From: "Williams, Dana M." <DANAWILL@SOUTHERNCO.COM>
To: "Christian Araguas" <CJA2@nrc.gov>,"William Burton" <WFB@nrc.gov>
Date: 11/28/2007 5:57:33 PM
Subject: SNC Letter AR-07-1802 transmitting SNC VEGP RAI Involving LWA-2 Supplement
cc: "James T. Davis" <JTDAVIS@southernco.com>,"Tom C. Moorer" <TCMOORER@southernco.com>

An electronic copy of Southern Nuclear's letter, AR-07-1802, dated November 28, 2007 is attached. In addition, a hard copy has been transmitted to the NRC Document Control desk via FedEx.

<<AR-07-1802 RAI Ltr #9 Resp - Final.pdf>>
Thank you,

Dana Williams
Southern Nuclear Operating Company
Nuclear Development
P 205.992.5934
F 205.992.5296

Hearing Identifier: Vogtle_Public
Email Number: 746

Mail Envelope Properties (47553C60.HQGWDO01.TWGWPO04.200.2000011.1.D3090.1)

Subject: SNC Letter AR-07-1802 transmitting SNC VEGP RAI Involving LWA-2 Supplement
Creation Date: 11/28/2007 5:57:33 PM
From: "Williams, Dana M." <DANAWILL@SOUTHERNCO.COM>

Created By: DANAWILL@SOUTHERNCO.COM

Recipients
"James T. Davis" <JTDAVIS@southernco.com>
"Tom C. Moorer" <TCMOORER@southernco.com>
"Christian Araguas" <CJA2@nrc.gov>
"William Burton" <WFB@nrc.gov>

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Reply Requested: No
Return Notification: None
None

Concealed Subject: No
Security: Standard

J. A. "Buzz" Miller
Senior Vice President
Nuclear Development

Southern Nuclear
Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.5754
Fax 205.992.6165

SOUTHERN COMPANY
Energy to Serve Your World℠

NOV 28 2007

Docket No.: 52-011 AR-07-1802

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Early Site Permit Application
Response to Request for Additional Information Involving
Limited Work Authorization-2 Supplement

Ladies and Gentlemen:

By letter dated August 15, 2007, Southern Nuclear Operating Company (SNC) submitted Supplement 2-S1 for the Vogtle Early Site Permit (ESP) Application to the U.S. Nuclear Regulatory Commission (NRC). That supplement requested the addition of a Limited Work Authorization (LWA-2) for selected safety-related construction activities, as part of the Vogtle ESP. By letter dated October 26, 2007, the NRC provided SNC with Request for Additional Information (RAI) Letter No. 9 concerning LWA-2 information contained in Chapters 1, 2, 3 and 13 of the supplemented ESP application. The enclosures to this letter provide SNC's response to the LWA-2 related RAIs.

The SNC contact for this RAI response letter is J. T. Davis at (205) 992-7692.

Mr. J. A. (Buzz) Miller states he is a Senior Vice President of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Joseph A. (Buzz) Miller

Sworn to and subscripted before me this 28th *day of* November*, 2007*

Dana M. Williams
Notary Public

My commission expires: 12/29/2010

JAM/BJS/dmw

Enclosures:

1. Response to October 26, 2007 RAI Letter No. 9 for the Vogtle ESP Application Involving LWA-2
2. Vogtle Electric Generating Plant Units 3 and 4 Fitness For Duty Program During Plant Construction

cc: Southern Nuclear Operating Company
Mr. J. B. Beasley, Jr., President and CEO (w/o enclosure)
Mr. J. T. Gasser, Executive Vice President, Nuclear Operations (w/o enclosure)
Mr. T. E. Tynan, Vice President - Vogtle (w/o enclosure)
Mr. D. M. Lloyd, Vogtle Deployment Director (w/o enclosure)
Mr. C. R. Pierce, Vogtle Development Licensing Manager (w/o enclosure)
Mr. D. P. Moore, Engineering Programs Consulting Engineer
Document Services RTYPE: AR01
File AR.01.01.06

