# PRELIMINARY DETERMINATION
## PERMIT RENEWAL AND MINOR MODIFICATION

Shelby County Commission
200 West College Street
Columbiana, Alabama 35051

Highway 70 Landfill
Permit No. 59-15

February 27, 2026

The Shelby County Commission has submitted to the Alabama Department of Environmental Management (ADEM) an application to renew and an application to modify the Solid Waste Disposal Facility Permit for Highway 70 Landfill (Permit No. 59-15**)**. The proposed modifications include an update to the Groundwater Monitoring Plan (GWMP), the addition of one groundwater monitoring well (MW-30), and the addition of tarps, spray-on product (BioCover), sludge and sludge-derived products, dredge materials, foundry sand, shredded green waste and wood chips mixed 50:50 with soil, nonhazardous contaminated soils, and EnviroCover non-reusable geosynthetic film with a minimum thickness of 1.75 mil as alternate daily covers in the Municipal Solid Waste Disposal Areas. The facility requested a variance from ADEM Admin. Code 335-13-4-.22(1)(b) to include an additional MSW working face in order to place a fluff layer in each newly constructed cell while at the same time continuing to fill the current cell. The facility also requested a variance to the two-foot limit in ADEM Admin. Code 335-13-4-.23(1)(b) for C&D waste layer lifts of 6 feet. The waste stream for Highway 70 Landfill Municipal Solid Waste Disposal Area would remain non-hazardous, non-infectious putrescible waste, including, but not limited to, municipal solid waste, industrial waste, construction and demolition waste, rubbish, sludge, and other similar-type materials. Special waste approved by ADEM may also be accepted. The waste stream for Highway 70 Landfill's Construction and Demolition Waste Disposal Area and would remain non-putrescible and non-hazardous construction and demolition waste and rubbish as defined by ADEM Admin. Code 335-13-1-.03. The service area for the Highway 70 Landfill would remain Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa, and Tuscaloosa Counties in Alabama. The maximum average daily volume of waste disposed at Highway 70 Landfill would remain 1,500 tons per day. All conditions of the current permit, including approved variances, have been requested and would be granted in the renewed and modified permit.

The Highway 70 Landfill is located in Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West located in Shelby County, Alabama. The permitted facility consists of approximately 360.05 acres and has 131.00 acres permitted for disposal with 77.70 acres permitted for MSW disposal operations and 53.30 acres for C/D disposal operations.

The Land Division has determined that the permit renewal application and the minor modification application comply with the applicable requirements of ADEM's Administrative Code 335-13 regulations for a municipal solid waste landfill.

Technical Contact:
Melissa H. Adornato
Solid Waste Engineering Section
Land Division
(334) 270-5605

Alabama Department of Environmental Management

# *SOLID WASTE DISPOSAL FACILITY PERMIT*

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| **PERMITTEE:** | **Shelby County Commission** |
| **FACILITY NAME:** | **Highway 70 Landfill** |
| **FACILITY LOCATION:** | **Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West in Shelby County, Alabama. The total facility consists of approximately 360.05 acres and has 131.00 acres permitted for disposal: a municipal solid waste disposal area of 77.70 acres and a construction and demolition waste disposal area of 53.30 acres.** |
| **PERMIT NUMBER:** | **59-15** |
| **PERMIT TYPE:** | **Municipal Solid Waste Landfill** |
| **WASTE APPROVED FOR DISPOSAL:** | **Municipal Solid Waste Disposal Area: Non-hazardous, non-infectious putrescible waste, including, but not limited to, municipal solid waste, industrial waste, construction and demolition waste, rubbish, as defined by ADEM Admin. Code 335-13-1-.03, sludge, and other similar-type materials. Special waste approved by ADEM may also be accepted. Construction and Demolition Waste Disposal Area: Non-putrescible and non-hazardous construction and demolition waste and rubbish. (See Section III, Paragraph B, of the permit.)** |
| **APPROVED WASTE VOLUME:** | **Maximum Daily Volume of 1,500 tons per day** |
| **APPROVED SERVICE AREA:** | **Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa, and Tuscaloosa Counties in Alabama** |

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

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| **ISSUANCE DATE:** | **XXXXXXXXXXX** |
| **EFFECTIVE DATE:** | **XXXXXXXXXXX** |
| **EXPIRATION DATE:** | **XXXXXXXXXXX** |

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**Alabama Department of Environmental Management**

**ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**
**SOLID WASTE PERMIT**

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| Permittee: | Shelby County Commission<br>200 West College Street<br>Columbiana, AL 35051 |
| Landfill Name: | Highway 70 Landfill |
| Landfill Location: | Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West in Shelby County, Alabama |
| Permit Number: | 59-15 |
| Landfill Type: | Municipal Solid Waste |

Pursuant to the Solid Wastes & Recyclable Materials Management Act, Code of Alabama 1975, §§ 22-27-1, *et seq*., as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM), this permit is issued to Shelby County Commission (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the Highway 70 Landfill.

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

This permit is based on the information submitted to the Department on May 25, 2021, for permit renewal, and on December 6, 2023, and December 18, 2023, for permit modification, and as amended, and is known as the Permit Application (hereby incorporated by reference and hereinafter referred to as the Application). Any inaccuracies found in this information could lead to the termination or modification of this permit and potential enforcement action. The Permittee must inform the Department of any deviation from or changes in the information in the Application that would affect the Permittee's ability to comply with the applicable ADEM Admin. Code or permit conditions.

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

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Alabama Department of Environmental Management Date Signed

## SECTION I. STANDARD CONDITIONS

A. Effect of Permit

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

B. Permit Actions

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

C. Severability

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

D. Definitions

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

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

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

E. Duties and Requirements

1. Duty to Comply

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

2. Duty to Reapply

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

3. Permit Expiration

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

4. Need to Halt or Reduce Activity Not a Defense

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

5. Duty to Mitigate

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

6. Proper Operation and Maintenance

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

7. Duty to Provide Information

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

8. Inspection and Entry

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

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

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

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

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

9. Monitoring, Corrective Actions, and Records

a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from ADEM Admin. Code 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water

and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), other appropriate EPA methods, or as specified in the Application. All field tests must be conducted using approved EPA test kits and procedures.

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

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

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

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

iii. The date(s) analyses were performed.

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

v. The analytical techniques or methods used.

vi. The results of such analyses.

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

10. Reporting Planned Changes

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

11. Transfer of Permit

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

12. Certification of Construction

Before the Permittee may commence disposal of waste in any new cell or phase:

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

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

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

13. Noncompliance

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

14. Other Information

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

F. Design and Operation of Facility

The Permittee shall maintain and operate the facility to minimize the possibility of a fire, explosion, or an unplanned sudden or nonsudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

G. Inspection Requirements

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

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

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

H. Recordkeeping and Reporting

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

a. Documentation of inspection and maintenance activities.

b. Daily Volume reports.

c. Personnel training documents and records.

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

e. Groundwater monitoring records.

f. Explosive gas monitoring records.

g. Surface water and leachate monitoring records. Monitoring is subject to applicable conditions of Section VII. of the permit.

h. Copies of this Permit and the Application.

i. Copies of all variances granted by the Department, including copies of all approvals of special operating conditions (such as approvals for open burning).

2. Quarterly Volume Report

Beginning with the effective date of this permit, the Permittee shall submit, within thirty (30) days after the end of each calendar quarter, a report summarizing the daily waste receipts of all waste for the previous (just ended) quarter. The Permittee shall report the receipts for municipal solid waste, industrial waste, and construction and demolition waste. Copies of the quarterly reports shall be maintained in the operating record.

3. Monitoring and Corrective Action Reports

The Permittee shall submit reports on all monitoring and corrective action activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas, and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year, and the reports shall be submitted at least semi-annually. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be conducted on a quarterly basis, and the reports should be submitted to the Department and placed in the operating record within thirty (30) days of the monitoring event. Copies of the semi-annual groundwater and quarterly explosive gas monitoring reports shall be maintained in the operating record.

4. Availability, Retention, and Disposition of Records

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

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

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

I. Documents to be Maintained by the Permittee

The Permittee shall maintain, at the Highway 70 Landfill office, the following documents and amendments, revisions, and modifications to these documents until an engineer certifies closure of the permitted landfill:

1. Operating record.

2. Closure Plan.

J. Mailing Location

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

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

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

K. Signatory Requirement

All applications, reports, or information required by this permit, or otherwise submitted to the Department, shall be signed and certified in accordance with ADEM Admin. Code 335-13-5 by the owner as follows:

1. If an individual, by the applicant.

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

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

L. Confidential Information

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

M. State Laws and Regulations

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

## SECTION II. GENERAL OPERATING CONDITIONS

A. Operation of Facility

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

B. Open Burning

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

C. Prevention of Unauthorized Disposal

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

D. Unauthorized Discharge

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

E. Industrial and Medical Waste Disposal

The Permittee shall dispose of industrial process waste in accordance with ADEM Admin. Code 335-13 and as specified in the Application. The Permittee, prior to disposal of industrial waste and/or medical waste, shall obtain from each generator a written certification that the material to be disposed does not contain free liquids, regulated hazardous wastes, regulated medical waste, or regulated PCB wastes.

F. Boundary Markers

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

G. Certified Operator

The Permittee shall be required to have an operator certified by the Department on-site during hours of operation, in accordance with the requirements of ADEM Admin. Code 335-13-12.

## SECTION III. SPECIFIC MSW LANDFILL REQUIREMENTS

A. Waste Identification and Management

1. Subject to the terms of this permit, the Permittee may dispose of the nonhazardous solid wastes listed in Section III, Paragraph B. Disposal of other waste streams is prohibited, except waste that is granted a temporary or one-time waiver by the Director.

2. The total permitted area for the Highway 70 Landfill is approximately 360.05 acres with a total disposal area of 131.00 acres. The Municipal Solid Waste Disposal Area consists of 77.70 acres, and the Construction/Demolition Waste Disposal Area consists of 53.30 acres.

3. The Permittee shall report maximum average daily volume of waste in tons/day for construction/demolition waste and municipal solid waste separately. The combined maximum average daily volume of waste disposed at the Highway 70 Landfill (municipal solid waste and construction/ demolition waste) shall not exceed 1,500 tons/day. Should the combined average daily volume exceed this value by 20% or 100 tons/day, whichever is less, for two (2) consecutive quarters, the Permittee shall be required to modify the permit in accordance with ADEM Admin. Code 335-13-5-.06(2)(b)2. An increase in maximum average daily volume shall not be approved by ADEM unless the Permittee has received local approval for the increased maximum average daily volume. The average daily volume shall be computed as specified by ADEM Admin. Code 335-13-4-.22(2)(g).

B. Waste Streams

The waste stream for the municipal solid waste disposal area shall be non-hazardous, non-infectious putrescible and non-putrescible wastes including, but not limited to, municipal solid waste, industrial waste, construction and demolition wastes, rubbish, as defined by ADEM Admin. Code 335-13-1-.03, sludge, and other similar-type materials. Special waste approved by ADEM may also be accepted.

The waste stream for the Construction/Demolition Waste Disposal Area shall be non-putrescible and non-hazardous construction and demolition waste and rubbish.

C. Service Area

The Permittee is allowed to receive waste for disposal from Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa, and Tuscaloosa Counties in Alabama.

D. Special Waste

The Permittee may dispose of special wastes in accordance with ADEM Admin. Coe 335-13.

1. Asbestos Waste

The Permittee shall dispose of asbestos waste in accordance with ADEM Admin. Code 335-13-4-.26(2).

2. Foundry Sand

The Permittee shall dispose of foundry waste in accordance with ADEM Admin. Code 335-13-4-.26(3).

3. Petroleum Contaminated Waste

The Permittee shall dispose of petroleum contaminated waste in accordance with ADEM Admin. Code 335-13-4-.26(4).

4. Municipal Solid Waste Ash

The Permittee shall dispose of municipal solid waste ash in accordance with ADEM Admin. Code 335-13-4-.26(5).

E. Liner Requirements

For the Municipal Solid Waste Disposal Area, the Permittee shall install a composite liner system as described in the Application consisting of 2 feet of 1 x $10^{-7}$ cm/sec compacted clay, a 60 mil HDPE geomembrane, 12-inch thick drainage layer with a minimum hydraulic conductivity of 1x$10^{-2}$ cm/sec, and a 12-inch thick protective soil layer. For Cell 3, Cell 4, and Cell 5, the Permittee is approved for an alternate liner. The Permittee shall install an alternate liner as described in the Application consisting of 12 inches of 1 x $10^{-5}$ cm/sec compacted soil, geosynthetic clay liner, a 60 mil HDPE geomembrane, 15-inch drainage layer, 3-inch temporary protective layer. The base of either composite liner system shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-4-.11(2)(a).

For the Construction/Demolition Waste Disposal Area, a liner will not be required at this time. The base of the cells or phases of this area shall be a minimum of five (5) feet above the highest measured groundwater level as determined by ADEM Admin. Code 335-13-4-.11(2)(a).

F Septic Tank Pumpings and Sewage Sludge

The Permittee shall not dispose of septic tank pumpings and/or sewage sludge unless specifically approved in writing by ADEM.

G. Large Dead Animals and Highly Putrescible Wastes

The Permittee shall handle the disposal of large dead animals and/or highly putrescible waste as required by ADEM Admin. Code 335-13-4-.22(1)(j). Large dead animals and/or highly putrescible waste shall only be disposed in the Municipal Solid Waste Disposal Area.

H. Cover Requirements

The Permittee shall cover all wastes as required by ADEM Admin. Code 335-13. All exposed waste disposed in the Municipal Solid Waste Disposal Area shall be covered at the conclusion of each day's activities. The Permittee may utilize the following as alternate daily covers in the Municipal Solid Waste Disposal Area:

1. 6 inches of nonhazardous contaminated soil
2. 6 inches of sludge and sludge-derived products
3. 6 inches of dredge materials
4. 6 inches of foundry sand
5. 6 inches of 50 percent shredded green waste to 50 percent soil
6. 6 inches of 50 percent wood chips to 50 percent soil
7. Tarps
8. Spray-on product (BioCover)
9. EnviroCover non-reusable geosynthetic film with a minimum thickness of 1.75 mil

Alternate daily cover must be applied in accordance with manufacturer's specifications and the approved Operations Plan. These alternate daily covers may only be used to cover the cells' interior slopes and the working face. At the conclusion of each week's activities, all exposed waste shall be covered with 6 inches of compacted soil in the Municipal Solid Waste Disposal Area. (See Section X, Paragraph 4.)

All waste disposed in the Construction/Demolition Waste Disposal Area shall be covered with 6 inches of earthen cover at the conclusion of each week's activities as required by ADEM Admin. Code 335-13.

I. Waste Compaction

All waste disposed in the Municipal Solid Waste Disposal Area shall be thoroughly compacted with adequate landfill equipment before the daily cover is applied. A completed daily cell shall not exceed eight feet in vertical thickness measured perpendicular to the slope of the preceding cell.

All waste disposed in the Construction/Demolition Waste Disposal Area shall be thoroughly compacted weekly with adequate landfill equipment prior to placing additional layers of waste or placing the weekly cover.

J. Daily Cells

All waste shall be confined to an area as small as possible within a single working face and spread to a depth not exceeding two feet prior to compaction, and such compaction shall be accomplished on a face slope not to exceed 4 to 1or as otherwise approved by ADEM. For the Construction/Demolition Waste Disposal Area, the Permittee has been granted a variance from ADEM Admin. Code 335-13-4-.23(1)(b) which requires all waste to be thoroughly spread in layers two feet or less in thickness. The Permittee shall be allowed to spread waste in layers up to six (6) feet in thickness. (See Section X, Paragraph 3.) A variance is granted for the Highway 70 Landfill from ADEM Admin. Code 335-13-4-.22(1)(b) which states that all waste shall be confined to as small an area as possible. Under this variance, Highway 70 Landfill is allowed to operate two working faces, one in the MSW Disposal Area and one in the C&D Waste Disposal Area. The Permittee shall be allowed to operate an additional (third) working face in order to place a fluff layer in each newly constructed cell while at the same time continuing to reach final elevation in the current cell. The purpose of this third working face

is to limit types of material that might damage the liner during the initial placement of waste in the new cell. The combined area of the working faces must remain as small as possible. (See Section X, Paragraph 2.)

K. Security

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

L. All Weather Access Roads

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

M. Adverse Weather Disposal

The Permittee shall provide for disposal activities in adverse weather conditions.

N. Personnel

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

O. Equipment

The Permittee shall provide the landfill equipment as required by ADEM Admin. Code 335-13-4-.22(1)(f).

P. Environmental Monitoring and Treatment Structures

The Permittee shall provide protection and proper maintenance of environmental monitoring and treatment structures.

Q. Vector Control

The Permittee shall provide for vector control as required by ADEM Admin. Code Division 13.

R. Bulk or Non-Containerized Liquid Waste

The Permittee shall not dispose of bulk or non-containerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin. Code 335-13-4-.22(1)(k) are met.

S. Empty Containers

The Permittee shall render empty containers larger than normally found in household waste unsuitable for holding liquids prior to delivery to the landfill unit unless otherwise approved by the ADEM.

T. Other Requirements

ADEM may enhance or reduce the requirements for operating and maintaining the landfill as deemed necessary by the Land Division.

U. Other Permits

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

V. Scavenging and Salvaging Operations

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

W. Signs

The Permittee shall provide a sign outlining instructions for use of the site. The sign shall be posted and have the information required by ADEM Admin. Code 335-13-4-.22(1)(i).

X. Litter Control

The Permittee shall control litter.

Y. Fire Control

The Permittee shall provide fire control measures.

## SECTION IV. GROUNDWATER MONITORING REQUIREMENTS

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

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

2. The Permittee shall maintain groundwater monitoring well GWM-A and GWM-B as the background groundwater monitoring wells for the entire facility.

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

4. Prior to installing any additional groundwater monitoring wells, the Permittee shall submit a plan to the Department with a permit modification request specifying the design, location, and installation of any additional monitoring wells. This plan shall be submitted within one hundred twenty (120) days prior to the installation which, at a minimum, shall include:

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

   b. Well development method(s);

   c. A complete analysis of well construction materials;

   d. A schedule of implementation for construction; and

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

5. The Permittee is approved to use the **interwell** method for statistical analysis.

B. Groundwater Monitoring Requirements

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

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

3. Prior to the initial receipt of waste at the facility, the Permittee shall sample and analyze for the parameters listed in Appendix I of ADEM Admin. Code 335-13-4-.27, and/or any other parameters specified by ADEM in Table IV. 2., all monitoring wells identified in Section IV.A.2. to establish background water quality and/or as directed by ADEM Admin. Code 335-13-4-.27(2)(j) and 335-13-4-.27(2)(a)(1). The records and results of this sampling and analysis activity shall be submitted to ADEM within ninety (90) days of the date of sampling.

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

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

C. Sampling and Analysis Procedures

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

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

2. Samples shall be analyzed according to the procedures specified in the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.

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

D. Recordkeeping and Reporting Requirements

1. Recording of Results

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

2. Recordkeeping

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

E. Permit Modification

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

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TABLE IV.1.
GROUNDWATER MONITORING WELLS

| Monitoring Well Number | Top of Casing (feet, msl) | Part Monitoring |
|---|---|---|
| UPGRADIENT/BACKGROUND MONITORING WELLS | | |
| MW-A | 682.12 | Entire Landfill |
| MW-B | 681.20 | Entire Landfill |
| MW-30 | 643.13 | Entire Landfill |
| DOWNGRADIENT MONITORING WELLS | | |
| MW-21 | 584.85 | Entire Landfill |
| MW-22 | 586.06 | Entire Landfill |
| MW-24 | 598.26 | Entire Landfill |
| MW-25 | 584.87 | Entire Landfill |
| MW-27 | 573.02 | Entire Landfill |
| MW-C | 569.90 | Entire Landfill |
| MW-D | 567.33 | Entire Landfill |
| MW-28 | 605.81 | Entire Landfill |
| MW-29 | 561.87 | Entire Landfill |

*ft-bls = Depth in feet below land surface

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TABLE IV.2.
BACKGROUND GROUNDWATER MONITORING

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

NOTE: The Permittee shall conduct a minimum of four independent sampling events as the initial sampling event, and analyze for the parameters listed above in order to establish background water quality. Following the four independent events, the Permittee may submit a request, with justification, for the deletion of or change in these parameters.

TABLE IV.3.
SEMI-ANNUAL GROUNDWATER MONITORING PARAMETERS

NOTE: The parameters to be monitored for in this Table are those listed in Appendix I of ADEM Admin. Code 335-13-4 and/or any other waste stream specific parameters.

## SECTION V. GAS MONITORING REQUIREMENTS

The Permittee must install and maintain an explosive gas monitoring system in accordance with ADEM Admin. Code 335-13.

## SECTION VI – MUNICIPAL SOLID WASTE LANDFILL AIR EMISSIONS

This landfill may be subject to ADEM Admin. Code 335-3 and the Federal Clean Air Act. Contact the ADEM Air Division for applicable requirements and permits.

## SECTION VII. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS

The Permittee must collect and dispose of the leachate that is generated at the facility. The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner. Prior to initial disposal, the Permittee shall provide the Department with a letter from the receiving publicly or privately owned treatment works, approving the acceptance of the leachate. Discharges to publicly or privately owned treatment works may be subject to the requirements of the ADEM Water Division's State Indirect Discharge (SID) Program. This applies only to the Municipal Solid Waste Disposal Area.

The permittee shall construct and maintain run-on and run-off control structures. Surface water discharges from drainage control structures shall be permitted through the ADEM Water Division's National Pollutant Discharge Elimination System (NPDES) Program.

## SECTION VIII. CLOSURE AND POST- CLOSURE REQUIREMENTS

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

A. Final Cover

The Permittee shall grade final soil cover such that surface water does not pond over the permitted area as specified in the Application. The final cover system for the Municipal Solid Waste Disposal Area shall consist of 12-inch-thick cap foundation soil, 40 mil HDPE or LDPE liner, Geocomposite drainage net (double sided), 12 inches protective soil, 18-inch infiltration layer, and 6 inches of topsoil erosion layer capable of supporting vegetative cover. The final cover for the C&D Waste Disposal Area shall consist of 18 inches of compacted earthen material excluding sands and 6 inches of topsoil erosion layer capable of supporting vegetative cover. For the C&D Waste Disposal Area, the Permittee is granted a variance from ADEM Admin. Code 335-13-4-.20(2)(c)3. requiring terraces. The Permittee shall not be required to construct terraces. (See Section X, Paragraph 1.)

B. Vegetative Cover

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

C. Notice of Intent

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

D. Completion of Closure Activities

The Permittee must complete closure activities of each landfill unit in accordance with the Closure Plan within one hundred eighty (180) days of the last known receipt of waste.

E. Certification of Closure

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

F. Post-Closure Care Period

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

G. Post-Closure Maintenance

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

H. Post-Closure Use of Property

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

I. Certification of Post-Closure

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

J. Recording Instrument

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

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

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

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

K. Removal of Waste

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

## SECTION IX. FINANCIAL ASSURANCE

A. The Permittee shall maintain detailed written cost estimates, in current dollars, at the landfill office and on file with ADEM in accordance with ADEM Admin. Code 335-13-4-.28.

B. All cost estimates must be updated annually as required by ADEM Admin. Code 335-13-4-28.

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code 335-13-4-28. into the landfill operating record before the initial receipt of waste in the case of closure, post-closure care, or no later than one hundred twenty (120) days after corrective action remedy has been selected. A copy of this information shall be submitted to ADEM in accordance with ADEM Admin. Code 335-13-4-.28(5).

D. The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed.

E. The financial assurance mechanisms must be legally valid, binding, and enforceable under state and federal law.

F. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code 335-13-4-.28 by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in the financial assurance mechanism must be approved by the Department.

G. The Permittee shall increase the closure, post-closure, or corrective action cost estimates, and the amount of financial assurance if changes in the closure, post-closure, or correction action plans, or landfill conditions increase the maximum cost.

H. The Permittee may reduce the amount of financial assurance by submitting justification and a revised estimate to ADEM for approval.

## SECTION X. VARIANCES

1. For the C&D Waste Disposal Area and the inactive Industrial/C&D Waste Disposal Area, the Permittee is granted a variance from ADEM Admin. Code 335-13-4-.20(2)(c)3. requiring terraces. The Permittee shall not be required to construct terraces (see Section VIII, Paragraph A).

2. A variance is granted for the Highway 70 Landfill from ADEM Admin. Code 335-13-4-.22(1)(b) which states that all waste shall be confined to as small an area as possible within a single working face. Under this variance, Highway 70 Landfill is allowed to operate two working faces, one in the MSW Disposal Area and one in the C&D Waste Disposal Area. The Permittee shall be allowed to operate an additional (third) working face in order to place a fluff layer in each newly constructed cell while at the same time continuing to reach final elevation in the current cell. The purpose of this third working face is to limit types of material that

might damage the liner during the initial placement of waste in the new MSW cell. The combined area of the working faces must remain as small as possible. (See Section III, Paragraph J.)

3. For the C&D Waste Disposal Area, the Permittee has been granted a variance from ADEM Admin. Code 335-13-4-.23(1)(b) which requires all waste to be thoroughly spread in layers two feet or less in thickness. The Permittee shall be allowed to spread waste in layers up to six (6) feet in thickness. (See Section III, Paragraph J.)

4. The Permittee has been approved to utilize 6 inches of nonhazardous contaminated soil, 6 inches of sludge and sludge-derived products, 6 inches of dredge materials, 6 inches of foundry sand, 6 inches of 50 percent shredded green waste to 50 percent soil, 6 inches of 50 percent wood chips to 50 percent soil, tarps, spray-on product (BioCover), or EnviroCover non-reusable geosynthetic film with a minimum thickness of 1.75 mil as an alternate daily cover in the Municipal Solid Waste Disposal Area. BioCover and EnviroCover must be applied in accordance with manufacturer's specifications and the approved Operations Plan. These alternate daily covers may only be used to cover the cells' interior slopes and the workface. If an alternate daily cover is utilized, the Permittee shall be required to cover the active cell with 6 inches of earthen cover at the conclusion of each week's activities. (See Section III, Paragraph H.)

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

# Permit No. 59-15 Renewal,

# Minor Mod, and Variance

# Applications

**Municipal Consultants, Inc.**
*Civil/Environmental Engineering*

200 Century Park South, Suite 212
Birmingham, Alabama 35226
P: (205) 822-0387
F: (205) 822-0386

May 25, 2021



Mr. Hunter Baker
Alabama Department of Environmental Management
Solid Waste Branch - Land Division
1400 Coliseum Boulevard
Montgomery, AL 36110-2400

RE: Renewal of Permit Number 59-15
Highway 70 Landfill
Shelby County Commission

Dear Mr. Baker,

The Shelby County Commission is requesting renewal of its existing landfill permit No. 59-15 to continue operating the landfill. On their behalf, we are providing the permit renewal form for the Hwy 70 Landfill. Please find enclosed 1 hard copy of form and a check in the amount of $37,270 for the permit renewal fee.

If you have any questions or require any additional information, please don't hesitate to contact us. Thank you for your consideration.

Yours truly,

Trent Turner

enclosures

# SOLID WASTE DISPOSAL FACILITY

## MSWLF/ILF/CCR UNIT PERMIT APPLICATION PACKAGE

January 16, 2018

**MEMORANDUM**

TO: Applicants Seeking a Permit for Solid Waste Facilities

FROM: Stephen A. Cobb, Chief
Land Division
Alabama Department of Environmental Management

RE: Processing Solid Waste Permits by ADEM

Any permit issued by ADEM must be in accordance with §22-27-48 and §22-27-48.1 Code of Alabama. This section indicates that ADEM may not consider an application for a new or modified permit unless such application has received approval by the affected unit of local government having an approved plan. ADEM, therefore, will require the following before it can process a new or modified permit application:

1. The local government having jurisdiction must approve the permit application in accordance with §22-27-48 and §22-27-48.1 Code of Alabama.

2. Local governments should follow the procedures outlined in §22-27-48 and §22-27-48.1 Code of Alabama and the siting standards included in the local approved plan in considering approval of a facility.

This procedure applies to applications for new or modified permits. ADEM cannot review an application unless it includes approval from the affected local government. This procedure shall not apply to exempted industrial landfills receiving waste generated on site only by the permittee.

Please contact the Solid Waste Branch of ADEM at (334) 274-4201 if there are any questions.

SAC/sss/abj

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

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

2. **Facility Name** Highway 70 Landfill

3. **Applicant:**

   **Name:** Shelby County Commission

   **Address:** 200 West College Street Columbiana, AL 35051

   **Telephone:** (205) 669-3737

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

   **Township** 21S **Range** 1W
   **Section** 19 & 30 **County** Shelby

   Township 21S Range 2W
   Section 24 & 25 County Shelby

5. **Land Owner:**

   **Name:** Shelby County Commission

   **Address:** 200 West College Street Columbiana, AL 35051

   **Telephone:** (205) 669-3737

   **(Attach copy of agreement from landowner if applicable.)**

6. **Contact Person:**

**Name** Brandon Hamilton

**Position or Affiliation** Supervisor, Environmental Services Shelby County, Alabama

**Address:** 1281 Hwy 70 Columbiana, AL 35051

**Telephone:** (205) 669-3737

7. **Size of Facility:** 360.5 **Acres**

**Size of Disposal Area(s):** 131 **Acres** (77.7 (MSW); 53.3 (C/D))

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

Service area shall remain as previously approved by ADEM and listed on the current permit as follows: Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, and Tuscaloosa Counties in Alabama

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

1,500 **Tons/Day** _____ **Cubic Yards/Day**

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

Municipal Solid Waste

Construction and Demolition Waste

**SIGNATURE** **DATE** 5/24/21

## ADDITIONAL REQUIRED INFORMATION

Applicants seeking to obtain a permit to construct and/or continue to operate a municipal solid waste (MSW) landfill, industrial landfill, coal combustion residuals (CCR) landfill, or CCR surface impoundment are required to submit additional information as part of the Solid Waste Disposal Facility Permit Application. These additional information requirements vary depending on the facility type.

For new and existing landfill units, refer to ADEM Admin Code 335-13-5-.02 for a list of additional information to be submitted in the permit application. Some requirements apply only to MSW landfills and CCR landfills, while other requirements apply to industrial landfills. You need only to address the requirements that pertain to your type landfill. For new and existing CCR surface impoundments, refer to ADEM Admin Code 335-13-15-.09 for additional information to be submitted in the permit application.

Each rule that is applicable to your type landfill or surface impoundment must be addressed in detail in the operational narrative and/or engineering drawings before the review process can be completed. All operational narratives, engineering drawings, survey maps and legal descriptions are to be prepared by licensed engineers or surveyors registered in the State of Alabama and with their stamp or seal on each drawing/map and cover of the narrative.

Act No. 89-824 Section 9(a) states "The department may not consider an application for a new or modified permit for a facility unless such application has received approval by the affected unit of local government having an approved plan." This document must be received by the Department prior to processing the application.

The referenced rules are covered in greater detail in ADEM's Administrative Code, Division 13. Clarification can be obtained by reviewing the regulations. Copies of the ADEM Administrative Code, Division 13 regulations, can be obtained for a fee by contacting ADEM's Permits and Services Division. If the Department can answer any questions, please contact the Solid Waste Branch at (334) 274-4201.

**DATA TO BE SUBMITTED ON ALL LANDFILLS REQUIRING A GEOLOGICAL EVALUATION**

The following items must be submitted along with the permit application. This data is necessary for ADEM to determine if the proposed landfill site is suitable from a geological standpoint.

a. Conduct a water well survey to a minimum of 1 mile from the perimeter of the proposed landfill or expansion.

   1. Locate water wells on a USGS 7.5 minute topographic map.

   2. Provide corresponding names and addresses of well owners.

   3. Determine the depth of the well and the static water level. Specify whether these data were determined by measurement or interview.

b. Conduct borings and/or pit excavations to establish site geology and hydrology at least to the mean annual water table or bedrock.

   1. Locate soil borings or excavation pits on a USGS 7.5 minute topographic map.

   2. Provide a log of excavation which includes the following:

      Foot by foot soil classification by the Unified Soil Classification System (USCS).

      Elevation at which groundwater or bedrock was observed.

      Elevation of groundwater after 24 hours.

c. Sample soil material from test borings or pit excavations for the following tests:

   1. Proctor density 90%-95% for liner material, 85%-90% for cover material.

   2. Permeability in cm/sec at the item (1) densities.

d. Construct the following maps:

   1. Potentiometric map using general elevations established after 24 hours.

   2. Regional map to a minimum of 1 mile from the perimeter indicating geology, structural features such as faults, etc.

   3. Cross sections using borings and/or excavation pits of site.

e. Any additional information deemed necessary to properly evaluate the site.

**Municipal Consultants, Inc.**
*Civil/Environmental Engineering*

200 Century Park South, Suite 212
Birmingham, Alabama 35226
(205) 822-0387

January 27, 2023

Melissa Adornato
Alabama Department of Environmental Management
Solid Waste Branch - Land Division
1400 Coliseum Boulevard
Montgomery, AL 36110-2400



RE: Request for Additional Information
Highway 70 Landfill
Permit No. 59-15

Dear Mrs. Adornato,

The Shelby County Commission received a letter from ADEM dated October 4, 2022 requesting additional information for the permit renewal application for the Highway 70 Landfill submitted on May 25, 2021. We have gathered the names and dates of submission of the relevant documents as requested by ADEM. Please see the list below:

- ***Any current variances (both the requests for those variances and ADEM's approval response letters).***
  - No terraces variance Requested in letters on August 2, 2001 and April 4, 2002 and Approved on June 28, 2002 with Permit Modification for Cell #3.
  - 2 working faces variance was not officially submitted but was handled in permit review and Approved on December 9, 2010 with Permit Modification.

- ***A copy of the original local approval and any subsequent local approvals relevant to current operations.***
  - Submitted on March 30, 2005 as Shelby County Highway 70 Landfill Permit Modification.

- ***Any siting requests and approvals relevant to current operations.***
  - Current Operations include all C&D and MSW areas.
  - Permit Modification for Cell #5 - Submitted on June 26, 2020 and Approved on May 21, 2021.
  - Additional information will be provided upon request.

- ***The hydrogeological evaluation relevant to current operations.***
    - Current Operations include all C&D and MSW areas.
    - Permit Modification for Cell #5 - Submitted on June 26, 2020 and Approved on May 21, 2021.
    - Additional information will be provided upon request.

- ***Stormwater runoff calculations used to size sediment ponds relevant to current operations.***
    - Current Operations include all C&D and MSW areas.
    - Permit Modification for Cell #5 - Submitted on June 26, 2020 and Approved on May 21, 2021.
    - Additional information will be provided upon request.

- ***The liner and leachate QA/QC plan relevant to current operations and statement of where the leachate goes after it leaves the facility.***
    - Current Operations include all C&D and MSW areas.
    - Permit Modification for Cell #5 - Submitted on June 26, 2020 and Approved on May 21, 2021.
    - Additional information will be provided upon request.

- ***The most recent operations plan as well as any additional modifications made since the last operations plan was written, including waste screening procedures.***
    - We have no record of submission of the Operations Plan for the landfill. The plan has been a working document that has been continually updated. The Operations Plan is attached.

- ***The most recent gas monitoring plan as well as any modifications made since the last gas monitoring plan was written.***
    - An Explosive Gas Monitoring Plan was created by Highland Technical Services, Inc. We have no record of submission. However, it is included in and became part of the Operations Plan for the landfill. The Operations Plan is attached.

- ***The most recent closure plan as well as any modifications made since the last closure plan was written.***
    - Permit Modification for MSW area - Submitted on June 26, 2020 and Approved on May 21, 2021
    - Permit Modification for C&D Cells – Submitted on March 25, 2005 and Approved on April 5, 2006

- ***The most recent groundwater monitoring plan as well as any modifications made since the last groundwater monitoring plan.***
    - Groundwater Monitoring Plan - Submitted via e-mail on November 23, 2021. The plan is also included in and became part of the Operations Plan for the

landfill. The Operations Plan is attached.

- ***The cell certification and subsequent approval letter from ADEM for the current cell waste is being disposed in.***
  - Cell #5 – Cell certification package submitted November 14, 2022 and approved on November 22, 2022.
  - Cell #4 – Cell certification package submitted May 21, 2012 and approved on June 21, 2012.
  - C&D Cell B – Cell certification package submitted June 14, 2017 and approved on July 10, 2017.
  - Additional approvals will be provided upon request.

- ***The most recent permit drawings relevant to site operations.***
  - Permit Modification for Cell #5 - Submitted on June 26, 2020 and Approved on May 21, 2021
  - C&D Cell B - Submitted on March 25, 2005 and Approved on April 5, 2006
  - Additional drawings will be provided upon request.

- ***Boundary plat and legal property description prepared, signed, and sealed by a land surveyor of the permitted facility boundary and permitted disposal area of the facility.***
  - Submitted on July 15, 2005 – Legal Description
  - Submitted on July 2, 2008 – Permit Modification Drawings Final (Sheet 2)

If you have any questions or require any additional information, please don't hesitate to contact us.

Sincerely,

Trent Turner

Enclosures: Shelby County Commission Hwy 70 Landfill Permit 59-15 – Operations Plan

# Shelby County Commission Hwy 70 Landfill
# Permit No. 59-15
# Operations Plan

*Prepared for:*
Shelby County Commission

*Prepared by:*
Municipal Consultants, Inc.
Birmingham, AL

Updated: November 25, 2021

# Operations Plan

## Table of Contents

# 1. General Information

## 1.1 Facility Information

The Shelby County Commission owns and operates the Highway 70 MSW and C&D Landfill (Landfill). The Landfill is located off Shelby County Highway 70 in Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West. The Landfill is located immediately adjacent to the closed Sheala landfill. The Sheala landfill was operated until the first subtitle D Municipal Solid Waste (MSW) cell went into operation in 1997. This 360± acres permitted for landfill use consists of 77.7 acres of active MSW disposal area and 53.3 acres of construction and demolition disposal area. There is also a designated area utilized for storing wood debris. In addition to the cells, there are stormwater detention ponds, leachate storage tanks, a scale house, and an equipment maintenance facility. Through its life, the Landfill has been expanded through the construction of additional cells. The MSW cells consists of 5 MSW subcells and the C&D cell is currently operating above and next to a capped IC&D cell that was closed in 2003.

## 1.2 Hours of Operation

The facility's permit allows for 24-hour operations, seven (7) days a week. However, the facility currently operates Monday through Saturday at the below hours. The site is closed on Sundays and major holidays.

Actual operational activities start and end based on many factors such as weather conditions, volume of waste received on a particular day and impacts due to holiday make-up days.

**Landfill Hours**

- Monday - Friday: 6:30 am - 4:30 pm
- Saturday: 7:30 am - 3:30 pm
- Sunday: Closed

These hours are subject to change at the County's discretion.

## 1.3 Service Area

The landfill is permitted to receive waste only from Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa, and Tuscaloosa Counties.

## 1.4 Site Access and Signage

Site access is controlled specific points of entrances and exits. Although the site does not have perimeter fencing, the perimeter is guarded by a significant tree and brush buffer to prohibit unauthorized vehicle access. All entrance/exit locations are equipped with locking gates. Waste is delivered to the site only through the main gate located at the south end of the facility. The facility's scale house and maintenance building are located at the main entrance. Scale house personnel monitor incoming traffic during business hours. Surveillance cameras, equipped with video recording, monitor the entrance road when the facility is closed. Gates are closed and locked during

non-operational hours.

The main access road is an all-weather asphalt roadway. All other on-site access roads to the disposal areas are constructed of crushed aggregate or other stone material and provide uninterrupted access during wet weather conditions. Some on-site secondary roads are unpaved.

As required by ADEM in Division 13 regulations, there is signage at the front gate and throughout the facility to provide all customers with relevant information and direction. At the main gate, there is a sign with the facility's name, permit number and other information located along the main access road. This sign also has operating hours and an emergency phone number posted. There are signs throughout the facility indicating disposal areas and how to access them. Numerous other warning messages and safety rules are posted on signs throughout the facility.

### 1.5 Equipment

The heavy equipment required for proper handling of incoming waste is provided onsite as needed. Currently, the site's primary equipment includes dozers for spreading the waste and cover material, compactors for compacting waste, dump trucks for hauling waste and cover materials, excavators for loading cover material., etc. Numerous other secondary equipment is utilized for on-site waste and cover operations, road maintenance, dust control and operational support.

### 1.6 Personnel

The landfill will be staffed appropriately to perform the continued operation of the facility. An experienced landfill supervisor is responsible for daily operations of the landfill.

## 2. Waste

### 2.1 Type of Waste

#### 2.1.1 Municipal Solid Waste

The waste stream for the MSW disposal area is non-hazardous, non-infectious putrescible wastes including, but not limited to, MSW, industrial waste, construction and demolition waste, rubbish, sludge and other similar type materials. Special waste approved by ADEM may also be accepted.

#### 2.1.2 Construction and Demolition Waste

The waste stream for the construction and demolition waste disposal area is non-putrescible and non-hazardous construction and demolition waste and rubbish as defined by Rule 335-13-1-.03.

#### 2.1.3 Special Waste

Special waste is any solid waste or combination of solid wastes that due to its quantity, concentration, physical or chemical characteristics or, biological properties may require special handling and disposal. There are various types of special wastes including treated medical waste, dead animals, non-regulated asbestos, regulated asbestos, foundry sand, empty pesticide containers, petroleum contaminated waste, MSW ash, sludges, grease trap waste and grit trap

waste.

Disposal of special wastes is subject to a Hazardous/Solid Waste determination by ADEM. All special waste is reviewed by ADEM for pre-acceptance to assure that a particular waste is non-hazardous and to determine if it is acceptable under the limitations of the permit. All special wastes are disposed of in the MSW disposal area.

The landfill does not accept hazardous waste, tires, batteries, or liquids of any type.

## 2.2 Waste Handling

### 2.2.1 Unloading

All waste delivered to the landfill is unloaded in the designated operating areas. Typically, there are five (5) such areas that are active on any given day. These active areas are:

- MSW Working Face
- Construction and Demolition Waste Working Face
- Brush Pile Area
- Customer Convenience Station (dedicated for residential vehicles)

These active areas are under supervision of landfill personnel during operating hours.

The Customer Convenience Station is located north of the scale house just off the main access road for use by residential customers. This station consists of a gravel area and pad around several 40 cubic yard roll-off containers. Customer vehicles may pull up to the containers and unload the waste materials into the roll-off containers. The containers are transported to the MSW working face, emptied and returned to the convenience station for repeated use.

### 2.2.2 Inspections

The landfill personnel perform inspections of incoming waste in accordance with ADEM Admin. Code Division 13 in order to minimize the potential that unacceptable wastes are delivered to the site. The landfill personnel conduct random inspections of incoming loads and maintains record of all inspections.

### 2.2.1 Compaction

All disposal activities will take place in areas that have been permitted and constructed for waste placement.

All waste disposed in the MSW and the construction and demolition waste disposal areas shall be spread with a dozer in layers or lifts approximately two-feet in thickness. These layers are then rolled over with a compactor making multiple passes. The working faces develop throughout each working day as layer after layer of waste is placed and compacted. A completed daily cell shall not exceed eight feet in vertical thickness.

# 3. Landfill Operations

## 3.1 Cover

All waste will be covered as required by ADEM Admin. Code Division 13. All waste disposed in the MSW disposal area will be covered at the conclusion of each day's activities. Daily cover is placed over the entire working face and consists of soil from excavations and stockpiles on the site at a thickness of 6 inches. Currently daily cover is onsite soil, but other alternative daily covers (ADC) may be used if approved by ADEM. There are no ADC's approved at this time. Examples of ADC's that could be used after approval from ADEM include synthetic material tarps, shredded brush materials, commercial spray-on foam products, dried water treatment screenings, construction and demolition debris, petroleum contaminated soils, etc.

All waste disposed in the construction and demolition waste disposal cell will be covered at the conclusion of each week's activities. Weekly cover is placed over the entire working face and consists of soil from excavations and stockpiles on the site at a thickness of 6 inches. Final cover will be placed over areas of the landfill that have reached full capacity and final design waste grades. The final cover system for the municipal solid waste area and construction and demolition area will be installed pursuant to ADEM regulations.

## 3.2 Open Burning

The landfill will not open burn without the written approval from ADEM. If open burning considered, a burn request should be submitted and approved by ADEM prior to the work beginning.

## 3.3 Litter Control

The amount of windblown litter within the landfill property will be controlled by effectively placing cover on the working face. Any litter that does accumulate away from the working face areas will be collected by landfill personnel on a routine basis.

## 3.4 Vector Control

Vectors will be controlled onsite through proper management of the disposal areas and litter control. The waste on the working faces will be properly compacted and covered to limit vector attraction. Litter throughout the site will be routinely collected to help limit vector attraction.

## 3.5 Fire Control

Burning of waste is strictly prohibited at the facility. In order to promptly extinguish any accidental fires, soil stockpiles are maintained near the active areas and an on-site water truck is available.

# 4. Leachate Collection and Handling

Each of the MSW subcells has its own individual leachate collection piping. This piping collects leachate off of the bottom of the cells and transports it to storage area. For Cell #1, #2, and #3, the leachate storage system consists of 2 – 85,000 gallon glass lined storage tanks. Each of these tanks has a pump that pumps the leachate into a force main that leaves the landfill site to the discharge location near the Calera WWTP.

Cell #4's leachate piping collects and originally discharged into a below ground pump station that discharged into the common force main that left the landfill site. In the construction of Cell #5, the pump station was removed and piping was installed to drain to the storage tank at Cell #5.

Cell #4 and #5's leachate piping collects and discharges into a 12,500 gallon HDPE tank with a duplex pump station. These pumps connect to and discharge into the common force main that leaves the landfill site.

# 5. Stormwater Handling and Controls

The Landfill maintains a National Pollutant Discharge Elimination System (NPDES) permit for all stormwater from the landfill. The landfill should be operated to properly manage any water pollution or unauthorized surface water discharge offsite in accordance with the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management.

The on-site stormwater system consists of several diversion ditches throughout the MSW cells and C&D cells and sedimentation ponds. The major erosion control devices used are sedimentation ponds and soil stabilization through soil revegetation. Silt fencing, check dams, hay bales, and other BMPs will also be used as needed in disturbed areas to minimize site erosion.

# 6. Groundwater Monitoring

The landfill has implemented a groundwater monitoring system as required by the permit. The landfill has groundwater monitoring wells installed and maintained around the site. These wells are monitored and sampled as indicated in the "Groundwater Monitoring Plan" attached to this plan.

# 7. Landfill Gas Monitoring and Handling

## 7.1 Gas Monitoring

The landfill has implemented an explosive gas monitoring system as required by the permit. The landfill has gas monitoring wells installed and maintained around the disposal areas for monitoring and sampling as required by the permit. These wells are monitored and sampled as indicated in the "Explosive Gas Monitoring Plan" attached to this plan.

### 7.2 Gas Handling

Cells #1, #2, and #3 has a gas collection system which removes the gas from the landfill thereby preventing the gas from escaping the facility. The gas collection system consists of wells that are installed into the waste mass. Each of the wells is connected with piping to form a network. Blowers/vacuums are used to create a vacuum on the network of wells and the gas is destroyed using a flare.

## 8. Record Keeping

The landfill shall maintain and retain all records, reports, drawings, etc. as required by the landfill permit. These should be stored at the landfill or other designated location. The items to be retained would include but not be limited to inspection reports, maintenance reports, groundwater and gas monitoring reports and records, sampling plans and results, daily volume reports, operating record, closure plan, etc.

## 9. Closure and Post Closure

### 9.1 MSW Closure

The current permitted final cover system for the MSW area shall consist of a 12-inch-thick cap foundation soil, 40 mil HDPE or LDPE liner, geocomposite drainage net (double sided), 18-inch infiltration layer and 6 inches of topsoil erosion layer capable of supporting vegetative cover. The final design and layout of closure will be pursuant to ADEM regulations at the time of closure.

### 9.2 C&D Closure

The final cover for the construction and demolition waste area shall consist of 18 inches of compacted earthen material excluding sands and 6 inches of topsoil erosion layer capable of supporting vegetative cover. The final design and layout of closure is as shown in the approved permit drawings and will be installed pursuant to ADEM regulations at the time of closure.

### 9.3 Requirements

All closure and post closure activities and maintenance of the landfill will be in accordance with Division 13 regulations.

# GROUNDWATER MONITORING PLAN

# GROUNDWATER MONITORING PLAN

**SHELBY COUNTY ENVIRONMENTAL SERVICES**
**HIGHWAY 70 LANDFILL**
**SHELBY COUNTY, ALABAMA**
**PERMIT NO.: 59-15**
**PROJECT NO.: 2210975.02**

PREPARED FOR:

SHELBY COUNTY COMMISSION
DEPARTMENT OF ENVIRONMENTAL SERVICES
1281 HIGHWAY 70
COLUMBIANA, ALABAMA 35051

NOVEMBER 18, 2021

PREPARED BY:

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

William W. Cooch, P.G.
Principal Geologist

## OWNER CERTIFICATION

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

Brandon Hamilton, Environmental Manager
Shelby County, Alabama

Date

## GEOLOGIST CERTIFICATION

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

Lori K. Norton

November 18, 2021

Lori K. Norton, P.G.
Senior Project Geologist
LaBella Associates, D.P.C.

Date

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## FIGURES

## APPENDICES

## 1.0 PURPOSE AND SCOPE

The Shelby County Department of Environmental Sciences (Shelby County) has prepared this Groundwater Monitoring Plan as part of the renewal for the Solid Waste Facility Disposal Permit Number 59-15 for the Highway 70 Landfill located in Shelby County, Alabama, and to also incorporate two new monitoring wells that had been requested by the Alabama Department of Environmental Management (ADEM). This Plan has been prepared in accordance with the ADEM Administrative Code 335-13. The following is a discussion of the site history, environmental setting, description of the monitoring requirements, and activities to be conducted over the life of the permitted facility.

## 2.0 SITE HISTORY AND STATUS

The Highway 70 Landfill (Permit No.: 59-15) is located at 4154 AL-70 in Columbiana, Shelby County, Alabama. The landfill is located predominantly in the Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West in Shelby County, Alabama. The site location is shown in Figure 1.

Shelby County was issued the most recent version of Permit Number 59-15 for the Highway 70 Landfill by the ADEM on November 21, 2016 (most current), effective date December 1, 2016 and modified on May 21, 2021. The facility is approximately 360.05 acres in size, with a municipal solid waste disposal area of 77.7 acres and a construction and demolition waste disposal area of 53.3 acres.

# 3.0 ENVIRONMENTAL SETTING

## 3.1 SITE GEOLOGY AND HYDROGEOLOGY

According to *Special Map 220,* prepared by the Geological Survey of Alabama, the subject property is underlain by the Parkwood Formation and Floyd Shale undifferentiated of Mississippian Age. The Parkwood Formation typically consists of interbedded medium to dark-gray shale and light to medium gray sandstone in part with dusky-red and grayish-green mudstone, argillaceous limestone, and clayey coal. The Floyd Shale typically consists of dark-gray shale, sideritic in part with thin beds of sandstone, limestone, and chert.

According to the *Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama; Area 4,* 1989 prepared by the United States Geological Survey (USGS), the major aquifers in the area of the subject property include the Knox-Shady and the Tuscumbia-Fort Payne aquifers. The subject property is located within the recharge area for both of the aquifers.

## 3.2 SURFACE WATER

Surface water from the Highway 70 Landfill generally flows to the north to tributaries of Big Creek which is located approximately 2,750 feet north of the northern property boundary as shown on the topographic map provided as Figure 1.

# 4.0 MONITORING WELL NETWORK AND GROUNDWATER FLOW

## 4.1 MONITORING WELL NETWORK

The facility will utilize nine (9) monitoring wells designated as MW-21, MW-22, MW-24, MW-25, MW-27, MW-28, MW-29, MW-A, MW-B, MW-C, and MW-D. Monitoring wells MW-A and MW-B are designated as the upgradient wells for groundwater quality comparisons and are located in the southeast portion of the property. Monitoring wells MW-21, MW-22, MW-24, MW-25, MW-27, MW-28, MW-29, MW-C, and MW-D are designated as the down-gradient (compliance) wells. The locations of the monitoring wells are shown on Figure 2. The available well construction details for monitoring wells at the site are included in Table 4.1 below.

TABLE 4.1 – MONITORING WELL CONSTRUCTION DETAILS

| MONITORING WELL NUMBER | MEASURING POINT ELEVATION (ft-amsl) | MEASURED TOTAL DEPTH (ft-btoc) | CASING DIAMETER | SCREENED INTERVAL (FT-BGS) |
|---|---|---|---|---|
| MW-21 | 584.85 | 43.48 | 4-inch | NA |
| MW-22 | 586.06 | 43.28 | 4-inch | NA |
| MW-24 | 598.26 | 36.25 | 4-inch | NA |
| MW-25 | 584.87 | 27.36 | 4-inch | NA |
| MW-27 | 573.02 | 37.10 | 4-inch | 21.0 – 35.0 |
| MW-28 | 605.81 | 56.98 | 2-inch | 42.83 – 52.83 |
| MW-29 | 561.87 | 21.86 | 2-inch | 8.17 – 18.17 |
| MW-A | 682.12 | 65.26 | 4-inch | NA |
| MW-B | 681.20 | 74.52 | 4-inch | NA |
| MW-C | 569.90 | 35.35 | 4-inch | NA |
| MW-D | 567.33 | 35.00 | 4-inch | NA |

ft-amsl – feet above mean sea level
ft-btoc – feet below top of casing
ft-bgs – feet below ground surface

At the request of ADEM, two additional compliance wells (MW-28 and MW-29) were installed along the north-western boundary of the landfill at the locations shown in Figure 2. A copy of the Monitoring Well Installation Report is provided in Appendix I.

## 4.2 GROUNDWATER FLOW

During each semi-annual monitoring event, static water level depth will be measured in each of the monitoring wells prior to purging. For reference, depth to groundwater measured during the September 2021 sampling event ranged from 4.60 feet below top of casing (ft-btoc) to 55.85 ft-btoc and the groundwater elevations ranged from 547.06 feet above mean sea level (ft-amsl) to 636.25

feet above mean sea level (ft-amsl). Groundwater elevation data is included in Table 4.2 below. The potentiometric surface calculated using September 2021 measurements is provided in Figure 3.

TABLE 4.2 – GROUNDWATER MEASUREMENTS AND ELEVATIONS

| WELL ID | MEASURING POINT ELEVATION (FT-AMSL) | MEASURED TOTAL DEPTH (FT-BTOC) | MEASURED DEPTH TO GW (FT-BTOC) | GROUNDWATER ELEVATION (FT-AMSL) |
|---|---|---|---|---|
| MW-A | 682.12 | 65.25 | 55.85 | 626.27 |
| MW-B | 681.20 | 74.50 | 44.95 | 636.25 |
| MW-C | 569.90 | 35.35 | 17.79 | 552.11 |
| MW-D | 567.33 | 35.00 | 20.27 | 547.06 |
| MW-21 | 584.85 | 43.48 | 4.60 | 580.25 |
| MW-22 | 586.06 | 43.28 | 5.41 | 580.65 |
| MW-24 | 598.26 | 36.25 | 17.20 | 581.06 |
| MW-25 | 584.87 | 27.36 | 10.83 | 574.04 |
| MW-27 | 573.02 | 37.10 | 5.42 | 567.60 |
| MW-28 | 605.81 | 56.98 | 13.40 | 592.41 |
| MW-29 | 561.87 | 21.86 | 10.89 | 550.98 |

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

As illustrated on the potentiometric surface map, the direction of shallow groundwater flow beneath the Landfill at the time of the September 2021 groundwater monitoring event was generally to the north-northwest with a hydraulic gradient (dh/dl) of approximately 0.0157 feet per foot (ft/ft). Groundwater velocity was calculated using Darcy's equation v = (K/ne* dh/dl) where K is the hydraulic conductivity and ne is the effective porosity. Based on the characteristics of the underlying formation, the hydraulic conductivity and effective porosity for shale and sandstone are estimated to be 1.0 x $10^{-5}$ centimeters per second (cm/sec) and 15%, respectively (Freeze, p. 29 and 37). Using an estimated hydraulic conductivity of 1.0 x $10^{-5}$ cm/sec, an effective porosity of 15%, and the calculated hydraulic gradient of 0.0157 ft/ft, the groundwater flow rate was estimated to be approximately 1.085 feet per year (ft/year) during the September 2021 event. An example of the groundwater flow rate calculations (September 2021) is provided in Appendix A.

