OPERATIONS PLAN

PLANT WANSLEY
COAL COMBUSTION RESIDUALS
(CCR) LANDFILL
HEARD COUNTY, GEORGIA

FOR

Georgia Power

SEPTEMBER 2022

REVISED OCTOBER 2024

HHNT
HODGES, HARBIN, NEWBERRY & TRIBBLE, INC.
Consulting Engineers

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
Approved
Solid Waste Management Program
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TABLE OF CONTENTS

1. GENERAL SITE INFORMATION 1

A. Volumes and Estimated Life 1
B. Coal Combustion Residuals (CCRs) Description 1
C. Zoning 2
D. Buffers 2
E. Site Survey Control 3
F. Limited Access 3
G. Posted Information 3
H. Communication 3
I. First Aid 3
J. Employee Facilities 3

2. OPERATIONAL PROCEDURES 4

A. Supervision 4
B. Exclusion of Prohibited Wastes 4
C. Prohibited Acts 4
D. Erosion and Sediment Control 4
E. Access Roads 4
F. Fire Protection 5
G. Site Equipment 5
H. Recovered Materials Processing Operations 5
I. Controlled Unloading of Waste 6
J. Solid Waste Processing Operations 6
K. Waste Requiring Special Handling 6
L. Spreading, Compaction and Stability 6
M. Daily and Intermediate Cover 8
N. Disease Vector Control 8
O. Litter Control 8
P. Dust Control 8
Q. Explosive Gas Control (Methane Gas) 9
R. Run-On/Run-Off Control 9
S. Surface Water Requirements 10
T. Final Grading 10
U. Vegetation 10
V. Continuity of Operation 11

3. ENVIRONMENTAL PROTECTION 12

A. Inspections 12
B. Annual Reporting 13
C. Ponds with Leak Detection Systems (Sedimentation Ponds / Clear Pool Pond) 13
D. Groundwater and Surface Water Monitoring Plan 13

4. RECORDKEEPING, NOTIFICATION, AND PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS 14

A. Recordkeeping 14
B. Notification and Internet Posting Requirements. 15
C. Measuring and Reporting Requirements 15

5. SITE LIMITATIONS (APPROVED JANUARY 26, 2018) 16

APPENDIX

Appendix A - Periodic Run-On and Run-Off Control Plan [391-3-4-.10(5) and 40. C.F.R. Part 257.81] Plant Wansley Coal Combustion By-Product Private Industrial Solid Waste Disposal Facility (Plant Wansley Gypsum Landfill), Georgia Power Company, Dated 10/15/21

Appendix B - Report of Laboratory Testing Results, Water Treatment Residual Material Mixes, prepared by Bunnell Lammons Engineering, Inc., dated 07/22/21

1. GENERAL SITE INFORMATION

This Operations Plan was developed to meet the requirements set forth in Rule 391-3-4-.10 (5)(a) of the Georgia Solid Waste Rules & Regulations (CCR Rules) which address the Operation Criteria of Coal Combustion Residuals (CCR) Landfills.

A. Volumes and Estimated Life

The total area of the Plant Wansley Coal Combustion Residuals (CCR) Landfill is 325 acres (within site boundary), with 77.93 acres currently being permitted and used for CCR disposal. The waste disposal area is divided into 3 cells. Cells 1, 2 and 3 are designed for and may receive gypsum and other CCR materials as defined in Section B of this plan. The CCR disposal and soil volumes required to close each cell are as follows:

				FINAL COVER[2]					
	CCR Volume (CY)	***LIFE[1] (YRS)***	***2-D Cell Area (AC)***	***2-D Closure Area (AC)***	***18" PROT. COVER SOIL (CY)***	***6" TOPSOIL (CY)***	***40 MIL LLDPE (SY)***	***GEO-COMPOSITE (SY)***	***18" 10^{-5} SOIL (CY)***
Cell 1 CCR Disposal	2,287,400	4.2	30.34	18.41	44,552	14,851	89,104	89,104	44,552
Cell 2 CCR Disposal	3,274,700	6	30.90	42.83	103,649	34,550	207,297	207,297	103,649
Cell 3 CCR Disposal	1,214,000[3]	2.2	16.69	16.69	40,390	13,463	80,780	80,780	40,390
TOTAL	6,776,100	12.4	77.93	77.93	188,591	62,864	377,181	377,181	188,591

Notes:
[1] The disposal life of the landfill is based on a projected average annual disposal rate of: 675,955 tons/year or 544,619 cy/year. The actual site life may differ depending on the amount of gypsum and other CCR disposed of, and the amount removed from the site for beneficial use.
[2] Closure areas are used to estimate the amount of soil and geosynthetics needed to close the landfill.
[3] This volume includes an increase of 55,500 cy from the original permitted volume for Cell 3.

B. Coal Combustion Residuals (CCRs) Description

The facility will receive solid waste produced from the generation of electricity from coal (CCRs) as defined in Rule 391-3-4-.01, and materials in contact with or used to contain or absorb CCR (truck liners, truck wash sediments containing ash, etc.) generated by Georgia Power Company. Allowable wastes include:

(i) CCR (fly ash, bottom ash, flue gas desulfurization materials, and boiler slag);

(ii) Materials contaminated by CCR, or used to collect or absorb CCR, that were generated by Georgia Power Company;

(iii) Other waste generated from milling coal in preparation for the combustion process; and

(iv) Coal combustion water treatment residuals (as described below and in Section 2.K and 2.L of this Operations Plan)

a. Coal combustion water treatment residuals are generated primarily from processes that support the combustion of coal or other fossil fuels that are co-disposed with fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste. The residuals result from the treatment of the following wastewaters: coal pile run-off, boiler cleaning solutions, boiler blowdown, ash pond dewatering, process water treatment and demineralizer regeneration wastes, cooling tower blowdown, air heater and precipitator washes, and effluents from floor and yard drains and sumps.

As required by the Rules, CCRs do not include putrescible or hazardous materials regulated under Subtitle C of the Resource Conservation Recovery Act (RCRA).

C. Zoning

A letter in support of this application dated October 4, 2017 is included in Section 3 of this permit application package.

D. Buffers

The disposal site is located entirely on Georgia Power Company property. A minimum 200-foot undisturbed buffer exists inside the permitted site boundary as indicated on permit drawings H1C11122 and H1C11123. A minimum 500-foot undisturbed buffer exists between the CCR disposal boundary and any adjacent residences and/or water supply wells.

A minimum 25-foot buffer exists between the CCR disposal boundary and any on-site springs and surface waters (perennial or intermittent). All erosion control measures and/or diversion ditches conform to the Erosion and Sedimentation Control Act and are protective of all streams in the landfill watershed and any associated perennial or intermittent tributaries.

Disturbance of wetland areas is prohibited, except as permitted by the United States Army Corps of Engineers. Otherwise, a minimum 50-foot buffer will be maintained between the CCR disposal boundary (limits of waste) and the jurisdictional wetland area depicted on Georgia Power Company's Figure 3.1 signed and sealed September 28, 2007 by Gary H. McWhorter, P.E. included in the Georgia Power Company Plant Wansley Proposed Coal Combustion By-Product Disposal Facility Site Acceptability Report, Revision 1, prepared by Earth Science and Environmental Engineering, Southern Company Generation, dated October 2007, and included in the Site Acceptability Report submitted to EPD when the landfill was originally permitted.

E. Site Survey Control

The Permitted Site Boundary is shown on drawing H1C11121 included in Section 10 of this permit application. Corner markers consisting of $^{1}/_{2}$-inch diameter rebars with GPC Red Cap have been installed to delineate this boundary. A permanent survey control monument is maintained at the location indicated on drawing H1C11124 for vertical and horizontal control.

F. Limited Access

This facility is for exclusive use by Georgia Power Company for CCR disposal. The landfill is located entirely within the Plant Wansley property boundary and only authorized personnel are allowed on the plant property. Access to the disposal area is further restricted by a chain-link security fence and gates.

G. Posted Information

The landfill is for exclusive use by Georgia Power Company for CCR disposal, and is not open to, or accessible by the public. Signage indicating the specific waste that can be placed in the landfill is posted at the entrance. Also, signage denoting the limits of the buffer zone and the location of groundwater and surface water monitoring points is in place.

Reference permit drawing H1C11147 for signage details.

H. Communication

Communications are by cell phone or two-way radio with Plant Wansley. Telephone communications are maintained at the Plant.

I. First Aid

First aid supplies are available at the plant.

J. Employee Facilities

Employee restroom facilities are available at Plant Wansley, as well as portable toilets in select locations around the landfill.

2. OPERATIONAL PROCEDURES

A. Supervision

The landfill is under the supervision of an operator who is present at all times during operation and who is properly trained in the operation of landfills and the implementation of the landfill's permit.

The landfill may operate twenty-four (24) hours a day. Personnel trained in landfill operations will be present at all times. Supervision is provided by Georgia Power Company trained personnel.

Training in the operation of CCR waste landfills and the implementation of the approved permit is provided by Georgia Power Company with documentation of training maintained in the facility's operating records.

B. Exclusion of Prohibited Wastes

No hazardous, putrescible wastes or other non-approved wastes will be deposited at this site. To ensure the exclusion of prohibited wastes, the supervisor and/or operator regularly performs random inspections of the CCR material placement operation (generally referred to as "stacking operations"). The results of each inspection are recorded and maintained as part of the facility's operating record. Facility personnel receive training to recognize prohibited wastes.

If prohibited wastes are detected at any time, Georgia Power will remove such waste and ensure it is transported to a properly permitted solid waste handling facility. Any incident of prohibited waste will be described in a report and placed in the facility's operating record.

C. Prohibited Acts

The landfill is operated and maintained in a manner described herein, to prevent open burning, scavenging, and the open dumping of waste.

D. Erosion and Sediment Control

All necessary erosion and sediment control measures will be constructed or installed in accordance with Best Management Practices (BMPs) that meet the requirements of the latest version of the Manual for Erosion and Sediment Control in Georgia (E&S Manual). Any required diversion berms, ditches and other stormwater management structures will be constructed in accordance with the E&S Manual.

E. Access Roads

The sluice method of gypsum delivery to the landfill does not require the use of temporary access roads within the lined disposal cells. For disposal of coal ash and other wastewater treatment residuals within the lined disposal cells, temporary access roads composed of graded aggregate, bottom ash, or other all-weather surface material may be necessary and will be maintained within the cells. Access to the CCR unloading and placement area will be provided by ramps and perimeter

berms. Final access roads are designed to provide continued access for maintenance and inspection. Details for permanent access roads are provided in the permit drawings.

F. Fire Protection

Fly ash, bottom ash and boiler slag are by-products of the coal combustion process and consist of non-combustible coal minerals. Synthetic gypsum is a by-product of the flue gas desulfurization process in which flue gas is forced through a fluidized bed of calcium carbonate (limestone). The oxidation process produces calcium sulfate (gypsum) and water, neither one is a combustible material. Coal combustion water treatment residuals and other wastes generated from milling coal are also not fire hazards. Litter and other putrescible wastes are not permitted for disposal at this landfill and as a result, the occurrence of fire related to CCRs disposal is not possible, and therefore no soil fire protection is required. Fly ash and gypsum are available for fire control if needed.

G. Site Equipment

The following is a list of typical equipment used during operation of this site:

- CAT D5H-5S dozer or equivalent,
- Excavators,
- Drum Rollers,
- Water truck with spray attachment,
- Off-road trucks,
- Backup and/or specialized equipment will be leased or subcontracted on an as-needed basis, and
- Other equipment, as needed.

H. Recovered Materials Processing Operations

CCRs may be recovered (removed) from the landfill for beneficial re-use in construction, manufacturing, agriculture and other industries. During recovery operations, personnel will leave two (2) feet minimum of in-place CCR material between the protective soil cover on the bottom of the cell and the material removed.

When recovered materials are removed by truck, the truck tires will be cleaned to avoid tracking of recovered materials offsite.

Georgia Power will maintain a record of the volume of CCR material that is recovered for beneficial re-use and will report it to EPD in accordance with Rule 391-3-4-.17(5). See Section 4.B. of this Operations Plan.

I. Controlled Unloading of Waste

The synthetic gypsum may be sluiced to a controlled discharge location(s) within the disposal cells. CCR material will be hauled to the disposal cells in dump trucks and unloaded. See Section 2. L. of this plan for placement and compaction procedures and Section 2.P. for Dust Control procedures.

Georgia Power will maintain a record of the volume of CCR that is placed in the CCR landfill and will report it to EPD in accordance with Rule 391-3-4-.17(5). See Section 4.C of this Operations Plan.

J. Solid Waste Processing Operations

No on-site waste processing is performed at this landfill.

K. Waste Requiring Special Handling

Coal combustion water treatment residuals currently require special handling (Refer to 2.*L Spreading, Compaction and Stability* for further details). This section will be updated prior to receipt of any new waste material that requires special handling.

L. Spreading, Compaction and Stability

i. Sluiced Gypsum

Synthetic gypsum may be sluiced to the discharge location(s) within the disposal cells. The slurry will be directed to varying locations within the disposal cells by interior berms and ditches constructed from previously settled gypsum, or a trough constructed out of durable material such as HDPE or plywood. The gypsum, which settles out of the flow, will be excavated and placed in the cell to provide a uniform compacted lift across the cell. The gypsum stack will be increased in height using interior gypsum berms constructed with excavated gypsum from the interior ditches. After removal of the riser and gravity drainage piping from any landfill cell as described in the permit drawings, gypsum will no longer be sluiced.

ii. CCR material other than Sluiced Gypsum will be placed in accordance with the procedures and requirements below:

a) CCR material will be uniformly spread in approximately 6 to 8 inch horizontal lifts (nominal loose thickness) and compacted to achieve a minimum 92% of its maximum dry density as determined by ASTM D698. Density tests shall be performed on representative compacted CCR material at a minimum frequency of 1 test per 5,000 cubic yard of in-place CCR. Lifts shall begin at the bottom of the cell with CCR materials abutting the perimeter berm and continue uniformly across the entire cell.

b) Wet CCR materials will be stabilized by mixing with dry materials or by other drying methods.

c) CCR materials shall not be placed by downhill pushing and/or compaction of CCR.

d) Each lift of CCR shall be benched when placing against existing CCR slopes.

e) The surface of the compacted CCR material will be rolled with a smooth drum roller to seal the surface to reduce infiltration and graded to prevent ponding of precipitation.

f) All CCR disposed in the landfill shall have a minimum drained shear strength of 28 degrees, or a combination of friction and cohesion equal to or greater than the shear strength envelope represented by 28 degrees. The strength of the CCR materials shall be evaluated at least annually to confirm that the minimum strength required for stability is being achieved. A test pad section constructed in the landfill using the field methods representative of placement conditions shall be built to obtain representative samples for testing in the laboratory. Testing results will be maintained in the facility operating record.

g) CCR shall be placed in a manner that minimizes the infiltration of water into the waste. The landfill shall be regularly monitored for standing water, leachate outbreaks, pumping and rutting of CCR materials under traffic loading, or other signs that may indicate that liquids are not draining properly.

h) Waste placement procedures should not be modified in a manner that may create impermeable zones of waste. If waste permeabilities change or signs of saturated waste conditions are observed, the stability of the landfill slopes shall be re-evaluated based on the new conditions.

i) Intermediate CCR slopes are not to be formed in the bottom of the cell, i.e. the slopes must toe-out and/or abut the exterior berm of the cell to maintain intermediate stability conditions.

j) CCR materials for intermediate benches above the perimeter berm elevation shall be placed and compacted in uniform and continuous lifts beginning at the down-slope extent of the bench, progressing up-slope.

iii. Moisture Conditioning

Georgia Power may utilize an irrigation type system or other forms of moisture conditioning, such as the use of water trucks, at the Plant Wansley CCR Landfill. The irrigation system will be installed in phases as CCR waste is placed in the constructed cells. If needed, the system may also be extended to the surface of each additional lift of CCR disposed. Water for the system will be pumped from one of the landfill clear pools or sediment ponds. All water from the system will be sprayed over lined areas and all run-off will be contained within the lined waste footprint or lined containment ditches. Water will be applied at a rate that minimizes runoff and does not over-saturate the waste. Any potential runoff will be directed to one of the landfill's lined sediment ponds. Spray nozzles and pipe sizes will be sized and adjusted by the landfill operator as necessary to meet operational requirements and minimize runoff. Pipe material for the irrigation system will be HDPE but may be modified at the operator's discretion.

iv. Long-Term Stability Considerations

The long-term stability of the cells, after modifications to the bottom liner system as described in the permit drawings, has been confirmed assuming that the CCR material is placed as discussed in this section of the Operations Plan and has the minimum drained shear strength discussed in the

Plant Wansley – Existing Landfill – Minor Modification Slope Stability Calculation Memorandum, prepared by WSP Golder.