Nuclear Regulatory Commission
Mr. R. W. Borchardt, Director of Office of Nuclear Regulation (w/o enclosure)
Mr. V. M. McCree, Acting Regional Administrator (w/o enclosure)
Mr. D. B. Matthews, Director of New Reactors (w/o enclosure)
Ms. S. M. Coffin, AP1000 Manager of New Reactors (w/o enclosure)
Mr. C. J. Araguas, Project Manager of New Reactors
Mr. W.F. Burton, Chief – Environmental Technical Support (w/o enclosure)
Mr. M. D. Notich, Environmental Project Manager
Mr. G. J. McCoy, Senior Resident Inspector of VEGP (w/o enclosure)

Georgia Power Company
Mr. O. C. Harper, Vice President, Resource Planning and Nuclear Development (w/o enclosure)

Oglethorpe Power Corporation
Mr. M. W. Price, Chief Operating Officer (w/o enclosure)

Municipal Electric Authority of Georgia
Mr. C. B. Manning, Senior Vice President and Chief Operating Officer (w/o enclosure)

Dalton Utilities
Mr. D. Cope, President and Chief Executive Officer (w/o enclosure)

Bechtel Power Corporation
Mr. J. S. Prebula, Project Engineer (w/o enclosure)
Mr. R. W. Prunty, Licensing Engineer

Tetra Tech NUS, Inc.
Ms. K. K. Patterson, Project Manager (w/o enclosure)

Southern Nuclear Operating Company

AR-07-1802

Enclosure 1

Response to October 26, 2007 RAI Letter No. 9

for the

Vogtle ESP Application Involving LWA-2

SSAR Section 1.1 Introduction

1.1-1 The second to last paragraph on Page 1-2 (Section 1.1) states that Southern Nuclear Company (SNC) requested a limited work authoriation-2 (LWA-2) under 10 CFR 50.10(e)(3) for some safety-related construction activities. The LWA-2 activities proposed by SNC include placement of engineered backfill including retaining walls and preparation of the nuclear island foundation including installation of mudmats, water proofing, formwork (retaining walls), rebar, and foundation embedments necessary to prepare the foundation for placement of concrete subsequent to the issuance of the combined license. In ardor for the staff to understand how these LWA-2 activities are to be implemented, SNC is requested to provide a detailed description (including drawings) of the above listed works (mudmats, water proofing, formwork, rebar, and foundation embedments) in the application.

Response:

After backfill beneath the NI (Nuclear Island) has been placed and compacted to roughly the required elevation for the first mud mat, the construction of the retaining wall will begin. The retaining wall will be a vertical mechanically-stabilized earth (MSE) wall with smooth-faced concrete panels. This wall will serve as a retaining wall as the backfill outside the NI volume is brought up to plant grade, and will also function as the exterior concrete forms for the outer walls of the NI.

The construction of the MSE wall begins with installation of a concrete footer. The top surface of the MSE wall footer will be installed below the bottom elevation of the first mud mat. The size and reinforcement for the concrete footer will be as required by the designer of the MSE wall. The MSE wall footer is a relatively thin concrete structure that provides a stable, level surface for construction of the MSE wall, and provides no structural support for the mud mats or the NI itself.

The first course of the MSE wall will be placed on top of the footer at the surveyed locations required to outline the NI footprint. Inspections will be performed as required to assure that the outer dimensions of the NI are properly set.

Backfill around the outer sides of the MSE wall will commence as required by the designer of the MSE wall, with the standard large compaction equipment being used away from the wall, and smaller equipment providing the required compaction at the edges of the wall. During backfill placement and compaction, the backfill surface will be sloped away from the NI to drain surface water away from the NI excavation volume. Additional courses of the MSE wall will be added until final plant grade is reached.

In parallel with the construction of the MSE wall, work within the NI footprint will continue. Temporary features to provide removal of surface water within the confined area of the NI will be installed as required. These features may include plastic sheeting, temporary sumps and pumps. In addition, the surface may be sloped to provide adequate drainage.

