	Annual

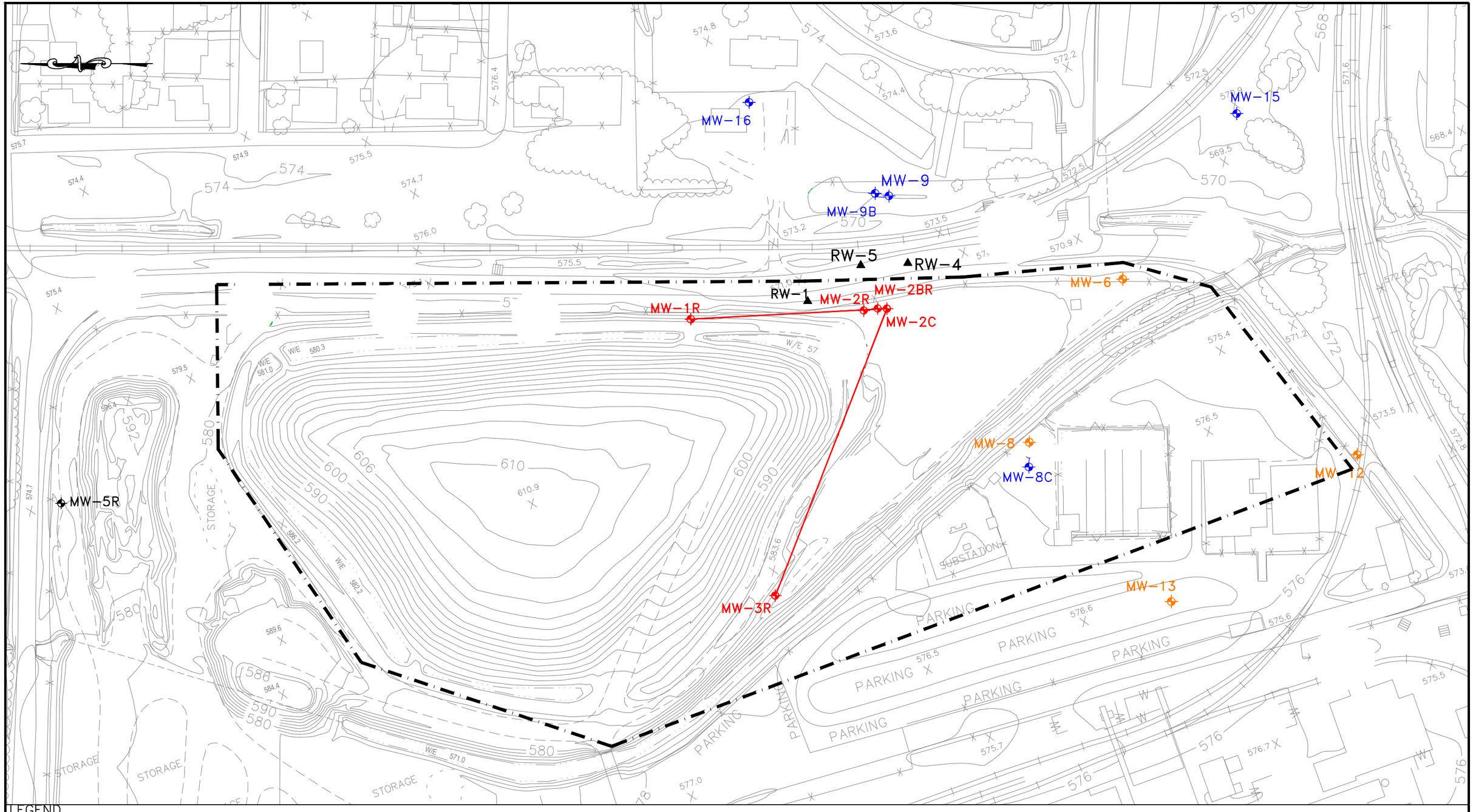
mg/L - milligrams per liter

Table D-4. Additional Monitoring Parameters
Mueller Property Holdings, LLC - Birmingham, Alabama

Constituent	Units	Location
Temperature	degrees F or C	Field
Specific Conductance	µS/cm	Field
pH	Standard Units	Field
Turbidity	NTUs	Field

F- Fahrenheit
C - Celsius
µS/cm - microSiemens per centimeter
NTUs - Nephelometric Turbidity Units

FIGURES



LEGEND

- SITE
- BACKGROUND MONITORING WELL
- BOUNDARY MONITORING WELL
- POINT OF COMPLIANCE MONITORING WELL
- EFFECTIVENESS WELL
- ▲ HYDRAULIC CONTROL WELL
- POINT OF COMPLIANCE

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	TWR
Drawn By:	RLW
Checked By:	TWR/MRF
Approved By:	TWR

Project No.	E1187001D
Scale:	AS SHOWN
File No.	E1187001E-1
Date:	MARCH 2018

Terracon
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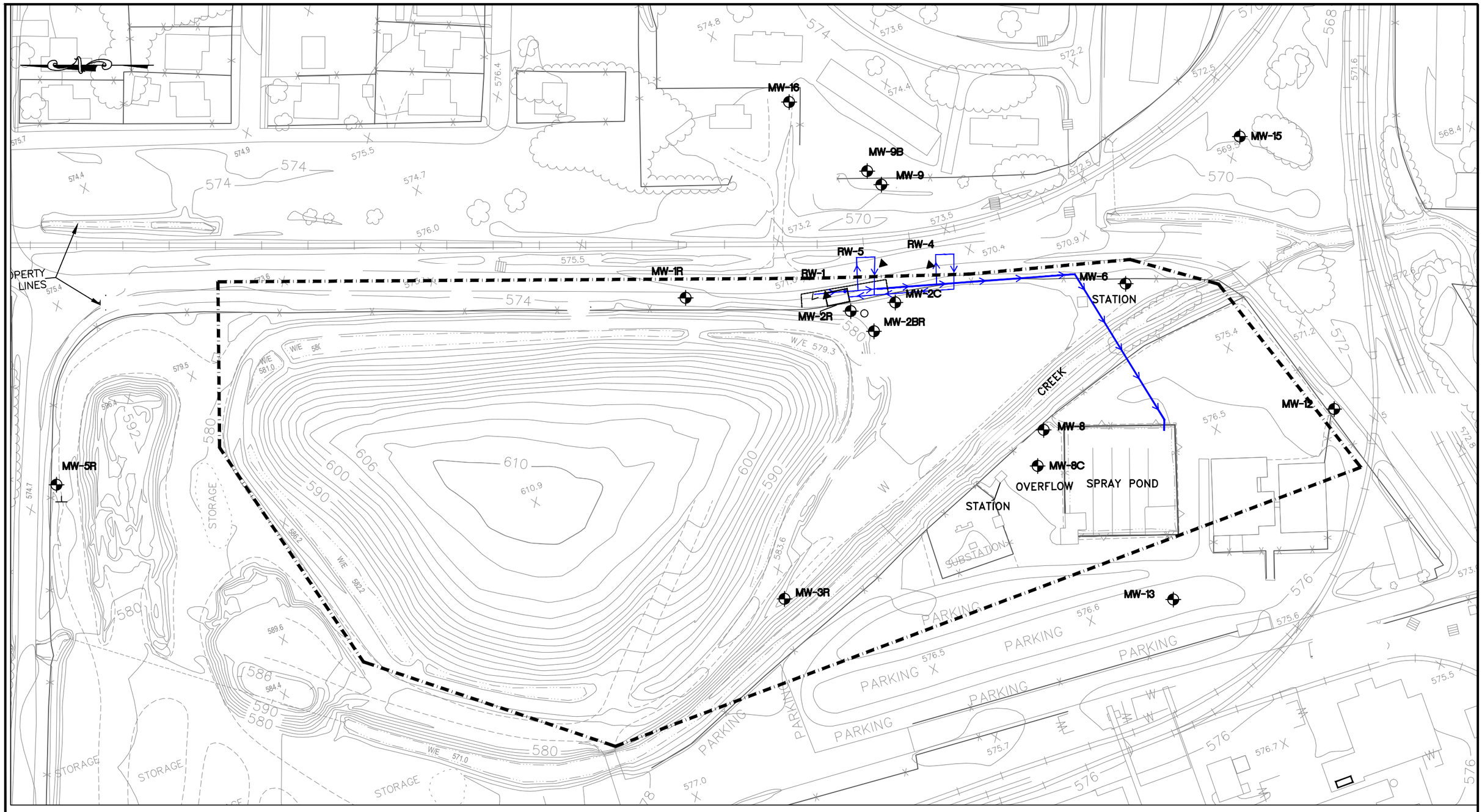
110 12th Street North Birmingham, Alabama 35203
(205) 942-1289 (205) 443-5302

SITE MAP
APPENDIX D
MUELLER PROPERTY HOLDINGS, LLC
SWMU 21 - CLOSED LANDFILL
BIRMINGHAM, AL

FIGURE
D-1



LEGEND

- SITE
- ▲ HYDRAULIC CONTROL WELL LOCATION
- ⌖ MONITORING WELL LOCATION
- WATER DISCHARGE LINE

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	TWR
Drawn By:	RLW
Checked By:	TWR/MRF
Approved By:	TWR
Project No.	E1187001D
Scale:	AS SHOWN
File No.	E1187001D-2
Date:	MARCH 2018