Testing of coal combustion water treatment residuals and various mixes of CCR and water treatment residual material is provided in the Report of Laboratory Testing Results, Water Treatment Residual Material Mixes, prepared by Bunnell Lammons Engineering, Inc., dated July 22, 2021, included in Appendix B of this Operations Plan. When compacted to 92% of the standard proctor maximum dry density, three mix samples achieved the drained shear strength envelope represented by 30 degrees. These three mixes are listed below:

100% coal combustion water treatment residual material

50% coal combustion water treatment residual material and 50% of bottom ash

50% coal combustion water treatment residual material, 25% bottom ash, and 25% fly ash

The mixture consisting of 50% fly ash and 50% coal combustion water treatment residual material did not meet the minimum shear strength requirements when compacted to 92% of standard proctor maximum dry density, therefore, this material mix and compaction rate will not be utilized for placement of the coal combustion water treatment residuals. Alternate material mixes or compaction criteria may be acceptable but must be confirmed with laboratory or field testing.

M. Daily and Intermediate Cover

CCRs are predominantly inorganic by-products of the coal combustion process. Synthetic gypsum is a by-product of the flue-gas desulfurization process in which the flue gas is forced through a fluidized bed of calcium carbonate (limestone). Additionally, litter and other putrescible wastes are not allowed to be disposed at this landfill. Therefore, daily and intermediate covers are not necessary for the control of disease vectors, odor, fires, scavenging, and litter.

Additionally, the CCRs will be deposited in a moistened condition thus reducing the possibility of dusting. The possibility of fugitive dust from this landfill will be further controlled by water spray from water trucks or irrigation type systems, as necessary (See Section 2.P. of this plan).

N. Disease Vector Control

The landfill is used only for the disposal of materials described in Section 1.B. Vector controls are not required at this landfill since no litter or putrescible wastes are disposed.

O. Litter Control

The Plant Wansley CCR Landfill is used exclusively for disposal of CCR materials. These materials do not contain litter or contribute to blowing refuse. Routine inspection of the landfill site is conducted regularly, and any litter and/or waste blown onto the site, is removed.

P. Dust Control

The purpose of this fugitive dust control plan is to demonstrate compliance with the fugitive dust requirements in CCR Rule 391-3-4-.10(5)(a).

This fugitive dust control plan identifies and describes the CCR fugitive dust control measures that Georgia Power Plant Wansley uses to minimize CCR from becoming airborne at the facility, including CCR fugitive dust originating from CCR units, roads, and other CCR management and material handling activities.

CCR Rule 391-3-4-.10(2)(a), by reference to 40 CFR 257.53, defines "CCR fugitive dust" as "solid airborne particulate matter that contains or is derived from CCR, emitted from any source other than through a stack, or chimney". Fugitive dust originating from Cells 1, 2 and 3 is controlled using water suppression and compaction.

The fugitive dust control measures identified and described in this plan were adopted and implemented based upon an evaluation of site-specific conditions and are determined to be applicable and appropriate for the Wansley CCR Landfill. Evaluation included assessing the effectiveness of the fugitive dust control measures for the facility, taking into consideration various factors such as site conditions, weather conditions, and operating conditions.

CCR that is transported via truck to cells 1, 2 or 3 is conditioned to appropriate moisture content to reduce the potential for fugitive dust.

Water suppression and/or a chemical dust suppressant is used as needed to control fugitive dust on facility roads used to transport CCR and other CCR management areas.

Speed limits are also utilized to reduce the potential for fugitive dust.

Trucks used to transport CCR are filled to or under capacity to reduce the potential for material spillage.

Plant personnel assess the effectiveness of the control measures by performing visual observations of all CCR units and surrounding areas and implementing appropriate corrective actions for fugitive dust, as necessary. Logs are used to record the utilization of water-spray equipment.

When a complaint is received from a citizen regarding a CCR fugitive dust event at the facility, the complaint is documented and investigated. Appropriate steps are taken if needed, including any corrective action.

Coal Combustion Residuals (CCR) Annual Fugitive Dust Control Reports for the Plant Wansley CCR Units are published in the Georgia Power website under Environmental Compliance.

Q. Explosive Gas Control (Methane Gas)

Methane gas is not generated in the disposal area because the FGD and the coal combustion processes do not produce waste that generate methane gas. Also, waste that may generate methane gas, such as putrescible wastes and litter, is not allowed at this landfill; thus, a methane monitoring system is not required.

R. Run-On/Run-Off Control

CCR is contained within a lined earthen berm to prevent storm water from the surrounding area from entering the disposal cells. CCR placement is confined to within this berm. Run-off from active

cells, as well as any disturbed areas, is routed into the lined sedimentation ponds and the clear pool pond, which are designed to collect and control the flow resulting from a 24-hour, 25-year storm. The details for erosion and sediment control structures are included in the permit drawings.

The updated Run-On and Run-Off Control Plan that Georgia Power developed to meet the requirements of the self-implementing Federal CCR Rule is included in Appendix A. This Run-On and Run-Off Control Plan will be reviewed and updated every 5 years. Georgia Power may amend the written run-on and run-off control system plan at any time provided the revised plan is placed in the facility's operating record. Georgia Power must amend the written run-on and run-off control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

S. Surface Water Requirements

Lined sedimentation ponds and a clear pool pond are provided to capture all leachate, sluice water and stormwater run-off from the CCR disposal stacks. Ditches contained within the perimeter earthen berms convey all run-off to these ponds. A return water pumping system is provided to transmit water from the clear pool pond to the plant location for discharge in accordance with the facility's NPDES wastewater permit. The ponds are designed to retain, without the consideration of pumping, three days of process flows (sluice flow), leachate, and the surface stormwater run-off for a 24 - hr. 100 yr. storm event.

T. Final Grading

The final slopes were designed to remain permanently stable, to control erosion, to allow placement, compaction, and seeding of cover material, to minimize percolation of precipitation into the final cover, and to provide diversion of surface run-off from the disposal area. The final surface slopes are between 3% and 33% (3H:1V). Final grading plans and final cover system details are provided in the permit drawings.

U. Vegetation

All vegetated areas of the landfill and ponds will be maintained throughout the life of the landfill. The following schedule indicates the recommended species, planting dates, and fertilization requirements. Reference the latest edition of the Manual for Erosion and Sediment Control in Georgia.

VEGETATION SCHEDULE														
BROADCAST														
SPECIES	RATES	PLANTING DATES												COMMENTS
		J	F	M	A	M	J	J	A	S	O	N	D	
Wilmington Bahia alone	60 lbs. / ac	....	....	..	———	———	....	....	....	....	....	....	....	Low growing.
Wilmington Bahia w/ other perennials	30 lbs. / ac			———					..	———	..			Mix with sericea lespedeza. Low growing.
Tall Fescue alone	50 lbs. / ac			———					..	———	..			
Tall Fescue w/ other perennials	30 lbs. / ac								..	———	..			Mix with sericea lespedeza.
Reed Canary alone	50 lbs. / ac								..	———	..			
Reed Canary w/ other perennials	30 lbs. / ac	....	....	..	———	———	....	....	....	....	....	....	....	
Ambro Virgata or Appalow Lespedeza scarified	60 lbs. / ac			..	———	———	..							Mix with bahai or tall fescue. Do not mix with sericea lespedeza.
Ambro Virgata or Appalow Lespedeza unscarified	60 lbs. / ac	———	———	....	....	....	....	....	....	———	———	———	———	Mix with bahai or tall fescue. Do not mix with sericea lespedeza.

Note: Solid lines indicate optimum dates, dotted lines indicate permissible but marginal dates.

FERTILIZATION (Warm Season Grasses)			
YEAR	N-P-K	RATE	N TOP DRESSING RATE
First	6-12-12	1500 lbs./ac	50 - 100 lbs./ac
Second	6-12-12	800 lbs./ac	50 - 100 lbs./ac
Maintenance	10-10-10	400 lbs./ac	30 lbs./ac

V. Continuity of Operation

Access roads and ramps are provided to the active disposal cells. The permanent access road to the landfill is an all-weather road and allows access to the landfill during inclement weather for disposal, inspection, and maintenance or replacement of equipment.

3. ENVIRONMENTAL PROTECTION

A. Inspections

1. Seven (7) Day Inspections

Georgia Power will inspect the CCR landfill at intervals not exceeding seven (7) days. The 7-day inspections will be made by a Qualified Person who is familiar with the landfill and include observation and documentation of any appearance of actual or potential structural weakness and other conditions which are disrupting or have the potential to disrupt the operation or safety of the landfill.

Georgia Power will record the results of these inspections on a self-generated form that will be filed in the facility's operating record. If a potential deficiency or release is identified during an inspection, Georgia Power will remedy the deficiency or release as soon as feasible. Georgia Power will prepare documentation detailing the corrective measures taken and place it in the facility's operating record.

If stability concerns are identified during the 7-day inspection, Georgia Power will notify the EPD Solid Waste Management Program within twenty-four (24) hours of observing the issue of concern and/or when the facility is advised by the geotechnical engineer that corrective measures are required to improve the stability of the waste mass.

2. Annual Inspections

As required by Chapter 391-3-4-.10(5) of the Georgia Solid Waste Rules, a Professional Engineer registered in Georgia will inspect the landfill on an annual basis. The inspection includes, at a minimum:

a. A visual inspection of the CCR landfill to identify signs of distress or malfunction of the CCR landfill.

b. A review of available information regarding the status and condition of the CCR Landfill, including, but not limited to, files available in the facility's operating record such as:

   i. The results of weekly inspections and the results of previous annual inspections,

   ii. Files available in the operating record and other conditions which have disrupted or have the potential to disrupt the operation or safety of the CCR landfill.

c. If a potential deficiency or release is identified during an inspection, Georgia Power will remedy the deficiency or release as soon as feasible. Georgia Power will prepare documentation detailing the corrective measures taken and place it in the facility's operating record.

B. Annual Reporting

At the completion of each annual inspection, the Professional Engineer who completed the inspection will prepare an annual report that includes the following:

1. Any changes in geometry of the landfill components since the previous annual inspection;

2. The approximate volume of CCR contained in the unit at the time of the inspection;

3. Any appearances of an actual or potential structural weakness of the CCR within the landfill, or any existing conditions that are disrupting or have the potential to disrupt the operation and stability of the CCR landfill; and

4. Any other change(s) which may have affected the stability or operation of the CCR landfill since the previous annual inspection.

Annual Inspection Reports for the Plant Wansley CCR Landfill, which meet the requirement of Chapter 391-3-4-.10(5) of the Georgia Rules, can be found online at the Georgia Power website under Environmental Compliance.

C. Ponds with Leak Detection Systems (Sedimentation Ponds / Clear Pool Pond)

Georgia Power will maintain permanent pumps in the leak detection sumps of the double-lined ponds and will operate them as needed to maintain liquids in the leak detection system lower than one (1) foot.

D. Groundwater and Surface Water Monitoring Plan

Groundwater and surface water monitoring will be performed in accordance with the schedule and requirements indicated in the Plant Wansley CCR Landfill Groundwater Monitoring Plan included in Section 7 of this permit application. The plan meets the requirements of Georgia CCR Rule 391-3-4-.10(6).

Additionally, results of analytical tests done on FGD samples are reported in the groundwater monitoring reports, unless or until FGD sluicing operations are terminated.

4. RECORDKEEPING, NOTIFICATION, AND PUBLICLY ACCESSIBLE INTERNET SITE REQUIREMENTS

The Plant Wansley CCR Landfill complies and will continue to comply with the recordkeeping, notification, and publicly accessible internet site requirements set forth in Georgia CCR Rule 391-3-4-.10(8).

The publicly accessible internet site for the Plant Wansley CCR facilities is found at the Georgia Power website under Environmental Compliance.

A. Recordkeeping

Georgia Power maintains and will continue to maintain the facility's operating record at all times during the life of the landfill including the closure and post closure period. These records are maintained by plant personnel and are located at Plant Wansley. The following records are maintained as part of the facility's operating record:

1. A copy of the permit and any operating conditions including location restrictions;
2. Inspection records, training procedures, and notification procedures required by this Plan and by Rule 391-3-4-.10(5) and (8);
3. Any demonstration, certification, finding, monitoring, testing, or analytical data pertaining to groundwater monitoring and as required by rule 391-3- 4 -.10(6);
4. Closure and post-closure care plans and any monitoring, testing, or analytical data required by those Plans and Rules 391-3-4.10(7);
5. Any cost estimates and financial assurance documentation;
6. A copy of the permit documents for the landfill;
7. A copy of the groundwater and surface water monitoring plan for the landfill;
8. A copy of the Construction Quality Assurance Plan, construction certifications, closure certifications, and post-closure certifications;
9. The fugitive dust control plan, and any subsequent amendment of the plan, as required by 40 CFR 257.80(b), except that only the most recent control plan must be maintained in the facility's operating record irrespective of the time requirement of 5 years;
10. The annual CCR fugitive dust control report as required by 40 CFR 257.80(c);
11. The initial and periodic run-on and run-off control system plans as required by 40 CFR 257.81(c).)

All information contained in the facility's operating record will be furnished to the Georgia EPD or be made available at all reasonable times for inspection by EPD staff.

B. Notification and Internet Posting Requirements.

Unless otherwise specified by the Rules, Georgia Power will provide notifications to EPD within 30 days of placing documents in the facility's operating record. The notifications will be sent before the close of business on or before the day the notification is required to be completed. Notifications to EPD will be postmarked or sent by electronic mail. If a notification deadline falls on a weekend or federal holiday, the notification deadline will be extended to the next business day. Georgia Power will state in the notification to EPD if the relevant information was also placed on the Georgia Power website under Environmental Compliance. Information required to be posted on the Georgia Power website under Environmental Compliance will be available to the public for at least five (5) years following the date on which the information was first posted.

C. Measuring and Reporting Requirements

In accordance with Rule 391-3-4-.17(5), on July 1 of each year after the first full year that the CCR Landfill permit is issued, Georgia Power will report to EPD the total volume of the CCR waste disposed in the CCR Landfill, and the CCR removed, recovered, or diverted for beneficial use. The required data will be submitted to EPD on forms issued by EPD.

5. SITE LIMITATIONS (APPROVED JANUARY 26, 2018)

1. The areas considered for acceptability include only those areas enclosed by the lines labeled Site Boundary, Plant Wansley, Proposed Coal Combustion By-Product Disposal Facility Property Map and Site Topographic Map, drawing number ES1444 F1-1, dated September 14, 2007 and signed/stamped by Mr. Gary McWhorter on September 28, 2007.

2. This facility may receive Coal Combustion Residuals (CCR), as defined in Rule 391-3-4-.01, and materials contaminated by CCR, or used to collect or absorb CCR, that were generated by Georgia Power Company.

3. Should the liquid pressure head be determined to surpass 30 cm, the landfill is to have a double composite liner with a leak detection system. Otherwise, a composite liner and leachate collection system designed in accordance with Rule 391-3-4-.07(1)(d), or an alternate equivalent, will be constructed. Liner systems will underlie areas of permanent CCR disposal as well as diversion ditches used for transport of gypsum-containing effluent.

4. The liner system will be kept a minimum of 5-feet above the seasonal high-water table or bedrock, whichever is higher in elevation contours, as shown on Georgia Power Company's Plant Wansley Coal Combustion By-Product Disposal Facility Composite Seasonal High Groundwater Map, Figure 4, dated August 14, 2009.

5. Disturbance of wetland areas is prohibited except as permitted by the United States Army Corps of Engineers. Otherwise, a minimum 50 - foot buffer will be maintained between the CCR disposal boundary (limits of waste) and the jurisdictional wetland area depicted on Georgia Power Company's Figure 3.1 signed and sealed September 28, 2007 by Gary H. McWhorter, P.E.

6. A minimum 500-foot buffer will be maintained between the CCR disposal boundary and any adjacent residences and/or any water supply wells.

7. A minimum 200-foot undisturbed buffer will be maintained between the CCR disposal boundary and the permitted Site Boundary referenced in the above limitation #1.

8. No waste will be disposed of in any 100-year flood hazard zone. The 100-year flood elevation must be shown on the Design and Operation plans.

9. If, during excavation of the site, any springs or seeps are detected, EPD will be notified immediately, and protective designs will be incorporated into the facility's design and operations plans, such that sampling of the spring or seep can be incorporated into the groundwater-monitoring plan.

10. All borings/piezometers located within the proposed waste footprint will be abandoned in accordance with the Water Well Standards Act. The abandonment will be supervised by a professional geologist (PG) or professional engineer (PE) registered to practice in the State of Georgia. The supervising PG/PE will submit a report of the abandonment to EPD and certify that the borings/piezometers were abandoned in accordance with the Water Well Standards Act.