After the first course of the MSE wall has been placed, the backfill within the NI volume will be reworked as required to provide the proper surface for placement of the mudmat. Temporary drainage features will be removed, and material will be removed or added as required to establish the final elevation for the mud mat. Areas disturbed by construction of the MSE wall and other activities will be recompacted and tested to confirm that the required compaction has been achieved.

The first mud mat will consist of a 6-inch layer of non-reinforced concrete and will be placed uniformly within the confines of the mechanically stabilized earth (MSE) wall. No additional formwork will be required. The friction factor between the mud mat and the backfill for Vogtle is projected to be less than the 0.7 friction factor specified Westinghouse as a site interface requirement. A site-specific stability analysis will be performed to demonstrate that the interface between the backfill and the first mud mat will provide an acceptable base for the AP1000 Nuclear Island.

When this lower mud mat slab has reached the specified strength, a layer of waterproof membrane will be applied to the entire top of the slab, and extended vertically up the face of the MSE wall surface. Per conference call with the NRC on November 14, 2007, the specification and design details for the waterproof membrane, including the features necessary to achieve the required friction factor between the mud mats and waterproof membrane, are generic issues that will be addressed by Westinghouse during the review of DCD revision 16.

The top portion of the mud mat slab will then be placed, sandwiching the waterproof membrane. Rebar and foundation embedments are not incorporated in either of these mud mats; therefore installation of such elements will not puncture the waterproofing membrane.

An engineered rebar support system will be installed or top of the mud mat to support the weight of the base slab rebar structure. When the support is in place, the rebar will be installed in accordance with Westinghouse drawing APP-1000CR-001 and established procedures. There will be a second engineered rebar support system installed to support the upper rebar framework. Subsequent rebar layers and shear reinforcement will then be installed in accordance with Westinghouse drawings AP-1000CR-002, -003, -004, and -901 and established procedures. These drawings correspond to the AP1000 Design Control Document Figure 3.8.5-3, Sheets 5, 6, and 7. Embedments in the NI slab will be placed and inspected in accordance with the approved construction drawings. Inspection attributes will be in accordance with the established Quality Assurance Program and procedures for reinforcing steel installation.

SSAR Section 2.5.4 Stability of Subsurface Materials and Foundations

2.5.4-1 Section 2.5.4. page 1, indicates that 174 borings have been taken at the site along with other types of penetrations (presumably Cone Penetration Tests [CPTs], Suspension and dawn-hole velocity loggers, etc.). In reading through the other descriptions provided along with the MACTEC Appendices, the staff was unable to determine how the total of 174 was reached. SNC is requested provide a detailed accounting of these penetrations and how many penetrations will be unusable for the site specific analyses (e.g.. because they were taken through material that is scheduled to be excavated).

Response:

In addition to the fourteen ESP borings described in Appendix 2.5A, Appendix 2.5C describes the 174 COL borings. The COL geotechnical investigation, with field work conducted between November 2006 and April 2007, included geophysical surveys and various subsurface penetrations. These penetrations consisted of 174 soil borings, 21 cone penetrometer test (CPTu) soundings, and 8 excavated test pits. The locations of these penetrations are illustrated on Figures 2.5.4-1a and 2.5.4-1b of ESP application Revision 2-S1. Generally, soil boring designators were assigned based on the subject of investigation. A summary is provided in the following table. The exploration depth of each boring varied depending on the existing ground elevation and the anticipated depth of influence of the structure. Exploration depths varied from 21.5 feet to 420 feet. SPT split barrel sampling was generally conducted on a five foot interval. One boring in each power block area was sampled continuously.