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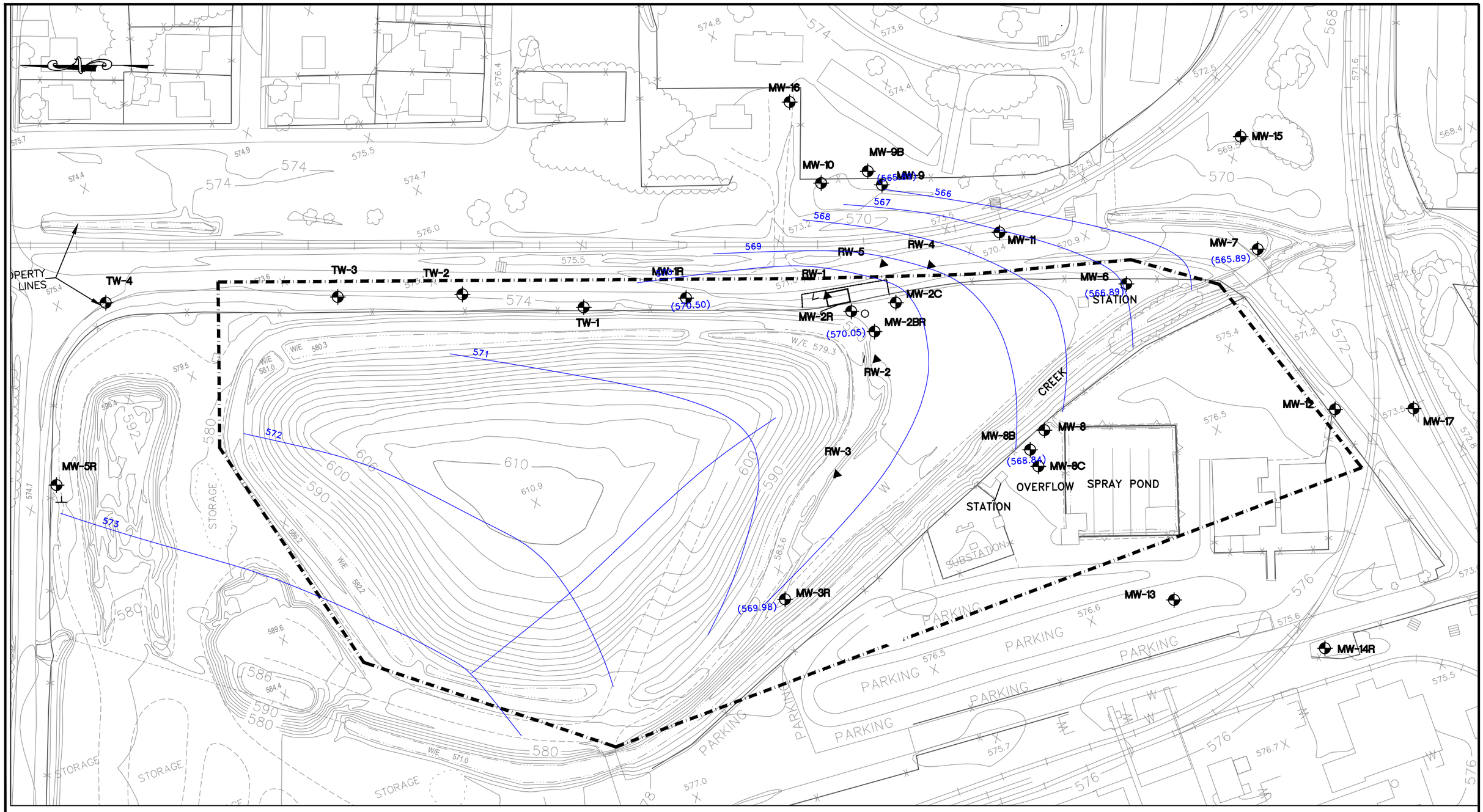
HYDRAULIC CONTROL SYSTEM SCHEMATIC

APPENDIX D
MUELLER PROPERTY HOLDINGS, LLC
SWMU 21 - CLOSED LANDFILL
BIRMINGHAM, AL

FIGURE
D-2



LEGEND

- SHALLOW/DEEP MONITORING WELLS
- RECOVERY WELLS
- TEMPORARY SOIL BORINGS
- TEMPORARY WELLS

WATER DISCHARGE LINE

THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Mngr:	TWR
Drawn By:	RLW
Checked By:	TWR/MRF
Approved By:	TWR
Project No.	E1187001D
Scale:	AS SHOWN
File No.	E1187001D-3
Date:	MARCH 2018

Terracon
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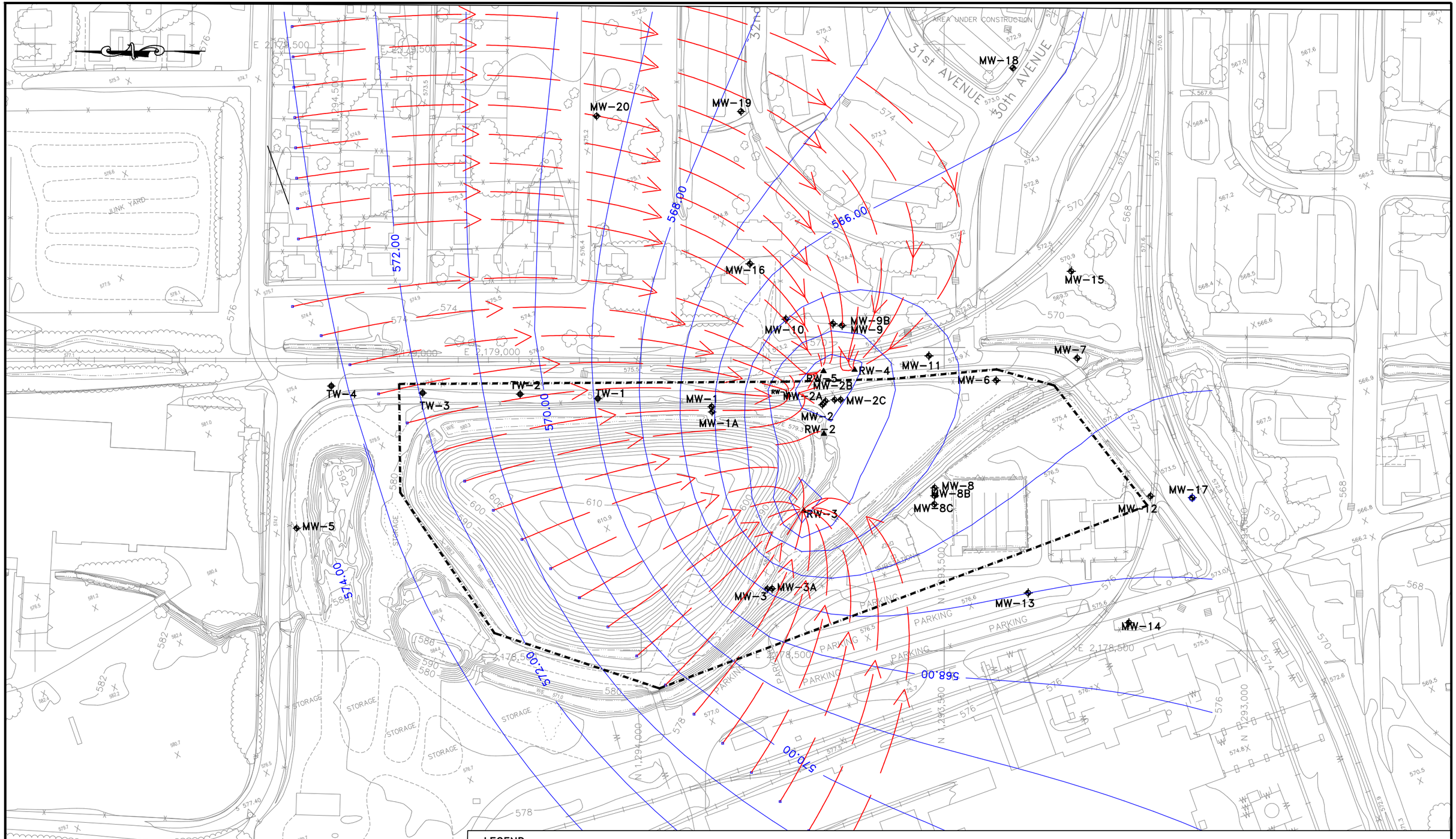
POTENTIOMETRIC SURFACE MAP
INTERMEDIATE FLOW ZONE JANUARY 26 1999
APPENDIX D
MUELLER PROPERTY HOLDINGS, LLC
SWMU 21 - CLOSED LANDFILL
BIRMINGHAM, AL