11. A groundwater monitoring system, conforming to EPD's Rules of Solid Waste Management and current guidance, will be installed at the site. The system design and monitoring requirements will be detailed in a Groundwater Monitoring Plan that is prepared in accordance with the Georgia Manual for Groundwater Monitoring and is approvable by EPD.

12. A minimum 25-foot buffer will be maintained between the CCB disposal boundary and any on-site springs and surface waters (perennial or intermittent). All erosion control measures and/or diversion ditches will conform to the Erosion and Sedimentation Control Act and be protective of all streams in the landfill watershed and any associated perennial or intermittent tributaries.

13. As the proposed site is located within a seismic impact zone, all plan sheets in the design and operations plan that detail surface water containment structures will specify that the structures are engineered to withstand a maximum horizontal acceleration of 0.17g.

APPENDIX A - PERIODIC RUN-ON AND RUN-OFF CONTROL PLAN [391-3-4-.10(5) AND 40 C.F.R. PART 257.81] PLANT WANSLEY COAL COMBUSTION BY-PRODUCT PRIVATE INDUSTRY SOLID WASTE DISPOSAL FACILITY (PLANT WANSLEY GYPSUM LANDFILL), GEORGIA POWER COMPANY, DATED 10/15/21

PERIODIC RUN-ON AND RUN-OFF CONTROL PLAN
391-3-4-.10(5) and 40 C.F.R. PART 257.81
PLANT WANSLEY COAL COMBUSTION BY-PRODUCT PRIVATE INDUSTRIAL SOLID WASTE DISPOSAL FACILITY (PLANT WANSLEY GYPSUM LANDFILL)
GEORGIA POWER COMPANY

The Federal CCR Rule, and, for Existing CCR Landfills where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill to prepare a run-on and run-off control system plan to document how these control systems have been designed and constructed to meet the applicable requirements of this section of the Rule. *See* 40 C.F.R. § 257.81; Ga. Comp. R. & Regs. r. 391.3-4-.10(5)(a). In addition, the Rules require periodic run-on and run-off control system plans every five years. *See* 40 C.F.R. § 257.81(c)(4); Ga. Comp. R. & Regs. r. 391.3-4-.10(4)(b).

The CCR landfill known as the Plant Wansley Gypsum Landfill is located on Plant Wansley property in Heard and Carroll Counties, Carrollton, Georgia. The landfill consists of three constructed cells (numbered 1 thru 3), two constructed sedimentation ponds, and a constructed clean water (return) pond. Each cell is lined with a composite liner system consisting of a 60-mil HDPE liner underlain with a geosynthetic clay liner, and a minimum 24-inch thick compacted clay liner with a maximum hydraulic conductivity of 1×10^{-5} cm/sec. Cells 1 through 3 are all currently being utilized for CCR storage.

Storm water flows used for development of the run-on and run-off control plan were calculated using the Natural Resources Conservation Service (NRCS) method (also known as the Soil Conservation Service (SCS) method) for a 25-yr 24-hr storm event. The stormwater detention system has been designed in accordance with the Georgia Soil and Water Conservation Commission requirements as well as other local, city, and government codes. The post developed storm water discharge was designed to be less than the pre-developed storm water discharge in accordance with the requirements of the State of Georgia.

Runoff curve number data was determined using Table 2-2A from the Urban Hydrology for Small Watersheds (TR-55). Appendix A and B from the TR-55 were used to determine the rainfall distribution methodology. Precipitation values were determined from National Oceanic and Atmospheric Administration (NOAA) Atlas 14.

The NRCS provided information on the soil characteristics and hydrologic groups present at the site. It was determined that hydrological group "B" best reflects the characteristics of the soils on site and was used to generate inputs for the calculations. This information was placed into Hydraflow Hydrographs 2019 and used to generate appropriate precipitation curves, runoff curve numbers and storm basin runoff values.

Cells 1-3 of the Plant Wansley Gypsum Landfill were designed and constructed with perimeter berms and drainage ditches around the cells that prevent stormwater run-on during the peak discharge of a 24-hr, 25-yr storm from flowing onto the active portion of the landfill. The perimeter berms and drainage ditches also route the stormwater run-off from the cells internally through the system of sedimentation/clarifying ponds designed to handle the run-off from a 24-hr, 25-yr storm.

Stormwater runoff from Cell 1 is directed to and decanted in the South Sedimentation Pond, while stormwater runoff from Cell 2 is directed to and decanted in the North Sedimentation Pond. Run-off from Cell 3 is collected in a 60" riser structure connected to a 36" HDPE pipe that flows into a ditch and connects to the perimeter ditch of Cell 2. From there, the run-off from Cell 3 flows into the North sedimentation pond. Decanted water from the two sedimentation ponds is then routed to the return water pond via two 36-inch HDPE pipes. Pumps located in the return water pond are utilized to send water back to the Plant for use as process water. Calculations indicate that rainfall occurring during a 24-hr, 25-yr storm is safely stored and passed. This plan is supported by appropriate engineering calculations which are attached.

The facility is operated subject to and in accordance with § 257.3-3 of EPA's regulations.

I hereby certify that the run-on and run-off control system plan meets the requirements of 40 C.F.R. Part 257.81.

10/15/2024

James C. Pegues, P.E.
Licensed State of Georgia, PE No. 17419

Run-on and Run-off Control System Plan for Landfills:
Calculation Summary

for

Plant Wansley Gypsum Landfill

Prepared by:

Southern Company T&PS Environmental Solutions

Originator: Ashley O. Grissom 10/06/2021
Ashley O. Grissom Date

Reviewer: Joshua K Myers 10/8/21
Josh K. Myers Date

Approval: James C. Pegues 10/8/21
James C. Pegues Date

1. Purpose of Calculation

The purpose of this report is to demonstrate the run-on and run-off controls of the Plant Wansley Gypsum landfill in order to prepare a run-on and run-off control system plan as required by the United States Environmental Protection Agency's (EPA) final rule for Disposal of Coal Combustion Residuals (CCR) from Electric Utilities (EPA 40 CFR 257) and the Georgia CCR Rule (391-3-4-.10).

Summary of Conclusions

Site Overview/Narrative

Georgia Power Company's Plant Wansley is located in Heard County, Georgia, 12 miles south of Carrollton and just north of the Chattahoochee River. The gypsum storage facility is located within the plant property and is comprised of three HDPE lined cells, two sedimentation ponds, and a return water pond. Cells 1 through 3 vary in size from approximately 31, 40, and 26 acres, respectively. The facility includes a perimeter dike around the gypsum cells to contain surface rainfall run-off. Run-off from this area is directed into the sedimentation ponds/return water pond via interior perimeter ditches and culverts. Water from the return water pond is pumped back to the plant and returned to the process. Gypsum disposal is contained within earthen berms to prevent stormwater from the surrounding area from entering the gypsum facility. Gypsum placement is confined to within these berms. Run-off from the active portion, as well as any disturbed areas, is routed into the sedimentation pond designed to collect and control flow resulting from a 100-year, 24-hour storm which is greater than the required 25-year, 24-hour design storm.

An overview of the facility is provided in Table 1 below.

Table 1. Landfill Site Characteristics

Description	Cell 1	Cell 2	Cell 3	North Sed. Pond	South Sed. Pond	Return Water Pond
Size (Acres)	31	40	26	4.2	2.9	0.8
Outlet Type	60" Riser connected to 36" pipe	60" Riser connected to 36" pipe	60" Riser connected to 36" pipe	Two 36" pipes	Two 36" pipes	Two 16" pumped lines
Outlets To	South Sed. Pond	North Sed. Pond	North Sed. Pond	Return Water Pond	Return Water Pond	Plant

1. Run-on Control System Plan

There is no stormwater run-on into the facility because it is contained within earthen berms that prevent stormwater from the surrounding area from entering the gypsum facility.

2. Run-off Control System Plan

A hydrologic and hydraulic model was developed for the Plant Wansley Gypsum cells to determine the hydraulic capacity of the sedimentation ponds/return water pond. The design storm for the purposes of run-off control system plans is the 24-hour, 25-year rainfall event. The results of routing the design storm event through the landfill are presented in the following table:

Table 2. Flood Routing Results

Plant Wansley	Normal Pool El (ft)	Top of embankment El (ft)	Peak Water Surface Elevation (ft	Freeboard* (ft)	Peak Inflow (cfs)	Peak Outflow (cfs)
North Sedimentation Pond	729	741.36	737.47	1.89	583.51	0
South Sedimentation Pond	729	741.36	736.66	2.70	367.89	0

*Freeboard is measured from the spillway crest to the peak water surface elevation

Methodology

3. HYDROLOGIC ANALYSES

The design storm for all run-on/run-off analyses is a 24-hour, 25-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 3.

Table 3. Plant Wansley Gypsum Landfill Design Storm Distribution

Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
25	24	6.35	NOAA Atlas 14	SCS Type II

The drainage area for the Plant Wansley Gypsum Landfill was delineated based on LiDAR data acquired for the Plant in December 2020. Run-off characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. An overall SCS curve number for the drainage area was developed based on methods prescribed in TR-55. Soil types were obtained from the Natural Resources Conservation Service. Land use areas were delineated based on aerial photography. Time of Concentration was also developed based on methodologies prescribed in TR-55.

A table of the pertinent basin characteristics of the landfill is provided below in Table 4:

Table 4. Landfill Hydrologic Information

	Cell 1	Cell 2	Cell 3
Drainage Basin Area (acres)	45.3	45.2	26.3
Hydrologic Curve Number, CN	95	96	95
Hydrologic Methodology	SCS Method	SCS Method	SCS Method
Time of Concentration (minutes)	8.1	9.6	6
Hydrologic Software	Hydraflow Hydrographs	Hydraflow Hydrographs	Hydraflow Hydrographs

Run-off values were determined by importing the characteristics developed above into a hydrologic model with the Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2019.

4. HYDRAULIC ANALYSES

Storage values for the sedimentation ponds/return water pond were determined by developing a stage-storage relationship utilizing contour data. The spillway system at the Plant Wansley Gypsum Landfill consists of a pump structure and an auxiliary spillway. The pump structure consists of two 16" HDPE lines that pump water back to the plant to be returned to the process. The auxiliary spillway is a gravel trapezoidal weir sloped at 0.5% slope with a crest elevation of EL 739.36. A summary of spillway information is presented below in Table 5.

Table 5. Spillway Attribute Table

Spillway Component	US Invert El (feet)	DS Invert El (feet)	Dimension (ft)	Slope (ft/ft)	Length (ft)	Spillway Capacity (cfs)
North Pond, Aux.	739.36	739.28	20' span, 2' rise	0.5%	16	307.9
South Pond, Aux	739.36	739.20	20' span, 2' rise	0.5%	32	307.9

Based on the spillway attributes listed above, the data was inserted into Hydraflow Hydrographs to determine the pond performance during the design storm. Results are shown in Table 2.

2. SUPPORTING INFORMATION

1. CURVE NUMBER

Terrain Type	Area (ac)	Curve Number
Water	8.1	100
Bare Gypsum over liner	108.7	95

STAGE-STORAGE TABLE OF SEDIMENTATION PONDS

North Pond:

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	720.00	3,093	0	0
2.00	722.00	41,807	37,511	37,511
4.00	724.00	82,825	122,305	159,816
5.50	725.50	93,135	131,881	291,697
6.00	726.00	97,337	47,609	339,307
8.00	728.00	122,631	219,460	558,766
10.00	730.00	149,335	271,501	830,267
12.00	732.00	160,792	310,026	1,140,293
14.00	734.00	172,484	333,174	1,473,467
16.00	736.00	184,414	356,796	1,830,263
18.00	738.00	196,579	380,890	2,211,153
19.36	739.36	204,987	273,018	2,484,171

South Pond:

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	722.00	45,239	0	0
2.00	724.00	75,648	119,579	119,579
3.50	725.50	84,374	119,945	239,524
4.00	726.00	86,504	42,714	282,238
6.00	728.00	95,162	181,579	463,817
8.00	730.00	104,057	199,133	662,950
10.00	732.00	113,188	217,159	880,110
12.00	734.00	122,555	235,657	1,115,767
14.00	736.00	132,158	254,627	1,370,394
16.00	738.00	141,997	274,069	1,644,463
17.36	739.36	148,820	197,718	1,842,181

TIME OF CONCENTRATION

Cell 1:

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 1

Cell 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.91		0.00		0.00		
Land slope (%)	= 7.00		0.00		0.00		
Travel Time (min)	**= 1.60**	**+**	**0.00**	**+**	**0.00**	**=**	**1.60**
Shallow Concentrated Flow							
Flow length (ft)	= 670.00		0.00		0.00		
Watercourse slope (%)	= 1.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.22		0.00		0.00		
Travel Time (min)	**= 5.02**	**+**	**0.00**	**+**	**0.00**	**=**	**5.02**
Channel Flow							
X sectional flow area (sqft)	= 117.50		0.00		0.00		
Wetted perimeter (ft)	= 33.40		0.00		0.00		
Channel slope (%)	= 0.60		0.00		0.00		
Manning's n-value	= 0.020		0.015		0.015		
Velocity (ft/s)	=13.40						
			0.00				
					0.00		
Flow length (ft)	({0})1156.0		0.0		0.0		
Travel Time (min)	**= 1.44**	**+**	**0.00**	**+**	**0.00**	**=**	**1.44**

Total Travel Time, Tc ..... 8.10 min

Cell 2:

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12

Hyd. No. 2

Cell 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.011		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.91		0.00		0.00		
Land slope (%)	= 1.00		0.00		0.00		
Travel Time (min)	= 3.48	+	0.00	+	0.00	=	3.48
Shallow Concentrated Flow							
Flow length (ft)	= 1000.00		0.00		0.00		
Watercourse slope (%)	= 3.20		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.89		0.00		0.00		
Travel Time (min)	= 5.77	+	0.00	+	0.00	=	5.77
Channel Flow							
X sectional flow area (sqft)	= 640.00		0.00		0.00		
Wetted perimeter (ft)	= 162.00		0.00		0.00		
Channel slope (%)	= 0.70		0.00		0.00		
Manning's n-value	= 0.020		0.015		0.015		
Velocity (ft/s)	=15.65						
			0.00				
					0.00		
Flow length (ft)	({0})287.0		0.0		0.0		
Travel Time (min)	= 0.31	+	0.00	+	0.00	=	0.31
Total Travel Time, Tc							9.60 min

(Cell 3 uses the minimum recommended by TR-55, 6 minutes.)

RESULTS

Hydrograph Report

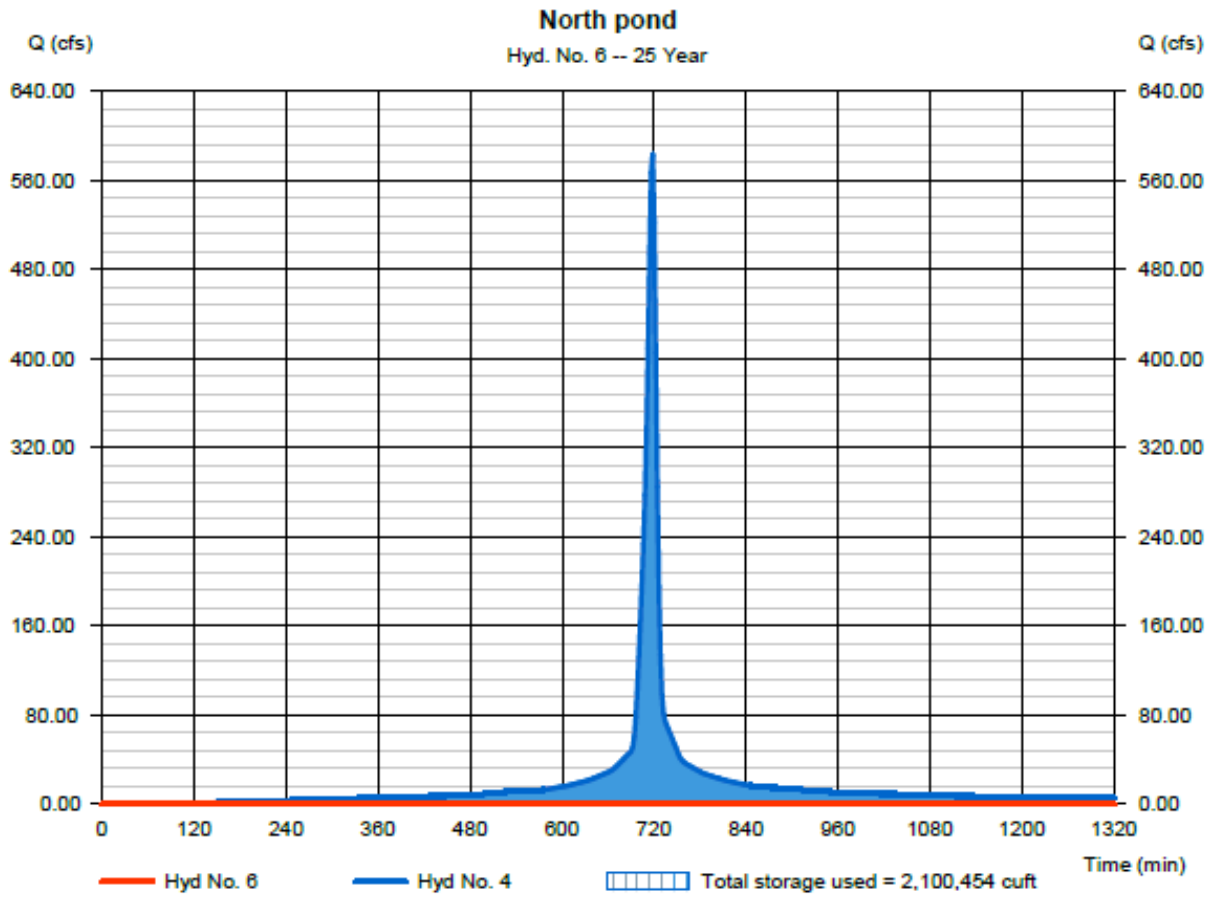
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12 — Wednesday, 05 / 26 / 2021

Hyd. No. 6

North pond

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - Cells 2 & 3 to North pond	Max. Elevation	= 737.47 ft
Reservoir name	= North Sed. Pond	Max. Storage	= 2,100,454 cuft

Storage Indication method used. Wet pond routing start elevation = 728.50 ft.