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

## 4.3 MONITORING WELL INSPECTION

During each semi-annual monitoring event the monitoring wells will be inspected for damage. If it is determined that a well should be replaced for any reason, a *Monitoring Well Abandonment and Replacement Plan* will be prepared for submittal to ADEM within 60 days of making the determination. The Plan will include, at a minimum, consideration of the following:

- The appropriate method for abandonment.
- The need for relocation to protect the replacement well from future damage.
- The anticipated replacement well type, depth, screened interval, casing diameter and surface completion in accordance with ADEM Admin Code 335-13-4-.27(2)(c).
- The need for replicate sample collection and, if required, the number of replicate samples and a schedule for completing sample collection.
- Statistical analysis to be used for groundwater quality data collected from the replacement well and a determination addressing if pooling data from the abandoned well with the new well is appropriate.

Upon approval of the *Monitoring Well Abandonment and Replacement Plan* and the replacement of the new well, a report documenting the abandonment and replacement activities will be prepared and submitted to ADEM along with a Minor Permit Modification request to update the facility Permit to include the newly installed well into the Permit compliance well network.

## 5.0 GROUNDWATER SAMPLING AND ANALYSIS

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

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

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

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

Groundwater samples will be obtained by filling appropriate laboratory-prepared sample containers directly from the discharge tubing connected to the pump or from disposable polyethylene bailers. New tubing will be used for each sample, and the pump will be decontaminated prior to use at each sample location. Subsequent to sample collection, the containers will be labeled and placed in a cooler with ice in an effort to achieve and maintain a sample temperature of 4°C. In the event one or more well is purged dry, those wells will be allowed to recharge sufficiently prior to sampling. Once recharged, samples from those wells will be collected using a disposal bailer.

The samples will be delivered to a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory, along with proper chain of custody documentation including project name and number; sampler's name and signature; sample identification numbers; sample date, time, and location; requested analyses; and sample container type and quantity. The samples collected from each of the monitoring wells will be analyzed for Appendix I volatile organic compounds (VOCs) and Appendix I metals. Additional parameters pH and conductivity will be measured in the field. The samples collected from site monitoring wells will be analyzed using the EPA Methods shown in Table 5.0 below.

TABLE 5.0 – LABORATORY ANALYTICAL METHODS

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

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

Both preserved and unpreserved groundwater samples will be collected for metals analysis during each monitoring event. The unpreserved samples will be retained in the event elevated metals concentrations are identified in one or more the groundwater samples. Specific unpreserved samples to those that returned elevated metals will be submitted and filtered for analysis by the laboratory, on an as needed basis, to determine if any metals detected in the unfiltered samples are

also present in dissolved concentrations. *Please note that field filtration is not allowed by ADEM guidelines.*

## 5.1 GROUNDWATER SAMPLE MANAGEMENT

In accordance with this Plan, each groundwater sample will be tracked from the time of collection by completing sample custody documentation. The sample custody documentation will include the field documentation and the chain of custody report. All samples will be placed in laboratory provided containers and preserved in a manner appropriate to the analytical method requested. Sample containers will be stored in a clean, secure area prior to use. Containerized samples will be labeled as they are collected and placed in a cooler with ice to maintain a sample temperature of 4°C until delivered to the analytical laboratory. Sample criteria are summarized in the Table 5.1 below.

**TABLE 5.1 – GROUNDWATER SAMPLING CRITERIA**

| ANALYSIS | SAMPLE MATRIX | BOTTLE TYPE | PRESERVATIVE | HOLDING TIMES |
|---|---|---|---|---|
| Appendix I Metals | Water | (1) 250 ml Plastic | 4°C / $HNO_3$ | 180 Days Mercury 28 Days |
| Filtered Sample Appendix I Metals | Water | (1) 250 ml Plastic | 4°C | 180 Days Mercury 28 Days |
| Appendix I VOCs | Water | (2) 40 ml vials | 4°C / HCL | 14 Days |

VOCs – Volatile Organic Carbons
ml – Milliliter
C – Celsius
$HNO_3$ – Nitric Acid
HCL – Hydrochloric Acid

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

The field data recorded at the time of sample collection provides an unambiguous identification of each sample. These field data will be recorded on groundwater monitoring well field logs. Field notes will include the following:

- date and time of sampling;
- name(s) of field personnel conducting sampling;
- name(s) of any observers at the sampling site;

- purpose of sampling;
- description of sample point;
- number and size(s) of sample(s) taken;
- field sample identification number(s);
- deviation from sampling plan, if any;
- field observations;
- references (such as maps) of sampling site; and
- sample handling and shipping information.

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

Samples will be hand delivered or shipped via overnight delivery service to the laboratory. Shipped samples will be accompanied by an appropriate freight (shipment) bill of lading form with the completed freight bill number recorded on the Chain of Custody accompanying each cooler shipment. The Chain of Custody will be sealed in a plastic bag and taped to the underside of the cooler lid. Coolers will be sealed with tape and a custody seal that will be initialed and dated to prevent any tampering during shipping and handling. The laboratory will be notified prior to shipment of samples that would arrive at the laboratory on a weekend or holiday to assure that the samples are properly received.

Sample custody documentation procedures will be maintained throughout the following activities:

- initial sample collection;
- transportation from sample collection site to analytical laboratory;

- receipt and preparation of laboratory sample extracts and digestives;
- storage at laboratory until an evaluation of analytical results determines that re-analysis is not required; and,
- final sample disposition.

At the time of sample collection, samples will be labeled and a record of the sampling activity will be recorded in the daily field log. Sample labeling procedures were discussed previously. Information required to identify sample custody and to request sample analyses are then entered on the Chain of Custody. The information recorded on the Chain of Custody will include:

- project name and number;
- sampler's name and signature;
- sample identification numbers;
- sample date, time, and location;
- requested analyses;
- sample container type and quantity;
- requested analytical turnaround time; and
- person to receive results and a contact telephone number to call in case problems arise.

A Sample Chain of Custody is included as Appendix D.

## 6.0 DECONTAMINATION OF EQUIPMENT

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

## 7.0 SEMI-ANNUAL REPORTING

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

### 7.1 STATISTICAL PROCEDURES

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

Monitoring wells MW-A and MW-B are designated as the background groundwater quality monitoring locations used for statistical evaluations. Monitoring wells MW-C, MW-D, MW-21, MW-22, MW-24, MW-25, MW-27, MW-28, and MW-29 are used as compliance wells.

Historical groundwater data dating back to March 2005 is available for use in statistical evaluations for the subject facility. The historically detected constituents, data sets, and time versus concentrations graphs will be provided in each semi-annual report. When determining which historical data to use when evaluating current concentrations of COCs in samples collected from the monitoring well network, data from more recent events may be used in order to account for changes in sampling procedures and groundwater geochemistry over the life of the monitoring well program. Justification for removal of historical data will be provided in each semi-annual report.

An Analysis of Variance (ANOVA) test was conducted for background wells MW-A and MW-B in order to determine the appropriate background data to be used for constituents being analyzed using inter-well analysis (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc). Prior to running the ANOVA statistical analysis, tests for outliers were conducted (Appendix E). Only the outliers identified by that test were removed from the historical datasets.

Following removal of the identified outliers, ANOVA tests were conducted using the historical data from background wells MW-A and MW-B. The results of this analysis are provided in Appendix E. Non-parametric ANOVA tests were conducted based on the results of normality as shown in Appendix E. Based on the results of this analysis, future statistical analysis of antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc will be conducted using pooled data from MW-A and MW-B.

### 7.1.1 Updating Background Datasets

In accordance with the Unified Guidance, background datasets will be updated after four new compliance observations have been collected (every two years for sites undergoing semi-annual groundwater monitoring). The update will only be performed if no SSIs have been recorded for that well constituent since the last update. Following receipt of the results of the fourth monitoring event, either a t-test (non-detects ≤ 75%) or Wilcoxon rank-sum comparison (non-detects ≥ 75%) will be conducted at each background well (inter-well analysis) and each compliance well (intra-well analysis) comparing existing background and the potential set of newer background. Should the comparison indicate no significant difference between the newer background data and the existing background data, the newer data will be re-classified as background measurements and added to the existing background sample. Should the comparison indicate a significant difference between the newer data and the existing background data, an evaluation of the more recent data will be conducted to determine whether a gradual trend is evident or other change has occurred warranting further investigation.

## 7.2 TESTS FOR OUTLIERS

A test for outliers will be conducted when multiple values in a dataset appear anomalously low or high when compared to other values (Unified Guidance). In order to screen for outliers, either a Tukey's Outlier Screening, or a Dixon's Test or a Rosner's Test, will be conducted. In the event an outlier is identified, an attempt will be made to determine the cause of the outlier, e.g. lab error, field error, etc., if possible. If outliers are identified within a constituent's dataset, a determination will be made as to whether the outlier(s) should remain or be removed from the dataset prior to completing the statistical analysis. A discussion regarding the removal on an outlier(s) will be provided in each semi-annual groundwater monitoring report.

## 7.3 TEST FOR NORMALITY

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

Typically, groundwater analytical data is subjected to a distribution analysis to determine if the data is normally distributed or can be transformed to a normal distribution using either log-normal or ladder of powers data transformations. If data is normally distributed, or can be transformed to create a normal distribution, a parametric statistical analysis is recommended. However, when the data contains a large percentage of non-detects (greater than 50%), the validity of distribution tests are questionable, suggesting that a non-parametric statistical analysis be used.

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

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

Depending on the results of the tests for normality, either parametric or non-parametric statistical analysis will be used to determine if there is an initial exceedance (SSI) for these constituents in samples collected from the compliance wells. The results for the tests for normality will be submitted in each semi-annual groundwater monitoring report.

## 7.4 TARGET CHEMICALS OF CONCERN

Target constituents at the site include each of the sixteen Appendix I metals. Each of the target constituents are considered reliable indicators for statistical analysis during each semi-annual monitoring event.

### 7.4.1 Double Quantification Rule (DQR) Discussion

Historically, one (1) of the forty-seven (47) Appendix I VOCs have been detected in one or more of the wells in the monitoring well network. The detected constituents, as well as the date of their last detection, are provided in Appendix F (COC Screening).

Carbon disulfide was detected in the samples collected on May 13, 2021 from newly installed monitoring wells MW-28 (0.00230 milligrams per liter [mg/l]) and MW-29 (0.00262 mg/l) during the first replicate sampling event completed after monitoring well installation activities. Carbon disulfide was not detected in either well during the subsequent replicate sampling events conducted on June 9, 2021 and June 24, 2021, or during the semi-annual groundwater monitoring event conducted on September 2, 2021. Since carbon disulfide was detected in the samples collected from each of the newly installed wells following the monitoring well installation activities, but not during the two subsequent replicate sampling events, LaBella is of the opinion that the carbon disulfide detected in the samples collected from MW-28 and MW-29 may have been an artifact of drilling and the disturbance of subsurface materials. The detected concentrations of carbon disulfide were well below their EPA screening level of 0.081 milligrams per liter (mg/l).

In the event carbon disulfide is detected in future samples collected from the monitoring well network, a retesting event will be conducted to verify the detections. If an initial exceedance is confirmed during the retesting event, then carbon disulfide will be subjected to statistical analysis.

The remaining forty-six (46) Appendix I VOCs have not been detected in the samples collected from the remaining compliance wells or from background wells MW-A or MW-B.

Pursuant to the Unified Guidance, when background sample data consists entirely of non-detects for a specific constituent, but there are detections above the laboratory detection limit in samples collected from compliance wells, then the Double Quantification Rule (DQR) can be applied. The DQR states that an SSI is declared when a constituent/compliance well pair displays consecutive quantified detections above the detection limit and the constituent/background well pair(s) contains

only non-detects. Therefore, when the DQR is applied, further analysis to determine a SSI is not warranted. If there are no consecutive detects (either from scheduled events and/or sampling following a detection), then the constituent/compliance well pair is not subjected to statistical analysis.

Forty-six (46) of the forty-seven (47) Appendix I VOCs have not been detected historically (100% non-detects) in the samples collected from background wells MW-A or MW-B or the compliance wells. In the event one of these constituents is detected during future monitoring events, the DQR will be applied. If the constituent is detected during the next scheduled monitoring or resampling event, then that constituent will be subjected to statistical analysis following a retesting event.

## 7.5 STATISTICAL ANALYSIS

### 7.5.1 Inter-Well & Intra-Well Statistical Analysis

Based on a review of the historical laboratory analytical results from groundwater samples collected from background well locations MW-A and MW-B and each of the compliance wells, an inter-well statistical analysis is recommended as part of future monitoring activities for a select group of inorganics. An inter-well evaluation will be used for the presence of SSIs in detected concentrations of antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc in samples collected from each compliance well during each semi-annual event. Based on actual evidence or supported justification of spatial variation in constituent concentrations for certain inorganics, an intra-well evaluation is recommended for determining the presence of an SSI for barium and cobalt. The rational for the use of an intra-well analysis is provided in the following discussion.

A review of Table 5-1 of the Unified Guidance, which summarizes typical background data patterns for common constituents in groundwater monitoring programs, barium is listed as typically having a very high frequency of detections with a high rate of mean differences between wells. At the Highway 70 Landfill, barium has consistently been detected in background wells MW-A and MW-B and each of the compliance monitoring wells since at least March 2005 indicating that barium occurs naturally in the groundwater underlying the site and, based on a review of historical data going back to 2005, at differing concentrations. Since March 2005, barium has had non-detect rates that have ranged from 0% to approximately 8% in the compliance wells, as well as, 18% non-detected in background well MW-A and 21% non-detect rate in background well MW-B.

Based on evidence that barium has been detected consistently in samples collected from the monitoring well network and exists naturally in groundwater underneath the site and at varying concentrations, LaBella is of the opinion that intra-well analysis is appropriate for evaluating barium detected in samples collected from the compliance wells.

Box plots were generated using historical data from September 2017 (when the screening level was reduced to 0.0006 mg/l) to the present for each of the background wells (MW-A and MW-B) and compliance wells, in order to determine if spatial variation may exist with respect to cobalt. The Box Plots are presented in Appendix G and indicate that spatial variation does exist between the background wells and the compliance wells. Since it appears that spatial variation exists for cobalt across the site, LaBella recommends that this constituent be statistically analyzed using intra-well analysis during future groundwater monitoring events.

To date, there have been nine semi-annual events conducted at the lower detection limit for cobalt below the screening value of 0.0006 mg/l. During future monitoring events, the type of statistical approach for cobalt will continue to be evaluated as more background data at the lower detection limit is collected. In the event a different statistical approach appears warranted, the recommended approach will be submitted to the ADEM for approval.

The type of statistical method that will be used for evaluating groundwater data will be the Parametric or Non-Parametric Prediction Limit analysis in accordance with ADEM Administrative Code R. 335-13-4-.27(2)(l)3. As discussed in Section 7.3, the decision to use Parametric or Non-Parametric analysis will depend on the percentage of non-detects for each constituent, and if required, the results of tests for normality for constituents with a non-detect rate of less than 50%. During each semi-annual event, the data sets for each individual constituent for each well will be deseasonalized prior to running prediction limit analysis, if needed.

In the event an initial exceedance of a target metal is determined through statistical analysis and subsequent retesting to be an SSI, then the type of analysis to be performed (inter-well or intra-well) may be reevaluated based on the results of an alternate source demonstration, if needed. Additionally, trend analysis, as discussed in Section 7.6 of this Plan, may be performed on COCs that have exhibited an increase over background to determine if detected concentrations at that location have decreased, increased, or have shown no identifiable trend over time.

## 7.6 SEN'S SLOPE TREND ANALYSIS

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

## 7.7 IDENTIFICATION OF A SSI (OR INITIAL EXCEEDANCE)

Should the statistical analysis confirm the presence of an initial exceedance for one or more target constituents over background groundwater quality, Shelby County will comply with the requirements of ADEM Admin. Code 335-13-4-.27(2)(n)3 and notify the Department within 14 days of the finding, and a retesting plan, if needed, will be initiated in accordance with the Unified Guidance and this Plan as discussed in Section 7.7.1 below.

### 7.7.1 Retesting Plan

In order to determine the retesting schedule for detected COCs with initial exceedances within the compliance wells, power curves were generated to determine the proper number of resampling events that would be needed in order to meet the EPA recommended power requirements for determining if a release has occurred at the facility. Power curves are provided in Appendix H. It should be noted that tests for normality were conducted for each of the constituents prior to generating the power curves. In the event a COC could not be transformed, or had a non-detect rate greater than 50 percent, the power curves were generated using a Non-Parametric analysis. If the data set for a constituent could be transformed, the power curves were generated using a Parametric analysis.

In the event there is an initial exceedance over background using inter-well analysis, the power curves suggests that the results will be verified by conducting one retesting event (1 of 2). The retesting will be completed within 45 days of the original event.

Due to the limited dataset, three retesting events (1 of 4) would be required to confirm an initial exceedance through intra-well analysis for wells MW-28 and MW-29. It should be noted that as the

sample sizes for MW-28 and MW-29 increase, retesting events for initial exceedances for constituents will be reduced during future semi-annual monitoring. Justification for the reduction in retesting events will be provided in subsequent semi-annual groundwater monitoring reports.

The results of the retesting events will be submitted to the ADEM as part of the semi-annual report or as an addendum to the semi-annual report. If the results of the retesting events indicate a SSI for a COC, and within 90 days of the determination of a SSI, an assessment monitoring program will be established and will comply with ADEM Admin. Code 335-13-4-.27(4) unless a determination can be made that a source other than the landfill unit caused the SSI, or there was an error in sampling, analytical testing, or statistical analysis. In the event there is a determination of an alternate source, a report documenting the alternate source will be submitted to the ADEM for approval and placed in the operating record.

## 7.8 REPORTING

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

- A discussion of the environmental setting of the facility.
- Summary tables of the laboratory analysis.
- Monitoring well sampling records.
- A table of historic groundwater elevations.
- Copies of the laboratory reports.
- Historical groundwater analytical results.
- Potentiometric surface map(s) illustrating groundwater elevation and flow direction.
- Time versus Concentration Graphs for each detected constituent.
- Other supporting figures, such as site and well location maps.

## 8.0 REFERENCES


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

Alabama Department of Environmental Management, Highway 70 Landfill, Solid Waste Disposal Permit No. 59-15, Effective December 1, 2016, Modified May 21, 2021, Expiration Date November 30, 2021, Issuance Date November 21, 2016.

Geological Survey of Alabama, Special Map 220, Geologic Map of Alabama, 1988.

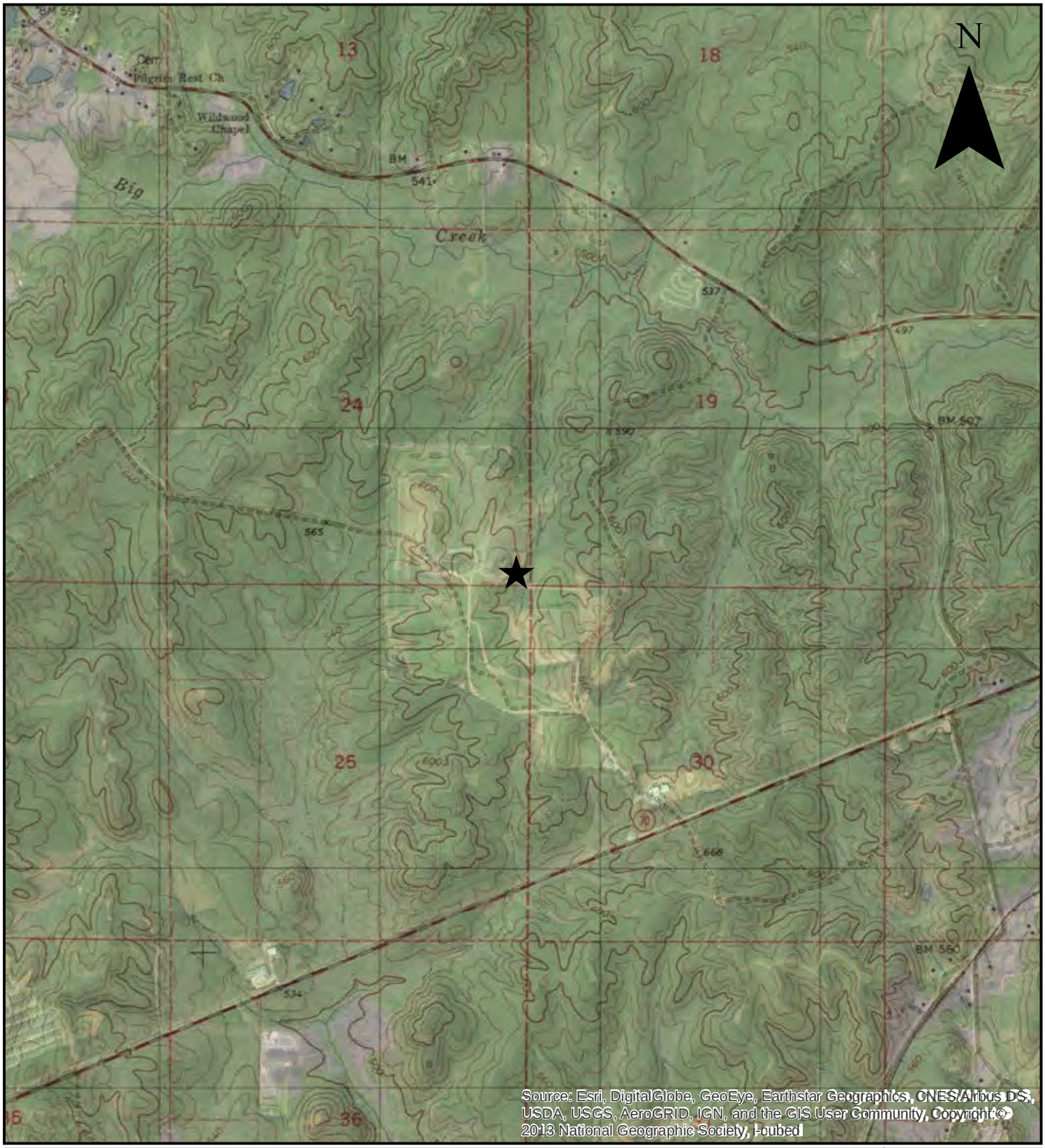
Kopaska-Merkel, David C, Dean, Lewis S., Moore, James D., 2005. Hydrogeology and Vulnerability to Contamination of Major Aquifers in Alabama, Area 4: Geological Survey of Alabama, Circular 199 D, 2005.

LaBella Associates, D.P.C., March 2021 Semi-Annual Groundwater Monitoring Report, Shelby County Environmental Services, Highway 70 Landfill, May 11, 2021.

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

US EPA, Office of Solid Waste, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

# *FIGURES*




## Legend

★ Site Location

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

**TITLE:**
Site Location Map

Highway 70 Landfill
SHE-ALA Landfill

Shelby County, Alabama

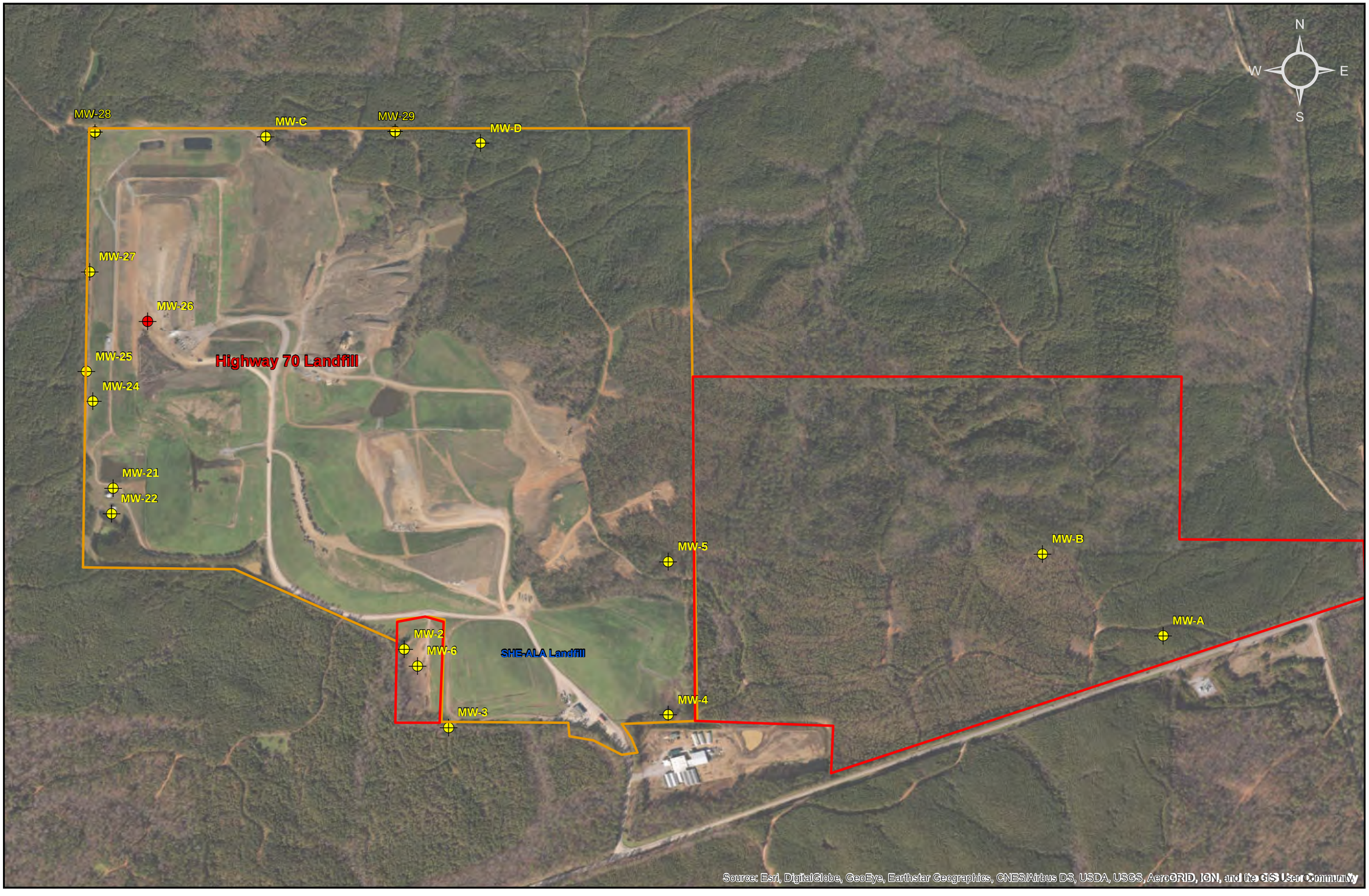
**SCALE:** 0 1,000 2,000
1 inch = 2,000 feet

**FIGURE NO.**
1

**PROJECT NO.**
General Map

**DRAWN BY**
AJH

**DATE DRAWN**
4-06-2021




**Legend**

- Existing Groundwater Well
- Abandoned Groundwater Well
- Approximate Landfill Boundary
- Approximate Shelby County Boundary

SCALE:

0 375 750

1 inch = 750 feet

TITLE:

**Site Plan & Monitoring Well Location Map**

**Highway 70 Landfill**

**Shelby County, Alabama**

| FIGURE NO. | PROJECT NO. |
|---|---|
| 2 | 2210975.00 |
| DRAWN BY: | DRAWN DATE: |
| LKN | 08-31-2021 |

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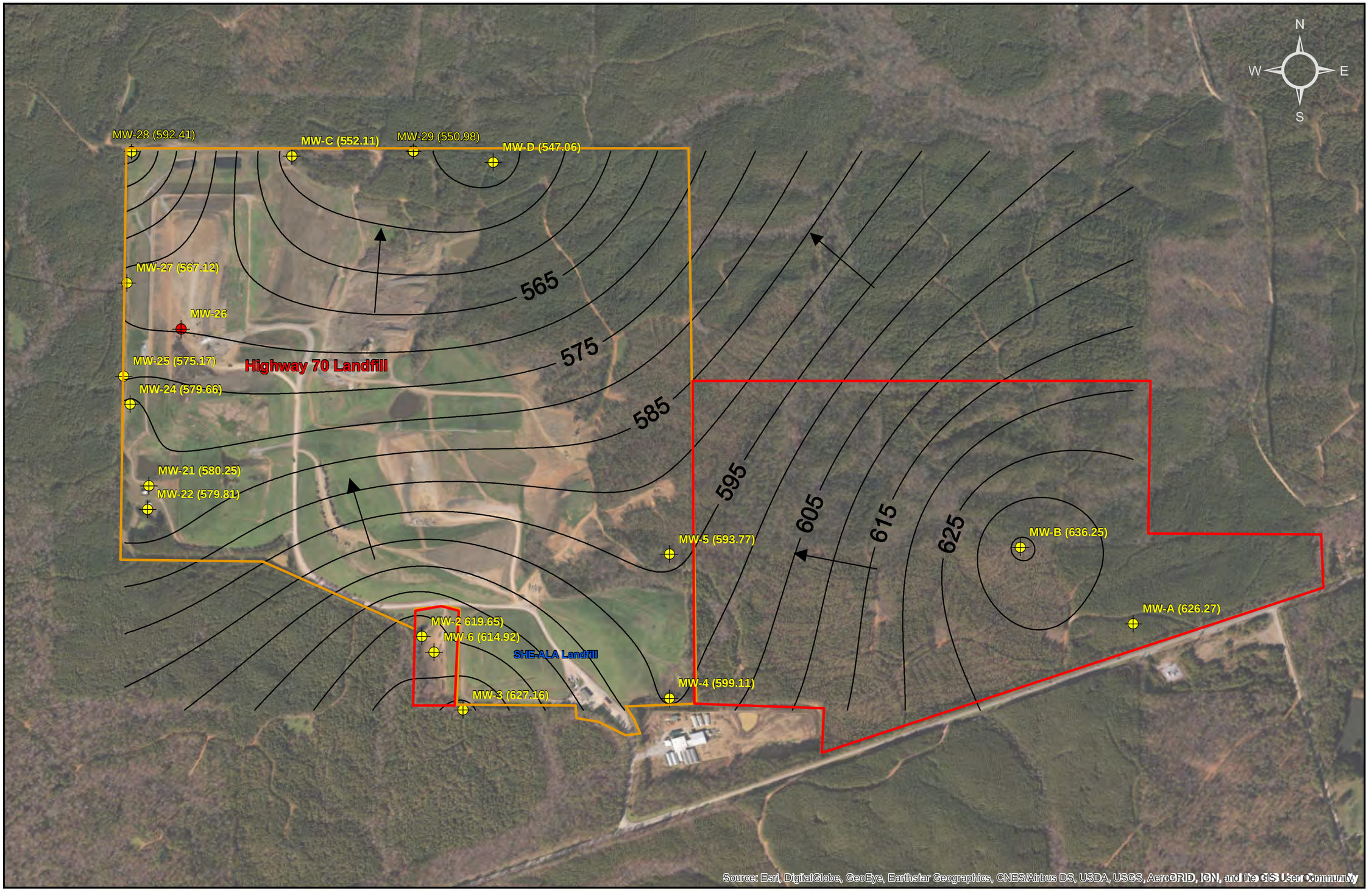
(205) 985-4874




**Legend**

- Existing Groundwater Well
- Abandoned Groundwater Well
- Potentiometric Contour Line
- Groundwater Flow Direction
- (626.27) Measured Groundwater Elevation (ft-amsl)
- Approximate Landfill Boundary
- Approximate Shelby County Boundary

SCALE:
0 400 800
1 inch = 800 feet

TITLE: Potentiometric Surface Map

September 2021

Shelby County
Highway 70 Landfill
SHE-ALA Landfill

Shelby County, Alabama

| FIGURE NO. | PROJECT NO. |
|---|---|
| 3 | 2210975.02 |
| DRAWN BY: | DRAWN DATE: |
| LKN | 11-17-2021 |

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HOOVER, AL 35244
(205) 985-4874

# *APPENDIX A*

**Appendix A**
**Calculated Groundwater Flow Velocities**
**September 2, 2021**

| Monitoring Well | Groundwater Elevation (ft-amsl) | Distance from MW-B to down gradient well (feet) | Gradient (i) | Hydraulic Conductivity (cm/sec) | effective porosity (ne) | Estimated Flow Velocity (feet/year) |
|---|---|---|---|---|---|---|
| MW-B | 636.25 | | | | | |
| MW-D | 547.06 | 5670.00 | 0.0157 | 0.00001 | 0.15 | 1.085 |
| | | | | | average velocity | 1.085 |

**Notes:**

1. Effective porosity values from Freeze & Cherry (1979) Table 2.4.
2. Hydraulic conductivity values were obtained from Freeze and Cherry (1979) Table 2.2

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

# *APPENDIX B*

# GROUNDWATER SAMPLING LOG

| | | |
|---|---|---|
| SITE NAME: | PROJECT: | LABELLA PROJECT NO: |
| FIELD PERSONNEL/SAMPLER: | WEATHER CONDITIONS: | DATE: |
| WELL NO: | WELL DIAMETER (in): | PURGE PUMP TYPE OR BAILER: |
| TOTAL WELL DEPTH (feet): | SCREEN (feet): | |
| STATIC WATER LEVEL (feet): | TIME: | |
| DEPTH TO FREE PRODUCT (feet): | | |
| LENGTH OF WATER COLUMN: | | |
| WELL VOLUME (gallons): | | |

**PURGING DATA**

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

| TIME | DEPTH TO WATER (feet) | pH (standard units) | COND. (mS/cm) | TURBIDITY (NTUs) | DISSOLVED OXYGEN (mg/L) | TEMP. (°C) | REDOX (ORP) (mV) | COLOR | ODOR |
|---|---|---|---|---|---|---|---|---|---|
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REMARKS:

**SAMPLING DATA**

| | | |
|---|---|---|
| SAMPLE DATE: | SAMPLE TIME: | SAMPLE METHOD: |

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

| | | |
|---|---|---|
| **Verify Well Cap Secured and Locked*** | **Yes:** | |

CALIBRATION INFORMATION:

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

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

# *APPENDIX C*

MONITORING WELL SAMPLING RECORD



**PROJECT NO:**
**PROJECT NAME:** Highway 70 Landfill
**SITE LOCATION:** Columbiana, Alabama
**RECORDED BY:**

| WELL NUMBER | MW-21 | MW-22 | MW-24 | MW-25 | *MW-26 |
|---|---|---|---|---|---|
| **GENERAL WELL DATA** | | | | | |
| Top of Casing (TOC) Elevation (ft) | 584.85 | 586.06 | 598.26 | 584.87 | 595.68 |
| Original Total Depth (ft below TOC) | NA | NA | NA | NA | NA |
| TOC Height (ft above/below grade) | NA | NA | NA | NA | NA |
| Screened Interval (ft below grade) | NA | NA | NA | NA | NA |
| Well Diameter (in)/Material | 4 in, PVC | 4 in, PVC | 4 in, PVC | 4 in, PVC | 4 in, PVC |
| Current Well Condition | Good | Good | Good | Good | Abandoned |
| **WATER LEVEL DATA** | | | | | |
| Date (mm/dd/yyyy) | | | | | |
| Time (military) | | | | | |
| Measured Total Depth (ft below TOC) | | | | | |
| Static Water Level (ft below TOC) | | | | | |
| Static Elevation (ft - AMSL) | | | | | |
| **WELL PURGE DATA** | | | | | |
| Purge Date (mm/dd/yyyy) | | | | | |
| Purge Time (military) | | | | | |
| Minimum Purge Volume (gal) | | | | | |
| Actual Purge Volume (gal) | | | | | |
| Equipment Used | | | | | |
| **WELL SAMPLING DATA** | | | | | |
| Sampling Date (mm/dd/yyyy) | | | | | |
| Sampling Time (military) | | | | | |
| Weather Conditions | | | | | |
| Equipment Used | | | | | |
| Groundwater pH (std units) | | | | | |
| Specific Conductance (mS/cm) | | | | | |
| Turbidity (NTU) | | | | | |
| Dissolved Oxygen (mg/L) | | | | | |
| Groundwater Temperature (degrees C) | | | | | |
| Oxidation-Reduction Potential (mV) | | | | | |
| Number of Containers Filled | | | | | |
| Water Clarity | | | | | |
| Parameters to be Analyzed | | | | | |

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

**REMARKS**

NA = Not Available/Applicable
NS = Not Sampled

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# *APPENDIX D*

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

**Analysis Required**



Remarks:

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

| Sample ID | Lab ID | Comp/ Grab | Sample Matrix | Sample Date | Sample Time | Sample Preservative |
|---|---|---|---|---|---|---|
| | | | | | | |
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Matrix: **SS** – Soil/Solid **GW** – Groundwater **WW** – Waste Water
**DW** – Drinking Water **SW –** Stormwater **OT** - Other

Special Instructions:

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

# *APPENDIX E*

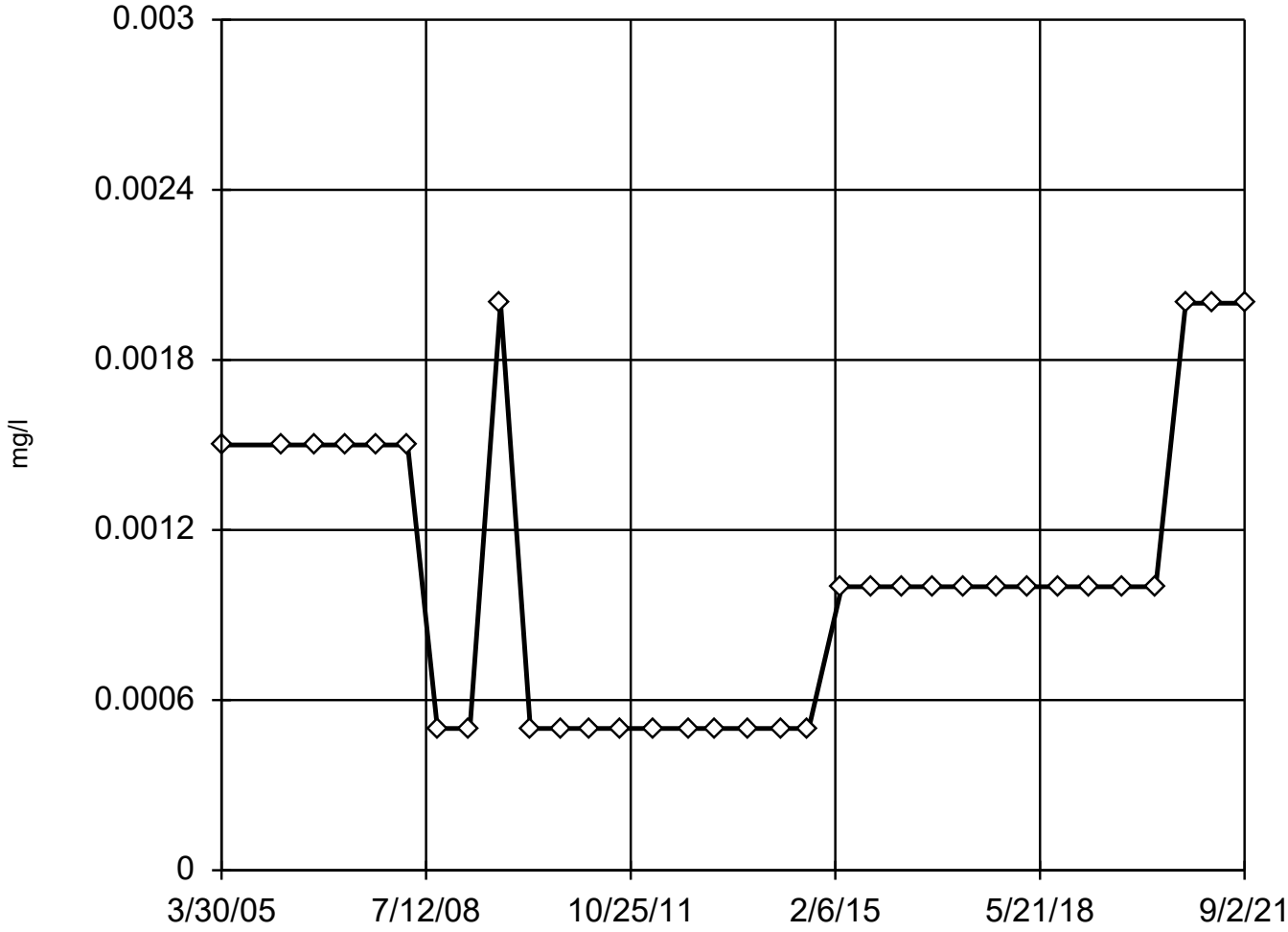
# Outlier Analysis

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas  Printed 11/17/2021, 2:03 PM

| Constituent | Well | Outlier | Value(s) | Date(s) | Method | Alpha | N | Mean | Std. Dev. | Distribution | Normality Test |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.00103 | 0.0005145 | n/a | n/a |
| Antimony (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.001121 | 0.0008481 | n/a | n/a |
| Arsenic (mg/l) | MW-A (bg) | No | n/a | n/a | NP | NaN | 33 | 0.001387 | 0.001093 | n/a | n/a |
| Arsenic (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 32 | 0.001131 | 0.0007226 | n/a | n/a |
| Beryllium (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.000... | 0.0002509 | n/a | n/a |
| Beryllium (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.000... | 0.0002509 | n/a | n/a |
| Cadmium (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.0005 | 0.0002652 | n/a | n/a |
| Cadmium (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.001121 | 0.003578 | n/a | n/a |
| Chromium (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.002774 | 0.002269 | n/a | n/a |
| Chromium (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.002774 | 0.00195 | n/a | n/a |
| Copper (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.002515 | 0.002563 | n/a | n/a |
| Copper (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.03513 | 0.1912 | n/a | n/a |
| **Lead (mg/l)** | **MW-A (bg)** | **Yes** | **0.004,0.006** | **3/23/2007...** | **NP** | **NaN** | **32** | **0.001336** | **0.001192** | **n/a** | **n/a** |
| Lead (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 32 | 0.001047 | 0.0008647 | n/a | n/a |
| Mercury (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.0001 | 0 | n/a | n/a |
| Mercury (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.0001 | 0 | n/a | n/a |
| Nickel (mg/l) | MW-A (bg) | No | n/a | n/a | NP | NaN | 33 | 0.004928 | 0.004137 | n/a | n/a |
| Nickel (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.003702 | 0.003642 | n/a | n/a |
| Selenium (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.001076 | 0.0007194 | n/a | n/a |
| Selenium (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.001127 | 0.0007375 | n/a | n/a |
| Silver (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.00212 | 0.001664 | n/a | n/a |
| Silver (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.002083 | 0.001686 | n/a | n/a |
| Thallium (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.000... | 0.0002509 | n/a | n/a |
| Thallium (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.000... | 0.0002509 | n/a | n/a |
| **Vanadium (mg/l)** | **MW-A (bg)** | **Yes** | **0.037,0.1...** | **3/23/2007...** | **NP** | **NaN** | **33** | **0.01026** | **0.02448** | **n/a** | **n/a** |
| Vanadium (mg/l) | MW-B (bg) | No | n/a | n/a | NP | NaN | 30 | 0.003817 | 0.002872 | n/a | n/a |
| Zinc (mg/l) | MW-A (bg) | n/a | n/a | n/a | NP | NaN | 33 | 0.01136 | 0.008342 | n/a | n/a |
| Zinc (mg/l) | MW-B (bg) | n/a | n/a | n/a | NP | NaN | 32 | 0.01051 | 0.006391 | n/a | n/a |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Antimony  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

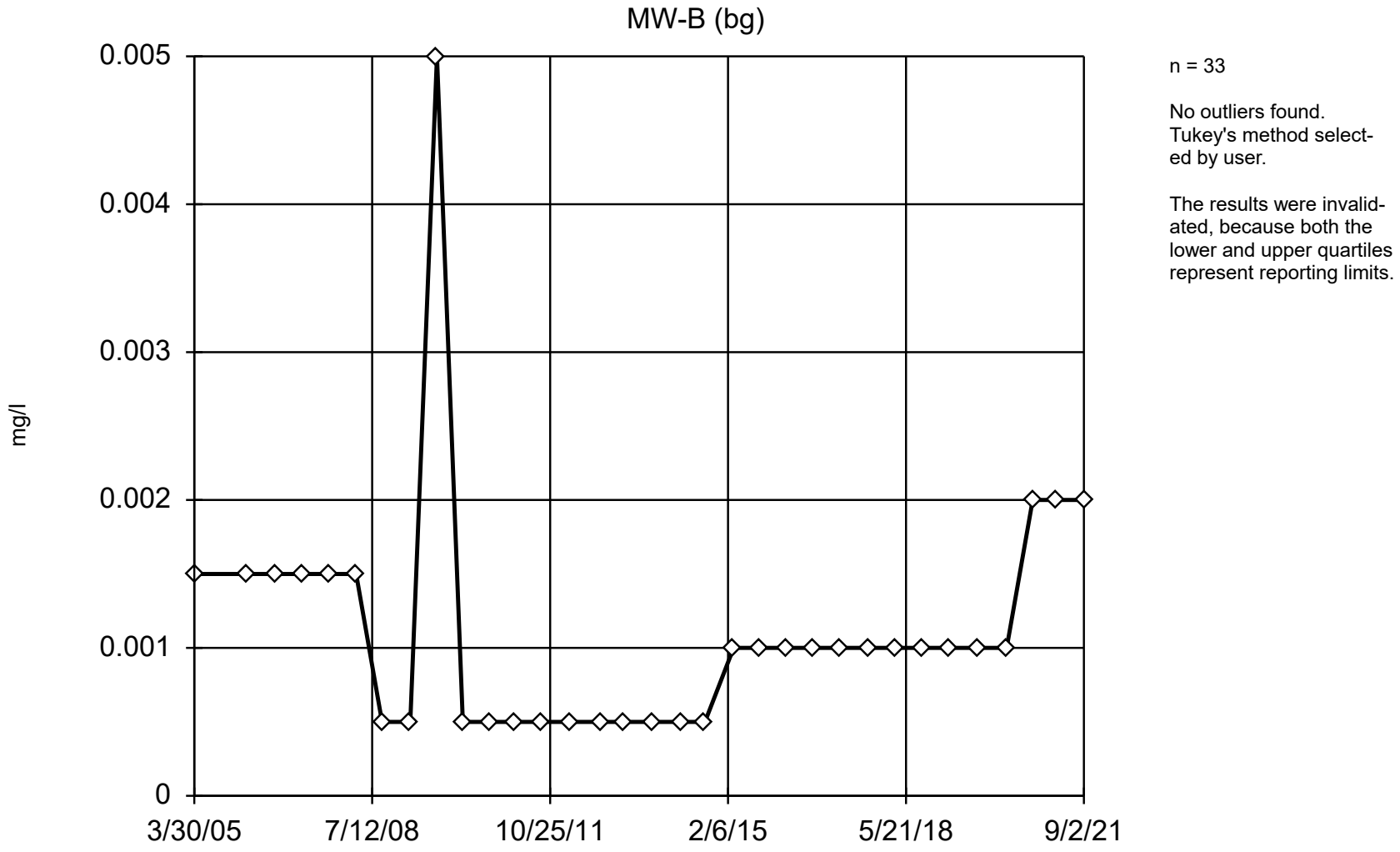
# Tukey's Outlier Screening

Constituent: Antimony (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.003 |
| 3/24/2006 | <0.003 |
| 9/26/2006 | <0.003 |
| 3/23/2007 | <0.003 |
| 9/26/2007 | <0.003 |
| 3/26/2008 | <0.003 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 0.002 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.004 |
| 3/1/2021 | <0.004 |
| 9/2/2021 | <0.004 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Antimony  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

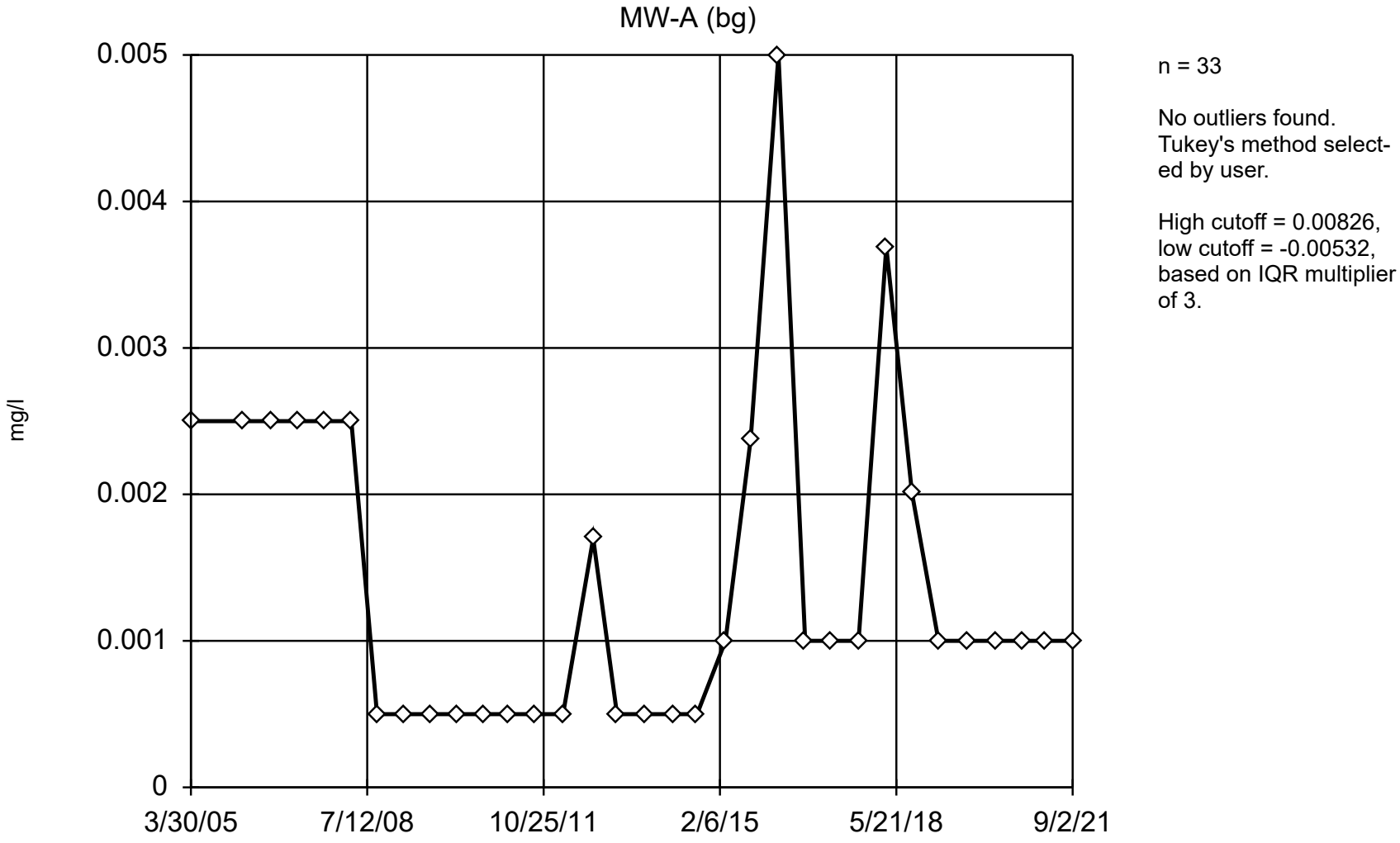
# Tukey's Outlier Screening

Constituent: Antimony (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.003 |
| 3/24/2006 | <0.003 |
| 9/26/2006 | <0.003 |
| 3/23/2007 | <0.003 |
| 9/26/2007 | <0.003 |
| 3/26/2008 | <0.003 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 0.005 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.004 |
| 3/1/2021 | <0.004 |
| 9/2/2021 | <0.004 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

High cutoff = 0.00826, low cutoff = -0.00532, based on IQR multiplier of 3.