FIGURE
D-3



THIS DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

LEGEND

- SHALLOW/DEEP MONITORING WELLS
- RECOVERY WELLS
- TEMPORARY SOIL BORINGS
- TEMPORARY WELLS

Project Mngr:	TWR
Drawn By:	RLW
Checked By:	TWR/MRF
Approved By:	TWR

Project No.	E1187001D
Scale:	AS SHOWN
File No.	E1187001E-4
Date:	MARCH 2018

Terracon
Consulting Engineers and Scientists
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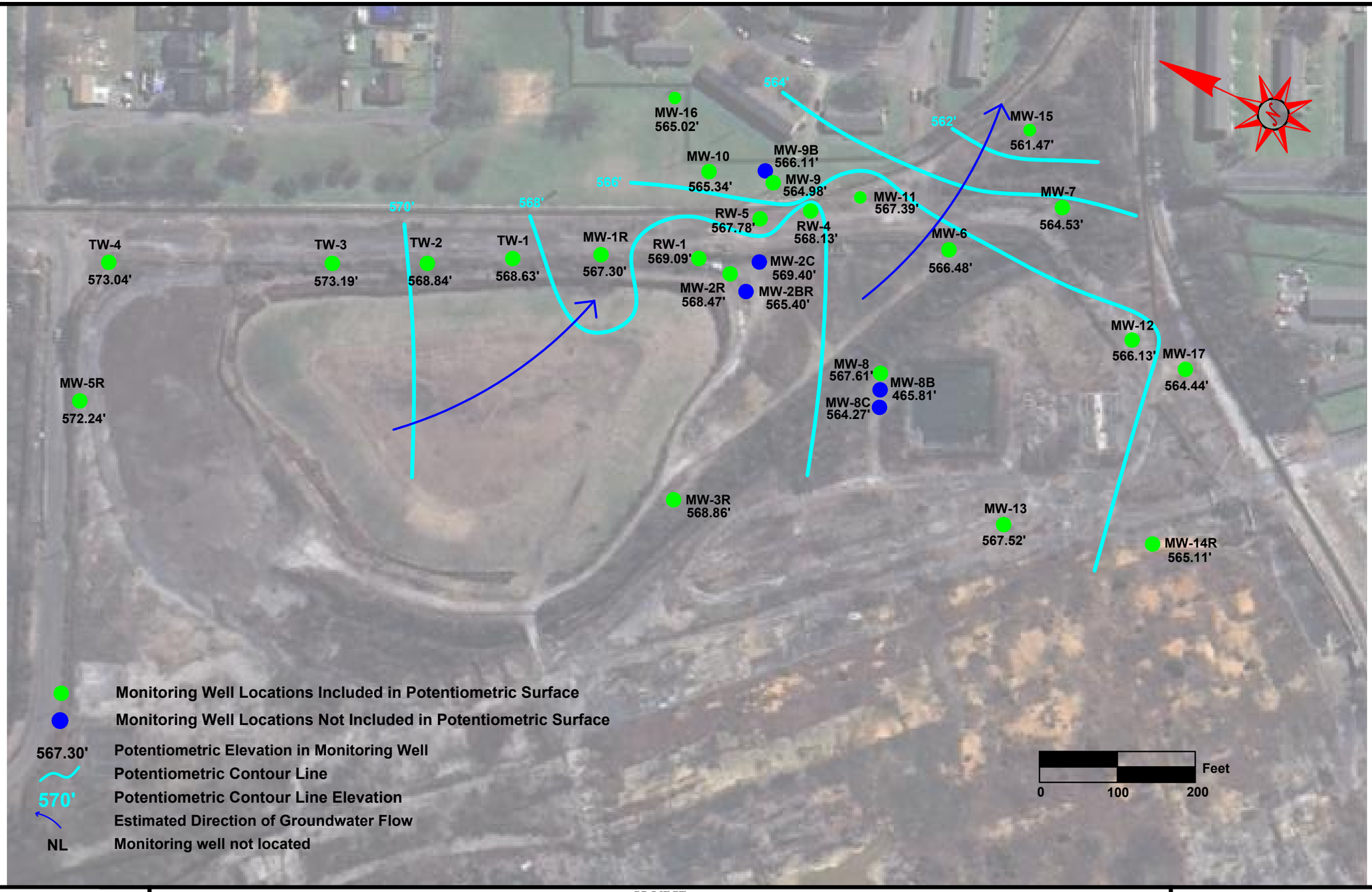
POTENTIOMETRIC SURFACE MAP,
INTERMEDIATE FLOW ZONE, JANUARY 28, 1999
APPENDIX D
MUELLER PROPERTY HOLDINGS, LLC
SWMU 21 - CLOSED LANDFILL
BIRMINGHAM, AL

FIGURE
D-4



bullock environmental, llc

PROJECT

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
MARCH 2024 EVENT
SWMU 21-CLOSED LANDFILL (FORMER U.S. PIPE & FOUNDRY)
3000 30TH AVENUE NORTH
BIRMINGHAM, JEFFERSON COUNTY, ALABAMA
USEPA ID#: ALD 004 017 901

FIGURE D-5

POTENTIOMETRIC SURFACE MAP
(MARCH 2024)

APPENDICES

APPENDIX D-A
BORING LOGS

WELL LOG NO. MW-1R

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

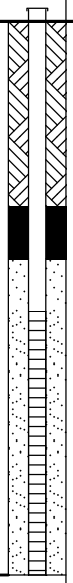
LOCATION See Exhibit A-2

Surface Elev.: 573.52 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, black, medium to coarse-grained, with pebbles, cobbles, and some boulders of slag	
5.0		568.5
	SILTY CLAY, tan, high plasticity	
	moist	
11.5	Hollow Stem Auger Refusal at 11.5 feet bls	562
	LIMESTONE, gray to white	
	Abundant water to boring termination	
21.0		552.5
	Boring Terminated at 21 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 5' and 11.75'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-26-2005 | Well Completed: 01-26-2005

Drill Rig: | Driller: Technical Drilling Services

Project No.: E1187001 | Exhibit: B-1

WELL LOG NO. MW-2R

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

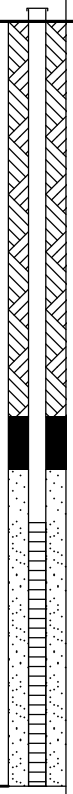
LOCATION See Exhibit A-2

Surface Elev.: 574.3 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.5	**GRASS AND TOPSOIL**	573.8
	FOUNDRY SAND, black, medium to coarse-grained, with pebbles, cobbles, and some silt	
7.0		567.3
	SILTY CLAY, brown, high plasticity	
	wet	
19.0	Hollow Stem Auger Refusal at 19 feet bls	555.3
	LIMESTONE, gray to white	
	Soft areas 23' to 24'	
29.0		545.3
	Boring Terminated at 29 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 6.5' and 12'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-18-2005 | Well Completed: 01-18-2005

Drill Rig: | Driller: Technical Drilling Services

Project No.: E1187001 | Exhibit: B-2

WELL LOG NO. MW-2BR

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

LOCATION See Exhibit A-2

INSTALLATION DETAILS

Well Completion:

Surface Elev.: 574.3 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
2.0	**FOUNDRY SAND**, black, medium to coarse-grained, with some silt	572.3
	SILTY CLAY, brown, little sand, high plasticity	
19.0	Water encountered at soil/rock interface Hollow Stem Auger Refusal at 19 feet bls	555.3
	LIMESTONE, gray to white	
	Surface Casing installed to 40' bls	
	Soft area from 50' to 53'	
	Soft area from 66' to 67'	
	Fracture zone then competent to 115'	
	Fracture zone	
130.0		444.3
	Boring Terminated at 130 Feet	

GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 10' and 19'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-24-2005 | Well Completed: 01-25-2005

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-3

WELL LOG NO. MW-3R

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

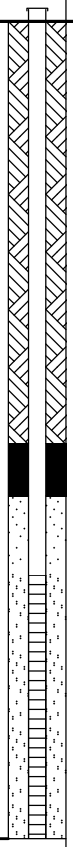
LOCATION See Exhibit A-2

Surface Elev.: 576.49 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.5	**GRASS AND TOPSOIL**	576
	FOUNDRY SAND, black, medium to coarse-grained, some silt	
	very moist	
	wet	
	hard grinding	
16.0		560.5
	SILTY CLAY, brown, high plasticity	
21.0	Hollow Stem Auger Refusal at 21 feet bls	555.5
	LIMESTONE, gray to white	
	Void from 25' to 26'	
31.0		545.5
	Boring Terminated at 31 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 7' and 10'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-18-2005 | Well Completed: 01-18-2005

Drill Rig: | Driller: Technical Drilling Services

Project No.: E1187001 | Exhibit: B-4

WELL LOG NO. MW-5R

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

LOCATION See Exhibit A-2

Surface Elev.: 577.54 (Ft.)

GRAPHIC LOG	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)	INSTALLATION DETAILS (Well Completion:)
		FOUNDRY SAND, black, medium to coarse-grained, with pebbles, cobbles of slag		
	11.0		566.5	
		SILTY CLAY, tan to brown-tan, wet		
		Cherty "rubble zone"		
	29.0		548.5	
		Boring Terminated at 29 Feet		

DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 6' and 11'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-17-2005
Well Completed: 01-17-2005
Drill Rig:
Driller: Technical Drilling Services
Project No.: E1187001
Exhibit: B-5

WELL LOG NO. MW-6

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

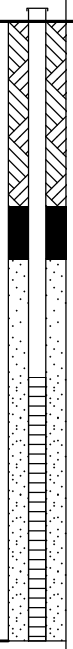
LOCATION See Exhibit A-2

Surface Elev.: 574.34 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.0	**FOUNDRY FILL**, black	
6.0		568.3
	SILTY CLAY, orange to red-brown	
13.0		561.3
	LIMESTONE, light to medium-gray, slightly weathered	
23.5		550.8
	Boring Terminated at 23.5 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 10-23-1996 | Well Completed: 10-23-1996

Drill Rig: | Driller:

Project No.: E1187001 | Exhibit: B-6

WELL LOG NO. MW-7

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

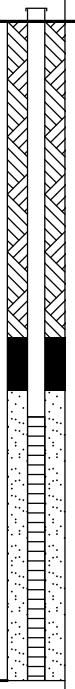
LOCATION See Exhibit A-2

Surface Elev.: 574.34 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY FILL, black	
3.0	**SILTY CLAY**, orange to red-brown	571.3
22.0		552.3
	LIMESTONE, light to medium-gray, slightly weathered	
25.0		549.3
	Boring Terminated at 25 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 06-20-1997
Well Completed: 06-20-1997
Drill Rig:
Driller:
Project No.: E1187001
Exhibit: B-7

WELL LOG NO. MW-8

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

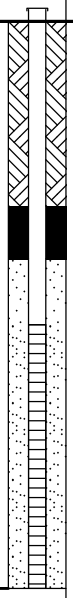
LOCATION See Exhibit A-2

Surface Elev.: 574.34 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.5	**TOPSOIL AND ROOTS**	573.8
	SILTY CLAY, orange to red-brown	
	Changes in color to light brown/tan	
16.5		557.8
	LIMESTONE, light to medium-gray, slightly weathered	
21.5		552.8
	Boring Terminated at 21.5 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 6.5'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 08-10-1998
Well Completed: 08-10-1998
Drill Rig:
Driller: AL Environmental Drilling
Project No.: E1187001
Exhibit: B-8

WELL LOG NO. MW-8B

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

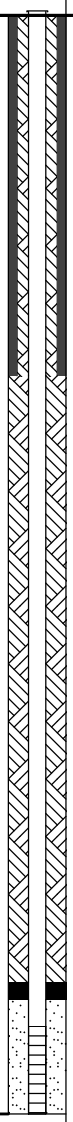
LOCATION See Exhibit A-2

Surface Elev.: 574.68 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, black, with slag up to 1" in diameter, medium coarse grained	
	Slag boulder from 3' to 4'	
10.0		564.7
11.0	**SILTY CLAY**, tan to gray	563.7
	LIMESTONE, gray to white	
	Weathered to 22'	
	Soft area 36' to 37'	
	Bottom of well casing at 41'	
	Soft area 52'	
	Soft area 64'	
	Fractured zone 70' to 75'	
	Mud seam at 80'	
	Fracture at 88'	
97.0		477.7
	LIMESTONE, dark gray to black	
102.0		472.7
	LIMESTONE, light gray	
	Fracture at 121'	
125.0		449.7
	Boring Terminated at 125 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-06-2001 | Well Completed: 12-07-2001