Hydrograph Report

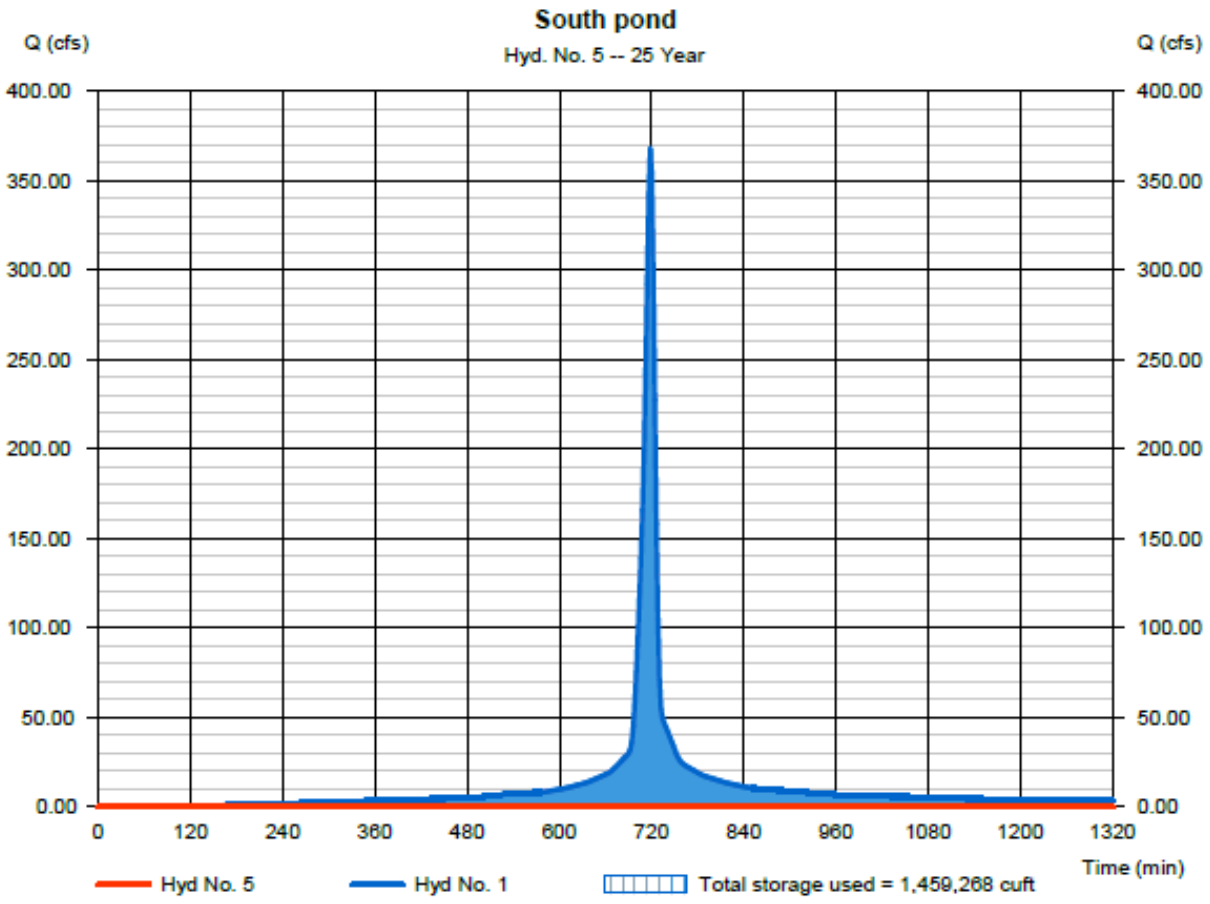
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v12 — Wednesday, 05 / 26 / 2021

Hyd. No. 5

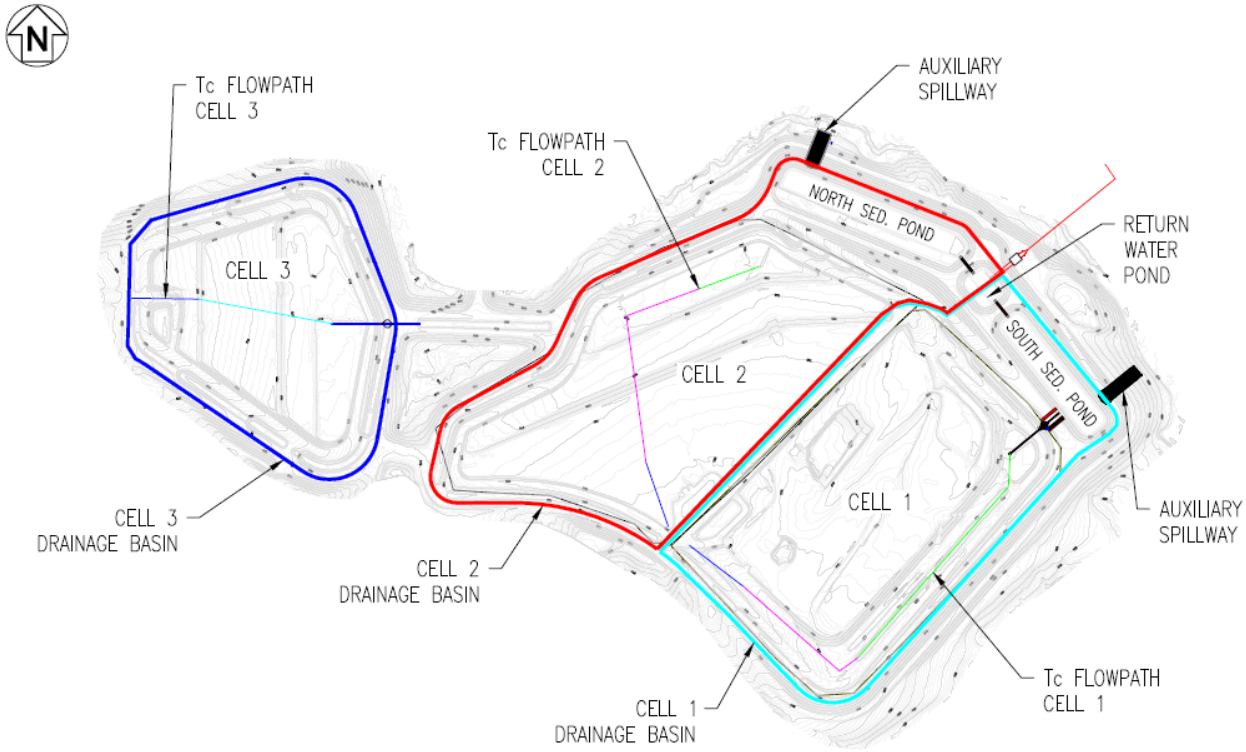
South pond

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - Cell 1	Max. Elevation	= 736.66 ft
Reservoir name	= South Sed. Pond	Max. Storage	= 1,459,268 cuft

Storage Indication method used. Wet pond routing start elevation = 728.50 ft.



FACILITY LAYOUT



APPENDIX B - REPORT OF LABORATORY TESTING RESULTS, WATER TREATMENT RESIDUAL MATERIAL MIXES, PREPARED BY BUNNELL LAMMONS ENGINEERING, INC., DATED 07/22/21

BUNNELL LAMMONS ENGINEERING

July 22, 2021

Hodges, Harbin, Newberry, and Tribble, Inc.
3920 Arkwright Road, Suite 101
Macon, Georgia 31210

Attention: Mr. R. Brant Lane, P.E.

Subject: **Laboratory Testing Results**
Water Treatment Residual Material Mixes
Georgia Power Plant Wansley
Heard County, Georgia
BLE Project No. J20-11379-05

Dear Mr. Lane:

Bunnell-Lammons Engineering, Inc. (BLE) is pleased to submit this summary of laboratory testing at Plant Wansley. Our lab testing to date has been performed in accordance with our proposal dated May 3, 2021. Our currently authorized scope of work includes index testing and four triaxial shear tests on water treatment residual coal combustion residual (WTR CCR) samples.

LABORATORY TESTING

The following samples were provided by HHNT for laboratory testing by BLE:

- (4) samples from WTR CCR bins
- (3) samples of bottom ash for mixing/stabilization of the WTR CCR material
- (3) samples of fly ash for mixing/stabilization of the WTR CCR material.

BLE received the samples in our Greenville, South Carolina laboratory where they were visually classified by senior geotechnical engineer Mr. Tyler Moody, P.E. Mr. Moody discussed the material conditions with Ms. Claudia Montero, P.E. of HHNT and Mr. Gary McWhorter of Georgia Power Company. Material mix proportions were prescribed by Mr. McWhorter. The following laboratory tests were performed:

- Standard Proctor (ASTM D698)
- Moisture content (ASTM D2216)
- Grain size with hydrometer (ASTM D422)
- Atterberg Limits (ASTM D4318)
- Triaxial Shear tests with pore pressure measurements (ASTM D4767)
- Specific Gravity (ASTM C128) – (1) on the WTR CCR

For the laboratory test program, the WTR CCR material was tested for moisture content at the as-received state. As-received moisture contents ranged from 225% to 245%. The WTR CCR material had been sealed

in 5-gallon buckets from the date of original receipt and was air-dried to a moisture content range suitable for standard Proctor testing. Standard Proctor testing was performed on four (4) composite samples of the WTR CCR material:

- C-1, which consisted of 100% of WTR CCR material
- BA-C-1, which consisted of 50% WTR CCR material and 50% of bottom ash
- FA-C-1, which consisted of 50% WTR CCR material and 50% of fly ash
- C-BA-FA-1, which consisted of 50% WTR CCR material, 25% bottom ash, and 25% fly ash

Samples were prepared by total (moist) weight. For example, for blended sample "BA-C-1", 20 lbs of WTR CCR was combined with 20 lbs of bottom ash in the as-received moisture condition. The sample was then uniformly blended and prepared for standard Proctor testing (ASTM D698). Remolded, consolidated-undrained triaxial testing was then performed at approximately 92% of the standard Proctor maximum dry density at moisture contents 2% wet of optimum.

Blended samples of fly ash, bottom ash, and WTR CCR material were prepared to represent a blended material mixed during stabilization and placement operations at the landfill. Following blending with hand tools, the mixes were allowed to air-dry before remolding in the triaxial cell. Compacted dry density values among the four remolded samples ranged from 67.7 pcf (FA-C-1) to 71.9 pcf (BA-C-1) at moisture contents ranging from 29.6% (BA-C-1) to 47.1% (C-1). It is noted that the standard Proctor maximum dry density for the mix with 50% fly ash (FA-C-1) is lighter than the standard Proctor maximum dry density for the WTR CCR material (C-1). The mix with 50% bottom ash (BA-C-1) is the heaviest blended sample with a standard Proctor maximum dry density of 78.2 pcf.

Triaxial shear strengths of the WTR CCR material and blended material samples is provided in the attached test reports. Consolidated undrained triaxial testing was performed with pore pressure measurement to provide effective stress shear strength parameters for the tested remolded specimen. Among the four triaxial tests performed, a minimum drained, effective stress friction angle of 29 degrees was measured for the mix with 50% fly ash (FA-C-1). The tested drain shear strength values of the remaining three triaxial tests exceed 30 degrees at the effective normal stress range provided on the test reports.

Due to the pore pressure response in fine-grained samples, such as those tested in this laboratory program, the maximum effective normal stress at failure was approximately 34 psi (4,896 psf). To evaluate the shear strengths at higher normal stresses, a direct shear test was performed on a specimen of each mix at a normal load equal to 11,000 psf. This represents approximately 90 feet of in-place CCR at a total unit weight of 120 pcf. An effective stress friction angle of greater than or equal to 30 degrees was measured for each mix in the direct shear test. A composite shear strength envelope of all mixes using the effective stress, drained strengths from triaxial and direct shear tests is attached.

A brief description of laboratory test procedures is attached along with the laboratory test reports. Laboratory testing has been performed using ASTM methods for soils which may not be representative of waste placement conditions. In-place density, moisture, and triaxial shear testing on relatively undisturbed samples should be performed on a test pad under the direction of a licensed geotechnical engineer to confirm

the physical properties of the WTR CCR material and blended (stabilized) material from laboratory test methods are applicable for the in-place waste. Additionally, a geotechnical engineer familiar with waste slope stability should review the waste placement methods and field conditions.

SUMMARY

The effective, drained shear strength of the mixture with 50% fly ash (FA-C-1), proportioned by total mass, did not meet the shear strength requirements outlined in the D&O Plan as being equal to or greater than a shear strength envelope represented by a 30-degree friction angle. However, the remolded shear strength test was performed at 92% of the standard Proctor maximum dry density which is a relatively low compaction value. Laboratory testing on in-place samples from a test pad should be used to determine the minimum density and moisture content relationship which results in a 30-degree friction angle for fly ash CCR mixes.

As shown on the attached shear strength relationship plot, the shear strength of the bottom ash CCR mixes and unmixed water treatment residual did achieve the minimum shear strength requirements at the moisture and density conditions tested.

CLOSING

This summary report provides the laboratory methods, test reports. We appreciate the opportunity to serve as your geotechnical consultant for Plant Wansley. If you have any questions, please do not hesitate to contact us at (864) 288-1265.

Sincerely,

BUNNELL-LAMMONS ENGINEERING, INC.

