

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

SOLID WASTE DISPOSAL FACILITY PERMIT

PERMITTEE: Alabama River Cellulose LLC

FACILITY NAME: Alabama River Cellulose Landfill

FACILITY LOCATION: Northeast ¼, Northeast ¼ of Sections 8 and 17, Township 7 North, Range 6 East, in Monroe County, Alabama. The total permitted area is approximately 40.03 acres with 37.50 acres approved for disposal.

PERMIT NUMBER: 50-03

PERMIT TYPE: Industrial Landfill

WASTE APPROVED FOR DISPOSAL: Non-putrescible and non-hazardous industrial waste, construction and demolition waste, and rubbish as defined by ADEM Rule 335-13-1-.03.

APPROVED WASTE VOLUME: Maximum Average Daily Volume of waste is 1500 cubic yards per day

APPROVED SERVICE AREA: Alabama River Cellulose LLC and additional waste associated with on-site activities.

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

ISSUANCE DATE: ????????????

EFFECTIVE DATE: ????????????

EXPIRATION DATE: ????????????

Alabama Department of Environmental Management

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

Permittee: Alabama River Cellulose LLC
P. O. Box 40
Perdue Hill, AL 36470

Landfill Name: Alabama River Cellulose Landfill

Landfill Location: Northeast ¼, Northeast ¼ of Sections 8 and 17, Township 7 North, Range 6 East,
Monroe County, Alabama

Permit Number: 50-03

Landfill Type: Industrial Landfill

Pursuant to the Solid Wastes & Recyclable Materials Management Act, Code of Alabama 1975, §§22-27-1, *et seq.*, as amended, and attendant regulations promulgated thereunder by the Alabama Department of Environmental Management (ADEM), this permit is issued to Alabama River Cellulose LLC., (hereinafter called the Permittee), to operate a solid waste disposal facility, known as the Alabama River Cellulose 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 335-13-15 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 February 14, 2014 and August 8, 2018 for permit renewal and modification, and as amended (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 ??????????????????, and shall remain in effect until ?????????????????? unless suspended or revoked.

Alabama Department of Environmental Management

Date Signed

SECTION I. STANDARD CONDITIONS

A. Effect of Permit

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

B. Permit Actions

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

C. Severability

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

D. Definitions

For the purpose of this permit, terms used herein shall have the same meaning as those in ADEM Admin. Code Division 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, other than noncompliance authorized by a variance, constitutes a violation of Code of Alabama 1975, Section 22-27-1 *et seq.*, as amended, and is grounds for enforcement action, permit suspension, revocation, modification, and/or denial of a permit renewal application.

2. Duty to Reapply

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

3. Permit Expiration

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

4. Need to Halt or Reduce Activity Not A Defense

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

5. Duty to Mitigate

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

6. Proper Operation and Maintenance

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

7. Duty to Provide Information

If requested, the Permittee shall furnish to 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, any records that must be kept under the conditions of this permit.
- c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit.
- d. Sample or monitor, at reasonable times, any substances or parameters at any location for the purposes of assuring permit compliance or as otherwise authorized by Code of Alabama 1975, Section 22-27-1 *et seq.*

9. Monitoring, Corrective Actions, and Records

- a. Samples and measurements taken for the purpose of monitoring or corrective action shall be representative of the monitored activity. The methods used to obtain representative samples to be analyzed must be the appropriate method from Chapter 335-13-4 or the methods as specified in the Application attached hereto and incorporated by reference. Laboratory methods must be those specified in Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes

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

- b. The Permittee shall retain records, at the location specified in Section I.,I., of all monitoring, or corrective action information, including all calibration and maintenance records, copies of all reports and records required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or record or for periods elsewhere specified in this permit. These periods may be extended by the request of the Department at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility.
 - c. Records of monitoring and corrective action information shall include.
 - i. The exact place, date, and time of sampling or measurement.
 - ii. The individual(s) and company who performed the sampling or measurements.
 - iii. The date(s) analyses were performed.
 - iv. The individual(s) and company who performed the analyses.
 - v. The analytical techniques or methods used.
 - vi. The results of such analyses.
 - d. The Permittee shall submit all monitoring and corrective action results at the interval specified elsewhere in this permit.
10. Reporting Planned Changes
- The Permittee shall notify the Department, in the form of a request for permit modification, at least 90 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
- The Permittee may not commence disposal of waste in any new cell or phase until the Permittee has submitted to the Department, by certified mail or hand delivery, a letter signed by both the Permittee and a professional engineer stating that the facility has been constructed in compliance with the permit.
- The Department must inspect the constructed cells or phases before the owner or operator can commence waste disposal unless the Permittee is notified that the Department will waive the inspection.

13. Compliance Schedules

Reports of compliance or noncompliance with or any progress reports on interim and final requirements contained in any compliance schedule required and approved by the Department shall be submitted no later than 14 days following each schedule date.

14. Other Noncompliance

The Permittee shall report all instances of noncompliance with the permit at the time monitoring reports are submitted.

15. Other Information

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

F. Design and Operation of Facility

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

G. Inspection Requirements

1. The Permittee shall comply with all requirements of ADEM Admin. Code Division 13.
2. The Permittee shall conduct random inspections of incoming loads.
3. Records of all inspections shall be included in the operating record.

H. Recordkeeping and Reporting

1. The Permittee shall maintain a written operating record at the location specified in Section I.,I. The operating record shall include:
 - a. Documentation of inspection and maintenance activities.
 - b. Daily Volume reports.
 - c. Personnel training documents and records.
 - d. Solid/Hazardous Waste Determination Forms for Industrial Wastes, and the associated Department disposal approval correspondence for industrial waste and special waste.
 - e. Groundwater monitoring records.
 - f. Surface water monitoring records.
 - g. Copies of this Permit and the Application.
 - h. Copies of all variances granted by the Department, including copies of all approvals of special operating conditions.

2. Quarterly Volume Report

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

3. Monitoring and Corrective Action Reports

The Permittee shall submit reports on all monitoring and corrective activities conducted pursuant to the requirements of this permit, including, but not limited to, groundwater, surface water, explosive gas and leachate monitoring. The groundwater monitoring shall be conducted in March and September of each year, or as directed by the Department, and the reports shall be submitted at least semi-annually, or as directed by the Department. The reports should contain all monitoring results and conclusions from samples and measurements conducted during the sampling period. Explosive gas monitoring must be submitted on a yearly basis, and the reports should be submitted to the Department and placed in the operating record within 30 days of the monitoring event. Copies of the groundwater and 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 Division 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 Division 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 Alabama River Cellulose LLC 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
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

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

K. Signatory Requirement

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

1. If an individual, by the applicant.
2. If a city, county, or other municipality or governmental entity, by the ranking elected official, or by a duly authorized representative of that person.
3. If a corporation, organization, or other legal entity, by a principal executive officer, of at least the level of Vice President, or by a duly authorized representative of that person.

L. Confidential Information

The Permittee may claim information submitted as confidential if the information is protected under Code of Alabama 1975 §§ 22-39-18, as amended.

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 Division 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 for the detecting and preventing the disposal of free liquids, regulated hazardous waste, PCB's, and medical waste at the facility.

D. Unauthorized Discharge

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

E. Industrial Waste Disposal

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

F. Boundary Markers

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

SECTION III. SPECIFIC REQUIREMENTS FOR INDUSTRIAL WASTE LANDFILLS

A. Waste Identification and Management

1. Subject to the terms of this permit, the Permittee may accept for disposal the nonhazardous solid wastes listed in III.B. Disposal of any other wastes is prohibited, except waste granted a temporary or one time waiver by the Director.
2. The total permitted area for the Alabama River Cellulose Landfill is approximately 40.03 acres with 37.50 acres approved for disposal.
3. The maximum average daily volume of waste disposed at the facility shall not exceed 1500 cubic yards a day. Should the average daily volume exceed this value by 20% or 100 tons/day, whichever is less, the permittee shall be required to modify the permit in accordance with Rule 335-13-5-.06(2)(a)5. An increase in maximum average daily volume shall not be approved by the Department unless the permittee has received local approval for the increased maximum average daily volume. The average daily volume shall be computed as specified by Rule 335-13-5-.06(2)(a)5.(i).

B. Waste Streams

The Permittee may accept for disposal non-putrescible and non-hazardous industrial waste, construction and demolition waste, and rubbish as defined by ADEM Rule 335-13-1-.03. Alabama River Cellulose LLC must keep a copy of approved Solid/Hazardous Waste Determination Forms for all the Industrial Wastes disposed and any associated Department correspondence in the facility operating record.

C. Service Area:

The Permittee is allowed to receive for disposal waste from Alabama River Pulp Cellulose LLC and additional waste associated with on-site activities.

D. Waste Placement, Compaction, and Cover

All waste shall be confined to an area as small as possible and placed onto an appropriate slope not to exceed 4 to 1. The Permittee is granted a variance from 4 to 1 slopes. (See Section VIII.4.) All waste shall be spread in layers two feet or less in thickness and thoroughly compacted with adequate landfill equipment prior to placing additional layers of waste or placing cover. A minimum of six inches of compacted earth or other alternative cover material approved by the Department shall be added at the conclusion of each week's of operation. The Permittee is not required to cover waste until closure. (See Section VIII.1.)

E. Liner Requirements

The Permittee is not required to install a liner system. If it is determined that a liner system is necessary, the Permittee must install a liner that meets the requirements of the Department. The base of the waste or the base of the liner system shall be a minimum of five (5) feet above the temporal fluctuation of the groundwater table.

F. Security

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

G. All Weather Access Roads

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

H. Adverse Weather Disposal

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

I. Personnel

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

J. Environmental Monitoring and Treatment Structures

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

K. Vector Control

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

L. Bulk or Noncontainerized Liquid Waste

The Permittee shall not dispose of bulk or noncontainerized liquid waste, or containers capable of holding liquids, unless the conditions of Rule 335-13-4-.23(1)(j) are met.

M. Empty Containers

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

N. Other Requirements

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

O. Other Permits

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

P. Scavenging and Salvaging Operations

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

Q. Signs

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

R. Litter Control

The Permittee shall control litter.

S. Fire Control

The Permittee shall provide fire control measures.

SECTION IV. GROUNDWATER MONITORING REQUIREMENTS

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

1. The permittee shall maintain the groundwater monitoring wells and piezometers identified in Table IV.1. at the locations specified in the Application, and any other groundwater monitoring wells which are added (Section IV.,A.,3.) during the active life and the post closure care period.
2. The Permittee shall maintain groundwater monitoring well PZ-6 as the background groundwater monitoring well for the entire facility.
3. The Permittee shall install and maintain additional groundwater monitoring wells as necessary to assess changes in the rate and extent of any plume of contamination or as otherwise deemed necessary to maintain compliance with the ADEM Admin. Code.
4. Prior to installing any additional groundwater monitoring wells, the Permittee shall submit a report to the Department with a permit modification request specifying the design, location and installation of any additional monitoring wells. This report shall be submitted within ninety (90) 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 an interwell approach 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 semi- annually or each time groundwater is sampled and submit as required by ADEM Admin. Code Division 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 Rule 335-13-4-.27, and/or any other parameters specified by the Department in Table IV. 2., all monitoring wells identified in Section IV.,A.,2. to establish background water quality and/or as directed by Rule 335-13-4-.27(2)(j) and 335-13-4-.27(2)(a)(1).
4. The Permittee shall sample, and analyze all monitoring wells identified in Table IV.1 for the parameters listed in Appendix I of Rule 335-13-4-.27(3), and/or any other parameters specified by the Department in Table IV.2, on a semi-annual basis throughout the active life of the facility and the post-closure care period in accordance with Rule 335-13-4-.27(3). Sampling shall be conducted during March and September of each year, beginning with the effective date of this permit. **The records and results of this sampling and analysis activity shall be submitted to the Department, within ninety (90) days of the date of sampling. Groundwater monitoring shall be conducted according to the groundwater monitoring plan submitted February 14, 2014.**
5. In addition to the requirements of Section IV., B.,1., B.,2., B.,3. and B.,4., the Permittee shall record water levels, mean sea level elevation measuring point, depth to water, and the results of field tests for pH and specific conductance at the time of sampling for each well.

C. Sampling and Analysis Procedures

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

1. Samples shall be collected, preserved, and shipped (when shipped off-site for analysis) in accordance with the procedures specified in the Application. Monitoring wells shall be bailed or pumped to remove at least four times the well volume of water. Slow recharge wells shall be bailed until dry. Wells shall be allowed to recharge prior to sampling.
2. Samples shall be analyzed according to the procedures specified of the Application, Standard Methods for the Examination of Water and Wastewater (American Public Health Association, latest edition), Methods for Chemical Analysis of Water and Wastes (EPA-600/4-79-020), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA Publication SW-846, latest edition), or other appropriate methods approved by this Department. All field tests must be conducted using approved EPA test kits and procedures.
3. Samples shall be tracked and controlled using the chain-of-custody and QA/QC procedures specified in the Application.

D. Recordkeeping and Reporting Requirements

1. Recording of Results

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

2. Recordkeeping

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

E. Permit Modification

If at any time the Permittee or the Department determines that the groundwater monitoring system no longer satisfies the requirements of 335-13-4-.14 or Section IV.,A. of this permit, the Permittee must, within 90 days, submit an application for a permit modification to make any necessary and/or appropriate changes to the system.

TABLE IV.1.
GROUNDWATER MONITORING WELLS

Monitoring Well Number	Top of Casing (feet msl)	Part Monitored
UPGRADIENT/BACKGROUND MONITORING WELLS		
PZ-6	61.24	Entire Landfill
DOWNGRAIENT MONITORING WELLS		
MW 5	56.23	Entire Landfill
MW 6	60.62	Entire Landfill
MW 7	69.77	Entire Landfill
MW 8	58.15	Entire Landfill

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

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

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 Chapter 335-13-4 , and/or any other waste stream specific parameters.

SECTION V. GAS MONITORING REQUIREMENTS

The permittee is not required to install and maintain an explosive gas monitoring system in accordance with ADEM Administrative Code, Division 13 at this time. (See Section VIII.2.)

SECTION VI. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS

The Permittee must collect and dispose of any leachate that is generated at the facility, and the leachate must be managed at a facility permitted to treat leachate. The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner.

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

SECTION VII. CLOSURE AND POST-CLOSURE REQUIREMENTS

The Permittee shall close the landfill and perform post-closure care of the landfill in accordance with Division 13.

A. Final Cover

The Permittee shall grade final soil cover such that surface water does not pond over the permitted area as specified in the Application. The final cover system shall comply with ADEM Admin. Code Division 13. **The Permittee is allowed to grade the final slopes between 3:1 and 4:1. (See Section VIII.5.)**

B. Vegetative Cover

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

C. Notice of Intent

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

D. Completion of Closure Activities

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

E. Certification of Closure

Following closure of each unit, the Permittee must submit to the Department a certification, signed by an 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 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 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 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

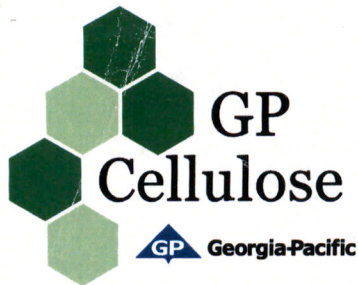
If the Permittee, or any other person(s), wishes to remove waste, waste residues, or any liner or contaminated soils, the owner must request and receive prior approval from the Department.

SECTION VIII. VARIANCES AND SPECIAL CONDITIONS

1. The Permittee is granted a variance from Rule 335-13-4-.23(1)(a)(1) requiring waste to be covered at the conclusion of each week's operation. The Permittee shall not be required to cover waste until closure. (See Section III. D.)
2. The Permittee is granted a variance from Rule 335-13-4-.16 requiring explosive gas monitoring. (See Section V.)
3. The Department has approved the facility to incorporate pulp mill fiber sludge as the infiltration layer in the final cover system.
4. The Permittee is granted a variance from ADEM Rule 335-13-4-.23(1) (c) requiring a 4 to 1 slope. The Permittee will maintain slopes according to the approved operating plan. (See Section III. D.)
5. **The Permittee is granted a variance from ADEM Rule 335-13-4-.20(2)(c)2 requiring a maximum final grade for the final cover system of 4 to 1. (See Section VII.A)**

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.

APPLICATION



Alabama River Cellulose LLC
P.O. Box 40
Perdue Hill, Alabama 36470
(251) 575-2000

February 11, 2014

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

SUBJECT: Solid Waste Disposal Facility Permit 50-03
Renewal Application
Alabama River Cellulose LLC
Monroe County, Alabama



Dear Sir:

The renewal application for the Alabama River Cellulose LLC industrial solid waste landfill is enclosed with this letter.

The renewal application is comprised of the following:

1. ADEM Form 439
2. Summary of Requested Changes
3. Drawings (3830419-C01, Existing Conditions, and 3830419-C02, Proposed Final Grades)
4. Groundwater Monitoring and Corrective Action Plan

Thank you in advance for your consideration of our request for approval. If you have any questions or need further clarification, please call me at 251.743.8793, or contact Mark Taylor at 864.527.4629.

Respectfully submitted,

ALABAMA RIVER CELLULOSE LLC

David Lazenby
Environmental Manager

Enclosures: Application for Industrial Landfill Minor Permit Modification
Summary of Requested Changes and Check No. 029937
Drawings 3830419-C01 and 3830419-C02
Groundwater Monitoring and Corrective Action Plan

SOLID WASTE DISPOSAL FACILITY PERMIT 50-03
ALABAMA RIVER CELLULOSE LLC
MONROE COUNTY, ALABAMA
RENEWAL APPLICATION
SUMMARY OF REQUESTED CHANGES

Section III.D. Waste Placement, Compaction, and Cover

All waste shall be confined to an area as small as possible and placed onto an appropriate slope ~~not to exceed 4 to 1~~. All waste shall be spread in layers two feet or less in thickness and thoroughly compacted with adequate landfill equipment prior to placing additional layers of waste or placing cover. ~~A minimum of six inches of compacted earth or other alternative cover material approved by the Department shall be added at the conclusion of each week's of operation.~~

Justification: The slope requirement in the first sentence should be eliminated to conform to Section VIII.4 that grants a variance from ADEM Rule 335-13-4-.23(1)(c) requiring a 4 to 1 slope. The last sentence should be deleted to conform to Section VIII.1 that grants a variance from ADEM Rule 335-13-4-.23(1)(a)(1) requiring earthen cover.

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

2. ~~The permittee shall maintain groundwater monitoring well PZ-6 as the background groundwater monitoring well for the entire facility.~~

Justification: PZ-6 is not an appropriate background groundwater monitoring well for the Old Landfill because two sources of groundwater quality variation – the New Landfill and a large lens of dense clay – lie between PZ-6 and the Old Landfill.

Section IV.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 annually throughout the active life and post-closure care period.

Justification: With the elimination of PZ-6 from the monitoring network, reference to a piezometer should be eliminated.

Table IV.1 GROUNDWATER MONITORING WELLS

UPGRADIENT/BACKGROUND MONITORING WELLS

~~PZ-6~~ ~~60.58~~ ~~Entire Landfill~~

Justification: With the elimination of PZ-6 from the monitoring network, reference to it should be eliminated.

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

The parameters in this Table are those **metals** listed in Appendix I of Chapter 335-13-4. [insert "metals"]

Justification: Volatile organic compounds have not been detected in any groundwater samples collected from the Old Landfill wells.

Table IV.3 SEMI-ANNUAL GROUNDWATER MONITORING PARAMETERS

The parameters in this Table are those **metals** listed in Appendix I of Chapter 335-13-4, and/or any other waste stream specific parameters. [insert "metals"]

Justification: Volatile organic compounds have not been detected in any groundwater samples collected from the Old Landfill wells.

Section VI. LEACHATE AND SURFACE WATER MANAGEMENT REQUIREMENTS

1. The Permittee must collect and dispose of any leachate that is generated at the facility, and the leachate must be managed at a facility permitted to treat leachate. ~~The Permittee shall install a leachate collection system designed to maintain less than 12 inches (30 cm) depth of leachate over the liner.~~

Justification: Because there is no liner required in accordance with Permit 50-03, Section III.E., the requirement for a leachate collection system is not appropriate.

Section VIII. VARIANCES AND SPECIAL CONDITIONS

5. The Permittee is granted a variance from Rule 335-13-4-.22(2)(a) to stage dry lime on the Old Landfill.

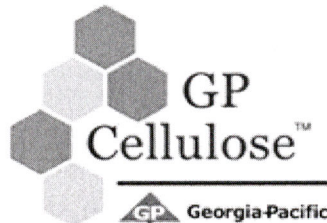
Justification: Rao Mallidi of the Department provided verbal approval for staging dry lime on the Old Landfill on November 17, 2008.

GROUNDWATER MONITORING AND STATISTICAL ANALYSIS PLAN

**ALABAMA RIVER CELLULOSE LLC
LANDFILL PERMIT No. 50-03
PERDUE HILL, ALABAMA**

JUNE 2017

PREPARED FOR:



**ALABAMA RIVER CELLULOSE, LLC
2373 LENA LANDEGGER HIGHWAY
PERDUE HILL, ALABAMA 36470**

PREPARED BY:

**SYNTERRA
148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA 29601**

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1.0 INTRODUCTION

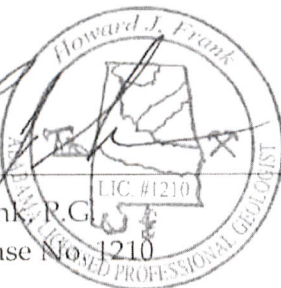
This Groundwater Monitoring and Statistical Analysis Plan was prepared for the Alabama River Cellulose (ARC) Landfill No. 50-03 in Perdue Hill, Alabama. This plan has been prepared in response to an April 3, 2017, letter from the Alabama Department of Environmental Management (ADEM) requesting an updated Groundwater Monitoring and Statistical Analysis Plan be submitted which eliminates intrawell statistical evaluation and presents an interwell statistical approach. This plan meets the requirements of the Alabama Department of Environmental Management (ADEM) Land Division – Solid Waste Program Permit Regulations, ADEM Admin Code R.335-13-4 for solid waste disposal sites. The ARC Landfill No. 50-03 is regulated under ADEM Solid Waste Permit No. 50-03.

The ARC Landfill No. 50-03 site will be monitored in a manner that protects human health and the environment by monitoring the quality of background and downgradient groundwater. The relevant point of compliance has been established based on site conditions. This monitoring plan also provides the mechanism for assessment and corrective action should a groundwater protection standard be exceeded at the point of compliance.

1.1 Certification

The analytical parameters, sampling and analysis procedures, and statistical analysis methods described in this Plan meet ADEM requirements. The number, spacing, and depth of the wells in the ARC Landfill No. 50-03 groundwater monitoring system meets the requirements of R.335-13-4-.27 and is consistent with professional standards and practices in Alabama at the time this plan was prepared.


Howard J. Frank, P.G.
Alabama License No. 1210



2.0 RELEVANT POINT OF COMPLIANCE

The ARC Mill is located north of Perdue Hill, Monroe County, Alabama (**Figure 1**). Landfill No. 50-03 is located southeast of the mill operations area and the groundwater monitoring network and relevant point of compliance for Landfill No. 50-03 are depicted on **Figure 2**. The compliance boundary extends 492 feet to the north and west of the Landfill No. 50-03. The compliance boundary extends south to County Road 39 (Lena Landegger Highway) and east to the boundary of Landfill No. 50-05 (also owned and operated by ARC). The landfill compliance boundary is located on ARC property.

The ARC Landfill No. 50-03 occupies approximately 40 acres. The landfill is bordered to the south by Lena Landegger Highway (County Road 39), to the east by the Mill log truck entrance road and Landfill No. 50-05, to the west by the Mill wastewater system equalization basin, and to the northwest/north/northeast by Mill operational areas.

To demonstrate the suitability of the monitoring wells to monitor groundwater quality in the uppermost aquifer around the unit, water level measurements are collected semiannually from the monitoring wells. A water level map from the September 2016 semiannual monitoring event is included as **Figure 3**.

Based on the water level measurements, the direction of groundwater flow across the site is to the northeast toward Big Flat Creek (**Figure 3**); this is consistent with historical observations. Monitoring wells MW-5, MW-6, MW-7, and MW-8 are positioned to monitor groundwater quality downgradient of Landfill No. 50-03.