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-9

WELL LOG NO. MW-8C

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

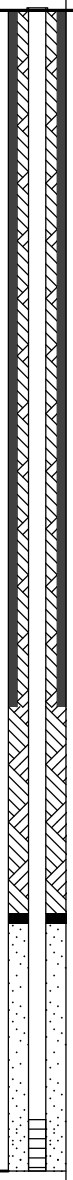
LOCATION See Exhibit A-2

Surface Elev.: 574.41 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, black, with slag gravel up to 1" in diameter, medium coarse grained	
10.0		564.4
13.0	Perched water at 9'	561.4
16.0	**SILTY CLAY**, tan to gray	558.4
20.0	**LIMESTONE BOULDER**	554.4
	SILTY CLAY, tan to dark gray	
	LIMESTONE, light to medium gray	
	Low yield water bearing zone at 44'	
	Fractured area from 68' to 70'	
	Low yield water bearing zone at 84'	
	Hard layer from 185.75' to 186' High yield (20gam) water Bearing zone at 186'	
	Possible fracture at 210'	
225.0		349.4
	Boring Terminated at 225 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 6', 9', 44', 84' and 186'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-21-2002 | Well Completed: 01-23-2002

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-10

WELL LOG NO. MW-9

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

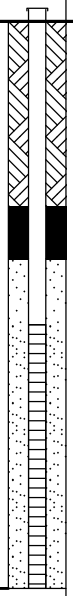
LOCATION See Exhibit A-2

Surface Elev.: 571.64 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.5	**TOPSOIL AND ROOTS**	571.1
	SILTY CLAY, orange to red-brown	
	Changes in color to light-brown/tan	
15.5		556.1
	LIMESTONE, light to medium-gray, slightly weathered	
21.5		550.1
	Boring Terminated at 21.5 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 10'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 08-10-1998 | Well Completed: 08-10-1998

Drill Rig: | Driller: AL Environmental Drilling

Project No.: E1187001 | Exhibit: B-11

WELL LOG NO. MW-9B

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

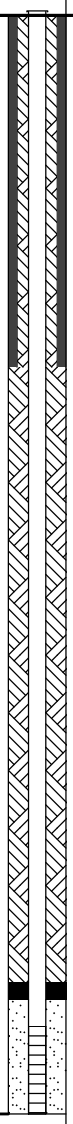
LOCATION See Exhibit A-2

Surface Elev.: 571.52 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	SILTY CLAY, tan and orange mottled, stiff, dry	
8.0		563.5
	LIMESTONE, light to medium-gray	
	Water at 17'	
	CHERTY LIMESTONE	
	Bottom of well casing at 40' Mud seam at 42'	
	Soft spot at 64' Fracture at 66' Fracture at 68'	
	Soft spot from 76' to 78'	
	Fracture at 80'	
	Soft spot at 100'	
	Fracture zone from 119' to 120'	
125.0		446.5
	Boring Terminated at 125 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 14' and 17'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-06-2001 | Well Completed: 12-08-2001

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-12

WELL LOG NO. MW-10

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

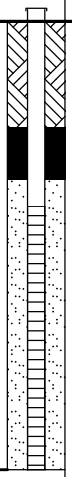
LOCATION See Exhibit A-2

Surface Elev.: 571.77 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.5	**TOPSOIL AND ROOTS**	571.3
	SILTY CLAY, orange to red-brown	
	Changes in color to light-brown/tan	
12.0		559.8
	LIMESTONE, light to medium-gray, slightly weathered	
17.0		554.8
	Boring Terminated at 17 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15

GRAPHIC LOG | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 4'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-20-2000 | Well Completed: 01-20-2000

Drill Rig: | Driller: AL Environmental Drilling

Project No.: E1187001 | Exhibit: B-13

WELL LOG NO. MW-11

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

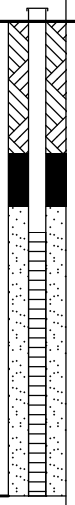
LOCATION See Exhibit A-2

Surface Elev.: 572.37 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.0	**FILL (SILTY CLAY AND GRAVEL)**, gray to tan	
6.0		566.4
	SILTY CLAY, light gray to tan	
13.0		559.4
	LIMESTONE, light to medium-gray, slightly weathered	
18.0		554.4
	Boring Terminated at 18 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 5'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-18-2000 | Well Completed: 01-18-2000

Drill Rig: | Driller: AL Environmental Drilling

Project No.: E1187001 | Exhibit: B-14

WELL LOG NO. MW-12

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

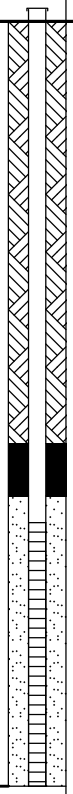
LOCATION See Exhibit A-2

Surface Elev.: 574.11 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FILL, black fine to large-grained sand, with gravel and cobble-sized pieces of slag	
14.0		560.1
	SILTY CLAY, light-gray	
24.0		550.1
	LIMESTONE, light to medium-gray, slightly weathered	
29.0		545.1
	Boring Terminated at 29 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-01-2000
Well Completed: 02-01-2000
Drill Rig:
Driller: AL Environmental Drilling
Project No.: E1187001
Exhibit: B-15

WELL LOG NO. MW-13

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

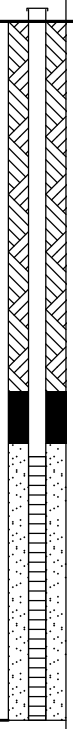
LOCATION See Exhibit A-2

Surface Elev.: 575.94 (Ft.)

GRAPHIC LOG	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	0.0	**FILL**, black fine to large-grained sand, with gravel and cobble-sized pieces of slag	
	19.0		556.9
	19.0	**SILTY CLAY**, light to medium-gray	
	21.5		554.4
	21.5	**LIMESTONE**, light to medium-gray, slightly weathered	
	26.5		549.4
		Boring Terminated at 26.5 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-02-2000
Well Completed: 02-02-2000
Drill Rig:
Driller: AL Environmental Drilling
Project No.: E1187001
Exhibit: B-16

WELL LOG NO. MW-14R

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

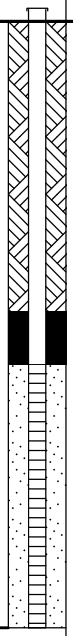
LOCATION See Exhibit A-2

Surface Elev.: 572.0 (Ft.)

GRAPHIC LOG	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
		CLAY WITH GRAVEL AND SLAG	
	10.0		562
		CLAY, dark brown, moist	
	15.0		557
		CLAY, yellow, moist	
	23.0		549
		Boring Terminated at 23 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Hollow Stem Auger

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 8'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 11-08-2012
Well Completed: 11-08-2012
Drill Rig:
Driller: Technical Drilling Services
Project No.: E1187001
Exhibit: B-17

WELL LOG NO. MW-15

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

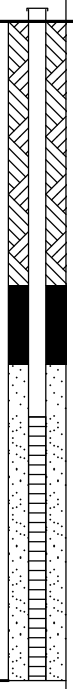
LOCATION See Exhibit A-2

Surface Elev.: 568.67 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	TOPSOIL, dark gray to black	
2.0		566.7
	SILTY CLAY, tan, dry	
10.0		558.7
	LIMESTONE	
	Fractured zone from 17' to 18'	
25.0		543.7
	Boring Terminated at 25 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-07-2001
Well Completed: 12-07-2001
Drill Rig:
Driller: Miller Drilling
Project No.: E1187001
Exhibit: B-18

WELL LOG NO. MW-16

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

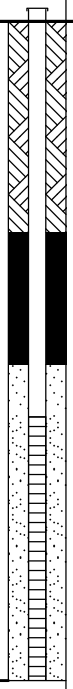
LOCATION See Exhibit A-2

Surface Elev.: 572.29 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	TOPSOIL, black	
2.0		570.3
	SILTY CLAY, orange, dry	
11.0		561.3
	LIMESTONE, light gray to white, weathered top 1'	
	Fractured zone from 17' to 18'	
25.0		547.3
	Boring Terminated at 25 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-07-2001
Well Completed: 12-07-2001
Drill Rig:
Driller: Miller Drilling
Project No.: E1187001
Exhibit: B-19

WELL LOG NO. MW-17

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

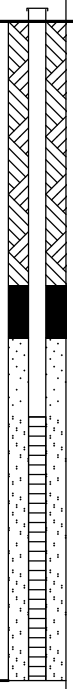
LOCATION See Exhibit A-2

Surface Elev.: 571.62 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND AND SLAG, black, mixed with dark brown silty clay	
	Water at 8'	
10.0		561.6
	SILTY CLAY, dark brown and gray	
	Tan	
23.5		548.1
25.0	**LIMESTONE**	546.6
	Boring Terminated at 25 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 5.5' and 8'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-23-2002
Well Completed: 01-23-2002
Drill Rig:
Driller: Miller Drilling
Project No.: E1187001
Exhibit: B-20

WELL LOG NO. TW-1

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

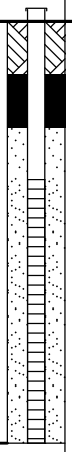
LOCATION See Exhibit A-2

Surface Elev.: 573.08 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FILL	
6.0		567.1
	SILTY CLAY, light reddish brown, medium plasticity	
16.0	LIMESTONE bedrock - end of borehole	557.1
	Boring Terminated at 16 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15

GRAPHIC LOG | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 8'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-28-2002 | Well Completed: 02-28-2002

Drill Rig: | Driller: AL Environmental Drilling

Project No.: E1187001 | Exhibit: B-21

WELL LOG NO. TW-2

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

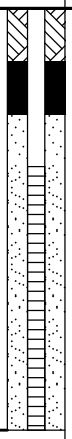
LOCATION See Exhibit A-2

Surface Elev.: 574.33 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.0	**FILL**	
6.0	**SILTY CLAY**, light brown, medium plasticity	568.3
9.0	**LIMESTONE BEDROCK**	565.3
16.0	***Boring Terminated at 16 Feet***	558.3

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 14'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-28-2002
Well Completed: 02-28-2002
Drill Rig:
Driller: AL Environmental Drilling
Project No.: E1187001
Exhibit: B-22