Johnny D. Vastag, E.I.T.
Engineering Associate

Tyler W. Moody, P.E.
Senior Engineer
Registered GA#39786

GEORGIA REGISTERED No. PE039786 PROFESSIONAL ENGINEER TYLER W. MOODY
7-22-21

cc: Claudia Montero, PE
Gary McWhorter
Tim Earl

Attachments
Laboratory Test Method Procedures
Laboratory Test Reports
Composite Shear Strength Relationships

LABORATORY TEST RESULTS

TABLE OF CONTENTS:

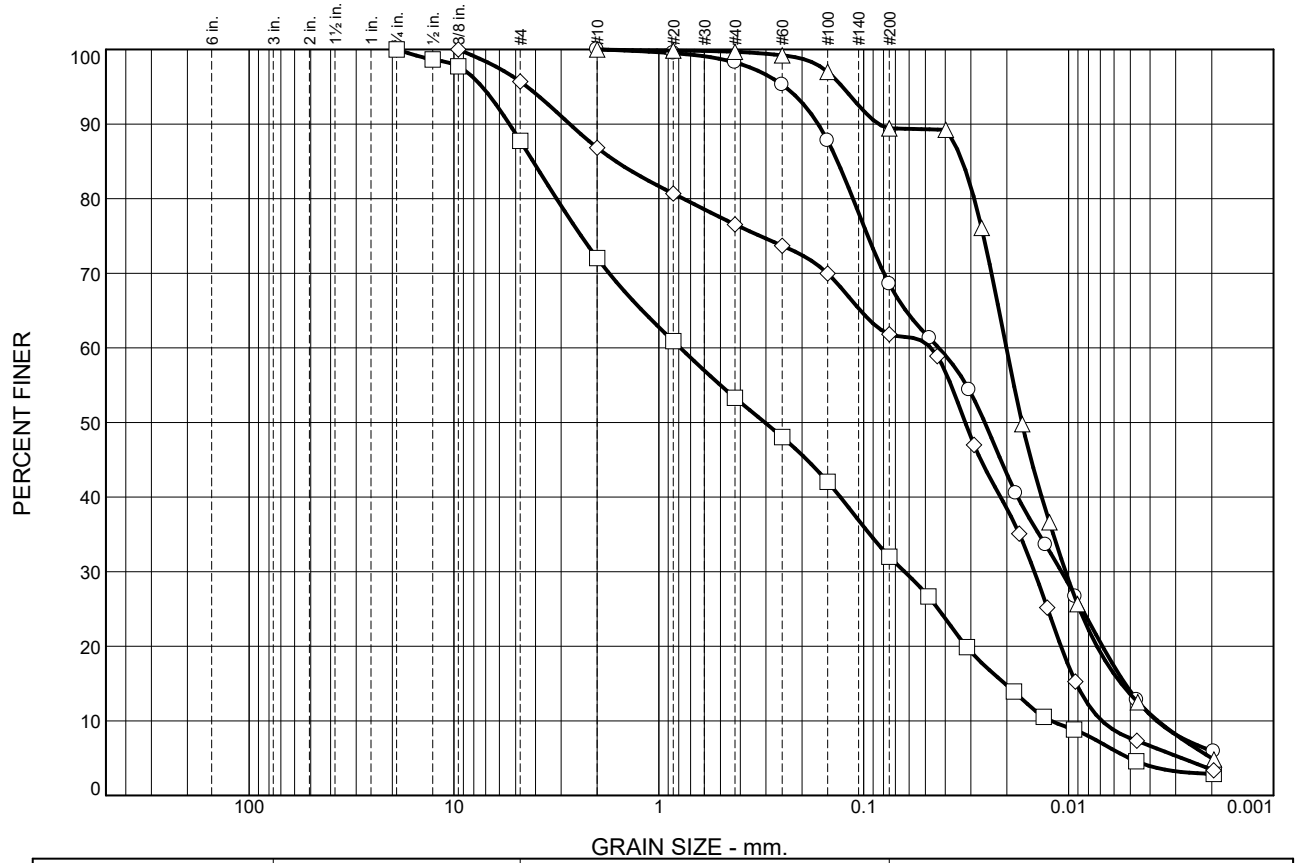
LABORATORY TEST RESULTS SUMMARY TABLE
GRAIN SIZE DISTRIBUTION
NATURAL MOISTURE CONTENT
SOIL PLASTICITY

STANDARD PROCTOR
TRIAXIAL COMPRESSION TEST
DIRECT SHEAR TEST

LABORATORY TEST RESULTS

GRAIN SIZE DISTRIBUTION

Particle Size Distribution Report ASTM D6913/D422



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	1.7	29.7	54.6	14.0
□	0.0	0.0	12.3	15.7	18.7	21.3	27.1	4.9
△	0.0	0.0	0.0	0.0	0.3	10.3	75.8	13.6
◇	0.0	0.0	4.3	8.9	10.3	14.7	54.1	7.7

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○		C-1		Coal Combustion Residual	MH
□		BA-C-1		Bottom Ash + Coal Combustion Residual	SM
△		FA-C-1		Fly Ash + Coal Combustion Residual	ML
◇		C-BA-FA-1		Coal Combustion Residual + Fly Ash + Bottom Ash	ML

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: HHNT - Lane

Project: Plant Wansley CCR Landfill

Project No.: 11379-05

Figure

Tested By: PY IV

LABORATORY TEST RESULTS

NATURAL MOISTURE CONTENT

BUNNELL LAMMONS ENGINEERING

LABORATORY MOISTURE CONTENT DETERMINATION

(ASTM D2216)

SAMPLE ID.	DEPTH (Ft)		WET WEIGHT (g)	DRY WEIGHT (g)	MOISTURE CONTENT %
C-2			186.0	55.7	233.9
C-3			214.3	64.2	233.8
C-4			246.1	75.7	225.1

JOB NAME: Plant Wansley CCR Landfill
JOB NO.: J21-11379-05
DATE: 5/21/2021

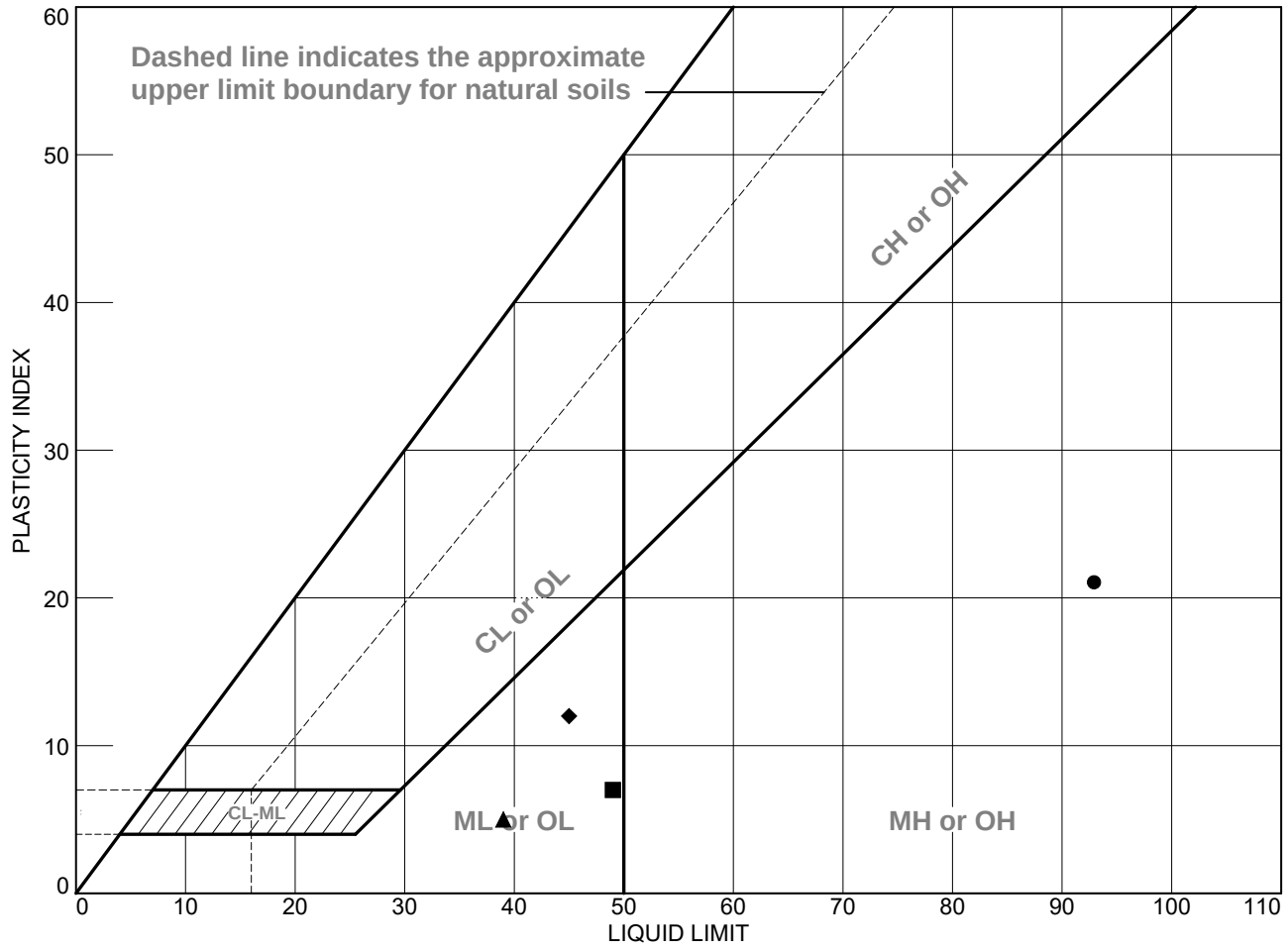
TESTED BY:
CHECKED BY: PAUL YARBER III

"C" Sample ID is for "Water Treatment Residual - Coal Combustion Residual"

LABORATORY TEST RESULTS

SOIL PLASTICITY

Liquid and Plastic Limits Test Report (ASTM D4318)



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		C-1		245.4	72	93	21	MH
■		BA-C-1		64.8	42	49	7	SM
▲		FA-C-1		75.5	34	39	5	ML
◆		C-BA-FA-1		70.9	33	45	12	ML

Bunnell Lammons Engineering, Inc.

Greenville, SC

Client: HHNT - Lane

Project: Plant Wansley CCR Landfill

Project No.: 11379-05

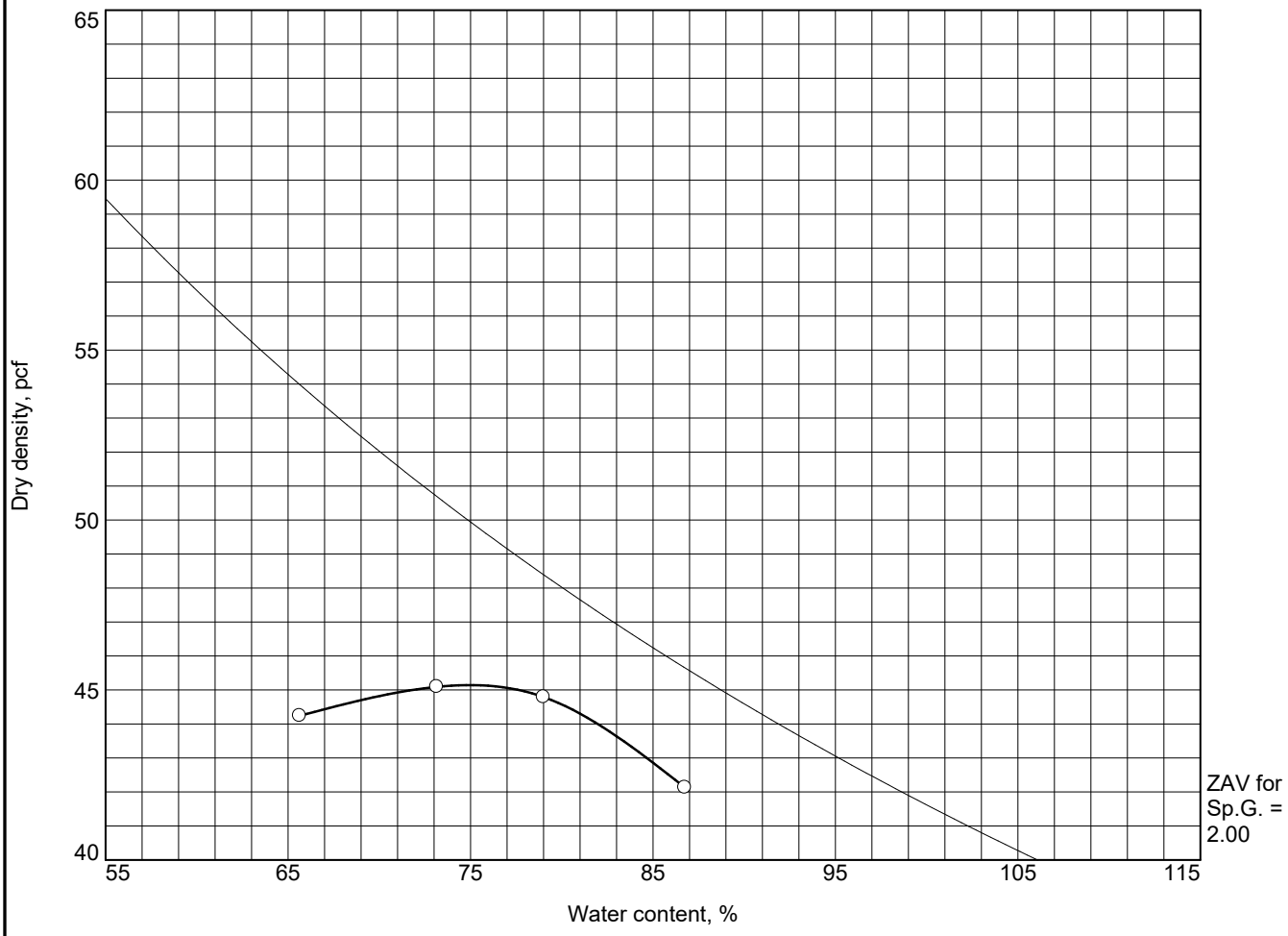
Figure

Tested By: JM

LABORATORY TEST RESULTS

COMPACTION

MOISTURE DENSITY RELATIONSHIP REPORT



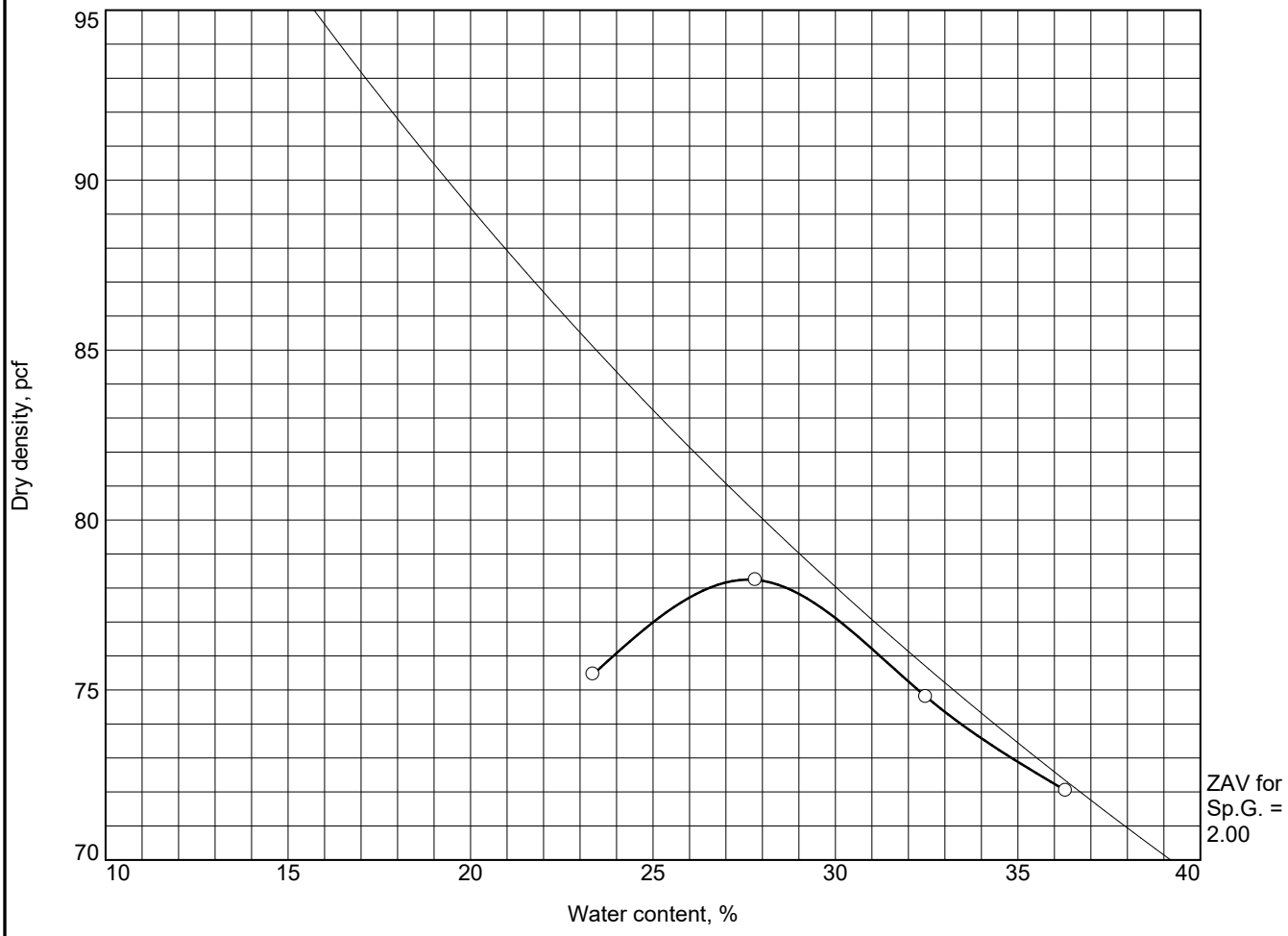
Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(22)	245.4	1.813	93	21	0.0	68.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 45.1 pcf Optimum moisture = 75.0 %	Coal Combustion Residual
Project No. 11379-05 **Client:** HHNT - Lane **Project:** Plant Wansley CCR Landfill ○**Sample Number:** C-1	**Remarks:**
Bunnell Lammons Engineering, Inc. **Greenville, SC**	**Figure**

Tested By: JR

MOISTURE DENSITY RELATIONSHIP REPORT



Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SM	A-2-5(0)	64.8	1.813	49	7	12.3	32.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 78.2 pcf Optimum moisture = 27.6 %	50% Bottom Ash + 50% Coal Combustion Residual (By Total Wt.)

