Vogtle Units 3 & 4 Engineered Fill Below Grade Test Pad
Phase 1

Attachment A
Test Pad Specification and Work Procedure

CONSISTS OF:

Specification No. SV0-SSAR-XGS-001, Version 3.0
and
Work Procedure ND-ARL-004 Version 4.0

Volume 1 of 1

Job No. 6141-06-0286

MACTEC ENGINEERING
AND CONSULTING, INC.

March 14, 2008

MACTEC

March 14, 2008

Mr. Tom McCallum
Georgia Power Company
C/O Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Phone: (205) 992-6697
e-mail: tomccall@southernco.com

Subject: **Geotechnical Data Report Attachment A – Test Pad Specifications and Work Procedure**
Vogtle Units 3 & 4 Engineered Fill Below Grade Test Pad
Phase 1
Vogtle Electric Generating Plant
Burke County, Georgia
MACTEC Project Number 6141-06-0286

Dear Mr. McCallum:

MACTEC Engineering & Consulting, Inc. is pleased to submit Attachment A of the Final Data Report for the geotechnical exploration and laboratory testing for the Vogtle Units 3 & 4 Engineered Fill Below Grade Test Pad Project located adjacent to the existing Vogtle Electric Generating Plant near Waynesboro, Burke County, Georgia.

It has been a pleasure to perform the work described in the attached report. If you have any questions, or if we may be of further service, we hope that you will contact us at your convenience.

Sincerely,

MACTEC ENGINEERING & CONSULTING, INC.

Matthew F. Cooke For Matthew F. Cooke with permission
Senior Geologist
Site Superintendent
Registered, Georgia 1887

Wm. Allen Lancaster
Project Manager
Civil Engineer
Registered, Georgia 7075

Stephen E. Woodham, E.I.T
Project Geotechnical Engineer

Pieter J. DePree
Principal Geotechnical Engineer
Registered Georgia 19637

DCN VGCOL 441
Revision 0, 3/14/08

ATTACHMENT A

This Attachment is one of a number of attachments that are part of the following report which was prepared by MACTEC Engineering & Consulting Inc.:

Geotechnical Data Report
Vogtle Units 3 & 4 Engineered Fill Below Grade Test Pad
Phase 1
Vogtle Electric Generating Plant
Burke County, Georgia
Subsurface Investigation and Laboratory Testing
SNC Subcontract No. 7074425
MACTEC Job No. 6141-06-0286

For background and a description of scope of work contained in the report, please refer to the above referenced report. The report was addressed as follows:

Mr. Tom McCallum
Georgia Power Company
C/O Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Phone: (205) 992-6697
e-mail: tomccall@southernco.com

The following list shows other Attachments to the above report and their included information:

Survey Report (Patterson and Dewar)…….…….See Attachment B

Laboratory Test Data Sheets….……..…See Attachment C

Geotechnical Boring Logs and SPT Energy Test Report …… ……See Attachment D

Geophysical Testing Report …….…….See Attachment E

ATTACHMENT A

Test Pad Specifications and Work Procedure

CONSISTS OF:

Specification No. SV0-SSAR-XGS-001, Version 3.0
and
Work Procedure ND-ARL-004 Version 4.0

Volume 1 of 1

SPECIFICATION NO. SV0-SSAR-XGS-001

VERSION 3.0

Southern Nuclear Operating Company, Inc.
Birmingham, Alabama

SPECIFICATION

FOR

Engineered Fill Below-Grade Test Pad

FOR

Vogtle Electric Generating Plant – UNITS 3 & 4

PREPARED BY: _____ DATE: 1-10-2008

REVIEWED BY: _____ DATE: 01/10/2008

APPROVED BY: _____ DATE: 01/10/2008

RECEIVED
JAN 10 2008
DOCUMENT SERVICES

Page Revised	Description of Change	Applicable Version
2	Revise Purpose Step 1.0 to "backfill test program to collect seismic soil properties in support of the"	2.0
2	Moved scope and responsibility statements to section 2.0 and added separate subsection for each entity.	2.0
General	Deleted procedure-level details that are covered in ND-ARL-014 (sloping of surfaces, disposal of spoils, etc). The intent was to move implementation details to the procedure and keep the focus of specification on: • definition of QA requirements • definition of scope of work • standards to be used for testing • backfill selection requirements • compaction requirements	2.0
6, 7	Moved all technical requirements into single section (6.0)	2.0
6	Revised lift height to be as described in ND-ARL-014 (6 inch compacted lift versus loose lift).	2.0
General	Other formatting and text changes were not technically significant.	2.0
General	Revised specification number to SV0-SSAR-XGS-001	2.0
General	Corrected Title – changed "A.W. Vogtle" to "Vogtle"	2.0
7	Added requirement for RCTS testing procedures to be approved under Geotechnical Contractor's QA program (6.16).	3.0