3.0 GROUNDWATER MONITORING SYSTEM

A total of five wells (MW-5, MW-6, MW-7, MW-8, and PZ-6) are installed around Landfill No. 50-03 (**Figure 2**) to monitor groundwater quality. Samples from PZ-6, which is located east of Landfill No. 50-05, are used as an indication of background for Landfill No. 50-03. Water level measurements are taken from each of these monitoring wells during each groundwater monitoring event, in addition to MW-1 through MW-4 (which comprise the groundwater monitoring network for the adjacent Equalization Basin), two temporary piezometers (TPZ-1 and TPZ-3), and MW-11R through MW-15 (which are used to monitor Landfill No. 50-05). A water level map showing the direction of groundwater flow is included as **Figure 3**. Based on the water level measurements and historical observations, monitoring wells MW-5, MW-6, MW-7, and MW-8 are positioned to monitor groundwater quality downgradient of Landfill No. 50-03.

The two TPZ piezometers were installed in February 2015 (TPZ-01) and July 2016 (TPZ-3) to aid in the determination of groundwater elevations and the interpretation of groundwater flow surrounding the landfill. TPZ-3 is being considered as an upgradient (background) monitoring location to replace PZ-6. Once additional groundwater quality data is collected (a total of eight samples), an evaluation will be completed and modifications to this plan might be made. Currently, four samples for groundwater quality have been collected from TPZ-3 and it is anticipated the eighth sample will be collected in March 2018 (being completed on a quarterly schedule).

The landfill site is situated in the South Coastal Plain of Alabama in a region of thick (10,000 to 15,000 feet) sedimentary formations overlying crystalline bedrock. Recent alluvial and low terrace deposits and sandy formations of Eocene age are characteristic of the immediate vicinity. Borings reveal that subsurface soils within the area of the landfill site occur in three primary layered systems, as follows:

- Upper system of cohesive soils comprised of sandy clay, clayey sand, and clayey silty sand
- Underlying granular soil system that includes silty sand, sand, sand with gravel, and sand and gravel
- Gosport-Lisbon geologic formation that includes sandy clay, clayey sand, and silty sand, including zones that are partially or fully indurated

Groundwater occurs in the granular soils system above the Gosport-Lisbon Formation. The sandy soils in the screened interval for the monitoring wells range in fines content,

with several well locations exhibiting significant clay and silt content. These fines, which are prevalent in the purge water from MW-7, might affect the chemistry of the groundwater samples collected from the wells.

The Landfill No. 50-03 groundwater monitoring program was evaluated in early 2011. Following that review, sediment was collected from MW-7 purge water generated during the March 2011 sampling event to evaluate the potential for soils to affect groundwater quality. The sediment sample was collected by decanting relatively clear water off the top of the bucket of purge water. The wet sample was subsequently allowed to settle for several days, decanted again, and air dried prior to chemical analysis.

The sediment sample from MW-7 contained the following metals:

- | | |
|--|------------------------|
| ☞ Arsenic - 17 milligrams per kilogram (mg/kg) | |
| ☞ Barium - 120 mg/kg | ☞ Lead - 19 mg/kg |
| ☞ Chromium - 29 mg/kg | ☞ Mercury - 0.87 mg/kg |
| ☞ Cobalt - 37 mg/kg | ☞ Vanadium - 36 mg/kg |
| ☞ Copper - 17 mg/kg | ☞ Zinc - 44 mg/kg |

Although this is not intended as an Alternative Source Demonstration (ASD), these analytical results indicate that naturally occurring metals in the soils that are suspended in the groundwater are a potential source of trace metals detected in samples of groundwater.

Landfill No. 50-03 monitoring wells are constructed of 2-inch diameter PVC pipe enclosed in above-ground steel protective casings. A survey of the entire Mill monitoring well network was completed in July 2016 and is provided in **Appendix A**. Well construction details are summarized in **Table 1**.

Landfill No. 50-03 monitoring wells range in depth from approximately 23 feet below ground surface (MW-5) to 42 feet below ground surface (MW-8).

Based on water level measurements collected in September 2016, the direction of groundwater flow across the site is to the northeast toward Big Flat Creek (**Figure 3**); consistent with historical observations. The average horizontal groundwater gradient is 0.0013 foot per foot (MW-3 to MW-7; MW-8 to MW-7; September 2016 monitoring event). The groundwater flow rate was estimated using a modified Darcy's equation (**Appendix B**). Using a previously determined hydraulic conductivity value of 483.84 feet per day [SynTerra (formerly The Fletcher Group), May 1998], an effective porosity

of 0.32, and gradient of 0.0013 foot per foot, the groundwater flow rate in the vicinity of Landfill No. 50-03 is approximately 700 feet per year.

4.0 GROUNDWATER SAMPLING AND ANALYSIS

The procedures and protocols that will be used to perform groundwater monitoring of Landfill No. 50-03 site are described in the following sections. This includes procedures and techniques for sample collection, sample preservation and shipment, analytical procedures, chain of custody, and quality assurance/quality control.

4.1 Field Sampling

Experienced technicians will conduct sampling activities. A copy of the sampling procedures and protocols will be provided to the sampling team and will be reviewed by that team prior to each sampling event. Personnel will wear new, disposable nitrile gloves during all groundwater sampling activities. At a minimum, the gloves will be replaced at each sample location. The wells will be purged using new disposable sampling equipment.

Groundwater sampling involves three tasks:

- Measuring the static water level and well depth to calculate the volume of water in the well.
- Properly purging the appropriate well volumes to generate a sample representative of the aquifer.
- Collecting, preserving, and handling the groundwater samples prior to receipt by the laboratory in a way that maintains sample integrity.

To limit the potential for cross-contamination during the sampling event, the wells will be sampled in the order of the lowest level of constituent concentrations to the highest level of constituent concentrations, based on historical data. If the constituent levels are not known, the wells will be sampled from upgradient to downgradient.

4.2 Well Sampling Procedures

The initial step is to measure the water level and the depth of each well before purging. This will be accomplished by lowering an electrical water level indicator into the well until it touches the water and measures a response. The water level measurements will be taken to the nearest 0.01 foot. The water level indicator will be thoroughly decontaminated before use at each well. Each well will have a reference point from which the water level measurement is taken. The reference point will be established in relation to a permanent benchmark, as mean sea level (msl), and the survey shall note the well location. An Alabama Registered Land Surveyor has surveyed the benchmark

for each well (**Table 1**). Water level elevations will be measured within a 24-hour period of the day that the samples are collected.

The monitoring wells will be purged before collecting samples to clear the well of stagnant water, which is not representative of aquifer conditions. To determine the purge volume, the following method will be used:

$V = 0.041 d^2 h$, where: V = one well volume of water in gallons

d = diameter of the well casing in inches

h = height of the water column in feet

A minimum of four well volumes of water will be purged from the landfill monitoring wells, unless the well goes dry prior to the removal of four well volumes. Indicator parameters (pH, specific conductance, turbidity, and temperature) will be measured periodically and recorded to document stabilization of these parameters prior to sample collection. The meters used for field measurements will be calibrated in the field to the equipment manufacturer's specifications. At least one set of indicator parameter readings will be collected per well volume. The well will be considered properly purged if the indicator parameters of specific conductance and temperature have stabilized to within 10 percent of the previous reading and the pH has stabilized to within 0.1 units of the previous reading.

The monitoring wells will be purged using new, disposable high-density polyethylene bailers.

4.3 Sample Collection and Parameters

The monitoring wells will be sampled using quiescent sampling methods. Samples for total metals analysis will be collected from each well on the day following purging using a disposable bailer. The bailer will be lowered in the well to the top of the water column and the sample collected with minimal disturbance to the water column. No purging will be performed on the day that the samples for metals analysis are collected.

The samples from the ARC Landfill No. 50-03 will be analyzed for inorganic parameters (metals) listed in Appendix I of R.335-13-4. The Appendix I inorganic constituents are summarized in **Table 2**.

Samples will be collected on a semiannual basis in March and September. Groundwater monitoring will be conducted during the life of the facility, including the closure and post closure periods.

4.4 Chain-of-Custody Procedures

Using chain-of-custody procedures, the handling of samples will be traceable from the time of collection to the time of final sample disposition. Field sampling personnel will be responsible for collecting the samples and for logging the samples into assigned field notebooks or a sample collection log. The field sampling personnel will complete and verify the chain-of-custody forms. The laboratory sample custodian and analysts will be responsible for custody of samples at the laboratory.

Prior to collecting samples in the field, the sampling personnel will obtain the sample bottles necessary for sampling. A self-adhesive sample label will be affixed to each sample bottle before sample collection. The field sampler will complete the label with the appropriate information using waterproof ink. At a minimum, the sample label will contain the following:

- ☞ Client - Job Name/Project Number
- ☞ Sample Identification
- ☞ Date and Time Collected (except for duplicate samples)
- ☞ Sampler's Signature (or initials)
- ☞ Required Preservatives

Chain-of-custody forms will accompany sample containers to document the transfer of the containers and samples from the originating laboratory through the field and to the laboratory receiving the samples for analyses. A sample container is under custody in the field if the following conditions exist:

- ☞ It is in the field investigator's actual possession.
- ☞ It is in the field investigator's view, after being in his/her physical possession.
- ☞ It was in the field investigator's physical possession and then she/he secured it to prevent tampering.
- ☞ It is in a secure area restricted to authorized personnel only.

The field sampling personnel will complete and verify the chain-of-custody forms. A copy of the chain-of-custody will be placed in the landfill operating record and the original will accompany the shipped samples. If the samples are shipped by a commercial carrier, a copy of the shipping label will be placed into the landfill operating record. Shipping label numbers will be included on the chain-of-custody form, along with the company name of the carrier.

For shipment to the laboratory, shipping containers will be sealed and accompanied by the chain-of-custody record, with appropriate signatures. The transfer of custody is the responsibility of the field sampling personnel and the laboratory. Upon receipt by the laboratory, a sample custodian will inspect the condition of the samples, reconcile the sample(s) received against the chain-of-custody record, log in the sample(s) in the laboratory sample tracking system, and store the sample(s) in a secured sample storage area maintained at a temperature between 0° and 4° Celsius (C) until assigned to an analyst for analysis.

The pH of samples that contain preservatives will be checked on arrival at the laboratory. In addition, the temperature of the samples will also be measured and documented on the chain-of-custody form upon receipt at the laboratory.

4.5 Sample Handling and Analysis

Sample containers, preservation methods, and holding times that meet US EPA standards will be used. Samples will be collected in new, preserved containers provided by the contract laboratory. Sample bottles for metal analyses will be preserved with nitric acid.

For delivery of samples to the laboratory, the following procedure will be implemented:

<u>Step</u>	<u>Procedure</u>
1.	Collect and seal the samples as outlined in this plan.
2.	Place sample containers in laboratory shipping container(s). Samples will be packed securely with packing material to protect the sample containers from accidental breakage during shipment and to prevent a leak or spill.
3.	Fill shipping container with enough ice to last the trip. Place ice in sealed plastic bags around sample containers.
4.	Complete the chain-of-custody form(s).
5.	Place the chain-of-custody form in a sealed plastic bag and place inside the shipping container.
6.	Seal shipping container using packing tape or duct tape.
7.	Deliver or ship to the laboratory. Fastest available shipping methods will be used whenever required by short holding times or project schedules.

4.6 Analytical Methods

The laboratory performing the analyses will use the methods specified in Appendix I of R. 335-13-4. The record of groundwater analyses shall include the methods used (by number), the sample preparation date (if applicable), and the date of actual analysis. Data from samples that are not analyzed within the recommended holding times will be considered suspect. Any deviation from a US EPA-approved method shall be adequately tested to ensure that the quality of the results meets the performance specifications (*e.g.*, detection limit, sensitivity, precision, accuracy) of the reference method. A planned deviation shall be justified and submitted for approval by ADEM.

4.7 Field Analytical Techniques

Equipment used for field analytical measurements will be suitable for the analytical method and will be properly calibrated each day it is in use. Field analysis will be conducted on samples that are considered representative of the source from which they were collected. The field analyses described below will be performed on all water samples collected.

Measurement of pH and Temperature

Measurements of pH will be made using a combination electrode and portable pH meter. A meter with provisions for automatic temperature compensation will be used. The pH probe will contain a temperature sensor and will be used for measuring sample temperature. The meter will be calibrated daily according to the manufacturer's instructions.

The meter will be checked for any mechanical or electrical failures, weak batteries, and cracked or fouled electrodes before mobilizing for field activities. For an apparent discrepancy in a pH measurement, the electrode will be checked with pH 7.0 buffer and recalibrated to the closest reference buffer. The sample will then be reanalyzed. The buffer solution containers will be refilled each day from fresh stock solutions.

Measurement of Conductivity

The meter will be calibrated according to the manufacturer's instructions. Batteries will be checked, and conductivity cells will be cleaned and checked against known standards. Sample results will be expressed in micromhos/centimeter (umhos/cm), automatically temperature compensated to 25° C.

Measurement of Turbidity

The meter will be calibrated according to the manufacturer's instructions. Batteries will be checked, and the meter calibration will be checked against known standards. Sample results will be expressed in nephelometric turbidity units (NTUs).

5.0 QUALITY ASSURANCE/QUALITY CONTROL

To assess and verify the performance of the field sampling and laboratory techniques, the following quality control procedures will be followed.

5.1 Equipment Blanks

If contaminants are routinely detected in landfill monitoring well samples, equipment blanks will be collected as a quality control check on the field sampling equipment, sample collection methods, decontamination procedures, and external contamination. Equipment blanks consist of distilled water poured over clean, unused field sampling equipment, *e.g.*, bailer or pump, and contained in each sample container or bottle with any preservatives required for that analysis.

5.2 Laboratory Quality Assurance/Quality Control

Samples from the ARC Landfill No. 50-03 monitoring wells will be analyzed by a qualified commercial environmental laboratory accredited by the National Environmental Laboratory Accreditation Program (NELAP). At a minimum, laboratory quality control will include analysis of method blank samples, laboratory control samples, and matrix spike samples.

5.3 Data Validation

Laboratory analytical data will be reviewed for precision, accuracy, and completeness in accordance with the permit requirements, the US EPA Contract Laboratory Program *National Functional Guidelines for Inorganic Superfund Data Review* (USEPA-540-R-2017-001, January 2017), and the most recently promulgated versions of the analytical methods.

After receipt of the laboratory analytical results, the data package will be reviewed for completeness to verify the appropriate samples were collected and the requested analyses performed. The sample collection logs will be reviewed and compared to the chain-of-custody documentation to verify collection information is properly transcribed. The chain-of-custody forms will be verified against the laboratory sample check-in documentation.

Laboratory batch quality control data will be evaluated for precision, accuracy, and completeness. Equipment blank data will be reviewed to verify no contamination was present.

6.0 STATISTICAL ANALYSIS PROCEDURES

To comply with R.335-13-4-.27(2)(a)3.(I), groundwater analytical data from the ARC Landfill No. 50-03 will be evaluated to determine whether a statistically significant increase (SSI) has occurred. Appropriate statistical methods for the landfill groundwater monitoring program will be determined utilizing the US EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance* (EPA 530/R-09-007, March 2009) and the ASTM *Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs* (D6312-98, 2012). The data set for each constituent detected during each semiannual monitoring event will be evaluated for SSIs using the statistical method considered appropriate based on the detection frequency of each constituent in each well and the statistical characteristics of the data set (*i.e.*, distribution type, number of background samples, variations in reporting limits, *etc.*).

At the request of ADEM, ARC will remove from the database used for statistical calculations, the elevated non-detect values that resulted from the change in reporting policy during the time period of September 2004 through September 2010. This is consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Unified Guidance* (USEPA 530/R-09-007, March 2009) which states “(i)f non-detect values higher than other quantified data at reasonable detection limits are included in a data set (especially if dictated by reporting policy rather than analytical considerations), these will almost invariably need to be removed.”

The landfill analytical data will be evaluated using interwell statistical methods for inorganic compounds. Interwell statistical methods are described in this Groundwater Monitoring and Statistical Analysis Plan.

6.1 Statistical Evaluation

The first step in statistically evaluating the data is to determine the type of distribution exhibited for each parameter at each well and for the pooled background data set. The appropriate prediction interval statistic used to calculate the prediction limit is dependent upon whether the data for a given constituent exhibits a normal or non-normal distribution and the number of nondetected results in a data set. The Shapiro-Wilks normality test, or comparable procedure, will be used to evaluate the statistical distribution of the data sets.

The data will then be screened for outliers and trends prior to conducting the statistical analysis. If an outlier is detected in the current data set, it will be screened for statistical

significance for informational purposes. Based on the results of the statistical screening, the verification resampling strategy will be as follows:

- ☞ If the outlier result is not statistically significant, the result will be verified by resampling during the next semiannual monitoring event. If results of the resampling do not confirm the outlier result as being valid, the outlier result will not be included in the historical dataset for computing background mean and standard deviation for the compliance statistic.
- ☞ If the outlier result appears to be statistically significant, the result will be verified by resampling within 45 days of the date of the original sampling event. If results from the resampling do not confirm the suspected outlier as being valid, then results from the resampling will replace the outlier result in the database. Statistical analysis will then be performed on results from the resampling.

The trend analysis procedure will be used with the prediction interval procedure to support conclusions about potential SSIs.

6.2 Prediction Limit Procedure

The interwell Prediction Limit statistic will be used to compare the results for the most recent sample to the historical (background) data for each constituent in each well. The data will be evaluated using either a Parametric or Nonparametric Prediction Limit procedure, based on data distribution, and other statistical characteristics, as prescribed in the US EPA and ASTM guidance documents. A determination that the current result lies in the historical population indicates that a statistically significant increase has not occurred and that the given parameter complies with established standards.

The Prediction Limit procedure estimates numerical bounds on a series of m independent future values. The prediction limit can be used to test whether the mean of one or more data points are equal to the mean of a background population. Assuming there is insignificant natural spatial variability, a prediction limit can be constructed using historical background data. The number of futures samples (m) should be chosen to reflect a single new observation collected from each compliance well prior to the next statistical evaluation, plus a fixed number ($m-1$) of possible resamples. The initial future observation at each compliance point is then compared to the prediction limit. If it exceeds the prediction limit, one or more verification samples are collected and retested (US EPA *Unified Guidance*, Part I, Chapter 8, Section 8.3) prior to declaring an SSI.

6.3 Alternate Statistical Methods

The Prediction Limit procedure is only one of the statistical methods that might be utilized to evaluate groundwater quality data. This conventional statistical method is recognized in the US EPA and ASTM guidance. However, more robust techniques for handling nondetected values are available and might be appropriate for the site.

Comparisons between the conventional statistical methods and alternate statistical procedures might be performed and submitted to ADEM for approval if ARC utilizes a statistical method other than the interwell prediction interval to determine whether an SSI has occurred at the ARC Landfill No. 50-03.

7.0 DETECTION MONITORING PROGRAM

Detection monitoring will continue on a semiannual basis during the life of the facility, continuing into the closure and post closure care period, in accordance with R.335-13-4-.27(3). The results of the groundwater monitoring will be provided to ADEM within 90 days of sample collection and added to the landfill operating record.

ARC will submit to ADEM a report containing all the analytical and statistical analysis performed at the ARC Landfill No. 50-03 for the groundwater monitoring event. The report will contain:

- A determination of the technical sufficiency of the monitoring well network in detecting a release from the Landfill,
- The determination of groundwater elevations, groundwater flow directions, and groundwater flow rates, and
- The results of the statistical analysis performed on the analytical data.

A Statistically Significant Increase (SSI) will be declared when a detected sample concentration exceeds the upper prediction limit for a data value that has been confirmed by verification sampling.

If it is determined that a *preliminary* SSI exists for one or more of the constituents required for routine monitoring at any one of the point of compliance wells, ARC shall within 14 days notify ADEM of the finding and which constituents have shown statistically significant increases and place a copy of the notice in the Landfill Operating Record. ARC will resample the monitoring well in question within 45 days of the finding to determine the validity of the results. ADEM will be notified of the results of the resampling within 45 days of collection of the samples.

If the SSI is verified, ARC will, within 90 days determine whether the exceedance can be related to a source other than the landfill or is a result from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality prior to establishing an assessment monitoring program. If a successful demonstration is made and documented, ARC will continue detection monitoring as specified. If a successful demonstration is not made, ARC will initiate the assessment monitoring program.

8.0 ASSESSMENT MONITORING AND CORRECTIVE ACTION PROGRAM

Assessment monitoring will be initiated if a statistically significant increase over background is detected and validated for one or more of the groundwater monitoring constituents listed in **Table 2** and an alternate source has not been identified. The assessment monitoring program will be implemented in accordance with specifications outlined in R.335-13-4-.27(4). Within 90 days of initiating an assessment monitoring program, ARC will prepare and submit to ADEM for review and approval, a groundwater quality assessment plan for identifying the source, nature, and extent of the constituents in groundwater. The groundwater quality assessment plan will contain a detailed schedule for the implementation and completion of the provisions of the plan. Upon approval of the plan, ARC will implement the plan according to the plan schedule. The groundwater quality assessment will be completed in a timely manner as outlined in the plan. If contamination is determined to have migrated off-site, ARC will notify all persons who own land or who reside on land that directly overlies any part of the plume of contamination.

If the concentration of the constituent(s) which triggered assessment monitoring program is below the groundwater protection standard, the facility will remain in assessment monitoring until the constituent(s) is not detected above the laboratory reporting limit for at least two consecutive monitoring events, in accordance with ADEM Admin. Code R.335-13-4-27(4)(e).

Within 90 days of finding that any of the assessment monitoring constituent has been detected at a statistically significant level exceeding the groundwater protection standards, ARC shall initiate an assessment of corrective action measures. The assessment of corrective measures shall be conducted in accordance with specifications stipulated in R.335-13-4-.27(5).

Upon the completion of the corrective action assessment, ARC shall submit to ADEM a corrective action remedy detailing the actions to be taken to address groundwater quality and a schedule for the initiation and completion of remedial activities. Corrective action will be initiated and completed within a reasonable time period as determined by the technical factors. The corrective action remedy will be protective of human health and the environment; attain appropriate groundwater protection standards; control the source of the release; and comply with all applicable standards for the management of wastes.

ARC will implement the corrective action plan within 90 days of approval by ADEM or as stipulated in R.335-13-4-.27(5). The corrective action plan will also contain provisions for the implementation of a groundwater monitoring program and network to demonstrate the effectiveness of the corrective action program. ARC will continue the corrective action measures to the extent necessary to ensure that the groundwater protection standards are not exceeded for a period of three consecutive years. ARC will submit to ADEM semiannual reports, which discuss the effectiveness of the corrective action program.

If ARC or ADEM determines that the corrective action program no longer performs to design specifications or is ineffective in achieving the required results, ARC will submit to ADEM within 90 days of the determination, a proposal to make appropriate changes or revisions to the corrective action program.

If groundwater protection standards are exceeded at the end of the post-closure care period, ARC will be responsible for maintaining the corrective action program to the extent necessary. When ADEM has issued approval to discontinue the corrective action program, ARC will return to detection monitoring of the landfill for the remainder of the active life and post-closure care period, unless additional groundwater quality assessment or corrective actions are required.

9.0 REFERENCES

ADEM, 2012, *Review of Groundwater and Corrective Action Plans - June 2011 Review and Comments*, September 17.

ADEM, 2014, *Review of Groundwater and Corrective Action Plan - December 11, 2012 Response to Comments*, May 28.

ADEM, 2016, *Land Division – Solid Waste Permit Regulations*, ADEM Code R.335-13-4 for Solid Waste Sites. April 8.

ADEM, 2016, *March 2016 Semiannual Groundwater Monitoring Statistical Analysis Report – Review and Comments*, August 12.

ADEM, 2017, *Response to ARC Comments (November 2016) and Semiannual Groundwater Monitoring Statistical Analysis Report (September 2016) – Review and Comments*, April 3.