Project No. 11379-05 **Client:** HHNT - Lane
Project: Plant Wansley CCR Landfill

○**Sample Number:** BA-C-1

Remarks:

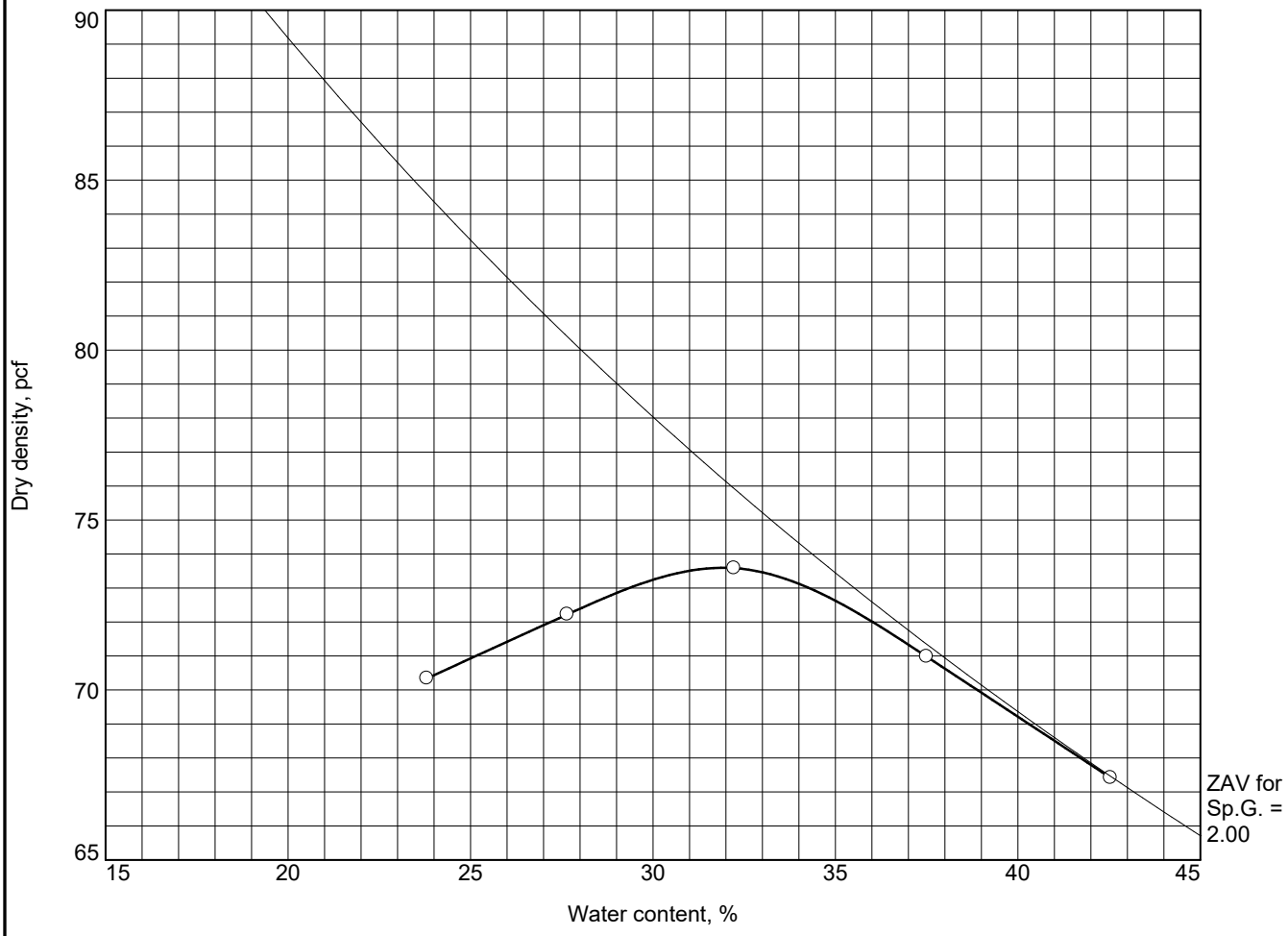
Bunnell Lammons Engineering, Inc.

Greenville, SC

Figure

Tested By: JR

MOISTURE DENSITY RELATIONSHIP REPORT



Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-4(7)	75.5	1.813	39	5	0.0	89.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 73.6 pcf Optimum moisture = 31.9 %	50% Fly Ash + 50% Coal Combustion Residual (By Total Wt.)

Project No. 11379-05 **Client:** HHNT - Lane
Project: Plant Wansley CCR Landfill

○**Sample Number:** FA-C-1

Remarks:

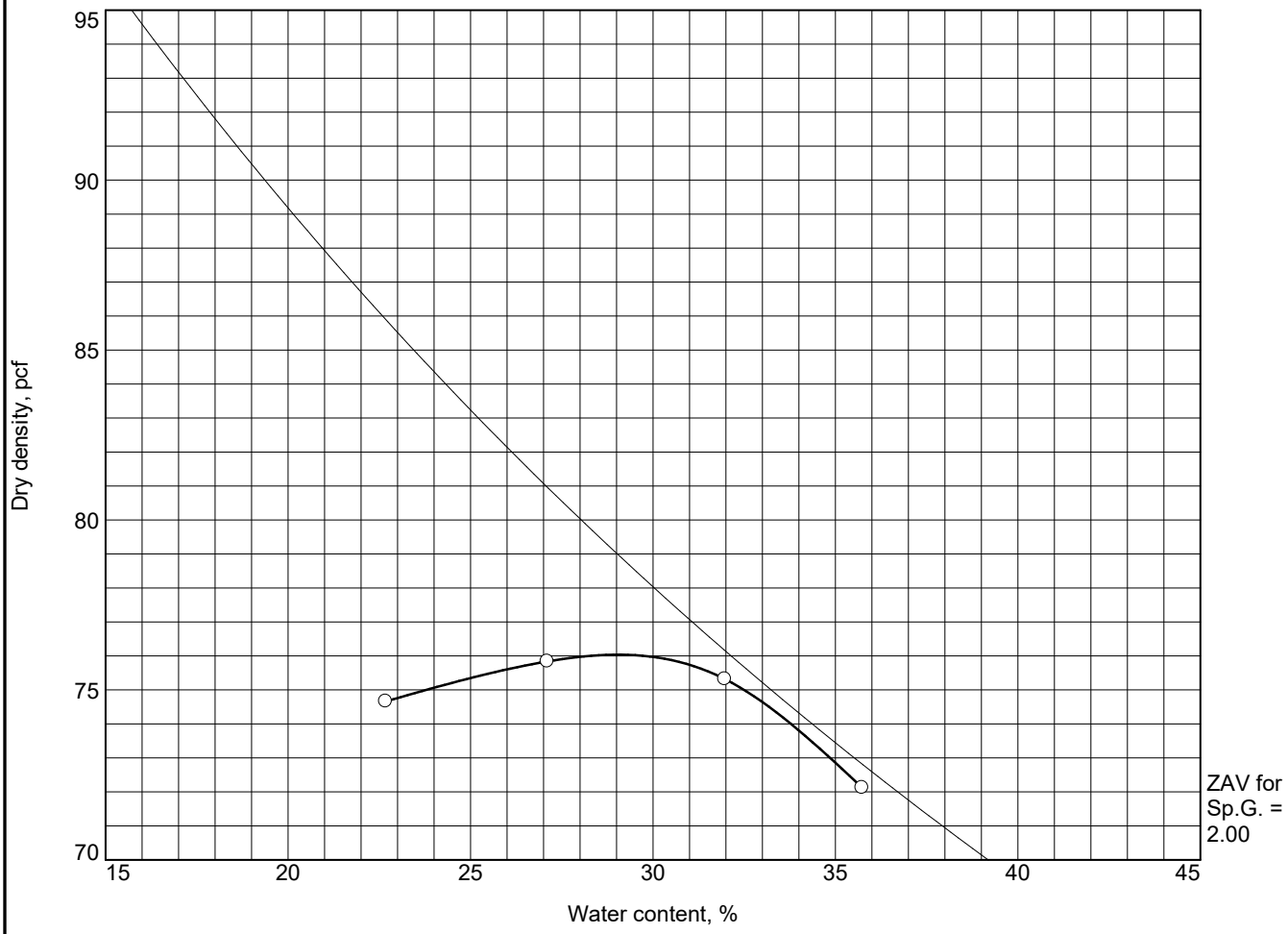
Bunnell Lammons Engineering, Inc.

Greenville, SC

Figure

Tested By: JR

MOISTURE DENSITY RELATIONSHIP REPORT



Test specification: ASTM D 698-12 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	ML	A-7-5(7)	70.9	1.813	45	12	4.3	61.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 76.0 pcf Optimum moisture = 29.0 %	25% Fly Ash + 25% Bottom Ash + 50% Coal Combustion Residual (By Total Wt.)

Project No. 11379-05 **Client:** HHNT - Lane
Project: Plant Wansley CCR Landfill

○**Sample Number:** C-BA-FA-1

Remarks:

Bunnell Lammons Engineering, Inc.

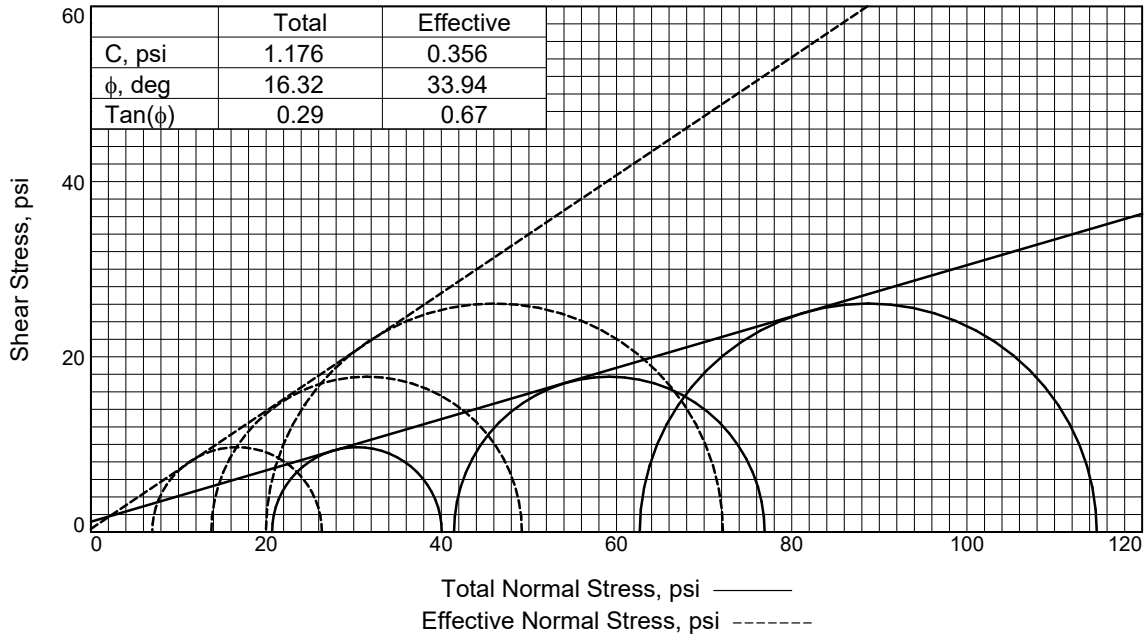
Greenville, SC

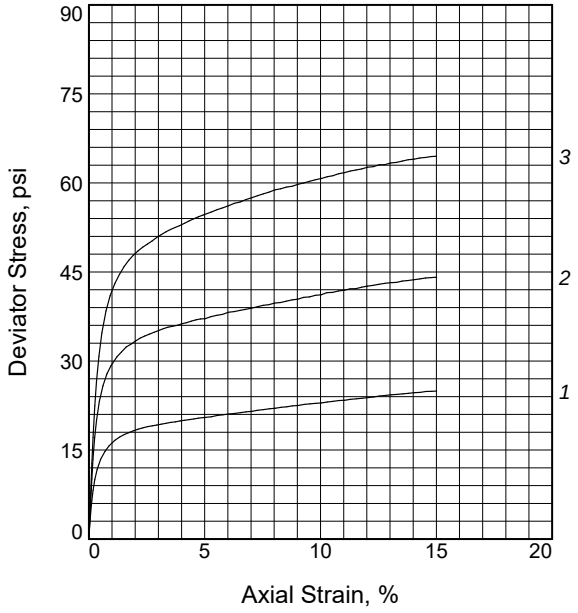
Figure

Tested By: JR

LABORATORY TEST RESULTS

TRIAXIAL COMPRESSION TEST





Sample No.		1	2	3
Initial	Water Content, %	77.0	77.0	77.0
	Dry Density, pcf	41.6	41.6	41.6
	Saturation, %	81.1	81.1	81.1
	Void Ratio	1.7204	1.7204	1.7204
	Diameter, in.	2.850	2.850	2.850
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	70.3	75.4	70.9
	Dry Density, pcf	49.8	47.8	49.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.2744	1.3678	1.2854
	Diameter, in.	2.631	2.700	2.672
	Height, in.	5.885	5.820	5.733
Strain rate, in./min.		0.010	0.010	0.010
Eff. Cell Pressure, psi		20.69	41.45	62.65
Fail. Stress, psi		19.36	35.46	52.16
Total Pore Pr., psi		73.68	77.70	72.67
Strain, %		3.1	3.2	3.5
Ult. Stress, psi		24.94	44.13	64.49
Total Pore Pr., psi		72.99	77.22	71.41
Strain, %		15.0	15.0	15.0
$\bar{\sigma}_1$ Failure, psi		26.37	49.20	72.15
$\bar{\sigma}_3$ Failure, psi		7.01	13.75	19.98

Type of Test:
CU with Pore Pressures

Sample Type: Remolded

Description: CCR

Specific Gravity= 1.813

Remarks:

100% CCR Material
Remolded at 92% Standard Proctor MDD(45.1 pcf) and 2% wet of optimum moisture (75%)