		Page Number
1.0	Purpose	2
2.0	Scope	2
3.0	Quality Requirements	4
4.0	Reference Codes and Standards	4
5.0	Definitions	5
6.0	Technical Requirements	6
7.0	Documentation Requirements	7
8.0	References	7
Attachment 1 - PDF Document Submittal Checklist		8

1.0 PURPOSE

This specification describes the requirements for a backfill test program to collect seismic soil properties in support of the combined license application for Vogtle 3 & 4.

2.0 SCOPE

2.1 This specification describes the construction and testing of a below-grade engineered fill test pad.

2.2 All activities will occur within the Vogtle Electric Generating Plant Owner Controlled Area. The specific location of this activity and related activities shall be selected and designated by Southern Nuclear Operating Company (SNC).

2.3 The purpose of this test pad is to develop backfill data (e.g., shear wave velocity) representative of engineered fill placed under field conditions. This test pad will be constructed in an excavation approximately 20 feet deep. The excavation may be a linear trench or an excavation into a sloped surface per SNC direction.

2.4 SNC shall be responsible for the following:

2.4.1 General work procedures and design drawings as required for excavation and construction of the test pad

2.4.2 An approved Sediment and Erosion Control Plan

2.4.3 Onsite supervision for overall work procedure implementation

2.4.4 Surveying support

2.5 The Earthwork Contractor shall be responsible for the following:

2.5.1 Installation storm water control features and performance of site restoration described in the Sediment and Erosion Control Plan.

2.5.2 All clearing, grubbing, and temporary road construction needed to complete the activity.

2.5.3 All excavation and backfill activities.

2.5.4 Earthwork Contractor shall provide an excavation supervisor qualified in accordance with applicable OSHA regulations and guidance.

2.5.5 The Earthwork Contractor shall furnish all labor, personnel, excavating equipment, earthmoving equipment, storm water control, and all the other accessories required to complete its responsibilities.

2.6 The Geotechnical Contractor shall be responsible for the following:

2.6.1 Geotechnical testing of backfill, subsurface investigation, laboratory tests on soil samples, and field testing.

2.6.2 The Geotechnical Contractor shall furnish all labor, personnel, drill rigs, exploration, sampling and testing equipment, and materials to complete its responsibilities.

2.6.3 The Geotechnical Contractor shall maintain a daily log when work is in progress and record information relevant to the excavation and backfill operation.

2.6.4 Preparation of a report as detailed in Section 7.0 documenting the results of all explorations, field testing, and laboratory tests covered by this Specification.

3.0 QUALITY REQUIREMENTS

3.1 Test pads constructed under this specification will not be used to support any Category 1 structures for Vogtle 3 & 4. The subsurface preparation beneath the pad and the overall shape and dimensions of the pad are not safety-related characteristics of the test pad and may be varied in the field as directed by SNC. The placement of the backfill will be performed under quality procedures meeting 10 CFR 50 Appendix B.

3.2 Soil testing, including but not limited to the laboratory testing for characterization of backfill material, compaction testing, crosshole shear wave velocity testing, and spectral analysis of surface waves (SASW) testing may be used to support calculations for the foundation design for Vogtle Units 3 & 4 Category 1 structures. Unless otherwise identified by this specification, all soil testing shall be performed in accordance with 10 CFR 50 Appendix B quality requirements.

3.3 Surveying activities associated with controlling lift thicknesses for the test pad will be performed by qualified land surveyors. The survey party chief shall comply with all survey requirements of the State of Georgia. The party chief (or other person in responsible charge of the survey effort) shall meet all licensing qualifications in Georgia and have prior experience in survey work in Georgia. Proper instruments, equipment and procedures shall be employed to produce an accurate survey, consistent with local codes and regulations. The surveys shall be completed to State Plane NGVD 29 (vertical) and NAD27 (horizontal).