WELL LOG NO. TW-3

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

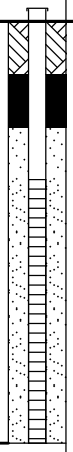
LOCATION See Exhibit A-2

Surface Elev.: 574.70 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FILL	
5.0		569.7
	SILTY CLAY, light brown, medium plasticity	
13.0		561.7
	LIMESTONE BEDROCK	
16.0		558.7
	Boring Terminated at 16 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 13.5'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-28-2002
Well Completed: 02-28-2002
Drill Rig:
Driller: AL Environmental Drilling
Project No.: E1187001
Exhibit: B-23

WELL LOG NO. TW-4

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

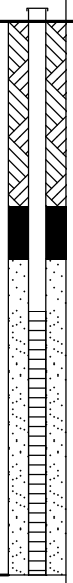
LOCATION See Exhibit A-2

Surface Elev.: 574.74 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FILL	
5.0		569.7
	SILTY CLAY, light brown, medium plasticity	
7.0		567.7
	LIMESTONE BEDROCK	
21.0		553.7
	Boring Terminated at 21 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
HSA & Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 15.5'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 02-28-2002 | Well Completed: 02-28-2002

Drill Rig: | Driller: AL Environmental Drilling

Project No.: E1187001 | Exhibit: B-24

WELL LOG NO. RW-1

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

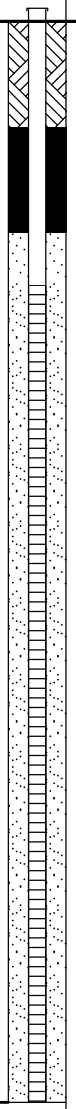
LOCATION See Exhibit A-2

Surface Elev.: 565.21 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, FILL, dark gray to black	
5.0		560.2
	SILTY CLAY, light tan and gray mottled	
	Water encountered at 12'	
15.0		550.2
	LIMESTONE, light gray, weathered	
41.0		524.2
	Boring Terminated at 41 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 12'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-13-1999 | Well Completed: 01-13-1999

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-25

WELL LOG NO. RW-2

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

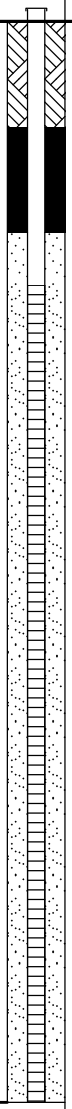
LOCATION See Exhibit A-2

Surface Elev.: 566.67 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	SILTY CLAY, tan to orange	
	Water encountered at 10'	
19.0		547.7
	LIMESTONE, light gray, weathered	
41.0		525.7
	Boring Terminated at 41 Feet	

INSTALLATION DETAILS

Well Completion:



DEPTH (ft): 5, 10, 15, 20, 25, 30, 35, 40

WATER LEVEL OBSERVATIONS

SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 10'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-15-1999
Well Completed: 01-15-1999
Drill Rig:
Driller: Miller Drilling
Project No.: E1187001
Exhibit: B-26

WELL LOG NO. RW-3

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

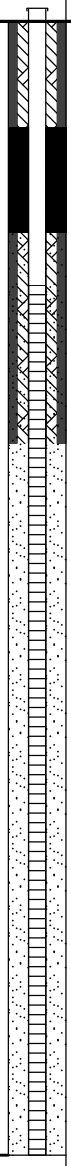
LOCATION See Exhibit A-2

Surface Elev.: 567.82 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, FILL, dark gray to black	
15.0		552.8
	SILTY CLAY, tan to brown	
17.0		550.8
	LIMESTONE, light gray, weathered	
43.0		524.8
	Boring Terminated at 43 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No water observed

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 01-14-1999 | Well Completed: 01-15-1999

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-27

WELL LOG NO. RW-4

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

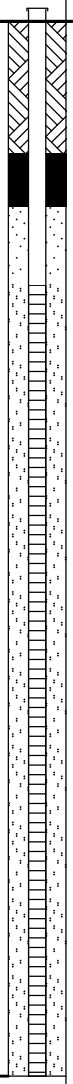
LOCATION See Exhibit A-2

Surface Elev.: 573.32 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
	FOUNDRY SAND, FILL, loose, brown to black, little gravel	
10.0		563.3
	CLAY, soft reddish-brown, wet at 10'	
20.0		553.3
	SILTY CLAY, firm, yellowish-brown, moist	
23.0		550.3
	LIMESTONE, dark gray, fine-grained, slightly weathered. Bedrock encountered at 23'. Hard limestone Weathered limestone to 33.5' Hard limestone	
40.0		533.3
	Boring Terminated at 40 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 10' and 14'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-18-2000 | Well Completed: 12-19-2000

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-28

WELL LOG NO. RW-5

PROJECT: Part B Permit Renewal Application

CLIENT: Mueller Property Holdings, LLC

SITE: SMWU 21 - Closed Landfill
Birmingham, Alabama

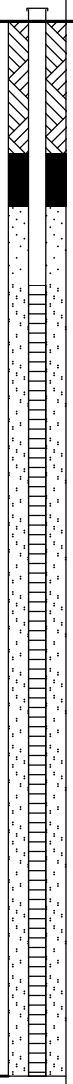
LOCATION See Exhibit A-2

Surface Elev.: 573.40 (Ft.)

DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)
0.0	**FOUNDRY SAND, FILL**, loose, brown to black, some gravel	
7.0		566.4
	CLAY, soft, reddish-brown, some silt, wet at 7'	
10.0		563.4
	SILTY CLAY, firm, yellowish-brown, slightly plastic, moist	
24.0		549.4
	LIMESTONE, dark gray, fine-grained, hard. Bedrock encountered at 24'.	
	Weathered limestone to 33', wet (some water encountered)	
40.0		533.4
	Boring Terminated at 40 Feet	

INSTALLATION DETAILS

Well Completion:



GRAPHIC LOG | DEPTH (ft) | WATER LEVEL OBSERVATIONS | SAMPLE TYPE

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
Air-Rotary

Abandonment Method:

See Appendices for description of field procedures.
See Appendices for description of laboratory procedures and additional data (if any).
See Appendices for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water observed at 7'. 8.51' and 32'

Terracon
2147 Riverchase Office Rd
Hoover, AL

Well Started: 12-18-2000 | Well Completed: 12-19-2000

Drill Rig: | Driller: Miller Drilling

Project No.: E1187001 | Exhibit: B-29

APPENDIX D-B
SITE-SPECIFIC HEALTH AND SAFETY PLAN

bullock environmental, llc 4924 5th avenue south, birmingham, alabama 35222 t 205.876.1715 f 205.443.9413

SITE HEALTH & SAFETY PLAN

A. GENERAL INFORMATION

SITE: Mueller Property Holdings, LLC, SWMU21-Landfill JOB NUMBER: 23-MUEL01

LOCATION: 3000 30th Avenue North, Birmingham, Alabama

PLAN PREPARED BY: Samuel Smith, PG DATE: August 15, 2024

APPROVED BY: Douglas A, Bullock DATE: September 4, 2024

OBJECTIVE(S):
1. Provide health & safety objectives during onsite groundwater monitoring; and
2. Provide health and safety objectives during scheduled inspections

PROPOSED DATE OF CLEANUP ACTIONS: NA

BACKGROUND REVIEW: Complete: X Preliminary: _

HAZARD SUMMARY: Overall Hazard: Serious: _____ Moderate:___ Minor: X

B. SITE/WASTE CHARACTERISTICS

WASTE TYPE(S): Liquid _X_ Solid Sludge __ Gas

CHARACTERISTIC(S): Low-level, dissolved chlorinated solvent compounds in groundwater.

Corrosive ___	Ignitable ___	Radioactive ___
Toxic ___	Reactive ___	Volatile
Unknown ___	Other (name)	

FACILITY DESCRIPTION: Closed US Pipe North Birmingham Landfill.

PRINCIPAL DISPOSAL METHOD (type and location): Purge water disposed of in onsite spray pond.

UNUSUAL FEATURES Tributary of Village Creek located along boundary. Uncovered manholes near periphery of landfill.

STATUS (active, inactive, unknown): Inactive

HISTORY (worker/non-work injury; complaints from public; previous agency action): None

C. HAZARD EVALUATION

Groundwater: Previous assessment activities found that site contaminants are limited to low-level chlorinated compounds in groundwater. Purge water temporarily stored in drums is transported to the onsite spray pond for disposition during each semi-annual monitoring event.

D. SITE SAFETY WORK PLAN

PERIMETER ESTABLISHMENT: Map/Sketch Attached: __ Site Secured X
Perimeter Identified: X Zone(s) of Contamination identified X

PERSONAL PROTECTION:

Level of Protection: A __ B __ C __ D X

Modification: Site workers will be required to wear high visibility safety vests, and steel-toed boots. Workers handling samples will be required to wear nitrile gloves. Hard hats are required for tasks involving heavy equipment (e.g., drilling rig and excavation).

Surveillance Equipment and Materials: None.

DECONTAMINATION PROCEDURES: Dedicated sampling equipment will be used for each monitoring well. Other, non-dedicated equipment (pumps, water level meters, etc.) will be decontaminated between sampling locations.

SITE ENTRY PROCEDURES: Only authorized personnel will be allowed on the site and they must sign-in with the Onsite Coordinator.

TRAFFIC: Not Applicable.

TEAM MEMBER / RESPONSIBILITY:
Samuel Smith, Bullock Environmental, LLC / Project Oversight - Onsite Coordinator
Douglas A. Bullock, Bullock Environmental, LLC / Project Oversight - Project Manager
Alison Dunagan, Bullock Environmental, LLC/ Project Support for Onsite Coordinator

WORK LIMITATIONS (time of day, etc.): Daylight (7 AM to 5 PM)

INVESTIGATION-DERIVED MATERIAL DISPOSAL: Not Applicable.

E. EMERGENCY INFORMATION

Emergency: 911
Birmingham Police Department: Non-emergencies: (205) 254-2860
Emergencies: 911
Birmingham Fire and Rescue Service: Fire Chief: (205) 254-2995
North Birmingham Fire Station: (205) 254-2052
Jefferson County Emergency Management Agency (EMA): (205) 254-2039
Alabama Department of Environmental Management (ADEM), Montgomery: 334-271-7700

Hospital Emergency Room: UAB, 1802 6th Ave S, Birmingham, AL 35233
(205) 9343411)

Directions:
1. Head west on 31st Ave. N toward 28th Place N. (0.3 mile)
2. Turn right onto Carraway Blvd (381 ft.)
3. Turn left onto 18th St. North (0.7 mi)
4. Merge onto US Interstate 65 South (0.2)
5. Proceed south on US Interstate 65 (3.3 mi)
6. Take Exit 259B (4th Avenue South)
7. Turn right onto 11th Street South (0.2 mi)
6. Turn left onto 6th Ave. South (0.7)

Emergency room located in North Pavilion of UAB.