Series	Subject	No. of Borings
B-1100	Switchyard, Roadways, Pumphouse, Pipelines, Batch Plant, Borrow Area	66
B-3000	Unit 3 Power Block and Cooling Tower	40
B-4000	Unit 4 Power Block and Cooling Tower	37
B-5000	Switchyard	4
B-6000	Batch Plant, Laydown Area, Roadways, Misc	27

Seventy soil borings (two of these were shallow offset borings due to near surface obstructions) were located in the immediate vicinity of the combined excavation footprint for the Units 3&4 power blocks. These included 9 of the 1100 series borings, 32 of the 3000 series borings, and 29 of the 4000 series borings. With the exception of the two offset borings, each of these borings was drilled through the Upper Sand and into the Blue Bluff Marl (BBM). Forty-two of the 70 borings penetrated the BBM and extended into the Lower Sands (LS). Six borings penetrated the underlying Still Branch Formation and two borings penetrated the Congaree Formation. Both of these formations are located in the upper portion of the LS strata. Suspension soil velocity measurements along with resistivity, spontaneous potential, and natural gamma data were obtained in the six deep borings. Caliper and boring deviation data were also collected in these deep borings.

Twenty-one CPTu soundings were taken across the site including four in the combined power block footprint, six in the area of the cooling towers, and the others in roadways and pipeline areas. The data collected at each of these soundings included tip resistance, sleeve resistance and pore pressure dissipation measurements. Eight of the 21 soundings were conducted as seismic cone penetrometer tests

(SCPTu). These soundings were located in the combined power block/cooling tower area. In addition to the CPT data, compression and shear wave velocity data were collected in the SCPTus. Due to the dense/hard layers encountered at the interface of the Upper Sand and Blue Bluff Marl strata, the soundings could not penetrate into the Blue Bluff Marl. Generally, CPTu and SCPTu data collection was limited to the Upper Sand stratum.

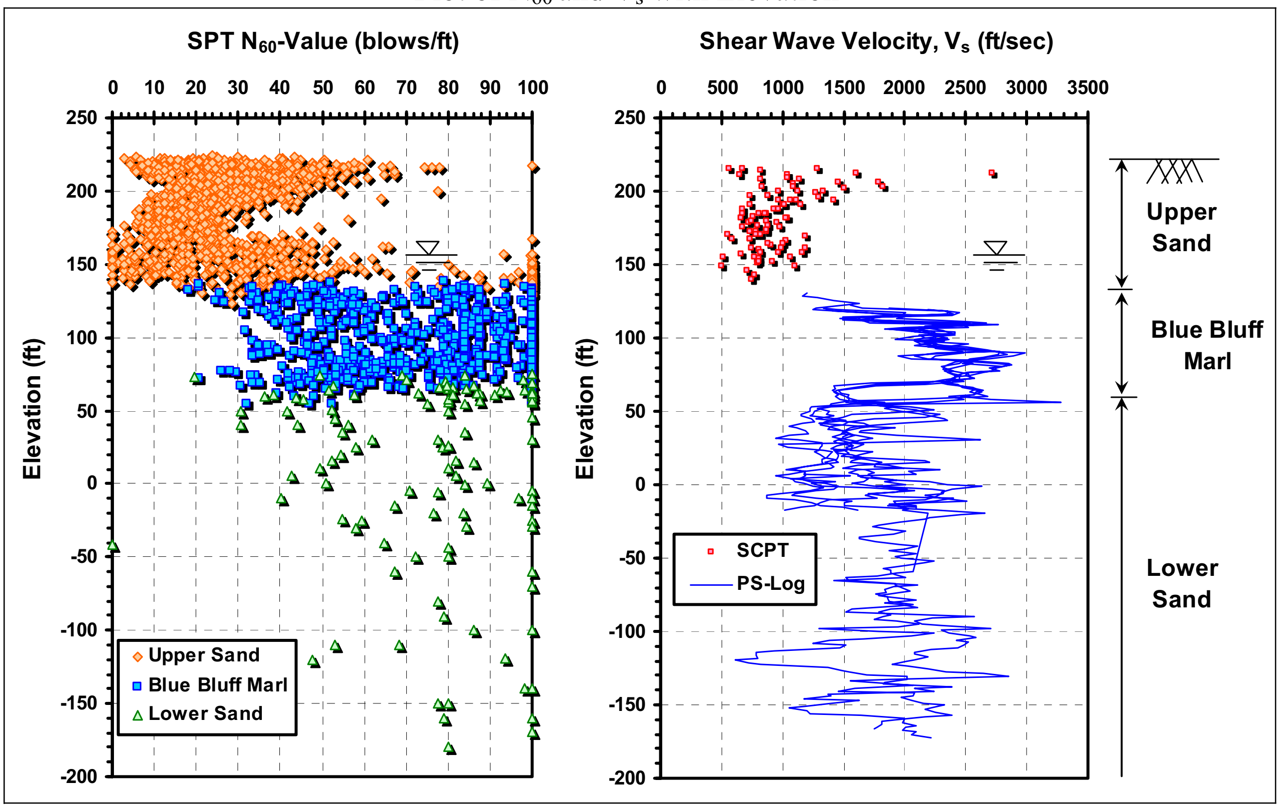
Eight test pits were excavated in proposed borrow areas, with five located in the switchyard area immediately north of the Units 3&4 power blocks and three located about 4,000 feet north of the power blocks, in Borrow Area 4. The test pit excavations were made with a backhoe and extended to depths of about 12 feet. The material sampled in the test pits was visually classified by a field geologist or geotechnical engineer and samples were collected for laboratory testing.