4.0 REFERENCED CODES AND STANDARDS

Codes and Standards referenced in this Specification include, but are not limited to, those listed below. Materials, workmanship, and testing shall conform to the following Codes and Standards and shall be the latest edition, revision, or supplement in effect on the date of the award of the contract to meet the requirements of this Specification unless noted otherwise.

4.1 ANSI N45.2 "QA Program Requirements for Nuclear Power Plants"

4.2 ASTM D422 "Particle-Size Analysis of Soils"

4.3 ASTM D653 "Definition of Terms and Symbols Relating to Soil and Rock Mechanics"

4.4 ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method"

4.5 ASTM D1557 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))"

4.6 ASTM D1586 "Standard Method for Penetration Test and Split-Barrel Sampling of Soils"

4.7 ASTM D2216 "Laboratory Determination of Moisture Content of Soil"

4.8 ASTM D2487 "Classification of Soils for Engineering Purposes"

4.9 ASTM 4318 "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

4.10 ASTM D4643 "Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method"

4.11 ASTM D4959 "Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating"

4.12 ASTM D6938 "Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)"

5.0 DEFINITIONS

5.1 Earthwork Contractor – organization responsible for clearing, grubbing, excavation, backfilling, and compaction.

5.2 Geotechnical Contractor – organization responsible for performing and reporting geotechnical and geophysical tests and inspections per SNC direction.

6.0 TECHNICAL REQUIREMENTS

6.1 Backfill for the test pad shall be free of all organic material; shall not include material greater than 3" in maximum dimension; and shall be classified as sand or silty sand with no more than 25% fines passing a #200 sieve by weight.

6.2 The base of the excavation shall be prepared and compacted as directed by SNC before placement of backfill. The base of the excavation shall be approximately horizontal (i.e. level) before placement of backfill.

6.3 Backfill shall be placed in lifts as required to achieve compacted lift heights of roughly 6", and compacted to a dry density greater than or equal to 95% Modified Proctor maximum dry density per ASTM D1557.

6.4 Work procedures shall be provided by SNC describing the implementation of the soil testing program, including testing frequency, location and other relevant details.

6.5 Particle size analysis of backfill soil shall be conducted in accordance with ASTM D422. Geotechnical Contractor may take exception to the hydrometer test component of ASTM D422.

6.6 Modified Proctor maximum dry density and optimum moisture content testing shall be conducted in accordance with ASTM D1557.

6.7 Soil classification shall be performed in accordance with ASTM D2487.

6.8 Testing for Atterberg Limits (Plastic Limit and Plasticity Index of Soils) shall be conducted in accordance with ASTM D4318.

6.9 Sand cone density testing shall be conducted in accordance with ASTM D1556.

6.10 Standard Penetration Tests (SPT) and split-barrel sampling of soils shall be conducted in accordance with ASTM D1586.

6.11 Field moisture content testing shall be conducted in accordance with ASTM D2216, ASTM D4643, or ASTM D4959.

6.12 Nuclear Density testing, if performed, shall be conducted in accordance with ASTM D6938.

6.13 Cross hole testing shall be conducted in accordance with procedures approved under the Geotechnical Contractor's quality program.

6.14 Spectral Analysis of Surface Waves (SASW) testing shall be conducted in accordance with procedures approved under the Geotechnical Contractor's quality program.

6.15 The Geotechnical Contractor shall document relevant information for each lift, including type of compaction equipment, number of passes, speed, and vibration settings of compaction equipment.

6.16 Resonant Column Torsional Shear (RCTS) testing shall be performed on remolded test pad fill material to determine soil properties relevant to the test pad seismic testing (e.g., shear modulus degradation and damping ratio versus shear strain) in accordance with procedures approved under the Geotechnical Contractor's quality program.

7.0 DOCUMENTATION REQUIREMENTS

7.1 Geotechnical Contractor is to provide a final report to include, but not be limited to the following:

- Summary of results and analysis of seismic testing;
- Contractor procedures;
- Calibration records in accordance with 10 CFR 50 Appendix B;
- All laboratory testing results;
- Field testing results;
- Field records, notes, and digital photographs.