Constituent: Arsenic  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

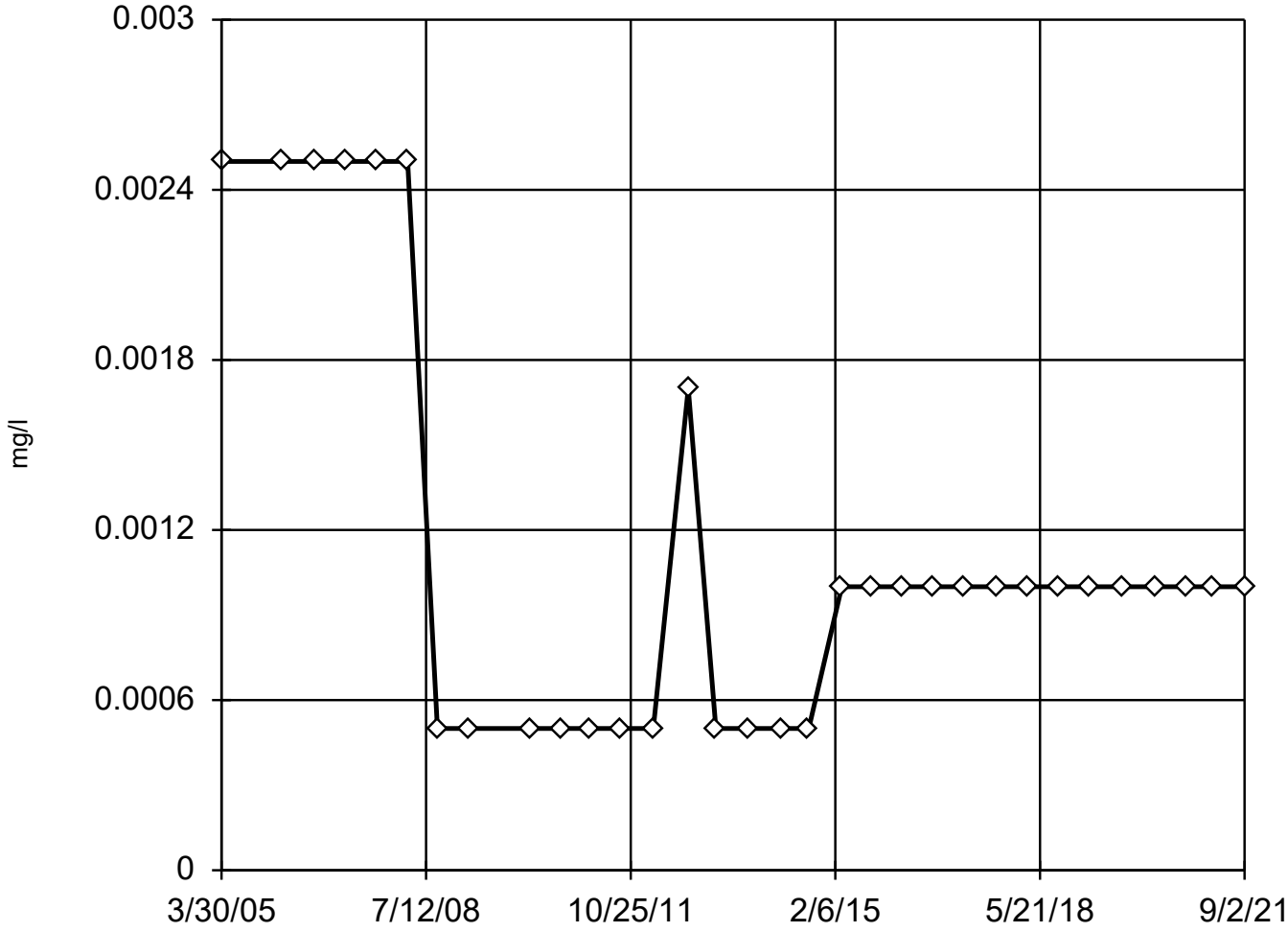
Constituent: Arsenic (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.005 |
| 3/24/2006 | <0.005 |
| 9/26/2006 | <0.005 |
| 3/23/2007 | <0.005 |
| 9/26/2007 | <0.005 |
| 3/26/2008 | <0.005 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | 0.0017 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | 0.00238 |
| 3/10/2016 | <0.01 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | 0.00369 |
| 9/5/2018 | 0.00201 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 32

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Arsenic  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

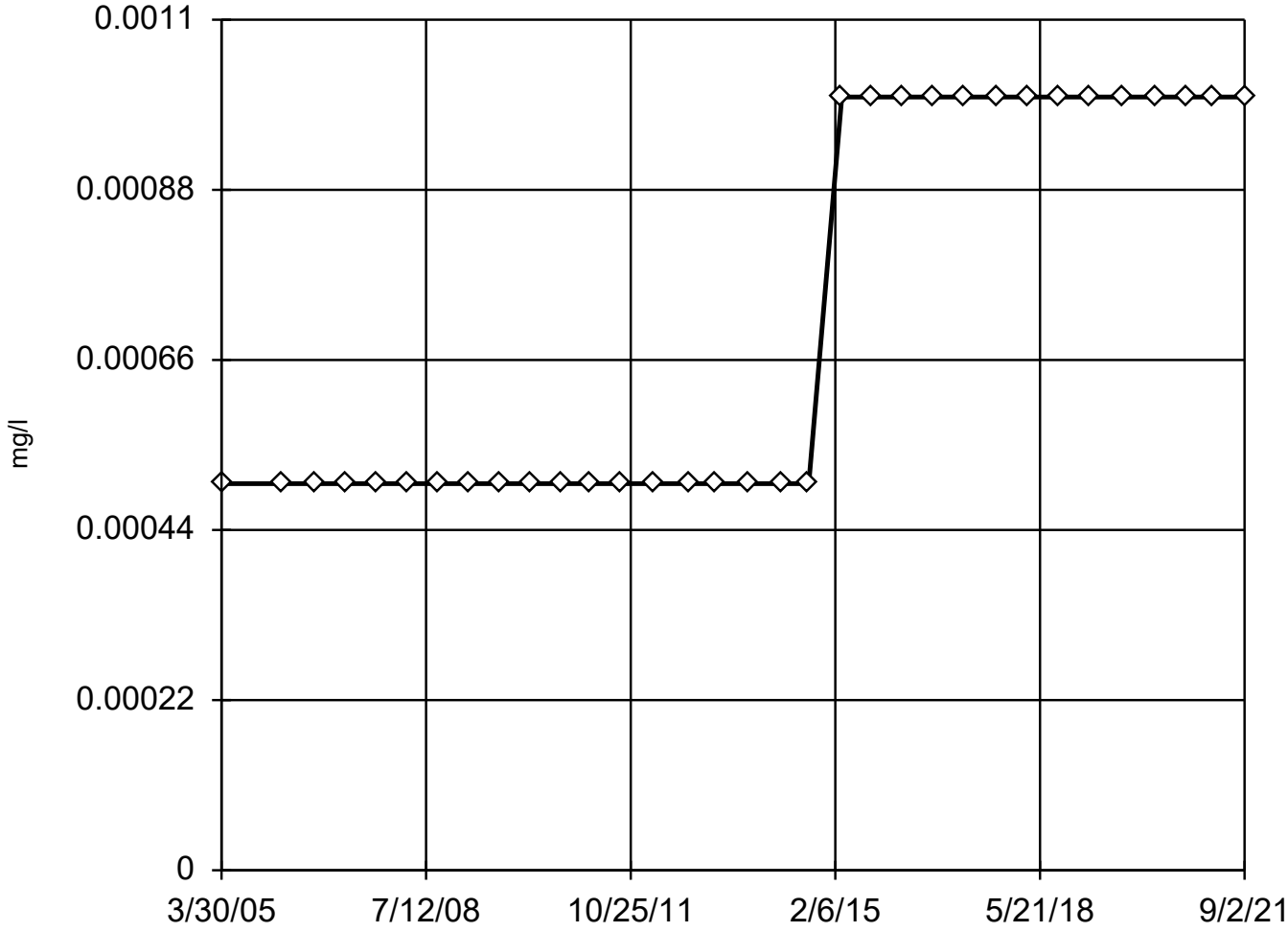
Constituent: Arsenic (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.005 |
| 3/24/2006 | <0.005 |
| 9/26/2006 | <0.005 |
| 3/23/2007 | <0.005 |
| 9/26/2007 | <0.005 |
| 3/26/2008 | <0.005 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | 0.0017 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Beryllium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

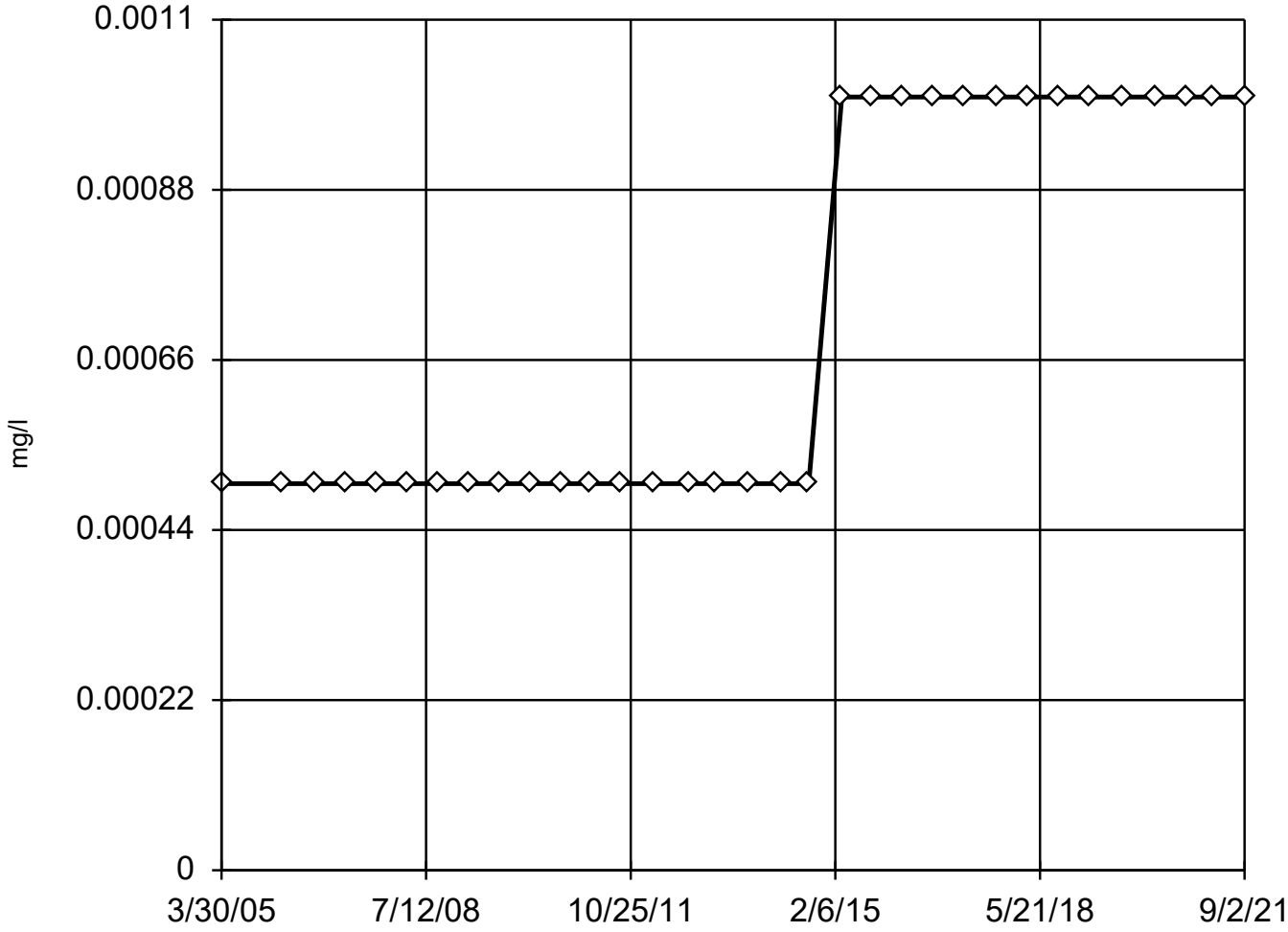
Constituent: Beryllium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | <0.001 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | <0.001 |
| 9/26/2007 | <0.001 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Beryllium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

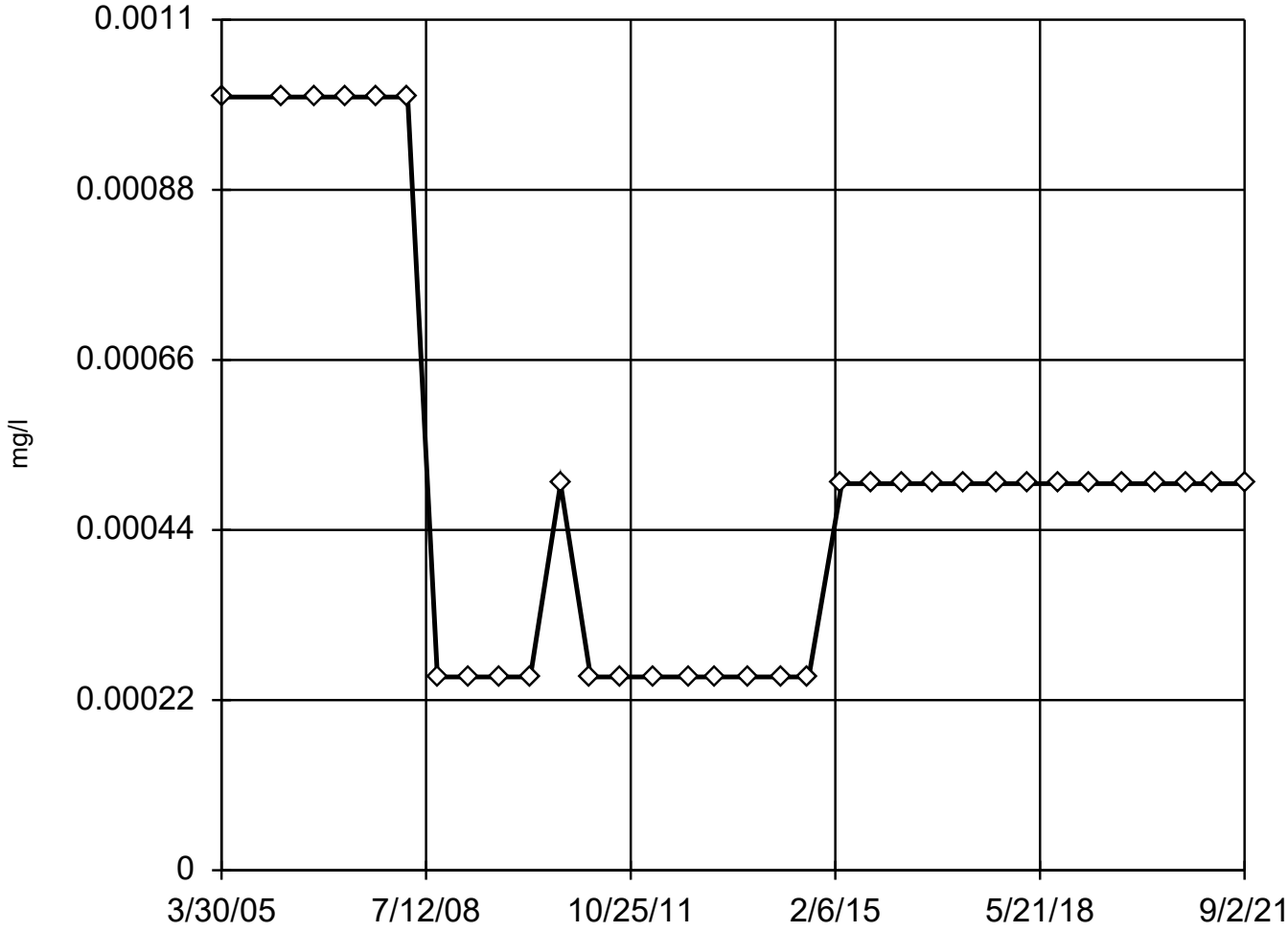
Constituent: Beryllium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | <0.001 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | <0.001 |
| 9/26/2007 | <0.001 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Cadmium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

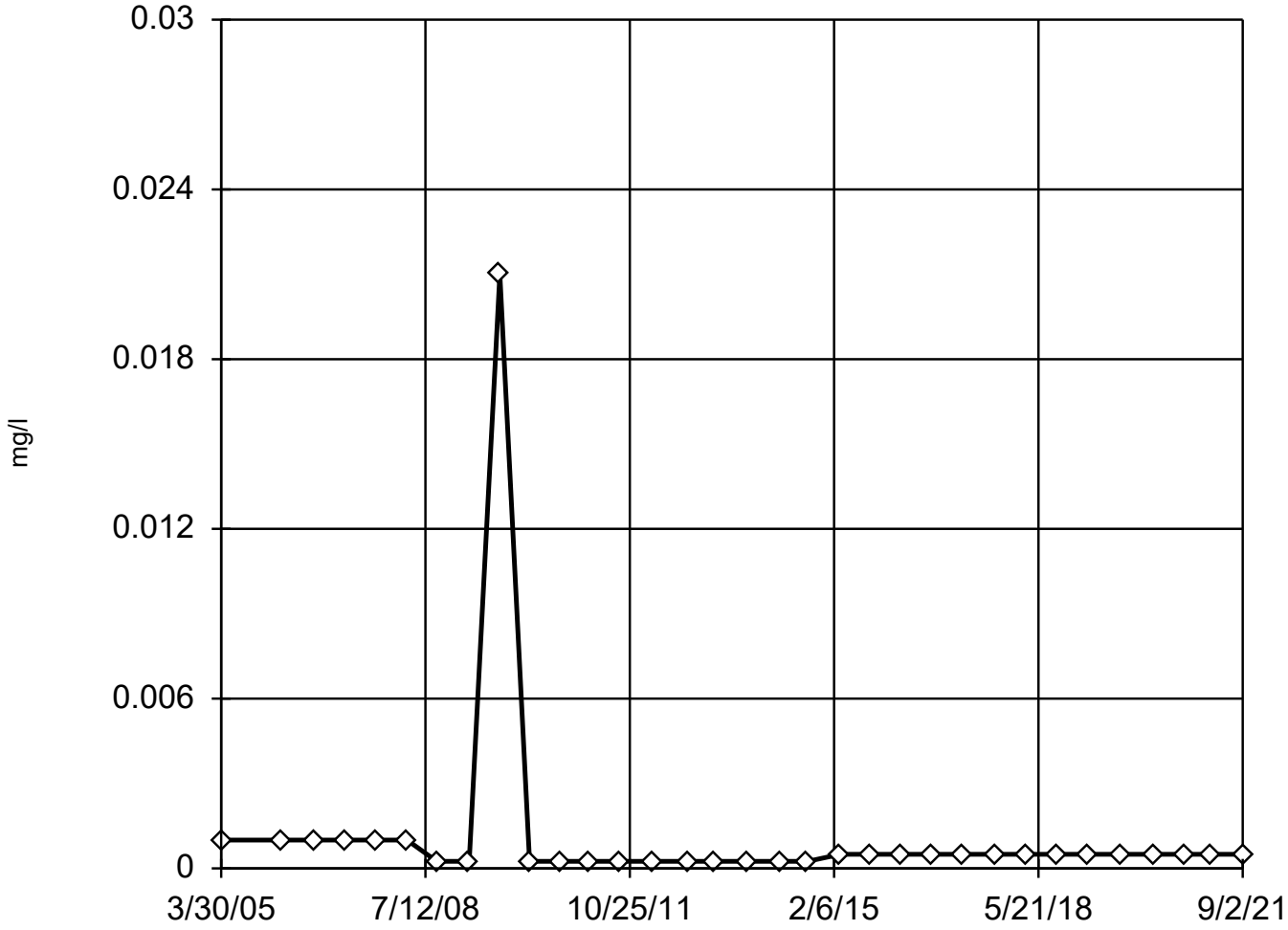
Constituent: Cadmium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.002 |
| 3/24/2006 | <0.002 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | <0.002 |
| 9/26/2007 | <0.002 |
| 3/26/2008 | <0.002 |
| 9/16/2008 | <0.0005 |
| 3/26/2009 | <0.0005 |
| 9/22/2009 | <0.0005 |
| 3/15/2010 | <0.0005 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.0005 |
| 9/1/2011 | <0.0005 |
| 3/5/2012 | <0.0005 |
| 9/26/2012 | <0.0005 |
| 3/7/2013 | <0.0005 |
| 9/12/2013 | <0.0005 |
| 3/24/2014 | <0.0005 |
| 9/3/2014 | <0.0005 |
| 3/16/2015 | <0.001 |
| 9/3/2015 | <0.001 |
| 3/10/2016 | <0.001 |
| 9/8/2016 | <0.001 |
| 3/2/2017 | <0.001 |
| 9/6/2017 | <0.001 |
| 3/14/2018 | <0.001 |
| 9/5/2018 | <0.001 |
| 3/4/2019 | <0.001 |
| 9/18/2019 | <0.001 |
| 3/30/2020 | <0.001 |
| 9/22/2020 | <0.001 |
| 3/1/2021 | <0.001 |
| 9/2/2021 | <0.001 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Cadmium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

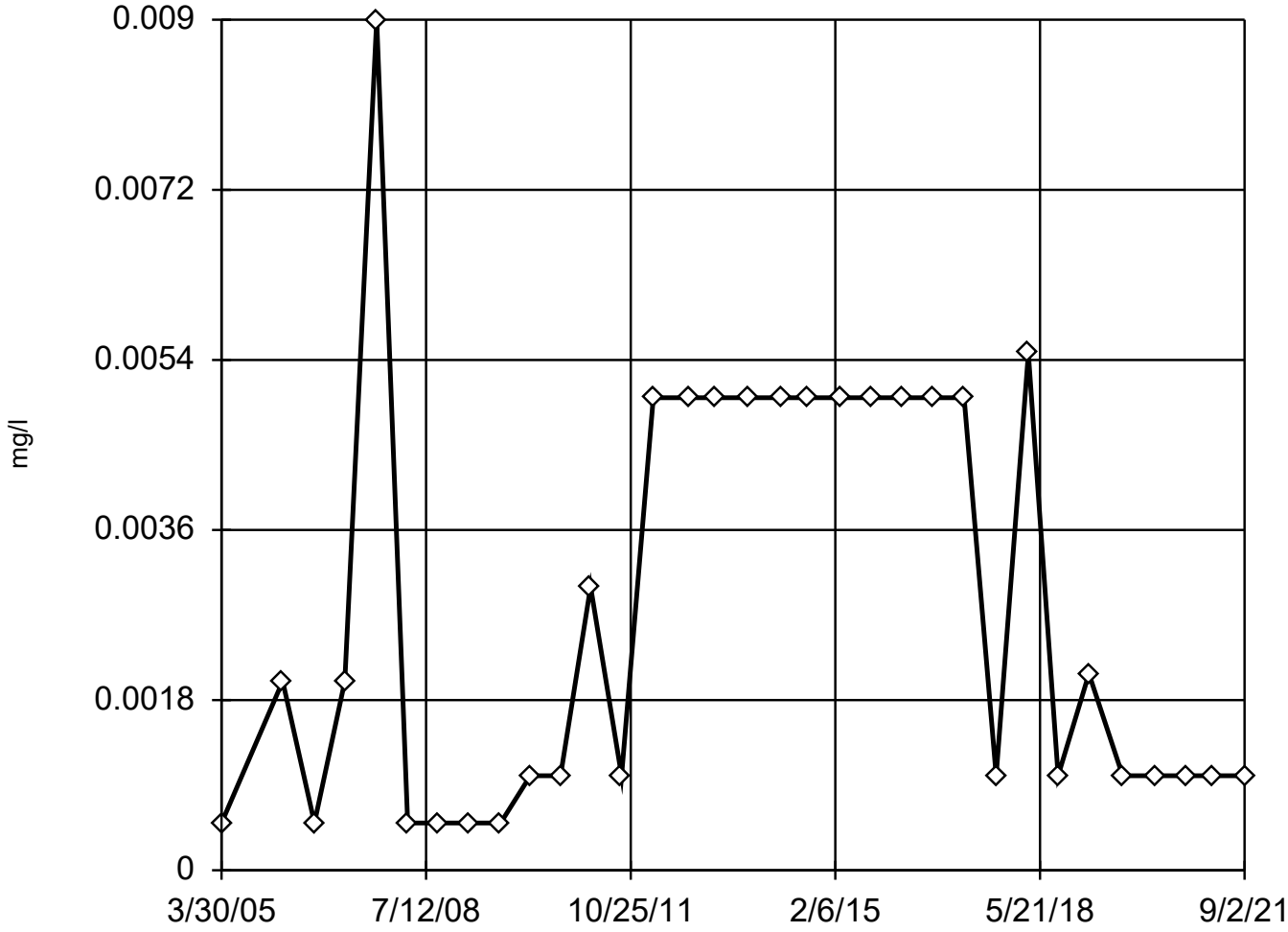
Constituent: Cadmium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.002 |
| 3/24/2006 | <0.002 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | <0.002 |
| 9/26/2007 | <0.002 |
| 3/26/2008 | <0.002 |
| 9/16/2008 | <0.0005 |
| 3/26/2009 | <0.0005 |
| 9/22/2009 | 0.021 |
| 3/15/2010 | <0.0005 |
| 9/8/2010 | <0.0005 |
| 3/4/2011 | <0.0005 |
| 9/1/2011 | <0.0005 |
| 3/5/2012 | <0.0005 |
| 9/26/2012 | <0.0005 |
| 3/7/2013 | <0.0005 |
| 9/12/2013 | <0.0005 |
| 3/24/2014 | <0.0005 |
| 9/3/2014 | <0.0005 |
| 3/16/2015 | <0.001 |
| 9/3/2015 | <0.001 |
| 3/10/2016 | <0.001 |
| 9/8/2016 | <0.001 |
| 3/2/2017 | <0.001 |
| 9/6/2017 | <0.001 |
| 3/14/2018 | <0.001 |
| 9/5/2018 | <0.001 |
| 3/4/2019 | <0.001 |
| 9/18/2019 | <0.001 |
| 3/30/2020 | <0.001 |
| 9/22/2020 | <0.001 |
| 3/1/2021 | <0.001 |
| 9/2/2021 | <0.001 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Chromium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

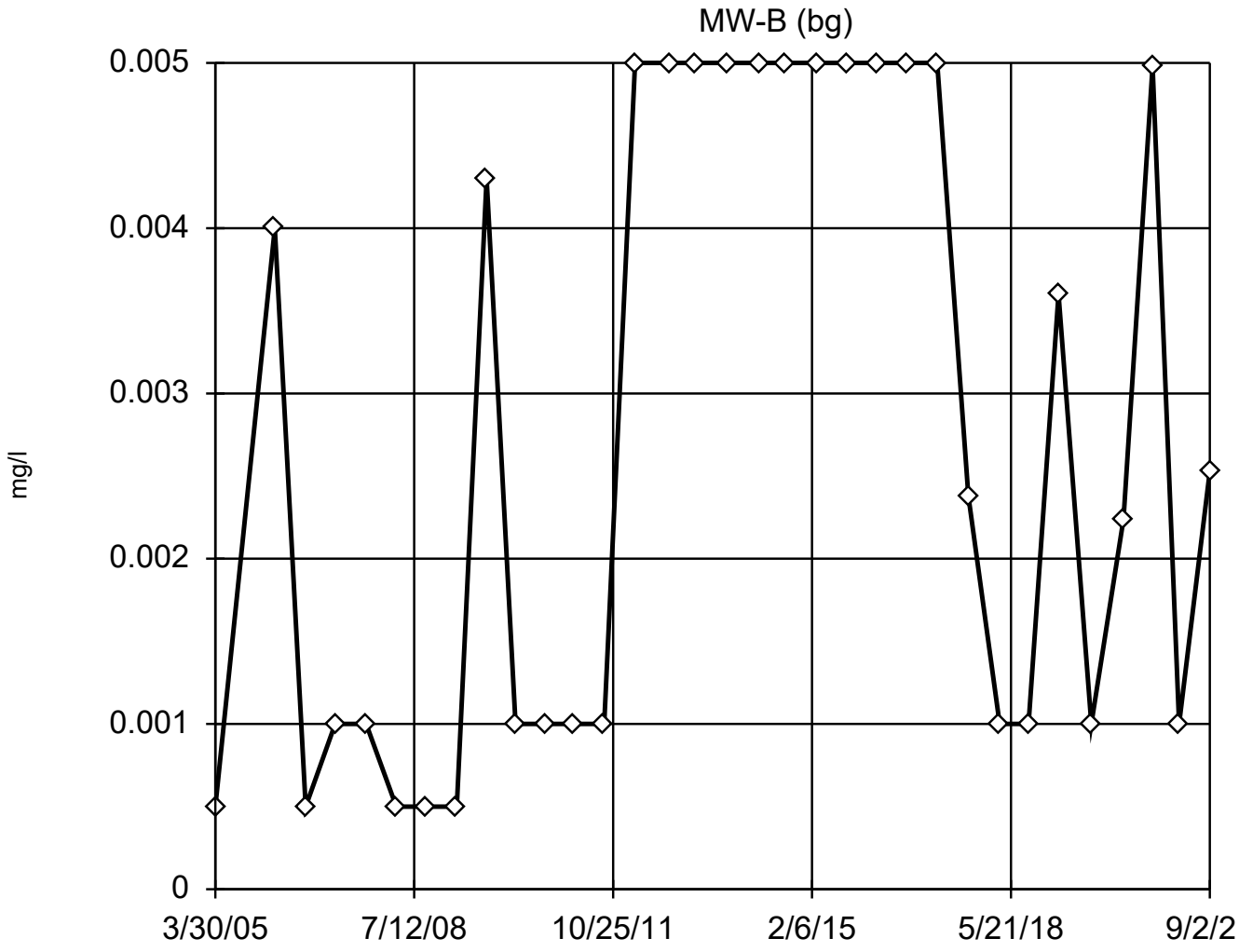
# Tukey's Outlier Screening

Constituent: Chromium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | 0.002 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | 0.002 |
| 9/26/2007 | 0.009 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | 0.003 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.01 |
| 3/10/2016 | <0.01 |
| 9/8/2016 | <0.01 |
| 3/2/2017 | <0.01 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | 0.00547 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | 0.00208 (B) |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Chromium Analysis Run 11/17/2021 2:02 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

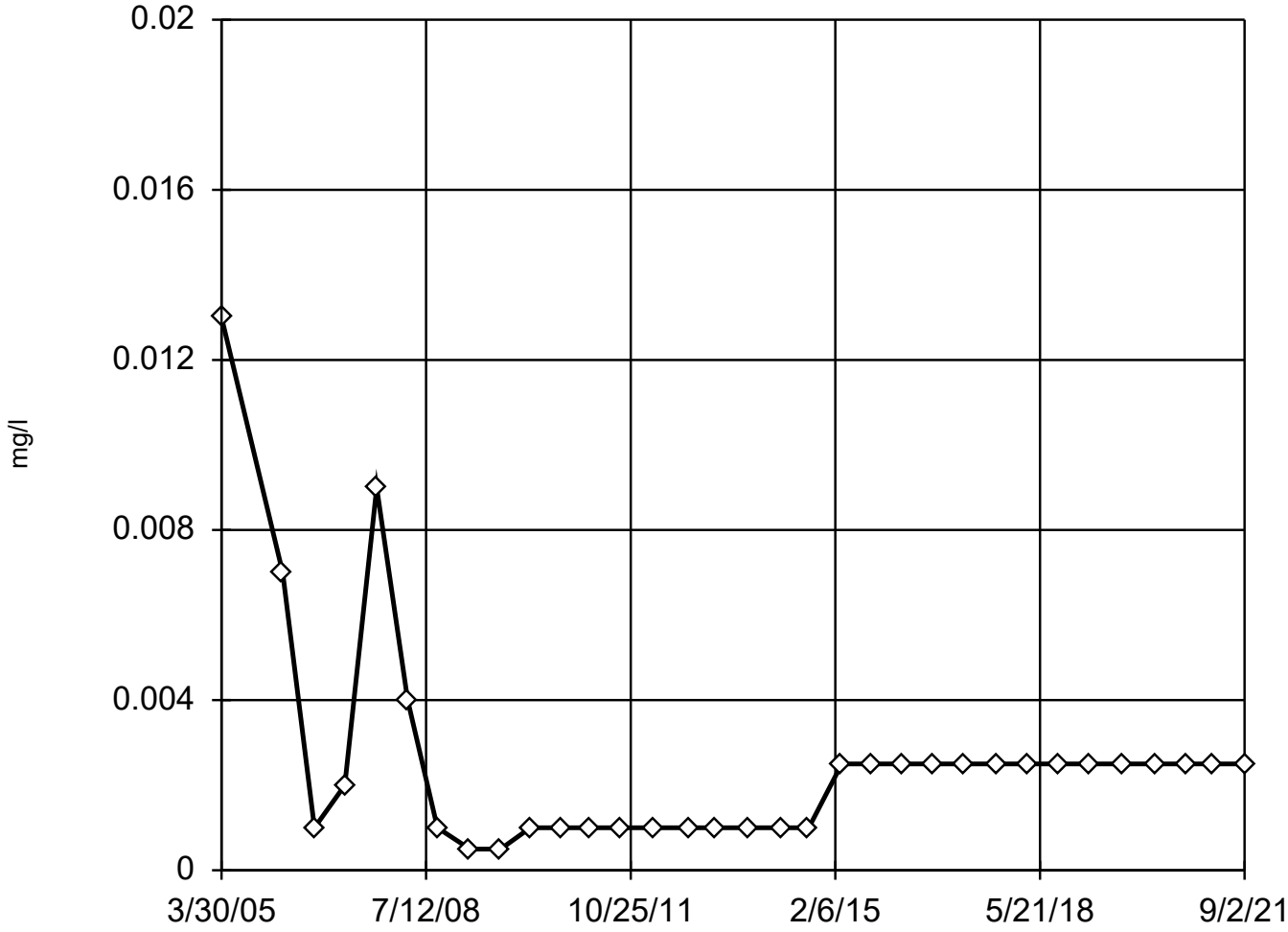
Constituent: Chromium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | 0.004 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | 0.001 |
| 9/26/2007 | 0.001 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 0.0043 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | <0.002 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.01 |
| 3/10/2016 | <0.01 |
| 9/8/2016 | <0.01 |
| 3/2/2017 | <0.01 |
| 9/6/2017 | 0.00238 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | 0.0036 (B) |
| 9/18/2019 | <0.002 |
| 3/30/2020 | 0.00224 (B) |
| 9/22/2020 | 0.00498 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | 0.00253 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Copper  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

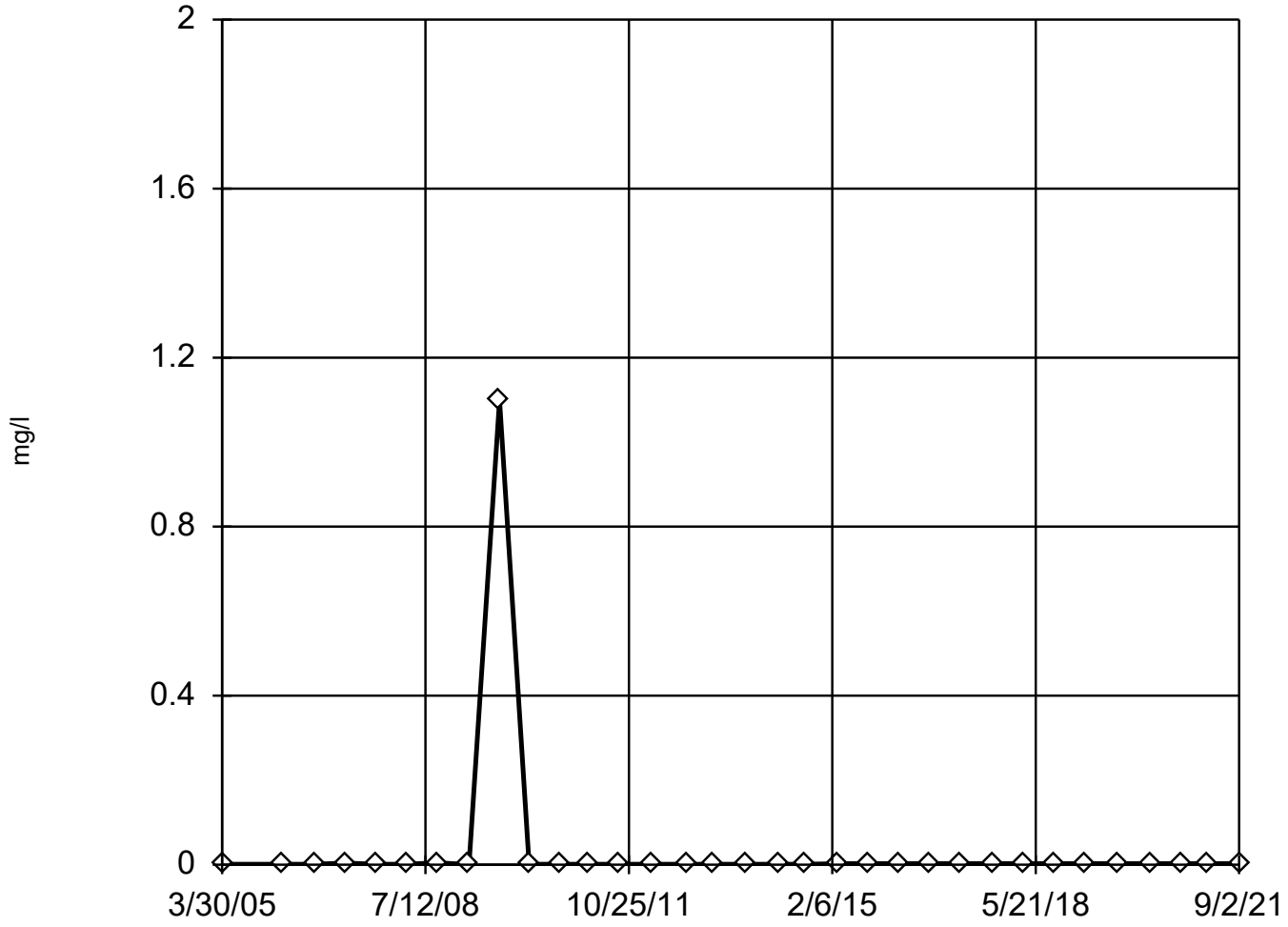
Constituent: Copper (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | 0.013 |
| 3/24/2006 | 0.007 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.002 |
| 9/26/2007 | 0.009 |
| 3/26/2008 | 0.004 |
| 9/16/2008 | 0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | <0.002 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.002 |
| 9/26/2012 | <0.002 |
| 3/7/2013 | <0.002 |
| 9/12/2013 | <0.002 |
| 3/24/2014 | <0.002 |
| 9/3/2014 | <0.002 |
| 3/16/2015 | <0.005 |
| 9/3/2015 | <0.005 |
| 3/10/2016 | <0.005 |
| 9/8/2016 | <0.005 |
| 3/2/2017 | <0.005 |
| 9/6/2017 | <0.005 |
| 3/14/2018 | <0.005 |
| 9/5/2018 | <0.005 |
| 3/4/2019 | <0.005 |
| 9/18/2019 | <0.005 |
| 3/30/2020 | <0.005 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.005 |
| 9/2/2021 | <0.005 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Copper  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

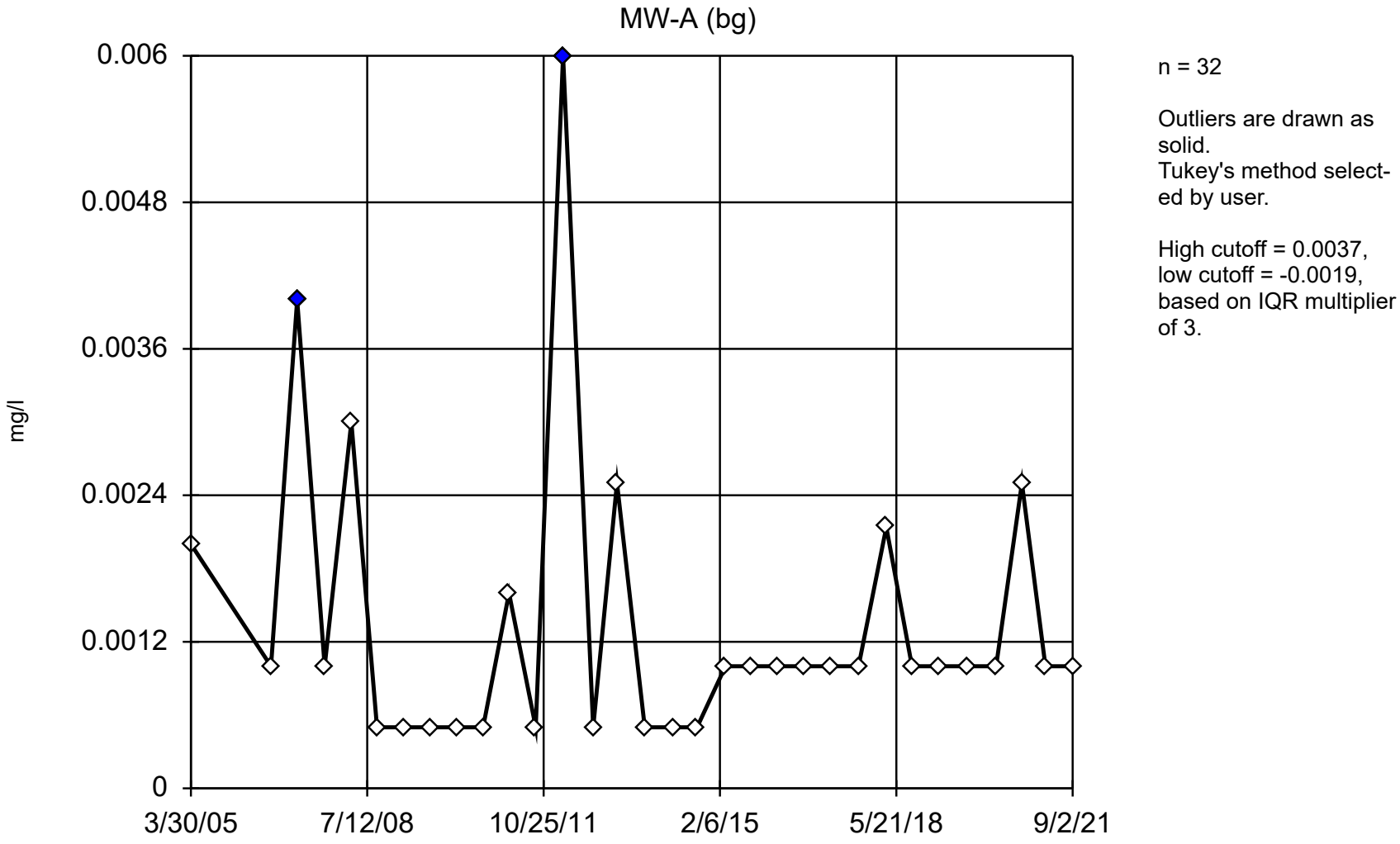
# Tukey's Outlier Screening

Constituent: Copper (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.002 |
| 3/24/2006 | <0.002 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.004 |
| 9/26/2007 | <0.002 |
| 3/26/2008 | <0.002 |
| 9/16/2008 | 0.0047 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 1.1 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | <0.002 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.002 |
| 9/26/2012 | <0.002 |
| 3/7/2013 | <0.002 |
| 9/12/2013 | <0.002 |
| 3/24/2014 | <0.002 |
| 9/3/2014 | <0.002 |
| 3/16/2015 | <0.005 |
| 9/3/2015 | <0.005 |
| 3/10/2016 | <0.005 |
| 9/8/2016 | <0.005 |
| 3/2/2017 | <0.005 |
| 9/6/2017 | <0.005 |
| 3/14/2018 | <0.005 |
| 9/5/2018 | <0.005 |
| 3/4/2019 | <0.005 |
| 9/18/2019 | <0.005 |
| 3/30/2020 | <0.005 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.005 |
| 9/2/2021 | <0.005 |

# Tukey's Outlier Screening




n = 32

Outliers are drawn as solid.
Tukey's method selected by user.

High cutoff = 0.0037, low cutoff = -0.0019, based on IQR multiplier of 3.

Constituent: Lead  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

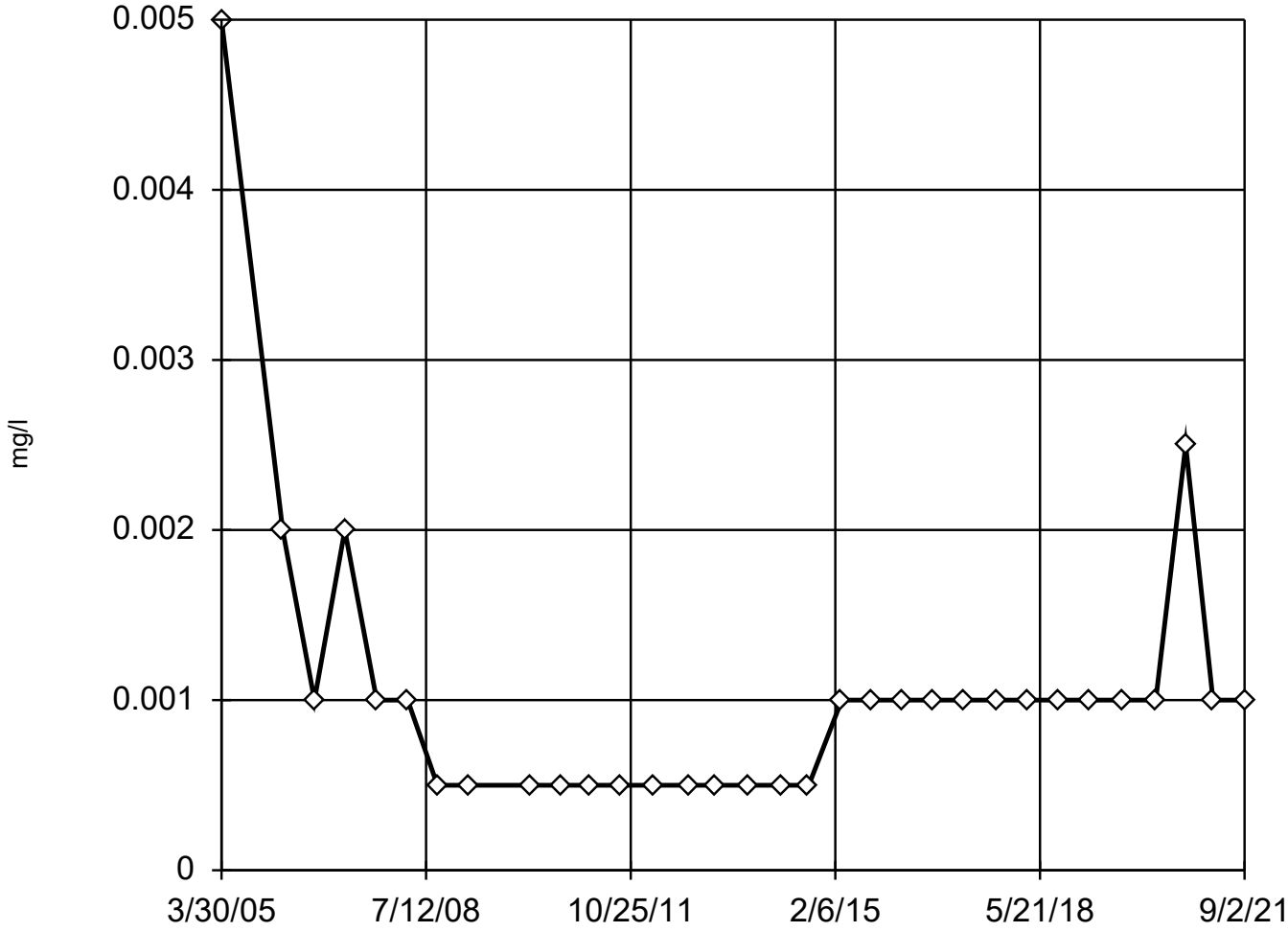
Constituent: Lead (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | 0.002 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.004 (O) |
| 9/26/2007 | <0.002 |
| 3/26/2008 | 0.003 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | 0.0016 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | 0.006 (O) |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.005 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | 0.00214 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 32

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Lead  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

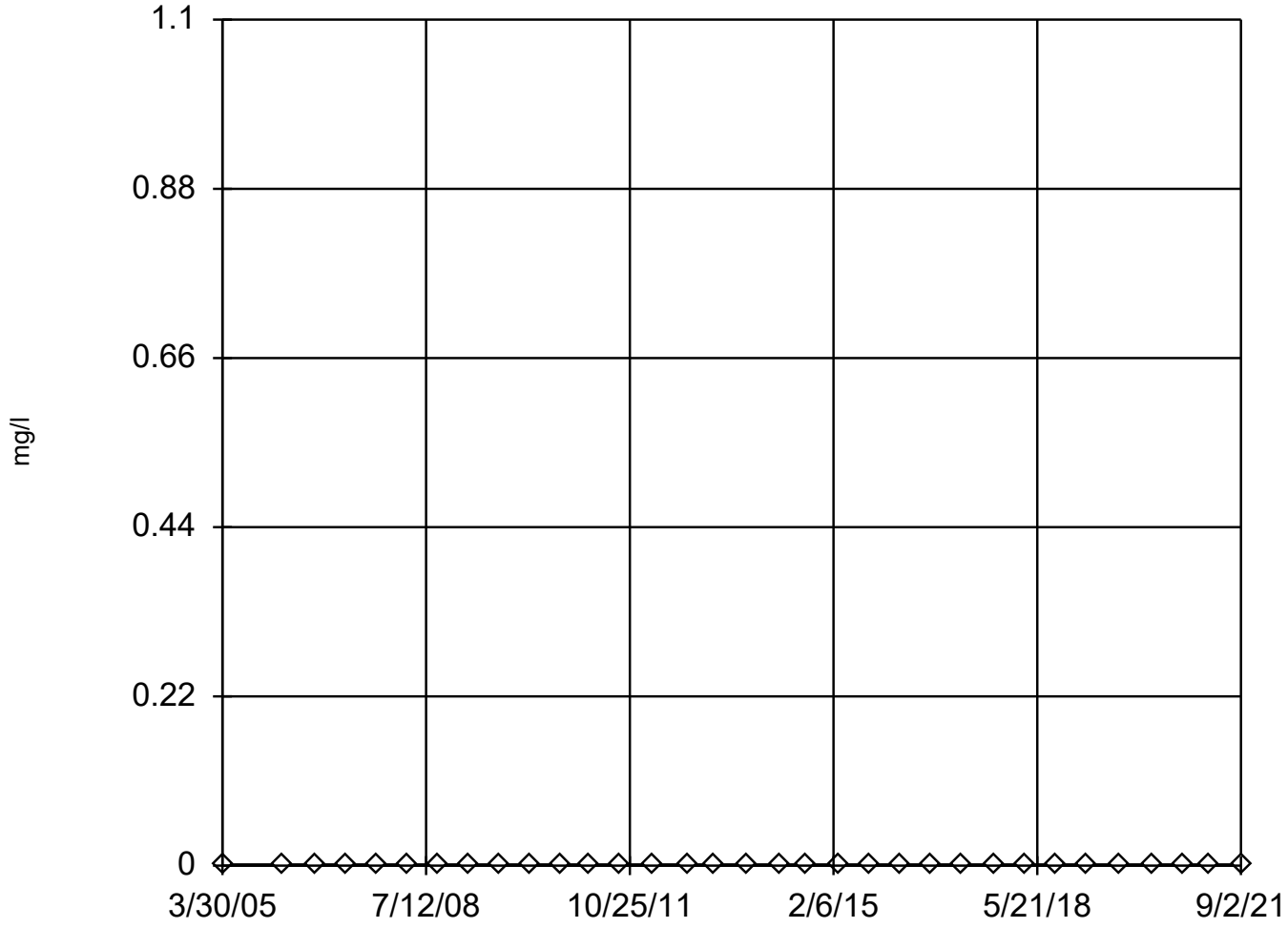
Constituent: Lead (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | 0.005 |
| 3/24/2006 | 0.002 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.002 |
| 9/26/2007 | <0.002 |
| 3/26/2008 | <0.002 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

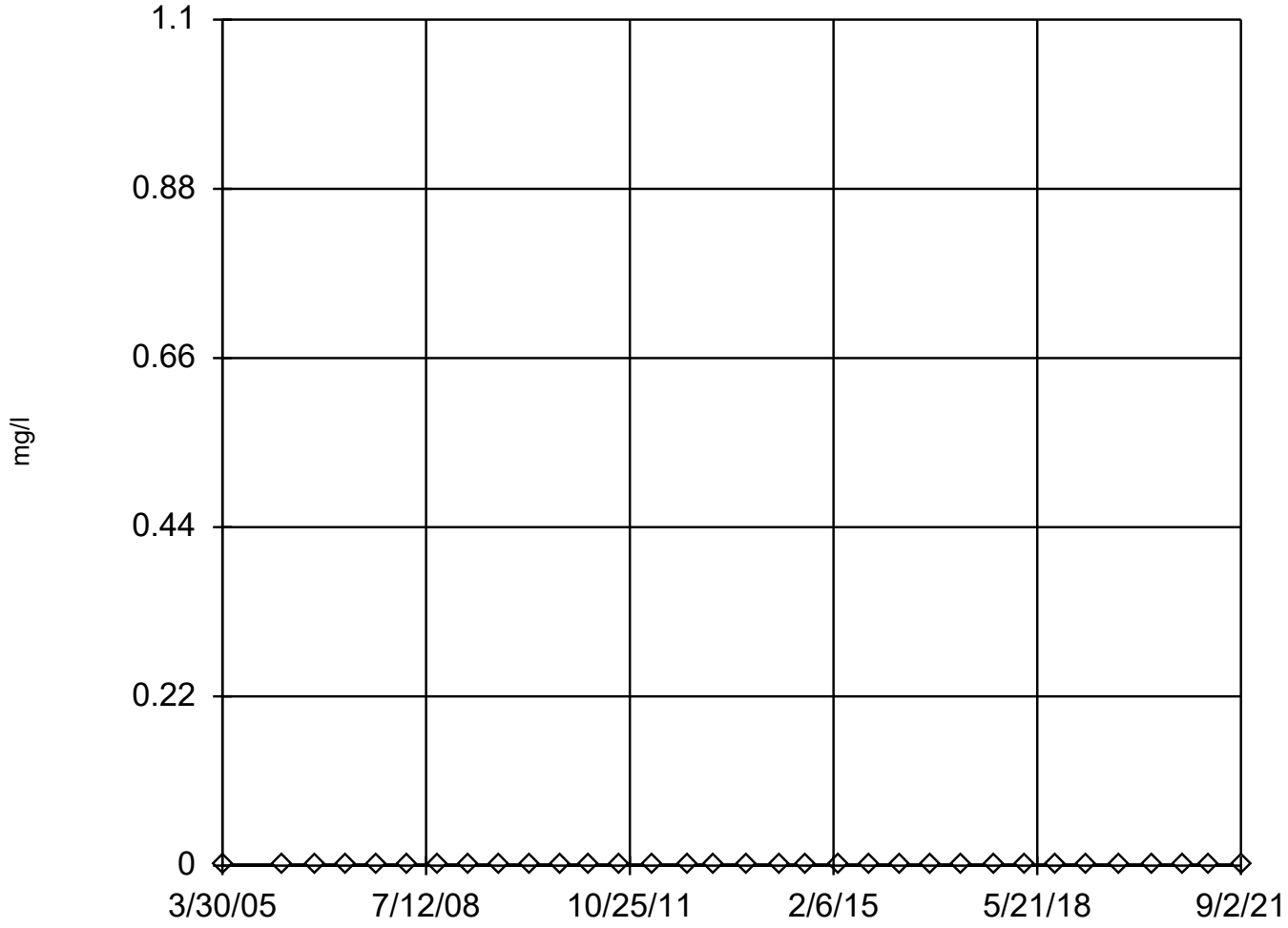
Constituent: Mercury (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.0002 |
| 3/24/2006 | <0.0002 |
| 9/26/2006 | <0.0002 |
| 3/23/2007 | <0.0002 |
| 9/26/2007 | <0.0002 |
| 3/26/2008 | <0.0002 |
| 9/16/2008 | <0.0002 |
| 3/26/2009 | <0.0002 |
| 9/22/2009 | <0.0002 |
| 3/15/2010 | <0.0002 |
| 9/8/2010 | <0.0002 |
| 3/4/2011 | <0.0002 |
| 9/1/2011 | <0.0002 |
| 3/5/2012 | <0.0002 |
| 9/26/2012 | <0.0002 |
| 3/7/2013 | <0.0002 |
| 9/12/2013 | <0.0002 |
| 3/24/2014 | <0.0002 |
| 9/3/2014 | <0.0002 |
| 3/16/2015 | <0.0002 |
| 9/3/2015 | <0.0002 |
| 3/10/2016 | <0.0002 |
| 9/8/2016 | <0.0002 |
| 3/2/2017 | <0.0002 |
| 9/6/2017 | <0.0002 |
| 3/14/2018 | <0.0002 |
| 9/5/2018 | <0.0002 |
| 3/4/2019 | <0.0002 |
| 9/18/2019 | <0.0002 |
| 3/30/2020 | <0.0002 |
| 9/22/2020 | <0.0002 |
| 3/1/2021 | <0.0002 |
| 9/2/2021 | <0.0002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because the lower and upper quartiles are equal.

Constituent: Mercury  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

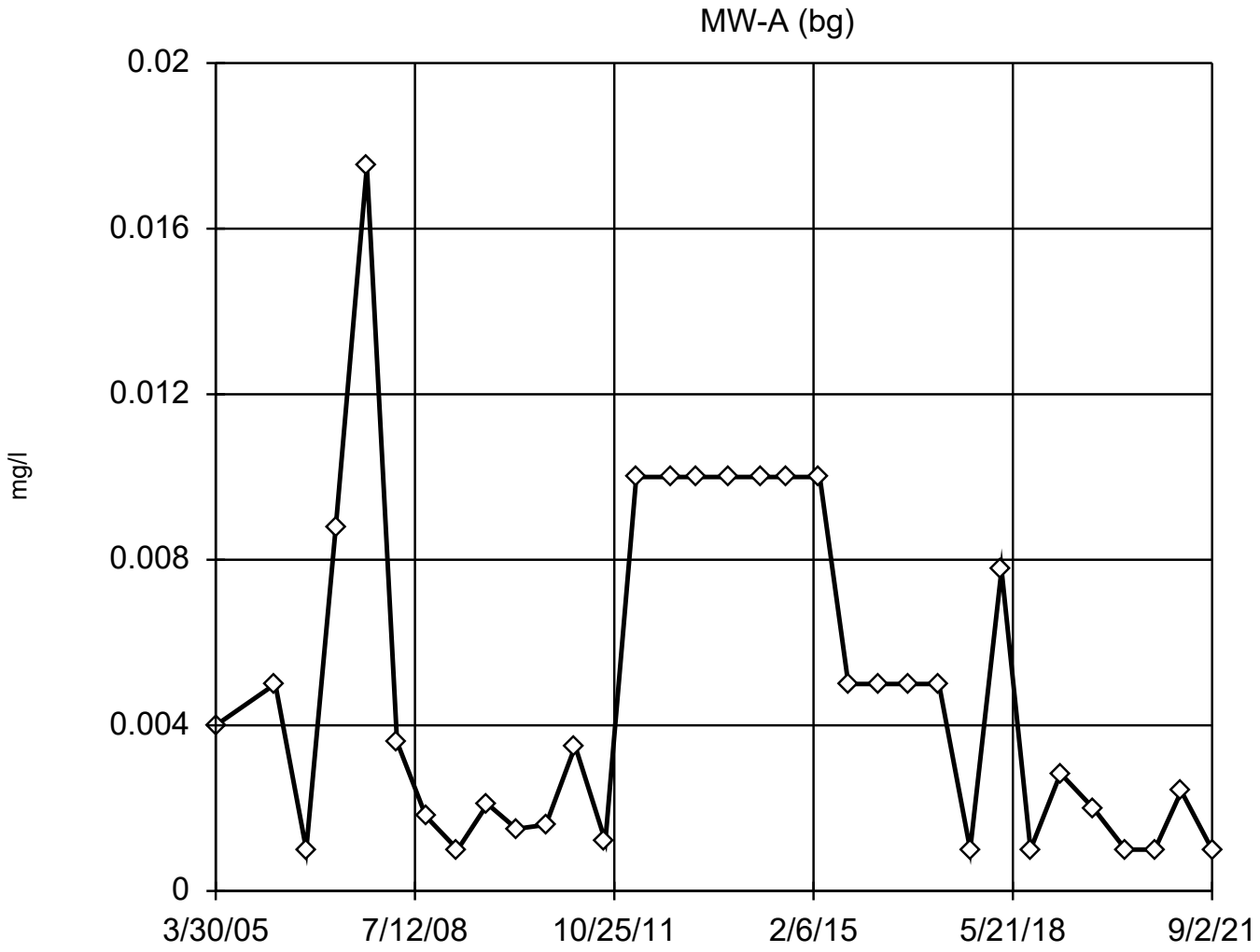
# Tukey's Outlier Screening

Constituent: Mercury (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.0002 |
| 3/24/2006 | <0.0002 |
| 9/26/2006 | <0.0002 |
| 3/23/2007 | <0.0002 |
| 9/26/2007 | <0.0002 |
| 3/26/2008 | <0.0002 |
| 9/16/2008 | <0.0002 |
| 3/26/2009 | <0.0002 |
| 9/22/2009 | <0.0002 |
| 3/15/2010 | <0.0002 |
| 9/8/2010 | <0.0002 |
| 3/4/2011 | <0.0002 |
| 9/1/2011 | <0.0002 |
| 3/5/2012 | <0.0002 |
| 9/26/2012 | <0.0002 |
| 3/7/2013 | <0.0002 |
| 9/12/2013 | <0.0002 |
| 3/24/2014 | <0.0002 |
| 9/3/2014 | <0.0002 |
| 3/16/2015 | <0.0002 |
| 9/3/2015 | <0.0002 |
| 3/10/2016 | <0.0002 |
| 9/8/2016 | <0.0002 |
| 3/2/2017 | <0.0002 |
| 9/6/2017 | <0.0002 |
| 3/14/2018 | <0.0002 |
| 9/5/2018 | <0.0002 |
| 3/4/2019 | <0.0002 |
| 9/18/2019 | <0.0002 |
| 3/30/2020 | <0.0002 |
| 9/22/2020 | <0.0002 |
| 3/1/2021 | <0.0002 |
| 9/2/2021 | <0.0002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

High cutoff = 0.03355, low cutoff = -0.0228, based on IQR multiplier of 3.