2.5.4-2 In its previous reviews conducted for the early site permit (ESP) application, the staff was concerned with the number of borings that penetrated significantly into the Blue Bluff Marl (BBM), the layer offering primary support to the Nuclear Island (NI). Without additional information concerning the depths and numbers of all these penetrations, the staff is unable to address whether the mean properties of site stratigraphy are adequately being modeled and whether enough properties were determined to be able to adequately determine material property variability; SNC is requested to provide a description of those borings that penetrated into and through the BBM and how many samples and types of samples were taken of this material as well as material below the BBM.

Response:

As stated in response to RAI 2.5.4-1, 70 borings were taken in the power block area; 42 of these borings penetrated the Blue Bluff Marl (BBM) accounting for 2,831 linear feet of drilling in this stratum. Seven hundred and forty-two SPT split barrel samples (disturbed samples) were obtained in the BBM. The SPT N_{60} values and shear wave velocity measurements in these borings are presented in the figures below. SPT blow count data are also summarized in the table below. From these SPT data, the average measured N-value is 70 bpf with a median value of 72 bpf. The average N_{60}-value is 96. Nearly all of the SPT N_{60} values from the BBM are greater than 30 bpf. Ninety-four relatively undisturbed samples were taken in the BBM. Laboratory tests were conducted on selected disturbed and undisturbed samples. A summary of these test results is also provided in the table found on page 6.

Plot of N_{60} and V_s with Elevation



SPT N_{60}-values and shear wave velocities measured at power block: (a) SPT N_{60}-value; (b) Shear wave velocity (MACTEC, 2007).
Note: It is assumed the measured SPT N = 100 blows/ft for refusal, and SPT N = 50 + 50/Δ/10 blows/ft for recorded blow counts of 50/(Δ ft). The energy-corrected SPT N_{60} does not exceed 100 blows/ft.

Field and Laboratory Test Data from BBM

ITEMS	SPT BLOW COUNTS N (blows/ft)	SPT BLOW COUNTS N_{60} (blows/ft)	SIEVE ANALYSIS Fines (%)	Water Content ω (%)	Unit Weight γ (pcf)	Specific Gravity G_s	ATTERBERG LIMITS LL (%)	ATTERBERG LIMITS PL (%)	ATTERBERG LIMITS PI (%)
Number of Tests	742	742	90	133	69	8	92	92	92
Minimum	13	18	29.4	14.3	95.2	2.6	34	20	11
Maximum	100	150	97.5	62.1	132.6	2.7	112	64	62
Average	70	96	73.9	33.1	115.4	2.6	67	34	33
Median	72	97	75.1	31.6	115.3	2.7	63	33	30