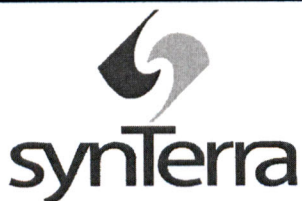
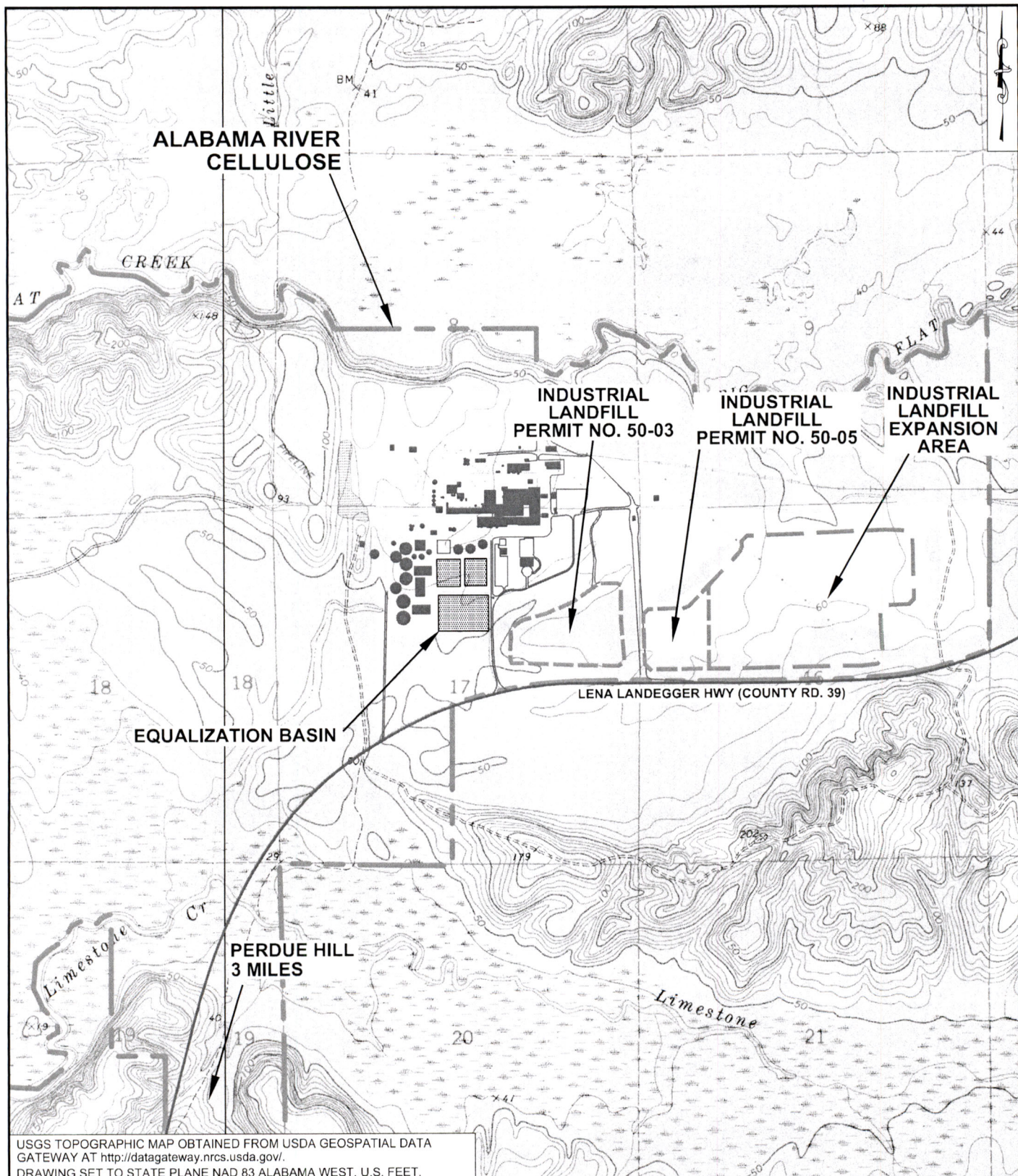
ASTM, 2012, D6312-98, *Standard Guide for Developing Appropriate Statistical Approaches for Groundwater Detection Monitoring Programs*.

US EPA, 2009, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Unified Guidance*, EPA 530/R-09-007, March.

US EPA Region IV, 2012 – 2014, Science and Ecosystem Support Division, Field Branches Quality System and Technical Procedures.

US EPA, 2017, *National Functional Guidelines for Inorganic Superfund Data Review*, Contract Laboratory Program, EPA-540-R-2017-001, January.

FIGURES



148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synterracorp.com



FIGURE 1
USGS TOPOGRAPHIC MAP
ALABAMA RIVER CELLULOSE LLC
PERDUE HILL, ALABAMA
CLAIBORNE & MEXIA, AL QUADRANGLES

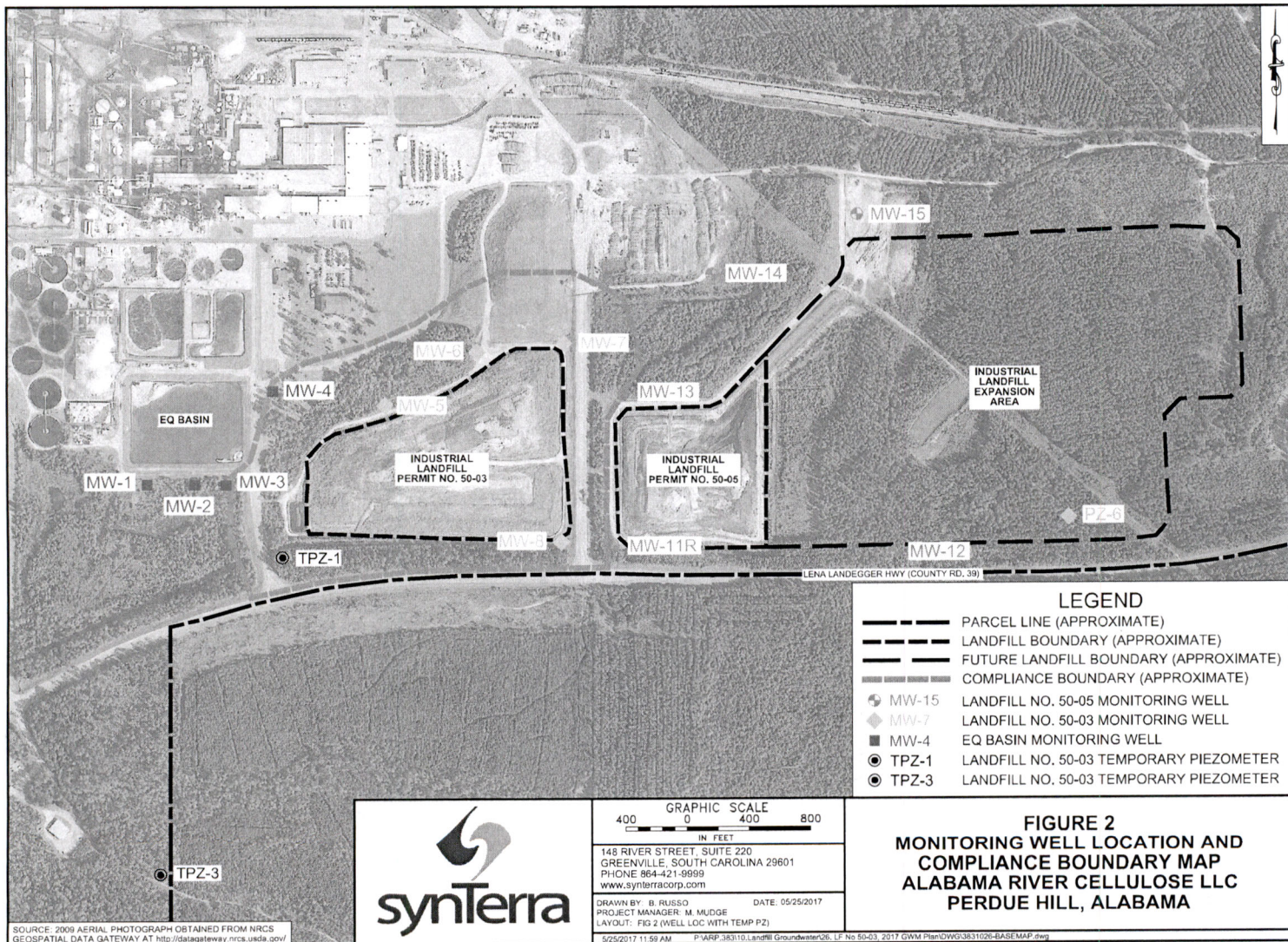
DRAWN BY: B. RUSSO
PROJECT MANAGER: M. MUDGE
LAYOUT: FIG 1 (USGS)

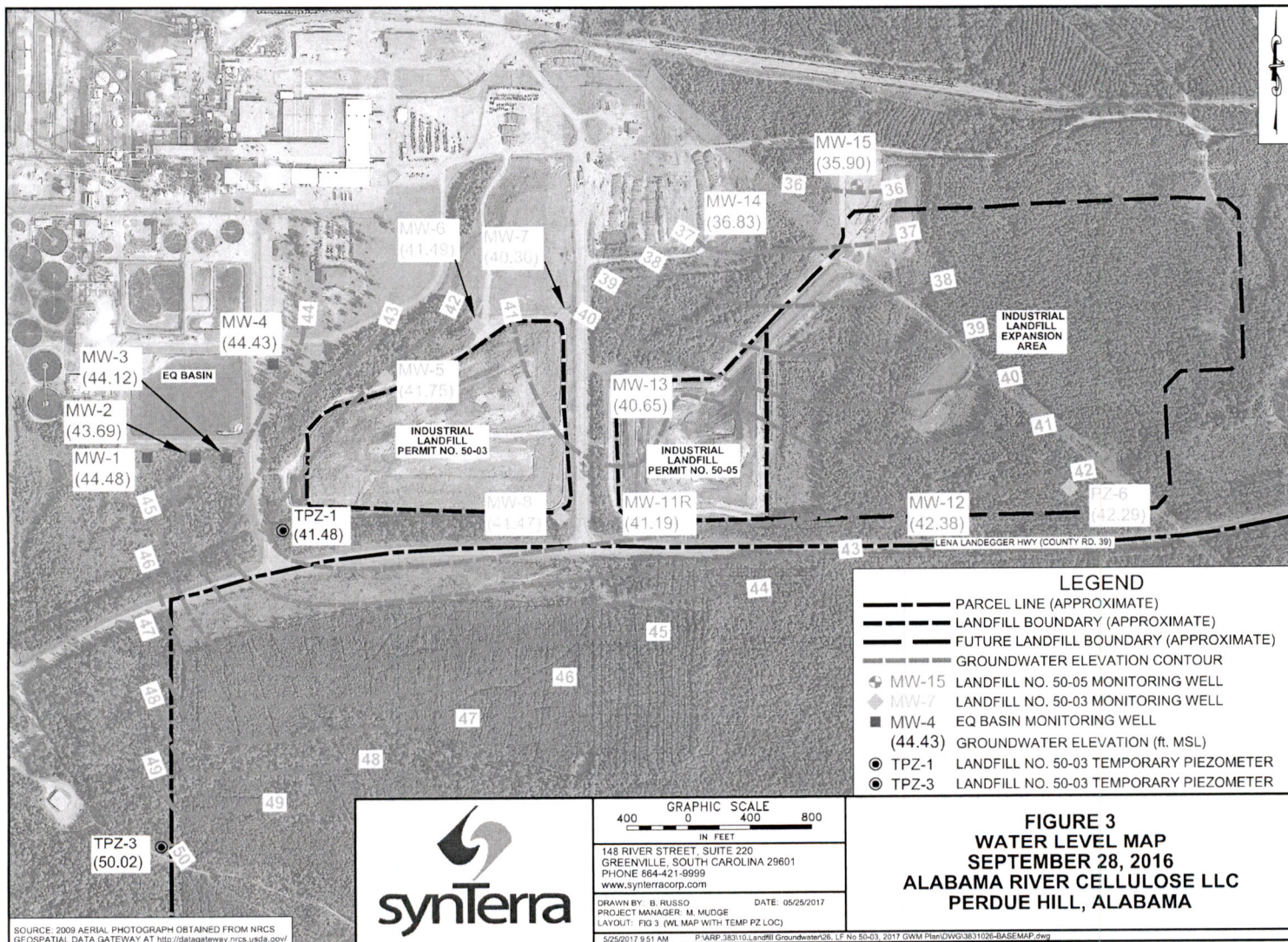
DATE: 05/25/2017
CONTOUR INTERVAL: 10 FT
MAP DATE: 1986

GRAPHIC SCALE
1000 0 1000 2000
IN FEET

8/25/2017 9:31 AM

P:\ARP_38310_Landfill_Groundwater\26_LF No 50-03_2017 GWM Plant\DWG\3831026-BASEMAP.dwg





TABLES

TABLE 1
MONITORING WELL CONSTRUCTION DETAILS
Landfill No. 50-03
Alabama River Cellulose LLC
Perdue Hill, Alabama

Well ID	Construction Materials	Diameter (inches)	Northing (feet)	Easting (feet)	Measuring Point TOC (feet, MSL)	Measured Well Depth ¹ (feet, TOC)
PZ-6	PVC	2	572914.45	1977758.69	61.24	23.65
MW-5	PVC	2	573641.72	1973333.69	56.23	25.15
MW-6	PVC	2	573979.72	1973931.68	60.62	30.82
MW-7	PVC	2	574040.15	1974495.70	69.77	35.52
MW-8	PVC	2	572759.89	1974476.67	58.15	44.39
TPZ-1	PVC	2	572664.66	1972672.33	53.23	25.36
TPZ-3	PVC	2	570613.18	1971882.55	92.84	48.90

Prepared by: MCM Checked by: MSM

NOTES:

BGS - Below ground surface

TOC - Top of casing

MSL - Mean sea level

Northing and easting locations in Alabama West Zone State Plane Coordinates NAD83

Monitoring well survey coordinate and elevation data from Kenneth E. Herring, PLS, Tuscaloosa, Alabama, July 28, 2016.

¹ = Well depths measured by SynTerra, March 22, 2017

TABLE 2
DETECTION MONITORING PARAMETERS
Landfill No. 50-03
Alabama River Cellulose LLC
Perdue Hill, Alabama

Appendix I Metals	
Antimony, total	Lead, total
Arsenic, total	Mercury, total
Barium, total	Nickel, total
Beryllium, total	Selenium, total
Cadmium, total	Silver, total
Chromium, total	Thallium, total
Cobalt, total	Vanadium, total
Copper, total	Zinc, total

APPENDIX A WELL SURVEY PLAT

APPENDIX B

GROUNDWATER GRADIENT AND FLOW RATE CALCULATIONS

**ALABAMA RIVER CELLULOSE OLD LANDFILL (50-03)
GROUNDWATER GRADIENT AND FLOW RATE**

Well ID	Measuring Point (MSL)	Depth to Water	Water Elevation (MSL)
MW-3	59.88	15.76	44.12 ✓
MW-5	56.23	14.48	41.75 ✓
MW-6	60.62	19.13	41.49 ✓
MW-7	69.77	29.47	40.30 ✓
MW-8	58.15	16.68	41.47 ✓
PZ-6	61.24	18.95	42.29 ✓

MSL - Feet Above Mean Sea Level
Depth measurements in feet

Monitoring Event: September 28, 2016 ✓

Average Groundwater Velocity (V)*

*Based on the Darcy Equation where velocity equals $(K \times i) / n$

Hydraulic Conductivity (K) 483.84 foot/day ✓
Average Gradient (i) 0.0013 foot/foot ✓
Porosity (n) 32 percent ✓
Velocity = 1.897 foot/day 692 foot/year M/M

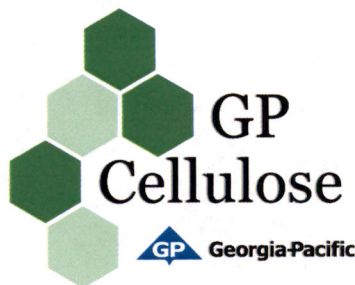
ASSUMPTIONS:

1. K measured at site and reported in "Hydrogeological Evaluation for a proposed Industrial Landfill Site", Fletcher Group, May 1998
2. Effective Porosity value of filter pack around screen obtained from Aqtesolv software guide and is based on Filter Pack of #1 sand listed on construction logs.
3. Effective Porosity values for aquifer obtained from Aqtesolv software guide and is based on lithology of medium sand.

LANDFILL 50-03

Fall 2016		
MW-3 to MW-7		
DISTANCE	CHANGE IN LEVEL	GRADIENT
2,391	3.82 ✓	0.00159799 ✓
MW-8 to MW-7		
DISTANCE	CHANGE IN LEVEL	GRADIENT
1,284	1.17 ✓	0.00091143 ✓
AVERAGE HORIZONTAL GRADIENT (i): 0.00125471 ✓		

Prepared by: JYT Date: 10/6/16
Checked by: MCM Date: 10/6/16



Alabama River Cellulose LLC
P.O. Box 40
Perdue Hill, Alabama 36470
(251) 575-2000

July 25, 2018



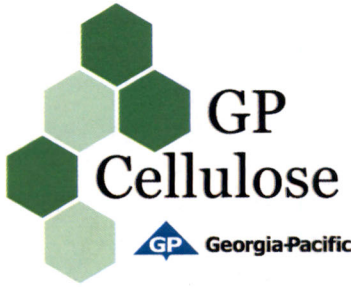
S. Scott Story, Chief
Solid Waste Engineering Section
Solid Waste Branch, Land Division
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, Alabama 36110-2400

RE: Requests for Minor Modifications to Industrial Landfill Permits 50-03 and 50-05
Alabama River Cellulose LLC – Perdue Hill, Alabama

Dear Mr. Story:

Alabama River Cellulose LLC (ARC) operates two industrial landfills adjacent to the facility's bleached Kraft pulp manufacturing site in Perdue Hill, Alabama. ARC is submitting the enclosed permit applications for minor modifications to the solid waste disposal Permit Nos. 50-03 and 50-05. ARC is requesting that the Alabama Department of Environmental Management (ADEM) modify permit condition IV.B.3 in each permit to provide 90 days from the date of sampling for ARC to submit the records and results of groundwater sampling and analysis activities to ADEM. Enclosed with these application forms are two separate checks in the amount of \$1,460.00 as payment to ADEM for the minor modification permit application fees for each industrial landfill. Permit No. 50-03 is currently in the process of reissuance from ADEM. ARC paid the reissuance fee for this permit on February 14, 2014.

The following information is being provided in support of Item 10 (list of accepted wastes) of the permit applications for Permits 50-03 and 50-05:



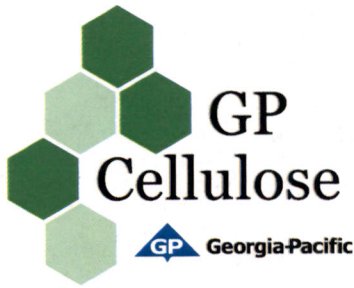
Alabama River Cellulose LLC
P.O. Box 40
Perdue Hill, Alabama 36470
(251) 575-2000

Industrial Wastes

- **Filter Cake**
 - Consists of solid wastewater treatment plant residues, including but not limited to bleached and unbleached pine and hardwood fibers removed at the primary clarifiers, biological solids from the activated sludge plant, and non-hazardous solids removed during the routine maintenance of the wastewater treatment system.
- **Boiler Ashes**
 - Consist of the solid residue from the burning of wood, sludge, or other combustible material used to generate energy, including but not limited to uncombusted material from the mill boilers.
- **Wood Wastes**
 - Consist of materials generated by the processing of wood, including but not limited to sticks, bark, grit, process sewer grit, sawdust, and knots.
- **Lime Wastes**
 - Consist of rejected and non-reclaimed material from the chemical recovery area, including but not limited to lime mud, lime slaker rejects, lime dregs, and lime mud removed from the mill settling pond.

Inert Wastes

- **Rubbish**
 - Consists of combustible and non-combustible materials, including but not limited to pallets, machine clothing, paper, rags, cartons, rubber, plastics, glass, metal, and containers rendered incapable of holding liquids.
- **Construction/Demolition Waste**
 - Consists of waste building materials, packaging, and rubble, including but not limited to masonry materials, sheet rock, roofing, insulation (not including asbestos), scrap metal, and wood products.



Alabama River Cellulose LLC
P.O. Box 40
Perdue Hill, Alabama 36470
(251) 575-2000

Special Wastes

- **Process Residues**
 - Consist of solid non-hazardous process residues generated during routine or non-routine maintenance operations, including but not limited to tank residues, line residues, and sewer system deposits.
- **Wastes Resulting from Releases**
 - Consists of solid, non-hazardous wastes generated during the cleanup of a material release, including but not limited to petroleum contaminated waste, the cleanup of non-hazardous material spills, and cleanup of materials rendered non-characteristic hazardous wastes (other than toxic and listed) during cleanup.

ARC respectfully requests that ADEM incorporate the requested minor modification into landfill permits 50-03 and 50-05. If you have any questions or need additional information regarding this request for minor modification to the permits, please contact Cody Austin at (251) 743-8334.

Sincerely,

Alabama River Cellulose LLC

David D. Lazenby
Manager, Environmental and Compliance

SOLID WASTE APPLICATION

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

1. Facility type: Municipal Solid Waste Landfill (MSWLF)
 ✓ Industrial Landfill (ILF)
 ✓ Other (explain) Minor Modification

2. Facility Name Alabama River Cellulose Landfill (Permit No. 50-03)

3. Applicant:

Name: Alabama River Cellulose LLC

Address: Post Office Box 40

Perdue Hill, AL 36470

Telephone: (251) 575-2000

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

Township	<u>7 North</u>	Range	<u>6 East</u>
Section	<u>8 and 17</u>	County	<u>Monroe</u>

5. Land Owner:

Name: Alabama River Cellulose LLC

Address: 2373 Lena Landegger Highway (County Road 39)
Perdue Hill, AL 36470

Telephone: (251) 575-2000

(Attach copy of agreement from landowner if applicable.)

November 1997

Solid Waste Permit Application
Page 2

6. Contact Person:

Name David D. Lazenby

Position or
Affiliation Manager, Environmental and Compliance

Address: Post Office Box 40
Perdue Hill, AL 36470

Telephone: (251) 743-8793

7. Size of Facility:

40.03 Acres

Size of Disposal Area(s):

37.50 Acres

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

Alabama River Cellulose LLC and additional waste associated with on-site activities

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

 Tons/Day 1,500 Cubic Yards/Day

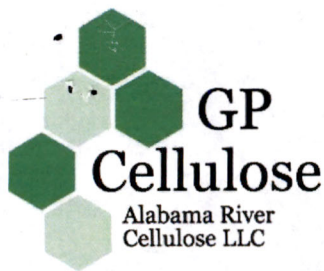
10. List all waste streams to be accepted at the facility (i.e., household solid waste, wood boiler ash, tires, trees, limbs, stumps, etc.):

Non-putrescible and non-hazardous industrial waste, construction and demolition waste, and rubbish as defined by

ADEM Administrative Code Rule 335-13-1-.03 (See specific descriptions of waste in cover letter.)

Timothy D. Lazenby
SIGNATURE

8/3/18
DATE



February 22, 2019

Mr. C. Blake Holden
Solid Waste Engineering Section
Land Division
Alabama Department of Environmental Management
1400 Coliseum Boulevard
Montgomery, AL 36110-2059

SUBJECT: Supplemental Information for Permit Renewal
Industrial Landfill Permit No. 50-03
Alabama River Cellulose LLC – Perdue Hill, Alabama

Mr. Holden:

Alabama River Cellulose LLC (ARC) is providing the attached supplemental information requested for landfill permit renewal for the Industrial Landfill Permit No. 50-03, located at the ARC facility in Perdue Hill, Alabama. The following information is included:

1. An updated Landfill Operations Plan which identifies the waste screening procedure.
2. A map showing the landfill permitted waste disposal boundary, 100-foot buffer zone, and compliance boundary.
3. Storm water calculations and modeling of a 25-year 24-hour storm event for the existing infrastructure.

Results of the storm water modeling show the landfill storm water sediment pond, wet well, and associated pumps and piping will not manage a 25 year 24 hour storm event. However, only on infrequent occasions does the pond completely fill, and overtopping has rarely been observed. When this does occur, the adjacent receiving storm water conveyance is within the greater ARC facility, contains its own sediment controls, and is included and monitored in accordance with the facility National Pollutant Discharge Elimination System (NPDES) permit (No. AL0025968). Based on this information, we believe we are in compliance with Rule 335-13-4-.17 as applied to run-off control system requirements and respectfully request a variance be granted or permit requirements be removed regarding the need to collect and control a 25 year 24 hour storm event within the Landfill No. 50-03 boundaries.

Alabama River Cellulose LLC
P.O. Box 40
2373 Lena Landegger Hwy. CR 39
Perdue Hill, Alabama 36470
www.gapac.com



ARC also respectfully requests all previously approved variances be retained (Section VIII of the permit), these include:

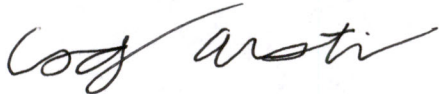
1. A variance from Rule 335-13-4-.23(1)(a)(1) requiring waste to be covered at the conclusion of each week's operation.
2. A variance from Rule 335-13-4-.16 requiring explosive gas monitoring.
3. Approval to incorporate pulp mill fiber sludge as the infiltration layer in the final cover system.
4. A variance from Rule 335-13-4-.23(1)(c) requiring a 4 to 1 slope.
5. The facility was given permission to store dry lime within the boundaries of Landfill No. 50-03. The original request was made on July 30, 2008, with supplemental information provided in a follow-up letter dated September 8, 2008.