Constituent: Nickel  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

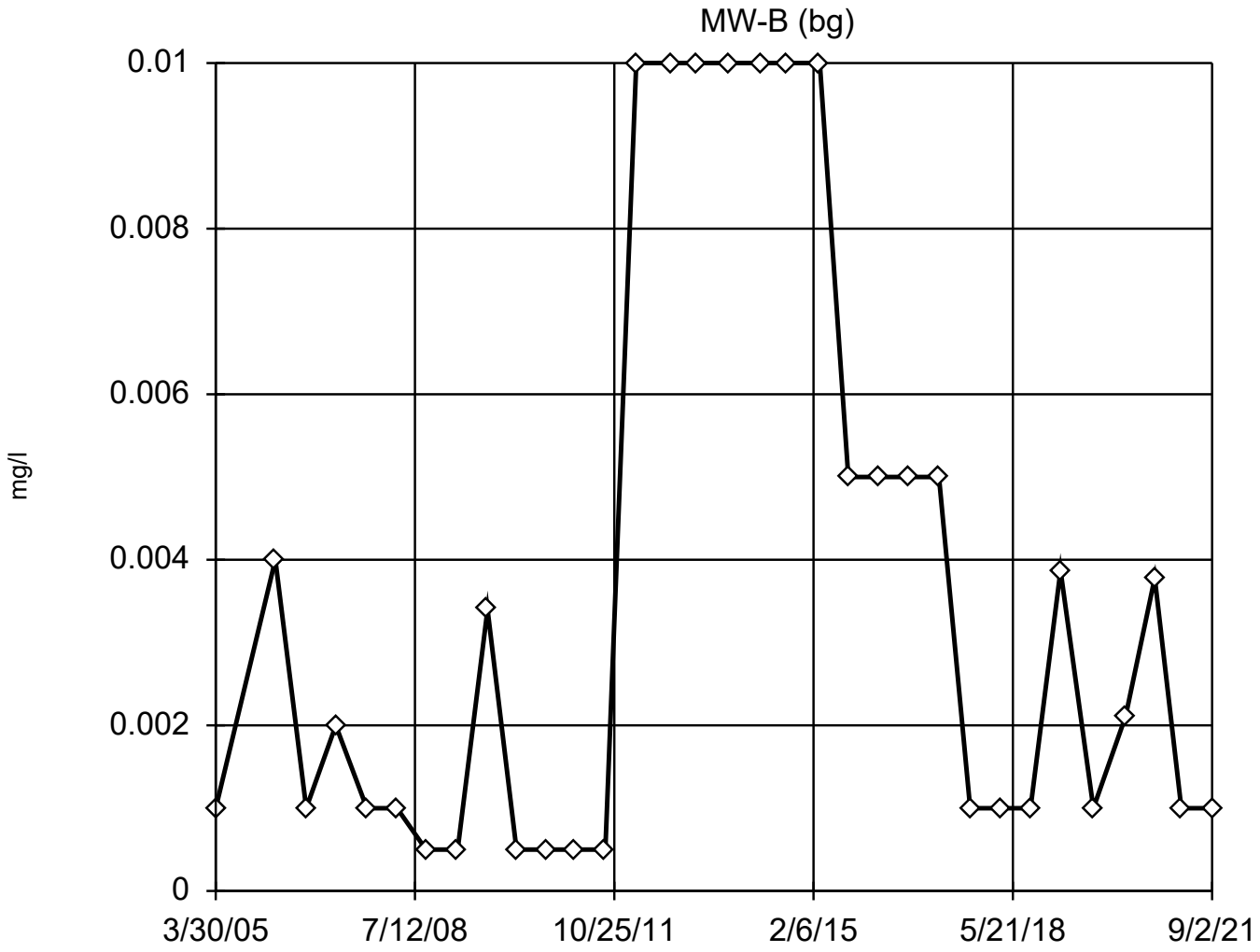
# Tukey's Outlier Screening

Constituent: Nickel (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | 0.004 |
| 3/24/2006 | 0.005 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.0088 |
| 9/26/2007 | 0.0175 |
| 3/26/2008 | 0.0036 |
| 9/16/2008 | 0.0018 |
| 3/26/2009 | 0.001 |
| 9/22/2009 | 0.0021 |
| 3/15/2010 | 0.0015 |
| 9/8/2010 | 0.0016 |
| 3/4/2011 | 0.0035 |
| 9/1/2011 | 0.0012 |
| 3/5/2012 | <0.02 |
| 9/26/2012 | <0.02 |
| 3/7/2013 | <0.02 |
| 9/12/2013 | <0.02 |
| 3/24/2014 | <0.02 |
| 9/3/2014 | <0.02 |
| 3/16/2015 | <0.02 |
| 9/3/2015 | <0.01 |
| 3/10/2016 | <0.01 |
| 9/8/2016 | <0.01 |
| 3/2/2017 | <0.01 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | 0.00776 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | 0.00284 (B) |
| 9/18/2019 | 0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | 0.00241 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Nickel  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

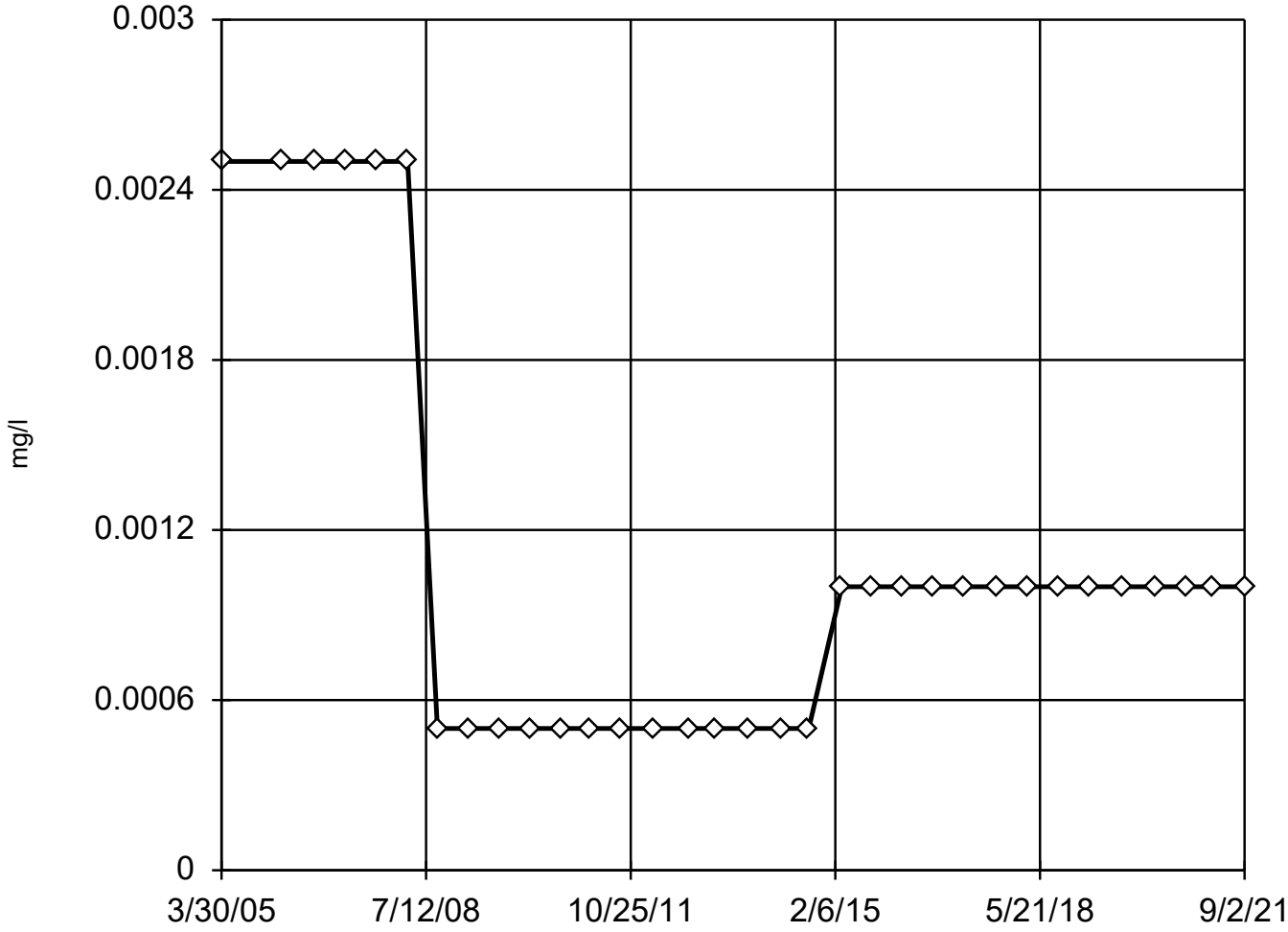
Constituent: Nickel (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.002 |
| 3/24/2006 | 0.004 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.002 |
| 9/26/2007 | <0.002 |
| 3/26/2008 | <0.002 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 0.0034 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.02 |
| 9/26/2012 | <0.02 |
| 3/7/2013 | <0.02 |
| 9/12/2013 | <0.02 |
| 3/24/2014 | <0.02 |
| 9/3/2014 | <0.02 |
| 3/16/2015 | <0.02 |
| 9/3/2015 | <0.01 |
| 3/10/2016 | <0.01 |
| 9/8/2016 | <0.01 |
| 3/2/2017 | <0.01 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | 0.00387 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | 0.00211 |
| 9/22/2020 | 0.00378 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Selenium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

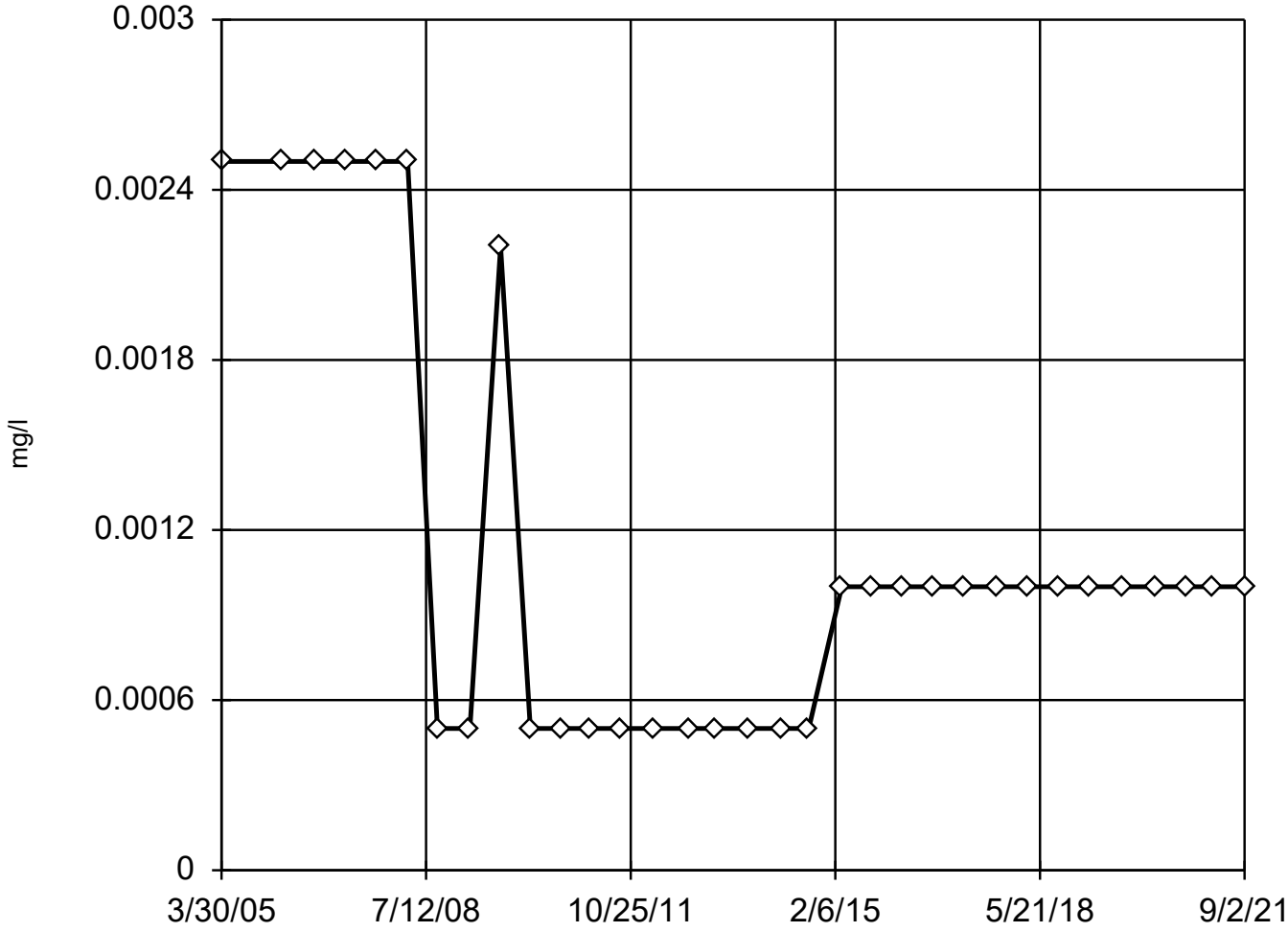
Constituent: Selenium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.005 |
| 3/24/2006 | <0.005 |
| 9/26/2006 | <0.005 |
| 3/23/2007 | <0.005 |
| 9/26/2007 | <0.005 |
| 3/26/2008 | <0.005 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Selenium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

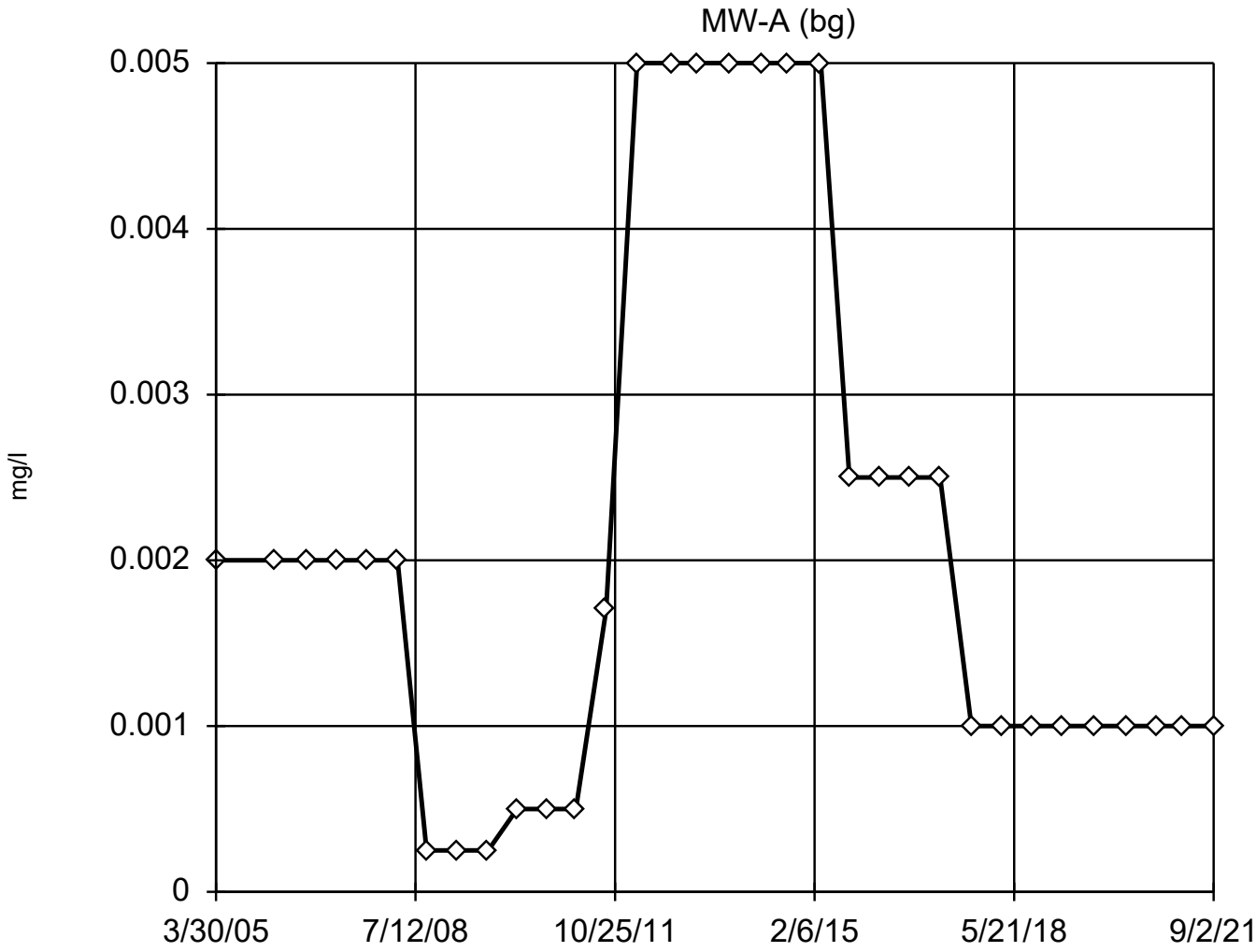
# Tukey's Outlier Screening

Constituent: Selenium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.005 |
| 3/24/2006 | <0.005 |
| 9/26/2006 | <0.005 |
| 3/23/2007 | <0.005 |
| 9/26/2007 | <0.005 |
| 3/26/2008 | <0.005 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | 0.0022 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Silver  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

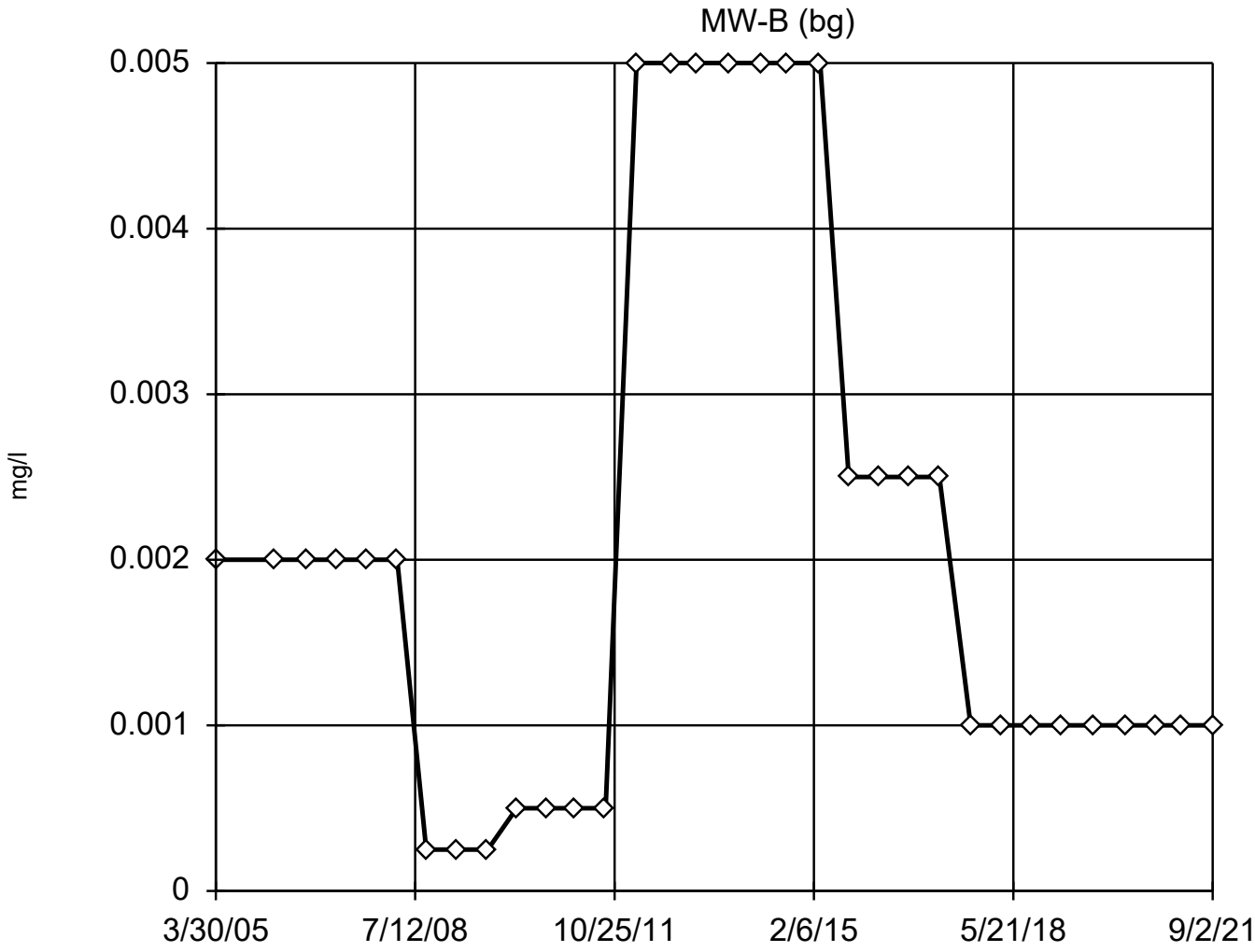
# Tukey's Outlier Screening

Constituent: Silver (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.004 |
| 3/24/2006 | <0.004 |
| 9/26/2006 | <0.004 |
| 3/23/2007 | <0.004 |
| 9/26/2007 | <0.004 |
| 3/26/2008 | <0.004 |
| 9/16/2008 | <0.0005 |
| 3/26/2009 | <0.0005 |
| 9/22/2009 | <0.0005 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | 0.0017 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.005 |
| 3/10/2016 | <0.005 |
| 9/8/2016 | <0.005 |
| 3/2/2017 | <0.005 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Silver  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

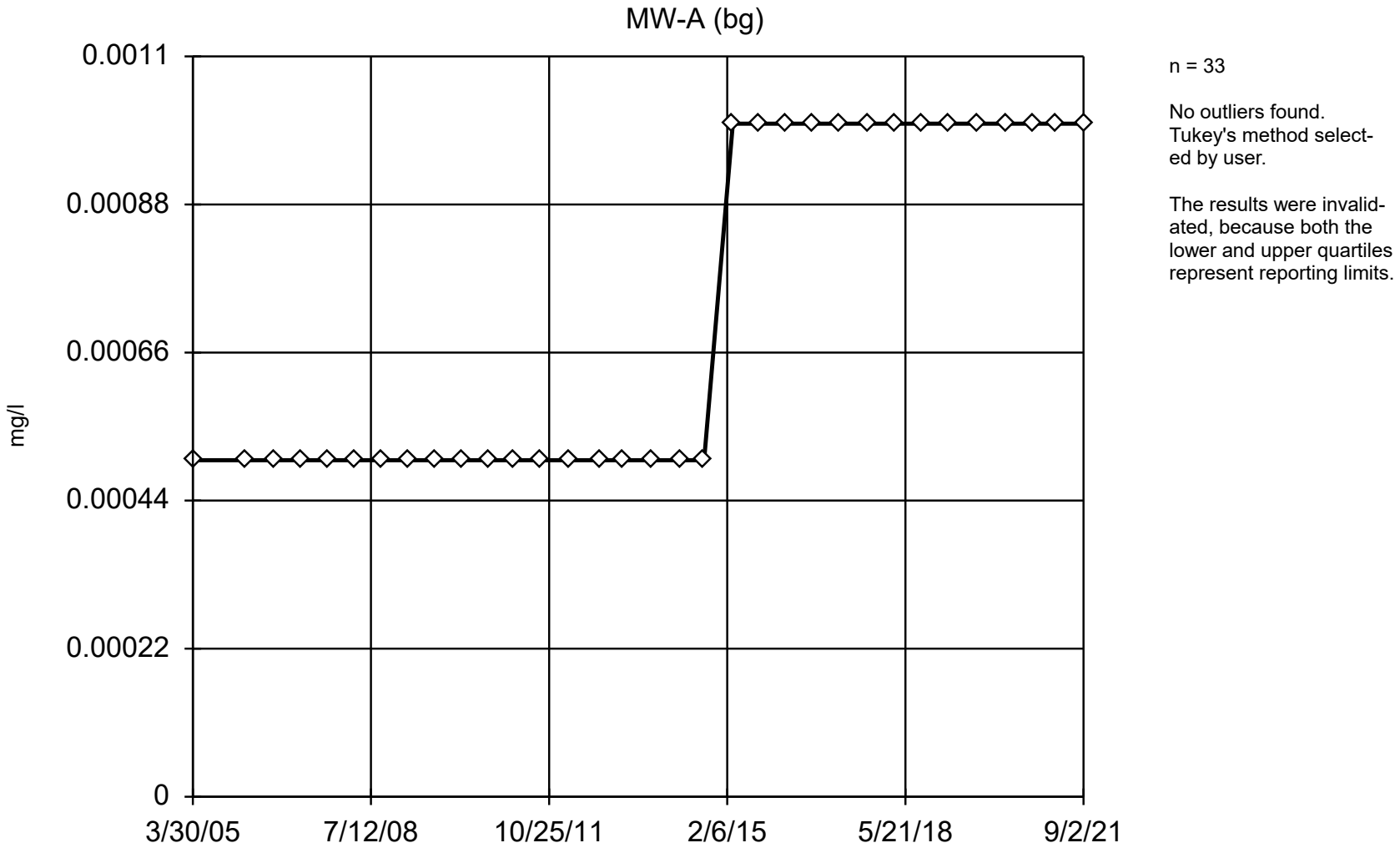
# Tukey's Outlier Screening

Constituent: Silver (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.004 |
| 3/24/2006 | <0.004 |
| 9/26/2006 | <0.004 |
| 3/23/2007 | <0.004 |
| 9/26/2007 | <0.004 |
| 3/26/2008 | <0.004 |
| 9/16/2008 | <0.0005 |
| 3/26/2009 | <0.0005 |
| 9/22/2009 | <0.0005 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.005 |
| 3/10/2016 | <0.005 |
| 9/8/2016 | <0.005 |
| 3/2/2017 | <0.005 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Thallium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

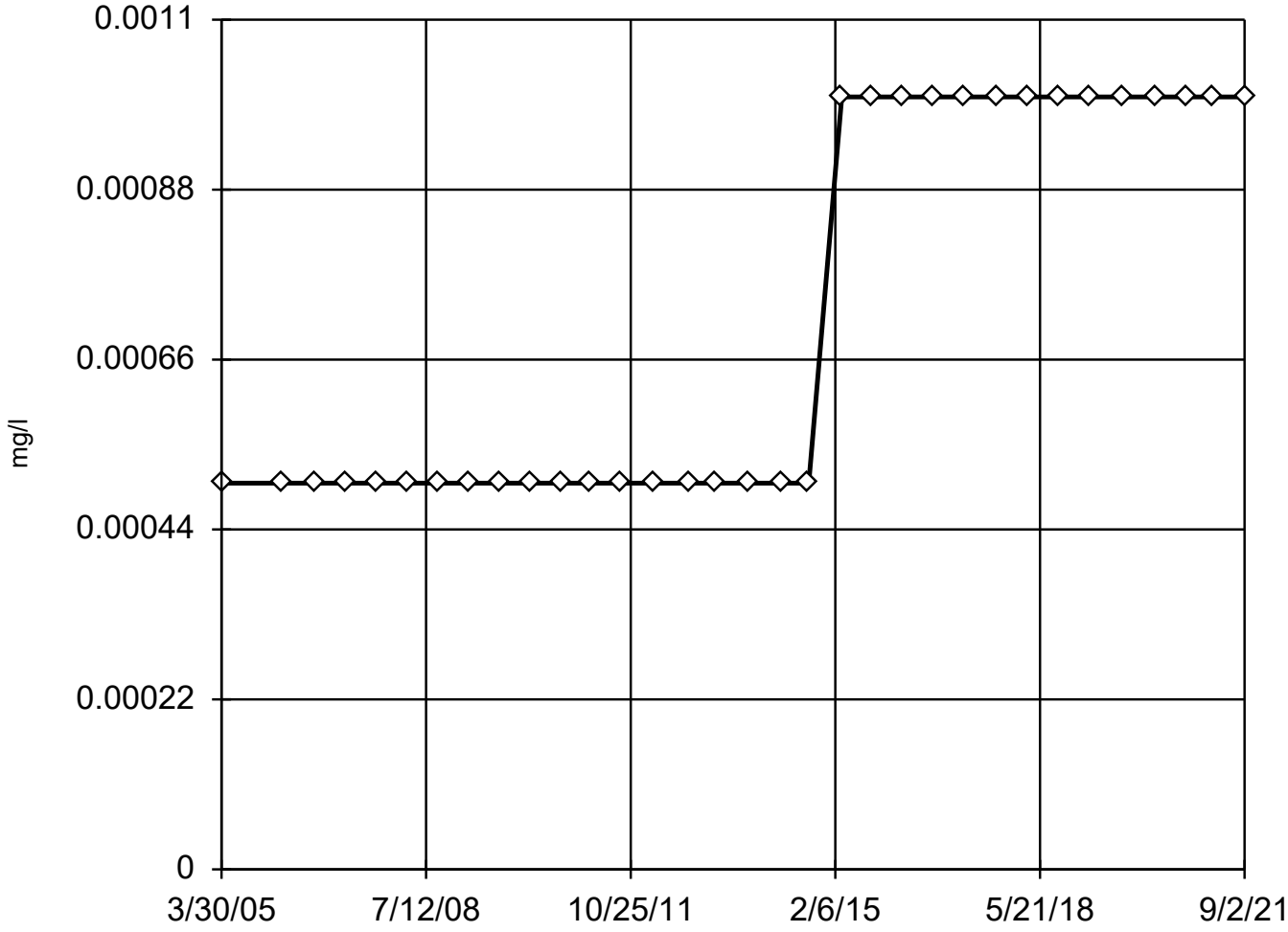
Constituent: Thallium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | <0.001 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | <0.001 |
| 9/26/2007 | <0.001 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Thallium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

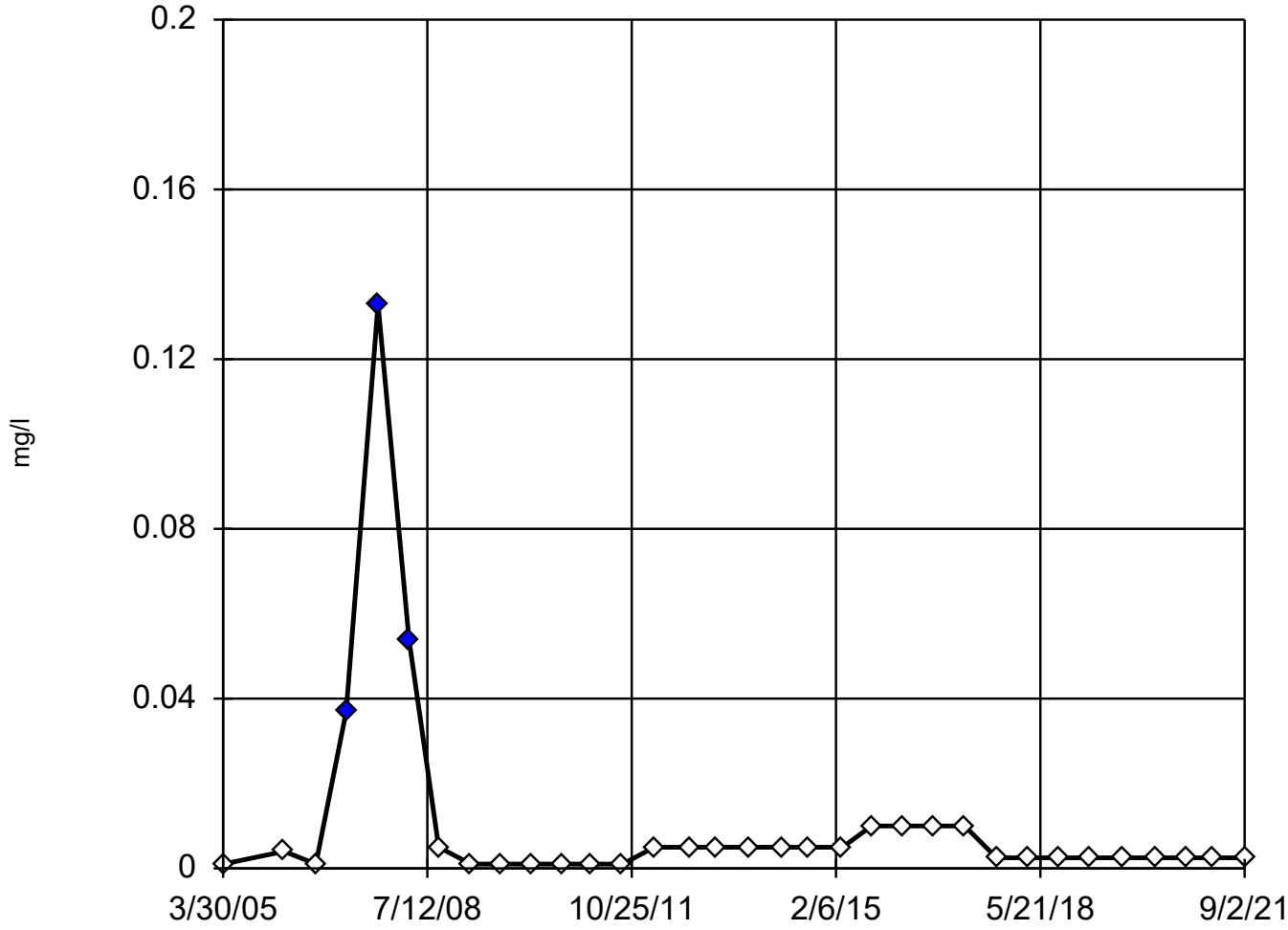
Constituent: Thallium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | <0.001 |
| 3/24/2006 | <0.001 |
| 9/26/2006 | <0.001 |
| 3/23/2007 | <0.001 |
| 9/26/2007 | <0.001 |
| 3/26/2008 | <0.001 |
| 9/16/2008 | <0.001 |
| 3/26/2009 | <0.001 |
| 9/22/2009 | <0.001 |
| 3/15/2010 | <0.001 |
| 9/8/2010 | <0.001 |
| 3/4/2011 | <0.001 |
| 9/1/2011 | <0.001 |
| 3/5/2012 | <0.001 |
| 9/26/2012 | <0.001 |
| 3/7/2013 | <0.001 |
| 9/12/2013 | <0.001 |
| 3/24/2014 | <0.001 |
| 9/3/2014 | <0.001 |
| 3/16/2015 | <0.002 |
| 9/3/2015 | <0.002 |
| 3/10/2016 | <0.002 |
| 9/8/2016 | <0.002 |
| 3/2/2017 | <0.002 |
| 9/6/2017 | <0.002 |
| 3/14/2018 | <0.002 |
| 9/5/2018 | <0.002 |
| 3/4/2019 | <0.002 |
| 9/18/2019 | <0.002 |
| 3/30/2020 | <0.002 |
| 9/22/2020 | <0.002 |
| 3/1/2021 | <0.002 |
| 9/2/2021 | <0.002 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

Outliers are drawn as solid.
Tukey's method selected by user.

High cutoff = 0.01475, low cutoff = -0.008, based on IQR multiplier of 3.

Constituent: Vanadium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

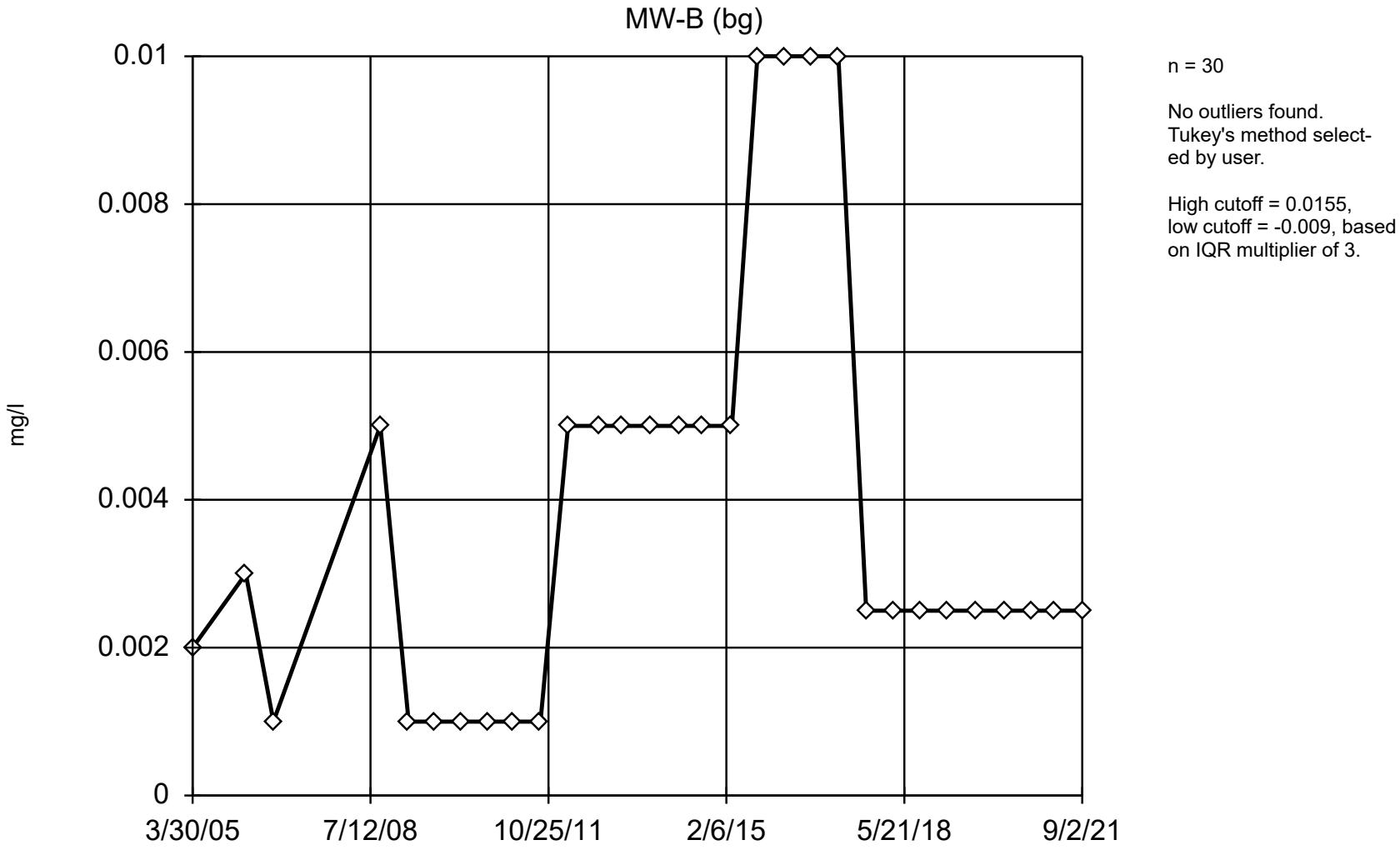
# Tukey's Outlier Screening

Constituent: Vanadium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | <0.002 |
| 3/24/2006 | 0.004 |
| 9/26/2006 | <0.002 |
| 3/23/2007 | 0.037 (O) |
| 9/26/2007 | 0.133 (O) |
| 3/26/2008 | 0.054 (O) |
| 9/16/2008 | <0.01 |
| 3/26/2009 | <0.002 |
| 9/22/2009 | <0.002 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | <0.002 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.02 |
| 3/10/2016 | <0.02 |
| 9/8/2016 | <0.02 |
| 3/2/2017 | <0.02 |
| 9/6/2017 | <0.005 |
| 3/14/2018 | <0.005 |
| 9/5/2018 | <0.005 |
| 3/4/2019 | <0.005 |
| 9/18/2019 | <0.005 |
| 3/30/2020 | <0.005 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.005 |
| 9/2/2021 | <0.005 |

# Tukey's Outlier Screening




n = 30

No outliers found.
Tukey's method select-
ed by user.

High cutoff = 0.0155,
low cutoff = -0.009, based
on IQR multiplier of 3.

Constituent: Vanadium  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

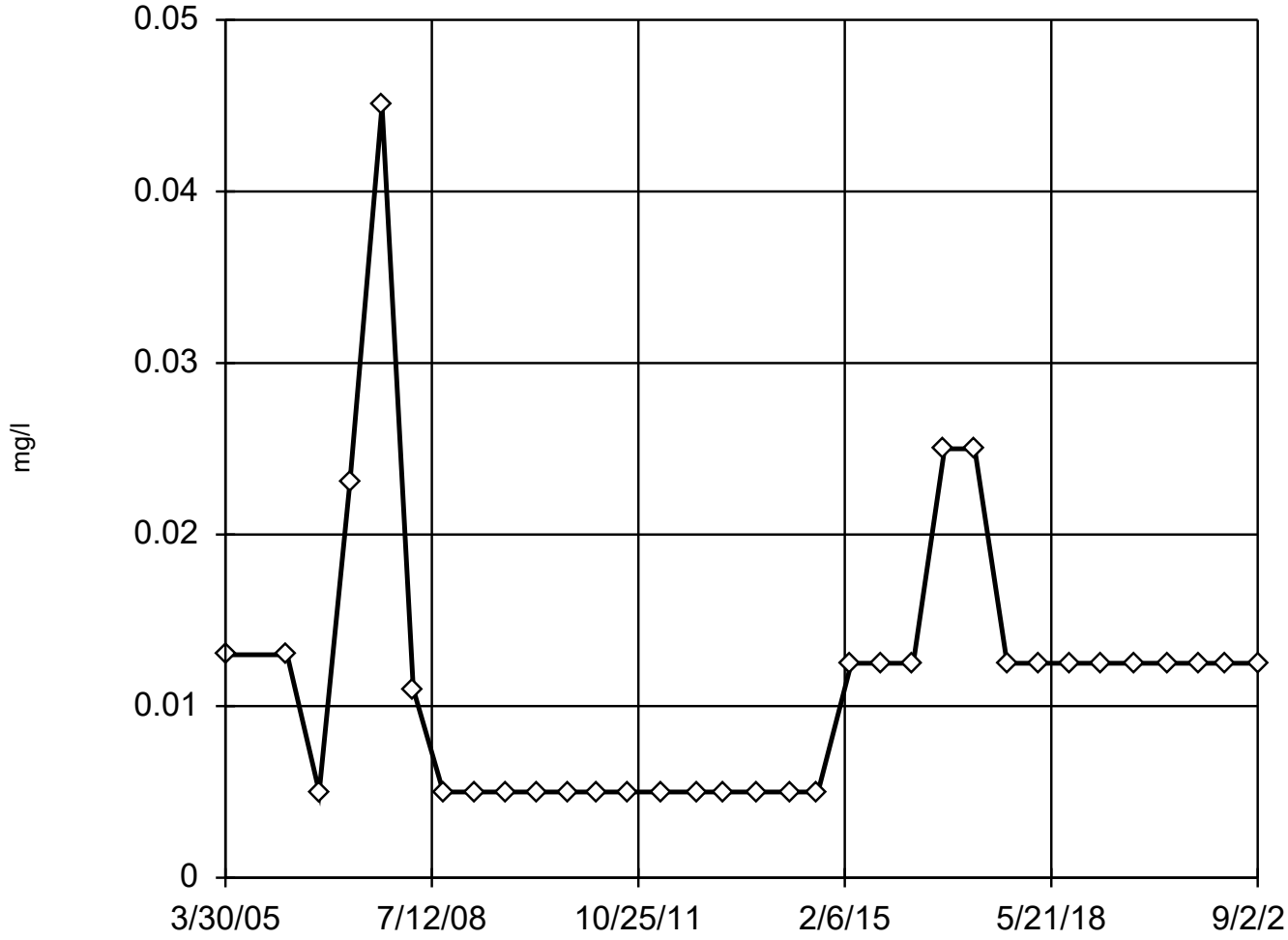
Constituent: Vanadium (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | 0.002 |
| 3/24/2006 | 0.003 |
| 9/26/2006 | <0.002 |
| 9/16/2008 | <0.01 |
| 3/26/2009 | <0.002 |
| 9/22/2009 | <0.002 |
| 3/15/2010 | <0.002 |
| 9/8/2010 | <0.002 |
| 3/4/2011 | <0.002 |
| 9/1/2011 | <0.002 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.01 |
| 9/3/2015 | <0.02 |
| 3/10/2016 | <0.02 |
| 9/8/2016 | <0.02 |
| 3/2/2017 | <0.02 |
| 9/6/2017 | <0.005 |
| 3/14/2018 | <0.005 |
| 9/5/2018 | <0.005 |
| 3/4/2019 | <0.005 |
| 9/18/2019 | <0.005 |
| 3/30/2020 | <0.005 |
| 9/22/2020 | <0.005 |
| 3/1/2021 | <0.005 |
| 9/2/2021 | <0.005 |

# Tukey's Outlier Screening

## MW-A (bg)




n = 33

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Zinc  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

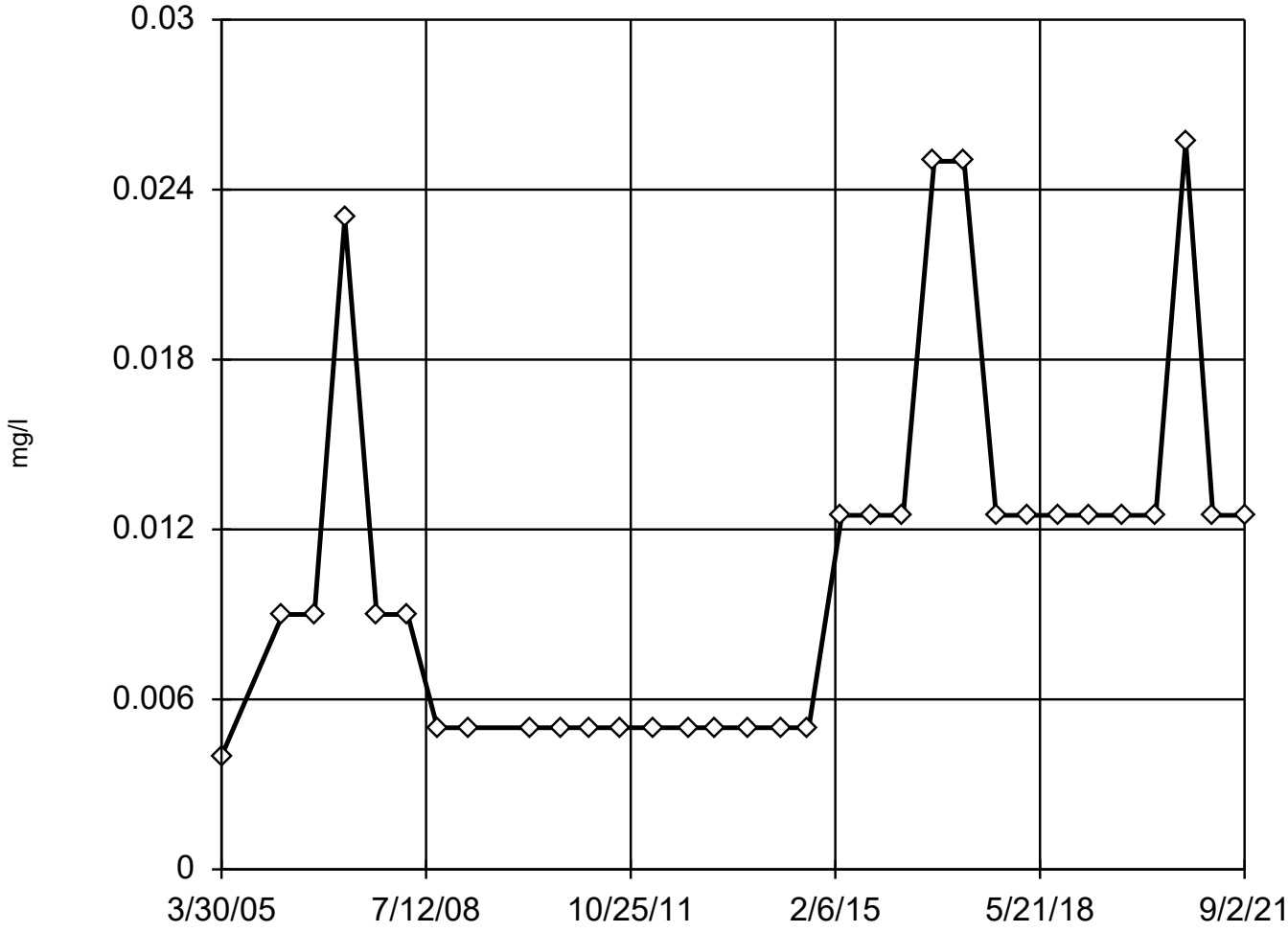
Constituent: Zinc (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) |
|---|---|
| 3/30/2005 | 0.013 |
| 3/24/2006 | 0.013 |
| 9/26/2006 | 0.005 |
| 3/23/2007 | 0.023 |
| 9/26/2007 | 0.045 |
| 3/26/2008 | 0.011 |
| 9/16/2008 | <0.01 |
| 3/26/2009 | <0.01 |
| 9/22/2009 | <0.01 |
| 3/15/2010 | <0.01 |
| 9/8/2010 | <0.01 |
| 3/4/2011 | <0.01 |
| 9/1/2011 | <0.01 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.025 |
| 9/3/2015 | <0.025 |
| 3/10/2016 | <0.025 |
| 9/8/2016 | <0.05 |
| 3/2/2017 | <0.05 |
| 9/6/2017 | <0.025 |
| 3/14/2018 | <0.025 |
| 9/5/2018 | <0.025 |
| 3/4/2019 | <0.025 |
| 9/18/2019 | <0.025 |
| 3/30/2020 | <0.025 |
| 9/22/2020 | <0.025 |
| 3/1/2021 | <0.025 |
| 9/2/2021 | <0.025 |

# Tukey's Outlier Screening

## MW-B (bg)




n = 32

No outliers found. Tukey's method selected by user.

The results were invalidated, because both the lower and upper quartiles represent reporting limits.