ITEMS	SHEAR STRENGTH Unconfined Compression q_u (psi)	SHEAR STRENGTH Effective Stress φ' (deg)	SHEAR STRENGTH Effective Stress c' (psi)	SHEAR STRENGTH Total Stress φ (deg)	SHEAR STRENGTH Total Stress c (psi)	CONSOLIDATION TESTS CR	CONSOLIDATION TESTS RR	CHEMICAL TESTS pH	CHEMICAL TESTS Chloride (ppm)	CHEMICAL TESTS Sulfate (ppm)
Number of Tests	27	11	11	27	27	18	18	2	2	2
Minimum	6.7	19.4	2.9	0.0	0.0	0.034	0.004	7.5	150	2400
Maximum	164.3	57.7	60.4	43.7	106.0	0.156	0.017	7.6	150	2600
Average	59.6	33.9	20.2	15.1	33.8	0.094	0.010	7.6	150	2500
Median	49.2	31.5	15.0	15.0	28.8	0.090	0.009	7.6	150	2500

Six of the 70 borings penetrated into the underlying Lower Sands (LS) accounting for 611 linear feet of drilling in this stratum. One hundred and eleven SPT split barrel samples were obtained in the LS as summarized in the table below. Twenty-nine relatively undisturbed samples were taken in the LS. Laboratory tests were conducted on selected disturbed and undisturbed samples. A summary of index property testing is also provided in the table below.

Field and Laboratory Test Data from LS

ITEMS	SPT BLOW COUNTS N (blows/ft)	SPT BLOW COUNTS N_{60} (blows/ft)	SIEVE ANALYSIS Fines (%)	Unit Weight γ (pcf)	Specific Gravity G_s	SHEAR STRENGTH Effective Stress φ' (deg)	SHEAR STRENGTH Effective Stress c' (psi)	SHEAR STRENGTH Total Stress φ (deg)	SHEAR STRENGTH Total Stress c (psi)
Number of Tests	111	111	14	16	4	3	3	3	3
Minimum	WOH	WOH	5.4	113.3	2.7	32.5	0.8	18.6	0.0
Maximum	100	100	69.6	133.5	2.7	39.6	2.9	30.0	96.8
Average	60	75	22.6	122.7	2.7	35.5	1.5	25.8	32.8
Median	60	80	17.4	122.4	2.7	34.4	0.9	28.7	1.6

2.5.4-3 Since the BBM material is important to the foundation support and site response, SNC is requested to demonstrate the ability to understand how samples of the BBM were obtained and how the degree of disturbance of this material was evaluated during the testing program.

Response:

The COL soil borings were drilled using mud rotary methods. Temporary steel casing was installed to various depths in many of the boreholes to maintain drilling fluid circulation. Standard penetration tests (SPT) and split barrel soil sampling were conducted in accordance with ASTM D 1586, generally at 5-foot intervals. Twelve drill rigs, each equipped with an automatic SPT hammer, were used during the COL investigation. SPT energy measurements were taken on each drill rig as summarized in the table below, to measure the energy transfer efficiency of the specific SPT system. These specific hammer correction values were used to correct the measured N-value to the N_{60}-value. During SPT testing, the sampler was typically driven 18 inches in soil with the number of hammer blows recorded for each six inch interval of penetration. In very hard or dense soils, the test was terminated at 50 blows if the six inch penetration had not been reached. The actual penetration was then recorded (e.g., 50 blows/3 inches). The split barrel sampler was opened at the drill site and the recovered materials were visually described and classified by MACTEC's rig geologist or geotechnical engineer and recorded on the field log. A representative portion of the sample (typically the material from the lower portion of the sample) was placed in a glass sample jar with a moisture proof lid. Sample jars were labeled, placed in cardboard boxes, and transported to the on-site storage area. Many of the split barrel samples obtained from harder layers or lenses within the marl were fractured by the sampling process. Some of the resulting samples had the appearance of sands or gravels, usually angular, when removed from the split barrel sampler.