ADEM approved this request in a phone conversation on November 17, 2008, between Mr. Rao Malladi (ADEM) and Mr David Lazenby (ARC).

We ask that this approval for lime storage be formally included in the permit issuance.

Please contact me at (251)-743-8334 if you have any questions about the information provided or require further information.

Respectfully submitted,
Alabama River Cellulose LLC



Cody Austin
Environmental Engineer

Enclosures: Landfill Operations Plan
Drawing showing Landfill No. 50-03 permitted waste disposal boundary, 100-foot buffer zone, and compliance boundary
Landfill No. 50-03 storm water calculations memorandum,
ARC internal communications record, re: variance for lime storage (November 17, 2008)

Cc: David Lazenby, ARC
Justin Bates, ARC
Matthew S. Mudge, SynTerra

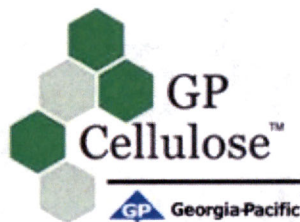


LANDFILL OPERATIONS PLAN

FOR

INDUSTRIAL LANDFILL PERMIT NOS. 50-03 AND 50-05

**ALABAMA RIVER CELLULOSE LLC
2372 LENA LANDEGGER HIGHWAY
PERDUE HILL, ALABAMA 36470**



ALABAMA RIVER CELLULOSE LLC

FEBRUARY 2019

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OVERVIEW

Alabama River Cellulose LLC (ARC) operates two industrial waste landfills permitted for use by ARC in Perdue Hill, Alabama. ARC is allowed to dispose of nonhazardous solid waste in accordance with the conditions of Landfill Permit Nos. 50-03 and 50-05 and Alabama Department of Environment Management (ADEM) Administrative Code Division 13 (Land Division - Solid Waste Program). The procedures necessary to effectively operate the ARC landfills are described in this Landfill Operations Plan.

The objectives of the landfill operating plan are:

- Ensure that approved operations described in ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05 are followed.
- Serve as a guide to ARC employees and contract personnel for landfill operations.
- Present operations details that are consistent and compatible with the site characteristics and are useful to operating personnel.
- Continue protection of the environment.

1.0 GENERAL OPERATIONS

ARC may dispose of nonhazardous solid wastes approved of in Landfill Permit Nos. 50-03 and 50-05. The waste streams approved for disposal in Section III.B of these permits include: filtercake, boiler ashes, wood wastes, lime wastes, rubbish, construction/demolition waste, process residues, petroleum-contaminated wastes, and wastes resulting from releases consisting of solid, non-hazardous wastes generated during the clean-up of a material release. Approved disposal rates for Landfill Permit Nos. 50-03 and 50-05 are 1,500 cubic yards per day and 2,000 cubic yards per day, respectively. Disposal of any other wastes is prohibited, except waste granted a temporary or one time waiver by the Director of ADEM.

ARC will maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

1.1 Operation of Facility

The disposal facilities will be operated and maintained consistently with ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13 (Land Division – Solid Waste Program), and this Landfill Operations Plan.

1.2 Service Area

Waste placed in the landfills is generated on site at the ARC facilities. These facilities are secured by fencing and manned security gates. For Landfill No. 50-03, wastes from off-site are not allowed to be disposed in the landfill. Landfill No. 50-05 does allow for disposal of waste from off-site; this is limited to other Georgia-Pacific facilities located in Alabama. Specific off-site waste streams should be evaluated on a case-by-case basis and may require a Solid/Hazardous Waste Determination Form be completed and placed in the Landfill Operating Record.

1.3 Boundary Markers – 335-13-4-.21(1)(e)

ARC shall ensure that the disposal facilities are identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

1.4 Industrial Waste Disposal – 335-13-4-.21(1)(c)

ARC shall dispose of industrial waste as required by ADEM Admin Code R. 335-13-4-.21(1)(c). ARC may accept for disposal non-putrescible and non-hazardous industrial waste, construction and demolition waste, and rubbish as defined by ADEM Rule 335-13-1-.03. ARC will keep a copy of approved Solid/Hazardous Waste Determination

Forms for all the Industrial Wastes disposed and any associated ADEM correspondence in the facility operating record.

1.5 Waste Screening Procedures – 335-13-4-.21(1)(b)

Waste streams designated for disposal in the landfills will be pre-approved by the ARC Environmental Department. Waste profiles will be completed, submitted, and reviewed by the Environmental Department and include evaluating waste for free liquids, regulated hazardous wastes, regulated medical wastes, and regulated PCB wastes.

1.6 Waste Placement and Compaction – 335-13-4-.23(1)

The overall objective of waste placement will be to construct a stable fill that attains final grades around the perimeter as soon as possible. Waste placement operations may occur anywhere within the permitted footprint of the landfill that has not reached final grades. Fill areas are typically rotated from one section of the landfill to another to allow for waste blending and stabilization.

All waste shall be spread in layers two feet or less in thickness and thoroughly compacted with adequate landfill equipment prior to placing additional layers of waste or placing cover.

1.6.1 Operating Slopes and Lifts

Working face slopes will not exceed 2 feet horizontal to 1 foot vertical (2:1). Due to the nature of the waste materials managed in the landfill, slopes approaching 1:1 might be present at any time. Temporary piles of stable materials might be present prior to blending into the waste fill (Section 1.6.2). Some waste materials require spreading in thin layers to stabilize prior to blending or covering with material such as wood bark, which can safely be stacked with steep slopes. Moist, fine-grained waste might be spread to air-dry or might be mixed with bark or other material before compacting to stabilize the fill.

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Mixing of the waste materials generates a uniform fill that will result in a relatively uniform rate of settlement. Waste materials will be mixed during placement. Selective use of ash is an exception, as described in Section 1.6.3.

Green liquor dregs will be stabilized either by air-drying before final incorporation or by mixing with dry lime or ash. Moist knots will be air-dried before incorporation, if at all possible. Care will be taken to avoid extensive layers, such as lime mud. Tipping areas established using fine-grained wastes

will be ripped or trenched before placement of the successive vertical lift of waste material.

1.6.3 Use of Ash in Landfill No. 50-05

Ash will be used as a fill material to stabilize the other wastes. Ash might also be used as a drainage layer within the fill near the leachate collection laterals.

1.6.3.1 Ash Buttress

A buttress constructed of ash will be placed around the perimeter of the landfill as necessary to provide additional slope stability to the waste fill (**Figure 1**, below). In order to facilitate placement of the buttress, 20 feet will be maintained between the edge of the perimeter berm and the toe of the waste in the landfill (**Figure 1**). At the intersection with the berm, the upper surface of the buttress will be a minimum of 2 feet below the berm to prevent runoff from the landfill.

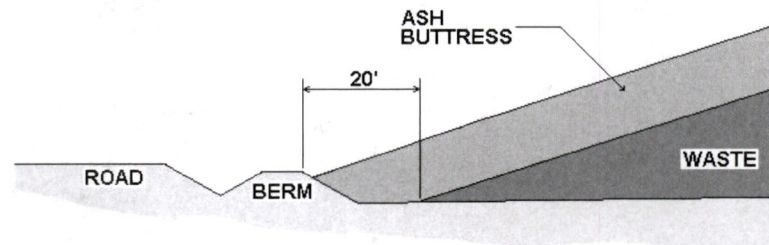


FIGURE 1 Ash Buttress

1.6.3.2 Vertical Ash Drains and Risers

Ash should be placed over leachate collection laterals and the leachate collection header to promote drainage within the landfill, as illustrated in **Figure 2**, below. The ash will promote drainage because it is the most granular waste material available. This will provide a conduit for leachate and precipitation to drain into the leachate collection system. Ash drains will be a minimum of six feet wide, centered over the leachate lateral and the leachate collection header, and at least as thick as each lift of waste.

Vertical risers bedded in sand may be installed in the ash drains. The spacing between the vertical riser pipes would be approximately 100 feet along the leachate laterals. The sand will not be as prone to settlement as the waste and ash. In order to limit the effects of settlement, the piping should be perforated, corrugated high-density polyethylene pipe. The

flexible nature of the corrugated pipe will accommodate settlement. The sand surrounding the vertical riser pipe will be a minimum of six feet around the piping.

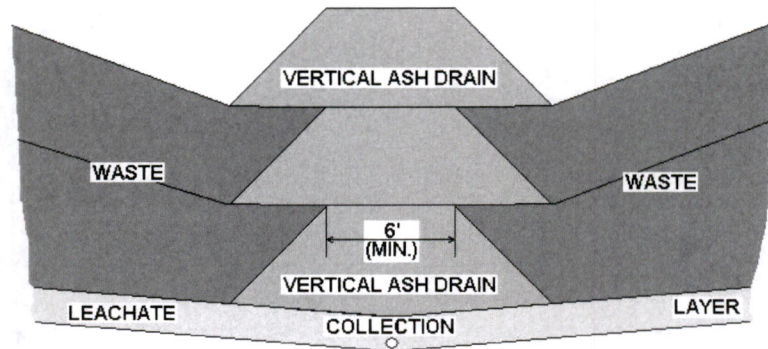


FIGURE 2 Vertical Ash Drain

1.7 Prevention of Unauthorized Disposal – 335-13-4-.21(1)(b)

Medical wastes are generated at the facility, and the mill has a Medical Waste Management Plan. This plan is adequate to ensure that medical waste will not be disposed of in the landfills.

Electrical equipment, the only possible source of PCBs at the site, will not be disposed of in the landfills. Regulated hazardous wastes generated at the ARC facility are collected, documented, and shipped off-site for treatment or disposal in accordance with RCRA regulations. Training programs are conducted to inform supervisors, employees, and contractors of proper handling and disposal procedures. Hazardous waste records are maintained in the facility environmental department.

1.8 Cover Material Placement – 335-13-4-.23(1)(a)

Landfill operations will be conducted such that blowing litter will be covered with a soil-like waste (lime waste, filtercake, ash, or wood waste) within an 8-hour shift. An intermediate cover might be placed on the waste in areas that have reached final waste grade elevations. The intermediate cover should consist of at least 12 inches of soil-like waste and might be removed and stockpiled before capping activities commence. If necessary, moist waste materials should be used for dust control.

For Landfill Nos. 50-03 and 50-05, ARC received a variance from ADEM Admin Code R. 335-13-4-.23(1)(a)(1) requiring waste to be covered at the conclusion of each week of operation. ARC is not required to cover the waste until closure.

1.9 Liner Protection – 335-13-4-.18

The disposal of waste in a new lined cell will not commence until the liner has been constructed in compliance with the standards or criteria prescribed or required by the manufacturers of the components and ADEM regulations. ADEM will inspect the constructed cells before the commencement of waste disposal unless ADEM waives the inspection.

No construction debris, wood waste, or other material that contains long pieces that could penetrate the membrane liner will be placed within five feet of the top of the liner system and/or leachate collection system.

1.10 Surface Water Management – 335-13-4-.17

Surface water run-on to the landfill sites is prevented by perimeter berms and storm water ditches designed to convey water away from both landfills. Surface water that comes into contact with waste is routed by gravity to leachate sumps, from which it is pumped to the facility National Pollutant Discharge Elimination System (NPDES) permitted wastewater treatment system.

1.10.1 Landfill No. 50-03

Surface water runoff from Landfill No. 50-03 is routed via perimeter ditches to a storm water/leachate sump west of the landfill. The perimeter ditches are maintained by removing debris to facilitate surface water conveyance to the sump.

1.10.2 Landfill No. 50-05

Permanent drainage structures are located on the north and south end of the leachate collection pipe in each cell of Landfill No. 50-05. Temporary drainage will be constructed as the filling operation progresses and will be adapted to changes in the operation of the landfill. All temporary drainage features will be routed to the permanent structures. Surface water will be routed via ditches and culverts, if necessary to maintain access, away from the working face. Ditches will be graded to have a minimum slope of 0.5 percent and a maximum slope of 6 to 7 percent.

A perimeter channel will be maintained within the lined portion of the landfill to collect runoff and convey it to the leachate collection system. As the elevation of the waste increases and final cover is placed over the lower reaches of the landfill, the perimeter channel will be relocated above the newly placed final covered portion of the landfill, progressively moving upward and inward in

order to remain within the active portion of the landfill. Generally, the locations of terraces in the final grading plan will be the locations of the perimeter channel.

The terraces will be graded to provide drainage off the landfill during both the active life and throughout closure. A temporary storm water diversion berm will be constructed on the terraces. This berm will form the downstream edge of the perimeter channel described above. Runoff from the slope above the berm will be routed to the leachate collection system.

Routine inspection and cleaning of ditches, channels, culverts, and other piping will be conducted to maintain proper flow.

1.11 Prevention of Unauthorized Discharge – 335-13-4-.21(1)(d)1.(i)

Leachate and storm water that comes into contact with waste are discharged from the disposal facilities to the ARC waste water treatment system, which operates under an NPDES permit according to the Alabama Water Pollution Control Act.

1.12 Leachate Management – 335-13-4-.18

The leachate collection facilities associated with the landfills include perimeter ditches, perforated collection piping, gravity main, pump stations, and force mains discharging to the waste water treatment facility. The pump stations will be monitored and maintained in accordance with ARC policy/procedures. Accumulations of sediment and debris will be removed, as needed.

Infiltration into the Landfill No. 50-05 leachate collection system is designed to occur over a 72-hour period. If the leachate collection system floods, due to loss of power at the pump station or excessive rainfall, the leachate collection piping will be flushed to remove sediment and debris.

Leachate piping will be periodically jetted to maintain functionality. The frequency of this maintenance will be determined based on leachate system performance.

1.13 Security – 335-13-4-.23(1)(e)

Security fencing and manned security gates are in place to prevent entry of unauthorized vehicular traffic to the ARC facility.

1.14 All Weather Access Road – 335-13-4-.23(2)(d)

All-weather access roads to the dumping face that are wide enough to allow passage of collection vehicles are in place and maintained at both landfills.

1.15 Adverse Weather Disposal – 335-13-4-.23(1)(g)

Disposal activities will be provided in adverse weather. In anticipation of wet weather operations, temporary drainage and erosion control systems will be in place and granular soil will be stockpiled.

1.16 Personnel and Equipment – 335-13-4-.23(1)(h) and (i)

Adequate personnel and equipment will be provided to ensure continued and smooth operation of the facility in accordance with the permits.

1.17 Environmental Monitoring Structures – 335-13-4-.23(2)(e)

Groundwater monitoring wells and explosive gas probes are secured by steel surface casings.

1.18 Vector Control – 335-13-4-.23(2)(g)

Due to the relatively inert and soil-like nature of the waste material, the potential for vectors is minimal. No putrescible waste is disposed in either landfill.

1.19 Bulk or Non-containerized Liquid Waste – 335-13-4-.23(1)(j)

There will be no disposal of bulk or non-containerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin Code R. 335-13-4-.23(1)(j) are met.

1.20 Empty Containers – 335-13-4-.23(1)(k)

Empty containers larger than 10 gallons in size will be rendered unsuitable for holding liquids prior to disposal in the landfill.

1.21 Scavenging and Salvaging Operations – 335-13-4-.23(2)(a)

Scavenging and salvaging operations will be prevented, except as part of a controlled recycling effort. Any recycling operation will be in accordance with plans submitted and approved by ADEM.

1.22 Signs – 335-13-4-.23(1)(f)

If the landfill becomes available to the public or commercial haulers, a sign outlining instructions for use of the site will be provided. The sign will be posted and have the information required by ADEM Admin Code R. 335-13-4-.23(1)(f).

1.23 Litter Control 335-13-4-.23(2)(b)

Unloading at the toe or the top of the working face depends on the type of wastes being placed and the weather. When the wind is blowing, it will be best to unload paper and plastic wastes near the toe of slope to limit the amount of windblown litter.

Construction debris, including lumber and concrete, will be placed into a pit excavated into the waste.

1.24 Open Burning and Fire Control – 335-13-4-.21(2)

Due to the relatively inert and soil-like nature of the waste material, the potential for fire is minimal. Open burning will not be permitted without prior written approval from ADEM and other appropriate agencies. A burn request will be submitted in writing to ADEM outlining why that burn request should be granted. This request will include, but not be limited to, specifically what areas would 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, will be included in the operating record.

2.0 CLOSURE

The disposal facilities will be closed in accordance with ADEM Solid Waste Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13-4-.20, and this Landfill Operations Plan.

2.1 Final Cover 335-13-4-.20

ARC was granted approval for an alternate final cover for both landfills in accordance with ADEM Admin Code R. 335-13-4-.20(2)(b)3. Waste materials (fiber sludge) are to be used to construct the landfill final cover, facilitating final cover construction as part of the landfill operation. The final soil cover will be graded such that surface water does not pond over the permitted area. When final grades are attained, a 12-inch layer of select waste (ash) will be used as a leveling course beneath the fiber sludge barrier layer. A 36-inch thick (consolidated to 24-inch thickness) fiber sludge cap will be applied directly to the waste surface. An erosion layer consisting of six inches of earthen material capable of supporting native plant growth will be placed on top of the fiber sludge cap. Completed portions of the landfill will be vegetated, or some other appropriate cover will be installed, to minimize erosion, when applicable.

2.1.1 Landfill No. 50-03

For Landfill No. 50-03, the waste will be graded to the final slopes at grades not to exceed between three feet and four feet horizontal to one foot vertical (3:1 to 4:1).

2.1.2 Landfill No. 50-05

For Landfill No. 50-05, the waste will be graded not to exceed the final slope of four feet horizontal to one foot vertical (4:1).

2.1.3 Quality Assurance / Quality Control Procedures

Because the stability of the fiber sludge barrier layer increases with thickness, sludge will be placed in relatively thick layers (two to four feet). Sludge will be tracked in by a bulldozer, but no attempt to compact the material will be made (refer to the *Sludge Cap Performance Demonstration – Industrial Landfill*, Fletcher Group, February 2000). Thickness will be controlled by the use of grade stakes. Sludge will be placed against the perimeter and terrace berms at a depth of three feet.

In general, areas ranging from one-half to two acres of fiber sludge barrier layer will be completed prior to placement of the overlying soil layer. Two weeks to a maximum of two months will be required to prepare areas for placement of the

topsoil cover. Runoff from the site is channeled via an existing perimeter ditch to the mill waste water treatment system. At no time will uncontrolled runoff from the barrier layer construction area leave the site.

The effectiveness of the fiber sludge barrier layer will be confirmed by testing the hydraulic conductivity (ASTM D7243) of undisturbed samples of the layer and measuring the thickness of the layer. Samples will be collected using Shelby tubes at a frequency of one sample per three acres of closed landfill. Samples will be collected at least six months after completion of the final cover system to ensure that sufficient consolidation has occurred to provide representative hydraulic conductivity properties. Test results will be reported to ADEM in the certification report for the closure phase (refer to Section 2.3 of this document). Thickness measurements, and sampling and testing of the fiber sludge barrier layer, shall continue annually, with results provided to ADEM until the data collected shows no further consolidation or degradation of hydraulic conductivity.

2.2 Vegetative Cover – 335-13-4-.20(2)(d)

A vegetative or other appropriate cover will be established within 90 days after completion of final grading requirements in the permits. Preparation of a vegetative cover will include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

2.3 Closure Documentation

A Closure Documentation Report verifying and documenting all aspects of site construction will be prepared following the final closure of the landfill site and submitted to ADEM by the ARC Environmental Department. The report will contain the following information:

1. A plan sheet illustrating final grades with spot elevations; the location of grassed waterways, drainage ditches, gas vents, fiber sludge barrier layer testing locations, and other information as appropriate.
2. A minimum of two cross sections drawn every 500 feet through the closed landfill site.
3. A comprehensive narrative explaining how closure of the landfill site was accomplished. This report shall also include an appendix containing all the raw data from the field and any laboratory soil testing performed.

4. A letter sealed by a Registered Professional Engineer certifying that the final cover was placed in substantial compliance with the revised closure plan. Any deviations from the approved plans shall be noted.

2.4 Closure Notification

When the entire landfill site has been filled, covered, and closed, notification will be filed with the local Judge of Probate for recording existence of landfill on the permanent land deed records. ADEM will be copied on the Final Closure Notice.

2.5 Records

Documentation of all work performed on the landfill will be kept on file by the Environmental Department at Alabama River Cellulose LLC in Perdue Hill.

3.0 MONITORING, CORRECTIVE ACTIONS, INSPECTIONS, AND RECORDKEEPING

Monitoring, corrective actions, and inspections will be completed in accordance with ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13-27, and this Landfill Operations Plan.

3.1 Monitoring and Corrective Actions

Samples and measurements taken for the purpose of monitoring or corrective action will be representative of the monitored activity. The methods used to obtain representative samples for analysis will be the appropriate method from ADEM Admin Code R. 335-13-4, or the methods specified in the permits.

Laboratory methods will 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 permits. All field tests will be conducted using approved EPA test kits and procedures.

3.1.1 Groundwater Monitoring – 335-13-4-.27

ARC will follow the groundwater monitoring requirements and sampling and analysis procedures as stated in the current permits and ADEM regulations. Separate Groundwater Monitoring and Statistical Analysis Plans for each landfill were developed and submitted to ADEM.

3.1.2 Gas Monitoring – 335-13-4-.16

Landfill No. 50-03 is granted a variance for requiring explosive gas monitoring. Landfill No. 50-05 will follow the gas monitoring requirements as stated in Permit No. 50-05 and ADEM regulations.

3.2 Inspections – 335-13-4-.21(1)(b)1 and 2

As stated in the current permits and ADEM regulations, ARC will conduct random inspections of incoming loads to ensure that materials for disposal do not contain unapproved wastes. ARC will also inspect suspicious loads.

3.3 Recordkeeping – 335-13-4-.12 and .21

ARC will maintain at their office a written operating record in accordance with Landfill Permit Nos. 50-03 and 50-05 and ADEM Admin Code R. 335-13-4-.12 and 335-13-4-.21.



LANDFILL OPERATIONS PLAN
FOR
INDUSTRIAL LANDFILL PERMIT NOS. 50-03 AND 50-05

ALABAMA RIVER CELLULOSE LLC
2372 LENA LANDEGGER HIGHWAY
PERDUE HILL, ALABAMA 36470



ALABAMA RIVER CELLULOSE LLC

FEBRUARY 2019

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OVERVIEW

Alabama River Cellulose LLC (ARC) operates two industrial waste landfills permitted for use by ARC in Perdue Hill, Alabama. ARC is allowed to dispose of nonhazardous solid waste in accordance with the conditions of Landfill Permit Nos. 50-03 and 50-05 and Alabama Department of Environment Management (ADEM) Administrative Code Division 13 (Land Division - Solid Waste Program). The procedures necessary to effectively operate the ARC landfills are described in this Landfill Operations Plan.

The objectives of the landfill operating plan are:

- Ensure that approved operations described in ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05 are followed.
- Serve as a guide to ARC employees and contract personnel for landfill operations.
- Present operations details that are consistent and compatible with the site characteristics and are useful to operating personnel.
- Continue protection of the environment.

1.0 GENERAL OPERATIONS

ARC may dispose of nonhazardous solid wastes approved of in Landfill Permit Nos. 50-03 and 50-05. The waste streams approved for disposal in Section III.B of these permits include: filtercake, boiler ashes, wood wastes, lime wastes, rubbish, construction/demolition waste, process residues, petroleum-contaminated wastes, and wastes resulting from releases consisting of solid, non-hazardous wastes generated during the clean-up of a material release. Approved disposal rates for Landfill Permit Nos. 50-03 and 50-05 are 1,500 cubic yards per day and 2,000 cubic yards per day, respectively. Disposal of any other wastes is prohibited, except waste granted a temporary or one time waiver by the Director of ADEM.

ARC will maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of contaminants (including leachate and explosive gases) to air, soil, groundwater, or surface water, which could threaten human health or the environment.

1.1 Operation of Facility

The disposal facilities will be operated and maintained consistently with ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13 (Land Division – Solid Waste Program), and this Landfill Operations Plan.

1.2 Service Area

Waste placed in the landfills is generated on site at the ARC facilities. These facilities are secured by fencing and manned security gates. For Landfill No. 50-03, wastes from off-site are not allowed to be disposed in the landfill. Landfill No. 50-05 does allow for disposal of waste from off-site; this is limited to other Georgia-Pacific facilities located in Alabama. Specific off-site waste streams should be evaluated on a case-by-case basis and may require a Solid/Hazardous Waste Determination Form be completed and placed in the Landfill Operating Record.