Constituent: Zinc  Analysis Run 11/17/2021 2:02 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Tukey's Outlier Screening

Constituent: Zinc (mg/l) Analysis Run 11/17/2021 2:03 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-B (bg) |
|---|---|
| 3/30/2005 | 0.004 |
| 3/24/2006 | 0.009 |
| 9/26/2006 | 0.009 |
| 3/23/2007 | 0.023 |
| 9/26/2007 | 0.009 |
| 3/26/2008 | 0.009 |
| 9/16/2008 | <0.01 |
| 3/26/2009 | <0.01 |
| 3/15/2010 | <0.01 |
| 9/8/2010 | <0.01 |
| 3/4/2011 | <0.01 |
| 9/1/2011 | <0.01 |
| 3/5/2012 | <0.01 |
| 9/26/2012 | <0.01 |
| 3/7/2013 | <0.01 |
| 9/12/2013 | <0.01 |
| 3/24/2014 | <0.01 |
| 9/3/2014 | <0.01 |
| 3/16/2015 | <0.025 |
| 9/3/2015 | <0.025 |
| 3/10/2016 | <0.025 |
| 9/8/2016 | <0.05 |
| 3/2/2017 | <0.05 |
| 9/6/2017 | <0.025 |
| 3/14/2018 | <0.025 |
| 9/5/2018 | <0.025 |
| 3/4/2019 | <0.025 |
| 9/18/2019 | <0.025 |
| 3/30/2020 | <0.025 |
| 9/22/2020 | 0.0257 |
| 3/1/2021 | <0.025 |
| 9/2/2021 | <0.025 |

# Analysis of Variance

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas  Printed 11/17/2021, 2:06 PM

| Constituent | Well | Calc. | Crit. | Sig. | Alpha | Transform | ANOVA Sig. | Alpha | Method |
|---|---|---|---|---|---|---|---|---|---|
| Antimony (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Arsenic (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Beryllium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Cadmium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Chromium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Copper (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Lead (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Nickel (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (normality) |
| Selenium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Silver (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Thallium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Vanadium (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |
| Zinc (mg/l) | n/a | n/a | n/a | n/a | n/a | No | No | 0.05 | NP (NDs) |

# Non-Parametric ANOVA

Constituent: Antimony  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.0007246

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.0006579
Adjusted Kruskal-Wallis statistic (H') = 0.0007246

# Non-Parametric ANOVA

Constituent: Antimony (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.003 | <0.003 |
| 3/24/2006 | <0.003 | <0.003 |
| 9/26/2006 | <0.003 | <0.003 |
| 3/23/2007 | <0.003 | <0.003 |
| 9/26/2007 | <0.003 | <0.003 |
| 3/26/2008 | <0.003 | <0.003 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | 0.002 | 0.005 |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | <0.001 | <0.001 |
| 9/26/2012 | <0.001 | <0.001 |
| 3/7/2013 | <0.001 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | <0.002 | <0.002 |
| 3/10/2016 | <0.002 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | <0.002 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.004 | <0.004 |
| 3/1/2021 | <0.004 | <0.004 |
| 9/2/2021 | <0.004 | <0.004 |

# Non-Parametric ANOVA

Constituent: Arsenic  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.2149

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1932
Adjusted Kruskal-Wallis statistic (H') = 0.2149

# Non-Parametric ANOVA

Constituent: Arsenic (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.005 | <0.005 |
| 3/24/2006 | <0.005 | <0.005 |
| 9/26/2006 | <0.005 | <0.005 |
| 3/23/2007 | <0.005 | <0.005 |
| 9/26/2007 | <0.005 | <0.005 |
| 3/26/2008 | <0.005 | <0.005 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | <0.001 | <0.001 |
| 9/26/2012 | 0.0017 | 0.0017 |
| 3/7/2013 | <0.001 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | 0.00238 | <0.002 |
| 3/10/2016 | <0.01 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | 0.00369 | <0.002 |
| 9/5/2018 | 0.00201 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.002 | <0.002 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Beryllium  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = -3.9e-14

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

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = -2.8e-14
Adjusted Kruskal-Wallis statistic (H') = -3.9e-14

# Non-Parametric ANOVA

Constituent: Beryllium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.001 | <0.001 |
| 3/24/2006 | <0.001 | <0.001 |
| 9/26/2006 | <0.001 | <0.001 |
| 3/23/2007 | <0.001 | <0.001 |
| 9/26/2007 | <0.001 | <0.001 |
| 3/26/2008 | <0.001 | <0.001 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | <0.001 |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | <0.001 | <0.001 |
| 9/26/2012 | <0.001 | <0.001 |
| 3/7/2013 | <0.001 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | <0.002 | <0.002 |
| 3/10/2016 | <0.002 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | <0.002 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.002 | <0.002 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Cadmium  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.0348

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

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.02997
Adjusted Kruskal-Wallis statistic (H') = 0.0348

# Non-Parametric ANOVA

Constituent: Cadmium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.002 | <0.002 |
| 3/24/2006 | <0.002 | <0.002 |
| 9/26/2006 | <0.002 | <0.002 |
| 3/23/2007 | <0.002 | <0.002 |
| 9/26/2007 | <0.002 | <0.002 |
| 3/26/2008 | <0.002 | <0.002 |
| 9/16/2008 | <0.0005 | <0.0005 |
| 3/26/2009 | <0.0005 | <0.0005 |
| 9/22/2009 | <0.0005 | 0.021 |
| 3/15/2010 | <0.0005 | <0.0005 |
| 9/8/2010 | <0.001 | <0.0005 |
| 3/4/2011 | <0.0005 | <0.0005 |
| 9/1/2011 | <0.0005 | <0.0005 |
| 3/5/2012 | <0.0005 | <0.0005 |
| 9/26/2012 | <0.0005 | <0.0005 |
| 3/7/2013 | <0.0005 | <0.0005 |
| 9/12/2013 | <0.0005 | <0.0005 |
| 3/24/2014 | <0.0005 | <0.0005 |
| 9/3/2014 | <0.0005 | <0.0005 |
| 3/16/2015 | <0.001 | <0.001 |
| 9/3/2015 | <0.001 | <0.001 |
| 3/10/2016 | <0.001 | <0.001 |
| 9/8/2016 | <0.001 | <0.001 |
| 3/2/2017 | <0.001 | <0.001 |
| 9/6/2017 | <0.001 | <0.001 |
| 3/14/2018 | <0.001 | <0.001 |
| 9/5/2018 | <0.001 | <0.001 |
| 3/4/2019 | <0.001 | <0.001 |
| 9/18/2019 | <0.001 | <0.001 |
| 3/30/2020 | <0.001 | <0.001 |
| 9/22/2020 | <0.001 | <0.001 |
| 3/1/2021 | <0.001 | <0.001 |
| 9/2/2021 | <0.001 | <0.001 |

# Non-Parametric ANOVA

Constituent: Chromium Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data
Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.0007069

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.0006579
Adjusted Kruskal-Wallis statistic (H') = 0.0007069

# Non-Parametric ANOVA

Constituent: Chromium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.001 | <0.001 |
| 3/24/2006 | 0.002 | 0.004 |
| 9/26/2006 | <0.001 | <0.001 |
| 3/23/2007 | 0.002 | 0.001 |
| 9/26/2007 | 0.009 | 0.001 |
| 3/26/2008 | <0.001 | <0.001 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | 0.0043 |
| 3/15/2010 | <0.002 | <0.002 |
| 9/8/2010 | <0.002 | <0.002 |
| 3/4/2011 | 0.003 | <0.002 |
| 9/1/2011 | <0.002 | <0.002 |
| 3/5/2012 | <0.01 | <0.01 |
| 9/26/2012 | <0.01 | <0.01 |
| 3/7/2013 | <0.01 | <0.01 |
| 9/12/2013 | <0.01 | <0.01 |
| 3/24/2014 | <0.01 | <0.01 |
| 9/3/2014 | <0.01 | <0.01 |
| 3/16/2015 | <0.01 | <0.01 |
| 9/3/2015 | <0.01 | <0.01 |
| 3/10/2016 | <0.01 | <0.01 |
| 9/8/2016 | <0.01 | <0.01 |
| 3/2/2017 | <0.01 | <0.01 |
| 9/6/2017 | <0.002 | 0.00238 |
| 3/14/2018 | 0.00547 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | 0.00208 (B) | 0.0036 (B) |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | 0.00224 (B) |
| 9/22/2020 | <0.002 | 0.00498 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | 0.00253 |

# Non-Parametric ANOVA

Constituent: Copper  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.1017

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.087
Adjusted Kruskal-Wallis statistic (H') = 0.1017

# Non-Parametric ANOVA

Constituent: Copper (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | 0.013 | <0.002 |
| 3/24/2006 | 0.007 | <0.002 |
| 9/26/2006 | <0.002 | <0.002 |
| 3/23/2007 | 0.002 | 0.004 |
| 9/26/2007 | 0.009 | <0.002 |
| 3/26/2008 | 0.004 | <0.002 |
| 9/16/2008 | 0.001 | 0.0047 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | 1.1 |
| 3/15/2010 | <0.002 | <0.002 |
| 9/8/2010 | <0.002 | <0.002 |
| 3/4/2011 | <0.002 | <0.002 |
| 9/1/2011 | <0.002 | <0.002 |
| 3/5/2012 | <0.002 | <0.002 |
| 9/26/2012 | <0.002 | <0.002 |
| 3/7/2013 | <0.002 | <0.002 |
| 9/12/2013 | <0.002 | <0.002 |
| 3/24/2014 | <0.002 | <0.002 |
| 9/3/2014 | <0.002 | <0.002 |
| 3/16/2015 | <0.005 | <0.005 |
| 9/3/2015 | <0.005 | <0.005 |
| 3/10/2016 | <0.005 | <0.005 |
| 9/8/2016 | <0.005 | <0.005 |
| 3/2/2017 | <0.005 | <0.005 |
| 9/6/2017 | <0.005 | <0.005 |
| 3/14/2018 | <0.005 | <0.005 |
| 9/5/2018 | <0.005 | <0.005 |
| 3/4/2019 | <0.005 | <0.005 |
| 9/18/2019 | <0.005 | <0.005 |
| 3/30/2020 | <0.005 | <0.005 |
| 9/22/2020 | <0.005 | <0.005 |
| 3/1/2021 | <0.005 | <0.005 |
| 9/2/2021 | <0.005 | <0.005 |

# Non-Parametric ANOVA

Constituent: Lead  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.3584

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.3018
Adjusted Kruskal-Wallis statistic (H') = 0.3584

# Non-Parametric ANOVA

Constituent: Lead (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | 0.002 | 0.005 |
| 3/24/2006 | | 0.002 |
| 9/26/2006 | <0.002 | <0.002 |
| 3/23/2007 | | 0.002 |
| 9/26/2007 | <0.002 | <0.002 |
| 3/26/2008 | 0.003 | <0.002 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | 0.0016 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | | <0.001 |
| 9/26/2012 | <0.001 | <0.001 |
| 3/7/2013 | <0.005 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | <0.002 | <0.002 |
| 3/10/2016 | <0.002 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | 0.00214 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.005 | <0.005 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Nickel  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 3.182

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

There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 3.087
Adjusted Kruskal-Wallis statistic (H') = 3.182

# Non-Parametric ANOVA

Constituent: Nickel (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | 0.004 | <0.002 |
| 3/24/2006 | 0.005 | 0.004 |
| 9/26/2006 | <0.002 | <0.002 |
| 3/23/2007 | 0.0088 | 0.002 |
| 9/26/2007 | 0.0175 | <0.002 |
| 3/26/2008 | 0.0036 | <0.002 |
| 9/16/2008 | 0.0018 | <0.001 |
| 3/26/2009 | 0.001 | <0.001 |
| 9/22/2009 | 0.0021 | 0.0034 |
| 3/15/2010 | 0.0015 | <0.001 |
| 9/8/2010 | 0.0016 | <0.001 |
| 3/4/2011 | 0.0035 | <0.001 |
| 9/1/2011 | 0.0012 | <0.001 |
| 3/5/2012 | <0.02 | <0.02 |
| 9/26/2012 | <0.02 | <0.02 |
| 3/7/2013 | <0.02 | <0.02 |
| 9/12/2013 | <0.02 | <0.02 |
| 3/24/2014 | <0.02 | <0.02 |
| 9/3/2014 | <0.02 | <0.02 |
| 3/16/2015 | <0.02 | <0.02 |
| 9/3/2015 | <0.01 | <0.01 |
| 3/10/2016 | <0.01 | <0.01 |
| 9/8/2016 | <0.01 | <0.01 |
| 3/2/2017 | <0.01 | <0.01 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | 0.00776 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | 0.00284 (B) | 0.00387 |
| 9/18/2019 | 0.002 | <0.002 |
| 3/30/2020 | <0.002 | 0.00211 |
| 9/22/2020 | <0.002 | 0.00378 |
| 3/1/2021 | 0.00241 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Selenium  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.08004

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

There were 3 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.06912
Adjusted Kruskal-Wallis statistic (H') = 0.08004

# Non-Parametric ANOVA

Constituent: Selenium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.005 | <0.005 |
| 3/24/2006 | <0.005 | <0.005 |
| 9/26/2006 | <0.005 | <0.005 |
| 3/23/2007 | <0.005 | <0.005 |
| 9/26/2007 | <0.005 | <0.005 |
| 3/26/2008 | <0.005 | <0.005 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | 0.0022 |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | <0.001 | <0.001 |
| 9/26/2012 | <0.001 | <0.001 |
| 3/7/2013 | <0.001 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | <0.002 | <0.002 |
| 3/10/2016 | <0.002 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | <0.002 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.002 | <0.002 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Silver  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.02072

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

There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.0199
Adjusted Kruskal-Wallis statistic (H') = 0.02072

# Non-Parametric ANOVA

Constituent: Silver (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.004 | <0.004 |
| 3/24/2006 | <0.004 | <0.004 |
| 9/26/2006 | <0.004 | <0.004 |
| 3/23/2007 | <0.004 | <0.004 |
| 9/26/2007 | <0.004 | <0.004 |
| 3/26/2008 | <0.004 | <0.004 |
| 9/16/2008 | <0.0005 | <0.0005 |
| 3/26/2009 | <0.0005 | <0.0005 |
| 9/22/2009 | <0.0005 | <0.0005 |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | 0.0017 | <0.001 |
| 3/5/2012 | <0.01 | <0.01 |
| 9/26/2012 | <0.01 | <0.01 |
| 3/7/2013 | <0.01 | <0.01 |
| 9/12/2013 | <0.01 | <0.01 |
| 3/24/2014 | <0.01 | <0.01 |
| 9/3/2014 | <0.01 | <0.01 |
| 3/16/2015 | <0.01 | <0.01 |
| 9/3/2015 | <0.005 | <0.005 |
| 3/10/2016 | <0.005 | <0.005 |
| 9/8/2016 | <0.005 | <0.005 |
| 3/2/2017 | <0.005 | <0.005 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | <0.002 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.002 | <0.002 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Thallium  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = -3.9e-14

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

There were 2 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = -2.8e-14
Adjusted Kruskal-Wallis statistic (H') = -3.9e-14

# Non-Parametric ANOVA

Constituent: Thallium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.001 | <0.001 |
| 3/24/2006 | <0.001 | <0.001 |
| 9/26/2006 | <0.001 | <0.001 |
| 3/23/2007 | <0.001 | <0.001 |
| 9/26/2007 | <0.001 | <0.001 |
| 3/26/2008 | <0.001 | <0.001 |
| 9/16/2008 | <0.001 | <0.001 |
| 3/26/2009 | <0.001 | <0.001 |
| 9/22/2009 | <0.001 | <0.001 |
| 3/15/2010 | <0.001 | <0.001 |
| 9/8/2010 | <0.001 | <0.001 |
| 3/4/2011 | <0.001 | <0.001 |
| 9/1/2011 | <0.001 | <0.001 |
| 3/5/2012 | <0.001 | <0.001 |
| 9/26/2012 | <0.001 | <0.001 |
| 3/7/2013 | <0.001 | <0.001 |
| 9/12/2013 | <0.001 | <0.001 |
| 3/24/2014 | <0.001 | <0.001 |
| 9/3/2014 | <0.001 | <0.001 |
| 3/16/2015 | <0.002 | <0.002 |
| 9/3/2015 | <0.002 | <0.002 |
| 3/10/2016 | <0.002 | <0.002 |
| 9/8/2016 | <0.002 | <0.002 |
| 3/2/2017 | <0.002 | <0.002 |
| 9/6/2017 | <0.002 | <0.002 |
| 3/14/2018 | <0.002 | <0.002 |
| 9/5/2018 | <0.002 | <0.002 |
| 3/4/2019 | <0.002 | <0.002 |
| 9/18/2019 | <0.002 | <0.002 |
| 3/30/2020 | <0.002 | <0.002 |
| 9/22/2020 | <0.002 | <0.002 |
| 3/1/2021 | <0.002 | <0.002 |
| 9/2/2021 | <0.002 | <0.002 |

# Non-Parametric ANOVA

Constituent: Vanadium  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.00286

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

There were 4 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.002678
Adjusted Kruskal-Wallis statistic (H') = 0.00286

# Non-Parametric ANOVA

Constituent: Vanadium (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | <0.002 | 0.002 |
| 3/24/2006 | 0.004 | 0.003 |
| 9/26/2006 | <0.002 | <0.002 |
| 9/16/2008 | <0.01 | <0.01 |
| 3/26/2009 | <0.002 | <0.002 |
| 9/22/2009 | <0.002 | <0.002 |
| 3/15/2010 | <0.002 | <0.002 |
| 9/8/2010 | <0.002 | <0.002 |
| 3/4/2011 | <0.002 | <0.002 |
| 9/1/2011 | <0.002 | <0.002 |
| 3/5/2012 | <0.01 | <0.01 |
| 9/26/2012 | <0.01 | <0.01 |
| 3/7/2013 | <0.01 | <0.01 |
| 9/12/2013 | <0.01 | <0.01 |
| 3/24/2014 | <0.01 | <0.01 |
| 9/3/2014 | <0.01 | <0.01 |
| 3/16/2015 | <0.01 | <0.01 |
| 9/3/2015 | <0.02 | <0.02 |
| 3/10/2016 | <0.02 | <0.02 |
| 9/8/2016 | <0.02 | <0.02 |
| 3/2/2017 | <0.02 | <0.02 |
| 9/6/2017 | <0.005 | <0.005 |
| 3/14/2018 | <0.005 | <0.005 |
| 9/5/2018 | <0.005 | <0.005 |
| 3/4/2019 | <0.005 | <0.005 |
| 9/18/2019 | <0.005 | <0.005 |
| 3/30/2020 | <0.005 | <0.005 |
| 9/22/2020 | <0.005 | <0.005 |
| 3/1/2021 | <0.005 | <0.005 |
| 9/2/2021 | <0.005 | <0.005 |

# Non-Parametric ANOVA

Constituent: Zinc  Analysis Run 11/17/2021 2:06 PM  View: Shelby County Statistics Data
Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

For observations made between 3/30/2005 and 9/2/2021, the non-parametric analysis of variance test indicates NO DIFFERENCE between the medians of the groups tested at the 5% significance level. Because the calculated Kruskal-Wallis statistic is less than or equal to the Chi-squared value, we conclude that no group has a significantly different median concentration of this constituent when compared to another group.

Calculated Kruskal-Wallis statistic = 0.2168

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

There were 6 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 0.1932
Adjusted Kruskal-Wallis statistic (H') = 0.2168

# Non-Parametric ANOVA

Constituent: Zinc (mg/l) Analysis Run 11/17/2021 2:06 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-A (bg) | MW-B (bg) |
|---|---|---|
| 3/30/2005 | 0.013 | 0.004 |
| 3/24/2006 | 0.013 | 0.009 |
| 9/26/2006 | 0.005 | 0.009 |
| 3/23/2007 | 0.023 | 0.023 |
| 9/26/2007 | 0.045 | 0.009 |
| 3/26/2008 | 0.011 | 0.009 |
| 9/16/2008 | <0.01 | <0.01 |
| 3/26/2009 | <0.01 | <0.01 |
| 9/22/2009 | <0.01 | |
| 3/15/2010 | <0.01 | <0.01 |
| 9/8/2010 | <0.01 | <0.01 |
| 3/4/2011 | <0.01 | <0.01 |
| 9/1/2011 | <0.01 | <0.01 |
| 3/5/2012 | <0.01 | <0.01 |
| 9/26/2012 | <0.01 | <0.01 |
| 3/7/2013 | <0.01 | <0.01 |
| 9/12/2013 | <0.01 | <0.01 |
| 3/24/2014 | <0.01 | <0.01 |
| 9/3/2014 | <0.01 | <0.01 |
| 3/16/2015 | <0.025 | <0.025 |
| 9/3/2015 | <0.025 | <0.025 |
| 3/10/2016 | <0.025 | <0.025 |
| 9/8/2016 | <0.05 | <0.05 |
| 3/2/2017 | <0.05 | <0.05 |
| 9/6/2017 | <0.025 | <0.025 |
| 3/14/2018 | <0.025 | <0.025 |
| 9/5/2018 | <0.025 | <0.025 |
| 3/4/2019 | <0.025 | <0.025 |
| 9/18/2019 | <0.025 | <0.025 |
| 3/30/2020 | <0.025 | <0.025 |
| 9/22/2020 | <0.025 | 0.0257 |
| 3/1/2021 | <0.025 | <0.025 |
| 9/2/2021 | <0.025 | <0.025 |

# *APPENDIX F*

# VOC Screening



A listing of detects and trace values for 64 constituents in 11 wells on 46 dates:

Antimony, MW-24, 9/22/2009: 0.002
Antimony, MW-A (bg), 9/22/2009: 0.002
Antimony, MW-B (bg), 9/22/2009: 0.005
Arsenic, MW-21, 9/22/2009: 0.0019
Arsenic, MW-22, 9/28/2005: 0.007
Arsenic, MW-25, 9/16/2008: 0.0018
Arsenic, MW-25, 9/22/2009: 0.0029
Arsenic, MW-25, 9/8/2010: 0.0024
Arsenic, MW-25, 3/5/2012: 0.0012
Arsenic, MW-25, 9/26/2012: 0.0012
Arsenic, MW-25, 3/7/2013: 0.0016
Arsenic, MW-25, 9/5/2018: 0.00268
Arsenic, MW-25, 3/4/2019: 0.00258
Arsenic, MW-25, 9/18/2019: 0.00269
Arsenic, MW-25, 3/30/2020: 0.0115
Arsenic, MW-25, 6/2/2020: 0.00726
Arsenic, MW-25, 9/22/2020: 0.00402
Arsenic, MW-25, 3/1/2021: 0.00513
Arsenic, MW-25, 9/2/2021: 0.00956
Arsenic, MW-A (bg), 9/26/2012: 0.0017
Arsenic, MW-A (bg), 9/3/2015: 0.00238
Arsenic, MW-A (bg), 3/14/2018: 0.00369
Arsenic, MW-A (bg), 9/5/2018: 0.00201
Arsenic, MW-B (bg), 9/26/2012: 0.0017
Arsenic, MW-C, 9/16/2008: 0.0018
Arsenic, MW-C, 9/22/2009: 0.01
Arsenic, MW-C, 3/15/2010: 0.01
Arsenic, MW-C, 9/8/2010: 0.0022
Arsenic, MW-C, 9/1/2011: 0.0019
Arsenic, MW-C, 3/5/2012: 0.0028
Arsenic, MW-C, 9/26/2012: 0.0036
Arsenic, MW-C, 3/7/2013: 0.0026
Arsenic, MW-C, 9/12/2013: 0.0038
Arsenic, MW-C, 9/3/2014: 0.0017
Arsenic, MW-C, 3/14/2018: 0.00224
Arsenic, MW-C, 9/5/2018: 0.00204
Arsenic, MW-D, 9/16/2008: 0.0022
Arsenic, MW-D, 3/26/2009: 0.001
Arsenic, MW-D, 9/22/2009: 0.0028
Arsenic, MW-D, 3/15/2010: 0.0023
Arsenic, MW-D, 9/8/2010: 0.0026
Arsenic, MW-D, 3/4/2011: 0.0012
Arsenic, MW-D, 9/1/2011: 0.0022
Arsenic, MW-D, 3/5/2012: 0.0017
Arsenic, MW-D, 9/26/2012: 0.001
Arsenic, MW-27, 9/1/2011: 0.0025
Arsenic, MW-27, 12/28/2011: 0.0018
Arsenic, MW-27, 2/10/2012: 0.0011
Arsenic, MW-27, 3/5/2012: 0.0017
Arsenic, MW-27, 9/26/2012: 0.001
Arsenic, MW-27, 3/7/2013: 0.001
Arsenic, MW-27, 9/12/2013: 0.001
Arsenic, MW-27, 3/24/2014: 0.0032
Barium, MW-21, 3/30/2005: 0.12
Barium, MW-21, 9/28/2005: 0.12
Barium, MW-21, 3/24/2006: 0.127
Barium, MW-21, 9/26/2006: 0.076
Barium, MW-21, 3/23/2007: 0.127
Barium, MW-21, 9/26/2007: 0.106
Barium, MW-21, 3/26/2008: 0.128

Barium, MW-21, 9/16/2008: 0.13
Barium, MW-21, 3/26/2009: 0.11
Barium, MW-21, 9/22/2009: 0.1
Barium, MW-21, 3/15/2010: 0.098
Barium, MW-21, 9/8/2010: 0.14
Barium, MW-21, 3/4/2011: 0.094
Barium, MW-21, 9/1/2011: 0.11
Barium, MW-21, 3/5/2012: 0.11
Barium, MW-21, 9/26/2012: 0.12
Barium, MW-21, 3/7/2013: 0.083
Barium, MW-21, 9/12/2013: 0.12
Barium, MW-21, 3/24/2014: 0.086
Barium, MW-21, 9/3/2014: 0.12
Barium, MW-21, 3/16/2015: 0.11
Barium, MW-21, 9/3/2015: 0.111
Barium, MW-21, 3/10/2016: 0.0721
Barium, MW-21, 9/8/2016: 0.129
Barium, MW-21, 3/2/2017: 0.128
Barium, MW-21, 9/6/2017: 0.101
Barium, MW-21, 3/14/2018: 0.0894
Barium, MW-21, 9/5/2018: 0.117
Barium, MW-21, 3/4/2019: 0.0868
Barium, MW-21, 9/18/2019: 0.116
Barium, MW-21, 3/30/2020: 0.0785
Barium, MW-21, 9/22/2020: 0.114
Barium, MW-21, 3/1/2021: 0.0865
Barium, MW-21, 9/2/2021: 0.111
Barium, MW-22, 3/30/2005: 0.212
Barium, MW-22, 9/28/2005: 0.212
Barium, MW-22, 3/24/2006: 0.211
Barium, MW-22, 9/26/2006: 0.172
Barium, MW-22, 3/23/2007: 0.205
Barium, MW-22, 9/26/2007: 0.196
Barium, MW-22, 3/26/2008: 0.217
Barium, MW-22, 3/26/2009: 0.21
Barium, MW-22, 9/22/2009: 0.18
Barium, MW-22, 9/8/2010: 0.23
Barium, MW-22, 3/4/2011: 0.18
Barium, MW-22, 9/1/2011: 0.19
Barium, MW-22, 3/5/2012: 0.19
Barium, MW-22, 9/26/2012: 0.2
Barium, MW-22, 3/7/2013: 0.21
Barium, MW-22, 9/12/2013: 0.21
Barium, MW-22, 3/24/2014: 0.18
Barium, MW-22, 9/3/2014: 0.2
Barium, MW-22, 3/16/2015: 0.19
Barium, MW-22, 9/3/2015: 0.194
Barium, MW-22, 3/10/2016: 0.185
Barium, MW-22, 9/8/2016: 0.217
Barium, MW-22, 3/2/2017: 0.188
Barium, MW-22, 9/6/2017: 0.21
Barium, MW-22, 3/14/2018: 0.214
Barium, MW-22, 9/5/2018: 0.205
Barium, MW-22, 3/4/2019: 0.198
Barium, MW-22, 9/18/2019: 0.192
Barium, MW-22, 3/30/2020: 0.184
Barium, MW-22, 9/22/2020: 0.181
Barium, MW-22, 3/1/2021: 0.193
Barium, MW-22, 9/2/2021: 0.187
Barium, MW-24, 3/30/2005: 0.012
Barium, MW-24, 9/28/2005: 0.022
Barium, MW-24, 3/24/2006: 0.022

# VOC Screening



Barium, MW-24, 9/26/2006: 0.015
Barium, MW-24, 3/23/2007: 0.012
Barium, MW-24, 9/26/2007: 0.01
Barium, MW-24, 3/26/2008: 0.008
Barium, MW-24, 3/26/2009: 0.0025
Barium, MW-24, 9/22/2009: 0.005
Barium, MW-24, 3/15/2010: 0.0066
Barium, MW-24, 9/8/2010: 0.0035
Barium, MW-24, 3/4/2011: 0.016
Barium, MW-24, 9/1/2011: 0.0032
Barium, MW-24, 3/7/2013: 0.0077
Barium, MW-24, 9/12/2013: 0.0055
Barium, MW-24, 3/24/2014: 0.0084
Barium, MW-24, 9/3/2014: 0.015
Barium, MW-24, 3/16/2015: 0.0068
Barium, MW-24, 9/3/2015: 0.00597
Barium, MW-24, 3/10/2016: 0.007
Barium, MW-24, 3/2/2017: 0.00929
Barium, MW-24, 9/6/2017: 0.00511
Barium, MW-24, 3/14/2018: 0.00681
Barium, MW-24, 3/4/2019: 0.00559
Barium, MW-24, 9/18/2019: 0.00527
Barium, MW-24, 9/2/2021: 0.00428
Barium, MW-25, 3/30/2005: 0.015
Barium, MW-25, 9/28/2005: 0.017
Barium, MW-25, 3/24/2006: 0.019
Barium, MW-25, 3/23/2007: 0.02
Barium, MW-25, 9/26/2007: 0.013
Barium, MW-25, 3/26/2008: 0.017
Barium, MW-25, 9/16/2008: 0.015
Barium, MW-25, 3/26/2009: 0.0093
Barium, MW-25, 9/22/2009: 0.021
Barium, MW-25, 3/15/2010: 0.0082
Barium, MW-25, 9/8/2010: 0.017
Barium, MW-25, 3/4/2011: 0.0094
Barium, MW-25, 9/1/2011: 0.012
Barium, MW-25, 3/5/2012: 0.018
Barium, MW-25, 9/26/2012: 0.013
Barium, MW-25, 3/7/2013: 0.013
Barium, MW-25, 9/12/2013: 0.0085
Barium, MW-25, 3/24/2014: 0.012
Barium, MW-25, 9/3/2014: 0.0089
Barium, MW-25, 3/16/2015: 0.0098
Barium, MW-25, 9/3/2015: 0.00634
Barium, MW-25, 3/10/2016: 0.00759
Barium, MW-25, 9/8/2016: 0.0111
Barium, MW-25, 3/2/2017: 0.009
Barium, MW-25, 9/6/2017: 0.00707
Barium, MW-25, 3/14/2018: 0.00671
Barium, MW-25, 9/5/2018: 0.00525
Barium, MW-25, 3/4/2019: 0.0129
Barium, MW-25, 9/18/2019: 0.00671
Barium, MW-25, 3/30/2020: 0.0191
Barium, MW-25, 9/2/2021: 0.00971
Barium, MW-A (bg), 3/30/2005: 0.007
Barium, MW-A (bg), 3/24/2006: 0.01
Barium, MW-A (bg), 9/26/2006: 0.006
Barium, MW-A (bg), 3/23/2007: 0.081
Barium, MW-A (bg), 9/26/2007: 0.031
Barium, MW-A (bg), 3/26/2008: 0.008
Barium, MW-A (bg), 3/26/2009: 0.0025
Barium, MW-A (bg), 9/22/2009: 0.005

# VOC Screening



Barium, MW-A (bg), 3/15/2010: 0.0066
Barium, MW-A (bg), 9/8/2010: 0.0035
Barium, MW-A (bg), 3/4/2011: 0.016
Barium, MW-A (bg), 9/1/2011: 0.0038
Barium, MW-A (bg), 9/3/2015: 0.00658
Barium, MW-A (bg), 3/14/2018: 0.0133
Barium, MW-A (bg), 9/2/2021: 0.0028
Barium, MW-B (bg), 3/30/2005: 0.012
Barium, MW-B (bg), 3/24/2006: 0.01
Barium, MW-B (bg), 9/26/2006: 0.004
Barium, MW-B (bg), 3/23/2007: 0.01
Barium, MW-B (bg), 9/26/2007: 0.007
Barium, MW-B (bg), 3/26/2008: 0.005
Barium, MW-B (bg), 9/22/2009: 0.0044
Barium, MW-B (bg), 9/1/2011: 0.0025
Barium, MW-B (bg), 3/14/2018: 0.00769
Barium, MW-B (bg), 3/4/2019: 0.0495
Barium, MW-B (bg), 3/30/2020: 0.0284
Barium, MW-B (bg), 9/2/2021: 0.00762
Barium, MW-C, 3/24/2006: 0.029
Barium, MW-C, 3/23/2007: 0.035
Barium, MW-C, 9/26/2007: 0.034
Barium, MW-C, 3/26/2008: 0.036
Barium, MW-C, 9/16/2008: 0.029
Barium, MW-C, 3/26/2009: 0.018
Barium, MW-C, 9/22/2009: 0.02
Barium, MW-C, 3/15/2010: 0.012
Barium, MW-C, 9/8/2010: 0.021
Barium, MW-C, 3/4/2011: 0.022
Barium, MW-C, 9/1/2011: 0.024
Barium, MW-C, 3/5/2012: 0.027
Barium, MW-C, 9/26/2012: 0.029
Barium, MW-C, 3/7/2013: 0.025
Barium, MW-C, 9/12/2013: 0.03
Barium, MW-C, 3/24/2014: 0.024
Barium, MW-C, 9/3/2014: 0.028
Barium, MW-C, 3/16/2015: 0.029
Barium, MW-C, 9/3/2015: 0.0341
Barium, MW-C, 3/10/2016: 0.0257
Barium, MW-C, 9/8/2016: 0.0305
Barium, MW-C, 3/2/2017: 0.0331
Barium, MW-C, 9/6/2017: 0.0265
Barium, MW-C, 3/14/2018: 0.0327
Barium, MW-C, 9/5/2018: 0.0236
Barium, MW-C, 3/4/2019: 0.0224
Barium, MW-C, 9/18/2019: 0.0225
Barium, MW-C, 3/30/2020: 0.022
Barium, MW-C, 9/22/2020: 0.0235
Barium, MW-C, 3/1/2021: 0.0252
Barium, MW-C, 9/2/2021: 0.0385
Barium, MW-D, 3/30/2005: 0.03
Barium, MW-D, 3/24/2006: 0.081
Barium, MW-D, 9/26/2006: 0.065
Barium, MW-D, 3/23/2007: 0.022
Barium, MW-D, 9/26/2007: 0.072
Barium, MW-D, 3/26/2008: 0.075
Barium, MW-D, 9/16/2008: 0.067
Barium, MW-D, 3/26/2009: 0.052
Barium, MW-D, 9/22/2009: 0.073
Barium, MW-D, 3/15/2010: 0.048
Barium, MW-D, 9/8/2010: 0.076
Barium, MW-D, 3/4/2011: 0.053

# VOC Screening



Barium, MW-D, 9/1/2011: 0.061
Barium, MW-D, 3/5/2012: 0.051
Barium, MW-D, 9/26/2012: 0.039
Barium, MW-D, 3/7/2013: 0.03
Barium, MW-D, 9/12/2013: 0.025
Barium, MW-D, 3/24/2014: 0.025
Barium, MW-D, 9/3/2014: 0.036
Barium, MW-D, 3/16/2015: 0.022
Barium, MW-D, 9/3/2015: 0.0357
Barium, MW-D, 3/10/2016: 0.0274
Barium, MW-D, 9/8/2016: 0.0534
Barium, MW-D, 3/2/2017: 0.0519
Barium, MW-D, 9/6/2017: 0.0351
Barium, MW-D, 3/14/2018: 0.0184
Barium, MW-D, 9/5/2018: 0.0221
Barium, MW-D, 3/4/2019: 0.0411
Barium, MW-D, 9/18/2019: 0.0356
Barium, MW-D, 3/30/2020: 0.0234
Barium, MW-D, 9/22/2020: 0.0261
Barium, MW-D, 3/1/2021: 0.0226
Barium, MW-D, 9/2/2021: 0.0262
Barium, MW-27, 9/1/2011: 0.36
Barium, MW-27, 12/28/2011: 0.45
Barium, MW-27, 2/10/2012: 0.42
Barium, MW-27, 3/5/2012: 0.4
Barium, MW-27, 9/26/2012: 0.32
Barium, MW-27, 3/7/2013: 0.3
Barium, MW-27, 9/12/2013: 0.26
Barium, MW-27, 3/24/2014: 0.61
Barium, MW-27, 9/3/2014: 0.36
Barium, MW-27, 9/3/2015: 0.409
Barium, MW-27, 9/8/2016: 0.549
Barium, MW-27, 3/2/2017: 0.417
Barium, MW-27, 9/6/2017: 0.515
Barium, MW-27, 3/14/2018: 0.438
Barium, MW-27, 9/5/2018: 0.426
Barium, MW-27, 3/4/2019: 0.392
Barium, MW-27, 9/18/2019: 0.413
Barium, MW-27, 3/30/2020: 0.427
Barium, MW-27, 9/22/2020: 0.454
Barium, MW-27, 3/1/2021: 0.465
Barium, MW-27, 9/2/2021: 0.425
Barium, MW-28, 6/9/2021: 0.0151
Barium, MW-28, 6/24/2021: 0.0165
Barium, MW-28, 9/2/2021: 0.0127
Barium, MW-29, 5/13/2021: 0.0243
Barium, MW-29, 6/9/2021: 0.0257
Barium, MW-29, 6/24/2021: 0.0251
Barium, MW-29, 9/2/2021: 0.033
Cadmium, MW-21, 9/26/2012: 0.00099
Cadmium, MW-21, 9/12/2013: 0.00053
Cadmium, MW-22, 9/12/2013: 0.00062
Cadmium, MW-24, 9/12/2013: 0.00097
Cadmium, MW-25, 9/26/2012: 0.00077
Cadmium, MW-25, 9/3/2014: 0.00064
Cadmium, MW-B (bg), 9/22/2009: 0.021
Cadmium, MW-C, 9/22/2009: 0.00099
Cadmium, MW-D, 9/26/2012: 0.00058
Carbon Disulfide, MW-28, 5/13/2021: 0.0023
Carbon Disulfide, MW-29, 5/13/2021: 0.00262
Chromium, MW-21, 3/24/2006: 0.002
Chromium, MW-21, 9/26/2007: 0.002

# VOC Screening



Chromium, MW-22, 3/30/2005: 0.001
Chromium, MW-22, 9/28/2005: 0.004
Chromium, MW-22, 3/24/2006: 0.002
Chromium, MW-22, 3/23/2007: 0.001
Chromium, MW-22, 9/26/2007: 0.002
Chromium, MW-22, 3/26/2008: 0.002
Chromium, MW-22, 3/4/2011: 0.0027
Chromium, MW-24, 9/28/2005: 0.01
Chromium, MW-24, 3/24/2006: 0.007
Chromium, MW-24, 3/23/2007: 0.002
Chromium, MW-24, 9/26/2007: 0.002
Chromium, MW-24, 3/26/2008: 0.001
Chromium, MW-24, 3/4/2011: 0.003
Chromium, MW-25, 9/28/2005: 0.006
Chromium, MW-25, 3/24/2006: 0.002
Chromium, MW-25, 3/23/2007: 0.001
Chromium, MW-25, 9/26/2007: 0.001
Chromium, MW-25, 3/30/2020: 0.003 (B)
Chromium, MW-A (bg), 3/24/2006: 0.002
Chromium, MW-A (bg), 3/23/2007: 0.002
Chromium, MW-A (bg), 9/26/2007: 0.009
Chromium, MW-A (bg), 3/4/2011: 0.003
Chromium, MW-A (bg), 3/14/2018: 0.00547
Chromium, MW-A (bg), 3/4/2019: 0.00208 (B)
Chromium, MW-B (bg), 3/24/2006: 0.004
Chromium, MW-B (bg), 3/23/2007: 0.001
Chromium, MW-B (bg), 9/26/2007: 0.001
Chromium, MW-B (bg), 9/22/2009: 0.0043
Chromium, MW-B (bg), 9/6/2017: 0.00238
Chromium, MW-B (bg), 3/4/2019: 0.0036 (B)
Chromium, MW-B (bg), 3/30/2020: 0.00224 (B)
Chromium, MW-B (bg), 9/22/2020: 0.00498
Chromium, MW-B (bg), 9/2/2021: 0.00253
Chromium, MW-C, 3/24/2006: 0.002
Chromium, MW-C, 3/23/2007: 0.001
Chromium, MW-C, 9/26/2007: 0.002
Chromium, MW-D, 3/24/2006: 0.002
Chromium, MW-D, 3/23/2007: 0.002
Chromium, MW-D, 9/26/2007: 0.002
Chromium, MW-D, 3/26/2008: 0.001
Chromium, MW-D, 9/1/2011: 0.0026
Chromium, MW-27, 9/1/2011: 0.024
Chromium, MW-27, 12/28/2011: 0.0049
Chromium, MW-29, 5/13/2021: 0.00312
Cobalt, MW-21, 9/16/2008: 0.0024
Cobalt, MW-21, 9/22/2009: 0.0024
Cobalt, MW-21, 9/8/2010: 0.0027
Cobalt, MW-21, 9/1/2011: 0.0025
Cobalt, MW-21, 9/6/2017: 0.00337
Cobalt, MW-21, 3/14/2018: 0.000446 (J)
Cobalt, MW-21, 9/5/2018: 0.00505
Cobalt, MW-21, 3/4/2019: 0.000809 (J)
Cobalt, MW-21, 9/18/2019: 0.00427
Cobalt, MW-21, 9/22/2020: 0.00446
Cobalt, MW-21, 3/1/2021: 5.1E-05 (J)
Cobalt, MW-21, 9/2/2021: 0.00378
Cobalt, MW-22, 9/6/2017: 0.000373
Cobalt, MW-22, 3/1/2021: 0.000148 (J)
Cobalt, MW-24, 3/30/2005: 0.005
Cobalt, MW-24, 9/28/2005: 0.012
Cobalt, MW-24, 3/24/2006: 0.01
Cobalt, MW-24, 3/23/2007: 0.0095

# VOC Screening



Cobalt, MW-24, 9/26/2007: 0.0079
Cobalt, MW-24, 3/26/2008: 0.0105
Cobalt, MW-24, 9/16/2008: 0.0096
Cobalt, MW-24, 9/1/2011: 0.0075
Cobalt, MW-24, 3/7/2013: 0.01
Cobalt, MW-24, 9/6/2017: 0.00766
Cobalt, MW-24, 3/14/2018: 0.0059
Cobalt, MW-24, 9/5/2018: 0.00819
Cobalt, MW-24, 3/4/2019: 0.00506
Cobalt, MW-24, 9/18/2019: 0.00611
Cobalt, MW-24, 3/30/2020: 0.00509
Cobalt, MW-24, 9/22/2020: 0.00788
Cobalt, MW-24, 3/1/2021: 0.00566
Cobalt, MW-24, 9/2/2021: 0.00549
Cobalt, MW-25, 3/30/2005: 0.005
Cobalt, MW-25, 9/28/2005: 0.01
Cobalt, MW-25, 3/24/2006: 0.009
Cobalt, MW-25, 3/23/2007: 0.0078
Cobalt, MW-25, 9/26/2007: 0.0067
Cobalt, MW-25, 9/16/2008: 0.0044
Cobalt, MW-25, 3/26/2009: 0.004
Cobalt, MW-25, 9/22/2009: 0.0048
Cobalt, MW-25, 9/8/2010: 0.0056
Cobalt, MW-25, 3/4/2011: 0.0038
Cobalt, MW-25, 9/6/2017: 0.00249
Cobalt, MW-25, 3/14/2018: 0.00266
Cobalt, MW-25, 9/5/2018: 0.00571
Cobalt, MW-25, 3/4/2019: 0.00285
Cobalt, MW-25, 9/18/2019: 0.00654
Cobalt, MW-25, 3/30/2020: 0.00295
Cobalt, MW-25, 9/22/2020: 0.00555
Cobalt, MW-25, 3/1/2021: 0.00407
Cobalt, MW-25, 9/2/2021: 0.00357
Cobalt, MW-A (bg), 3/23/2007: 0.0055
Cobalt, MW-A (bg), 9/26/2007: 0.008
Cobalt, MW-A (bg), 9/16/2008: 0.0011
Cobalt, MW-A (bg), 3/14/2018: 0.0023
Cobalt, MW-A (bg), 9/5/2018: 0.000606 (J)
Cobalt, MW-A (bg), 3/4/2019: 0.000695 (J)
Cobalt, MW-A (bg), 9/18/2019: 0.000686 (J)
Cobalt, MW-A (bg), 9/22/2020: 0.000533 (J)
Cobalt, MW-A (bg), 3/1/2021: 0.000215 (J)
Cobalt, MW-A (bg), 9/2/2021: 0.000216 (J)
Cobalt, MW-B (bg), 9/22/2009: 0.0019
Cobalt, MW-B (bg), 3/14/2018: 0.000555 (J)
Cobalt, MW-B (bg), 3/4/2019: 0.000899 (J)
Cobalt, MW-B (bg), 9/18/2019: 0.00058 (J)
Cobalt, MW-B (bg), 3/30/2020: 0.000531 (J)
Cobalt, MW-B (bg), 9/22/2020: 0.000578 (J)
Cobalt, MW-B (bg), 3/1/2021: 0.000433 (J)
Cobalt, MW-B (bg), 9/2/2021: 0.000396 (J)
Cobalt, MW-C, 3/24/2006: 0.011
Cobalt, MW-C, 3/23/2007: 0.0103
Cobalt, MW-C, 9/26/2007: 0.0109
Cobalt, MW-C, 3/26/2008: 0.0096
Cobalt, MW-C, 9/16/2008: 0.011
Cobalt, MW-C, 3/26/2009: 0.0051
Cobalt, MW-C, 9/22/2009: 0.0068
Cobalt, MW-C, 9/8/2010: 0.0057
Cobalt, MW-C, 3/4/2011: 0.0068
Cobalt, MW-C, 9/1/2011: 0.0072
Cobalt, MW-C, 9/3/2015: 0.0133

# VOC Screening



Cobalt, MW-C, 9/6/2017: 0.0126
Cobalt, MW-C, 3/14/2018: 0.00442
Cobalt, MW-C, 9/5/2018: 0.011
Cobalt, MW-C, 3/4/2019: 0.0029
Cobalt, MW-C, 9/18/2019: 0.00716
Cobalt, MW-C, 3/30/2020: 0.00362
Cobalt, MW-C, 9/22/2020: 0.00737
Cobalt, MW-C, 3/1/2021: 0.00224
Cobalt, MW-C, 9/2/2021: 0.0087
Cobalt, MW-D, 3/30/2005: 0.006
Cobalt, MW-D, 9/16/2008: 0.0025
Cobalt, MW-D, 9/22/2009: 0.0051
Cobalt, MW-D, 3/15/2010: 0.0012
Cobalt, MW-D, 9/8/2010: 0.0027
Cobalt, MW-D, 9/1/2011: 0.0038
Cobalt, MW-D, 9/6/2017: 0.00152
Cobalt, MW-D, 3/14/2018: 0.000381 (J)
Cobalt, MW-D, 9/5/2018: 0.000386 (J)
Cobalt, MW-D, 3/4/2019: 0.000334 (J)
Cobalt, MW-D, 9/18/2019: 0.00132 (J)
Cobalt, MW-D, 3/30/2020: 0.000298 (J)
Cobalt, MW-D, 3/1/2021: 0.000957 (J)
Cobalt, MW-D, 9/2/2021: 0.000582 (J)
Cobalt, MW-27, 9/1/2011: 0.003
Cobalt, MW-27, 3/1/2021: 6.19E-05 (J)
Cobalt, MW-27, 9/2/2021: 9.2E-05 (J)
Cobalt, MW-28, 5/13/2021: 0.00972
Cobalt, MW-28, 6/9/2021: 0.00965
Cobalt, MW-28, 6/24/2021: 0.00931
Cobalt, MW-28, 9/2/2021: 0.00826
Cobalt, MW-29, 5/13/2021: 0.0152
Cobalt, MW-29, 6/9/2021: 0.0162
Cobalt, MW-29, 6/24/2021: 0.0142
Cobalt, MW-29, 9/2/2021: 0.0108
Copper, MW-22, 9/28/2005: 0.002
Copper, MW-22, 9/26/2007: 0.003
Copper, MW-24, 9/28/2005: 0.003
Copper, MW-24, 3/24/2006: 0.003
Copper, MW-24, 3/23/2007: 0.002
Copper, MW-24, 9/26/2007: 0.003
Copper, MW-24, 9/5/2018: 0.0123
Copper, MW-24, 3/4/2019: 0.0118
Copper, MW-24, 9/18/2019: 0.0081
Copper, MW-24, 3/30/2020: 0.0349
Copper, MW-24, 9/22/2020: 0.0174
Copper, MW-24, 3/1/2021: 0.0301
Copper, MW-24, 9/2/2021: 0.0273 (B)
Copper, MW-25, 9/16/2008: 0.0013
Copper, MW-25, 9/5/2018: 0.00866 (B)
Copper, MW-25, 3/4/2019: 0.0128
Copper, MW-25, 9/18/2019: 0.00992
Copper, MW-25, 3/30/2020: 0.00687
Copper, MW-25, 9/22/2020: 0.025
Copper, MW-25, 9/2/2021: 0.0132 (B)
Copper, MW-A (bg), 3/30/2005: 0.013
Copper, MW-A (bg), 3/24/2006: 0.007
Copper, MW-A (bg), 3/23/2007: 0.002
Copper, MW-A (bg), 9/26/2007: 0.009
Copper, MW-A (bg), 3/26/2008: 0.004
Copper, MW-A (bg), 9/16/2008: 0.001
Copper, MW-B (bg), 3/23/2007: 0.004
Copper, MW-B (bg), 9/16/2008: 0.0047

# VOC Screening



Copper, MW-B (bg), 9/22/2009: 1.1
Copper, MW-C, 3/23/2007: 0.004
Copper, MW-C, 9/26/2007: 0.003
Copper, MW-C, 3/26/2008: 0.002
Copper, MW-C, 9/16/2008: 0.0015
Copper, MW-C, 9/22/2009: 0.11
Copper, MW-C, 3/4/2019: 0.00943 (B)
Copper, MW-C, 9/18/2019: 0.016
Copper, MW-C, 3/30/2020: 0.0082
Copper, MW-C, 9/22/2020: 0.00634
Copper, MW-C, 3/1/2021: 0.0123
Copper, MW-C, 9/2/2021: 0.0169 (B)
Copper, MW-D, 3/23/2007: 0.006
Copper, MW-D, 9/26/2007: 0.002
Copper, MW-D, 9/22/2009: 0.0072
Copper, MW-D, 9/22/2020: 0.00661
Copper, MW-27, 9/1/2011: 0.0064
Copper, MW-27, 12/28/2011: 0.0026
Copper, MW-27, 2/10/2012: 0.0018
Copper, MW-27, 9/5/2018: 0.00741 (B)
Copper, MW-27, 3/4/2019: 0.00695
Copper, MW-27, 9/18/2019: 0.00564
Copper, MW-27, 9/22/2020: 0.0205
Copper, MW-27, 3/1/2021: 0.00669
Copper, MW-27, 9/2/2021: 0.00908 (B)
Copper, MW-28, 5/13/2021: 0.00882
Copper, MW-28, 6/24/2021: 0.0103 (B)
Copper, MW-29, 5/13/2021: 0.00918
Copper, MW-29, 6/24/2021: 0.00545 (B)
Lead, MW-21, 9/8/2016: 0.00585
Lead, MW-24, 3/30/2005: 0.002
Lead, MW-24, 9/28/2005: 0.002
Lead, MW-24, 3/24/2006: 0.005
Lead, MW-24, 3/23/2007: 0.002
Lead, MW-24, 3/4/2011: 0.0016
Lead, MW-25, 3/30/2005: 0.003
Lead, MW-25, 9/28/2005: 0.002
Lead, MW-25, 9/1/2011: 0.0015
Lead, MW-25, 3/30/2020: 0.00282 (B)
Lead, MW-A (bg), 3/30/2005: 0.002
Lead, MW-A (bg), 3/26/2008: 0.003
Lead, MW-A (bg), 3/4/2011: 0.0016
Lead, MW-A (bg), 3/14/2018: 0.00214
Lead, MW-B (bg), 3/30/2005: 0.005
Lead, MW-B (bg), 3/24/2006: 0.002
Lead, MW-B (bg), 3/23/2007: 0.002
Lead, MW-C, 3/30/2005: 0.002
Lead, MW-C, 3/24/2006: 0.003
Lead, MW-C, 3/23/2007: 0.002
Lead, MW-C, 3/26/2008: 0.002
Lead, MW-C, 9/22/2009: 0.014
Lead, MW-D, 3/30/2005: 0.002
Lead, MW-D, 3/24/2006: 0.006
Lead, MW-D, 3/23/2007: 0.003
Lead, MW-D, 3/26/2008: 0.003
Lead, MW-27, 9/1/2011: 0.0051
Lead, MW-27, 12/28/2011: 0.011
Lead, MW-27, 2/10/2012: 0.0035
Mercury, MW-22, 3/2/2017: 0.000217
Mercury, MW-24, 9/22/2020: 0.00022
Mercury, MW-D, 9/16/2008: 0.0002
Mercury, MW-27, 2/10/2012: 2E-05

# VOC Screening



Nickel, MW-21, 3/30/2005: 0.004
Nickel, MW-21, 9/28/2005: 0.006
Nickel, MW-21, 3/24/2006: 0.006
Nickel, MW-21, 3/23/2007: 0.007
Nickel, MW-21, 9/26/2007: 0.0055
Nickel, MW-21, 3/26/2008: 0.0065
Nickel, MW-21, 9/16/2008: 0.0043
Nickel, MW-21, 3/26/2009: 0.0022
Nickel, MW-21, 9/22/2009: 0.0044
Nickel, MW-21, 3/15/2010: 0.0015
Nickel, MW-21, 9/8/2010: 0.0043
Nickel, MW-21, 3/4/2011: 0.0011
Nickel, MW-21, 9/1/2011: 0.0031
Nickel, MW-21, 9/6/2017: 0.0056
Nickel, MW-21, 3/14/2018: 0.00409
Nickel, MW-21, 9/5/2018: 0.00804
Nickel, MW-21, 3/4/2019: 0.00239
Nickel, MW-21, 9/18/2019: 0.00523
Nickel, MW-21, 9/22/2020: 0.00641
Nickel, MW-21, 3/1/2021: 0.00249
Nickel, MW-21, 9/2/2021: 0.00645
Nickel, MW-22, 3/30/2005: 0.002
Nickel, MW-22, 9/28/2005: 0.002
Nickel, MW-22, 3/23/2007: 0.002
Nickel, MW-22, 3/26/2008: 0.0029
Nickel, MW-22, 9/16/2008: 0.0013
Nickel, MW-22, 9/22/2009: 0.0032
Nickel, MW-22, 3/15/2010: 0.0015
Nickel, MW-22, 9/8/2010: 0.0015
Nickel, MW-22, 3/4/2011: 0.0026
Nickel, MW-22, 9/6/2017: 0.0023
Nickel, MW-22, 3/14/2018: 0.00376
Nickel, MW-24, 3/30/2005: 0.013
Nickel, MW-24, 9/28/2005: 0.021
Nickel, MW-24, 3/24/2006: 0.018
Nickel, MW-24, 9/26/2006: 0.005
Nickel, MW-24, 3/23/2007: 0.0203
Nickel, MW-24, 9/26/2007: 0.019
Nickel, MW-24, 3/26/2008: 0.021
Nickel, MW-24, 9/16/2008: 0.02
Nickel, MW-24, 3/26/2009: 0.001
Nickel, MW-24, 9/22/2009: 0.0021
Nickel, MW-24, 3/15/2010: 0.0015
Nickel, MW-24, 9/8/2010: 0.0016
Nickel, MW-24, 3/4/2011: 0.0035
Nickel, MW-24, 9/1/2011: 0.017
Nickel, MW-24, 3/7/2013: 0.022
Nickel, MW-24, 9/8/2016: 0.0211
Nickel, MW-24, 3/2/2017: 0.0153
Nickel, MW-24, 9/6/2017: 0.0144
Nickel, MW-24, 3/14/2018: 0.00919
Nickel, MW-24, 9/5/2018: 0.0174
Nickel, MW-24, 3/4/2019: 0.0071
Nickel, MW-24, 9/18/2019: 0.0105
Nickel, MW-24, 3/30/2020: 0.00709
Nickel, MW-24, 9/22/2020: 0.0142
Nickel, MW-24, 3/1/2021: 0.00708
Nickel, MW-24, 9/2/2021: 0.00663
Nickel, MW-25, 3/30/2005: 0.024
Nickel, MW-25, 9/28/2005: 0.021
Nickel, MW-25, 3/24/2006: 0.027
Nickel, MW-25, 9/26/2006: 0.002

# VOC Screening



Nickel, MW-25, 3/23/2007: 0.0243
Nickel, MW-25, 9/26/2007: 0.0216
Nickel, MW-25, 3/26/2008: 0.0271
Nickel, MW-25, 9/16/2008: 0.015
Nickel, MW-25, 3/26/2009: 0.015
Nickel, MW-25, 9/22/2009: 0.016
Nickel, MW-25, 9/8/2010: 0.018
Nickel, MW-25, 3/4/2011: 0.014
Nickel, MW-25, 9/1/2011: 0.0055
Nickel, MW-25, 9/3/2014: 0.022
Nickel, MW-25, 9/3/2015: 0.0165
Nickel, MW-25, 3/10/2016: 0.0114
Nickel, MW-25, 9/8/2016: 0.0244
Nickel, MW-25, 3/2/2017: 0.0219
Nickel, MW-25, 9/6/2017: 0.0116
Nickel, MW-25, 3/14/2018: 0.012
Nickel, MW-25, 9/5/2018: 0.0161
Nickel, MW-25, 3/4/2019: 0.0149
Nickel, MW-25, 9/18/2019: 0.0188
Nickel, MW-25, 3/30/2020: 0.0096
Nickel, MW-25, 9/22/2020: 0.0236
Nickel, MW-25, 3/1/2021: 0.0265
Nickel, MW-25, 9/2/2021: 0.0674
Nickel, MW-25, 10/28/2021: 0.0156
Nickel, MW-A (bg), 3/30/2005: 0.004
Nickel, MW-A (bg), 3/24/2006: 0.005
Nickel, MW-A (bg), 3/23/2007: 0.0088
Nickel, MW-A (bg), 9/26/2007: 0.0175
Nickel, MW-A (bg), 3/26/2008: 0.0036
Nickel, MW-A (bg), 9/16/2008: 0.0018
Nickel, MW-A (bg), 3/26/2009: 0.001
Nickel, MW-A (bg), 9/22/2009: 0.0021
Nickel, MW-A (bg), 3/15/2010: 0.0015
Nickel, MW-A (bg), 9/8/2010: 0.0016
Nickel, MW-A (bg), 3/4/2011: 0.0035
Nickel, MW-A (bg), 9/1/2011: 0.0012
Nickel, MW-A (bg), 3/14/2018: 0.00776
Nickel, MW-A (bg), 3/4/2019: 0.00284 (B)
Nickel, MW-A (bg), 9/18/2019: 0.002
Nickel, MW-A (bg), 3/1/2021: 0.00241
Nickel, MW-B (bg), 3/24/2006: 0.004
Nickel, MW-B (bg), 3/23/2007: 0.002
Nickel, MW-B (bg), 9/22/2009: 0.0034
Nickel, MW-B (bg), 3/4/2019: 0.00387
Nickel, MW-B (bg), 3/30/2020: 0.00211
Nickel, MW-B (bg), 9/22/2020: 0.00378
Nickel, MW-C, 3/30/2005: 0.005
Nickel, MW-C, 3/24/2006: 0.031
Nickel, MW-C, 9/26/2006: 0.012
Nickel, MW-C, 3/23/2007: 0.0309
Nickel, MW-C, 9/26/2007: 0.0343
Nickel, MW-C, 3/26/2008: 0.0285
Nickel, MW-C, 9/16/2008: 0.038
Nickel, MW-C, 3/26/2009: 0.019
Nickel, MW-C, 9/22/2009: 0.024
Nickel, MW-C, 3/15/2010: 0.0082
Nickel, MW-C, 9/8/2010: 0.02
Nickel, MW-C, 3/4/2011: 0.025
Nickel, MW-C, 9/1/2011: 0.024
Nickel, MW-C, 3/5/2012: 0.02
Nickel, MW-C, 9/26/2012: 0.027
Nickel, MW-C, 3/24/2014: 0.023