7.2 Final reports are to meet SNC Nuclear Development electronic document submittal guidance provided as Attachment 1.

8.0 REFERENCES

8.1 ND-ARL-014 "Engineered Fill Below-Grade Test Pad"

Attachment 1
Nuclear Development PDF Document Submittal Checklist

Electronic documents submitted to Nuclear Development shall meet the following requirements to support NRC review and document storage requirements:

1. All PDF files should be created using Adobe Acrobat 8 Professional (8.1.0 or later) using NRC settings. (http://www.nrc.gov/site-help/electronic-sub-ref-mat.html).
2. All files should be distilled directly into PDF format through the native software (e.g., MS Word, AutoCad, etc.). Native software should use non-proprietary true-type fonts (preferred SNC font is Arial).
3. All distilled documents (including graphics) shall be word searchable.
4. All scanned pages shall be at a minimum 300 dpi.
5. All scanned documents shall be rotated for screen view prior to performing OCR.
6. All scanned documents shall be OCR'd using Adobe Acrobat 8 Professional (8.1.0 or later) and fonts embedded to ensure searchability.
7. All pages are properly rotated for on-screen viewing.
8. All pages of the electronic document shall be numbered to ensure proper assembly, identification and completeness.
9. All documents shall pass Adobe Acrobat 8 Professional (8.1.0 or later) NRC Preflight default settings.
10. All electronic documents shall be Fast Web View Enabled.
11. Maximum file size for all electronic documents shall be less than or equal to 49 MB. For documents that are larger than 49 MB, the file shall be subdivided into multiple files less than 49 MB in size.
12. Electronic files provided on CD or DVD shall have a prefix number beginning with 001 and continue sequentially such that if printed in order, the files would produce a hardcopy version of the electronic document provided.
13. A hard copy version shall be provided that was generated from the final electronic PDF files.
14. Electronic documents (e.g., reports, manuals, procedures) shall be formatted to facility two sided printing. The first page (or front page) of any two-sided document will be an odd numbered page and the back will be even numbered. Blank numbered pages shall be inserted as needed at the end of sections and chapters to ensure two-sided print format is maintained.
15. Electronic media (e.g., CDs or DVDs) shipped via U.S. Mail or other carriers shall be packaged in such a manner to insure damage does not occur during shipping. Packaging shall include but not limited to CD type shipping boxes/containers.
16. All security settings off or deactivated (e.g., password protected, encrypted) that would inhibit or prevent viewing, printing or copying.

Vogtle Deployment Director: Dale M. Lloyd
(Signature)

Approval Date: 12-14-07

Effective Date: 12-18-07

Table of Contents

Page

1.0 Purpose 3
2.0 Applicability 3
3.0 References 3
4.0 Definitions 3
5.0 Responsibilities 3
6.0 Quality Requirements 4
7.0 Precautions and Limitations 4
8.0 Prerequisites 5
9.0 Process Description 5
10.0 Deficiencies 8
11.0 Records 8
12.0 Commitments 8
Attachment 1 - Potential Borrow Material Testing Requirements 9
Attachment 2 - Backfill Placement Testing Requirements 10
Attachment 3 - Expected Elevations of Test Pad 11
Figure 1 - Test Pad Layout 12

1.0 Purpose

This procedure describes the construction and testing of a compacted soil test pad. The intent of this procedure is to simulate the compaction process for a production backfill operation that produces consistent results that meet the specification requirements. The data collected from this test pad will be used to support licensing activities for Vogtle 3 and 4. The final test pad will not be used as part of the physical foundation for any safety-related structure, and therefore the activities described by this procedure are not considered construction activities as defined by 10CFR52.

This procedure describes Phase 1 of a backfill test pad program. The purpose of the Phase 1 program is to provide soil properties representative of backfill properties for the new units, on a schedule that will support NRC review activities for the Vogtle ESP/LWA.

Phase 2 will expand the test pad effort to include an investigation of backfill placement techniques and variability of the onsite soils to determine site-specific procedures for Vogtle 3 and 4 backfill placement.

2.0 Applicability

This procedure is applicable to construction and testing of a backfill test pad. This procedure describes activities to be performed by SNC Nuclear Development personnel and subcontractors.

3.0 References

3.1 NMP-GM-010, Supplemental Personnel Control

3.2 Nuclear Development Quality Assurance Manual

3.3 SV0-SSAR-XGS-001, Specification for Engineered Fill Below-Grade Test Pad

3.4 SV0-0000-GOR-2002, Test Pad Location Plan and Section

3.5 25016-C, Earthwork

4.0 Definitions

4.1 BMPs – storm water Best Management Practices as defined by the SWP.

4.2 SWP – Storm Water Permit, represented by an active Erosion, Sediment and Pollution Control Plan.

5.0 Responsibilities

5.1 The **SNC Project Supervisor** is responsible for execution of this procedure and for oversight of all onsite activities. The SNC Project Supervisor is also responsible for ensuring that all requirements of the stormwater permit are implemented throughout the project duration.