1.3 Boundary Markers – 335-13-4-.21(1)(e)

ARC shall ensure that the disposal facilities are identified with a sufficient number of permanent boundary markers that are at least visible from one marker to the next.

1.4 Industrial Waste Disposal – 335-13-4-.21(1)(c)

ARC shall dispose of industrial waste as required by ADEM Admin Code R. 335-13-4-.21(1)(c). ARC may accept for disposal non-putrescible and non-hazardous industrial waste, construction and demolition waste, and rubbish as defined by ADEM Rule 335-13-1-.03. ARC will keep a copy of approved Solid/Hazardous Waste Determination

Forms for all the Industrial Wastes disposed and any associated ADEM correspondence in the facility operating record.

1.5 Waste Screening Procedures – 335-13-4-.21(1)(b)

Waste streams designated for disposal in the landfills will be pre-approved by the ARC Environmental Department. Waste profiles will be completed, submitted, and reviewed by the Environmental Department and include evaluating waste for free liquids, regulated hazardous wastes, regulated medical wastes, and regulated PCB wastes.

1.6 Waste Placement and Compaction – 335-13-4-.23(1)

The overall objective of waste placement will be to construct a stable fill that attains final grades around the perimeter as soon as possible. Waste placement operations may occur anywhere within the permitted footprint of the landfill that has not reached final grades. Fill areas are typically rotated from one section of the landfill to another to allow for waste blending and stabilization.

All waste shall be spread in layers two feet or less in thickness and thoroughly compacted with adequate landfill equipment prior to placing additional layers of waste or placing cover.

1.6.1 Operating Slopes and Lifts

Working face slopes will not exceed 2 feet horizontal to 1 foot vertical (2:1). Due to the nature of the waste materials managed in the landfill, slopes approaching 1:1 might be present at any time. Temporary piles of stable materials might be present prior to blending into the waste fill (Section 1.6.2). Some waste materials require spreading in thin layers to stabilize prior to blending or covering with material such as wood bark, which can safely be stacked with steep slopes. Moist, fine-grained waste might be spread to air-dry or might be mixed with bark or other material before compacting to stabilize the fill.

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Mixing of the waste materials generates a uniform fill that will result in a relatively uniform rate of settlement. Waste materials will be mixed during placement. Selective use of ash is an exception, as described in Section 1.6.3.

Green liquor dregs will be stabilized either by air-drying before final incorporation or by mixing with dry lime or ash. Moist knots will be air-dried before incorporation, if at all possible. Care will be taken to avoid extensive layers, such as lime mud. Tipping areas established using fine-grained wastes

will be ripped or trenched before placement of the successive vertical lift of waste material.

1.6.3 Use of Ash in Landfill No. 50-05

Ash will be used as a fill material to stabilize the other wastes. Ash might also be used as a drainage layer within the fill near the leachate collection laterals.

1.6.3.1 Ash Buttress

A buttress constructed of ash will be placed around the perimeter of the landfill as necessary to provide additional slope stability to the waste fill (**Figure 1**, below). In order to facilitate placement of the buttress, 20 feet will be maintained between the edge of the perimeter berm and the toe of the waste in the landfill (**Figure 1**). At the intersection with the berm, the upper surface of the buttress will be a minimum of 2 feet below the berm to prevent runoff from the landfill.

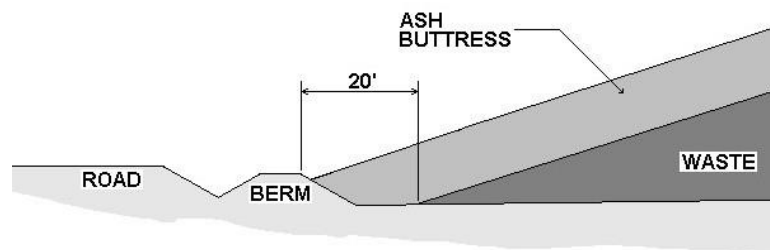


FIGURE 1 Ash Buttress

1.6.3.2 Vertical Ash Drains and Risers

Ash should be placed over leachate collection laterals and the leachate collection header to promote drainage within the landfill, as illustrated in **Figure 2**, below. The ash will promote drainage because it is the most granular waste material available. This will provide a conduit for leachate and precipitation to drain into the leachate collection system. Ash drains will be a minimum of six feet wide, centered over the leachate lateral and the leachate collection header, and at least as thick as each lift of waste.

Vertical risers bedded in sand may be installed in the ash drains. The spacing between the vertical riser pipes would be approximately 100 feet along the leachate laterals. The sand will not be as prone to settlement as the waste and ash. In order to limit the effects of settlement, the piping should be perforated, corrugated high-density polyethylene pipe. The

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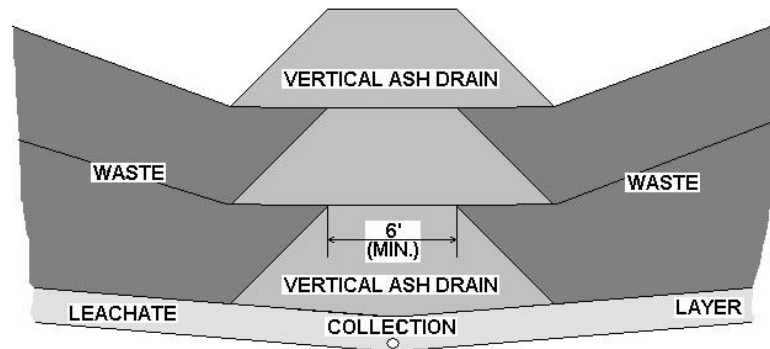


FIGURE 2 Vertical Ash Drain

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Medical wastes are generated at the facility, and the mill has a Medical Waste Management Plan. This plan is adequate to ensure that medical waste will not be disposed of in the landfills.

Electrical equipment, the only possible source of PCBs at the site, will not be disposed of in the landfills. Regulated hazardous wastes generated at the ARC facility are collected, documented, and shipped off-site for treatment or disposal in accordance with RCRA regulations. Training programs are conducted to inform supervisors, employees, and contractors of proper handling and disposal procedures. Hazardous waste records are maintained in the facility environmental department.

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For Landfill Nos. 50-03 and 50-05, ARC received a variance from ADEM Admin Code R. 335-13-4-.23(1)(a)(1) requiring waste to be covered at the conclusion of each week of operation. ARC is not required to cover the waste until closure.

1.9 Liner Protection – 335-13-4-.18

The disposal of waste in a new lined cell will not commence until the liner has been constructed in compliance with the standards or criteria prescribed or required by the manufacturers of the components and ADEM regulations. ADEM will inspect the constructed cells before the commencement of waste disposal unless ADEM waives the inspection.

No construction debris, wood waste, or other material that contains long pieces that could penetrate the membrane liner will be placed within five feet of the top of the liner system and/or leachate collection system.

1.10 Surface Water Management – 335-13-4-.17

Surface water run-on to the landfill sites is prevented by perimeter berms and storm water ditches designed to convey water away from both landfills. Surface water that comes into contact with waste is routed by gravity to leachate sumps, from which it is pumped to the facility National Pollutant Discharge Elimination System (NPDES) permitted wastewater treatment system.

1.10.1 Landfill No. 50-03

Surface water runoff from Landfill No. 50-03 is routed via perimeter ditches to a storm water/leachate sump west of the landfill. The perimeter ditches are maintained by removing debris to facilitate surface water conveyance to the sump.

1.10.2 Landfill No. 50-05

Permanent drainage structures are located on the north and south end of the leachate collection pipe in each cell of Landfill No. 50-05. Temporary drainage will be constructed as the filling operation progresses and will be adapted to changes in the operation of the landfill. All temporary drainage features will be routed to the permanent structures. Surface water will be routed via ditches and culverts, if necessary to maintain access, away from the working face. Ditches will be graded to have a minimum slope of 0.5 percent and a maximum slope of 6 to 7 percent.

A perimeter channel will be maintained within the lined portion of the landfill to collect runoff and convey it to the leachate collection system. As the elevation of the waste increases and final cover is placed over the lower reaches of the landfill, the perimeter channel will be relocated above the newly placed final covered portion of the landfill, progressively moving upward and inward in

order to remain within the active portion of the landfill. Generally, the locations of terraces in the final grading plan will be the locations of the perimeter channel.

The terraces will be graded to provide drainage off the landfill during both the active life and throughout closure. A temporary storm water diversion berm will be constructed on the terraces. This berm will form the downstream edge of the perimeter channel described above. Runoff from the slope above the berm will be routed to the leachate collection system.

Routine inspection and cleaning of ditches, channels, culverts, and other piping will be conducted to maintain proper flow.

1.11 Prevention of Unauthorized Discharge – 335-13-4-.21(1)(d)1.(i)

Leachate and storm water that comes into contact with waste are discharged from the disposal facilities to the ARC waste water treatment system, which operates under an NPDES permit according to the Alabama Water Pollution Control Act.

1.12 Leachate Management – 335-13-4-.18

The leachate collection facilities associated with the landfills include perimeter ditches, perforated collection piping, gravity main, pump stations, and force mains discharging to the waste water treatment facility. The pump stations will be monitored and maintained in accordance with ARC policy/procedures. Accumulations of sediment and debris will be removed, as needed.

Infiltration into the Landfill No. 50-05 leachate collection system is designed to occur over a 72-hour period. If the leachate collection system floods, due to loss of power at the pump station or excessive rainfall, the leachate collection piping will be flushed to remove sediment and debris.

Leachate piping will be periodically jetted to maintain functionality. The frequency of this maintenance will be determined based on leachate system performance.

1.13 Security – 335-13-4-.23(1)(e)

Security fencing and manned security gates are in place to prevent entry of unauthorized vehicular traffic to the ARC facility.

1.14 All Weather Access Road – 335-13-4-.23(2)(d)

All-weather access roads to the dumping face that are wide enough to allow passage of collection vehicles are in place and maintained at both landfills.

1.15 Adverse Weather Disposal – 335-13-4-.23(1)(g)

Disposal activities will be provided in adverse weather. In anticipation of wet weather operations, temporary drainage and erosion control systems will be in place and granular soil will be stockpiled.

1.16 Personnel and Equipment – 335-13-4-.23(1)(h) and (i)

Adequate personnel and equipment will be provided to ensure continued and smooth operation of the facility in accordance with the permits.

1.17 Environmental Monitoring Structures – 335-13-4-.23(2)(e)

Groundwater monitoring wells and explosive gas probes are secured by steel surface casings.

1.18 Vector Control – 335-13-4-.23(2)(g)

Due to the relatively inert and soil-like nature of the waste material, the potential for vectors is minimal. No putrescible waste is disposed in either landfill.

1.19 Bulk or Non-containerized Liquid Waste – 335-13-4-.23(1)(j)

There will be no disposal of bulk or non-containerized liquid waste, or containers capable of holding liquids, unless the conditions of ADEM Admin Code R. 335-13-4-.23(1)(j) are met.

1.20 Empty Containers – 335-13-4-.23(1)(k)

Empty containers larger than 10 gallons in size will be rendered unsuitable for holding liquids prior to disposal in the landfill.

1.21 Scavenging and Salvaging Operations – 335-13-4-.23(2)(a)

Scavenging and salvaging operations will be prevented, except as part of a controlled recycling effort. Any recycling operation will be in accordance with plans submitted and approved by ADEM.

1.22 Signs – 335-13-4-.23(1)(f)

If the landfill becomes available to the public or commercial haulers, a sign outlining instructions for use of the site will be provided. The sign will be posted and have the information required by ADEM Admin Code R. 335-13-4-.23(1)(f).

1.23 Litter Control 335-13-4-.23(2)(b)

Unloading at the toe or the top of the working face depends on the type of wastes being placed and the weather. When the wind is blowing, it will be best to unload paper and plastic wastes near the toe of slope to limit the amount of windblown litter.

Construction debris, including lumber and concrete, will be placed into a pit excavated into the waste.

1.24 Open Burning and Fire Control – 335-13-4-.21(2)

Due to the relatively inert and soil-like nature of the waste material, the potential for fire is minimal. Open burning will not be permitted without prior written approval from ADEM and other appropriate agencies. A burn request will be submitted in writing to ADEM outlining why that burn request should be granted. This request will include, but not be limited to, specifically what areas would 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, will be included in the operating record.

2.0 CLOSURE

The disposal facilities will be closed in accordance with ADEM Solid Waste Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13-4-.20, and this Landfill Operations Plan.

2.1 Final Cover 335-13-4-.20

ARC was granted approval for an alternate final cover for both landfills in accordance with ADEM Admin Code R. 335-13-4-.20(2)(b)3. Waste materials (fiber sludge) are to be used to construct the landfill final cover, facilitating final cover construction as part of the landfill operation. The final soil cover will be graded such that surface water does not pond over the permitted area. When final grades are attained, a 12-inch layer of select waste (ash) will be used as a leveling course beneath the fiber sludge barrier layer. A 36-inch thick (consolidated to 24-inch thickness) fiber sludge cap will be applied directly to the waste surface. An erosion layer consisting of six inches of earthen material capable of supporting native plant growth will be placed on top of the fiber sludge cap. Completed portions of the landfill will be vegetated, or some other appropriate cover will be installed, to minimize erosion, when applicable.

2.1.1 Landfill No. 50-03

For Landfill No. 50-03, the waste will be graded to the final slopes at grades not to exceed between three feet and four feet horizontal to one foot vertical (3:1 to 4:1).

2.1.2 Landfill No. 50-05

For Landfill No. 50-05, the waste will be graded not to exceed the final slope of four feet horizontal to one foot vertical (4:1).

2.1.3 Quality Assurance / Quality Control Procedures

Because the stability of the fiber sludge barrier layer increases with thickness, sludge will be placed in relatively thick layers (two to four feet). Sludge will be tracked in by a bulldozer, but no attempt to compact the material will be made (refer to the *Sludge Cap Performance Demonstration – Industrial Landfill*, Fletcher Group, February 2000). Thickness will be controlled by the use of grade stakes. Sludge will be placed against the perimeter and terrace berms at a depth of three feet.

In general, areas ranging from one-half to two acres of fiber sludge barrier layer will be completed prior to placement of the overlying soil layer. Two weeks to a maximum of two months will be required to prepare areas for placement of the

topsoil cover. Runoff from the site is channeled via an existing perimeter ditch to the mill waste water treatment system. At no time will uncontrolled runoff from the barrier layer construction area leave the site.

The effectiveness of the fiber sludge barrier layer will be confirmed by testing the hydraulic conductivity (ASTM D7243) of undisturbed samples of the layer and measuring the thickness of the layer. Samples will be collected using Shelby tubes at a frequency of one sample per three acres of closed landfill. Samples will be collected at least six months after completion of the final cover system to ensure that sufficient consolidation has occurred to provide representative hydraulic conductivity properties. Test results will be reported to ADEM in the certification report for the closure phase (refer to Section 2.3 of this document). Thickness measurements, and sampling and testing of the fiber sludge barrier layer, shall continue annually, with results provided to ADEM until the data collected shows no further consolidation or degradation of hydraulic conductivity.

2.2 Vegetative Cover – 335-13-4-.20(2)(d)

A vegetative or other appropriate cover will be established within 90 days after completion of final grading requirements in the permits. Preparation of a vegetative cover will include, but not be limited to, the placement of seed, fertilizer, mulch, and water.

2.3 Closure Documentation

A Closure Documentation Report verifying and documenting all aspects of site construction will be prepared following the final closure of the landfill site and submitted to ADEM by the ARC Environmental Department. The report will contain the following information:

1. A plan sheet illustrating final grades with spot elevations; the location of grassed waterways, drainage ditches, gas vents, fiber sludge barrier layer testing locations, and other information as appropriate.
2. A minimum of two cross sections drawn every 500 feet through the closed landfill site.
3. A comprehensive narrative explaining how closure of the landfill site was accomplished. This report shall also include an appendix containing all the raw data from the field and any laboratory soil testing performed.

4. A letter sealed by a Registered Professional Engineer certifying that the final cover was placed in substantial compliance with the revised closure plan. Any deviations from the approved plans shall be noted.

2.4 Closure Notification

When the entire landfill site has been filled, covered, and closed, notification will be filed with the local Judge of Probate for recording existence of landfill on the permanent land deed records. ADEM will be copied on the Final Closure Notice.

2.5 Records

Documentation of all work performed on the landfill will be kept on file by the Environmental Department at Alabama River Cellulose LLC in Perdue Hill.

3.0 MONITORING, CORRECTIVE ACTIONS, INSPECTIONS, AND RECORDKEEPING

Monitoring, corrective actions, and inspections will be completed in accordance with ADEM Solid Waste Disposal Facility Permit Nos. 50-03 and 50-05, ADEM Administrative Code R. 335-13-27, and this Landfill Operations Plan.

3.1 Monitoring and Corrective Actions

Samples and measurements taken for the purpose of monitoring or corrective action will be representative of the monitored activity. The methods used to obtain representative samples for analysis will be the appropriate method from ADEM Admin Code R. 335-13-4, or the methods specified in the permits.

Laboratory methods will 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 permits. All field tests will be conducted using approved EPA test kits and procedures.

3.1.1 Groundwater Monitoring – 335-13-4-.27

ARC will follow the groundwater monitoring requirements and sampling and analysis procedures as stated in the current permits and ADEM regulations. Separate Groundwater Monitoring and Statistical Analysis Plans for each landfill were developed and submitted to ADEM.

3.1.2 Gas Monitoring – 335-13-4-.16

Landfill No. 50-03 is granted a variance for requiring explosive gas monitoring. Landfill No. 50-05 will follow the gas monitoring requirements as stated in Permit No. 50-05 and ADEM regulations.

3.2 Inspections – 335-13-4-.21(1)(b)1 and 2

As stated in the current permits and ADEM regulations, ARC will conduct random inspections of incoming loads to ensure that materials for disposal do not contain unapproved wastes. ARC will also inspect suspicious loads.

3.3 Recordkeeping – 335-13-4-.12 and .21

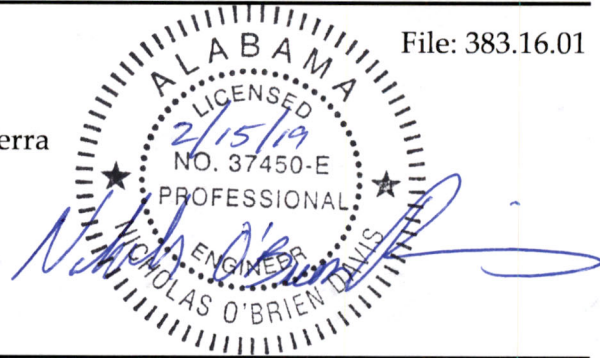
ARC will maintain at their office a written operating record in accordance with Landfill Permit Nos. 50-03 and 50-05 and ADEM Admin Code R. 335-13-4-.12 and 335-13-4-.21.



MEMORANDUM

Date: February 15, 2019
To: Cody Austin
Cc: Matthew Mudge - SynTerra
From: Nicholas Davis, P.E.
Subject: Storm Water Calculations
Landfill Permit No. 50-03
Alabama River Cellulose, LLC

File: 383.16.01



As part of the permit renewal process for Landfill No. 50-03, the Alabama Department of Environmental Management (ADEM) requested storm water calculations modelling the 25-year 24-hour storm event for Landfill No. 50-03.

Landfill No. 50-03 is located in the south/central portion of the Alabama River Cellulose, LLC (ARC) mill. Figure 1 (**Attachment 1**) shows a 2015 topographic survey of the landfill with an aerial image in the background. A perimeter haul road surrounds the landfill. Storm water from the landfill is routed to a storm water pond via perimeter ditches.

The storm water pond is located at the southwest corner of the landfill and has a pump station with two 50 horsepower (HP) submersible pumps to convey storm water to the mill wastewater treatment system. The drainage area for the storm water pond is approximately 37 acres. The storm water pond drains into the pump station wet well and is then pumped to the wastewater treatment system equalization basin approximately 600 feet north and west of the landfill pump station.

Based on design drawings by Parsons and Whittemore dated 1994 (**Attachment 2**), the pond drains into the wet well at elevation 44.5 feet. Above elevation 44.5 feet there is nothing separating the wet well from the pond, meaning that the pumps would be pumping the entire volume of the pond and wet well above elevation 44.5 feet. Historical surveys and aerial photographs show that the water level stays above this elevation.

Storm water calculations are based on information provided by ARC, design drawings, and field observations. Inputs for the calculations are shown in **Table 1**, below.

TABLE 1 – Storm Water Calculation Inputs

Item	Input	Comments
25-year 24-hour Storm Event	8.74 inches (Attachment 3)	Type III storm event
Drainage Area	37.08 acres (Attachment 1)	Footprint of landfill, calculated using AutoCAD
Runoff Curve Number	82	Based on regional soil type and vegetation or cover

TABLE 1 – Storm Water Calculation Inputs (cont.)

Pumps	2 Gorman Rupp SF6D pumps (Attachment 4)	Assumed impeller size of 10.75 inches
Force Main Details	See Calculations (Attachment 5)	Elevations and sizes estimated from measurements taken on-site
Pump on/off switches	Both pumps on at elevation 44.5 feet	Assumed based on available historical surveys and aerial photographs

Rainfall data was obtained from the National Weather Service Precipitation Frequency Data Server. The point precipitation frequency estimates for the ARC mill are attached (**Attachment 3**). The force main calculations are separated based on pipe size and included in **Attachment 5**. Each pump has a 4 inch discharge that flows into a 4-inch by 10-inch increaser. The two 10-inch pipes then manifold into one 12-inch pipe. The force main is then 12-inches in diameter the distance to the discharge point at the equalization basin. Friction losses from pipe bends, and valves are calculated on the last sheet of the force main calculations worksheet (**Attachment 5**). The resulting storm water conveyance system capacity for the Landfill No. 50-03 is shown on Figure 2 (**Attachment 6**). The capacity of the system was calculated by plotting the pump curve provided by the manufacturer (**Attachment 4**) on the system curve and results in a peak capacity of 2,425 gallons per minute (gpm).

Calculations using storm water modeling software HydroCAD® show that a 25-year 24-hour storm event will produce 20.284 acre-feet of water at a peak flow of 151.66 cubic feet per second (cfs) or approximately 68,000 gpm. The total storage volume of the storm water pond is 4.708 acre-feet and the pumps can discharge 5.40 cfs or 2,425 gpm when both pumps are running. A hydrograph representing the 25-year 24-hour storm event for the Landfill No. 50-03 storm water pond is presented on Figure 3 (**Attachment 7**). The area under the hydrograph curve represents the volume of water produced by the storm event. The amount of storage volume required to manage the storm event can be calculated by plotting the pump discharge (5.40 cfs) on the hydrograph and calculating the area under the hydrograph curve above the pump discharge line. The 25-year 24-hour storm event requires approximately 13.75 acre-feet of storage. The landfill storm water pond holds 4.708 acre-feet and the total combined pumping capacity is 2,425 gpm.

Based upon the calculation inputs and modeling results summarized above, and the storm water system configuration and infrastructure, the Landfill No. 50-03 storm water pond and pump station will not manage a 25-year 24-hour storm event.