All site personnel have read the above plan and are familiar with its provisions.

Name (Print)	Signature	Date
Project Manager: Douglas. A. Bullock (Bullock Environmental, LLC)		
Sam Smith, Bullock Env.		

Site Personnel:	Signature	Date

APPENDIX E
SAMPLING AND ANALYSIS PLAN

Sampling and Analysis Plan

Mueller Property Holdings, LLC
Former U.S. Pipe North Birmingham Property
3000 30th Avenue North
Birmingham, Jefferson County, Alabama
USEPA ID ALD 004 017 901
Bullock Environmental, LLC Project #: 23-MUEL01

Prepared for:

MUELLER PROPERTY HOLDINGS, LLC
ATLANTA, GA

TABLE OF CONTENTS

TABLES

1.0 GENERAL INFORMATION

This Sampling and Analysis Plan for the Former U.S. Pipe North Birmingham Property was prepared in general accordance with the Alabama Environmental Investigation and Remediation Guidance (AEIRG, Revision 4, February 2017).

2.0 SAMPLE PROCEDURES

Groundwater sample collection and analysis will be performed on a semi-annual basis for this facility. Monitoring well construction details are included in **Table E-1**. Collection of the groundwater samples will be conducted in general accordance with the AEIRG. Analysis of the groundwater samples will follow the procedures and protocols recommended in the Environmental Protection Agency (EPA) document, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," 3rd Edition (EPA Office of Water and Waste Management, SW-846, 1986) or most recent edition of SW-846. Constituents to be analyzed will be dependent upon the type of monitoring being performed (i.e., Compliance Monitoring, Corrective Action Monitoring, etc.). **Table E-2** lists the monitoring wells to be sampled on a semi-annual and annual basis and details the specific chemicals of concern (COCs) to be analyzed during each event.

2.1 MEASUREMENT OF STATIC WATER LEVEL ELEVATION

Prior to initiating purging and sampling, the depth to water and total well depth in each well will be determined to the nearest 0.01-foot using an electronic water level indicator. The distance from the top of the water to the survey mark, located on the top of the inner well casing, will be measured and recorded. Nitrile disposable gloves will be worn while measuring the depth to water and total well depth. The probe and wetted portion of the tape of the water level indicator will be rinsed with phosphate-free laboratory grade detergent and tap water, rinsed with tap water, and final rinsed with deionized water immediately after use. At the time the well is gauged, it will also be visually inspected, and the condition of the well will be noted. Once all the site monitoring wells have been measured, purging and sampling procedures will be initiated. **Table E-3** includes a checklist which will be used in conjunction with each sampling event to ensure health and safety and verify field personnel are prepared for each event.

2.2 WELL EVACUATION

Purging is conducted to ensure that stagnant water has been removed from the well and that groundwater samples that are representative of actual aquifer conditions will be collected. To determine when a well has been adequately purged, field personnel will monitor the pH, specific conductance, temperature, and turbidity of the groundwater removed during purging.

Purging activities will be conducted using low flow/low volume purging techniques/procedures described in Appendix C.3.3(a)iv. of the AEIRG using either a peristaltic, bladder, or centrifugal pump. If bailers are used, plastic sheeting will be placed on the ground around each well to provide

a clean working area. Standard cleaned, dedicated, disposable Teflon® tubing will be lowered into the top of the standing water column to pull water from the formation into the screened area of the well and up through the casing so that the entire static volume can be removed. If dedicated tubing is left in place, all tubing exposed to air will be thoroughly inspected prior to purging. All wetted portions (if applicable) of the equipment will be cleaned after purging each well as outlined in Appendix E of the AEIRG.

An adequate purge is achieved when the pH, specific conductance, and temperature of groundwater have stabilized, and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs). Stabilization of the groundwater chemistry parameters occurs when pH measurements remain constant within 0.1 Standard Unit (SU), specific conductance varies no more than 10 percent, and the temperature is constant within 1 degree Celsius for at least three consecutive readings. Standard procedure is to collect an initial set of groundwater chemistry parameters prior to all purging activities, with a set of parameters measured every two to five minutes. The conditions of all purging and sampling activities will be noted in the field log. If a well is pumped dry, this is considered an adequate purge, and the well will be sampled following sufficient recovery (i.e., enough volume to allow filling of all sample containers), or within 24 hours.

The purge water will be placed into drums or totes. Following review of the analytical results, the purge water will be transferred from the drums and/or totes into the spray pond. Disposable equipment and used PPE will be properly disposed offsite.

2.3 FIELD ANALYSIS

At the time of sample collection, the well water will be tested for dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, temperature, and specific conductance. The probe of the pH/conductivity meter will not be inserted into any sample bottles that are to be sent to the laboratory for analysis.

Field instruments will be calibrated each day prior to use according to the manufacturer's recommendations using appropriate standards (if applicable). Prior to use and between sample locations, the field instruments will be wiped with a clean, damp cloth. The probes on the instruments (pH, conductivity, DO, etc.) will be rinsed with analyte-free water and air-dried.

2.4 SAMPLE COLLECTION

Samples will be collected from the wells using low-flow sampling techniques with a peristaltic or bladder pump and dedicated, disposable tubing or with dedicated, disposable bottom valve, polyethylene bailers. When using a bailer, new plastic sheeting will be placed on the ground around each well prior to sample collection to provide a clean working area.

For low-flow sampling, the pumping device will be capable of meeting the low-flow flow rate requirements [i.e., minimal disturbance of the sample across a range of low-flow rates (0.1 to 0.5

liters per minute)]. The tubing will be gently lowered to the desired sampling point, which is 3 to 5 feet below the top of the well screen in a well with a ten-foot screened interval.

If dedicated, disposable, bottom valve polyethylene bailers are used, clean nylon rope or monofilament line will be attached to the bailer. The bailer will be lowered slowly and gently into the top of the water column until just filled. The bailer will be removed carefully, and its contents emptied into the appropriate sample containers. The bailer will be raised and lowered slowly to prevent agitation and aeration of the water.

Groundwater samples will be collected in the order of the volatilization potential (i.e., highest ability to volatilize to the lowest). Groundwater samples for volatile organic compound (VOC) analysis will be collected initially prior to all other samples. The wells will be sampled from least to most contaminated. The time of sampling, monitoring well location, method of sampling, color of sample, any odors detected, and any sediment observed will be recorded in the field notes. The monitoring parameters are presented in the Alabama Hazardous Wastes Management and Minimization Act (AHWMMA) Post Closure Permit Number ALD 004 017 901. The parameters are also included in **Table E-2**.

In addition to the groundwater samples, a trip blank, a rinse blank, and duplicate sample(s) will be collected as quality assurance samples. A trip blank will be prepared by the laboratory and will be transported in the cooler with the samples. A field equipment or rinse blank will be collected using dedicated, disposable tubing, and one duplicate sample will be collected for every ten monitoring wells sampled. Finally, a composite sample of the purge water will be collected for analysis of the compounds listed in Table III.3 of the Permit.

3.0 SAMPLE PRESERVATION

As detailed in **Table E-4**, samples will be placed in new, laboratory-provided bottles containing the required preservatives appropriate for the sample to be analyzed [i.e., three 40-milliliter (mL) glass vials with hydrochloric acid (HCl) for VOCs, 500-mL plastic bottles with nitric acid (HNO_3) for metals, and 1-L amber glass containers with no chemical preservative for semi-volatiles].

4.0 LABELING AND CHAIN-OF-CUSTODY CONTROL

4.1 SAMPLE LABELS

Samples collected for specific field analysis or measurement data will be recorded in bound field logbooks, on sample collection forms, and/or directly on the chain-of-custody record. Samples collected for laboratory analyses will include sample labels or sample tags. The following information will be written on the sample labels or tags using waterproof, non-erasable ink:

- Project number;
- Field identification or monitoring well number;
- Date and time of sample collection;

- Designation of the sample as a grab or composite;
- Type of sample (i.e., groundwater);
- The preservative used (if any); and
- The general types of analyses to be performed.

The labels may be partially filled out prior to sample collection. The date and time will be added to the label at the time the sample is collected.

4.2 FIELD SAMPLE LOG

At the time of collection, the following information will be recorded in the bound field notebook or on a field sample log:

- Project number;
- Field identification or monitoring well number;
- Date and time of sample collection;
- Designation of the sample as a grab or composite;
- The signature of either the sampler(s) or the designated sampling team leader and the field sample custodian;
- Whether the sample was preserved or unpreserved, and if preserved, identify the preservative used;
- The types of analyses to be performed;
- Field measurements collected during the purging of monitoring wells (pH, DO, ORP, specific conductance, temperature, and turbidity);
- Water levels and total well depths measured during the sampling event; and,
- Any relevant comments (such as readily detectable or identifiable odor, color, or known toxic properties).

4.3 CHAIN-OF-CUSTODY RECORD/ANALYSIS REQUEST

All information on the chain-of-custody forms should be recorded in a legible manner. Chain-of-custody forms will originate in the field immediately upon sample collection. The chain-of-custody forms will stay with the samples at all times until properly relinquished to the laboratory for analysis. Information which should be present on chain-of-custody forms include the following:

- Site name and location;
- Date and time of sampling of each sample;
- Sample identification numbers;
- Name of sampler(s);
- Analytical laboratory to be utilized;
- Analytical methods to be used;
- Type of sample (i.e., composite, grab, etc.);

- Matrix sampled (i.e., groundwater);
- Number of sample containers;
- Remarks regarding sampling, if applicable;
- Preservatives used for each sample (also indicate if placed on ice);
- Personnel relinquishing samples with times and dates; and
- Personnel receiving samples with times and dates.