5.2 The **SNC Contract Administrator** is responsible for performing contract administration duties for all contractors in accordance with NMP-GM-010, Supplemental Personnel Control.

5.3 The **Earthwork Contractor** is responsible for installing storm water BMPs and performing clearing, grubbing, excavation, earthmoving, backfilling, compaction and final site restoration. The earthwork contractor will provide a qualified Excavation Competent Individual to oversee excavation activities.

5.4 The **Excavation Competent Individual** is responsible for ensuring that all excavation activities are performed safely and in accordance with OSHA requirements.

5.5 The **Geotechnical Contractor** is responsible for underground utility surveys prior to excavation activities, performing geotechnical tests and inspections, installation of cased boreholes for seismic cross-hole testing, and compilation of a final report of all geotechnical activities. The Geotechnical Contractor is also responsible for providing the Geotechnical Lead.

5.6 The **Geotechnical Lead** will be responsible for technical direction of soil selection, sampling, stockpiling, backfilling, compaction and testing activities.

6.0 Quality Requirements

Quality requirements are described in Nuclear Development Quality Assurance Manual.

7.0 Precautions and Limitations

7.1 This procedure will be worked in parallel with an SWP. The SWP describes activities that must be performed and conditions that must be met as part of this work activity. Deviations and changes to the SWP may be implemented with the concurrence from the cognizant SNC Environmental personnel.

7.2 Current GPC interpretations of the Georgia storm water regulations prohibit clear-cutting of trees prior to approval of the SWP.

7.3 A design drawing shall be provided as a guide for the construction activities (Refer to SV0-0000-GOR-2002, Test Pad Location Plan and Section). The overall physical dimensions of the test pad are not critical parameters and may be adjusted as directed by the SNC Project Supervisor. Other features such as the areas to be cleared, the return road, the spoils disposal area and stockpile may be modified as directed by the SNC Project Supervisor provided the provisions of the Storm Water Permit are met.

7.4 An Excavation Authorization data sheet will be completed in accordance with the requirements of 25016-C, Earthwork, for all excavations. A single Excavation Authorization data sheet may include multiple excavations.

7.5 Horizontal survey data should be provided in horizontal state plane or plant grid coordinates as defined on drawing SV0-0000-GOR-2002, Test Pad Location Plan and Section.

7.6 Vertical survey elevations shall be referenced to the NGVD 29 vertical datum.

7.7 Debris shall be handled as directed by GPC Land Management and SNC environmental personnel.

7.8 The Geotechnical Lead shall maintain a daily log of activities including weather conditions and other relevant information.

7.9 Ensure backfill is NOT placed over a frozen surface, **AND** that frozen earth is NOT incorporated into the backfill.

7.10 Ensure environmental controls are in place as directed by SNC environmental personnel for equipment and fuel tanks.

8.0 Prerequisites

8.1 Obtain a copy of the approved SWP.

8.2 Obtain training records for persons who will be the excavation competent individual.

8.3 Contract administration functions have been completed for all contractors.

9.0 Process Description

NOTE: Section 9.1 should be performed in order prior to continuing with this procedure.

9.1 Installation of Storm Water Features

9.1.1 Contact a responsible SNC Environmental representative (24-hour contact person listed on the SWP or other designated SNC Environmental contact) and confirm that installation of BMPs may proceed.

9.1.2 Install BMPs in accordance with the SWP.

9.1.3 Verify the initial BMPs have been inspected and that the required SWP signature has been obtained.

NOTE: Steps within 9.2 may be performed in phases and concurrently with other activities in this procedure.

9.2 Site Preparation, Excavation and Selection of Borrow Material

9.2.1 Perform tree clearing and grubbing as needed to prepare areas for excavation and stockpiling.

- Dispose of debris as directed by GPC Land Management **AND** SNC environmental personnel.

9.2.2 Perform excavations as needed for construction activities.

9.2.3 Handle material removed from excavations as follows:

9.2.3.1 Potentially acceptable borrow material shall be segregated from unsuitable material and tested in accordance with Attachment 1.