Attachments:

- Att 1 Figure 1 – Landfill No. 50-03 Drainage Area
- Att 2 Pump Well Design Drawing by Parsons & Whittemore
- Att 3 NOAA Point Precipitation Frequency Estimates
- Att 4 Manufacturer Pump Curve
- Att 5 Force Main Calculations



Att 6 Figure 2 – Pump Operating Points

Att 7 Figure 3 – 25-year 24-hour Storm Event



EXISTING TOPOGRAPHY PROVIDED BY:

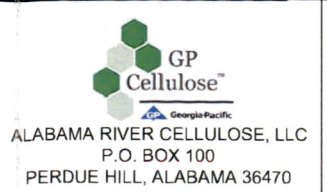


345 STONERIDGE WAY FAYETTEVILLE, GEORGIA 30215
WWW.GPSHILL.COM 678-977-2947 GPS.HILL@GMAIL.COM
DATE OF PHOTOGRAPHY: MARCH 06, 2015

VIEWPORT SCALE: 1" = 200'



100 0 100 200
IN FEET
148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA 29601
PHONE 864-421-9999
WWW.SYNTERRACORP.COM
DRAWN BY: LINDA BUCK
PROJECT MANAGER: NICK DAVIS
LAYOUT: 11X17 DRAINAGE AREA
PLOTTED: 01/16/2019 at 1:53 PM



ALABAMA RIVER CELLULOSE, LLC
P.O. BOX 100
PERDUE HILL, ALABAMA 36470

FIGURE 1
DRAINAGE AREA
LANDFILL NO. 50-03



NOAA Atlas 14, Volume 9, Version 2
Location name: **Monroeville, Alabama, USA***
Latitude: **31.5759°, Longitude: -87.4852°**
Elevation: **60.55 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeries](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.532 (0.427-0.656)	0.603 (0.485-0.745)	0.718 (0.575-0.890)	0.811 (0.646-1.01)	0.935 (0.719-1.20)	1.03 (0.774-1.34)	1.12 (0.815-1.50)	1.21 (0.845-1.68)	1.32 (0.891-1.90)	1.40 (0.926-2.06)
10-min	0.778 (0.626-0.960)	0.884 (0.710-1.09)	1.05 (0.842-1.30)	1.19 (0.946-1.48)	1.37 (1.05-1.76)	1.50 (1.13-1.97)	1.64 (1.19-2.20)	1.77 (1.24-2.46)	1.93 (1.31-2.78)	2.05 (1.36-3.02)
15-min	0.949 (0.763-1.17)	1.08 (0.866-1.33)	1.28 (1.03-1.59)	1.45 (1.15-1.80)	1.67 (1.28-2.14)	1.84 (1.38-2.40)	2.00 (1.46-2.69)	2.15 (1.51-3.00)	2.35 (1.59-3.39)	2.50 (1.65-3.68)
30-min	1.39 (1.12-1.72)	1.59 (1.28-1.96)	1.91 (1.53-2.36)	2.16 (1.72-2.69)	2.49 (1.92-3.20)	2.74 (2.07-3.58)	2.98 (2.17-4.01)	3.22 (2.26-4.47)	3.52 (2.38-5.06)	3.73 (2.47-5.49)
60-min	1.84 (1.48-2.26)	2.08 (1.67-2.56)	2.49 (1.99-3.08)	2.84 (2.26-3.54)	3.35 (2.59-4.35)	3.76 (2.84-4.96)	4.18 (3.06-5.68)	4.63 (3.26-6.49)	5.23 (3.55-7.58)	5.71 (3.78-8.41)
2-hr	2.28 (1.85-2.79)	2.56 (2.07-3.15)	3.07 (2.47-3.78)	3.53 (2.83-4.38)	4.21 (3.29-5.46)	4.77 (3.65-6.29)	5.38 (3.98-7.29)	6.03 (4.29-8.44)	6.95 (4.76-10.0)	7.69 (5.12-11.3)
3-hr	2.55 (2.07-3.11)	2.85 (2.31-3.48)	3.41 (2.76-4.18)	3.95 (3.18-4.87)	4.79 (3.78-6.24)	5.51 (4.24-7.27)	6.30 (4.69-8.56)	7.18 (5.14-10.1)	8.45 (5.82-12.2)	9.49 (6.34-13.8)
6-hr	3.05 (2.49-3.69)	3.41 (2.78-4.14)	4.11 (3.35-5.01)	4.81 (3.90-5.89)	5.93 (4.74-7.73)	6.92 (5.38-9.13)	8.03 (6.03-10.9)	9.26 (6.68-12.9)	11.1 (7.69-15.9)	12.6 (8.45-18.2)
12-hr	3.59 (2.95-4.32)	4.07 (3.35-4.91)	4.99 (4.09-6.04)	5.89 (4.80-7.16)	7.30 (5.86-9.43)	8.53 (6.66-11.1)	9.88 (7.47-13.3)	11.4 (8.27-15.8)	13.6 (9.49-19.4)	15.4 (10.4-22.1)
24-hr	4.14 (3.43-4.95)	4.77 (3.95-5.71)	5.94 (4.90-7.14)	7.04 (5.78-8.50)	8.74 (7.05-11.2)	10.2 (8.01-13.2)	11.8 (8.96-15.7)	13.6 (9.89-18.6)	16.1 (11.3-22.8)	18.1 (12.4-25.9)
2-day	4.71 (3.93-5.59)	5.43 (4.53-6.47)	6.78 (5.63-8.09)	8.05 (6.65-9.66)	10.0 (8.13-12.7)	11.7 (9.25-15.1)	13.5 (10.4-17.9)	15.6 (11.4-21.3)	18.5 (13.1-26.0)	20.9 (14.3-29.6)
3-day	5.11 (4.28-6.05)	5.83 (4.88-6.91)	7.19 (6.00-8.55)	8.49 (7.04-10.1)	10.5 (8.60-13.4)	12.3 (9.77-15.8)	14.3 (10.9-18.8)	16.4 (12.1-22.4)	19.5 (13.9-27.4)	22.1 (15.2-31.3)
4-day	5.47 (4.59-6.46)	6.17 (5.18-7.30)	7.52 (6.29-8.92)	8.83 (7.34-10.5)	10.9 (8.93-13.8)	12.7 (10.1-16.3)	14.7 (11.3-19.4)	16.9 (12.5-23.0)	20.1 (14.4-28.2)	22.8 (15.7-32.2)
7-day	6.40 (5.41-7.52)	7.12 (6.01-8.37)	8.49 (7.14-10.0)	9.80 (8.20-11.6)	11.9 (9.78-14.9)	13.7 (11.0-17.4)	15.7 (12.2-20.5)	17.9 (13.3-24.2)	21.2 (15.2-29.4)	23.8 (16.5-33.4)
10-day	7.21 (6.11-8.44)	7.96 (6.74-9.32)	9.36 (7.90-11.0)	10.7 (8.97-12.6)	12.7 (10.5-15.9)	14.5 (11.6-18.3)	16.5 (12.8-21.4)	18.6 (13.9-24.9)	21.7 (15.6-30.0)	24.2 (16.9-33.8)
20-day	9.47 (8.08-11.0)	10.4 (8.82-12.0)	11.9 (10.1-13.9)	13.2 (11.2-15.5)	15.2 (12.6-18.7)	16.9 (13.6-21.0)	18.6 (14.5-23.9)	20.5 (15.3-27.1)	23.1 (16.6-31.6)	25.1 (17.6-34.9)
30-day	11.4 (9.77-13.2)	12.4 (10.7-14.4)	14.2 (12.1-16.5)	15.7 (13.3-18.3)	17.8 (14.7-21.5)	19.4 (15.7-24.0)	21.1 (16.5-26.8)	22.9 (17.2-30.0)	25.3 (18.3-34.3)	27.1 (19.1-37.5)
45-day	13.9 (12.0-16.1)	15.3 (13.1-17.6)	17.4 (14.9-20.1)	19.1 (16.3-22.3)	21.5 (17.8-25.9)	23.4 (18.9-28.6)	25.2 (19.7-31.8)	27.0 (20.3-35.2)	29.4 (21.3-39.6)	31.2 (22.1-43.0)
60-day	16.2 (14.0-18.6)	17.8 (15.3-20.4)	20.3 (17.5-23.4)	22.4 (19.1-26.0)	25.2 (20.8-30.1)	27.3 (22.1-33.2)	29.3 (23.0-36.8)	31.4 (24.6-40.7)	34.0 (26.4-45.6)	35.9 (25.4-49.3)

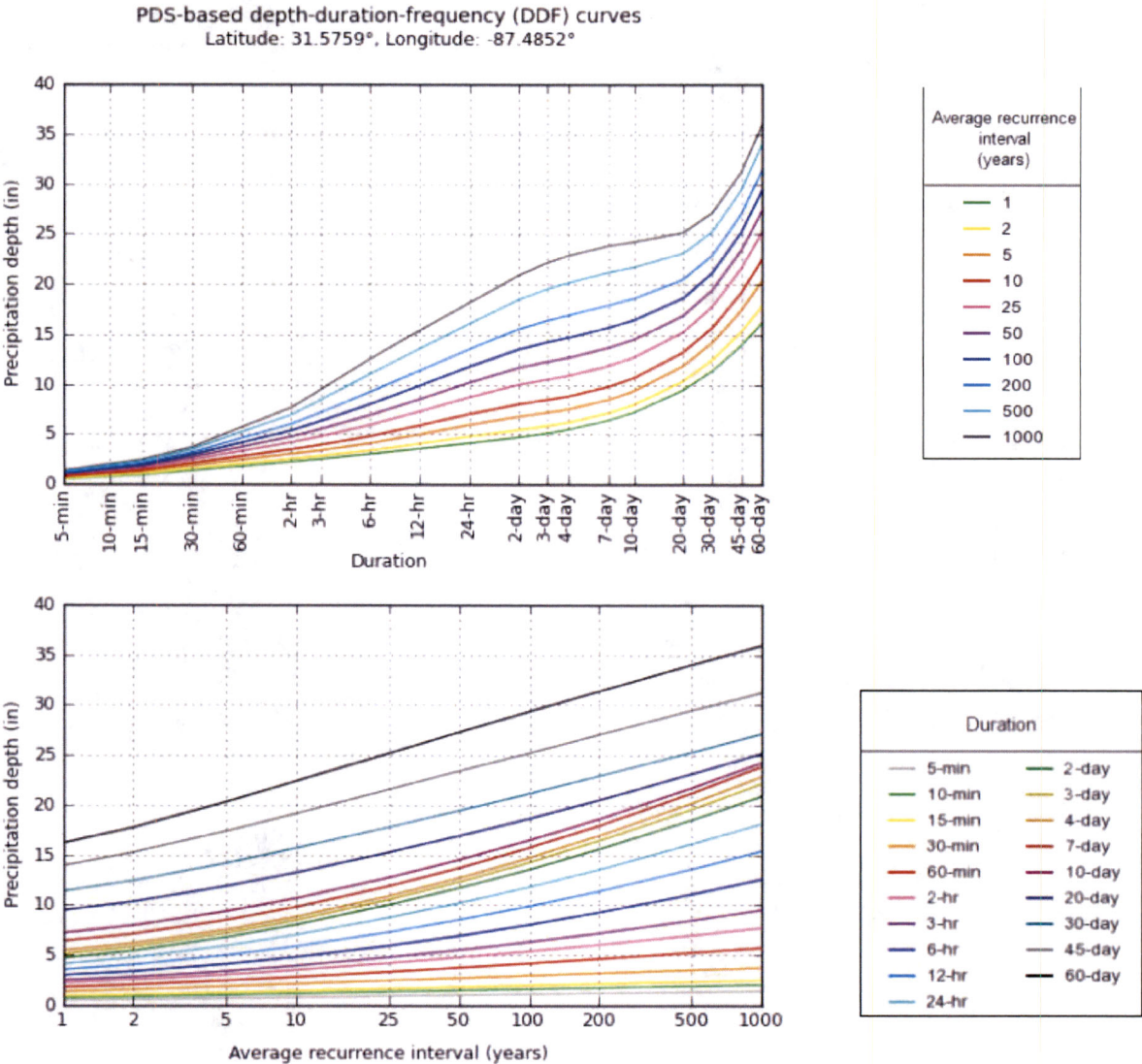
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

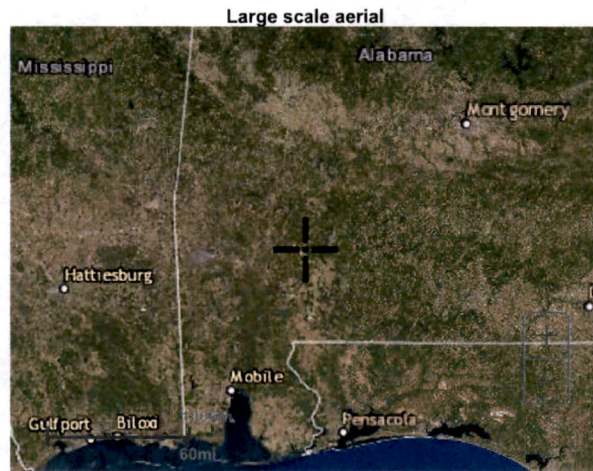
Please refer to NOAA Atlas 14 document for more information.

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PF graphical



Maps & aerals**Small scale terrain****Large scale terrain****Large scale map**



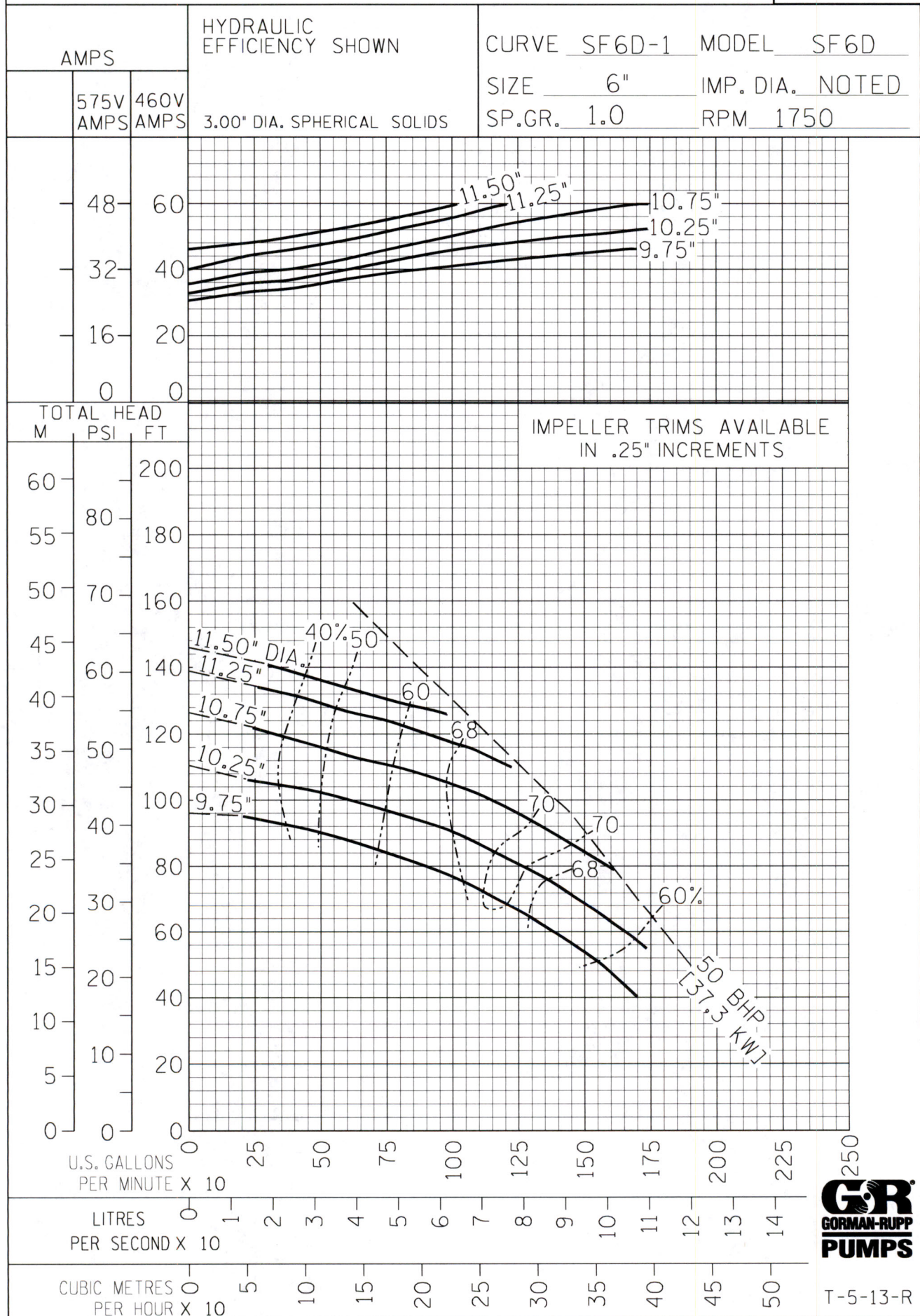
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PERFORMANCE CURVE

Attachment 4
Storm Water Calculations
Memorandum



FILE NO. SF6D.S01



T-5-13-R

ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

		Flowrate 1	Flowrate 2	Flowrate 3	Flowrate 4	Flowrate 5	Flowrate 6	Flowrate 7	Flowrate 8
	Flowrate (gpm) =	0	250	500	750	1,000	1,250	1,500	2,500
4" DIP (within Pump Station to 10")	Force Main Diameter (in.) =	4	4	4	4	4	4	4	4
	Velocity (ft/s) =	0.00	6.39	12.77	19.16	25.55	31.93	38.32	63.86
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	17	17	17	17	17	17	17	17
	Equivalent Length (from minor losses) (ft) =	12	12	12	12	12	12	12	12
	Total Length of Pressurized Pipe (ft) [Length of 4" DIP + Equivalent Length of Minor Losses] =	29	29	29	29	29	29	29	29
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	3.59	12.95	27.41	46.67	70.52	98.81	254.23
	Total Friction Head Loss (ft H ₂ O) =	0.00	1.03	3.73	7.89	13.44	20.31	28.46	73.22
10" DIP (from end of 4" to Manifold)	Force Main Diameter (in.) =	10	10	10	10	10	10	10	10
	Velocity (ft/s) =	0.00	1.02	2.04	3.07	4.09	5.11	6.13	10.22
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	6	6	6	6	6	6	6	6
	Equivalent Length (from minor losses) (ft) =	137	137	137	137	137	137	137	137
	Total Length of Pressurized Pipe (ft) [Length of 10" DIP + Equivalent Length of Minor Losses] =	143	143	143	143	143	143	143	143
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	0.04	0.15	0.32	0.54	0.82	1.14	2.94
	Total Friction Head Loss (ft H ₂ O) =	0.00	0.06	0.21	0.45	0.77	1.17	1.64	4.22

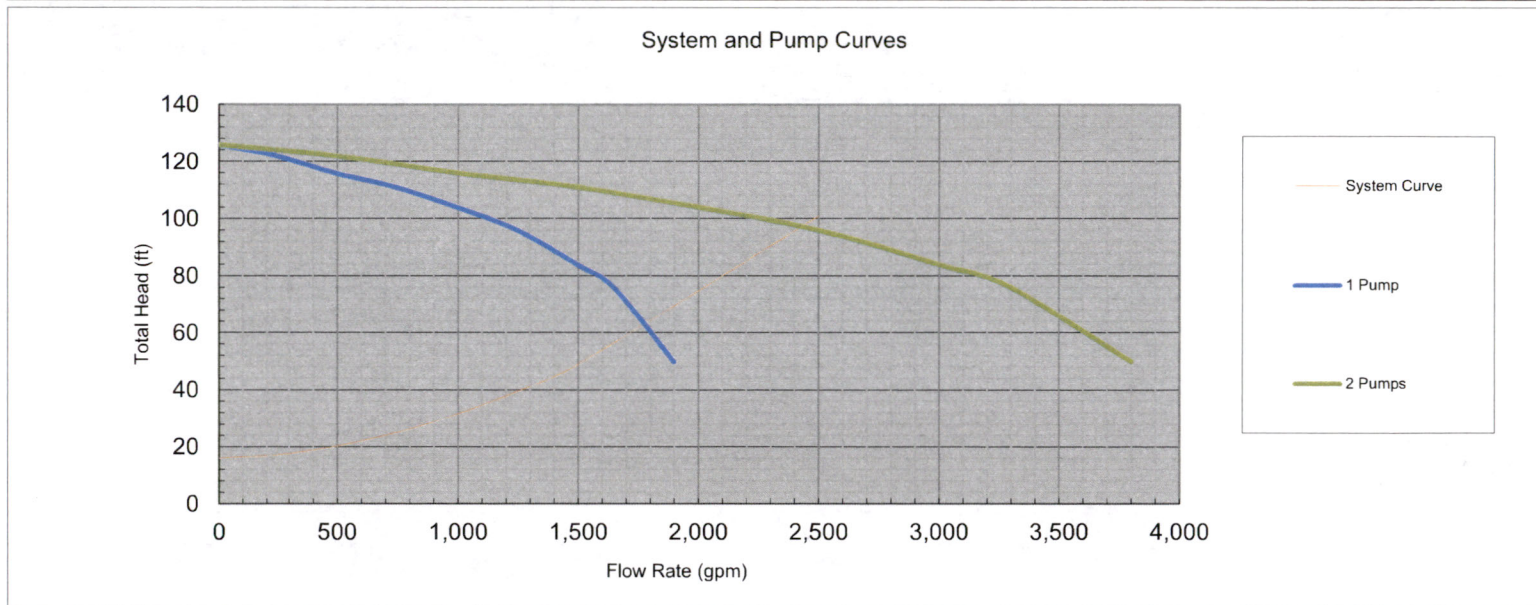
ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

12" DIP (from Manifold to Discharge)	Force Main Diameter (in.) =	12	12	12	12	12	12	12	12
	Velocity (ft/s) =	0.00	0.71	1.42	2.13	2.84	3.55	4.26	7.10
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	510	510	510	510	510	510	510	510
	Equivalent Length (from minor losses) (ft) =	107	107	107	107	107	107	107	107
	Total Length of Pressurized Pipe (ft) [Length of 12" DIP + Equivalent Length of Minor Losses] =	617	617	617	617	617	617	617	617
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	0.02	0.06	0.13	0.22	0.34	0.47	1.21
	Total Friction Head Loss (ft H ₂ O) =	0.00	0.11	0.38	0.81	1.37	2.08	2.91	7.48
High Water Level	Total Head (ft) [Total Static + Friction Head Loss] =	16	17	20	25	32	40	49	101

ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

Existing Pump

Flow (gpm)	0	250	500	750	1000	1250	1500	1650	1900
Flowrate of 2 Pumps (gpm) =	0	500	1000	1500	2000	2500	3000	3300	3800
Flowrate of 3 Pumps (gpm) =									
Flowrate of 4 Pumps (gpm) =									
Total Dynamic Head (ft) =	126	122	116	111	104	96	84	76	50



ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

4" DIP (within Pump Station to 10")	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	90 degree bend	2	0.33333333		5.9	11.8

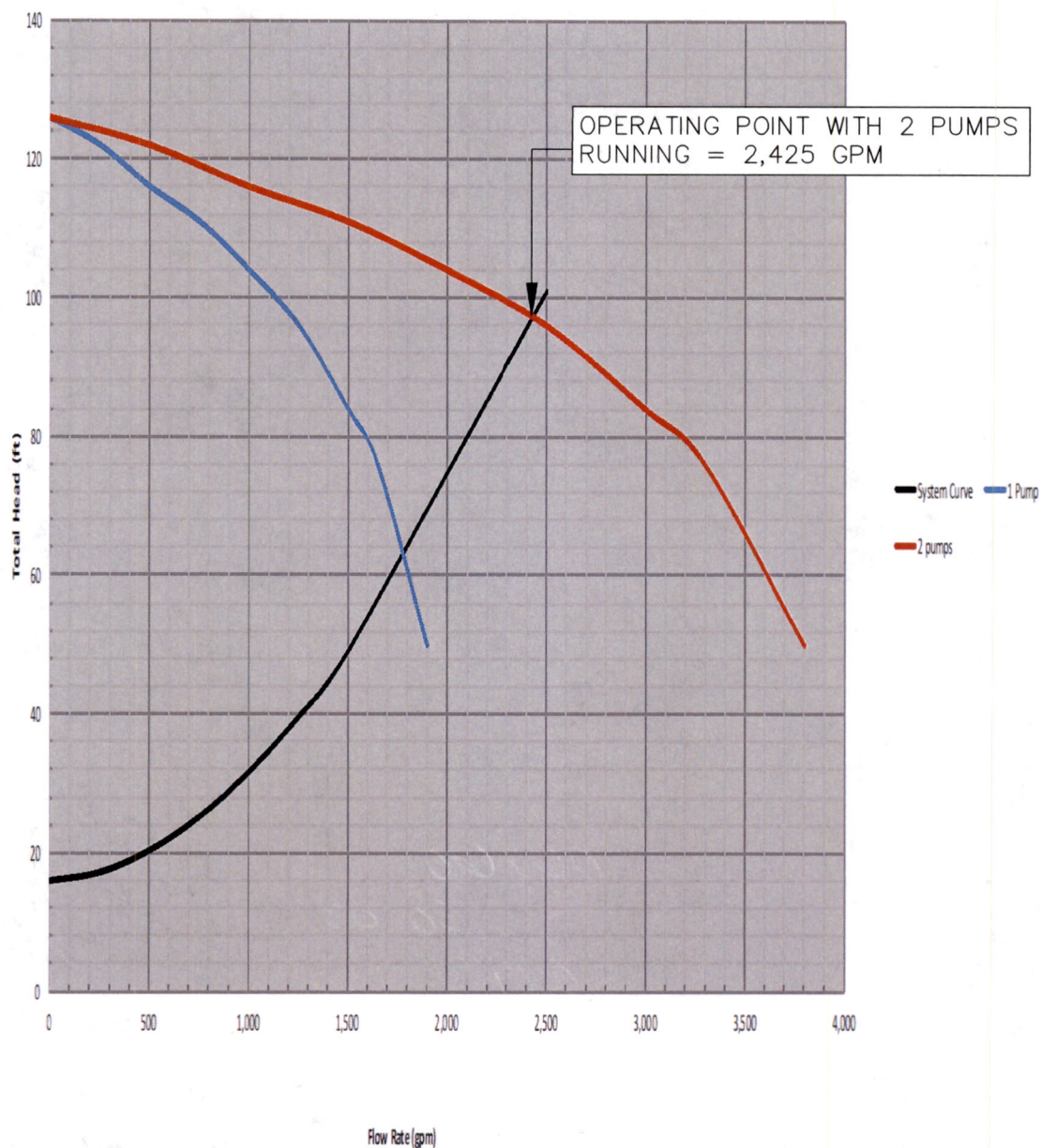
Total Equivalent Loss in Length (ft) 12

10" DIP (from end of 4" to Manifold)	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	Check Valve	1	0.833333		120	120
	Butterfly Valve	1	0.833333		3.2	3.2
	90 degree bend	1	0.833333		14	14

Total Equivalent Loss in Length (ft) 137

12" DIP (from Manifold to Discharge)	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	45 degree bend	2	1		11	22
	90 degree bend	5	1		17	85

Total Equivalent Loss in Length (ft) 107



SOURCE:
PUMP PERFORMANCE CURVES OBTAINED FROM GORMAN-RUPP PUMPS, FILE NO.
SF6D.S01.