5.0 ANALYTICAL PROCEDURES

An EPA National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory will analyze the groundwater samples. The laboratory will employ methods specified in the following EPA documents:

- "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", 3rd Edition (or any of its successor documents).
- "Methods for Chemical Analysis of Water and Wastes", Revised March 1983 (or any of its successor documents).

Table E-4 lists the EPA Method numbers, sample containers, preservatives, and hold times for each sampled constituent. **Table E-5** summarizes the Groundwater Protection Standards applicable to the Site. The concentrations measured in onsite groundwater will be compared to these levels (note: this table is the same as Table III.3 in the AHWMMA Permit).

6.0 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

6.1 QUALITY CONTROL

The analytical laboratory will follow an active quality control program during the analysis of samples, including the aspects listed below:

- Sample containers will be prepared in accordance with EPA protocols. Preservatives will be included in the proper bottles for client convenience and immediate stabilization of samples.
- Internal quality controls will include routine analysis of quality control check samples, duplicates, and spiked samples. Techniques used for specific tests may include one or more of these approaches, as appropriate. Calibration samples and standard samples will be both prepared in-house and obtained from the EPA. The results of quality control tests will be evaluated to determine the acceptability of analytical results and permanently recorded on tables and on control charts.
- The laboratory will also participate in NELAP external quality control programs administered by the EPA. These programs are separate and additional to internal programs.

Detailed instructions for quality control procedures, sample handling, and EPA-approved test procedures are included in appropriate sections of laboratory manuals.

6.2 QUALITY ASSURANCE

The important components of the laboratory's Quality Assurance Program will include adequately trained analysts, use of approved procedures, routine control of precision and accuracy, outside confirmation of internal control and records, and documentation of activities suitable for display to the public.

TABLES

Table E-1. Monitoring Well Construction Details
Mueller Property Holdings, LLC - Birmingham, Alabama

Well Number	Well Type	Well Latitude (decimal degrees)	Well Longitude (decimal degrees)	Well Depth (ft.)	TOC Elevation (ft. AMSL)	Screened Interval (ft. AMSL)	Well Diameter (inches)	Well Material
MW-1R	POC	33 33 18.21N	86 48 33.46W	23.46	576.51	11-21	2	PVC
MW-2R	POC	33 33 16.30N	86 48 33.67W	31.12	576.95	19-29	2	PVC
MW-2BR	POC	33 33 16.07N	86 48 34.02W	129.97	575.28	125-130	2	PVC
MW-2C	POC	33 33 15.88N	86 48 33.58W	124.95	576.9	202.8-222.8	2	PVC
MW-3R	POC	33 33 17.07N	86 48 37.36W	32.68	579.69	21-31	2	PVC
MW-5R	BKG	33 33 24.79N	86 48 35.84W	26.8	580.39	13-29	2	PVC
MW-6	EFF	33 33 13.35N	86 48 35.37W	23.72	574.58	12-22	2	PVC
MW-8	EFF	33 33 14.30N	86 48 35.25W	23.64	577.19	11.5-21.5	2	PVC
MW-8C	BDY	33 33 14.35N	86 48 35.64W	224.82	577.02	215-225	2	PVC
MW-9	BDY	33 33 15.90N	86 48 32.22W	23.74	574.73	11.5-21.5	2	PVC
MW-9B	BDY	33 33 15.95N	86 48 32.11W	124.46	574.11	115-125	2	PVC
MW-12	EFF	33 33 11.14N	86 48 34.95W	28.18	572.78	19-29	2	PVC
MW-13	EFF	33 33 12.82N	86 48 37.41W	27.84	579.15	16.5-26.5	2	PVC
MW-15	BDY	33 33 12.12N	86 48 31.43W	26.56	571.38	15-25	2	PVC
MW-16	BDY	33 33 16.98N	86 48 30.99W	27.2	575.03	15-25	2	PVC
RW-1	REC	33 33 16.361N	86 48 33.545W	40	572.68	10-40	4	PVC
RW-4	REC	33 33 16.740N	86 48 32.820W	40	572.93	10-40	4	PVC
RW-5	REC	33 33 16.50N	86 48 33.060W	40	572.98	10-40	4	PVC

POC - Point of Compliance Well
BKG - Background Well
EFF - Effectiveness Monitoring Well
BDY - Boundary Monitoring Well
REC - Recovery Well
ft. AMSL - feet above mean sea level
PVC - polyvinyl chloride

Table E-2. Sampling & Analysis Program Summary
Mueller Property Holdings, LLC - Birmingham, Alabama

Monitoring Well	Analytical Parameter	Monitoring Frequency
Background Well (BKG) MW-5R **Point of Compliance Wells (POC)** MW-1R MW-2R MW-2BR MW-2C MW-3R **Effectiveness Wells (EFF)** MW-6 MW-8 MW-12 MW-13	Arsenic	Semi-annually
	Barium	Semi-annually
	Beryllium	Semi-annually
	Cadmium	Semi-annually
	Chromium	Semi-annually
	Copper	Semi-annually
	Lead	Semi-annually
	Nickel	Semi-annually
	Zinc	Semi-annually
	1,1-Dichloroethane	Semi-annually
	1,2-Dichloroethane	Semi-annually
	1,1-Dichloroethene	Semi-annually
	cis-1,2-Dichloroethene	Semi-annually
	trans-1,2-Dichloroethene	Semi-annually
	1,1,1-Trichloroethane	Semi-annually
	1,1,2-Trichloroethane	Semi-annually
	Trichloroethene	Semi-annually
	Vinyl Chloride	Semi-annually
Background Well (BKG) MW-5R **Point of Compliance Wells (POC)** MW-1R MW-2R MW-2BR MW-2C MW-3R **Effectiveness Wells (EFF)** MW-6 MW-8 MW-12 MW-13 **Boundary Wells (BDY)** MW-8C MW-9 MW-9B MW-15 MW-16	Arsenic	Annually
	Barium	Annually
	Beryllium	Annually
	Cadmium	Annually
	Chromium	Annually
	Copper	Annually
	Lead	Annually
	Nickel	Annually
	Zinc	Annually
	1,1-Dichloroethane	Annually
	1,2-Dichloroethane	Annually
	1,1-Dichloroethene	Annually
	cis-1,2-Dichloroethene	Annually
	trans-1,2-Dichloroethene	Annually
	1,1,1-Trichloroethane	Annually
	1,1,2-Trichloroethane	Annually
	Trichloroethene	Annually
	Vinyl Chloride	Annually
	Acrolein	Annually
	Acrylonitrile	Annually
	1,1,2,2-Tetrachloroethane	Annually
	Dibenz(a,h)anthracene	Annually
	Indeno(1,2,3-cd)pyrene	Annually
	Naphthalene	Annually

Note: Annual event is conducted in March.

Table E-3. Sampling Equipment Summary
Mueller Property Holdings, LLC - Birmingham, Alabama

Sample Documentation Supplies

- ☐ Field Logbook
- ☐ Monitoring Well Inspection Form
- ☐ Gauging/Sampling Order
- ☐ Monitoring Well Gauging Form
- ☐ Groundwater Purging/Sampling Forms
- ☐ Equipment Calibration Forms
- ☐ Chain-of-Custody Form

Monitoring Equipment

- ☐ Plastic Sheeting
- ☐ Water Level Meter
- ☐ Oil-Water Interface Probe
- ☐ Water Quality Meter(s)*
- ☐ Calibration Fluids
- ☐ Clear bailers (if NAPL present)

Decontamination Equipment

- ☐ Spray Bottles
- ☐ Detergent/Alconox
- ☐ Acetone
- ☐ Distilled Water
- ☐ Potable Water
- ☐ Scrub Brushes
- ☐ Five-Gallon Buckets
- ☐ Paper Towels

Sample Packaging Supplies

- ☐ Sample Containers
- ☐ Bubble Wrap
- ☐ Ziplock Bags
- ☐ Garbage Bags

Health & Safety Equipment

- ☐ Hard Hat
- ☐ Safety Glasses
- ☐ Steel-Toe Boots
- ☐ Photoionization Detector
- ☐ Tyvek (if needed)
- ☐ Nitrile Gloves
- ☐ First Aid Kit

Sampling Equipment

- ☐ Submersible Pump
- ☐ Tubing
- ☐ Bottom-filling Bailers
- ☐ Bailer Cord/Twine/Rope

Miscellaneous Equipment

- ☐ Well Keys and Gate Key(s)/combination
- ☐ Cellular Phone
- ☐ Stop Watch
- ☐ Electronic Calculator
- ☐ Waterproof Markers/Pens
- ☐ Clipboard
- ☐ Camera

Sample Shipping Supplies

- ☐ Ice
- ☐ Sample Coolers
- ☐ Custody Seals
- ☐ Packaging Tape/Duct Tape

Notes:

* Meters for pH, spec. conductance, turbidity, DO, temperature, and ORP.