9.2.3.2 Unsuitable backfill material shall be spoiled in accordance with the SWP or used in construction of ramps and roadways.

9.2.3.3 **IF** inclement weather is expected, **THEN** stockpiled borrow material should be protected from rainwater saturation by compaction and sloping of surfaces or other means.

NOTE: Prior to covering the test pad excavation sides with erosion control fabric, the excavation should be photographed and the photos retained as project records.

Construction activities may continue during installation of BMPs.

9.2.4 Install BMPs for excavations as described in the SWP.

9.3 Preparation of Test Pad Base Material

9.3.1 Prepare the base of the test pad as directed by the Geotechnical Lead. Expected preparatory activities include mixing the native material to a depth of approximately 12 inches following by compaction to obtain a stable subsurface for backfill placement. Compaction should include testing the base material for localized soft spots. Additional excavation may be required based on local conditions. Material including backfill, sand or gravel may be added as directed by the Geotechnical Lead. Testing of the sub-grade will be as directed by the Geotechnical Lead.

9.3.2 The test pad excavation shall be surveyed to record the dimensions and elevation of the sub-grade base.

NOTE: Section 9.4 applies to backfill placement directly beneath the test pad plus a 40 foot margin on all sides. Outside of this area fill material may be placed and compacted as directed by the Geotechnical Lead. Section 9.4 shall be repeated as required to construct the test pad.

NOTE: Vibratory compaction for sand and silty sand effectively compacts the soils below the upper layer while the top surface may experience a "fluffing" effect. All compaction requirements relate to layers of soil below the uppermost layer of soil.

9.4 Test Pad Backfill Placement and Testing

9.4.1 **IF** the previous lift has become too dry to permit a suitable compaction (based on the judgment of the Geotechnical Lead), **THEN** rework the material.

9.4.2 Place qualified backfill material as required to achieve compacted lifts that are approximately 6" thick.

- Maintain a slight slope on the fill surface to prevent collection of rain water within the excavation area.

NOTE: Representative samples for testing may be taken during placement of borrow material or following density testing using the material from sand cone testing, as directed by the Geotechnical Lead.

9.4.3 Obtain representative samples of the backfill and test as described in Attachment 2.

9.4.4 Moisture condition as necessary to obtain a moisture content close to the optimum moisture content for compaction. As a guideline, the target moisture density for materials having a distinctly peaked moisture curve is approximately (-3%) to plus two (+2%) percentage points of the average optimum moisture content. The acceptable target moisture band may need to be adjusted in the field as necessary to achieve the required density.

- Mix lift to ensure moisture content of entire layer is uniform.

9.4.5 Compact each lift to a minimum 95% Modified Proctor maximum dry density per ASTM D1557 using a vibratory drum roller or SNC approved alternative.

- Record relevant information including equipment used, number of passes, speed, and vibratory settings.

9.4.6 Perform density testing within the test pad area as described in Attachment 2.

- **IF** test results indicate that the compaction requirements have NOT been achieved, **THEN** rework **OR** replace the affected layers **AND** retest until acceptable results are achieved.

9.4.7 Perform SASW testing per Attachment 2.

9.4.8 Survey **AND** record the compacted lift height as required to monitor backfill progress.

9.4.9 **When** the test pad has reached final grade, **THEN** slope surfaces as shown in reference 3.4 and as required to prevent ponding of surface water on the test fill area.

9.5 Seismic Cross-hole Testing

9.5.1 Locate a minimum of three borings along the centerline of the test pad area, as shown in Figure 1. Borings shall be spaced seven feet on center.

9.5.2 Perform SPT testing at the boring locations per Attachment 2.

9.5.3 Case the SPT boreholes for cross-hole testing:

- Casing shall be plastic casing having a minimum inside diameter of 3”.
- If required for verticality testing device, casing shall have internal slots.
- Casing shall extend to the bottom of the boring and approximately one foot above the surface of the test pad.

9.5.4 Casings shall be grouted in place:

- Use a cement/bentonite grout consisting of approximately 8 gallons of water and 2.5 pounds of powdered bentonite to a 96 pound bag of Portland cement.
- Bentonite shall be thoroughly mixed with water before adding the Portland cement.
- Grout shall be placed by the Tremie method to insure that grout completely fills the annulus outside of the casing.

9.5.5 Geotechnical Contractor shall measure the verticality of the casings in accordance with vender procedures using calibrated equipment.