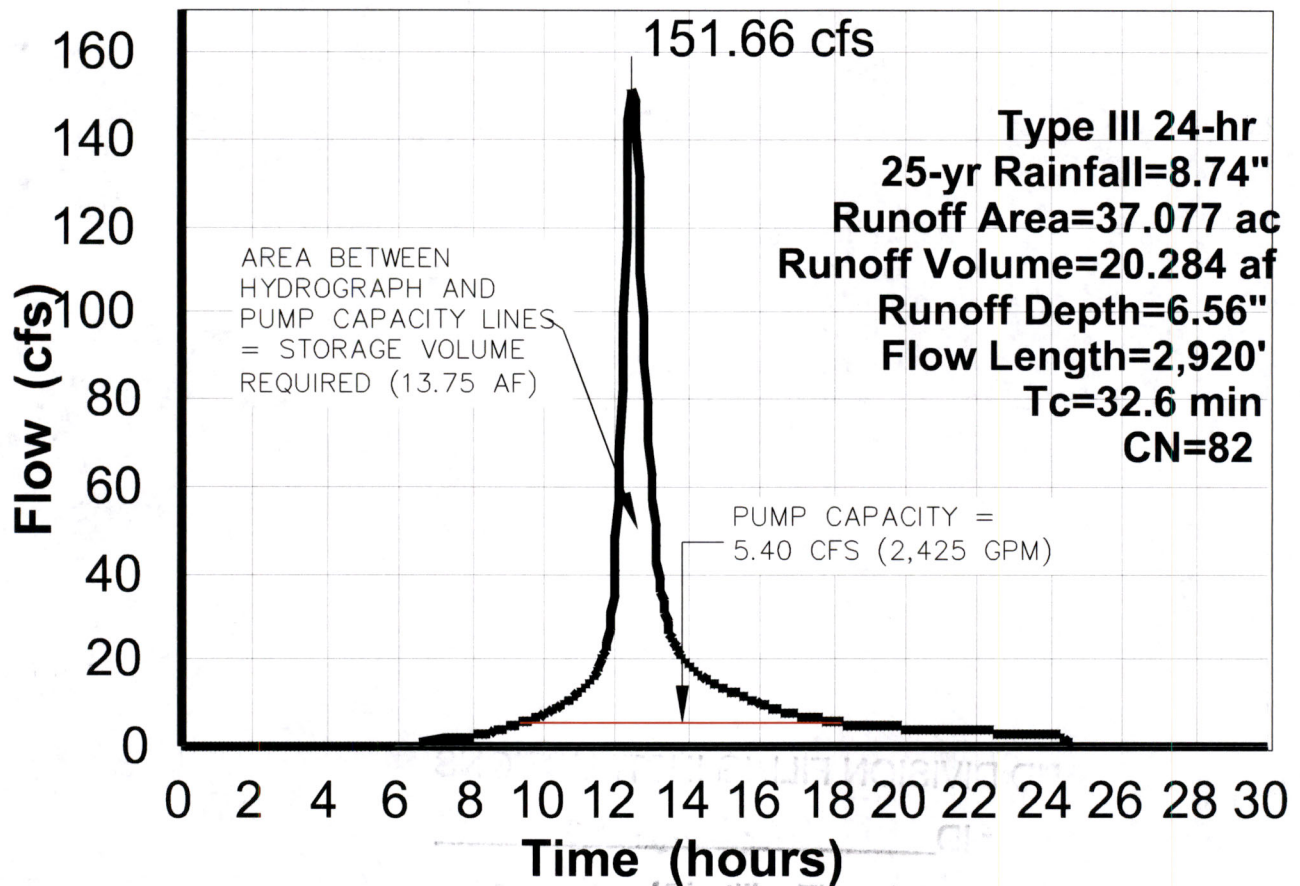
148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synTerracorp.com

FIGURE 2
PUMP OPERATING POINTS
LANDFILL NO. 50-03
ALABAMA RIVER CELLULOSE, LLC

DRAWN BY: NICK DAVIS
PROJECT MANAGER: M. MUDGE
LAYOUT: FIGURE 1

DATE: 11/30/2018
CONTOUR INTERVAL: N/A
MAP DATE: N/A

NOT TO SCALE



SOURCE:
HYDROGRAPH GENERATED USING HYDROCAD



148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synterracorp.com

**FIGURE 3
25-YEAR 24-HOUR STORM EVENT
LANDFILL NO. 50-03
ALABAMA RIVER CELLULOSE, LLC**

DRAWN BY: NICK DAVIS
PROJECT MANAGER: M. MUDGE
LAYOUT: FIGURE 2

DATE: 11/30/2018
CONTOUR INTERVAL: N/A
MAP DATE: N/A

NOT TO SCALE



MEMORANDUM

Date: February 15, 2019
To: Cody Austin
Cc: Matthew Mudge - SynTerra
From: Nicholas Davis, P.E.
Subject: Storm Water Calculations
Landfill Permit No. 50-03
Alabama River Cellulose, LLC



File: 383.16.01

As part of the permit renewal process for Landfill No. 50-03, the Alabama Department of Environmental Management (ADEM) requested storm water calculations modelling the 25-year 24-hour storm event for Landfill No. 50-03.

Landfill No. 50-03 is located in the south/central portion of the Alabama River Cellulose, LLC (ARC) mill. Figure 1 (**Attachment 1**) shows a 2015 topographic survey of the landfill with an aerial image in the background. A perimeter haul road surrounds the landfill. Storm water from the landfill is routed to a storm water pond via perimeter ditches.

The storm water pond is located at the southwest corner of the landfill and has a pump station with two 50 horsepower (HP) submersible pumps to convey storm water to the mill wastewater treatment system. The drainage area for the storm water pond is approximately 37 acres. The storm water pond drains into the pump station wet well and is then pumped to the wastewater treatment system equalization basin approximately 600 feet north and west of the landfill pump station.

Based on design drawings by Parsons and Whittemore dated 1994 (**Attachment 2**), the pond drains into the wet well at elevation 44.5 feet. Above elevation 44.5 feet there is nothing separating the wet well from the pond, meaning that the pumps would be pumping the entire volume of the pond and wet well above elevation 44.5 feet. Historical surveys and aerial photographs show that the water level stays above this elevation.

Storm water calculations are based on information provided by ARC, design drawings, and field observations. Inputs for the calculations are shown in **Table 1**, below.

TABLE 1 – Storm Water Calculation Inputs

Item	Input	Comments
25-year 24-hour Storm Event	8.74 inches (Attachment 3)	Type III storm event
Drainage Area	37.08 acres (Attachment 1)	Footprint of landfill, calculated using AutoCAD
Runoff Curve Number	82	Based on regional soil type and vegetation or cover

TABLE 1 – Storm Water Calculation Inputs (cont.)

Pumps	2 Gorman Rupp SF6D pumps (Attachment 4)	Assumed impeller size of 10.75 inches
Force Main Details	See Calculations (Attachment 5)	Elevations and sizes estimated from measurements taken on-site
Pump on/off switches	Both pumps on at elevation 44.5 feet	Assumed based on available historical surveys and aerial photographs

Rainfall data was obtained from the National Weather Service Precipitation Frequency Data Server. The point precipitation frequency estimates for the ARC mill are attached (Attachment 3). The force main calculations are separated based on pipe size and included in Attachment 5. Each pump has a 4 inch discharge that flows into a 4-inch by 10-inch increaser. The two 10-inch pipes then manifold into one 12-inch pipe. The force main is then 12-inches in diameter the distance to the discharge point at the equalization basin. Friction losses from pipe bends, and valves are calculated on the last sheet of the force main calculations worksheet (Attachment 5). The resulting storm water conveyance system capacity for the Landfill No. 50-03 is shown on Figure 2 (Attachment 6). The capacity of the system was calculated by plotting the pump curve provided by the manufacturer (Attachment 4) on the system curve and results in a peak capacity of 2,425 gallons per minute (gpm).

Calculations using storm water modeling software HydroCAD® show that a 25-year 24-hour storm event will produce 20.284 acre-feet of water at a peak flow of 151.66 cubic feet per second (cfs) or approximately 68,000 gpm. The total storage volume of the storm water pond is 4.708 acre-feet and the pumps can discharge 5.40 cfs or 2,425 gpm when both pumps are running. A hydrograph representing the 25-year 24-hour storm event for the Landfill No. 50-03 storm water pond is presented on Figure 3 (Attachment 7). The area under the hydrograph curve represents the volume of water produced by the storm event. The amount of storage volume required to manage the storm event can be calculated by plotting the pump discharge (5.40 cfs) on the hydrograph and calculating the area under the hydrograph curve above the pump discharge line. The 25-year 24-hour storm event requires approximately 13.75 acre-feet of storage. The landfill storm water pond holds 4.708 acre-feet and the total combined pumping capacity is 2,425 gpm.

Based upon the calculation inputs and modeling results summarized above, and the storm water system configuration and infrastructure, the Landfill No. 50-03 storm water pond and pump station will not manage a 25-year 24-hour storm event.

Attachments:

- Att 1 Figure 1 – Landfill No. 50-03 Drainage Area
- Att 2 Pump Well Design Drawing by Parsons & Whittemore
- Att 3 NOAA Point Precipitation Frequency Estimates
- Att 4 Manufacturer Pump Curve
- Att 5 Force Main Calculations



Att 6 Figure 2 – Pump Operating Points

Att 7 Figure 3 – 25-year 24-hour Storm Event



EXISTING TOPOGRAPHY PROVIDED BY:



345 STONERIDGE WAY FAYETTEVILLE, GEORGIA 30215
WWW.GPSHILL.COM 678-977-2947 GPS.HILL@GMAIL.COM

DATE OF PHOTOGRAPHY: MARCH 06, 2015

VIEWPORT SCALE: 1" = 200'



GRAPHIC SCALE
100 0 100 200
IN FEET
148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA 29601
PHONE 864-421-9999
WWW.SYNTERRACORP.COM
DRAWN BY: LINDA BUCK DATE: 12/3/2018
PROJECT MANAGER: NICK DAVIS
LAYOUT: 11X17 DRAINAGE AREA
PLOTTED: 01/16/2019 at 1:53 PM



ALABAMA RIVER CELLULOSE, LLC
P.O. BOX 100
PERDUE HILL, ALABAMA 36470

**FIGURE 1
DRAINAGE AREA
LANDFILL NO. 50-03**



NOAA Atlas 14, Volume 9, Version 2
Location name: **Monroeville, Alabama, USA***
Latitude: **31.5759°**, Longitude: **-87.4852°**
Elevation: **60.55 ft****
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.532 (0.427-0.656)	0.603 (0.485-0.745)	0.718 (0.575-0.890)	0.811 (0.646-1.01)	0.935 (0.719-1.20)	1.03 (0.774-1.34)	1.12 (0.815-1.50)	1.21 (0.845-1.68)	1.32 (0.891-1.90)	1.40 (0.926-2.06)
10-min	0.778 (0.626-0.960)	0.884 (0.710-1.09)	1.05 (0.842-1.30)	1.19 (0.946-1.48)	1.37 (1.05-1.76)	1.50 (1.13-1.97)	1.64 (1.19-2.20)	1.77 (1.24-2.46)	1.93 (1.31-2.78)	2.05 (1.36-3.02)
15-min	0.949 (0.763-1.17)	1.08 (0.866-1.33)	1.28 (1.03-1.59)	1.45 (1.15-1.80)	1.67 (1.28-2.14)	1.84 (1.38-2.40)	2.00 (1.46-2.69)	2.15 (1.51-3.00)	2.35 (1.59-3.39)	2.50 (1.65-3.68)
30-min	1.39 (1.12-1.72)	1.59 (1.28-1.96)	1.91 (1.53-2.36)	2.16 (1.72-2.69)	2.49 (1.92-3.20)	2.74 (2.07-3.58)	2.98 (2.17-4.01)	3.22 (2.26-4.47)	3.52 (2.38-5.06)	3.73 (2.47-5.49)
60-min	1.84 (1.48-2.26)	2.08 (1.67-2.56)	2.49 (1.99-3.08)	2.84 (2.26-3.54)	3.35 (2.59-4.35)	3.76 (2.84-4.96)	4.18 (3.06-5.68)	4.63 (3.26-6.49)	5.23 (3.55-7.58)	5.71 (3.78-8.41)
2-hr	2.28 (1.85-2.79)	2.56 (2.07-3.15)	3.07 (2.47-3.78)	3.53 (2.83-4.36)	4.21 (3.29-5.46)	4.77 (3.65-6.29)	5.38 (3.98-7.29)	6.03 (4.29-8.44)	6.95 (4.76-10.0)	7.69 (5.12-11.3)
3-hr	2.55 (2.07-3.11)	2.85 (2.31-3.48)	3.41 (2.76-4.18)	3.95 (3.18-4.87)	4.79 (3.78-6.24)	5.51 (4.24-7.27)	6.30 (4.69-8.56)	7.18 (5.14-10.1)	8.45 (5.82-12.2)	9.49 (6.34-13.8)
6-hr	3.05 (2.49-3.69)	3.41 (2.78-4.14)	4.11 (3.35-5.01)	4.81 (3.90-5.89)	5.93 (4.74-7.73)	6.92 (5.38-9.13)	8.03 (6.03-10.9)	9.26 (6.68-12.9)	11.1 (7.69-15.9)	12.6 (8.45-18.2)
12-hr	3.59 (2.95-4.32)	4.07 (3.35-4.91)	4.99 (4.09-6.04)	5.89 (4.80-7.16)	7.30 (5.86-9.43)	8.53 (6.66-11.1)	9.88 (7.47-13.3)	11.4 (8.27-15.8)	13.6 (9.49-19.4)	15.4 (10.4-22.1)
24-hr	4.14 (3.43-4.95)	4.77 (3.95-5.71)	5.94 (4.90-7.14)	7.04 (5.78-8.50)	8.74 (7.05-11.2)	10.2 (8.01-13.2)	11.8 (8.96-15.7)	13.6 (9.89-18.6)	16.1 (11.3-22.8)	18.1 (12.4-25.9)
2-day	4.71 (3.93-5.59)	5.43 (4.53-6.47)	6.78 (5.63-8.09)	8.05 (6.65-9.66)	10.0 (8.13-12.7)	11.7 (9.25-15.1)	13.5 (10.4-17.9)	15.6 (11.4-21.3)	18.5 (13.1-26.0)	20.9 (14.3-29.6)
3-day	5.11 (4.28-6.05)	5.83 (4.88-6.91)	7.19 (6.00-8.55)	8.49 (7.04-10.1)	10.5 (8.60-13.4)	12.3 (9.77-15.8)	14.3 (10.9-18.8)	16.4 (12.1-22.4)	19.5 (13.9-27.4)	22.1 (15.2-31.3)
4-day	5.47 (4.59-6.46)	6.17 (5.18-7.30)	7.52 (6.29-8.92)	8.83 (7.34-10.5)	10.9 (8.93-13.8)	12.7 (10.1-16.3)	14.7 (11.3-19.4)	16.9 (12.5-23.0)	20.1 (14.4-28.2)	22.8 (15.7-32.2)
7-day	6.40 (5.41-7.52)	7.12 (6.01-8.37)	8.49 (7.14-10.0)	9.80 (8.20-11.6)	11.9 (9.78-14.9)	13.7 (11.0-17.4)	15.7 (12.2-20.5)	17.9 (13.3-24.2)	21.2 (15.2-29.4)	23.8 (16.5-33.4)
10-day	7.21 (6.11-8.44)	7.96 (6.74-9.32)	9.36 (7.90-11.0)	10.7 (8.97-12.6)	12.7 (10.5-15.9)	14.5 (11.6-18.3)	16.5 (12.8-21.4)	18.6 (13.9-24.9)	21.7 (15.6-30.0)	24.2 (16.9-33.8)
20-day	9.47 (8.08-11.0)	10.4 (8.82-12.0)	11.9 (10.1-13.9)	13.2 (11.2-15.5)	15.2 (12.6-18.7)	16.9 (13.6-21.0)	18.6 (14.5-23.9)	20.5 (15.3-27.1)	23.1 (16.6-31.6)	25.1 (17.6-34.9)
30-day	11.4 (9.77-13.2)	12.4 (10.7-14.4)	14.2 (12.1-16.5)	15.7 (13.3-18.3)	17.8 (14.7-21.5)	19.4 (15.7-24.0)	21.1 (16.5-26.8)	22.9 (17.2-30.0)	25.3 (18.3-34.3)	27.1 (19.1-37.5)
45-day	13.9 (12.0-16.1)	15.3 (13.1-17.6)	17.4 (14.9-20.1)	19.1 (16.3-22.3)	21.5 (17.8-25.9)	23.4 (18.9-28.6)	25.2 (19.7-31.8)	27.0 (20.3-35.2)	29.4 (21.3-39.6)	31.2 (22.1-43.0)
60-day	16.2 (14.0-18.6)	17.8 (15.3-20.4)	20.3 (17.5-23.4)	22.4 (19.1-26.0)	25.2 (20.8-30.1)	27.3 (22.1-33.2)	29.3 (23.0-36.8)	31.4 (23.6-40.7)	34.0 (24.6-45.6)	35.9 (25.4-49.3)

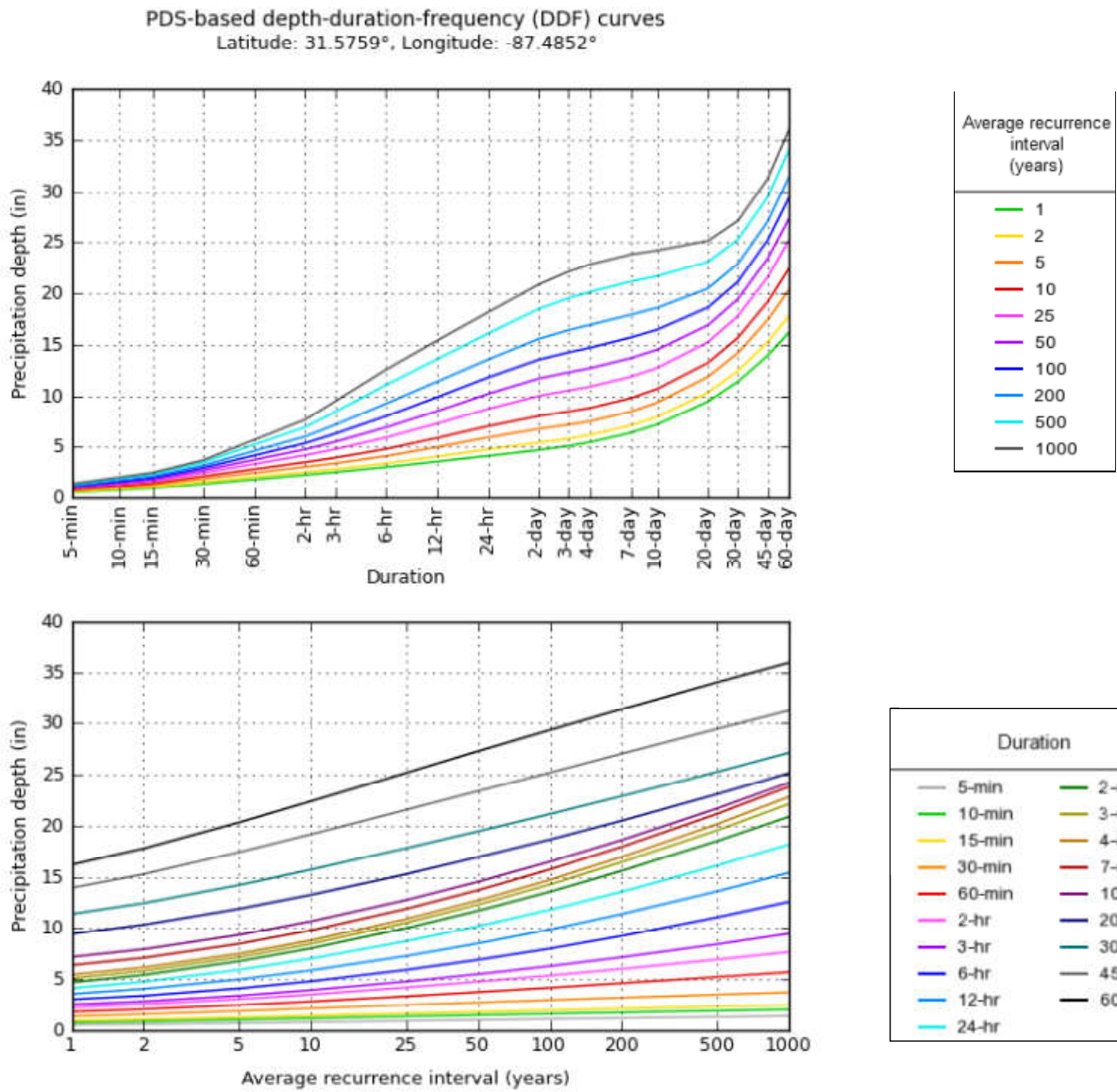
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical



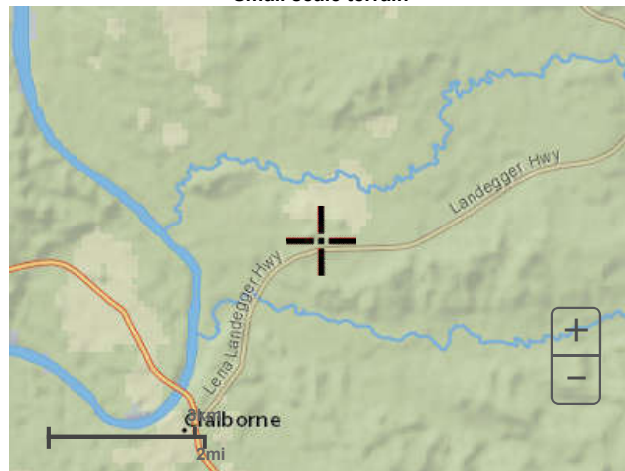
NOAA Atlas 14, Volume 9, Version 2

Created (GMT): Mon Dec 3 21:25:34 2018

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Maps & aerals

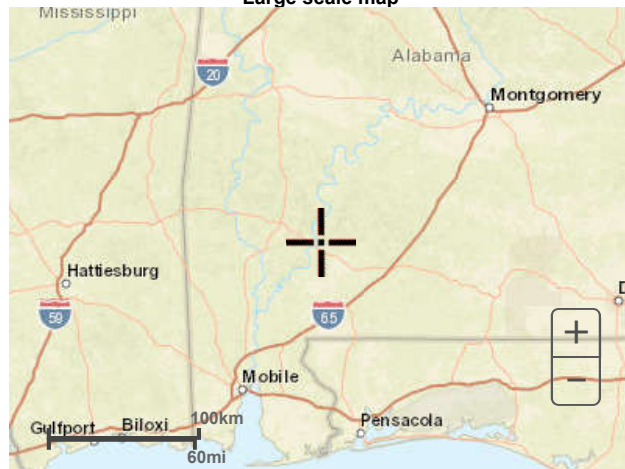
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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Questions?: HDSC.Questions@noaa.gov