Table E-4. Sampling, Handling, Preservation, & Hold Times
Mueller Property Holdings, LLC - Birmingham, Alabama

Parameter	Method	Sample Bottles	Preservative	Hold Time
Volatile Organic Compounds	SW 846 8260, EPA Method 524	40-mL vials with sealed septum	4ºC, HCl to pH <2	14 days
Semi-Volatile Organic Compounds	SW 846 8270	1-Liter Glass Amber Bottles with lined caps	Cool, 4ºC	7 days until extraction, 40 days until analysis
Metals	SW 846 6000 Series	500-mL Plastic Bottles	Cool, 4ºC, HNO_3 to pH <2	6 months

Notes:
(1) See Table E-2 for monitoring locations, specific analysis, and sampling frequency.
(2) SW 846 refers to U.S. EPA SW846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, most recent edition.
mL - milliliter
°C - degrees Celsius
HCl - hydrochloric acid
HNO_3 - nitric acid

Table E-5. Groundwater Protection Standards
Mueller Property Holdings, LLC - Birmingham, Alabama

Hazardous Constituent	Unit	Concentration Limit (mg/L)*
Arsenic	Landfill	0.01
Barium	Landfill	2
Beryllium	Landfill	0.004
Cadmium	Landfill	0.005
Chromium	Landfill	0.1
Copper	Landfill	1.3
Lead	Landfill	0.015
Nickel	Landfill	0.039
Zinc	Landfill	0.6
Acrolein	Landfill	0.0000042
Acrylonitrile	Landfill	0.000052
1,1-Dichloroethane	Landfill	0.0028
1,2-Dichloroethane	Landfill	0.005
1,1-Dichloroethene	Landfill	0.007
cis-1,2-Dichloroethene	Landfill	0.07
trans-1,2-Dichloroethene	Landfill	0.1
1,1,2,2-Tetrachloroethane	Landfill	0.000076
1,1,1-Trichloroethane	Landfill	0.2
1,1,2-Trichloroethane	Landfill	0.005
Trichloroethene	Landfill	0.005
Vinyl Chloride	Landfill	0.002
Dibenzo(a,h)anthracene	Landfill	0.000025
Indeno(1,2,3-cd)pyrene	Landfill	0.00025
Naphthalene	Landfill	0.00012

* Concentration Limit is the concentration listed above or the concentration contained in the most recent edition of the Regional Screening Level (RSL) Table for Tap Water (released bi-annually by U.S. EPA) for a target cancer risk (TR) of 1E-06 and target hazard quotient (HQ) of 0.1

mg/L - milligrams per liter

APPENDIX F

FINANCIAL ASSURANCE

POST-CLOSURE CARE

PC-1

Facility Name: Mueller Property Holdings, LLC

SUMMARY WORKSHEET

	Activity	Worksheet Number	Cost
1.	O&M of Hydraulic Control System	PC-A	$321,000
2.	Site Security	PC-3	N/A
3.	Maintenance of Vegetative Cover	PC-4	$450,000
4.	Maintenance and Inspection	PC-5	$18,000
5.	Groundwater Monitoring	PC-6	$750,000
6.	Deed Notation	PC-7	N/A
7.	Maintenance and Inspection of Asphalt Cover	PC-8	N/A
8.	Subtotal of Post-Closure Costs (Add lines 1 through 7)		$1,539,000
9.	Engineering Expenses		N/A
10.	Certification of Post-Closure	PC-9	N/A
11.	Subtotal (Add engineering expenses and cost of certification of post-closure to post-closure costs [Add lines 8, 9, and 10])		$1,539,000
12.	Contingency Allowance (Contingency Allowances are typically 10% of post-closure care costs, engineering expenses, and cost of certification of post-closure.)		$153,900
TOTAL COST OF POST-CLOSURE CARE (add lines 11 and 12)			$1,692,900

POST-CLOSURE CARE

PC-A

Facility Name: Mueller Property Holdings, LLC

CORRECTIVE ACTION

O&M of Hydraulic Control System (When in Operation) *				
1.	Inspections every two weeks	1 hr/trip	26 hrs/year @ $150.00/hr	$3,900
2.	Minor Maintenance	1 hrs/month	12 hrs/year @ $150.00/hr	$1,800
3.	Replacement of major components-labor	10 hrs/year	10 hour/year @ $150.00/hr	$1,500
4.	Replacement of major components-parts	$3,500/year		$3,500
YEARLY TOTAL (Add lines 1, 2, 3, and 4)				$10,700
TOTAL COST OF HYDRAULIC CONTROL SYSTEM O&M ** (Enter total on Worksheet PC-1, line 1)				$321,000

Notes: * Since actual operational time is not known, assumes full-time operation
** Assumes 30 years of post-closure care

POST-CLOSURE CARE PC-4

Facility Name: Mueller Property Holdings, LLC

MAINTENANCE OF VEGETATIVE COVER

1. MOWING			
1.A	Area of Cover to be mowed (Enter from worksheet LF-1, line 1.D)	250,000 ft2	
1.B	Covert the area in ft2 to MSF (thousand square feet)(Divide line 1A by 1,000)	250 MSF	
1.C	Labor and equipment cost per MSF	$10.00/MSF	
1.D	Cost of 1 mowing event	$2,500/event	
1.E	Number of mowing events per year	6 events/year	
1.F	Number of years in post-closure care period*	30 years	
1.G	Number of mowing events during the post-closure care period (Multiply line 1.E by line 1.F)	180 events	
1.H	**Cost to mow for Post-Closure Care Period (Multiply line 1.D by line 1.G)**		$450,000
2. FERTILIZING (Included with mowing fees)			
2.A	Area of Cover to be fertilized (Enter from line 1.B)	MSF	
2.B	Labor and equipment cost per MSF	$_/MSF	
2.C	Cost of 1 fertilizing event (Multiply 1.B by line 1.C)	$_/event	
2.D	Number of fertilizing events per year	events/year	
2.E	Number of years in post-closure care period*	years	
2.F	Number of fertilizing events during the post-closure care period (Multiply line 1.E by line 1.F)	events	
2.G	**Cost to fertilize for Post-Closure Care Period (Multiply line 2.C by line 2.F)**		$ See Item 1 above
3. WATERING (Included with mowing fees)			
3.A	Area of Cover to be fertilized (Enter from line 1.B)	MSF	
3.B	Labor and equipment cost per MSF	$_/MSF	
3.C	Cost of 1 watering event (Multiply 1.B by line 1.C)	$_/event	
3.D	Number of watering events per year	events/year	
3.E	Number of years in post-closure care period*	years	
3.F	Number of watering events during the post-closure care period (Multiply line 1.E by line 1.F)	events	
3.G	**Cost to water for Post-Closure Care Period (Multiply line 3.C by line 3.F)**		$ See Item 1 above
TOTAL COST OF MAINTENANCE OF VEGETATIVE COVER (Add Lines 1.H, 2.G, and 3.G) (Enter total on Worksheet PC-1, line 3)			$450,000

Notes: * Assumes 30 years of post-closure care

POST-CLOSURE CARE PC-5

Facility Name: Mueller Property Holdings, LLC

MAINTENANCE AND INSPECTION

If maintenance Costs are not specifically indicated, the cost of maintaining and repairing the final cover can be estimated based on a percentage of constructing the final cover (such as 20 percent). If the unit is closed and construction costs for the final cover are not available, use landfill worksheets LF-3 through LF-6, found in chapter 7 to estimate cost.

1. MAINTENANCE AND REPAIR OF FINAL COVER			
1.A	Cost of installing clay layer	ft2	
1.B	Cost of installing geomembrane	MSF	
1.C	Costs of installing drainage layer	$_/MSF	
1.D	Cost of installing topsoil	$_/event	
1.E	Total cost of final cover	events/year	
1.F	**Cost to Maintain and Repair Final Cover**		N/A
2. POST-CLOSURE CARE INSPECTION			
2.A	Cost of conducting one inspection *	$300/inspection	
2.B	Number of inspections per year	2 inspections/year	
2.C	Cost of conducting post-closure care inspections per year (Multiply line 2.A by line 2.B)	$600/year	
2.D	Number of years in post-closure care.**	30 years	
2.E	**Costs to Conduct Post-Closure Care Inspections Over the Post-Closure Care Period (Multiply line 2.C by line 2.D)**		$18,000
TOTAL COST OF MAINTENANCE AND INSPECTION (Add lines 1.F and 2.E) (Enter total on Worksheet PC-1, line 4)			$18,000

Notes: * Based on 2 hours time per inspection @ $150.00/hour
** Assumes 30 years of post-closure care

GROUNDWATER MONITORING PC-6

Facility Name: Mueller Property Holdings, LLC

GROUNDWATER MONITORING

1. COLLECTION OF GROUNDWATER SAMPLES FOR POST-CLOSURE CARE (SEMI-ANNUAL EVENT)			
1.A	Number of sample locations	10 sample locations	
1.B	Sampling team and equipment cost per work hour	$150	
	Choose the appropriate level of PPE: a. Protection Level D $150/work hr b. Protection Level C c. Protection Level B		
1.C	Work hours required to collect samples from one sampling location	2 work hrs/location	
1.D	Number of hours required to collect all samples (Multiply line 1.A by line 1.C)	20 work hours	
1.E	**Cost to Collect Groundwater Samples for Semi-Annual Event (Multiply line 1.B by line 1.D)**		$3,000/year
2. ANALYSIS OF GROUNDWATER SAMPLES FOR POST-CLOSURE CARE (SEMI-ANNUAL EVENT)			
2.A	Calculate the cost of analysis per semi-annual sample event for groundwater samples.	$3,000/event	
2.B	Enter the number of sampling events.	1 event/year	
2.C	**Costs to Analyze Groundwater Samples for Semi-Annual Event (Multiply line 2.A by line 2.B)**		$3,000/year
3. COLLECTION OF GROUNDWATER SAMPLES FOR POST-CLOSURE CARE (ANNUAL EVENT)			
3.A	Number of sample locations	15 sample locations	
3.B	Sampling team and equipment cost per work hour	$150	
	Choose the appropriate level of PPE: a. Protection Level D $150/work hr b. Protection Level C c. Protection Level B		
3.C	Work hours required to collect samples from one sampling location	2 work hrs/location	
3.D	Number of hours required to collect all samples (Multiply line 3.A by line 3.C)	30 work hours	
3.E	**Cost to Collect Groundwater Samples for Annual Event (Multiply line 3.B by line 3.D)**		$4,500/year

GROUNDWATER MONITORING

PC-6

Facility Name: Mueller Property Holdings, LLC

GROUNDWATER MONITORING

4. ANALYSIS OF GROUNDWATER SAMPLES FOR POST-CLOSURE CARE (ANNUAL EVENT)			
4.A	Calculate the cost of analysis per annual sample event for groundwater samples.	$7,500/event	
4.B	Enter the number of sampling events.	1 event/year	
4.C	**Costs to Analyze Groundwater Samples for Annual Event (Multiply line 4.A by line 4.B)**		$7,500/year
5. REPORTING			
5.A	Reporting cost	$3,500/report	
5.B	Number of reports required each year	2 reports/year	
5.C	**Annual Cost for Reporting (Multiply line 5.A by line 5.B)**		$7,000/year
TOTAL ANNUAL COST OF GROUNDWATER MONITORING FOR POST-CLOSURE CARE (Add lines 1.E, 2.C, 3.E, 4.C and 5.C)			$25,000/year
TOTAL COST OF GROUNDWATER MONITORING * (Enter total on Worksheet PC-1, line 5)			$750,000

Notes: * Assumes 30 years of post-closure care

Includes cost of collection and handling of samples, vehicle rental, and decontamination of sampling equipment.