9.5.6 Perform seismic cross-hole testing per Attachment 2.

9.6 Site Restoration

9.6.1 **WHEN** directed by the SNC Project Supervisor, **THEN** perform site restoration as described in the SWP.

10.0 Deficiencies

10.1 Deficiencies discovered during conduct of this procedure will be documented per the SNC Nuclear Development QA Program.

10.2 Condition reports generated as a result of this work should be documented on the Corporate Database of Syncpwr unless the CR is related to personnel safety or systems, structures or activities associated with Unit 1 and 2, which shall be documented as a CR in the Vogtle 1 and 2 Syncpwr database.

11.0 Records

11.1 Testing performed by the Geotechnical Contractor will be included in a final report to be submitted, reviewed and approved after completion of all activities.

11.2 Daily logs and other pertinent information maintained by the SNC Project Supervisor shall be attached to this procedure and retained a QA record.

11.3 Records generated as a result of this procedure will be maintained in accordance with the Southern Nuclear Development QA Program.

12.0 Commitments

NONE

Attachment 1 - Potential Borrow Material Testing Requirements

Test Description		Number of Tests (a)
1.	Gradation tests in accordance with ASTM D422 (excluding the hydrometer test).	Minimum of four tests each.
2.	Modified Proctor maximum dry density compaction tests according to ASTM D1557 to determine average optimum moisture content.	
3.	Natural moisture tests in accordance with ASTM D2216 (oven heating), ASTM D4643 (microwave), or ASTM D4959 (direct heating).	
4.	Soil classification tests in accordance with ASTM D2487	
5.	Atterberg Limits (Plastic Limit and Plasticity Index of Soils) in accordance with ASTM D4318.	

Notes:

a. The above tests shall be performed for each distinct type of soil found within the borrow area. Mixing of materials prior to testing is allowed to achieve uniformity.

b. Acceptable borrow material is defined by SV0-SSAR-XGS-001, Specification for Engineered Fill Below-Grade Test Pad.

Attachment 2 - Backfill Placement Testing Requirements

	Test Description	Number of Tests
1.	Gradation tests in accordance with ASTM D422 (excluding the hydrometer test).	Minimum of four tests per lift.
2.	Moisture tests in accordance with ASTM D2216 (oven heating), ASTM D4643 (microwave), or ASTM D4959 (direct heating).	Minimum of one test per lift.
3.	Atterberg Limits (Plastic Limit and Plasticity Index of Soils) in accordance with ASTM D4318.	Minimum of one test per lift.
4.	Soil classification in accordance with ASTM D2487.	As supported by test data.
5.	Modified Proctor maximum dry density compaction test according to ASTM D1557 to determine average optimum moisture content.	Perform testing as directed by Geotechnical Lead (a)
6.	Perform field density testing (sand cone) in accordance with ASTM D1556 using a 6” sand cone at a depth of 6” below the fill surface and ensure test holes have a volume of at least 0.2 cubic feet.	One test per lift staggered with each lift to avoid previous test locations (b)(c)
7.	Nuclear density testing in accordance with ASTM D6938.	Optional (as directed by Geotechnical Lead) (b)
8.	SASW testing per procedure approved by Geotechnical Contractor.	Perform after depth of fill reaches 5’, 10’, 15’ and final depth, per Figure 1. (d)
9.	Perform standard penetration testing (SPT) in accordance with ASTM D 1586 to 20 feet below bottom of fill. Use continuous sampling to bottom of fill, and sample every 5 feet for remainder of boring.	At final depth only, minimum of three tests located per Figure 1.
10.	Perform seismic cross-hole testing in accordance with procedure approved by Geotechnical Contractor.	At final depth only.

a. Modified Proctor testing need not be performed every lift, if, at the judgment of the Geotechnical Lead, the borrow material is uniform and the optimum moisture content is predictable.

b. No density testing is required for the first and second lifts placed on the sub-grade base. After placement of the third lift, density testing should be conducted on the material from the first and second lift.

c. Sand cone test should be performed at same location as one of the nuclear density tests (if performed).

d. Active depth of fill between SASW tests may be varied by as much as two feet to allow backfill activities to be efficiently scheduled around SASW tests.