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PERFORMANCE CURVE

Attachment 4
Storm Water Calculations
Memorandum

AMPS

HYDRAULIC
EFFICIENCY SHOWN

CURVE SF6D-1 MODEL SF6D

575V
AMPS

460V
AMPS

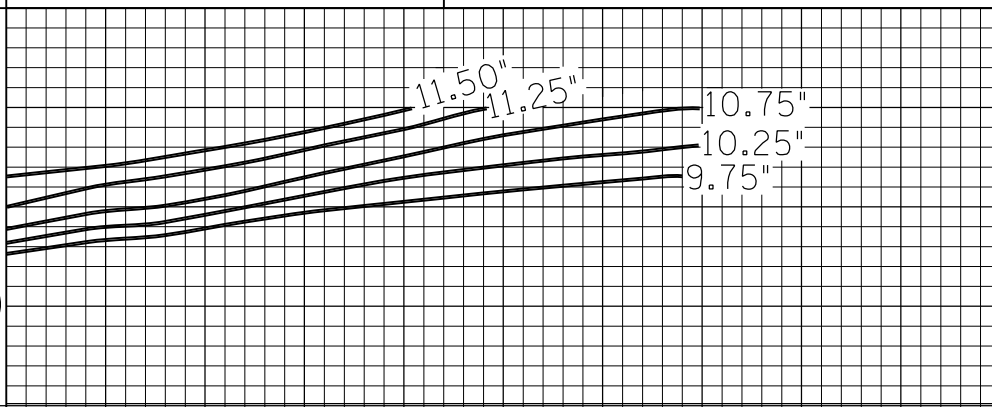
3.00" DIA. SPHERICAL SOLIDS

SIZE 6" IMP. DIA. NOTED

SP.GR. 1.0 RPM 1750

48
32
16
0

60
40
20
0

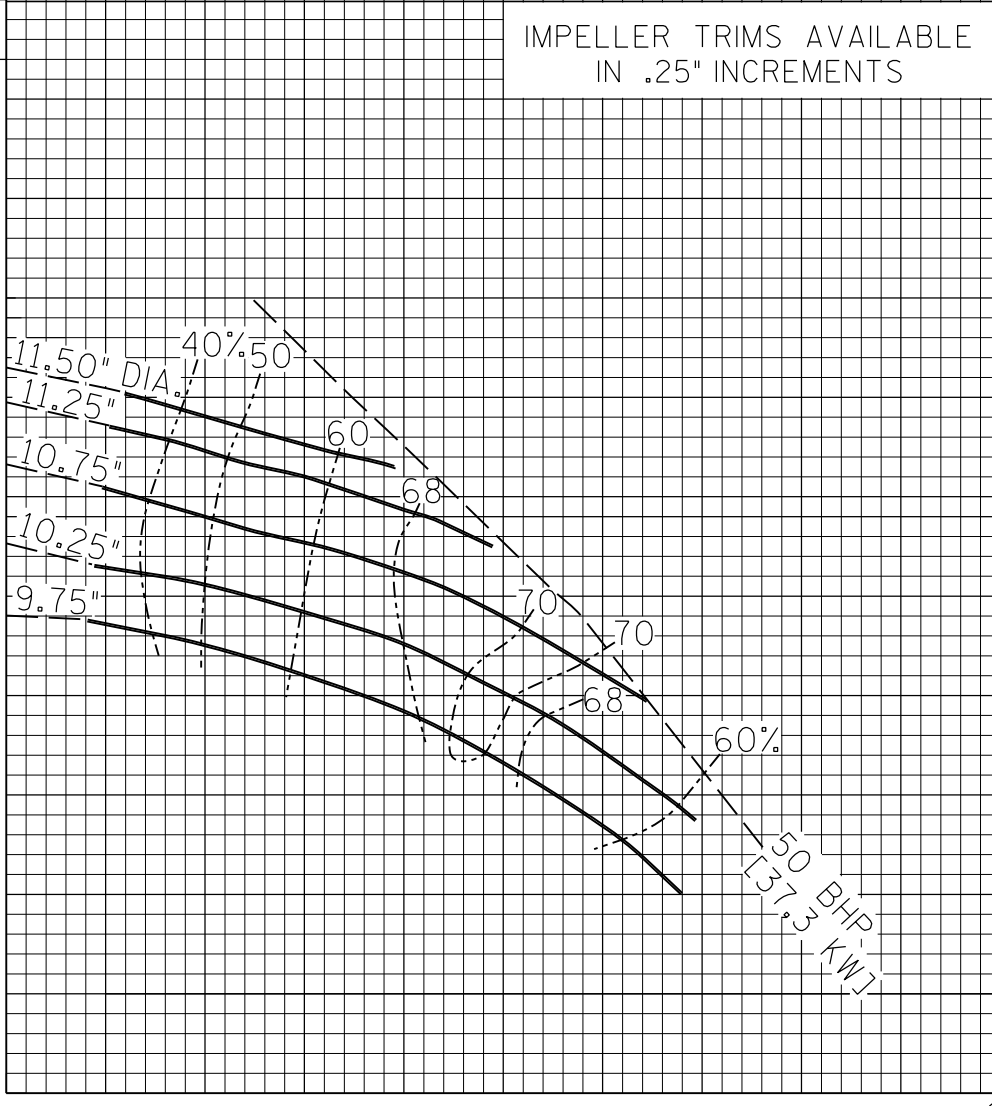


TOTAL HEAD
M PSI FT

IMPELLER TRIMS AVAILABLE
IN .25" INCREMENTS

60
55
50
45
40
35
30
25
20
15
10
5
0

200
180
160
140
120
100
80
60
40
20
0



U.S. GALLONS
PER MINUTE X 10

LITRES
PER SECOND X 10

CUBIC METRES
PER HOUR X 10

0 25 50 75 100 125 150 175 200 225 250



T-5-13-R

ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

		Flowrate 1	Flowrate 2	Flowrate 3	Flowrate 4	Flowrate 5	Flowrate 6	Flowrate 7	Flowrate 8
	Flowrate (gpm) =	0	250	500	750	1,000	1,250	1,500	2,500
4" DIP (within Pump Station to 10")	Force Main Diameter (in.) =	4	4	4	4	4	4	4	4
	Velocity (ft/s) =	0.00	6.39	12.77	19.16	25.55	31.93	38.32	63.86
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	17	17	17	17	17	17	17	17
	Equivalent Length (from minor losses) (ft) =	12	12	12	12	12	12	12	12
	Total Length of Pressurized Pipe (ft) [Length of 4" DIP + Equivalent Length of Minor Losses] =	29	29	29	29	29	29	29	29
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	3.59	12.95	27.41	46.67	70.52	98.81	254.23
	Total Friction Head Loss (ft H ₂ O) =	0.00	1.03	3.73	7.89	13.44	20.31	28.46	73.22
10" DIP (from end of 4" to Manifold)	Force Main Diameter (in.) =	10	10	10	10	10	10	10	10
	Velocity (ft/s) =	0.00	1.02	2.04	3.07	4.09	5.11	6.13	10.22
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	6	6	6	6	6	6	6	6
	Equivalent Length (from minor losses) (ft) =	137	137	137	137	137	137	137	137
	Total Length of Pressurized Pipe (ft) [Length of 10" DIP + Equivalent Length of Minor Losses] =	143	143	143	143	143	143	143	143
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	0.04	0.15	0.32	0.54	0.82	1.14	2.94
	Total Friction Head Loss (ft H ₂ O) =	0.00	0.06	0.21	0.45	0.77	1.17	1.64	4.22

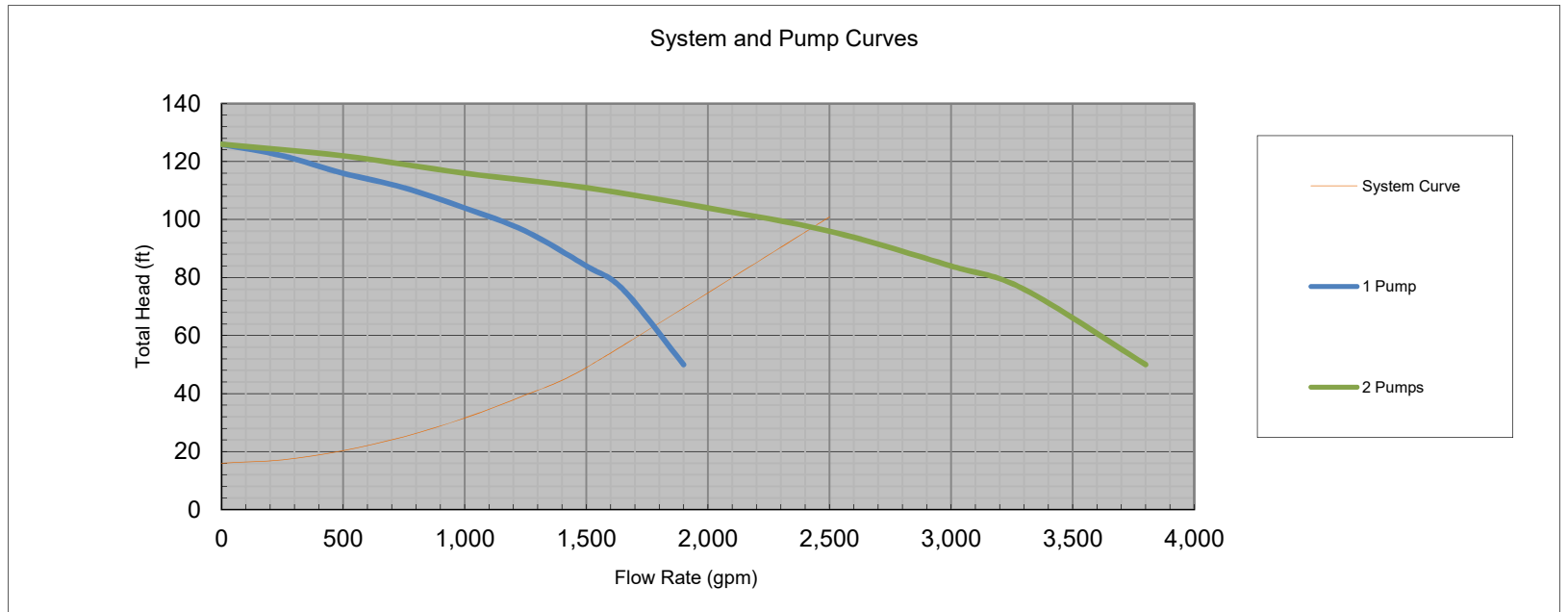
ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

12" DIP (from Manifold to Discharge)	Force Main Diameter (in.) =	12	12	12	12	12	12	12	12
	Velocity (ft/s) =	0.00	0.71	1.42	2.13	2.84	3.55	4.26	7.10
	Hazen and Williams Coefficient of Friction C	140	140	140	140	140	140	140	140
	Length of Pipe (ft) =	510	510	510	510	510	510	510	510
	Equivalent Length (from minor losses) (ft) =	107	107	107	107	107	107	107	107
	Total Length of Pressurized Pipe (ft) [Length of 12" DIP + Equivalent Length of Minor Losses] =	617	617	617	617	617	617	617	617
	Friction Head Loss per 100 ft (ft H ₂ O / 100 ft pipe) =	0.00	0.02	0.06	0.13	0.22	0.34	0.47	1.21
	Total Friction Head Loss (ft H ₂ O) =	0.00	0.11	0.38	0.81	1.37	2.08	2.91	7.48
High Water Level	Total Head (ft) [Total Static + Friction Head Loss] =	16	17	20	25	32	40	49	101

ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

Existing Pump

Flow (gpm)	0	250	500	750	1000	1250	1500	1650	1900
Flowrate of 2 Pumps (gpm) =	0	500	1000	1500	2000	2500	3000	3300	3800
Flowrate of 3 Pumps (gpm) =									
Flowrate of 4 Pumps (gpm) =									
Total Dynamic Head (ft) =	126	122	116	111	104	96	84	76	50

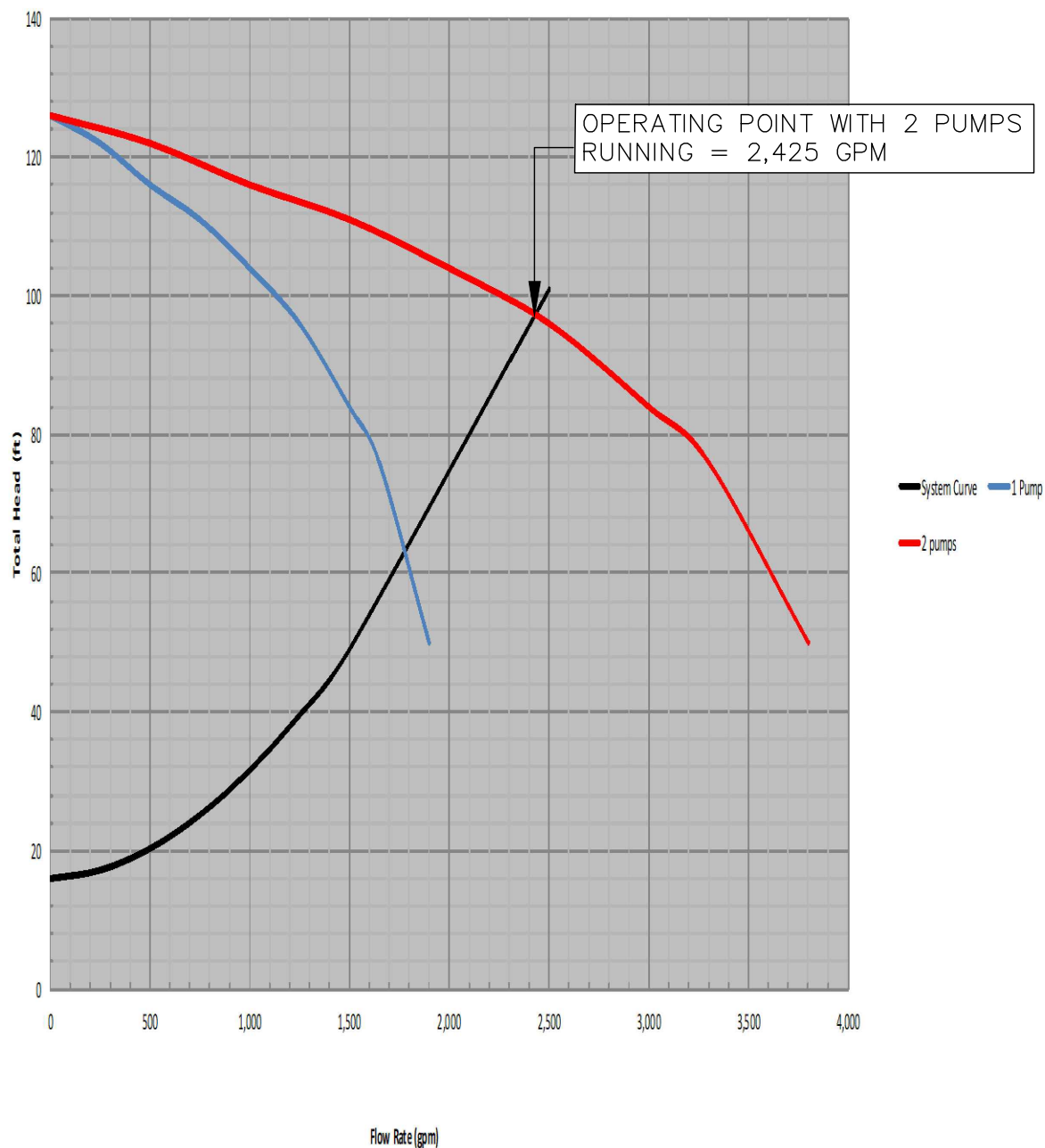


ATTACHMENT 5
EXISTING FORCE MAIN CALCULATIONS
ALABAMA RIVER CELLULOSE, LLC - LANDFILL NO. 50-03

4" DIP (within Pump Station to 10")	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	90 degree bend	2	0.333333333		5.9	11.8
Total Equivalent Loss in Length (ft)						12

10" DIP (from end of 4" to Manifold)	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	Check Valve	1	0.833333		120	120
	Butterfly Valve	1	0.833333		3.2	3.2
	90 degree bend	1	0.833333		14	14
Total Equivalent Loss in Length (ft)						137

12" DIP (from Manifold to Discharge)	Item	Amount	Pipe Size (ft)	(L/D)eq	Leq (ft)	Total Loss (ft)
	45 degree bend	2	1		11	22
	90 degree bend	5	1		17	85
Total Equivalent Loss in Length (ft)						107



SOURCE:
PUMP PERFORMANCE CURVES OBTAINED FROM GORMAN-RUPP PUMPS, FILE NO.
SF6D.S01.



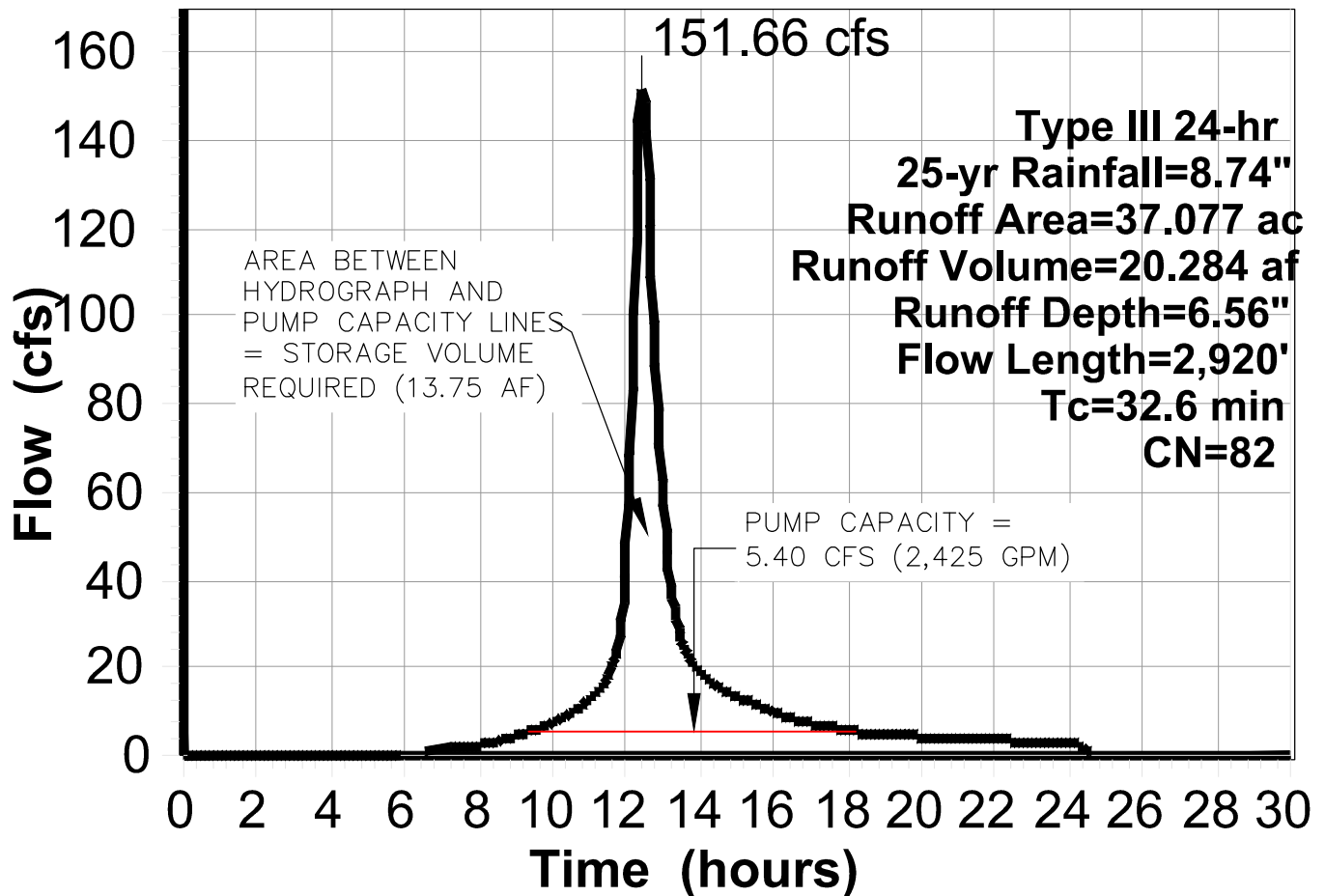
148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synterracorp.com

FIGURE 1
PUMP OPERATING POINTS
LANDFILL NO. 50-03
ALABAMA RIVER CELLULOSE LLC

DRAWN BY: NICK DAVIS
PROJECT MANAGER: M. MUDGE
LAYOUT: FIGURE 1

DATE: 11/30/2018
CONTOUR INTERVAL: N/A
MAP DATE: N/A

NOT TO SCALE



SOURCE:
HYDROGRAPH GENERATED USING HYDROCAD



148 RIVER STREET, SUITE 220
GREENVILLE, SOUTH CAROLINA
PHONE 864-421-9999
www.synterracorp.com

FIGURE 3
25-YEAR 24-HOUR STORM EVENT
LANDFILL NO. 50-03
ALABAMA RIVER CELLULOSE, LLC

DRAWN BY: NICK DAVIS
PROJECT MANAGER: M. MUDGE
LAYOUT: FIGURE 2

DATE: 11/30/2018
CONTOUR INTERVAL: N/A
MAP DATE: N/A

NOT TO SCALE

P:\VRP_383\16.LF No 50-03\01.Supplemental Info For Permit Renewal\DWG\Hydrographs.dwg

NOTES:

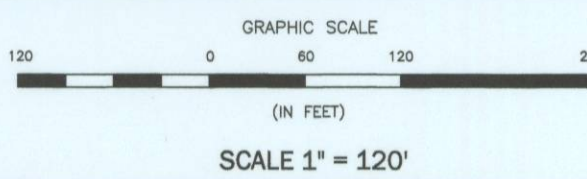
1. PROPERTY LINE BASED ON INFORMATION OBTAINED FROM A DEED FILED ON JUNE 29, 1990, IN THE PROBATE OFFICE OF MONROE COUNTY, ALABAMA. DEED LOCATED IN BOOK 387, PAGE 98.
2. TOPOGRAPHY PROVIDED BY:
GARLAND PHOTOGRAMMETRIC SERVICES,
FAYETTEVILLE, GEORGIA, BASED UPON AERIAL PHOTOGRAPH TAKEN ON MARCH 05, 2015.
- ALABAMA RIVER CELLULOSE, BASED UPON A GROUND SURVEY PERFORMED BY CIVIL ENGINEERING RESOURCES GROVE HILL, ALABAMA, DATED AUGUST 22, 2005.
3. PLANIMETRIC DATA SHOWN TAKEN FROM USGS TOPOGRAPHICAL MAP #31087-E4-TF-024, DATED 1972, MEXIA, ALABAMA QUADRANGLE USING PHOTOGRAMMETRICAL METHODS. ADDITIONAL REVISIONS AND WOODLAND AREAS PHOTO REVISED IN 1986.

LEGEND:

- MW-6 46.07 EXIST. MONITORING WELL LOCATION
- 46.07 WATER LEVEL IN FEET (msl.)
- MW-4 EQ BASIN MONITORING WELL
- PROPERTY LINE
- POWER LINE
- SURFACE WATER DRAINAGE PATH
- SURFACE WATER FLOW DIRECTION
- COMPLIANCE BOUNDARY
- PERMITTED WASTE DISPOSAL BOUNDARY
- 100 FOOT BUFFER

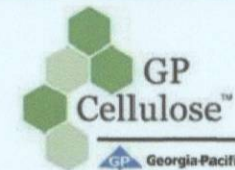
ISSUED FOR PERMITTING

REV.	DATE	DESCRIPTION	CCN	MSM	MSM
A	10/12/2018	FOR REGULATORY REVIEW	CCN	MSM	MSM



148 River Street, Suite 220
Greenville, South Carolina 29601
864-421-9999
www.synterracorp.com

DRAWN BY: C. NEWELL DATE: 10/12/2018
CHECKED BY: M. MUDGE DATE: 10/12/2018
PROJECT MANAGER: M. MUDGE
LAYOUT NAME: FIG 1 (100 FOOT BUFFER)



ALABAMA RIVER CELLULOSE, LLC
P.O. BOX 100
PERDUE HILL, ALABAMA 36470

FIGURE 1
PERMITTED WASTE DISPOSAL
BOUNDARY AND 100 FOOT
BUFFER ZONE
INDUSTRIAL LANDFILL PERMIT
NO. 50-03
PERMIT RENEWAL