# VOC Screening



Nickel, MW-C, 9/3/2014: 0.022
Nickel, MW-C, 3/16/2015: 0.026
Nickel, MW-C, 9/3/2015: 0.0347
Nickel, MW-C, 3/10/2016: 0.0152
Nickel, MW-C, 9/8/2016: 0.0256
Nickel, MW-C, 3/2/2017: 0.0218
Nickel, MW-C, 9/6/2017: 0.0282
Nickel, MW-C, 3/14/2018: 0.0348
Nickel, MW-C, 9/5/2018: 0.0182
Nickel, MW-C, 3/4/2019: 0.0137
Nickel, MW-C, 9/18/2019: 0.019
Nickel, MW-C, 3/30/2020: 0.015
Nickel, MW-C, 9/22/2020: 0.0225
Nickel, MW-C, 3/1/2021: 0.0199
Nickel, MW-C, 9/2/2021: 0.0226
Nickel, MW-D, 3/30/2005: 0.024
Nickel, MW-D, 3/24/2006: 0.007
Nickel, MW-D, 3/23/2007: 0.005
Nickel, MW-D, 9/26/2007: 0.0059
Nickel, MW-D, 3/26/2008: 0.007
Nickel, MW-D, 9/16/2008: 0.004
Nickel, MW-D, 3/26/2009: 0.0022
Nickel, MW-D, 9/22/2009: 0.004
Nickel, MW-D, 3/15/2010: 0.002
Nickel, MW-D, 9/8/2010: 0.0037
Nickel, MW-D, 3/4/2011: 0.0015
Nickel, MW-D, 9/1/2011: 0.003
Nickel, MW-D, 9/6/2017: 0.00497
Nickel, MW-D, 3/14/2018: 0.00227
Nickel, MW-D, 9/5/2018: 0.00328
Nickel, MW-D, 3/4/2019: 0.00269 (B)
Nickel, MW-D, 9/18/2019: 0.00295
Nickel, MW-27, 9/1/2011: 0.015
Nickel, MW-27, 12/28/2011: 0.0066
Nickel, MW-27, 9/6/2017: 0.0021
Nickel, MW-27, 3/14/2018: 0.00551
Nickel, MW-27, 3/4/2019: 0.00366
Nickel, MW-27, 9/18/2019: 0.00265
Nickel, MW-27, 3/1/2021: 0.0161
Nickel, MW-27, 9/2/2021: 0.00224
Nickel, MW-28, 5/13/2021: 0.0255
Nickel, MW-28, 6/9/2021: 0.0176
Nickel, MW-28, 6/24/2021: 0.015
Nickel, MW-28, 9/2/2021: 0.0226
Nickel, MW-28, 10/28/2021: 0.01
Nickel, MW-29, 5/13/2021: 0.0159
Nickel, MW-29, 6/9/2021: 0.0111
Nickel, MW-29, 6/24/2021: 0.0151
Nickel, MW-29, 9/2/2021: 0.00736
Selenium, MW-21, 9/22/2009: 0.0013
Selenium, MW-25, 9/16/2008: 0.0051
Selenium, MW-25, 3/26/2009: 0.0042
Selenium, MW-25, 9/22/2009: 0.0021
Selenium, MW-25, 3/15/2010: 0.0046
Selenium, MW-25, 9/8/2010: 0.0019
Selenium, MW-25, 3/4/2011: 0.003
Selenium, MW-25, 9/1/2011: 0.0066
Selenium, MW-25, 3/5/2012: 0.0077
Selenium, MW-25, 9/26/2012: 0.0068
Selenium, MW-25, 3/7/2013: 0.0057
Selenium, MW-25, 9/12/2013: 0.0086
Selenium, MW-25, 3/24/2014: 0.013

# VOC Screening



Selenium, MW-25, 9/3/2014: 0.0021
Selenium, MW-25, 3/16/2015: 0.013
Selenium, MW-25, 3/10/2016: 0.0134
Selenium, MW-25, 3/2/2017: 0.00492
Selenium, MW-25, 9/6/2017: 0.00288
Selenium, MW-25, 3/14/2018: 0.00427
Selenium, MW-25, 3/30/2020: 0.00327
Selenium, MW-B (bg), 9/22/2009: 0.0022
Selenium, MW-C, 9/22/2009: 0.0014
Selenium, MW-C, 9/8/2010: 0.0013
Selenium, MW-C, 3/7/2013: 0.0011
Selenium, MW-C, 3/4/2019: 0.00352
Selenium, MW-C, 3/30/2020: 0.00378
Silver, MW-21, 3/7/2013: 0.018
Silver, MW-A (bg), 9/1/2011: 0.0017
Tin, MW-B (bg), 3/1/2021: 0.00234
Tin, MW-C, 3/4/2019: 0.00276
Tin, MW-28, 10/28/2021: 0.000879 (J)
Vanadium, MW-21, 3/24/2006: 0.005
Vanadium, MW-21, 3/23/2007: 0.037
Vanadium, MW-21, 9/26/2007: 0.101
Vanadium, MW-22, 9/28/2005: 0.014
Vanadium, MW-22, 3/24/2006: 0.005
Vanadium, MW-22, 3/23/2007: 0.043
Vanadium, MW-22, 9/26/2007: 0.094
Vanadium, MW-22, 3/26/2008: 0.034
Vanadium, MW-22, 3/4/2011: 0.0032
Vanadium, MW-24, 9/28/2005: 0.012
Vanadium, MW-24, 3/24/2006: 0.004
Vanadium, MW-24, 3/23/2007: 0.041
Vanadium, MW-24, 9/26/2007: 0.082
Vanadium, MW-24, 3/26/2008: 0.047
Vanadium, MW-25, 9/28/2005: 0.009
Vanadium, MW-25, 3/23/2007: 0.036
Vanadium, MW-25, 9/26/2007: 0.144
Vanadium, MW-25, 3/26/2008: 0.051
Vanadium, MW-A (bg), 3/24/2006: 0.004
Vanadium, MW-B (bg), 3/30/2005: 0.002
Vanadium, MW-B (bg), 3/24/2006: 0.003
Vanadium, MW-C, 3/23/2007: 0.022
Vanadium, MW-C, 9/26/2007: 0.145
Vanadium, MW-C, 3/26/2008: 0.053
Vanadium, MW-D, 3/24/2006: 0.004
Vanadium, MW-D, 3/23/2007: 0.029
Vanadium, MW-D, 9/26/2007: 0.154
Vanadium, MW-D, 3/26/2008: 0.066
Vanadium, MW-27, 9/1/2011: 0.017
Vanadium, MW-27, 12/28/2011: 0.0036
Zinc, MW-21, 3/30/2005: 0.003
Zinc, MW-21, 9/28/2005: 0.006
Zinc, MW-21, 3/24/2006: 0.005
Zinc, MW-21, 3/23/2007: 0.01
Zinc, MW-21, 9/26/2007: 0.011
Zinc, MW-21, 3/26/2008: 0.004
Zinc, MW-21, 9/22/2009: 0.057
Zinc, MW-21, 9/8/2010: 0.012
Zinc, MW-21, 9/8/2016: 0.0257
Zinc, MW-21, 3/2/2017: 0.0456
Zinc, MW-22, 3/30/2005: 0.06
Zinc, MW-22, 9/28/2005: 0.005
Zinc, MW-22, 3/24/2006: 0.012
Zinc, MW-22, 3/23/2007: 0.019

# VOC Screening



Zinc, MW-22, 9/26/2007: 0.007
Zinc, MW-22, 3/26/2008: 0.021
Zinc, MW-22, 9/16/2008: 0.04
Zinc, MW-22, 9/22/2009: 0.014
Zinc, MW-22, 9/8/2010: 0.014
Zinc, MW-22, 3/4/2011: 0.014
Zinc, MW-22, 9/18/2019: 0.0452
Zinc, MW-24, 3/30/2005: 0.034
Zinc, MW-24, 9/28/2005: 0.062
Zinc, MW-24, 3/24/2006: 0.052
Zinc, MW-24, 9/26/2006: 0.06
Zinc, MW-24, 3/23/2007: 0.06
Zinc, MW-24, 9/26/2007: 0.06
Zinc, MW-24, 3/26/2008: 0.06
Zinc, MW-24, 9/16/2008: 0.077
Zinc, MW-24, 9/1/2011: 0.034
Zinc, MW-24, 3/5/2012: 0.03
Zinc, MW-24, 3/7/2013: 0.037
Zinc, MW-24, 9/12/2013: 0.012
Zinc, MW-24, 3/24/2014: 0.034
Zinc, MW-24, 9/3/2014: 0.018
Zinc, MW-24, 9/8/2016: 0.033
Zinc, MW-24, 3/2/2017: 0.0279
Zinc, MW-24, 9/5/2018: 0.0955
Zinc, MW-24, 3/4/2019: 0.0354
Zinc, MW-24, 9/18/2019: 0.0634
Zinc, MW-24, 3/30/2020: 0.0582
Zinc, MW-24, 9/22/2020: 0.0739 (B)
Zinc, MW-24, 3/1/2021: 0.0833 (B)
Zinc, MW-24, 9/2/2021: 0.0397
Zinc, MW-25, 3/30/2005: 0.058
Zinc, MW-25, 9/28/2005: 0.046
Zinc, MW-25, 3/24/2006: 0.064
Zinc, MW-25, 9/26/2006: 0.044
Zinc, MW-25, 3/23/2007: 0.071
Zinc, MW-25, 9/26/2007: 0.054
Zinc, MW-25, 3/26/2008: 0.063
Zinc, MW-25, 9/16/2008: 0.072
Zinc, MW-25, 3/26/2009: 0.036
Zinc, MW-25, 9/22/2009: 0.043
Zinc, MW-25, 3/15/2010: 0.026
Zinc, MW-25, 9/8/2010: 0.044
Zinc, MW-25, 3/4/2011: 0.033
Zinc, MW-25, 9/1/2011: 0.016
Zinc, MW-25, 3/5/2012: 0.044
Zinc, MW-25, 9/26/2012: 0.02
Zinc, MW-25, 3/7/2013: 0.032
Zinc, MW-25, 9/12/2013: 0.013
Zinc, MW-25, 3/24/2014: 0.029
Zinc, MW-25, 9/3/2015: 0.0298
Zinc, MW-25, 9/8/2016: 0.116
Zinc, MW-25, 3/2/2017: 0.0736
Zinc, MW-25, 9/6/2017: 0.0265
Zinc, MW-25, 9/5/2018: 0.0643
Zinc, MW-25, 3/4/2019: 0.0792
Zinc, MW-25, 9/18/2019: 0.185
Zinc, MW-25, 3/30/2020: 0.174
Zinc, MW-25, 6/2/2020: 0.229
Zinc, MW-25, 9/22/2020: 0.13
Zinc, MW-25, 3/1/2021: 0.0811
Zinc, MW-25, 9/2/2021: 0.0681
Zinc, MW-A (bg), 3/30/2005: 0.013

# VOC Screening



Zinc, MW-A (bg), 3/24/2006: 0.013
Zinc, MW-A (bg), 9/26/2006: 0.005
Zinc, MW-A (bg), 3/23/2007: 0.023
Zinc, MW-A (bg), 9/26/2007: 0.045
Zinc, MW-A (bg), 3/26/2008: 0.011
Zinc, MW-B (bg), 3/30/2005: 0.004
Zinc, MW-B (bg), 3/24/2006: 0.009
Zinc, MW-B (bg), 9/26/2006: 0.009
Zinc, MW-B (bg), 3/23/2007: 0.023
Zinc, MW-B (bg), 9/26/2007: 0.009
Zinc, MW-B (bg), 3/26/2008: 0.009
Zinc, MW-B (bg), 9/22/2020: 0.0257
Zinc, MW-C, 3/30/2005: 0.005
Zinc, MW-C, 3/24/2006: 0.073
Zinc, MW-C, 9/26/2006: 0.053
Zinc, MW-C, 3/23/2007: 0.068
Zinc, MW-C, 9/26/2007: 0.06
Zinc, MW-C, 3/26/2008: 0.052
Zinc, MW-C, 9/16/2008: 0.084
Zinc, MW-C, 3/26/2009: 0.046
Zinc, MW-C, 9/22/2009: 0.073
Zinc, MW-C, 3/15/2010: 0.028
Zinc, MW-C, 9/8/2010: 0.046
Zinc, MW-C, 3/4/2011: 0.056
Zinc, MW-C, 9/1/2011: 0.02
Zinc, MW-C, 3/5/2012: 0.012
Zinc, MW-C, 3/7/2013: 0.01
Zinc, MW-C, 9/12/2013: 0.014
Zinc, MW-C, 3/24/2014: 0.027
Zinc, MW-C, 9/3/2014: 0.025
Zinc, MW-C, 3/16/2015: 0.047
Zinc, MW-C, 9/3/2015: 0.0427
Zinc, MW-C, 3/10/2016: 0.0438
Zinc, MW-C, 9/8/2016: 0.0447
Zinc, MW-C, 3/2/2017: 0.0891
Zinc, MW-C, 9/6/2017: 0.0702
Zinc, MW-C, 3/14/2018: 0.03
Zinc, MW-C, 9/5/2018: 0.0724
Zinc, MW-C, 3/4/2019: 0.053
Zinc, MW-C, 9/18/2019: 0.223
Zinc, MW-C, 3/30/2020: 0.415
Zinc, MW-C, 9/22/2020: 0.0797
Zinc, MW-C, 3/1/2021: 0.089
Zinc, MW-C, 9/2/2021: 0.0956
Zinc, MW-D, 3/30/2005: 0.056
Zinc, MW-D, 3/24/2006: 0.015
Zinc, MW-D, 3/23/2007: 0.034
Zinc, MW-D, 9/26/2007: 0.009
Zinc, MW-D, 3/26/2008: 0.007
Zinc, MW-D, 9/8/2016: 0.0319
Zinc, MW-D, 9/5/2018: 0.0252 (B)
Zinc, MW-D, 9/22/2020: 0.0336
Zinc, MW-27, 9/1/2011: 1.9
Zinc, MW-27, 12/28/2011: 0.056
Zinc, MW-27, 2/10/2012: 0.076
Zinc, MW-27, 3/5/2012: 0.014
Zinc, MW-27, 3/4/2019: 0.0336
Zinc, MW-27, 9/18/2019: 0.0919
Zinc, MW-27, 3/30/2020: 0.104
Zinc, MW-27, 6/2/2020: 0.12
Zinc, MW-27, 9/22/2020: 0.0605 (B)
Zinc, MW-27, 3/1/2021: 0.048

# VOC Screening



Zinc, MW-27, 9/2/2021: 0.0317
Zinc, MW-28, 5/13/2021: 0.0468
Zinc, MW-28, 6/9/2021: 0.138
Zinc, MW-28, 6/24/2021: 0.115
Zinc, MW-29, 5/13/2021: 0.0305
Zinc, MW-29, 6/9/2021: 0.0641
Zinc, MW-29, 6/24/2021: 0.0598 (B)

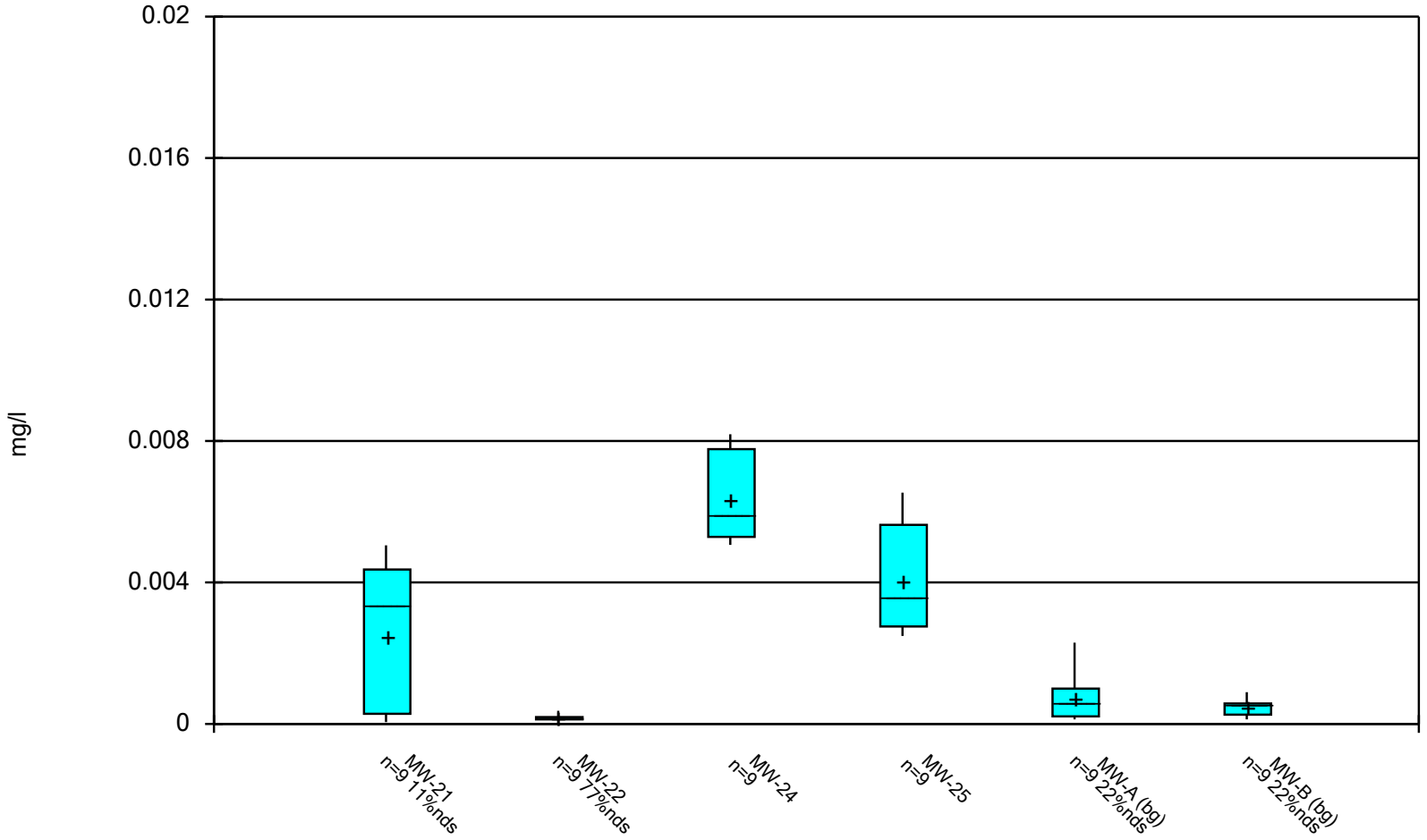
# *APPENDIX G*

# Box & Whiskers Plot

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas  Printed 11/17/2021, 2:34 PM

| Constituent | Well | N | Mean | Std. Dev. | Std. Err. | Median | Min. | Max. | %NDs |
|---|---|---|---|---|---|---|---|---|---|
| Cobalt (mg/l) | MW-21 | 9 | 0.002485 | 0.002079 | 0.0006929 | 0.00337 | 0.000051 | 0.00505 | 11.11 |
| Cobalt (mg/l) | MW-22 | 9 | 0.000... | 0.0000... | 0.0000... | 0.00013 | 0.000... | 0.000373 | 77.78 |
| Cobalt (mg/l) | MW-24 | 9 | 0.006338 | 0.001233 | 0.0004111 | 0.0059 | 0.00506 | 0.00819 | 0 |
| Cobalt (mg/l) | MW-25 | 9 | 0.004043 | 0.001519 | 0.0005062 | 0.00357 | 0.00249 | 0.00654 | 0 |
| Cobalt (mg/l) | MW-A (bg) | 9 | 0.000... | 0.0006833 | 0.0002278 | 0.000606 | 0.00013 | 0.0023 | 22.22 |
| Cobalt (mg/l) | MW-B (bg) | 9 | 0.000... | 0.000239 | 0.0000... | 0.000531 | 0.00013 | 0.000899 | 22.22 |
| Cobalt (mg/l) | MW-C | 9 | 0.006668 | 0.003657 | 0.001219 | 0.00716 | 0.00224 | 0.0126 | 0 |
| Cobalt (mg/l) | MW-D | 9 | 0.000... | 0.0004792 | 0.0001597 | 0.000386 | 0.000... | 0.00152 | 11.11 |
| Cobalt (mg/l) | MW-27 | 9 | 0.000... | 0.0000... | 0.0000... | 0.00013 | 0.000... | 0.000... | 77.78 |
| Cobalt (mg/l) | MW-28 | 4 | 0.009235 | 0.0006742 | 0.0003371 | 0.00948 | 0.00826 | 0.00972 | 0 |
| Cobalt (mg/l) | MW-29 | 4 | 0.0141 | 0.002347 | 0.001173 | 0.0147 | 0.0108 | 0.0162 | 0 |

# Box & Whiskers Plot




Constituent: Cobalt  Analysis Run 11/17/2021 2:33 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

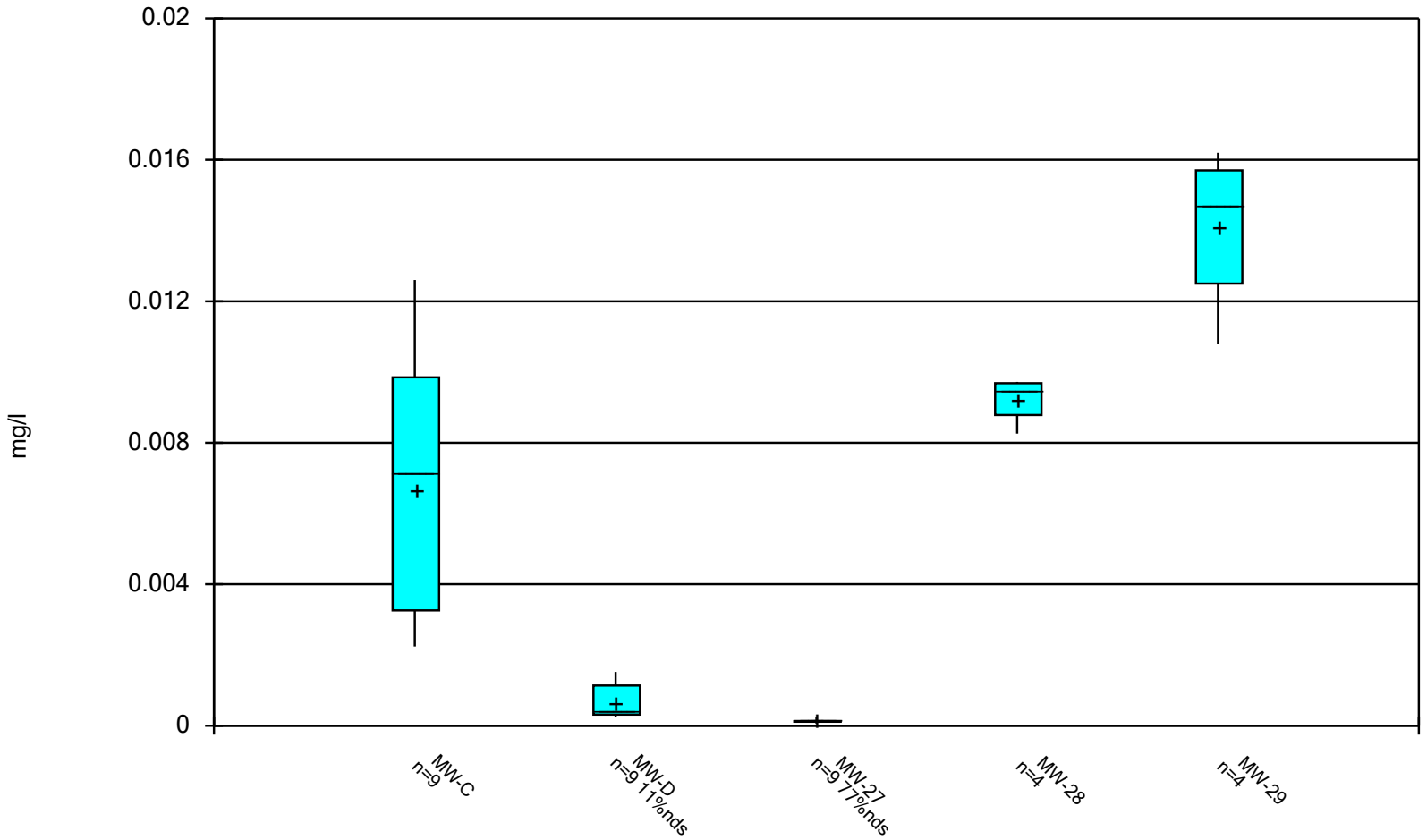
# Box & Whiskers Plot

Constituent: Cobalt (mg/l) Analysis Run 11/17/2021 2:34 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-21 | MW-22 | MW-24 | MW-25 | MW-A (bg) | MW-B (bg) |
|---|---|---|---|---|---|---|
| 9/6/2017 | 0.00337 | 0.000373 | 0.00766 | 0.00249 | <0.00026 | <0.00026 |
| 3/14/2018 | 0.000446 (J) | <0.00026 | 0.0059 | 0.00266 | 0.0023 | 0.000555 (J) |
| 9/5/2018 | 0.00505 | <0.00026 | 0.00819 | 0.00571 | 0.000606 (J) | <0.00026 |
| 3/4/2019 | 0.000809 (J) | <0.00026 | 0.00506 | 0.00285 | 0.000695 (J) | 0.000899 (J) |
| 9/18/2019 | 0.00427 | <0.00026 | 0.00611 | 0.00654 | 0.000686 (J) | 0.00058 (J) |
| 3/30/2020 | <0.00026 | <0.00026 | 0.00509 | 0.00295 | <0.0026 | 0.000531 (J) |
| 9/22/2020 | 0.00446 | <0.000477 | 0.00788 | 0.00555 | 0.000533 (J) | 0.000578 (J) |
| 3/1/2021 | 5.1E-05 (J) | 0.000148 (J) | 0.00566 | 0.00407 | 0.000215 (J) | 0.000433 (J) |
| 9/2/2021 | 0.00378 | <5.96E-05 | 0.00549 | 0.00357 | 0.000216 (J) | 0.000396 (J) |
| Median | 0.00337 | 0.00013 | 0.0059 | 0.00357 | 0.000606 | 0.000531 |
| LowerQ. | 0.000288 | 0.00013 | 0.00529 | 0.002755 | 0.0002155 | 0.000263 |
| UpperQ. | 0.004365 | 0.0001932 | 0.00777 | 0.00563 | 0.0009975 | 0.000579 |
| Min | 5.1E-05 | 2.98E-05 | 0.00506 | 0.00249 | 0.00013 | 0.00013 |
| Max | 0.00505 | 0.000373 | 0.00819 | 0.00654 | 0.0023 | 0.000899 |
| Mean | 0.002485 | 0.0001599 | 0.006338 | 0.004043 | 0.0007423 | 0.0004702 |

# Box & Whiskers Plot




Constituent: Cobalt  Analysis Run 11/17/2021 2:33 PM  View: Shelby County Statistics Data

Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# Box & Whiskers Plot

Constituent: Cobalt (mg/l) Analysis Run 11/17/2021 2:34 PM View: Shelby County Statistics Data

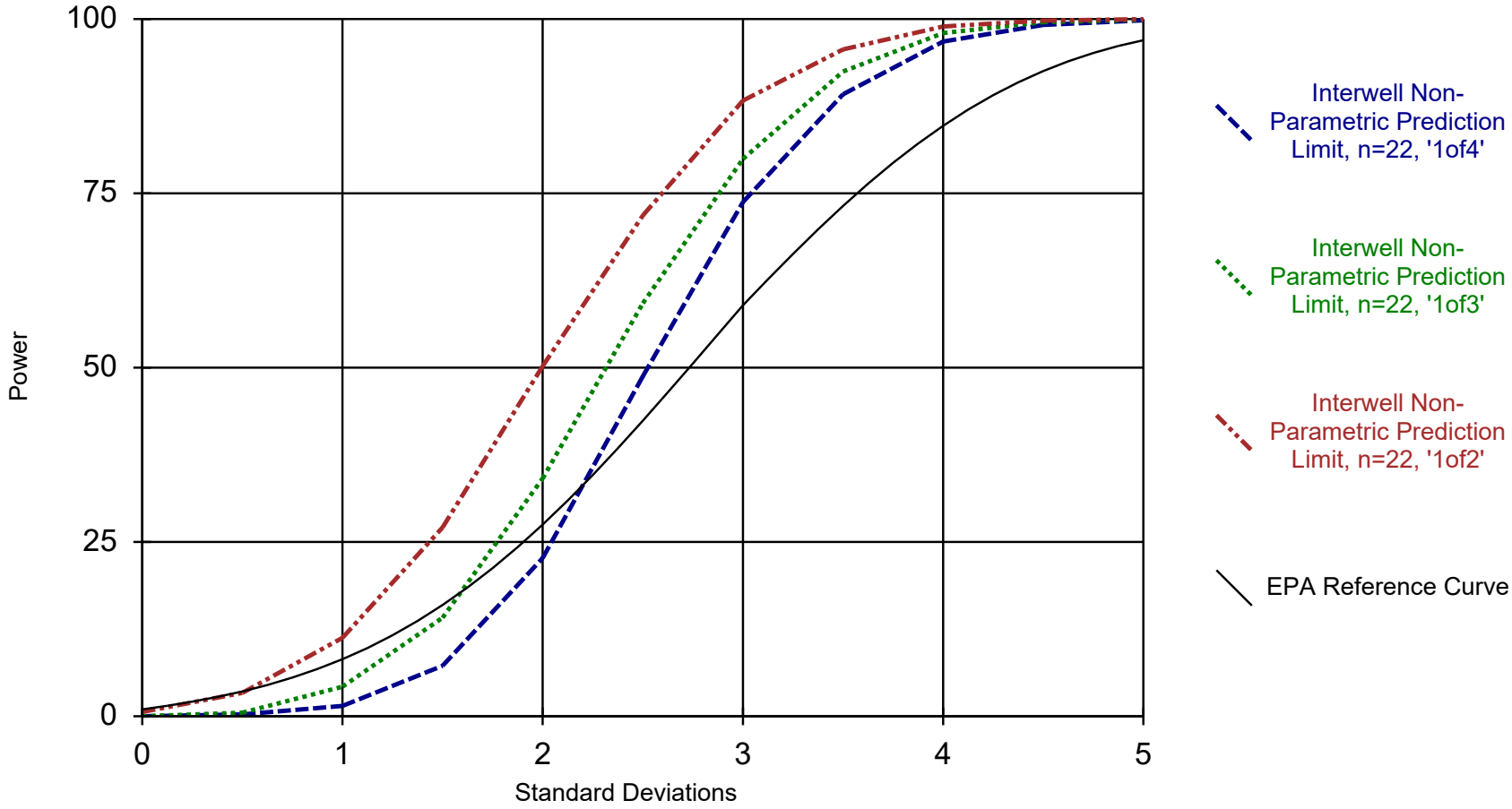
Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

| | MW-C | MW-D | MW-27 | MW-28 | MW-29 |
|---|---|---|---|---|---|
| 9/6/2017 | 0.0126 | 0.00152 | <0.00026 | | |
| 3/14/2018 | 0.00442 | 0.000381 (J) | <0.00026 | | |
| 9/5/2018 | 0.011 | 0.000386 (J) | <0.00026 | | |
| 3/4/2019 | 0.0029 | 0.000334 (J) | <0.00026 | | |
| 9/18/2019 | 0.00716 | 0.00132 (J) | <0.00026 | | |
| 3/30/2020 | 0.00362 | 0.000298 (J) | <0.00026 | | |
| 9/22/2020 | 0.00737 | <0.000477 | <0.000477 | | |
| 3/1/2021 | 0.00224 | 0.000957 (J) | 6.19E-05 (J) | | |
| 5/13/2021 | | | | 0.00972 | 0.0152 |
| 6/9/2021 | | | | 0.00965 | 0.0162 |
| 6/24/2021 | | | | 0.00931 | 0.0142 |
| 9/2/2021 | 0.0087 | 0.000582 (J) | 9.2E-05 (J) | 0.00826 | 0.0108 |
| Median | 0.00716 | 0.000386 | 0.00013 | 0.00948 | 0.0147 |
| LowerQ. | 0.00326 | 0.000316 | 0.000111 | 0.008785 | 0.0125 |
| UpperQ. | 0.00985 | 0.001139 | 0.00013 | 0.009685 | 0.0157 |
| Min | 0.00224 | 0.0002385 | 6.19E-05 | 0.00826 | 0.0108 |
| Max | 0.0126 | 0.00152 | 0.0002385 | 0.00972 | 0.0162 |
| Mean | 0.006668 | 0.0006685 | 0.0001303 | 0.009235 | 0.0141 |

# *APPENDIX H*

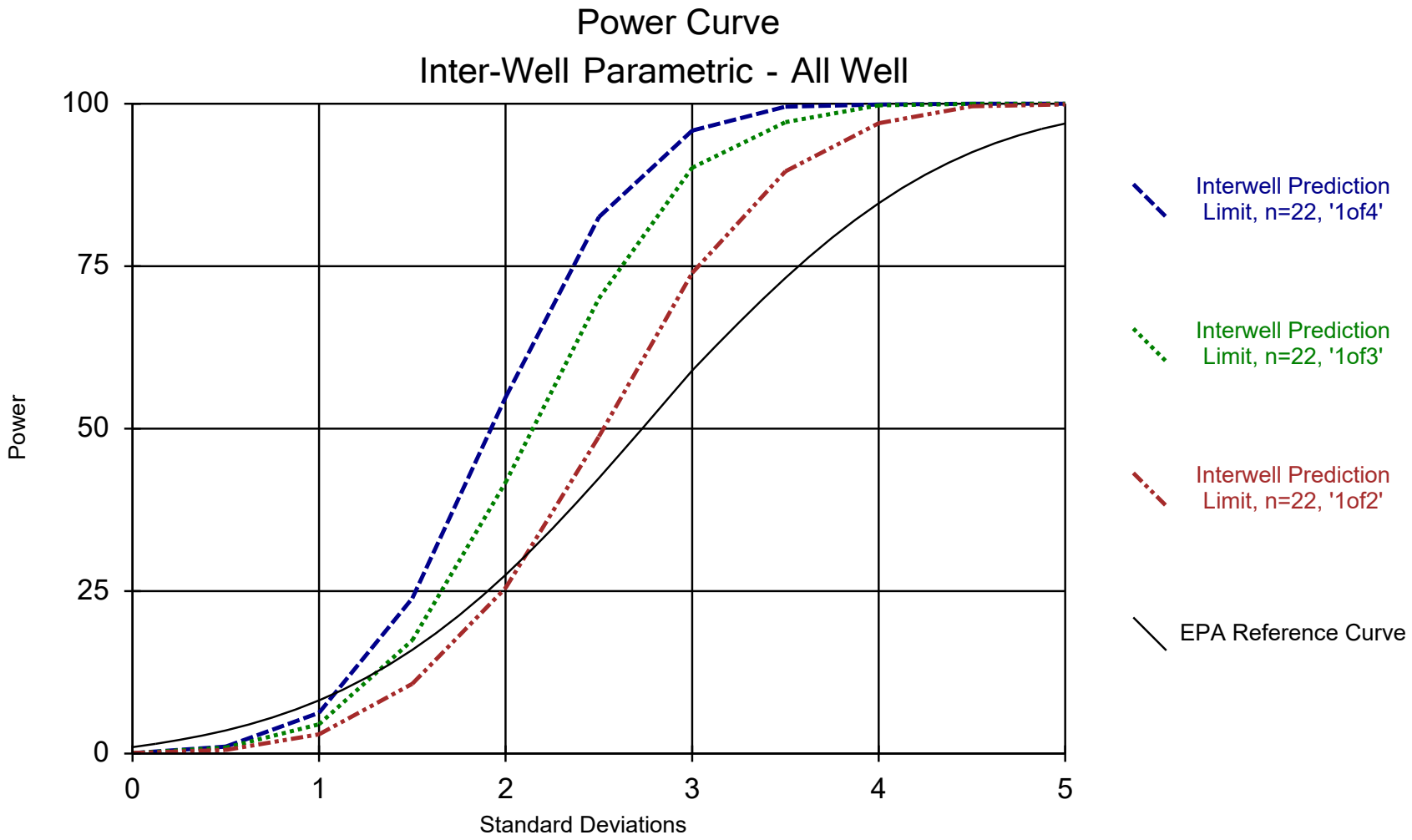
# Power Curve

## Inter-Well Non-Parametric - All Wells




Analysis Run 9/2/2021 12:39 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

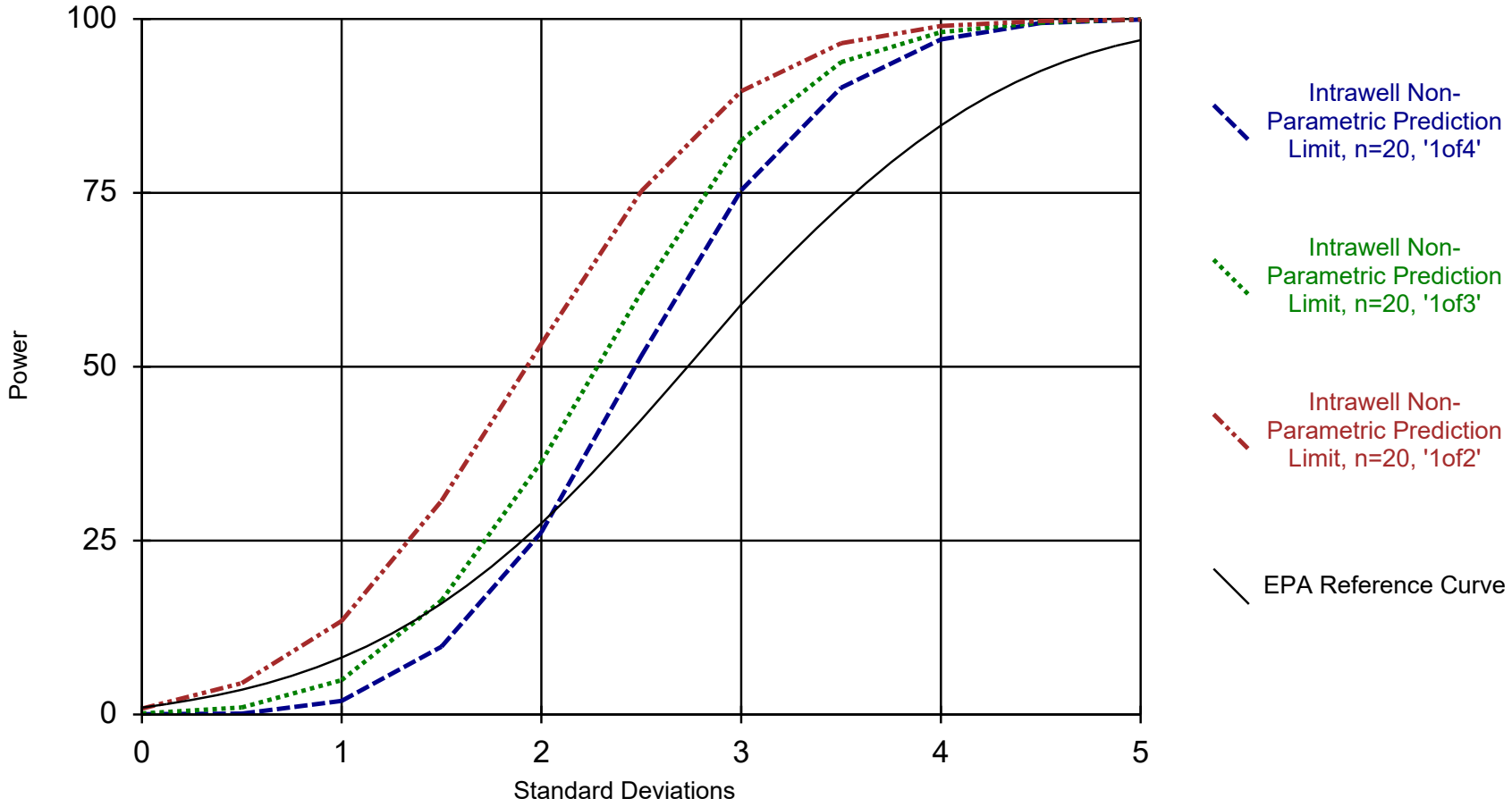



Analysis Run 9/2/2021 12:36 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

# Power Curve

Intra-Well Non-Parametric - Barium (MW-21, MW-22, MW-24, MW-25, MW-27, MW-C, MW-D)

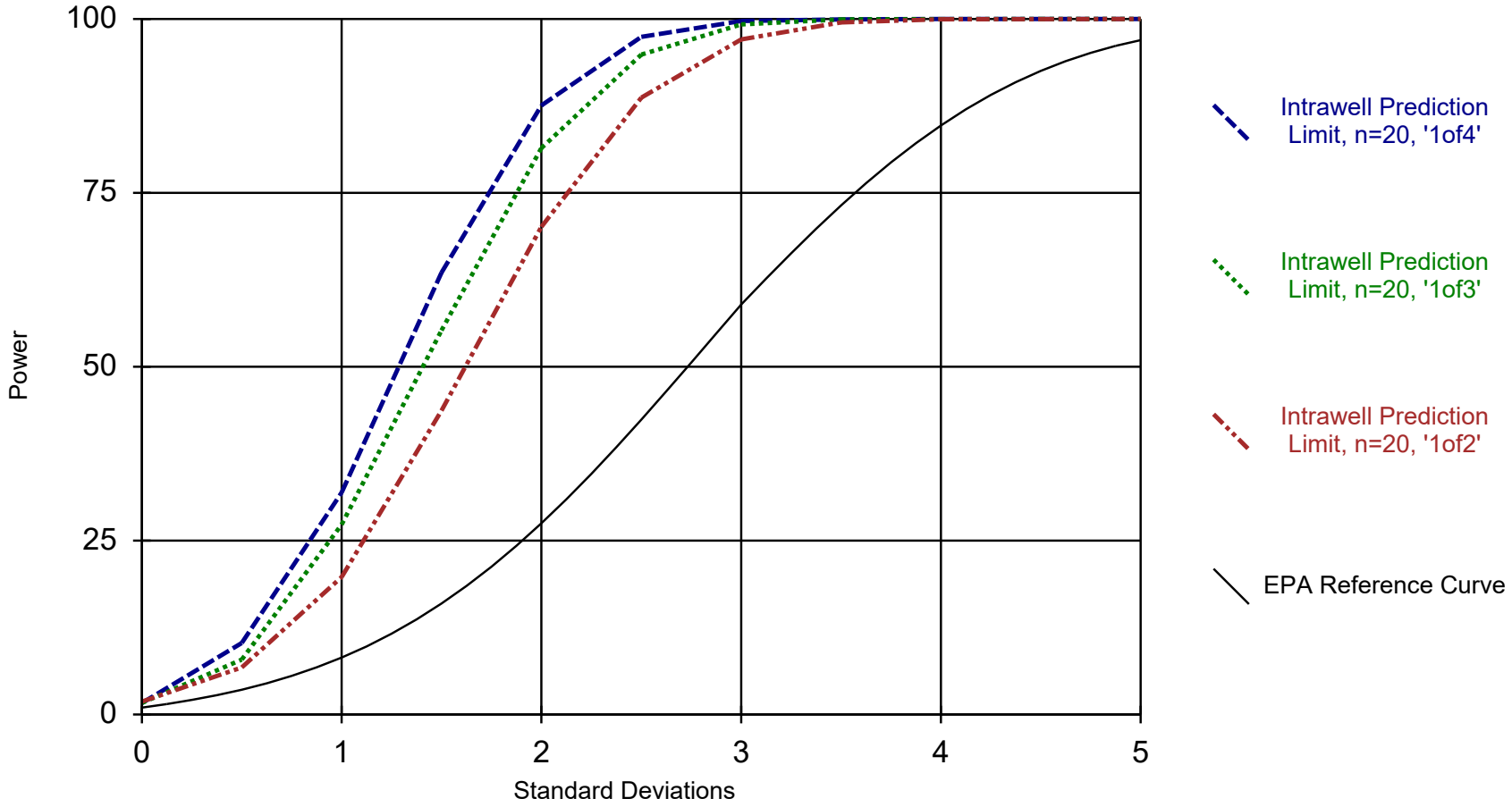



Analysis Run 9/2/2021 12:44 PM View: Shelby County Statistics Data

Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

# Power Curve

Intra-Well Parametric - Barium (MW-21, MW-22, MW-24, MW-25, MW-27, MW-C, MW-D)

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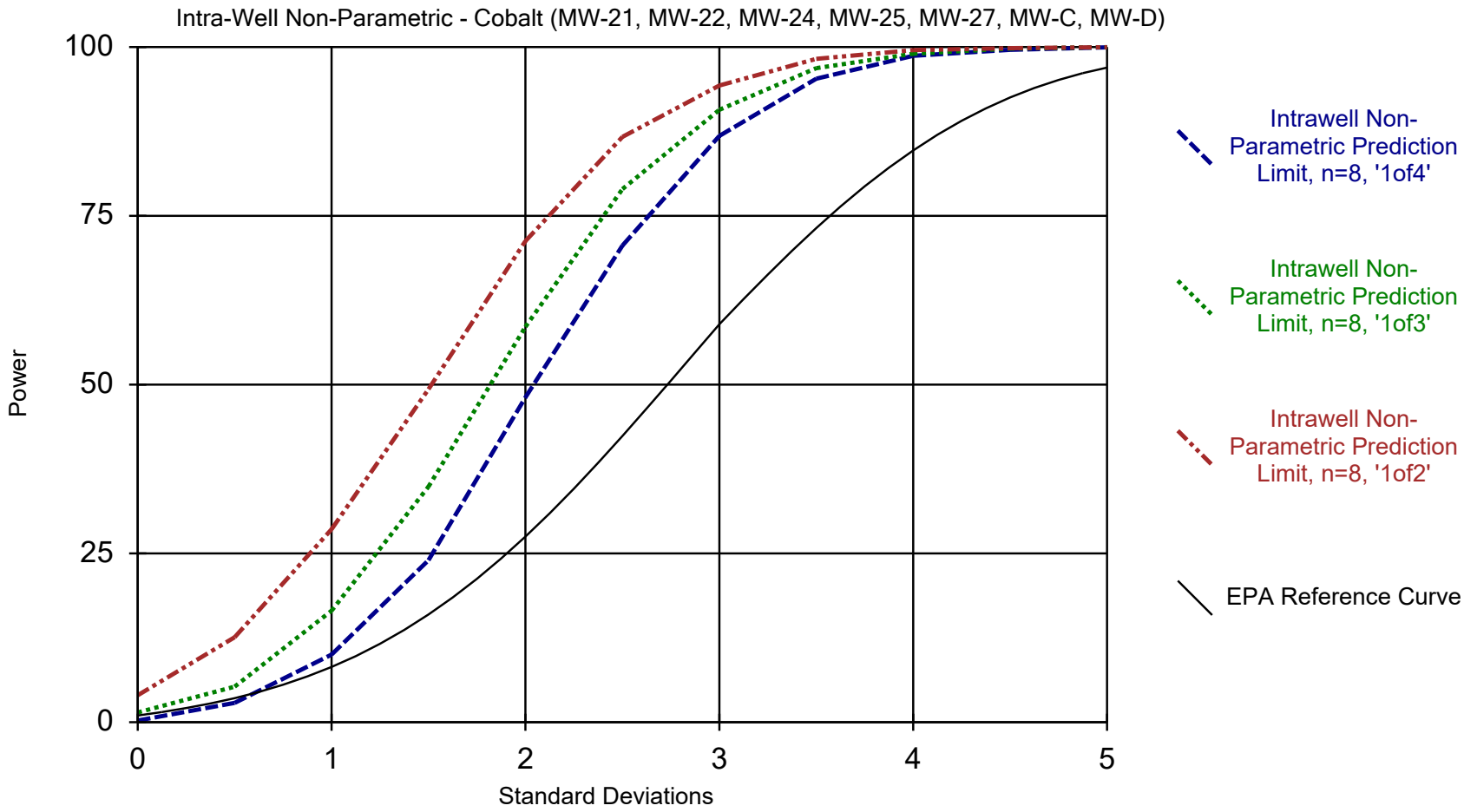
Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

# Power Curve

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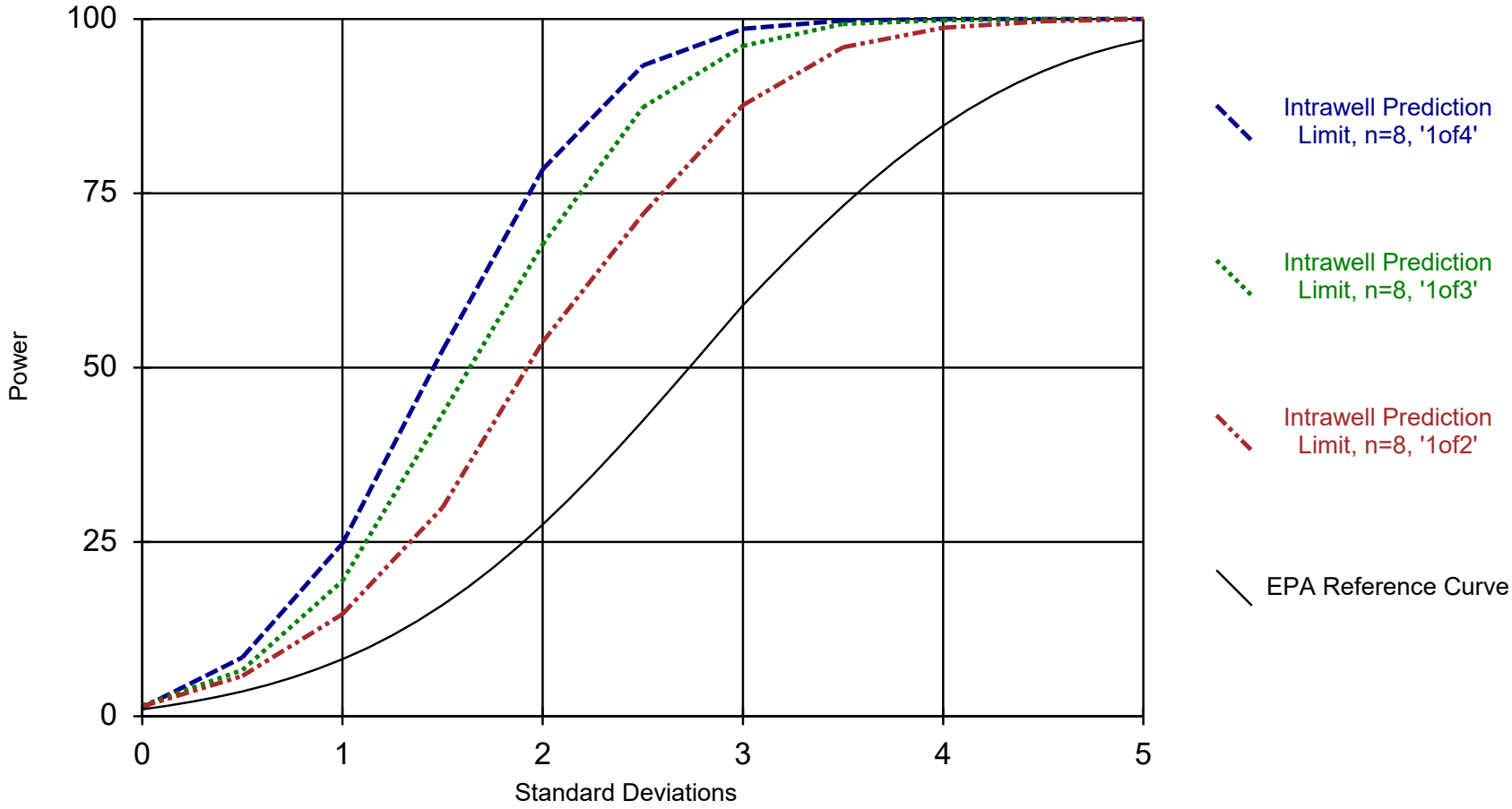
Shelby Co Hwy 70 LF Client: Shelby County Data: Shelby Stats for Sanitas

# Power Curve

Intra-Well Parametric - Cobalt (MW-21, MW-22, MW-24, MW-25, MW-27, MW-C, MW-D)

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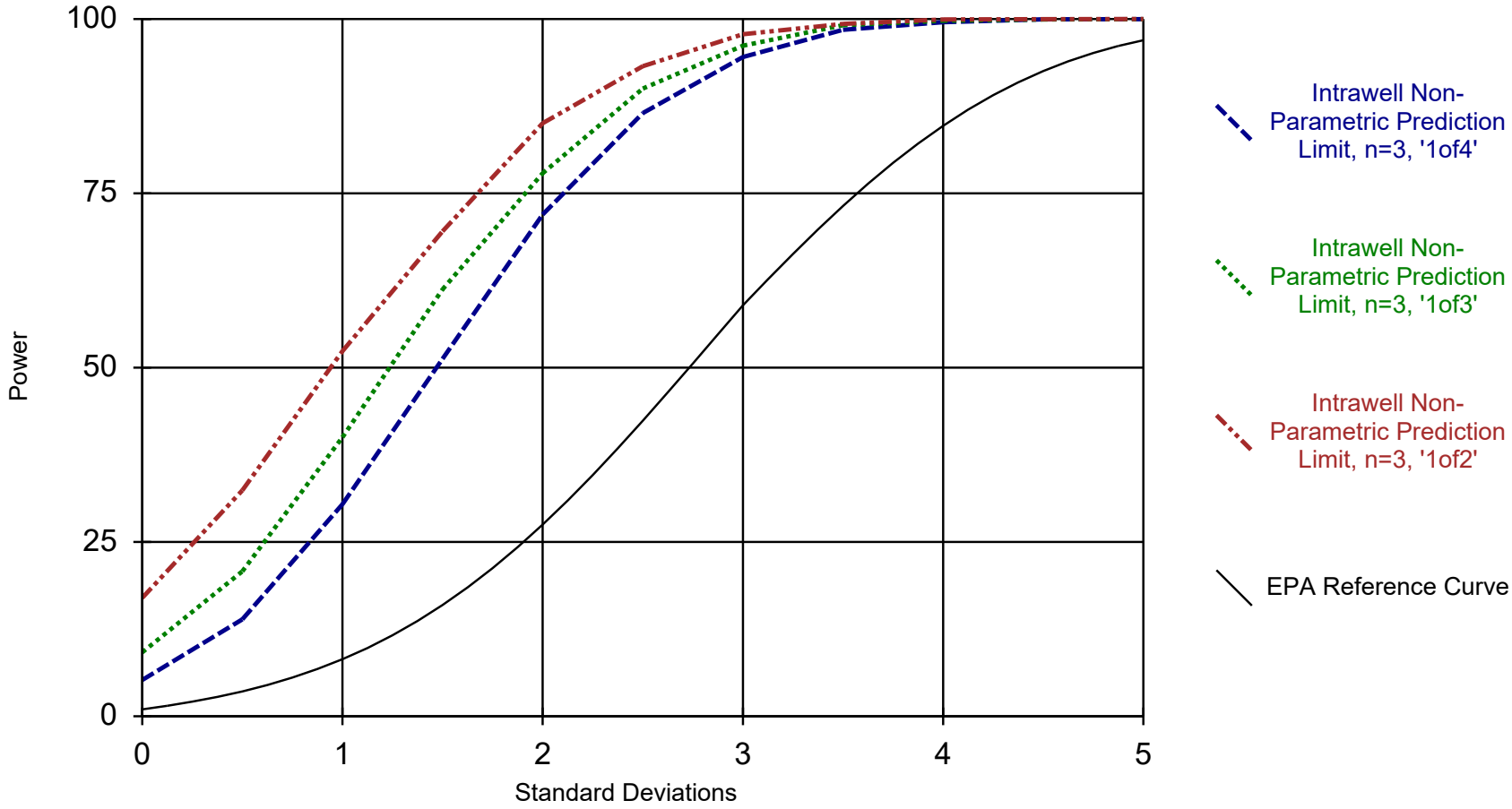
# Power Curve

## Intra-Well Non-Parametric - Barium & Cobalt - MW-28 & MW-29

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Shelby Co Hwy 70 LF  Client: Shelby County  Data: Shelby Stats for Sanitas

# *APPENDIX I*

November 17, 2021

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

Attention: Mr. Hunter Baker
Solid Waste Engineering Branch

RE: Monitoring Well Installation Report
Highway 70 Landfill
401 Landfill Road, Columbiana, Shelby County, Alabama
Permit No.: 59-15 & 59-04R

Dear Mr. Baker,

On behalf of Shelby County Environmental Services, LaBella Associates, D.P.C. (LaBella) is submitting this monitoring well installation report for the installation of monitoring wells MW-28 and MW-29 at the Highway 70 Landfill – Permit No. 59-15 & 59-04R, in Shelby County, Alabama (herein referred to as "the Site"). The well installation activities were completed in accordance with the *Monitoring Well Installation Plan,* dated December 22, 2020 (Highland Technical Services, Inc. [now LaBella]). A Site location map is provided as Figure 1 attached.

## MONITORING WELL INSTALLATION

Two groundwater monitoring wells (identified as MW-28 and MW-29) were installed at the locations shown on Figure 2. The exact location of each well was determined in the field at the time of installation and were placed in areas that allowed for overhead clearance of the drill derrick.

Monitoring wells MW-28 and MW-29 were installed using a 4.25-inch inside diameter (ID) hollow stem auger (HSA). MW-28 and MW-29 were constructed as Type II permanent groundwater monitoring wells in accordance with the most recent edition of the U.S. Environmental Protection Agency (EPA) Region IV's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* and the most recent edition of the *Alabama Environmental Investigation and Remediation Guidance (AEIRG).* The wells were constructed using a 10-foot section of 2-inch diameter Schedule 40 polyvinyl chloride (PVC), 0.010-slotted screen and 2-inch diameter PVC riser casing to ground surface. Sand filter packs were installed to approximately two to three feet above the well screens. Approximately three feet of bentonite was placed above the sand packs as seals, and the remainder of the annulus was filled with a neat cement/grout mixture to ground surface. Each of the wells were then completed with a 2-feet x 2-feet concrete pad, one 4-inch diameter x 5-feet long steel bollard at each corner of the well pad, and a 4-inch x 5-feet long stand-up protective aluminum cover with locking cap. The drilling and installation of the wells was supervised by a

LaBella geoscientist experienced with groundwater investigations and monitoring well installation. A monitoring well construction summary table is provided below.