Client: HHNT - Lane

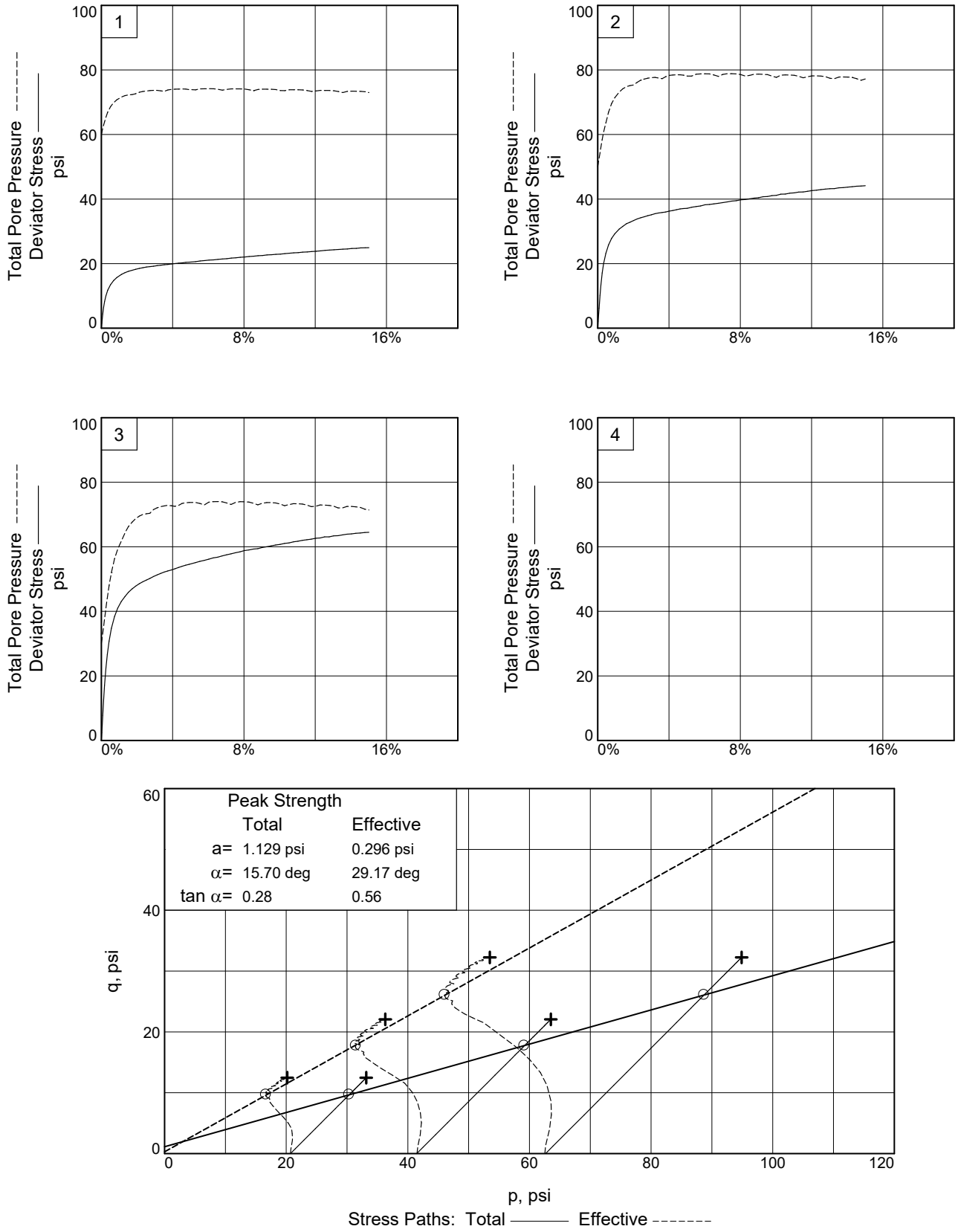
Project: Plant Wansley CCR Landfill

Sample Number: C-1

Proj. No.: 11379-05 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC

Tested By: PY IV

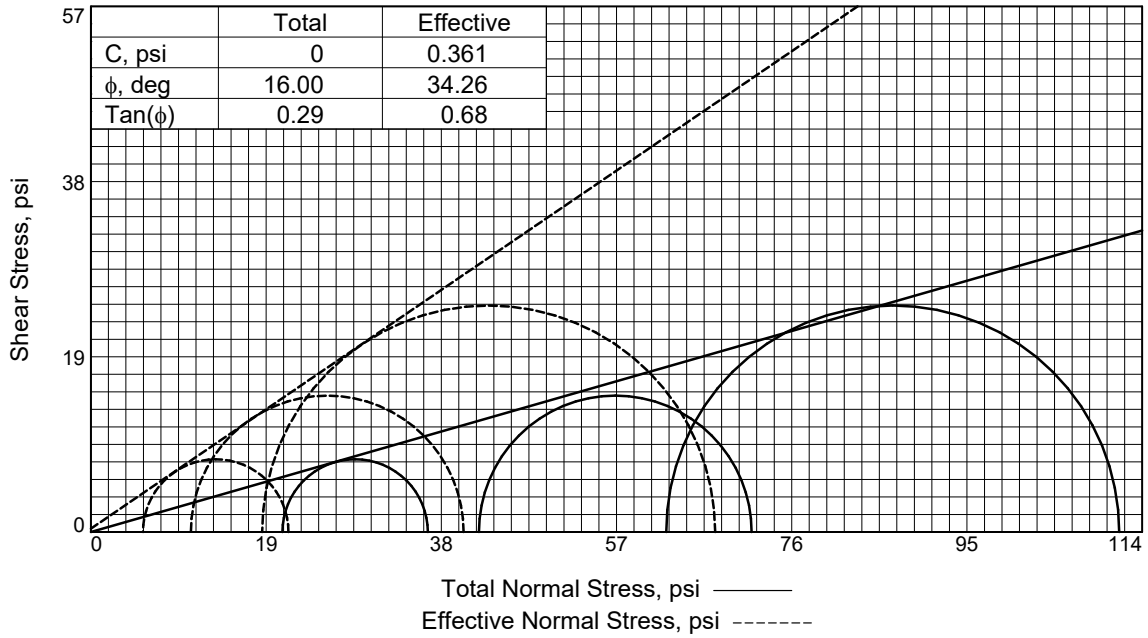


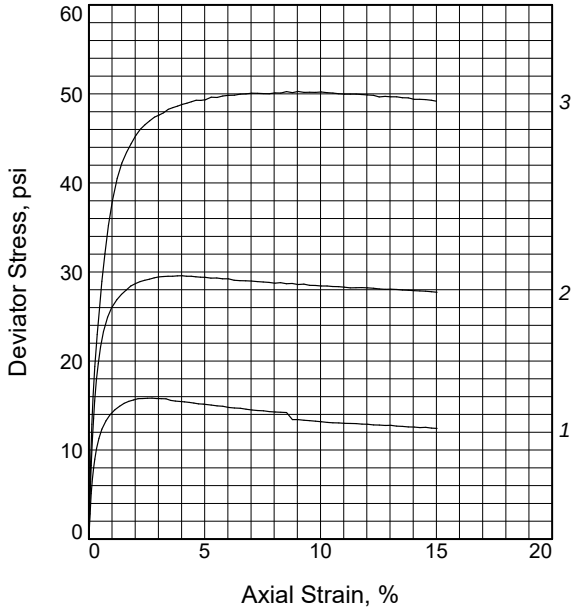
Client: HHNT - Lane
Project: Plant Wansley CCR Landfill
Sample Number: C-1
Project No.: 11379-05

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: PY IV





Sample No.		1	2	3
Initial	Water Content, %	29.6	29.6	29.6
	Dry Density, pcf	72.1	72.1	72.0
	Saturation, %	94.0	94.0	94.0
	Void Ratio	0.5709	0.5709	0.5712
	Diameter, in.	2.850	2.850	2.850
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	38.3	37.0	34.9
	Dry Density, pcf	66.8	67.7	69.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6939	0.6716	0.6319
	Diameter, in.	2.973	2.966	2.937
	Height, in.	5.947	5.896	5.870
Strain rate, in./min.		0.010	0.010	0.010
Eff. Cell Pressure, psi		20.77	42.08	62.39
Fail. Stress, psi		15.77	29.57	49.12
Total Pore Pr., psi		75.12	81.24	73.81
Strain, %		3.1	4.0	4.4
Ult. Stress, psi		12.43	27.72	49.19
Total Pore Pr., psi		76.19	82.32	74.59
Strain, %		15.0	15.0	15.0
$\bar{\sigma}_1$ Failure, psi		21.42	40.41	67.69
$\bar{\sigma}_3$ Failure, psi		5.65	10.84	18.58

Type of Test:
CU with Pore Pressures

Sample Type: Remolded

Description: CCR

LL= 49 **PL=** 42 **PI=** 7

Specific Gravity= 1.813

Remarks:

50% Bottom Ash & 50% CCR Material by total wt. Remolded at 92% of Std. Proctor MDD (78.2 pcf) and 2% wet of optimum moisture (27.6%)

Client: HHNT - Lane

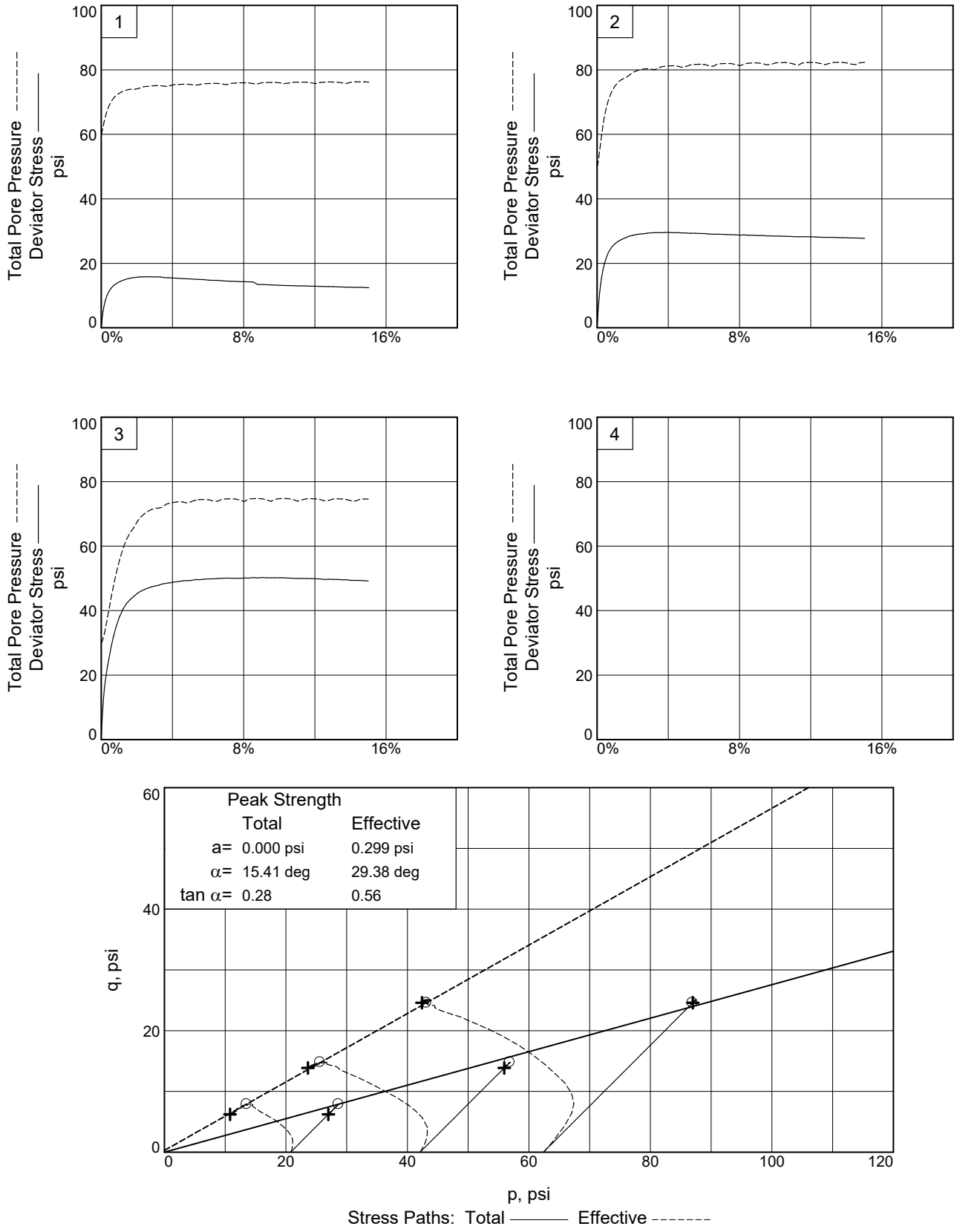
Project: Plant Wansley CCR Landfill

Sample Number: BA-C-1

Proj. No.: 11379-05 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC

Tested By: PY IV

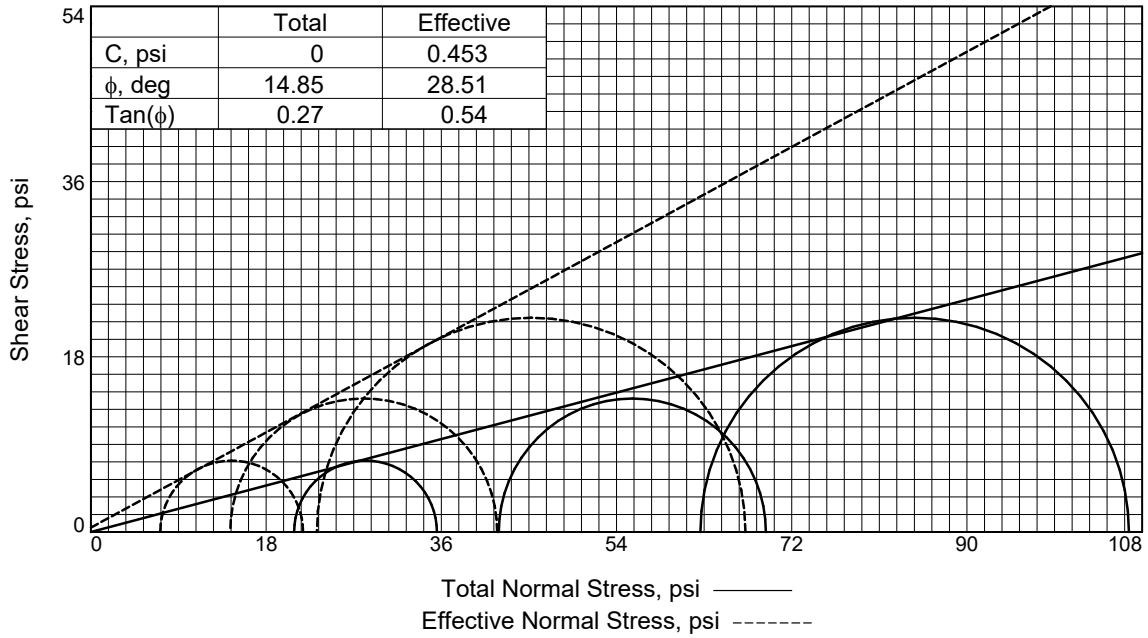


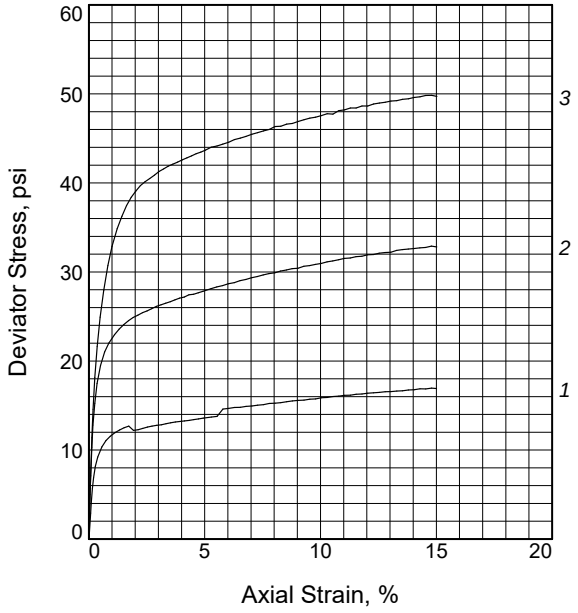
Client: HHNT - Lane
Project: Plant Wansley CCR Landfill
Sample Number: BA-C-1
Project No.: 11379-05

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: PY IV





Sample No.		1	2	3
Initial	Water Content, %	33.9	33.9	33.9
	Dry Density, pcf	67.9	67.8	67.8
	Saturation, %	92.1	91.9	92.0
	Void Ratio	0.6676	0.6687	0.6682
	Diameter, in.	2.850	2.850	2.850
	Height, in.	5.998	6.000	6.000
At Test	Water Content, %	40.1	39.2	37.4
	Dry Density, pcf	65.6	66.2	67.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7261	0.7109	0.6788
	Diameter, in.	2.934	2.934	2.906
	Height, in.	5.858	5.806	5.808
Strain rate, in./min.		0.010	0.010	0.010
Eff. Cell Pressure, psi		20.88	41.91	62.62
Fail. Stress, psi		14.67	27.43	44.02
Total Pore Pr., psi		73.75	77.60	69.40
Strain, %		6.0	4.3	5.3
Ult. Stress, psi		16.91	32.81	49.72
Total Pore Pr., psi		72.91	76.52	68.35
Strain, %		15.0	15.0	15.0
$\bar{\sigma}_1$ Failure, psi		21.80	41.75	67.24
$\bar{\sigma}_3$ Failure, psi		7.13	14.31	23.22

Type of Test:
CU with Pore Pressures

Sample Type: Remolded

Description: CCR

LL= 39 **PL=** 34 **PI=** 5

Specific Gravity= 1.813

Remarks:
50% Fly Ash & 50% CCR Material by total wt. Remolded at 92% Std. Proctor MDD (73.6 pcf) and 2% wet of optimum moisture (31.9%)