Attachment 3 - Expected Elevations of Test Pad

Level	Depth of Fill	Elevation (NGVD 29)
Final Grade	20’	246’ MSL
Third SASW	15’	241’ MSL
Second SASW	10’	236’ MSL
First SASW	5’	231’ MSL
Base	0’	226’ MSL

Notes:
1) MSL elevations may be adjusted based on local conditions of the excavation.
2) Active depth of fill between SASW tests may be varied by as much as two feet to allow backfill activities to be efficiently scheduled around SASW tests.
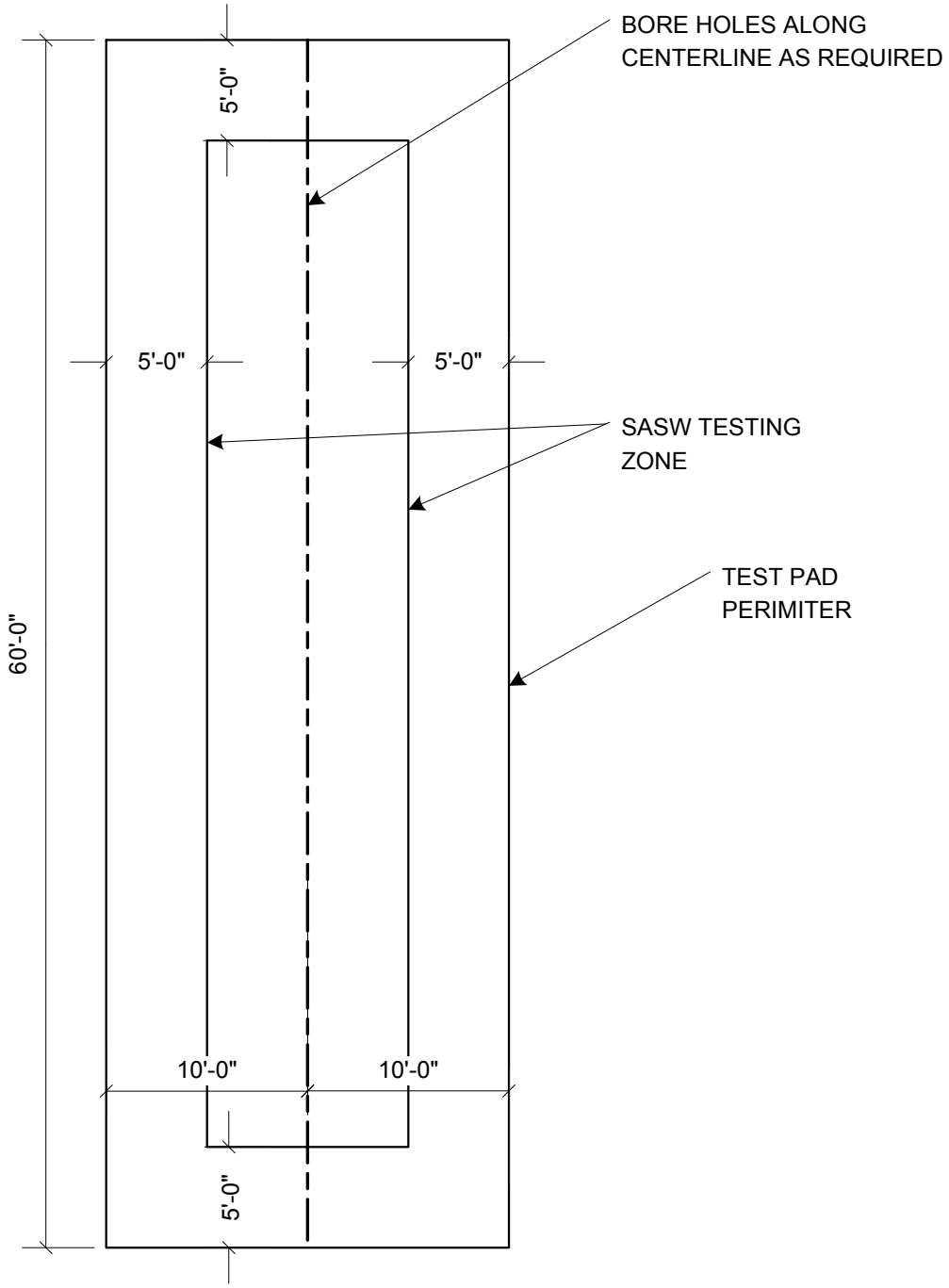
Figure 1 - Test Pad Layout