**MONITORING WELL CONSTRUCTION SUMMARY**

| Monitoring Well ID | Casing Diameter (in) | Measuring Point Elevation (ft-amsl) | Measured Total Depth (ft-btoc) | Measured Water Level (ft-btoc) | Screened Interval (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|
| MW-28 | 2.0 | 605.81 | 56.98 | 12.75 | 42.83 – 52.83 | 33.187408° | -86.699225° |
| MW-29 | 2.0 | 561.87 | 21.86 | 21.85 | 8.17 – 18.17 | 33.187424° | -86.692533° |

ft-amsl – feet above mean sea level

ft-btoc – feet below top of casing

The location and top of casing of the new wells were surveyed by an Alabama licensed professional land surveyor provided by Shelby County Environmental Services in late October 2021 . The survey was done to establish a measuring point elevation on the top of PVC casing and was referenced in feet to mean sea level.

**WELL DEVELOPMENT AND REPLICATE SAMPLING**

After installation was completed, the drilling contractor developed each well. The wells were developed sufficiently to remove sediments accumulated in the well screen and filter pack. The wells were then left undisturbed for at least one week before the first (of four) replicate groundwater sampling events began.

Results from the replicate samples will be included along with the forthcoming semiannual groundwater sampling event.

If you have any questions concerning this submittal or require any additional information, please contact our office at (205) 985-4874.

*Sincerely,*

***LaBella Associates, D.P.C.***

*Robert R. Bailey*

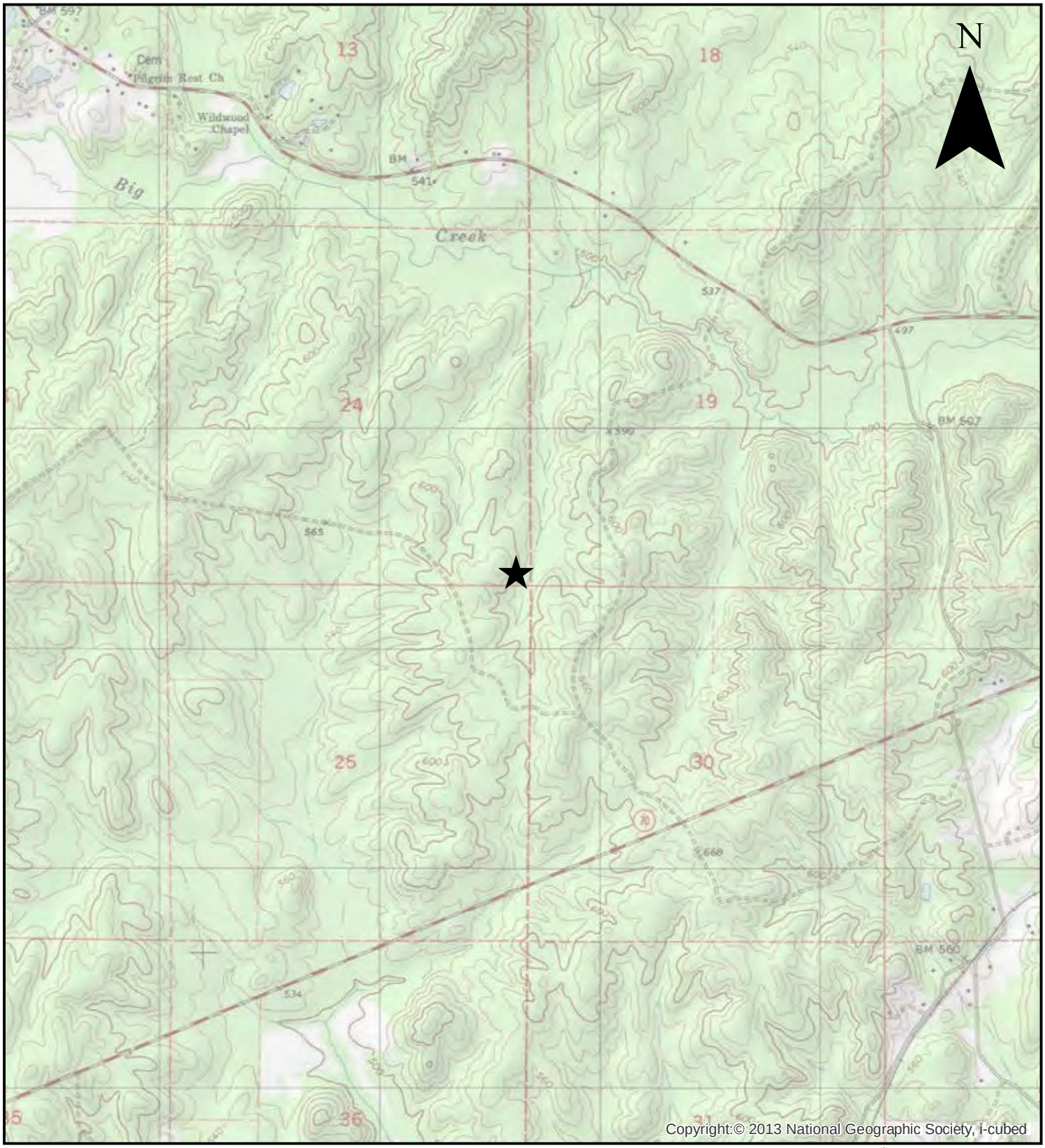
*Senior Project Geologist*

Attachments: Figure 1 – Site Location Map

Figure 2 – Site Layout Map with Installed Wells

Figure 3 – Monitoring Well Construction Details MW-28 & MW-29

# *FIGURES*




## Legend

★ Site Location

LaBella
Powered by partnership

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

**TITLE:**
Site Location Map

Highway 70 Landfill

Shelby County, Alabama

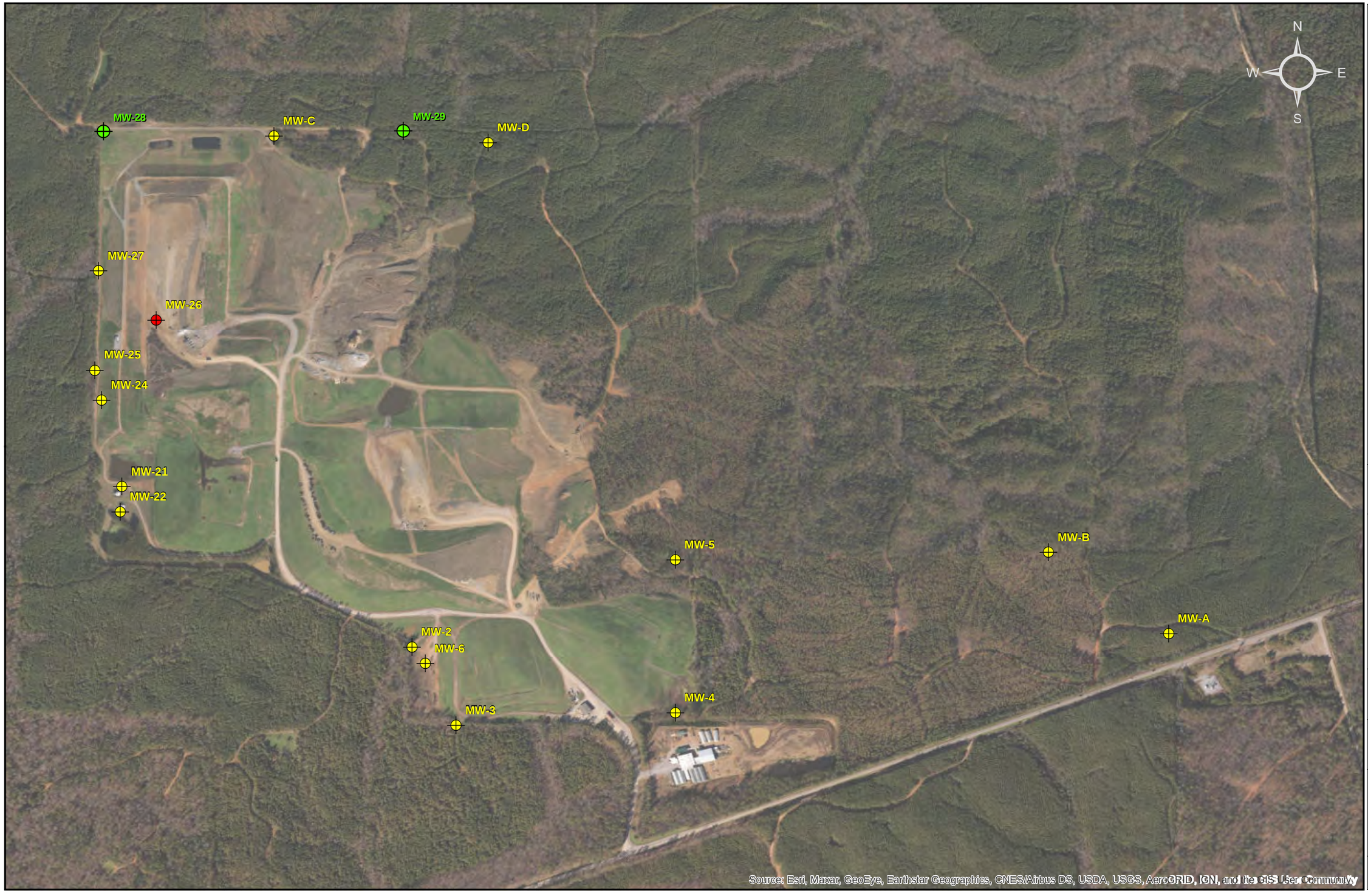
**SCALE:** 0 1,000 2,000
1 inch = 2,000 feet

**FIGURE NO.** 1

**PROJECT NO.** General Map

**DRAWN BY** AJH

**DATE DRAWN** 4-06-2021




**Legend**

- Installed Monitoring Well
- Existing Groundwater Well
- Abandoned Groundwater Well

SCALE:

0 375 750

1 inch = 750 feet

TITLE:

**Site Layout Map**

**Highway 70 Landfill**

**Shelby County, Alabama**

| FIGURE NO. | PROJECT NO. |
|---|---|
| 2 | 2210975.01 |
| DRAWN BY: | DRAWN DATE: |
| AJH | 11-10-2021 |

LaBella
Powered by partnership

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

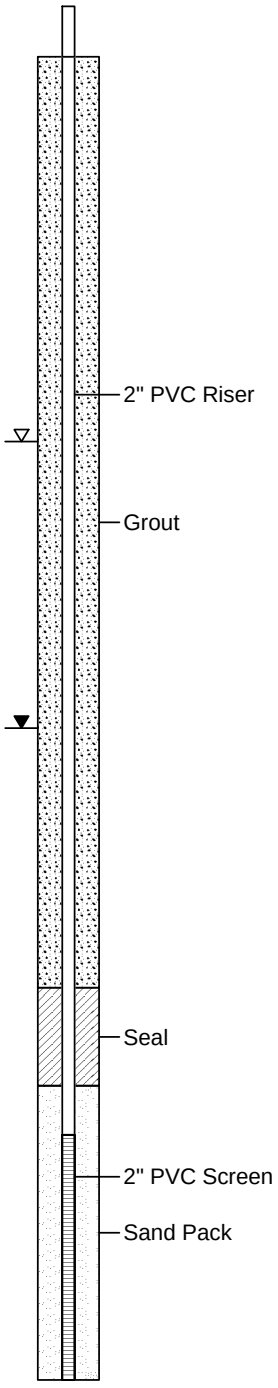
Monitoring Well Installation
Shelby County Highway 70 Landfill
401 Landfill Road
Columbiana, AL 35051

# Log for MW-28



| | | | |
|---|---|---|---|
| Date Started | : 5/4/2021 | Drilling Company | : Tech. Drilling Services |
| Date Completed | : 5/5/2021 | Driller | : Curtis Lee |
| Hole Diameter | : 2" | Latitude | : 33.187408 |
| Drilling Method | : HSA | Longitude | : -86.699225 |
| Sampling Method | : Split Spoon | Logged By | : Adam Hughes |

| Depth in Feet (bgs) | Ground Surf. Elev. | USCS | GRAPHIC | PID Result | DESCRIPTION | Blow Count | Sample Locations |
|---|---|---|---|---|---|---|---|
| 0 | 602 | | | | Light brown, loose, very fine sand and top soil over light gray, tight, dense, silty clay. | | |
| 5 | 597 | | | | Light gray, tight, dense, silty clay. Shale lenses encountered in lower 1' of interval. | 5/5/6/6 | |
| 10 | 592 | | | | Same as above. | 19/17/18/9 | |
| 15 | 587 | | | | Same as above. Shale layers are loose and heavily eroded. Material is dry. | 1/13/30/32 | |
| 20 | 582 | | | | Light brown, loose, very fine sand and silt with shale fragments. | 1/40/50 | |
| 25 | 577 | | | | Light brown, loose, very fine sand and silt with shale fragments over light gray silty clay with shale fragments. Dry. | 13/50 | |
| 30 | 572 | | | | Gray, dry, heavily eroded shale and silt. | 3/19/40/50 | |
| 35 | 567 | | | | Dark gray, dry, silt and eroded shale. High resistance.<br>Damp silty clay sampled from split spoon. | 1/25/50 | |
| 40 | 562 | | | | Dark gray silty clay in highly resistant eroded shale layers. | 0/9/43/48 | |
| 45 | 557 | | | | Dark gray, dry silt and eroded shale and rock fragments. | 8/43/50 | |
| 50 | 552 | | | | Saturated with shale fragments and light gray silty clay sediment. Boring terminated. Well set. | 11/50 | |
| 55 | | | | | | | |



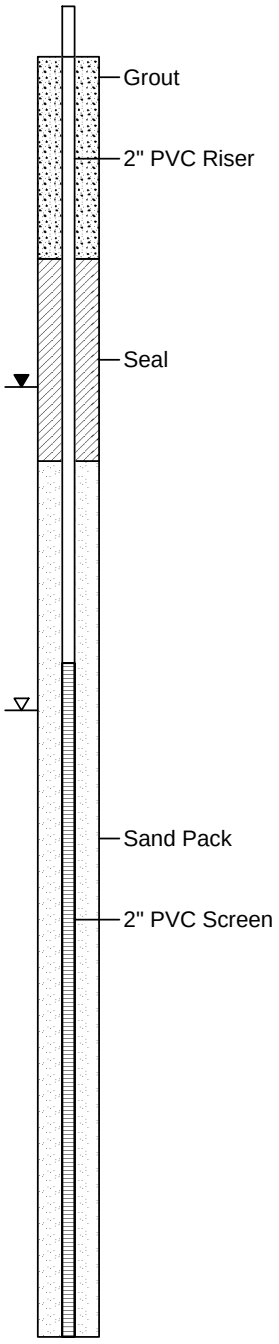
Monitoring Well Installation
Shelby County Highway 70 Landfill
401 Landfill Road
Columbiana, AL 35051

# Log for MW-29



| | | | |
|---|---|---|---|
| Date Started | : 5/5/2021 | Drilling Company | : Tech. Drilling Services |
| Date Completed | : 5/5/2021 | Driller | : Curtis Lee |
| Hole Diameter | : 2" | Latitude | : 33.1874239 |
| Drilling Method | : HSA | Longitude | : -86.6925328 |
| Sampling Method | : Split Spoon | Logged By | : Adam Hughes |

| Depth in Feet (bgs) | Ground Surf. Elev. | USCS | GRAPHIC | PID Result | DESCRIPTION | Blow Count | Sample Locations |
|---|---|---|---|---|---|---|---|
| 0 | 558 | | | | Light brown, loose, very fine sand over tight, dense, light brown, dry clay. | | |
| 5 | 553 | | | | Loose, dry, very fine sand and silt with layered eroded shale and mudstone fragments. | 8/21 | |
| 10 | 548 | | | | Dark gray, loose, very fine sand and clay over heavily eroded shale. | 2/13/47/50 | |
| 15 | 543 | | | | Dark gray, saturated very fine sand and silt with shale fragments.<br><br>Refusal at limestone. Boring terminated. Well set. | 40/50 | |
| 20 | | | | | | | |



# EXPLOSIVE GAS MONITORING PLAN

# EXPLOSIVE GAS MONITORING PLAN

**HIGHWAY 70 LANDFILL**
**401 LANDFILL ROAD**
**COLUMBIANA, SHELBY COUNTY, ALABAMA**
**PERMIT NO.: 59-15 & 59-04R**
**HTSI PROJECT NO.: 20-190505.03**

PREPARED FOR:

SHELBY COUNTY COMMISSION
DEPARTMENT OF ENVIRONMENTAL SERVICES
1281 HIGHWAY 70
COLUMBIANA, ALABAMA 35051

JULY 16, 2020

PREPARED BY:

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

Phillip D. Davis, P.E.
Senior Engineer

Robert R. Bailey, P.G.
Senior Project Geologist

## OWNER CERTIFICATION

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

Brandon Hamilton, Environmental Supervisor
Shelby County Department of Environmental Services

7/16/20
Date

## PROFESSIONAL ENGINEER CERTIFICATION

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

July 10, 2020
Date

Phillip D. David, P.E. #19547
Senior Engineer
Highland Technical Services, Inc.

## TABLE OF CONTENTS



## Attachments

# 1.0 INTRODUCTION

This Explosive Gas Monitoring Plan (EGMP or "the Plan") was prepared for the Highway 70 Landfill (herein referred to as "the Landfill") located at 401 Landfill Road in Columbiana, Shelby County, Alabama, Permit Numbers 59-15 & 59-04R (collectively herein referred to as "the Permit"). The purpose of this EGMP is to detail how the Landfill will control and monitor for explosive gases, especially methane. The information obtained during monitoring events will be used to evaluate the explosive gas migration/accumulation (if any) at the Landfill. In accordance with the Alabama Department of Environmental Management (ADEM) Land Division – Solid Waste Division Administrative Code, Section 335-13-4-.16, the Landfill will

1. *Control:*
    a. *Explosive gases shall not exceed the lower explosive limit (LEL) at the facility boundary*
    b. *Explosive gases shall not exceed 25% of the LEL in the facility structures except for gas control or recovery system components.*
    c. *Facility structures shall be designed and constructed so as not to allow explosive gases to collect in, under or around structures in concentrations exceeding the requirements of this rule.*

Per ADEM requirements, explosive gas monitoring points shall be located every 300 feet along the Landfill permit boundary. In areas where a dwelling is within 1,000 feet of the Landfill boundary, the monitoring points shall be 100 feet apart or as otherwise directed by the ADEM.

Described herein includes the monitoring methods and procedures for gas sample collection which are based on ADEM guidance and U.S. Environmental Protection Agency (EPA) Region 4 Standard Operating Procedures (SOPs). Any modifications to this Plan will be approved by ADEM and applicable changes appropriately documented and placed in the Landfill's Operating Record.

## 2.0 LANDFILL GAS MONITORING PROGRAM

The Landfill currently monitors explosive gases at the facility. These gas monitoring procedures will comply with the control and monitoring requirements of ADEM Administrative Code r. 335-13-4-.16 and the Solid Waste Permit Number 59-15 & 59-15R Section H.3. – *Monitoring and Corrective Action Reports*. Gas monitoring data will be included in the Landfill's Operating Record and be made available to ADEM upon request.

The Landfill conducts gas monitoring quarterly of each calendar year. Explosive gas monitoring wells, site structures and any other location conducive to gas accumulation will be monitored with a portable gas meter. Readings will be recorded in percent LEL for methane and percent methane by volume. Explosive gas monitoring reports will be submitted to the Department within 30 days of explosive gas sampling. The quarterly explosive gas monitoring reports will include a site plan map indicating the explosive gas monitoring well locations and the results from each well/bar-hole/structures monitored (an example field form for the documentation of gas readings is provided in Attachment A).

### 2.1.1 Permanent Gas Monitoring Well Sampling

The Landfill will test for explosive gas (methane) on a quarterly basis as required by the Landfill's Permit. The permanent explosive gas monitoring locations are presented on the Shelby County, Highway 70 Landfill, Site Plan (Attachment B) provided by the Shelby County Development Services department. An example of a typical permanent gas monitoring well design is provided in Attachment C. Note that per the ADEM regulations, permanent gas monitoring wells shall be installed to a minimum depth of six feet below ground surface.

Representative gas measurements are collected from permanent gas monitoring well locations (Attachment B) with a portable gas meter that calculates methane concentrations as percent LEL. The portable gas meter is typically equipped with a flexible extension hose and rigid plastic probe. At a minimum, the portable gas meter should be calibrated on a quarterly basis or in accordance with the manufacturer's specifications. The amount of monitoring and the handling of the portable gas meter will influence whether the calibration frequency should be increased.

### 2.1.2 Bar-Hole Sampling

Bar-hole sampling may need to be performed due to, but not limited to, the following occurrences: a permanent gas monitoring well is damaged, a permanent gas well indicates

a concentration of explosive gas greater than 5 percent methane by volume, or subsurface conditions are not conducive to permanent well installation. Bar-hole sampling is performed via a plunger bar installed to a minimum depth of four feet below ground surface (per the ADEM regulations). After the plunger bar is removed, the portable gas meter tubing is inserted into the hole immediately. In the event that a permanent gas well indicates a concentration of explosive gas greater than 5 percent methane by volume, step-out bar-holes will be advanced at 5 to 10 feet intervals (within the property boundary), radiating outward in the four Cardinal directions from the original permanent gas monitoring well of concern until readings of zero are obtained. Once limits of migration are defined by the bar-hole sampling effort, Landfill management will be notified and will decide if further action is warranted.

### 2.1.3 Site Structure Sampling

Explosive gas accumulation should be monitored either in site buildings with continuous gas monitors or permanent gas wells located within 100 feet of each building. Each groundwater monitoring well and culvert located on the Landfill property should also be monitored for explosive gases. Monitoring with a portable gas meter can also be used in and around site buildings if migrating landfill gas is suspected in the area or if the continuous gas monitor detects gas. Areas to be monitored in accessible spaces of a structure would be corners, along baseboards, attics, drainage structures (drains, toilets, sumps) or other accessible areas where explosive gas could enter unnoticed. (Confined spaces where gas accumulation may occur should not be entered without proper Occupational Safety and Health Administration training and preparation). Additional monitoring location considerations include, but are limited to: culverts, under bridges, drop inlets, and any other place that is conducive to gas accumulation.

### 2.1.4 Landfill Flare System

The Landfill has an active gas flare system with piping installed in select cells to assist in controlling methane and carbon dioxide generated from bio-digestion. The design/construction details are available in the Landfill Operational Plan.

## 2.2 Concentration Limits

The Landfill will operate to maintain:

- Methane gas concentrations shall not exceed 25 percent of the LEL (i.e., 1.25% methane by volume) in any Landfill structure other than those used for the gas control and/or recovery system.

- Methane gas concentrations shall not exceed the LEL (i.e., 5% methane by volume) at the gas monitoring locations along the Landfill property boundary.

## 3.0 CORRECTIVE ACTION

In the event that explosive gas levels exceed the limits specified in this Plan, the Landfill will:

1. Immediately take all necessary steps to ensure protection of human health and the property. This action may include restricting access to employees/customers in the identified area or structure(s) until abatement actions have been performed and subsequent monitoring indicates that the identified area or structure(s) are safe to return; and by eliminating potential ignition sources;

2. Immediately notify the ADEM of the explosive gas concentrations detected and the steps taken to protect human health and the property;

3. Within 7 days of detection, place in the Landfill Operating Record the explosive gas concentrations detected and the immediate steps taken to protect human health and property;

4. Submit an Explosive Gas Remedial Plan for approval by the ADEM within 20 days of the detection of the exceedance(s). The Explosive Gas Remedial Plan should be reviewed by a professional engineer prior to ADEM submittal, and should include a description of the nature and extent of the explosive gases, and the proposed remedy to intercept the migration of the explosive gases. The remedy may include the installation of interception trench and vent systems, installation of membrane barriers, re-location of equipment or structures, venting areas of gas accumulation, installation of recovery and controlled combustion systems, etc.

5. Implement the ADEM approved Explosive Gas Remedial Plan within 60 days of the detection. Within 60 days of the detection, place the Explosive Gas Remedial Plan and a Notification to the ADEM that the Explosive Gas Remedial Plan has been implemented in the Landfill's Operating Record.

# 4.0 POTENTIAL SAFETY HAZARDS

When monitoring on landfill sites, the monitoring technicians should be alert to the hazards caused by the presence of potentially explosive landfill gas. Hazards that might occur could be one or more of the following:

- Fires that may start from exposed or decomposing solid waste.
- Fires and explosions that may occur from the presence of landfill/methane gas.
- Landfill gas that may cause an oxygen deficiency in underground trenches, vaults, conduits, and structures; confined space entry procedures should be followed where applicable.
- Hydrogen sulfide ($H_2S$) that may be present. $H_2S$ is a colorless, very flammable gas that in low concentrations has an offensive odor similar to that of rotten eggs. $H_2S$ is highly toxic. Although the odor of H2S is recognizable (unless masked) at 1/400 of the lowest possible amount that can cause injurious effects, sense of smell is lost within 2 to 15 minutes of exposure. At higher concentrations, it will deaden the sense of smell instantly and cause death within seconds by terminating the function of the nerve and motor center in the brain.

## 4.1 Safety Precautions

The following minimum safety precautions should be adhered to by personnel monitoring for combustible gas:

- When feasible, at least two people should be present at all times when monitoring for potentially explosive gas concentrations (buddy system).
- Hard hats and glasses must be worn in designated areas.
- Smoking is prohibited during monitoring.
- A fire extinguisher must be readily available, especially when monitoring gas concentrations within structures or confined spaces.

- The site-specific Landfill safety program should be followed.

- Bar-hole probing will not be conducted near buildings unless:

    - Sub-grade utility lines are located and clearly marked before the monitoring event.

    - A person with knowledge of all sub-grade utility lines is consulted prior to the monitoring event.

    - Monitoring personnel have an accurate site utility plan/map.

- Methane is an odorless, tasteless gas, and it is undetectable by the human senses. Therefore, sampling personnel must be continually aware of and avoid all potential sources of ignition. When technicians are monitoring in confined areas, a portable gas meter should be used to monitor the gas conditions continually within the working area. This gas monitoring device should continually monitor for methane, oxygen and hydrogen sulfide and provide both a visual and audible alarm if gas concentrations exceed or drop below a specified level.

## 5.0 REFERENCES

Alabama Department of Environmental Management Administrative Code, Section 335-13-4-.16.

Highway 70 Landfill Permit Numbers 59-15 and 59-04R.

Highway 70 Landfill Health and Safety Plan.

# *ATTACHMENT A*

**Explosive Gas Monitoring**

**Highway 70 Landfill**
**401 Landfill Road**
**Columbiana, Shelby County, Alabama**
**Quarterly Sampling Event**
**Year: _____ Quarter: _____**

**Date: _____**
**Sampler(s): _____**

| Monitoring Point | Sample ID | Sample Type (Well/Bar Hole) | % Lower Explosive Level | % Gas |
|---|---|---|---|---|
| 1 | | | | |
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Notes:

**Explosive Gas Monitoring**

**Highway 70 Landfill**
**401 Landfill Road**
**Columbiana, Shelby County, Alabama**
**Quarterly Sampling Event**
**Year: _____ Quarter: _____**

**Date: _____**
**Sampler(s): _____**

| Monitoring Point | Sample ID | Sample Type (Well/Bar Hole) | % Lower Explosive Level | % Gas |
|---|---|---|---|---|
| 31 | | | | |
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Notes:

## Explosive Gas Monitoring

**Highway 70 Landfill**
**401 Landfill Road**
**Columbiana, Shelby County, Alabama**
**Quarterly Sampling Event**
**Year: _____ Quarter: _____**

**Date: _____**
**Sampler(s): _____**

| Monitoring Point | Sample ID | Sample Type (Well/Bar Hole) | % Lower Explosive Level | % Gas |
|---|---|---|---|---|
| 61 | | | | |
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Notes:

# *ATTACHMENT B*

# SHELBY COUNTY
# HIGHWAY 70 LANDFILL
# SITE PLAN


Shelby County Development Services
Landfill Division
504 Highway 70
Columbiana, AL 35051
205-669-3737


ADEM Permit #59-15

KEY

- Monument
- Leachate Marker
- Meter Pit
- Valve Pit
- Light Pole
- Air Relief Valve
- Leachate Line Cleanout
- Leachate Pump Station
- Stormwater Pipe Outfall
- Piezometer
- Landfill Gas Collection Well
- Methane Gas Monitoring Well
- Groundwater Monitoring Well
- Landfill Cell
- Landfill Boundary
- County Property
- Stormwater Collection

0 200 400 600

Feet

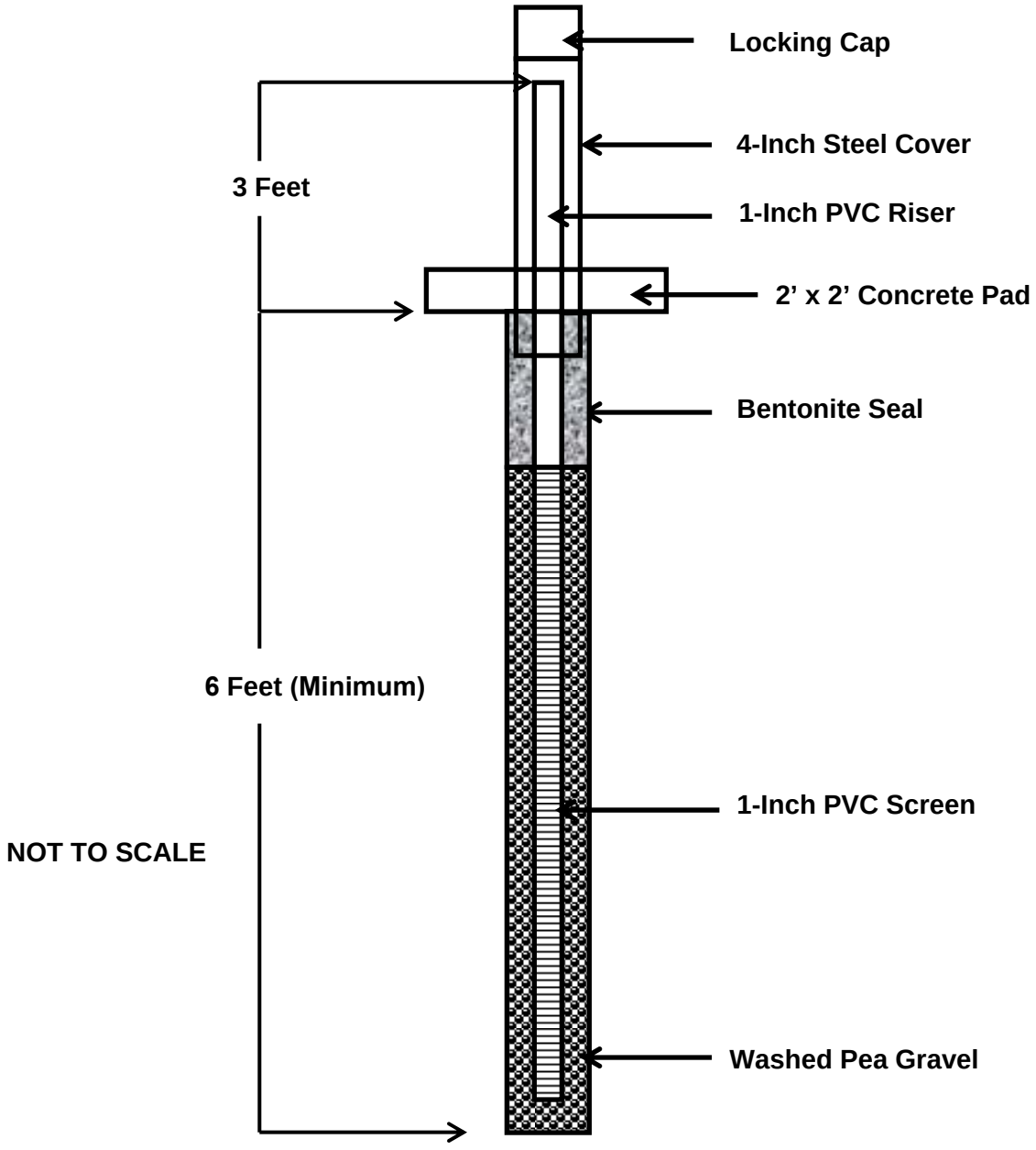
1 Inch = 200 Feet

NORTH

Map Updated
June 17, 2020

# *ATTACHMENT C*

# TYPICAL METHANE MONITORING WELL CONSTRUCTION DETAIL





Highland Technical Services, Inc.

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


SCALE: N/A

PROJECT: SHELBY COUNTY HIGHWAY 70 LANDFILL

LOCATION: COLUMBIANA, AL

PROJECT NO.: N/A

December 6, 2023

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

Attention: Ms. Melissa Adornato

RE: Monitoring Well Installation Plan
Highway 70 Landfill
Shelby County, Alabama
Permit No.: 59-15
LaBella Project No.: 2230437.06

Dear Ms. Adornato:

On behalf of Shelby County Environmental Services (Shelby County), LaBella Associates, D.P.C. (LaBella) is submitting this Work Plan for the installation of one additional permanent groundwater monitoring well at the Highway 70 Landfill (Permit No.: 59-15). The additional monitoring well (to be designated as MW-30) will be installed along the Landfill's southwestern boundary at the approximate location shown in Figure 1.

The new monitoring well that is the subject of this Plan is being installed at the request of the Alabama Department of Environmental Management (the Department) in accordance with comments provided to Shelby County in the Department's letter dated August 15, 2023. In this letter the Department stated:

> *According to the response to comments, groundwater flow in the central portion of the property is considered to flow generally to the north, and according to Section 4.2 of the GWMP, the potentiometric surface elevation map provided in the GWMP is based on available measured groundwater levels that may conflict with surface topography and/or actual groundwater potentiometric surface at certain locations. We acknowledge that the accuracy of interpolation of groundwater surface contours relies on the availability of groundwater data collection points. Based on review of topographical and surface water features, it appears that groundwater beneath the southwestern portion of the landfill may flow to the southwest toward a tributary of Camp Creek. Therefore, in accordance with ADEM Admin. Code r. 335-13-4-.27(2)(a), to ensure adequate representation of groundwater quality at the relevant point of compliance of existing landfill units bordering the southern and southwestern boundaries of the landfill, additional piezometer measuring point elevations (or the addition of a groundwater monitoring well) are recommended to further characterize the direction of groundwater flow to the south and southwest of the landfill.*

### HIGHWAY 70 WELL INSTALLATION

In compliance with the Department's request, the new groundwater monitoring well will be installed at the approximate location shown in Figure 1, attached. Based on prior experience and understanding of Site conditions, LaBella is anticipating that the boring for the new monitoring well will be advanced using hollow-stem augers to a maximum depth of approximately 40 to 60 feet below ground surface (ft-bgs). Split spoon samples will be collected at five-foot intervals for the purpose of logging subsurface materials. The drilling and installation of the new well will be supervised by a geoscientist experienced with groundwater investigations and monitoring well installation.

Once the boring is terminated, the monitoring well (to be designated as MW-30) will be installed as a Type II monitoring well and constructed using a 10-foot section of 2-inch Schedule 40 PVC, 0.010-slotted screen and 2-inch PVC riser casing to ground surface. A sand filter pack will be installed to a minimum of one foot above the well screen. A minimum of two feet of bentonite will be placed above the sand pack as a seal and the remainder of the annulus will be filled with a neat cement mixture to ground surface. The monitoring well will then be completed with a stand-up protective aluminum cover with a locking cap.

The monitoring well will be installed and constructed following the guidelines outlined in the most recent edition of EPA Region IV's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* and the most recent edition of the *Alabama Environmental Investigation and Remediation Guidance (AEIRG)*. Following the completion, the monitoring well will be developed sufficiently to remove sediments accumulated in the well screen and filter pack.

Upon completion, the location and top of casing of the new monitoring well will be surveyed by an Alabama licensed professional land surveyor. The survey will establish a measuring point elevation on the top of casing and will be referenced to mean sea level.

### BACKGROUND SAMPLING

In an effort to establish a statistically viable dataset of groundwater quality at the new monitoring well location, background samples will be collected quarterly (for a total of four background samples). Each sample will be placed in laboratory provided containers, labelled, and placed in a cooler on ice to maintain a sample temperature of 4 degrees Celsius. The samples will be shipped under proper chain of custody to a certified laboratory for analysis. In accordance with the Landfill's Solid Waste Permit, the background samples will be analyzed for Appendix I Volatile Organic Compounds (VOCs) in accordance with EPA Method 8260 and Appendix I metals in accordance with EPA Methods 6020 and 7470 (mercury). The background sample dataset will be used to establish water quality within the water-bearing zone intersected at the new well location to support future statistical evaluations. Since this is not a replacement well, a comparison of historical data and newly collected background data will not be necessary.

### Monitoring Well Installation Report & Revised GWM Plan

Following completion of the well installation, a letter report documenting the installation activities will be submitted to the Department. A revised *Groundwater Monitoring Plan* will also be completed and

will include a figure showing the location of the newly installed well and a discussion of the recommended statistical method to be use in the future for samples collected from the new well.

### MINOR PERMIT MODIFICATION

In addition to the services described above, Shelby County is also submitting a request for a Minor Permit Modification for the addition of the new monitoring well (MW-30) to the facility's Permit.

LaBella Associates, D.P.C. appreciates your consideration in this matter. If you have any questions concerning this submittal or require any additional information, please contact our office at (205) 985-4874.

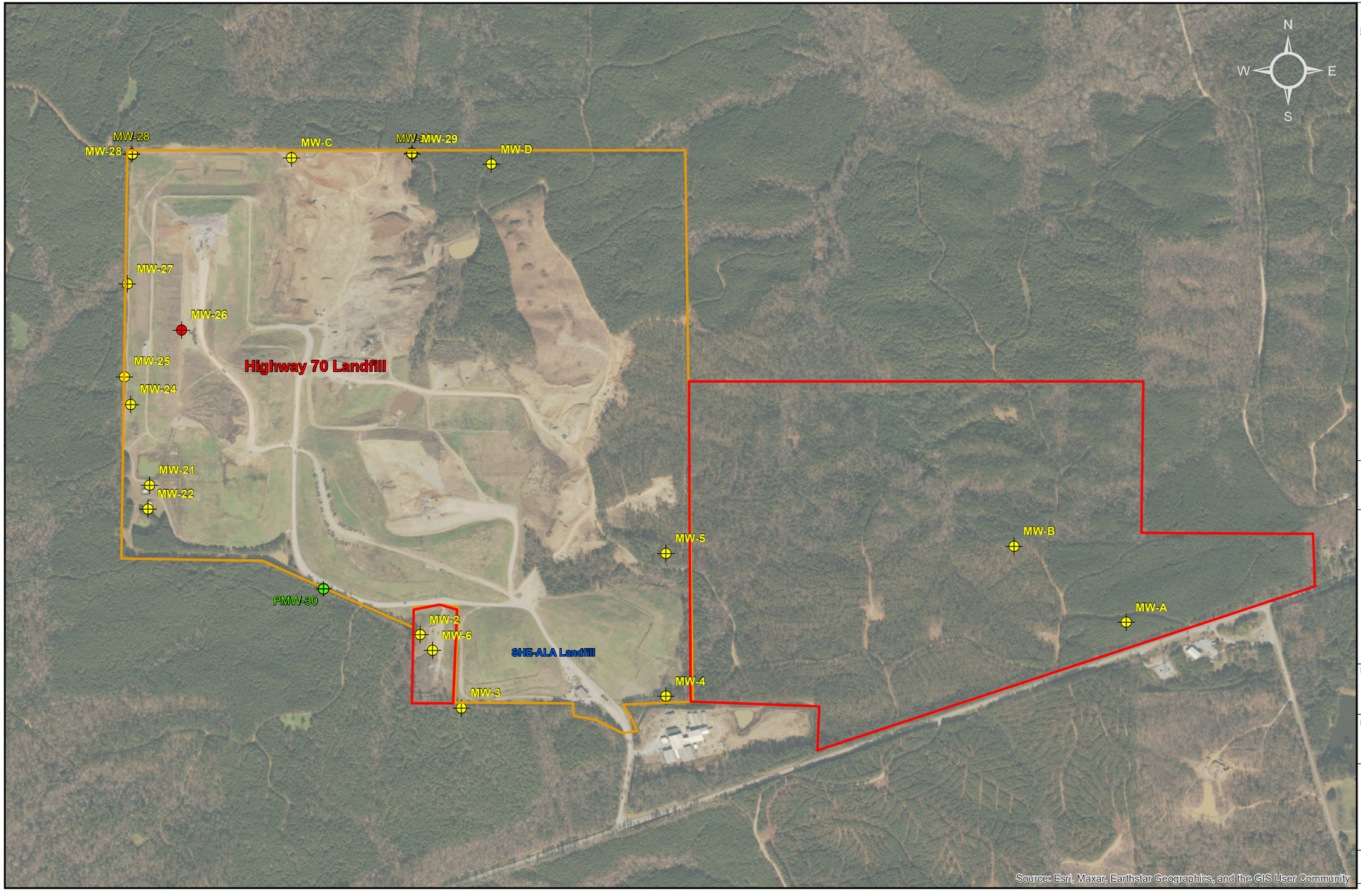
*Sincerely,*
**LABELLA ASSOCIATES, D.P.C.**

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

William W. Cooch, P.G.
Principal Geologist

Attachments: Figure 1 – Proposed Monitoring Well Location Map
Form 439

cc: Brandon Hamilton, Shelby County Environmental Services




**Legend**

- Existing Groundwater Well
- Abandoned Groundwater Well
- Proposed Monitoring Well
- Approximate Landfill Boundary
- Approximate Shelby County Boundary

SCALE:
0 400 800
1 inch = 800 feet

TITLE:

Proposed Monitoring Well Location Map

Shelby County
Highway 70 Landfill

Shelby County, Alabama

| FIGURE NO. | PROJECT NO. |
|---|---|
| 1 | General Map |
| DRAWN BY: | DRAWN DATE: |
| LKN | 11-28-2023 |

LaBella
Powered by partnership.

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

# SOLID WASTE DISPOSAL FACILITY

## MSWLF/ILF/CCR UNIT PERMIT APPLICATION PACKAGE

January 16, 2018

**MEMORANDUM**

TO: Applicants Seeking a Permit for Solid Waste Facilities

FROM: Stephen A. Cobb, Chief
Land Division
Alabama Department of Environmental Management

RE: Processing Solid Waste Permits by ADEM

Any permit issued by ADEM must be in accordance with §22-27-48 and §22-27-48.1 Code of Alabama. This section indicates that ADEM may not consider an application for a new or modified permit unless such application has received approval by the affected unit of local government having an approved plan. ADEM, therefore, will require the following before it can process a new or modified permit application:

1. The local government having jurisdiction must approve the permit application in accordance with §22-27-48 and §22-27-48.1 Code of Alabama.

2. Local governments should follow the procedures outlined in §22-27-48 and §22-27-48.1 Code of Alabama and the siting standards included in the local approved plan in considering approval of a facility.

This procedure applies to applications for new or modified permits. ADEM cannot review an application unless it includes approval from the affected local government. This procedure shall not apply to exempted industrial landfills receiving waste generated on site only by the permittee.

Please contact the Solid Waste Branch of ADEM at (334) 274-4201 if there are any questions.

SAC/sss/abj

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

1. Facility type:
   - _X_ Municipal Solid Waste Landfill (MSWLF)
   - ____ Industrial Landfill (ILF)
   - ____ CCR Landfill (CCRLF)
   - ____ CCR Surface Impoundment (CCRSI)
   - ____ Other (explain)____

2. Facility Name Highway 70 Landfill

3. Applicant:

   Name: Shelby County Commission

   Address: 1281 Highway 70
   Columbiana, Alabama 35051

   Telephone: (205) 669-3737

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

   Township 21 South Range 1 West
   Section 19 & 30 County Shelby

   Township 21 South Range 2West
   Section 24 & 25 County Shelby

5. Land Owner:

   Name: Shelby County

   Address: 1281 Highway 70
   Columbiana, Alabama 35051

   Telephone: (205) 669-3737

   (Attach copy of agreement from landowner if applicable.)

6. Contact Person:

Name Brandon Hamilton

Position or
Affiliation Environmental Manager

Address: 1281 Highway 70
Columbiana, Alabama 35051

Telephone: (205) 669-3737

7. Size of Facility: 360.05 Acres

Size of Disposal Area(s): 77.7 MSW & 53.3 C&D Acres

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

Municipal Solid Waste and Construction & Demolition Waste

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

1500 Tons/Day _____ Cubic Yards/Day

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

Municipal Solid Waste Disposal Area: Nonhazardous, non-infectious putrescible wastes including but not limited to municipal solid waste, industrial waste, construction and demolition waste, rubbish, sludge and other similar type materials. Special waste approved by ADEM may also be accepted. Construction & Demolition Waste Disposal Area: Non-putrescible and nonhazardous construction & demolition waste and rubbish as defined by Rule 335-13-1-.03.

SIGNATURE

11/28/23
DATE

## ADDITIONAL REQUIRED INFORMATION

Applicants seeking to obtain a permit to construct and/or continue to operate a municipal solid waste (MSW) landfill, industrial landfill, coal combustion residuals (CCR) landfill, or CCR surface impoundment are required to submit additional information as part of the Solid Waste Disposal Facility Permit Application. These additional information requirements vary depending on the facility type.

For new and existing landfill units, refer to ADEM Admin Code 335-13-5-.02 for a list of additional information to be submitted in the permit application. Some requirements apply only to MSW landfills and CCR landfills, while other requirements apply to industrial landfills. You need only to address the requirements that pertain to your type landfill. For new and existing CCR surface impoundments, refer to ADEM Admin Code 335-13-15-.09 for additional information to be submitted in the permit application.

Each rule that is applicable to your type landfill or surface impoundment must be addressed in detail in the operational narrative and/or engineering drawings before the review process can be completed. All operational narratives, engineering drawings, survey maps and legal descriptions are to be prepared by licensed engineers or surveyors registered in the State of Alabama and with their stamp or seal on each drawing/map and cover of the narrative.

Act No. 89-824 Section 9(a) states "The department may not consider an application for a new or modified permit for a facility unless such application has received approval by the affected unit of local government having an approved plan." This document must be received by the Department prior to processing the application.

The referenced rules are covered in greater detail in ADEM's Administrative Code, Division 13. Clarification can be obtained by reviewing the regulations. Copies of the ADEM Administrative Code, Division 13 regulations, can be obtained for a fee by contacting ADEM's Permits and Services Division. If the Department can answer any questions, please contact the Solid Waste Branch at (334) 274-4201.

## DATA TO BE SUBMITTED ON ALL LANDFILLS REQUIRING A GEOLOGICAL EVALUATION

The following items must be submitted along with the permit application. This data is necessary for ADEM to determine if the proposed landfill site is suitable from a geological standpoint.

a. Conduct a water well survey to a minimum of 1 mile from the perimeter of the proposed landfill or expansion.

   1. Locate water wells on a USGS 7.5 minute topographic map.

   2. Provide corresponding names and addresses of well owners.

   3. Determine the depth of the well and the static water level. Specify whether these data were determined by measurement or interview.

b. Conduct borings and/or pit excavations to establish site geology and hydrology at least to the mean annual water table or bedrock.

   1. Locate soil borings or excavation pits on a USGS 7.5 minute topographic map.

   2. Provide a log of excavation which includes the following:

      Foot by foot soil classification by the Unified Soil Classification System (USCS).

      Elevation at which groundwater or bedrock was observed.

      Elevation of groundwater after 24 hours.

c. Sample soil material from test borings or pit excavations for the following tests:

   1. Proctor density 90%-95% for liner material, 85%-90% for cover material.

   2. Permeability in cm/sec at the item (1) densities.

d. Construct the following maps:

   1. Potentiometric map using general elevations established after 24 hours.

   2. Regional map to a minimum of 1 mile from the perimeter indicating geology, structural features such as faults, etc.

   3. Cross sections using borings and/or excavation pits of site.

e. Any additional information deemed necessary to properly evaluate the site.

**Municipal Consultants, Inc.**
*Civil/Environmental Engineering*

200 Century Park South, Suite 212
Birmingham, Alabama 35226
(205) 822-0387



December 15, 2023

Melissa Adornato
Alabama Department of Environmental Management
Solid Waste Branch - Land Division
1400 Coliseum Boulevard
Montgomery, AL 36110-2400

RE: Request for Permit Modification for the
Highway 70 Landfill Permit No. 59-15
Shelby County Commission

Dear Mrs. Adornato,

On behalf of the Shelby County Commission, we are providing a permit modification application for Hwy 70 Landfill Permit No. 59-15. No design changes are being proposed as part of this permit modification; however, there are several permit variances being requested. The following are the variances requested:

Alternate Daily Cover

As required by the Alabama Department of Environmental Management Admin. Code R. 335-13-4-.22(1)(a)1. and Section III, H. of their current permit 59-15, the Shelby County Commission is required to cover all waste disposed in the municipal solid waste disposal area at the conclusion of each day's activities with a minimum of 6 inches of earthen material to control disease vectors, fires, odors, blowing litter, and scavenging.

The Shelby County Commission is requesting a permit modification to their existing landfill permit No. 59-15 to utilize the following items in the municipal solid waste disposal area as alternate daily cover all included in the EPA's "The Use of Alternative Materials for Daily Cover at Municipal Solid Waste Landfills" document:

- Commercially Available Products:
  - landfill tarps
  - spray on products (hydro-mulch)
- Indigenous Materials:
  - ash based materials (fly ash)
  - sludges and sludge derived products
  - dredge materials

- foundry sand
- shredded green waste
- wood chips
- contaminated soils

When the above alternate daily cover(s) are used as daily cover, the County will continue to cover the active working face in the municipal solid waste disposal area with 6 inches of earthen material at the end of each week's activities. The landfill operations plan will be updated as required to include alternate daily covers identified above.

Multiple MSW Working Faces

As required by the Alabama Department of Environmental Management Admin. Code R. 335-13-4-.22(1)(b), all waste shall be confined to as small an area as possible within a single working face and spread to a depth not exceeding two feet prior to compaction, and such compaction shall be accomplished on a face slope not to exceed 4 to 1 (25%) or as otherwise approved by the Department. As indicated in Section III, J. of their current permit 59-15, the County has previously been granted a variance from Code R. 335-13-4-.22(1)(b) allowing a second working face. This variance includes one working face for municipal solid waste disposal and one working face for C&D waste disposal.

The Shelby County Commission is requesting a permit modification to their existing landfill permit to allow two working faces in the municipal solid waste disposal area along with the working face in the C&D waste disposal area. Since the County has sufficient equipment and personnel and multiple cells with available air space, the County is requesting to be allowed to operate two (2) active working faces in the municipal waste disposal area.

Depth of C&D Waste Layers

As required by the Alabama Department of Environmental Management Admin. Code R. 335-13-4-.23(1)(b), all waste shall be thoroughly spread in layers two feet or less in thickness and thoroughly compacted weekly with adequate landfill equipment prior to placing additional layers of waste or placing weekly cover as specified in 335-13-4-.23(1)(a)1., unless otherwise approved by the Department.

Since many items received of C&D waste have thicknesses or widths larger than two (2) feet, the County is requesting a permit modification to their existing landfill permit No. 59-15 to allow layers of C&D waste be spread in six (6) feet or less in thickness prior to compaction.

As part of this permit modification, the County would also like to include the addition of a new monitoring well as discussed with ADEM and described in the report "*Monitoring Well Abandonment and Installation Plan*" dated December 6, 2023. This report has been previously submitted to ADEM by LaBella Associates under a separate cover letter.

On their behalf, we are providing the permit modification form for the Hwy 70 Landfill. Please find enclosed 1 hard copy of the form and a check in the amount of $3,275 for the permit minor modification fee.

If you have any questions or require any additional information, please don't hesitate to contact us. Thank you for your consideration.

Yours truly,

Trent Turner

enclosures

# SOLID WASTE APPLICATION

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

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

2. **Facility Name** Highway 70 Landfill

3. **Applicant:**

   **Name:** Shelby County Commission

   **Address:** 200 West College Street Columbiana, AL 35051

   **Telephone:** (205) 669-3737

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

   **Township** 21S **Range** 1W
   **Section** 19 & 30 **County** Shelby

   Township 21S Range 2W
   Section 24 & 25 County Shelby

5. **Land Owner:**

   **Name:** Shelby County Commission

   **Address:** 200 West College Street Columbiana, AL 35051

   **Telephone:** (205) 669-3737

   **(Attach copy of agreement from landowner if applicable.)**

6. **Contact Person:**

**Name** Brandon Hamilton

**Position or Affiliation** Supervisor, Environmental Services Shelby County, Alabama

**Address:** 1281 Hwy 70 Columbiana, AL 35051

**Telephone:** (205) 669-3737

7. **Size of Facility:** 360.5 **Acres**

**Size of Disposal Area(s):** 131 **Acres** (77.7 MSW; 53.3 C&D)

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

Service area shall remain as previously approved by ADEM and listed on the current permit as follows: Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, and Tuscaloosa Counties in Alabama

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

1,500 **Tons/Day** _____ **Cubic Yards/Day**

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

Municipal Solid Waste

Construction and Demolition Waste

**SIGNATURE** **DATE** 12/15/23

# SHELBY COUNTY
## DEPARTMENT OF ENVIRONMENTAL SERVICES
1281 HIGHWAY 70
COLUMBIANA, AL 35051
(205) 669-3737
www.ShelbyAL.com


February 17th, 2025



Ms. Melissa Adornato
Alabama Department of Environmental Management
Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, AL 36110-240

RE: Permit Modification Alternate Daily Cover Addition

Dear Ms. Adornato

Please see the following request to add an additional alternative daily cover material to our permit modification that was originally submitted on December 15, 2023. We are requesting to add Enviro Cover System to the list of alternate daily cover material approved for use at the Hwy 70 Landfill. Enviro Cover is a polyethylene film developed by EPI called Enviro™Cover, as a daily cover material, instead of a minimum of six inches of compacted operating cover. Enviro™Cover is a non-reusable, engineered film with sufficient tear strength at 1.75 mL thickness, puncture resistance and elongation characteristics that can be deployed over uneven surfaces. Enviro™Cover is impermeable so it traps odors and gaseous emissions at the landfill surface, and minimizes stormwater infiltration. The Enviro™Cover system meets the Environmental Protection Agency's (EPA) requirements for alterative daily cover in 40 CFR Part 258.21 Paragraph 3.3.3.1(b). Manufacturer information is attached for your review.

Our main focus remains operating the Shelby County Landfill in compliance with all state and federal regulations. While also maximizing air space in our MSW disposal areas. If approved for use Enviro Cover will allow Shelby County to comply with state and federal daily cover regulations, along with improving issues of blown litter, scavenging, and odor control at our MSW disposal area. Enviro Cover will also allow Shelby County to increase its compaction rate and save air space in the active MSW disposal area extending the life of the landfill.

Should you have any questions regarding this request, please feel free to contact me by email at jfrost@shelbyal.com or via telephone at 205-669-3737.

Sincerely,

James Frost

James Frost
Manager, Environmental Services
Shelby County, Alabama

# SHELBY COUNTY
## DEPARTMENT OF ENVIRONMENTAL SERVICES
1281 HIGHWAY 70
COLUMBIANA, AL 35051
(205) 669-3737
www.ShelbyAL.com


February 25th, 2025

Ms. Melissa Adornato
Alabama Department of Environmental Management
Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, AL 36110-240

RE: Permit Modification Alternate Daily Cover Addition Follow-up

Dear Ms. Adornato,

As a follow up to our original letter on February 17th, 2025 we wanted to add some additional information. In regards to the Enviro Cover as an alternate daily cover, ADEM has already approved the use of the 1.75mL thick cover material. ADEM approved this through a 2022/2023 pilot study performed at the Huntsville Landfill (Permit No. 45-01). The Huntsville Landfill's permit was modified on 10/24/2023 to include the use of the 1.75 mL thick Enviro Cover material as an acceptable ADC.

We hope this information will help in the approval of modifying our new landfill permit to allow for the Enviro Cover 1.75 mL thick material to be utilized as an ADC at our landfill. Thank you for your assistance in this matter.

Should you have any questions regarding this request, please feel free to contact me by email at jfrost@shelbyal.com or via telephone at 205-669-3737.