Client: HHNT - Lane

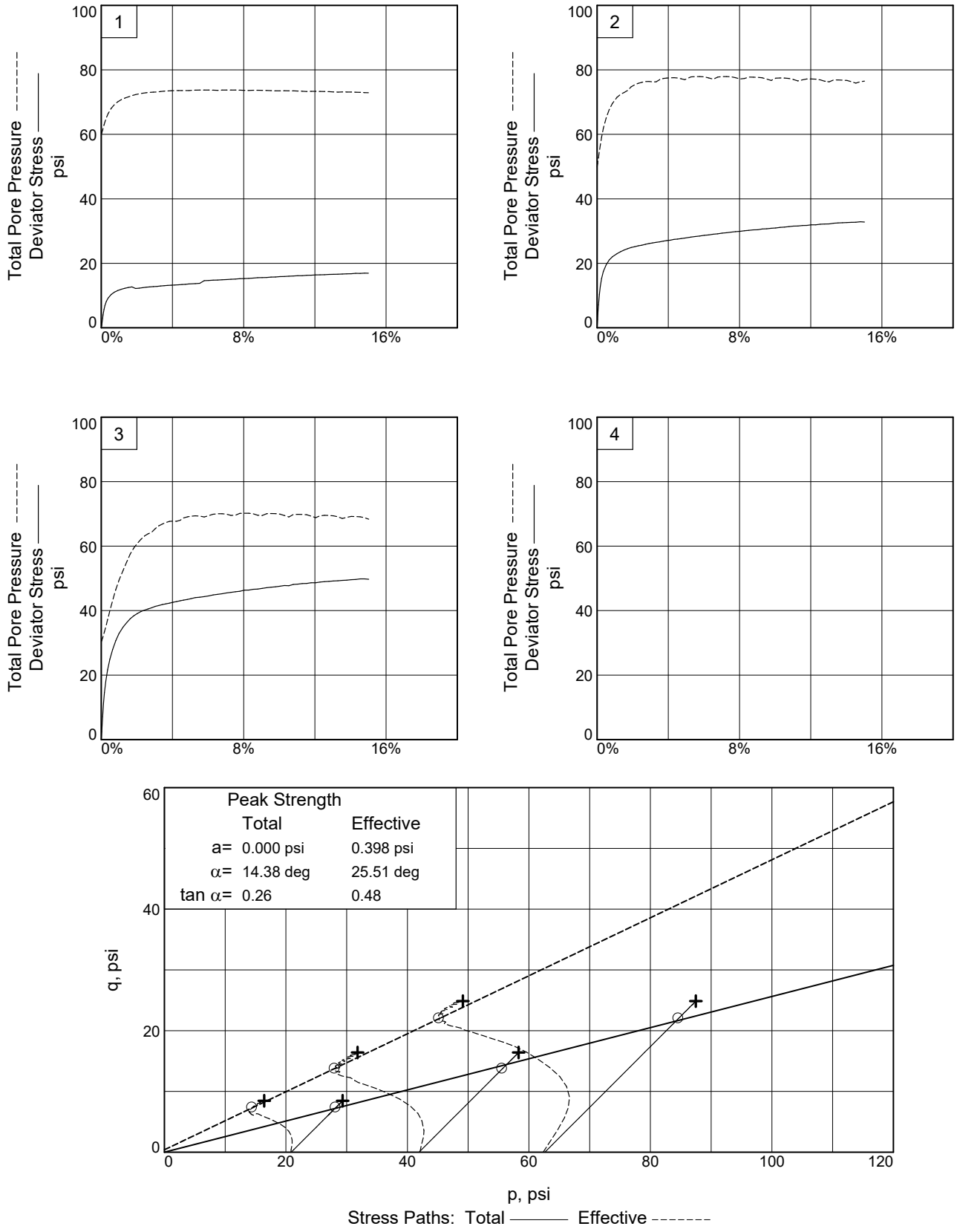
Project: Plant Wansley CCR Landfill

Sample Number: FA-C-1

Proj. No.: 11379-05 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC

Tested By: PY IV

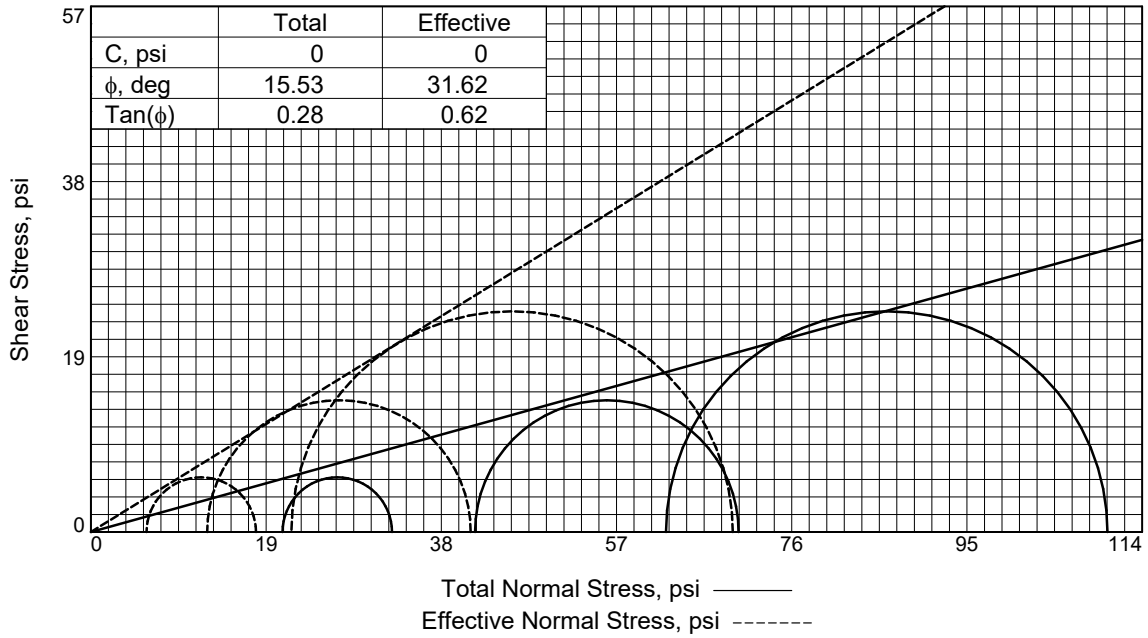


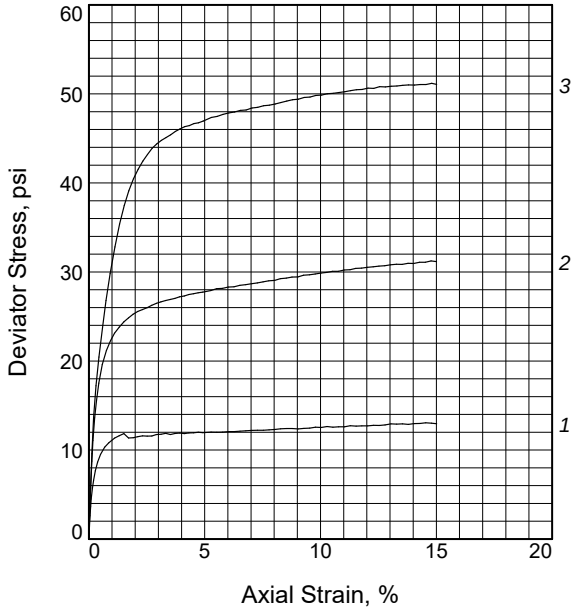
Client: HHNT - Lane
Project: Plant Wansley CCR Landfill
Sample Number: FA-C-1
Project No.: 11379-05

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: PY IV





Sample No.		1	2	3
Initial	Water Content, %	30.8	31.1	30.8
	Dry Density, pcf	70.2	70.0	70.2
	Saturation, %	91.1	91.5	91.1
	Void Ratio	0.6131	0.6172	0.6132
	Diameter, in.	2.850	2.850	2.850
	Height, in.	6.000	6.000	6.000
At Test	Water Content, %	38.8	36.5	34.2
	Dry Density, pcf	66.5	68.1	69.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7030	0.6610	0.6207
	Diameter, in.	2.961	2.935	2.907
	Height, in.	5.867	5.809	5.795
Strain rate, in./min.		0.010	0.010	0.010
Eff. Cell Pressure, psi		20.79	41.66	62.37
Fail. Stress, psi		11.86	28.58	47.87
Total Pore Pr., psi		74.75	79.05	70.63
Strain, %		3.7	6.8	6.0
Ult. Stress, psi		12.96	31.17	51.07
Total Pore Pr., psi		75.09	78.33	70.85
Strain, %		15.0	15.0	15.0
$\bar{\sigma}_1$ Failure, psi		17.90	41.19	69.61
$\bar{\sigma}_3$ Failure, psi		6.04	12.61	21.74

Type of Test:
CU with Pore Pressures

Sample Type: Remolded

Description: Coal Ash

LL= 45 **PL=** 33 **PI=** 12

Specific Gravity= 1.813

Remarks:

25% Fly Ash & 25% Bottom Ash & 50% CCR Material by total wt. Remolded at 92% Std. Proctor MDD (76.0 pcf) and 2% wet of optimum moisture (29%).

Client: HHNT - Lane

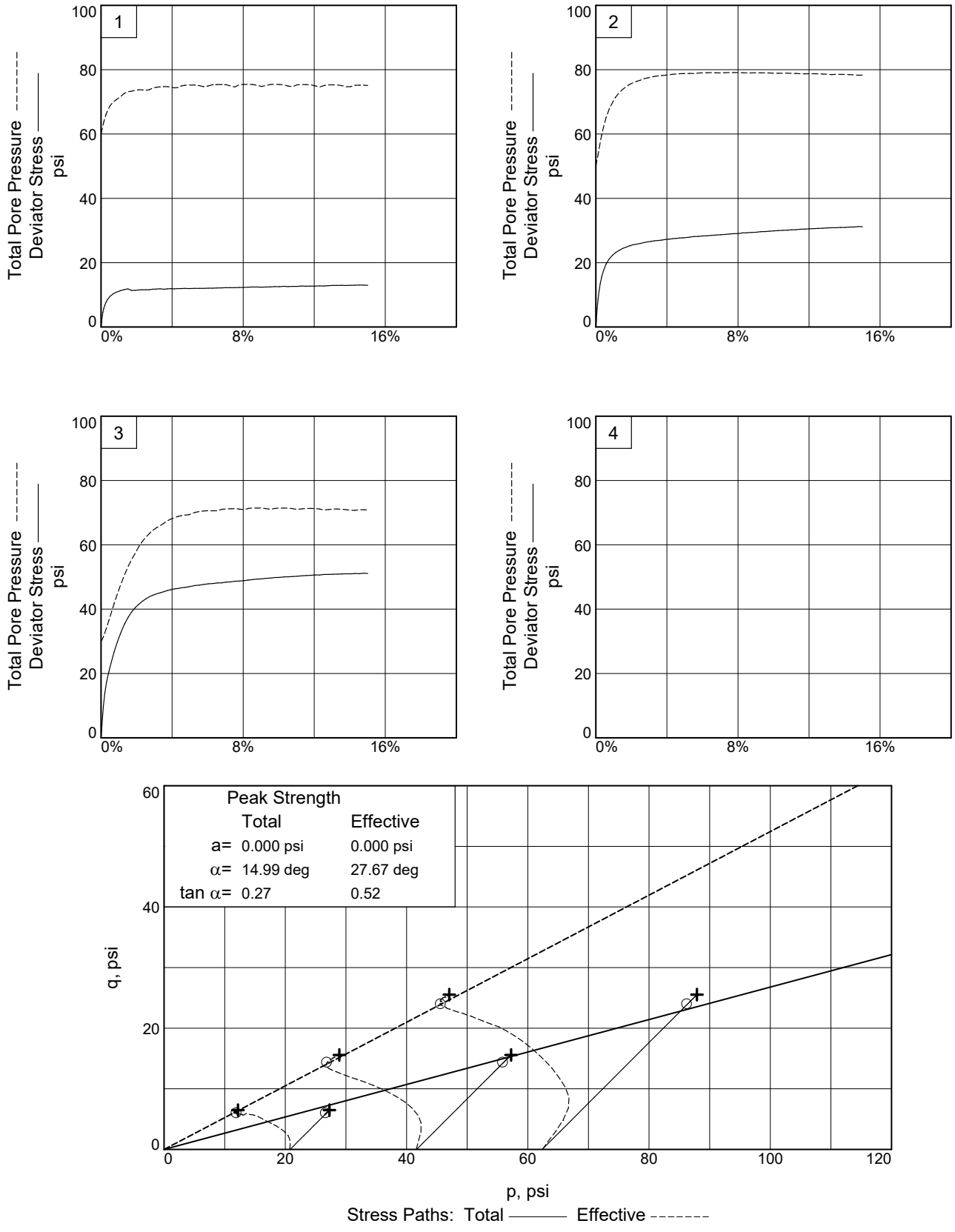
Project: Plant Wansley CCR Landfill

Sample Number: C-BA-FA-1

Proj. No.: 11379-05 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Bunnell Lammons Engineering, Inc.
Greenville, SC

Tested By: PY IV

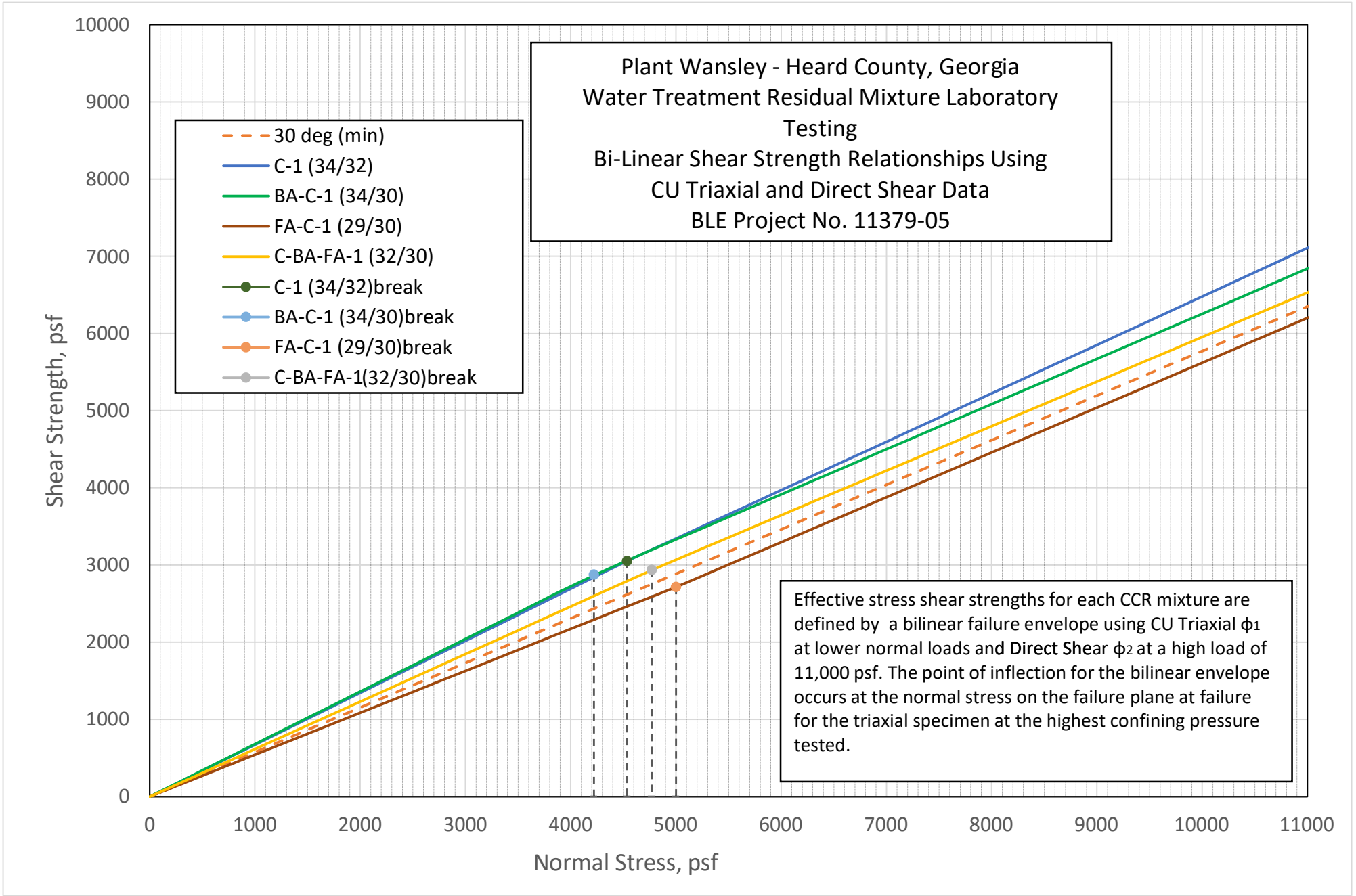


Client: HHNT - Lane
Project: Plant Wansley CCR Landfill
Sample Number: C-BA-FA-1
Project No.: 11379-05

Figure _____

Bunnell Lammons Engineering, Inc.

Tested By: PY IV


Plant Wansley - Heard County, Georgia
Water Treatment Residual Mixture Laboratory Testing
Bi-Linear Shear Strength Relationships Using CU Triaxial and Direct Shear Data
BLE Project No. 11379-05
30 deg (min)
C-1 (34/32)
BA-C-1 (34/30)
FA-C-1 (29/30)
C-BA-FA-1 (32/30)
C-1 (34/32)break
BA-C-1 (34/30)break
FA-C-1 (29/30)break
C-BA-FA-1(32/30)break
Effective stress shear strengths for each CCR mixture are defined by a bilinear failure envelope using CU Triaxial ϕ1 at lower normal loads and Direct Shear ϕ2 at a high load of 11,000 psf. The point of inflection for the bilinear envelope occurs at the normal stress on the failure plane at failure for the triaxial specimen at the highest confining pressure tested.
Shear Strength, psf
Normal Stress, psf
0
1000
2000
3000
4000
5000
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7000
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11000