Sincerely,

James Frost

James Frost
Manager, Environmental Services
Shelby County, Alabama

# ENVIRO™ COVER SYSTEM

# Benefits

**Enviro™ Cover System is an Alternative Daily Cover (ADCM) that provides landfills with environmental, operational, performance and economic benefits.**

## Features and Benefits Summary:

- Enviro™ Cover is non-reusable, providing continuous and uninterrupted impermeable barrier over the surface of the waste.
- Enviro™ Cover provides barrier performance and benefits for the duration of the cover period.
- Enviro™ Cover provides complete garbage containment.
- Enviro™ Cover prevents rainwater infiltration to minimize leachate generation, allowing more control over leachate management including less cost associated with treatment.
- Enviro™ Cover provides and excellent barrier in shedding water.
- Enviro™ Cover provides continuous barrier to control, prevent, reduces the escape of odors, gas and vapour emissions from the landfill cell, while also minimizing the risk of fires by limiting air intrusion.
- Enviro™ Cover is mechanically destroyed by subsequent placement of waste and further deteriorates by stress conditions within the landfill, resulting in no intervening barriers within the landfill to impede the movement of leachate and gas for collection and treatment.
- Different grades of Enviro™ Cover are available for daily cover application, each formulated to provide effective cover for their variable duration periods of up to 4 weeks. For prolonged coverage of up to 6 months, Intermediate cover is also available.
- Enviro™ Cover System increases the airspace utilization rate of a landfill and with it, the landfill's gross revenue.
- In comparison with using traditional earthen materials, the Enviro™ Cover System saves the operating costs of importing, storage, moving, spreading, compacting and recovery of soils or inert materials and reduces landfill equipment capital costs, noise and dust generation, manpower time and related expenses.
- Simplifies and expedites the daily covering operation - no post application requirements for applicator equipment, generally only 2 personnel are needed to efficiently apply Enviro™ Cover, freeing other personnel and equipment to continue working in another area of the working face.
- Enviro™ Cover is applied by a range of Deployers (applicators) which are either self propelled or easily attach to landfill site equipment. Enviro™ Cover System is an efficient cover application even in the most adverse climatic conditions, with the flexibility of scalable placement to suit any size or shape of cover area or working face.
- Rapid and ease of deployment.


epi
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**envirocover@epi-global.com**
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EPI (Europe) Ltd.
**European Headquarters**
McLintocks, Summer Lane
Barnsley, South Yorkshire
United Kingdom S70 2NZ





Doc #: EC105 / Rev. 1 / Effective Date: January 1, 2018

# Enviro™ Cover System

## *Compliance with the US EPA Requirements of Alternative Daily Cover*

Enviro™ Cover meets the Environmental Protection Agency's requirements 40CFR258.21 3.3.1(b) of alternative daily cover (ADC) "to control disease vectors, fires, odors, blowing litter, and scavenging without presenting a threat to human health and the environment".

## Compliance with EPA's Requirements

### *Disease Vectors*

Enviro™ Cover controls disease vectors by providing complete coverage of waste, including protruding bulky items on the working face, to block out disease vectors. It provides a slippery plastic surface that creates a hostile environment to rodents. It discourages rodents from burrowing with the highly puncture resistant film.

Enviro™ Cover is applied in 10 to 18-foot wide panels, which are overlapped by approximately 6 to 18 inches and are securely anchored by ballast material. The overlapped panels perform as a continuous barrier over the waste to isolate waste and disease vectors, e.g. flies, mosquitoes, rodents etc., from the atmosphere and human contacts. It does not contain any nutrients for vectors.

**Enviro™ Cover completely covers protruding objects and provides a slippery surface that is hostile to rodents.**

### *Fires*

There are two methods for ADC's to control landfill fires, namely non-combustibility of the ADC material and its ability to prevent gas and air exchanges. Enviro™ Cover's fire control capability does not rely on the non-combustibility of the material because modern landfills have adopted many practices, such as elimination of hot loads, prohibition of open burning, and restricted access to the working face, to reduce the reliance on non-combustibility of ADC material on the waste surface.

Enviro™ Cover is an impermeable sheet and controls landfill fires by providing a substantially improved barrier to prevent gas and air migration, which is an important element in the spread of landfill fires. It reduces the mixing of atmospheric oxygen with landfill fuel gases and provides a considerable control over the spread of landfill fires. Enviro™ Cover material does not contribute to fire. Even if it is ignited, it will not burn so vigorously and persistently that it creates a hazard.

In 2006, a landfill fire broke out in an Italian landfill that used Enviro™ Cover as the ADC. After the fire, the landfill operator made a remark that Enviro™ Cover performed an excellent function of control over the spread of the landfill fire.

**Enviro™ Cover assisted in controlling the spread of a landfill fire in an Italian landfill**

## *Odors*

Enviro™ Cover is an impermeable non-reusable polyethylene film that controls odors by providing a continuous impermeable polyethylene barrier to trap odors arising from the waste. The permeability of Enviro™ Cover has been tested by ASTM E96 of the American Society for Materials and Testing. The test results showed that water vapour permeation, which was an indicator of landfill gas and odor emissions, through the film was well below the standard suggested by the American Society for Materials and Testing in its Guideline ASTM D6523.

## *Blowing Litter*

Enviro™ Cover controls blowing litter by providing rapid and continuous coverage over the working face. For example, the RK650 Enviro™ Cover Deployer can cover up to 20,000 $ft^2$ in less than one hour. Once applied, Enviro™ Cover seals loose waste items beneath the cover and prevents them from being picked up by winds. Enviro™ Cover can be applied in strong winds, providing the most needed control over blowing litter problem.

## *Scavenging*

Enviro™ Cover controls scavenging by providing a dark brown cover that mimics the color of soil. It discourages burrowing with the highly puncture resistant film. It has a slippery plastic surface that creates a hostile environment to rodents and birds. It traps odors and provides complete coverage of the waste. As opposed to soil, where bulky items may still protrude from the working face, Enviro™ Cover wraps around and encloses the irregularities of the waste to completely block out scavenging.

## *Threat to Human Health*

Enviro™ Cover does not pose a threat to human health. The Material Safety Data Sheet for Enviro™ Cover shows that Enviro™ Cover does not cause skin or eye irritation. It is considered biologically benign. It does not require any special exposure control during ordinary handling.

### *Threat to the Environment*

Enviro™ Cover does not pose a threat to the environment. The Material Safety Data Sheet shows that all chemicals for the Enviro™ Cover film are listed in TSCA inventory list and there is no known adverse effect for these chemicals. (The TSCA Inventory lists the latest public information on all chemicals or chemical substances manufactured or imported into the U.S. for commercial purposes as defined under the Toxic Substances Control Act.) Enviro™ Cover is not a hazardous waste under RCRA regulations. In addition, eco-toxicity tests were carried out on earthworm and daphnia survival, lettuce seed germination, and cress plants and summer barley plants growth. The test results showed that there was no detectable toxic effect on these species.

## Test Standard

At present, there is no widely accepted method to test the capability of ADC material to control disease vectors, fires, odors, blowing litter, and scavenging. In agreement with this situation, Neal Bolton wrote in MSW Management (July/August 2001) that, "Another problem related to ADC is the lack of industry-wide standards. What's acceptable at one landfill might not be acceptable at another... Unfortunately, developing consistent statewide or even national standards isn't as easy as it sounds." As a result, there is no standard test, both in laboratory and in the field that can be used to determine ADC compliance with the regulation.

## ASTM D6523

**Standard Guide for Evaluation and Selection of Alternative Daily Covers (ADCs) for Sanitary Landfills**

The American Society for Testing and Materials attempted to evaluate in general terms the capability of different ADCs in complying with the individual EPA requirement. Its guideline ASTM D6523 describes the non-reusable geosynthetic ADC, the ADC category to which Enviro™ Cover belongs, as follows:

| Consideration | ASTM D6523 Description |
|---|---|
| Disease Vector Control? | Can completely cover waste so as not to attract disease vectors |
| Odor and Air Emission Control? | Trap odors and other emissions; can be tested by ASTM E96 permeation |
| Dust Control? | Yes |
| Blowing Litter Control? | Yes |
| Water Infiltration Control? | Shed rainwater effectively for several layers of cover |
| Fire Control<br>a) Combustible?<br>b) Barrier to air/gas movement? | <br>Yes<br>High |

## Nation-wide Acceptance

The compliance of an ADC with EPA's requirements is primarily tested by means of a demonstration or trial on a particular site. When a demonstration/trial shows that an ADC complies with the requirements,

the local EPA accepts its use on the site. In other words, the most meaningful evidence of an ADC's ability to comply with the EPA requirements is its acceptance and use in US.

Enviro™ Cover has been evaluated against the EPA requirement by a number of state authorities in US. It is approved in the States of California, Oregon, South Carolina, North Carolina, Nebraska, Texas, New York, Minnesota, Utah, Illinois, Indiana, Arkansas, and Arizona. The number of states approving Enviro™ Cover is continuously increasing. Based on its extensive use, it is evident that Enviro™ Cover complies with EPA's regulations of alternative daily cover to "control disease vectors, fires, odors, blowing litter, and scavenging, without presenting a threat to human health and the environment".

Attachment 2

# Enviro™ Cover Technical Specifications

## 1. Physical Form

Polyethylene film

## 2. Film Dimensions

**Table 1 Standard Dimensions and Weight**

| Model | Thickness in. (mm) | Width in. (cm) | Length ft (m) | Area $ft^2$ ($m^2$) | Film Weight lb (kg) |
|---|---|---|---|---|---|
| **1.25 mil x 10 ft** *(32 micron x 3.0 m)* | 0.00125 *(0.032)* | 111.5 *(283)* | 7,560 *(2,304)* | 70,245 *(6,525)* | 422 *(192)* |
| **1.25 mil x 16 ft** *(32 micron x 4.88 m)* | 0.00125 *(0.032)* | 190 *(483)* | 7,560 *(2,304)* | 119,700 *(11,119)* | 720 *(327)* |
| **1.25 mil x 18 ft** *(32 micron x 5.5 m)* | 0.00125 *(0.032)* | 214 *(544)* | 7,560 *(2,304)* | 134,820 (12,524) | 810 (368) |
| **1.75 mil x 16 ft** *(45 micron x 4.88 m)* | 0.00175 *(0.045)* | 190 *(483)* | 5,250 *(1,600)* | 83,000 *(7,710)* | 698 *(317)* |
| **1.75 mil x 18 ft** *(45 micron x 5.5 m)* | 0.00175 *(0.045)* | 214 *(544)* | 5,250 *(1,600)* | 93,500 *(8,686)* | 786 *(357)* |
| **2 mil x 16 ft** (51 micron x 4.88 m) | 0.002 (0.051) | 190 *(483)* | 5,250 *(1,600)* | 83,000 *(7,710)* | 800 *(364)* |
| **2 mil x 18 ft** *(51 micron x 5.5 m)* | 0.002 *(0.051)* | 214 *(544)* | 5,250 *(1,600)* | 93,500 *(8,686)* | 900 *(409)* |
| **5 mil x 16 ft** 127 micron x 4.88 m) | 0.005 (0.127) | 190 (483) | 2,100 (640) | 33,000 (3,065) | 800 (364) |
| **5 mil x 18 ft** *(127 micron x 5.5 m)* | 0.005 *(0.127)* | 214 *(544)* | 2,100 *(640)* | 37,150 *(3,451)* | 900 *(409)* |

*Note: The tolerance for film thickness and film weight is +/- 10% of the specified values.*

## 3. Properties

**Table 2 Standard Color**

| Type | Opacity | Colour |
|---|---|---|
| **Daily Cover** | Opaque | Brown |
| **Extended Daily Cover** | Opaque | Buff |
| **Intermediate Cover** | Opaque | Brown |

**Table 3 Minimum Elongation**

| Model | Minimum Elongation (%) |
|---|---|
| **1.25 mil x 10 ft** | 350 |
| **1.25 mil x 16 ft** | 350 |
| **1.25 mil x 18 ft** | 350 |
| **1.75 mil x 16 ft** | 400 |
| **1.75 mil x 18 ft** | 400 |
| **2 mil x 16 ft** | 500 |
| **2 mil x 18 ft** | 500 |
| **5 mil x 16 ft** | 700 |
| **5 mil x 18 ft** | 700 |

## 4. Packaging

4.1. Enviro™ Cover is packaged in rolls with a core. The core has a minimum inside diameter of 6 inches (150 mm) and a minimum thickness of 0.45 inch (12 mm).

4.2. Each roll has a serial number, which is marked on a label along with the information on film weight and film length.

4.3. Rolls are sealed tightly with a 20 mil white polyethylene (or equivalent) and shrink wrapped to exclude air and sunlight. An outer polyethylene sleeve is pulled onto the roll with both ends sealed.

4.4. The length, diameter and gross weight of the rolls are shown in Table 4.

**Table 4 Standard Dimensions and Gross Weight**

| Model | Roll Length in. (cm) | Roll Diameter in. (cm) | Gross Weight lb (kg) |
|---|---|---|---|
| **1.25 mil x 10 ft** | 113.5 (288) | 14.5 (37) | 450 *(205)* |
| **1.25 mil x 16 ft** | 191 (485) | 14.5 (37) | 770 *(350)* |
| **1.25 mil x 18 ft** | 215 (546) | 14.5 (37) | 870 (395) |
| **1.75 mil x 16 ft** | 191 (485) | 14 (36) | 750 *(341)* |
| **1.75 mil x 18 ft** | 215 (546) | 14 (36) | 846 *(385)* |
| **2 mil x 16 ft** | 191 (485) | 15 (38) | 850 *(386)* |
| **2 mil x 18 ft** | 215 (546) | 15 (38) | 950 *(432)* |
| **5 mil x 16 ft** | 191 (485) | 16 (41) | 850 (386) |
| **5 mil x 18 ft** | 215 (546) | 16 (41) | 950 *(432)* |

## 5. Storage Period and Average Cover Duration

5.1. Enviro™ Cover storage period and average cover duration shown in Table 6, are subject to proper storage conditions recommended by EPI. The average cover duration will vary with the seasons and with the regions, subject to mechanical stress, UV and heat exposure.

**Table 6 Storage Period and Average Cover Duration**

| Type | Model | Storage Period | Average Cover Duration |
|---|---|---|---|
| **Daily Cover** | **1.25 mil x 10 ft** | 12 months | 5 days |
| | **1.25 mil x 16 ft** | 12 months | 5 days |
| | **1.25 mil x 18 ft** | 12 months | 5 days |
| | **1.75 mil x 16 ft** | 12 months | 6 days |
| | **1.75 mil x 18 ft** | 12 months | 6 days |
| | **2 mil x 16 ft** | 12 months | 7 days |
| **Extended Daily Cover** | **1.75 mil x 16 ft** | 12 months | 4 weeks |
| | **1.75 mil x 18 ft** | 12 months | 4 weeks |
| | **2 mil x 18 ft** | 12 months | 5 weeks |
| **Intermediate Cover** | **5 mil x 16 ft** | 12 months | 6 months |
| | **5 mil x 18 ft** | 12 months | 6 months |

# ENVIRO™ COVER
# MATERIAL SAFETY DATA SHEET

## 1. PRODUCT IDENTIFICATION & COMPANY INFORMATION

PRODUCT NAME: ENVIRO™ COVER
CHEMICAL NAME: Polyethylene Film
CHEMICAL FAMILY: Polymer
PRODUCT USE: Plastic Film with TDPA®

EPI ENVIRONMENTAL PRODUCTS INC.
Unit 207, 102 Grover Street
Lynden, WA 98264, USA
Tel: +1 (604) 738-6281
Toll Free: +1(866) 738-6281
MSDS e-mail: msdsinfo@epi-global.com

## 2. HAZARDOUS IDENTIFICATION

HMIS Ratings: Health: 0; Fire: 1; Physical Hazard: 0Hazard Scale: 0= Minimal; 1= Slight; 2=Moderate; 3=Serious; 4=Severe
EMERGENCY OVERVIEW: Colored odorless film. Not considered hazardous. Can release irritating smoke if involved in a fire.

**POTENTIAL HEALTH HAZARDS:**
EYE CONTACT: Not hazardous in normal industrial use.
SKIN CONTACT: Not hazardous in normal industrial use.
INHALATION: Not a route of exposure
INGESTION: Not a route of exposure

## 3. COMPOSITION/ INFORMATION ON INGREDIENTS

| Ingredient name: | CAS# | Weight % |
|---|---|---|
| **Polyethylene (Non Hazardous)** | **9002-88-4** | **96-100%** |

## 4. FIRST AID MEASURES

EYE CONTACT: None needed
SKIN CONTACT: None needed
INHALATION: Not a route of exposure
INGESTION: Not a route of exposure
ADVICE TO PHYSICIAN: None

## 5. FIRE FIGHTING MEASURES

FLASH POINT: Not Applicable
FLAMMABLE LIMITS: LEL: Not Applicable; UEL: Not Applicable

AUTOIGNITION TEMPERATURE: Not Available
EXTINGUISHING MEDIA: Use water spray to cool fire exposed surfaces, foam, dry powder/chemicals or carbon dioxide.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Under fire conditions product will burn and emit irritating smoke and toxic gases.
FIREFIGHTING EQUIPMENT/ INSTRUCTIONS: Wear self-contained positive –pressure breathing apparatus and full protective gear.

## 6. ACCIDENTAL RELEASE MEASURES

**In case of land spill or water spill:**
Always wear recommended personal protective equipment.
Recover spilled material and place in suitable containers for recycle or disposal. Consult your local or regional authorities. Meet any applicable regulations.

## 7. HANDLING AND STORAGE

Rolls of film can be handled/ moved with proper carpet pole by inserting into the business end of the roll or by slings.
Always wear recommended personal protective equipment.
Store in a cool, dry area and away from direct sunlight. Covered storage area is recommeneded to achieve a maximum storage life of the plastic film with TDPA®.
Keep in original packaging which includes a UV protective film until usage and away from hazardous chemicals.

## 8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

**Engineering Controls**: Use local exhaust in confined spaces where material is heated.
**Personal Protective Equipment**: Not normally required. Use heat resistant gloves and safety glasses if material is heated to a melted state.
**Polyethylene Film is a Non- Hazardous material** – with no exposure limits.

## 9. PHYSICAL & CHEMICAL PROPERTIES

PHYSICAL STATE AND APPEARANCE: Solid colored plastic film
ODOR: None
SPECIFIC GRAVITY (Water=1.0): 0.91-1.05
FLASH POINT: Not Applicable
VAPOR PRESSURE: Not Applicable
SOLUBILITY IN WATER: Insoluble
MELTING POINT/RANGE: 105-135 Degrees C (221-275 Degrees F)
BOILING POINT: Not Applicable
EVAPORATION RATE: Not Applicable

## 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable
HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Avoid prolonged heating material over 250 Degrees Celsius; thermal decomposition may occur
MATERIALS TO AVOID/CHEMICAL INCOMPATIBILITY: Strong oxidizing agents and acids.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition products may include carbon dioxide, carbon monoxide, aldehydes, acrolein and other organic vapors.
OTHERS: Electrostatic accumulation may occur; use proper grounding

## 11. TOXICOLOGICAL INFORMATION

Material is considered non-toxic.

## 12. ECOLOGICAL INFORMATION

Material is considered non-toxic. After disposal in the environment, no harmful ingredients are left such as metabolites, undegraded components and inorganic components which exert a negative influence on plant growth, earthworms or freshwater organisms. The only by products are $CO_2$; water and biomass.

## 13. DISPOSAL CONSIDERATIONS

Disposal methods must comply with Federal, State/Provincial and local laws and regulations which may vary dependent upon location.

## 14. TRANSPORTATION INFORMATION

US DOT CLASSIFICATION: Not restricted
CANADIAN TDG CLASSIFICATION: Not restricted
INTERNATIONAL AIR TRANSPORT (ICAO and IATA): Not restricted
INETRANTIONAL MARITIME DANGEROUS GOODS (IMDG): Not restricted

## 15. REGULATORY INFORMATION

TSCA- TOXIC SUBSTANCES CONTROL ACT STATUS: Listed on TSCA Inventory list.
SARA TITEL III: Not Applicable
CERCLA Reportable quantities: Not Applicable
WHMIS CLASSIFICATION (CANADA): Not a controlled material

## 16. OTHER INFORMATION

ISSUE DATE: Feb 2, 2012
REVISED DATE: Sept 8th, 2014

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Attachment 3

# Enviro™ Cover Controls Odours in Landfills

It is a common requirement for landfills to control odours from municipal solid waste by covering deposited waste with an earthen or alternative daily cover (ADC) material.

Enviro™ Cover is a non-reusable polyethylene ADC, which is a technically "impermeable" material to gaseous movement because it has no interconnected pores. Gas molecules including water vapour, methane and other odourous gases move extremely slowly through Enviro™ Cover only as a vapor phase via molecular solubility and diffusion, in a process known as permeation. As a result, Enviro™ Cover effectively contains odours which are generated from the landfill working face.

## ASTM Test Method E96

At present, there is no widely accepted direct method to test the capability of an ADC material to control odours in the field. The American Society for Testing and Materials (ASTM) recommends in the ASTM Standard Guide D6523 (Ref. 1), Standard Guide for Evaluation and Selection of Alternative Daily Covers (ADCs) for Sanitary Landfills, "For slurries and geosynthetics, an odour control test should be conducted to assess performance. For these materials a permeation test, Test Method E96, is suggested, correlating the movement of water vapours through an ADC layer to the movement of odour layers through such layer. Water vapour loss through the ADC should be less than 3,000 $g/m^2$•day."

Two of the Enviro™ Cover grades, 1.5 mil daily Enviro™ Cover and 2.0 mil Progressive Daily Cover (Progressive Daily Cover is currently renamed as Extended Enviro™ Cover), were tested with ASTM Test Method E96 (Ref. 2) by an independent ISO 9002 certified laboratory (Ref. 3). The test results (Table 1) show that water vapour loss through the 1.5 mil Enviro™ Cover was 0.023 $g/m^2$•day. It was only $1/130{,}000^{th}$ of ASTM's recommended daily value. Enviro™ Cover has different grades ranging from 1.5 to 2.0 mil thickness. Thicker Enviro™ Cover films provide a longer pathway to water vapour loss and have a more superior odour control capability.

**Table 1 Water Vapour Transmission Test Result**

**(ASTM Test Method E96 tested by an independent ISO 9002 certified laboratory, Precision Geosynthetic Laboratories, PGL Job No. 010965 @ test conditions of 22°C and 60% relative humidity)**

| Enviro™ Cover Grade | Water Vapour Transmission ($g/m^2$-day) | Permeance ($g/Pa•s•m^2$) | Permeability (m/s) |
|---|---|---|---|
| 1.5 mil Daily Enviro™ Cover | 0.023 | $1.46 \times 10^{-10}$ | $5.5 \times 10^{-17}$ m/s |
| 2.0 mil Progressive Daily Cover | 0.011 | $6.64 \times 10^{-11}$ | $3.3 \times 10^{-17}$ m/s |

*(Note: ASTM recommends that water vapour transmission through slurries and geosynthetics should be less than 3,000 $g/m^2$•day)*

## Comparison with Soil Cover

Using the water vapor transmission data of the 1.5 mil daily Enviro™ Cover and making assumptions about typical temperature, humidity and pressure, the permeability of water vapour through the 1.5 mil daily Enviro™ Cover is calculated in Appendix 1 to be roughly $5.5 \times 10^{-17}$ m/s. This is about 1/1,000,000,000$^{th}$ of typical permeability of methane through daily soil cover of $5.7 \times 10^{-8}$ m/s (Appendix 2). Thicker Enviro™ Cover films provide a longer pathway to water vapour loss and have a more superior odour control capability. Therefore, Enviro™ Cover deployed over the active working face is far more effective than soil in controlling odours through the cover material.

## International Acceptance

In many cases, compliance with statutory odour control requirement, amongst other operating requirements, is tested by means of a demonstration or trial for each landfill site. When a demonstration or trial proves that an ADC complies with the requirements, the ADC is accepted. The most meaningful indication of an ADC's odour control capability is its worldwide acceptance and use.

In the United States of America, Enviro™ Cover has been evaluated independently in many states by EPA's requirements and has been approved in many states such as California, Oregon, South Carolina, North Carolina, Nebraska, Texas, New York, Minnesota, Utah, Illinois, Indiana, Arkansas, and Arizona. The number of states approving Enviro™ Cover is continuously increasing.

Enviro™ Cover has also been evaluated in many countries by their respective odour control standards. It has been approved for use in many countries such as Canada, Argentina, Australia, England, Erie, Finland, North Ireland, Wales and Scotland. From the extensive acceptance and use of Enviro™ Cover, it is evident that Enviro™ Cover meets the US and international standards in odour control.

Reference
1. The American Society for Testing and Materials, ASTM D6523-00, "Standard Guide for Evaluation and Selection of Alternative Daily Covers (ADCs) for Sanitary Landfills"
2. The American Society for Testing and Materials, ASTM Test Method E96-00, "Standard Test Methods for Water Vapor Transmission of Materials
3. "Precision Geosynthetic laboratories, Test Report PGL Job No. 0.0965, November 7, 2001
4. Swiss Standard SN 670 010b, Characteristic Coefficients of Soils, Association of Swiss Road and Traffic Engineers
5. National Institute of Standards and Technology website, http://webbook.nist.gov/chemistry/fluid/

## *Appendix 1: Permeability of Water Vapour through Enviro™ Cover*

A) 1.5 mil Daily Enviro™ Cover

Permeability coefficient $k$ = Permeance • g • t

where Permeance = $1.46 \times 10^{-10}$ g/Pa•s•m$^2$ at 22 °C (Table 1)
g is the standard gravity = 9.81 m/s$^2$
t is the thickness = 1.5 mil or $38.1 \times 10^{-6}$ m

$k = 1.46 \times 10^{-10} \times 10^{-3} \times 9.81 \times 38.1 \times 10^{-6}$

$k = 5.5 \times 10^{-17}$ m/s

B) 2.0 mil Progressive Daily Cover

Permeability coefficient $k$ = Permeance • g • t

where Permeance = $6.64 \times 10^{-11}$ g/Pa•s•m$^2$ at 22 °C (Table 1)
g is the standard gravity = 9.81 m/s$^2$
t is the thickness = 1.5 mil or $38.1 \times 10^{-6}$ m

$k = 6.64 \times 10^{-11} \times 10^{-3} \times 9.81 \times 38.1 \times 10^{-6}$

$k = 3.3 \times 10^{-17}$ m/s

## *Appendix 2: Permeability of Methane through Daily Soil Cover*

Flow Equation (Darcy's Law): $v = k \cdot i$

where v is the apparent fluid velocity through the medium, m/s
k is the coefficient of permeability, m/s
i is the hydraulic gradient

k depends on the relative permeability of the medium for fluid and the dynamic viscosity of the fluid

$$k = K \cdot \rho \cdot g / \mu$$
or $$K = k \cdot \mu / (\rho \cdot g)$$

where: $\rho$ is the density of the fluid, $kg/m^3$
g is the standard gravity = 9.81 $m/s^2$
K is the an absolute coefficient of the medium only, $m^2$
$\mu$ is the dynamic viscosity of the fluid, Pa•s or kg/(m•s)

The coefficient of permeability of methane can be derived from that of water for a given medium

$$K = k_m \cdot \mu_m / (\rho_m \cdot g) \text{ and } K = k_w \cdot \mu_w / (\rho_w \cdot g)$$
or $$k_m = k_w \cdot \mu_w \cdot \rho_m / (\rho_w \cdot \mu_m)$$

where the subscript m stands for methane and w for water

Typical values of $k_w$ of silty gravels, silty sandy gravels: $5 \times 10^{-8}$ to $5 \times 10^{-6}$ m/s (Ref. 4). Because of relatively poor compaction of daily soil cover over solid waste, a close to the higher limit for silty gravels, silty sandy gravels, $1 \times 10^{-6}$ m/s, is assumed.

$$k_m = k_w \cdot \mu_w \cdot \rho_m / (\rho_w \cdot \mu_m)$$

where $k_w = 1 \times 10^{-6}$ m/s
$\mu_w = 0.000954$ Pa•s at 22 °C (Ref. 5)
$\rho_w = 997.8$ $kg/m^3$ at 22 °C (Ref. 5)
$\mu_m = 0.00001109$ Pa•s at 22 °C (Ref. 5)
$\rho_m = 0.6636$ $kg/m^3$ at 22 °C (Ref. 5)

$k_m = 1 \times 10^{-6} \times 0.000954 \times 0.6636 / (997.8 \times 0.00001109)$
$= 5.7 \times 10^{-8}$ m/s

# Gas & Odour Suppression: A Comparison of Polyethylene Film Alternative Cover (AC) and Daily Cover Soil

*By: Mark Cadwallader, Cadwallader Technical Services, Conroe, Texas*

The use of polyethylene covers in landfills has improved landfill gas collection to utilize the energy value of methane gas and to control air pollution problems resulting from odors and greenhouse gas effects. Compared to earthen final covers of compacted clay for landfill closures, polyethylene final covers are known by landfill operators to be a more efficient barrier to landfill gas. This has to do with the significantly lower effective permeability of polyethylene compared with soil, as well as the tendency for soil barriers to weather, shift and crack over unconsolidated sub-surfaces such as landfill waste.

Polyethylene is a technically "impermeable" material, with no interconnected pores through which fluids can flow. Fluid molecules move very slowly through polyethylene film as a vapor phase via molecular solubility and diffusion, in a phenomenon known as permeation. Polyethylene liner permeation calculated from water vapor transmission (WVT), making assumptions about temperature, humidity and pressure, is compared with permeability for soils measured by Darcy's Law test apparatus (Koerner, 1994). The effective moisture permeability of polyethylene sheet is then calculated, as exemplified in Figure 1, to be roughly $3 \times 10^{-15}$ m/sec. This compares with $1 \times 10^{-8}$ m/sec for typical well-compacted clay. Because of polyethylene's very low impermeability, methane gas trapped under the film can be very effectively controlled and directed for processing in landfill closures. Permeability is an intrinsic material property, independent of thickness.

Landfill gas contains methane, volatile organic carbons (VOC's), odorous mercaptans and water vapor. Odorous landfill gases are less polyethylene-permeating than methane (which is odorless) so that the polyethylene film permeation numbers presented below, using the data in Figure 2, are "worst case" when extended to odorous VOC's and mercaptans. The odorous components of landfill gas permeate even less than the values here presented, displaying an even greater difference compared to compacted soils.

A continuous non-reusable polyethylene film AC will greatly exceed the performance of cover soil in suppressing and controlling the evolution of landfill gas with its odors and air pollution, provided film panels are properly overlapped and punctures are kept to a minimum.

Another important consideration is that compacting clay layers, used for daily cover, can undesirably form interior barriers to the movement of leachate and gas. Such layers are not formed when a non-reusable polyethylene film is used, since the film barrier is designed to lose its integrity within the landfill. Such interior barriers formed by clay can disrupt the desired movement and direction of leachate and gas within a landfill, causing the fluids to migrate sideways resulting in side-slope outbreaks and other seeps at unintended points. Side-slope seeps create significant leachate control problems and can cost un-budgeted dollars in corrective action.

Non-reusable polyethylene film is an excellent continuous fluid barrier at the surface of the waste where it is needed. The film is mechanically destroyed by subsequent placement of waste and by stress conditions within the landfill, therefore not impeding the fluid flow.

# Methane Gas Loss Through Daily Cover Soil

Flow Equation (Darcy's Law): $Q = k_g A (H + t)/t$

where: Q = flow through daily cover, $m^3$/day

$k_g$ = permeability to methane gas = $k_w \mu_w / \mu_g$

$k_w$ = permeability to water, m/sec

$\mu_g$ = viscosity of methane gas at 26°C, 1 ATM (0.011 centipoise)

$\mu_w$ = viscosity of water at 26°C (0.9 centipoise)

Assuming: H = effective head of methane = 0.2 m,
t = thickness of cover = 0.3 m,
A = area of working face = 1,000 m²

Therefore, $Q = k_w(.9/.011)1000(.5/.3)(86{,}400\text{sec/day})$

$= k_w(136{,}363\ m^2)(86{,}400\text{sec/day})$

| **Soil Conditions** | **Flow Through (1,000 m² area) Soil Cover,Q** |
|---|---|
| $k_w=10^{-8}$ m/sec, compacted clay over firm subgrade | 117 m³/day |
| $k_w=10^{-6}$ m/sec, typical clayey soil compacted over poor subgrade (such as landfill waste) | 11,700 m³/day |
| $k_w=10^{-5}$ m/sec, typical sandy/clayey soil over poor subgrade | 117,000 m³/day |

## Methane Gas Loss Through Polyethylene Film (1,000 m² area)

From Matrecon Laboratories, Oakland, Calif., 1991 (Figure 2):

| | |
|---|---|
| 2mil, permeation = 92 cm³/100 in²/day | = 1.4 m³/day |
| 3mil, permeation = 73 cm³/100 in²/day | = 1.1 m³/day |
| 5mil, permeation = 49 cm³/100 in²/day | = 0.76 m³/day |

Figure 1

PERMEABILITY OF MEDIUM DENSITY POLYETHYLENE

$P_s$ = pressure of saturated vapor at a given temperature (given in physics textbooks)
H = relative humidity - 60%
T = 23 °C

At T = 23 °C, $P_s$, = 21.068 mm Hg

$P_s$ = 21.068 x 133.3 = 2808 Pa

The vapor pressure is $p = H \times P_s$.

p = 0.6 x 2808 = 1685 Pa

Water Vapor Transmission WVT = 0.04 $g/m^2$.24h for 40 mil HDPE

WVT = p x w (w is the permeance)

$$w = \frac{WVT}{p} = \frac{0.04 \times 10^{-3}}{8.64 \times 10^{4} \times 1685} = 2.75 \times 10^{-13} \text{ kg/m}^2\text{. Pa. s}$$

Permittivity $K_t = w \times g$ ($g = 9.81 \text{ m/s}^2$)

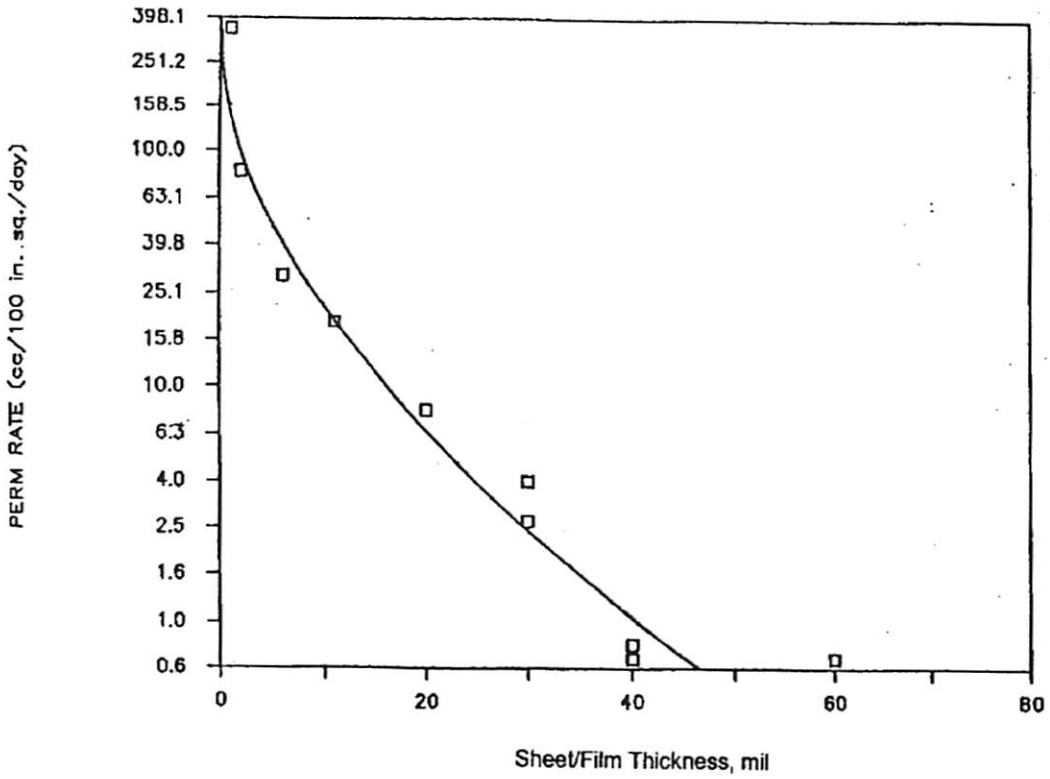
$K_t = 2.75 \times 10^{-13} \times 9.81 = 2.70 \times 10^{-12}$/s

Permeability $k = K_t \times t$ (t = thickness), t = 40 mils = 1 mm = $10^{-3}$ m

$k = 2.70 \times 10^{-12} \times 10^{-3}$

$k = 2.70 \times 10^{-15}$ m/s

Figure 2 METHANE PERMEATION OF MEDIUM DENSITY POLYETHYLENE SHEET/FILM (Matrecon Laboratories, 1991)




References
1. Koerner, R.M., Designing with Geosynthetics, 3rd Edition, Prentice Hall, Englewood Cliffs, NJ, 1994.
2. Matrecon Laboratories, Oakland, California, for Poly-America Corp, Grand Prairie, TX, 1991.

RiverBirch
INCORPORATED
2000 SOUTH KENNER ROAD
AVONDALE, LA 70094

October 24, 2013

Mr. Randy Kozak
Enviro™ Cover Division Manager
EPI Environmental Products Inc.
Suite 801, 1788 West Broadway
Vancouver, B.C., Canada V6J 1Y1

***Re: Utilization of EPI Enviro™ Cover as Landfill Daily Cover***

Dear Mr. Kozak:

As you are aware, River Birch, Inc. purchased an EPI Enviro™ Cover deployment machine and began using your Enviro™ Cover, polyethylene film at our Avondale, Louisiana landfill as daily cover since July 2013. This decision was made after conducting a thorough field trial and comparing the results with other cover materials including clay, silty clays, and alternative "spray-applied" covers. Our decision was based on economics, basically complete garbage containment, and the ease and rapid deployment of the cover. Of course we were interested in shedding rain water off of the working face and preventing excessive water infiltration into the garbage. After three months use additional observations support this expectation and we are pleased to report less odors emanating from the working face after rain events.

We have also observed an additional phenomenon that significantly reduces odors emanating from daily working faces. The humid/subtropical conditions of our area result in extensive, odorous vapor releases from the working face and the releases are particularly odor-intensive in the evening and continuing through mid-morning. This often results in a concentrated mist similar to ground fog that has the tendency to "flow", mainly during the same hours mentioned above when wind currents often remain at 1-3 mph. This odorous mist reaches surrounding neighborhoods resulting in strong garbage odors offensive to the residents if the prevailing wind direction is South/Southwest. Utilizing the polyethylene cover, we observed the condensation of the vapors on the underside of the sheeting, preventing them from becoming airborne. Consequently we have noted significantly less odors coming from the daily working faces that are covered with your Enviro™ Cover.

Mr. Kozak, River Birch, Inc. will continue making observations and report any significant findings to EPI Environmental Products, Inc. as we continue to utilize this daily cover. We look forward to a continued working relationship with your company.

Best Regards,

***River Birch, Inc.***

Victor C. Culpepper, Sc.D.
Technical Director

Attachment 4

# ENVIRO™ COVER SYSTEM

# Deployer Model 800

Enviro™ Cover Deployer Model 800 is a self-propelled applicator built on a rubber track carrier, enabling the waste-covering process to be conducted effectively and rapidly.

## Key Features:

- Ideal for large cover areas / working faces
- Rapid deployment of cover up to 3,200 ft² (260 m²) per minute
- Hydraulic roll arms lower and raise Enviro™ Cover roll
- Multi-direction deployment allows a tight turning radius to provide increased covering efficiency and performance
- Hydrostatic transmission (hydraulic pumps), allows for economical use of the engine's full power
- Rubber tracks combine characteristics of a tire equipped carrier - smooth ride and speed, while also providing the traction of a steel type track
- The rubber tracks offer low ground pressure, high performance movement and excellent traction, which with the floating bogie wheel undercarriage, makes even difficult terrain accessible
- CATERPILLAR C7 industrial engine and controls
- Variable speed hydraulic chain floor and side feeder ballast dispensing system
- Ballast payload capacity container allows for continuous deployment minimizing ballast reloading
- Compatible with flowable ballast material (such as sand, soil, aggregates)

## Attachment Method:

- Self-propelled

## Model 800 Specification:

- Dimensions (L x W x H):
  24 ft x 20 ft 7 in x 10 ft 6 in
  (7.3 m x 6.3 m x 3.2 m)
- Weight (Wet): 34,000 lbs (15,422 kg)
- Max Carrying Capacity: 16,000 lbs (7,257 kg)
- Ground Pressure:
  3.1 psi (unloaded) and 5.7 psi (loaded)

## Enviro™ Cover Roll Specification:

- Thickness: 1.25, 1.75, 5 mil (32, 45, 127 micron)
- Roll Width: 18 ft (5.5 m)

epi
Phone: +1 (604) 738-6281
Toll free: +1 (866) 738-6281
Fax: +1 (604) 856-8189
envirocover@epi-global.com
www.envirocoversystem.com

EPI Environmental Products Inc.
**US Corporate Office**
1610 Grover Street, Ste. B7
Lynden, WA
USA 98264

EPI Environmental Products Inc.
**Canadian Corporate Office**
#801 - 1788 West Broadway
Vancouver, BC
Canada V6J 1Y1

EPI (Europe) Ltd.
**European Headquarters**
McLintocks, Summer Lane
Barnsley, South Yorkshire
United Kingdom S70 2NZ


Doc #: EC102 / Rev.1 / Effective Date: January 1, 2018

Variances

# SHELBY COUNTY

## DEPARTMENT OF ENVIRONMENTAL SERVICES

1281 HIGHWAY 70
COLUMBIANA, AL 35051
(205) 669-3737
www.ShelbyAL.com

February 3, 2026

Ms. Melissa Adornato
Alabama Department of Environmental Management
Solid Waste Branch
1400 Coliseum Boulevard
Montgomery, AL 36110-240

RE: Variance Request Petition

Dear Ms. Adornato,

As part of the Permit Renewal Application for the Shelby County Highway 70 Landfill (Permit 59-15) submitted to the Alabama Department of Environmental Management (ADEM) on May 25, 2021, Shelby County respectfully Request the following variances to be extended in our new permit.

1. For the C&D area, the Permittee is granted a variance from Rule 335-13-4-.20(2)©2. Requiring terraces. The Permittee shall not be required to construct terraces.
2. A variance is granted for the Highway 70 Landfill from Rule 335-13-4-.22(1)(b) which states that all waste shall be confined to as small an area as possible. Under this variance, Highway 70 Landfill is allowed to operate two working faces. The Highway 70 Landfill will only be allowed one working face in each of the disposal areas.

The Shelby County Highway 70 Landfill will ensure that disposal requirements are met for both the MSW and C/D working faces in accordance with the permit conditions. In addition, Shelby County will ensure proper storm water management and control along with erosion prevention of slopes without the requirement for terraces as successfully demonstrated over many years at the site. Shelby County requests these Variances be extended in addition to the permit modifications and variances requested in our Request for Permit Modification letter received by ADEM on December 18, 2023.

If you have any questions or need any additional information, please contact me via email at jfrost@shelbyal.com or via phone at 205-358-5879.

Best Regards,

James Frost
Environmental Services Manager
Shelby County Alabama

Chad Scroggins
County Manager
Tel. (205) 620-6650

James Frost
Manager
Tel. (205) 670-3737

# SHELBY COUNTY
## DEPARTMENT OF DEVELOPMENT SERVICES

Inspection Services, Planning Services, Landfill Division, Emergency Management, MS4 Stormwater, Litter and Animal Control
1123 COUNTY SERVICES DRIVE
PELHAM, ALABAMA 35124
www.ShelbyAL.com


September 19, 2016

Mr. Devin Jenkins
Alabama Department of Environmental Management
Land Division, Solid Waste Branch
P. O. Box 301463
Montgomery, Alabama 36130-1463

RE: Permit Renewal Application - Variances
Highway 70 Landfill
Shelby County, Alabama
Permit 59-15

Dear Mr. Jenkins,

As part of the completed Permit Renewal Application (Form 439) for the Shelby County Highway 70 Landfill (Permit 59-15) submitted to the Alabama Department of Environmental Management (ADEM) on May 6, 2016, Shelby County respectfully requests no changes from the current landfill operating permit including the continuance and renewal of the 2 current variances for 1) the ability to operate 2 working faces (1 for MSW and 1 for C/D disposal) and 2) the variance for no requirement for terraces. The Shelby County Highway 70 Landfill will insure that disposal requirements are met for both the MSW and C/D working faces in accordance with the permit conditions. In addition, Shelby County will insure proper storm water management and control along with erosion prevention of slopes without the requirement for terraces as successfully demonstrated over many years at the site.

Shelby County requests that ADEM please consider the continuation of these variances in the upcoming permit renewal. Should you have any questions regarding this response and request, please feel free to call me at 205-620-6653.

Sincerely,

Chad Scroggins
Manager, Development Services
Shelby County, Alabama

Cc: Trey Gauntt, Chief Engineer, Shelby County Development Services

# Shelby County Environmental Office

504 Highway 70
Columbiana, Alabama 35051

Robert Kelley
Environmental Manager

Office: 205-669-3737
Fax: 205-669-3871


April 2, 2002

Mr. Jonathan Crosby
Alabama Department of Environmental Management
Solid Waste Branch - Land Division
1400 Coliseum Boulevard
Montgomery, AL 36110-2059

RE: Modification to Permit Number 59-15
Highway 70 Landfill
Shelby County

Dear Mr. Crosby,

The Shelby County Commission is requesting a variance to the closure plan of the Construction and Demolition Landfill currently being reviewed by ADEM.

The requested variance will eliminate the terraces at every 20' rise in elevation. The proposed C&D closure would match the requested I,C,& D Cell closure. It would consist of 4:1 maximum slopes and a maximum slope distance of 280 feet. Drainage ditches at the base of the cell, which may cause a problem due to concentrated flows, will be rip-rapped as required to control erosion.

The caps of two existing MSW cells closed in 1999 support this request for modification. These two cells were closed with no terraces, 4:1 slopes, and slope distances exceeding 400 feet. This closure has performed as intended with no drainage or erosion problems. As was the case with the MSW cells closed in 1999, the C&D cell is within the boundaries of an active landfill. This will allow landfill operators to routinely inspect the closed cells and quickly repair any problems which may arise.

In reviewing our request, please refer any questions you may have to Chris Cousins of Municipal Consultants, Inc. (205) 822-0387 or myself.

Sincerely,

Robert Kelley
Environmental Manager

REK/ms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FINAL DETERMINATION

MODIFICATION

Shelby County Commission
510 Highway 70
Columbiana, AL 35051

Highway 70 Landfill

June 28, 2002

The Shelby County Commission has submitted to the Alabama Department of Environmental Management (ADEM) an application to modify Permit 59-15. The Highway 70 landfill is currently composed of a municipal solid waste disposal area and an industrial, construction and demolition waste disposal area. The municipal solid waste disposal area consists of two cells. The Permittee requests to add a third cell to the municipal solid waste disposal area. The Permittee requests modify the permit to add a construction and demolition waste cell. The proposed construction and demolition waste cell is located adjacent to the industrial, construction and demolition waste disposal cell. The Permittee requests to dispose of construction and demolition waste in the proposed construction and demolition cell and on top of the industrial, construction and demolition cell after an intermediate cap is constructed over this area. The proposed construction and demolition cell and the industrial, construction and demolition waste disposal cell will be closed as one unit. After the intermediate cap is constructed over the industrial, construction and demolition waste cell, only construction and demolition waste will be disposed in this area.

The waste stream for the municipal solid waste disposal area is non-hazardous, non-infectious putrescible wastes including but not limited to municipal solid waste, industrial waste, construction and demolition waste, rubbish, sludge, special wastes approved by the Department and other similar type materials. The waste stream for the industrial, construction and demolition waste cell before the intermediate cap is constructed is industrial waste as approved by the Department, construction and demolition waste, foundry sand as approved by the Department, tree limbs, leaves, brush, stumps, asbestos and special wastes as approved by the Department. The waste stream for the propose construction and demolition waste cell shall be construction and demolition waste. The service area for the Highway 70 landfill is Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa and Tuscaloosa Counties in Alabama. The maximum average daily volume of waste disposed at the Highway 70 Landfill will be 1500 tons per day.

The Highway 70 Landfill is described as being located in Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West. The Highway 70 Landfill consists of 110.77 acres located on Highway 70 west of Columbiana in Shelby County, Alabama. The disposal consists of 36.44 acres for municipal solid waste disposal and 22.7 acres for construction and demolition waste disposal. The Permitte shall be allowed to dispose of industrial waste in 16.2 acre cell until closure elevations are reached.

A Public Notice period was announced by ADEM on May 22, 2002 and ended on June 25, 2002. The permit application and draft permit was on display at the Alabama Department of Environmental Management. No written comments were received during the public comment period.

The Solid Waste Branch has determined that the permit modification complies with the requirements of ADEM's Administrative Code Division 13 regulations for a municipal solid waste landfill and proposes modify and issue Permit 59-15.

Technical Contact:

Jonathan Crosby
Solid Waste Branch
Land Division

ADEM

**ALABAMA**
**DEPARTMENT OF ENVIRONMENTAL MANAGEMENT**

# *SOLID WASTE DISPOSAL FACILITY PERMIT*

| | |
|---|---|
| **PERMITTEE:** | **Shelby County Commission** |
| **FACILITY NAME:** | **Highway 70 Landfill** |
| **FACILITY LOCATION:** | **Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West in Shelby County and comprises of approximately 110.77 acres.** |
| **PERMIT NUMBER:** | **59-15** |
| **PERMIT TYPE:** | **Municipal Solid Waste Landfill** |
| **WASTE APPROVED FOR DISPOSAL:** | **Municipal Solid Waste, Industrial Solid Waste and Construction and Demolition Waste** |
| **APPROVED WASTE VOLUME:** | **Maximum Average Daily Volume of Waste for the Highway 70 Landfill shall be 1500 tons per day** |
| **APPROVED SERVICE AREA:** | **Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa and Tuscaloosa Counties in Alabama** |

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

| | |
|---|---|
| **ISSUANCE DATE:** | **October 9, 2001** |
| **EFFECTIVE DATE:** | **October 9, 2001** |
| **MODIFICATION DATE:** | **June 28, 2002** |
| **EXPIRATION DATE:** | **October 8, 2006** |

**Alabama Department of Environmental Management**

F. Post-Closure Care Period

Post-closure care activities shall be conducted after closure of each unit throughout the life of this permit and continuing for a period of thirty (30) years following closure of the facility. The Department may shorten or extend the post-closure care period applicable to the solid waste disposal facility. The Permittee shall reapply in order to fulfill the post-closure care requirements of this permit.

G. Post-Closure Maintenance

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

H. Post-Closure Use of Property

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

I. Certification of Post-Closure

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

J. Notice in Deed to Property

The Permittee shall record a notation onto the land deed containing the property utilized for disposal within 90 days after permit expiration, revocation or when closure requirements are achieved as determined by the Department as stated in the Application. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility and beginning and closure dates of the disposal activity.

K. Recording Instrument

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

L. Removal of Waste

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

## SECTION IX. VARIANCES

1. For the I, C&D area and the C&D area, the Permitee is granted a variance from Rule 335-13-4-.20(2)(c)2. requiring terraces. The Permittee shall not be required to construct terraces.

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

**LANCE R. LEFLEUR**
DIRECTOR

**Alabama Department of Environmental Management**
**adem.alabama.gov**
1400 Coliseum Blvd. 36110-2400 ■ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ■ FAX (334) 271-7950

**BOB RILI**
GOVERNC

December 9, 2010

Mr. Robert Kelley
Shelby County Environmental Services
504 Highway 70
Columbiana, Alabama 35051

RE: Highway 70 Landfill
Permit 59-15

Dear Mr. Kelley:

Enclosed is the modified Solid Waste Facility Disposal Permit for the Highway 70 Landfill (Permit No. 59-15). The permit modification is effective December 9, 2010 and the expiration date of the permit will remain November 30, 2011.

If you should have any questions, please contact Mr. Jonathan Crosby at the Solid Waste Engineering Section at (334) 270-5644.

Sincerely,

Phillip D. Davis, Chief
Solid Waste Branch
Land Division

PDD/jc

**Birmingham Branch**
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

**Decatur Branch**
2715 Sandlin Road, S. W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

**Mobile Branch**
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

**Mobile-Coastal**
4171 Commanders Drive
Mobile, AL 36615-1421
(251) 432-6533
(251) 432-6598 (FAX)

FINAL DETERMINATION

MAJOR PERMIT MODIFICATION

Shelby County Commission
510 Highway 70
Columbiana, AL 35051

Highway 70 Landfill
Permit No. 59-15

December 9, 2010

The Shelby County Commission has submitted to the Alabama Department of Environmental Management (ADEM) a permit modification application to expand the disposal area within the previously approved landfill facility boundary for the Highway 70 Landfill (Permit No. 59-15). The Highway 70 Landfill is described as being located in Sections 19 and 30, Township 21 South, Range 1 West and Sections 24 and 25, Township 21 South, Range 2 West in Shelby County, Alabama. The proposed modification increases the municipal solid waste disposal area from 36.44 acres to 57.6 acres. The construction and demolition waste disposal area for the Highway 70 Landfill would remain 53.3 acres. The total landfill facility area for the Highway 70 Landfill would remain 360.05 acres. All other permit conditions remain unchanged.

The waste stream for Highway 70 Landfill would remain municipal solid waste, industrial solid waste and construction and demolition waste. The service area for the Highway 70 Landfill would remain Bibb, Calhoun, Cherokee, Chilton, Clay, Cleburne, Coosa, Etowah, Jefferson, Randolph, St. Clair, Shelby, Talladega, Tallapoosa and Tuscaloosa Counties in Alabama. The maximum average daily volume of waste disposed at Highway 70 Landfill would remain 1500 tons per day.

A public comment period was announced by ADEM on October 27, 2010 and ended on December 1, 2010. The draft permit and application was available for inspection at the Alabama Department of Environmental Management. The Department received no comments during the comment period..

The Solid Waste Engineering Section has determined that the permit application complies with the requirements of ADEM's Administrative Code Division 13 regulations for a municipal solid waste landfill.

Technical Contact:

Mr. Jonathan Crosby
Solid Waste Engineering Section
Land Division

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

J. Notice in Deed to Property

The Permittee shall record a notation onto the land deed containing the property utilized for disposal within 90 days after permit expiration, revocation or when closure requirements are achieved as determined by the Department as stated in the Application. This notation shall state that the land has been used as a solid waste disposal facility, the name of the Permittee, type of disposal activity, location of the disposal facility and beginning and closure dates of the disposal activity.

K. Recording Instrument

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

L. Removal of Waste

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

## SECTION IX. FINANCIAL ASSURANCE

A. The Permittee shall maintain detailed written cost estimates, in current dollars, at the landfill office and on file with ADEM in accordance with ADEM Admin. Code 335-13-4-.28.

B. All cost estimates must be updated annually as required by ADEM Admin Code 335-13-4-28.

C. The Permittee must place a copy of the financial assurance mechanism along with other items required by ADEM Admin. Code 335-13-4-28. into the landfill operating record and submitted to ADEM before the initial receipt of waste in the case of closure, post-closure care, or no later than 120 days after corrective action remedy has been selected.

D. The financial assurance mechanisms must ensure that funds will be available in a timely fashion when needed.

E. The financial assurance mechanisms must be legally valid, binding, and enforceable under state and federal law.

F. The Permittee shall demonstrate continuous compliance with ADEM Admin. Code 335-13-4-28. by providing documentation of financial assurance in at least the amount that equals or exceeds the cost estimate. Changes in the financial assurance mechanism must be approved by the Department.

G. The Permittee shall increase the closure, post-closure or corrective action cost estimates and the amount of financial assurance if changes in the closure, post-closure or correction action plans or landfill conditions increase the maximum cost.

H. The Permittee may reduce the amount of financial assurance by submitting justification and a revised estimate to ADEM for approval.

## SECTION X. VARIANCES

1. For the I, C&D area and the C&D area, the Permitee is granted a variance from Rule 335-13-4-.20(2)(c)2. requiring terraces. The Permittee shall not be required to construct terraces. (See Section VIII.A.)

2. A variance is granted for the Highway 70 Landfill from Rule 335-13-4-.22.(1).(b) which states that all waste shall be confined to a small an area as possible. Under this variance, Highway 70 Landfill is allowed to operate in three working faces. The Highway 70 Landfill will only be allowed one working face in each of the disposal areas. (See Section III.J.)

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