Summary of SPT Energy Measurements

Hammer Serial No.	Rig Type	Number of Measurements	Min. ETR* (%)	Max. ETR* (%)	Avg. ETR* (%)	Hammer Correction (Ce)
100	Diedrich D-50 ATV	6	69.1	75.1	72.4	1.21
165592	CME 850 ATV	7	78.9	90.0	83.4	1.39
200587	CME 75 Truck	5	83.7	86.6	84.2	1.40
211797	CME 75 Truck	3	75.1	80.3	77.6	1.29
219505	CME 55 Truck	3	67.1	80.6	70.1	1.17
219907	CME 75 Truck	3	76.6	84.6	80.2	1.34
270256	CME 85 Truck	5	77.7	88.0	82.5	1.38
311025	CME 55 Truck	4	88.3	92.6	90.2	1.50
328848	CME 750 ATV	3	83.1	85.1	84.0	1.40
331145	CME 55LC Truck	5	85.7	90.0	88.4	1.47
337153	CME 550 ATV	4	76.0	87.7	82.0	1.37
XO2958	CME 850 ATV	3	78.0	79.4	78.9	1.32
ETR – Energy Transfer Ratio						

Relatively undisturbed (intact) soil samples were taken using a 3-inch diameter thin-walled tube (Shelby tube) sampler in accordance with ASTM D 1587. Generally, samples taken in the Upper Sand (US) were obtained through direct push methods, whereas samples taken in the Blue Bluff Marl (BBM) and the Lower Sands (LS) were obtained using a Pitcher sampler due to the very hard/dense nature of the BBM and LS. The Pitcher sampler is a double-tube core barrel sampler. The thin-walled tube sampler is spring-mounted to the inner barrel and retracts relative to the cutting bit on the outer barrel as the soil stiffness changes. This sampler is generally recommended for hard or dense soils, partially cemented soils, and soft rock. According to ASTM D 6169, the Pitcher sampler has a suitability rating of excellent to good for stiff to hard fine-grained material such as the BBM and a suitability rating of excellent to poor for dense cohesionless material such as the LS. After retrieval of the undisturbed sample, the depth of penetration and recovery length were noted. The sample and tube were inspected and the sample was sealed with wax at the top and bottom against moisture loss, labeled, kept in an upright condition and transported to the climate-controlled on-site storage area following ASTM D 4220 guidelines. These samples were transported by vehicle to various testing laboratories according to approved transportation procedures, for further testing.

MACTEC or one of its subcontractors performed all of the geotechnical testing on disturbed, relatively undisturbed, or bulk samples. The majority of the testing was performed in MACTEC's Atlanta laboratory. Their Charlotte laboratory performed limited direct shear testing. Chemical tests on soil samples were performed by Test America, formerly Severn Trent Laboratories, located in Savannah, Georgia. Resonant column/ torsional shear (RCTS) tests are being performed by Fugro Consultants, Inc. (Fugro) in Houston, Texas under the purview of Dr. K. Stokoe of the University of Texas-Austin. Fugro also performed other strength and classification testing assigned to samples where RCTS testing was performed.

The tube samples were visually examined by laboratory personnel for any apparent damage before testing. Some tubes were found to be out of round and were obviously disturbed resulting from the sampling operations of retrieving the samples from the bore holes. These disturbed Shelby and Pitcher tube samples were not tested. After the visual examination, samples were kept upright in an environmentally controlled sample storage room. RCTS samples were transported to Fugro's Houston laboratory by automobile using approved transportation procedures.

At MACTEC's Atlanta geotechnical laboratory, both Shelby and Pitcher tube samples were cut into 6 to 7 inch sections for strength tests or 2.5 – 3 inch sections for consolidation or direct shear tests. Crimped edges where the tube was cut were removed with a de-burring tool. The cut tube section was placed in a hydraulic sample extruder. The sample was then slowly extruded vertically from the tube using the extruder. The sample was extruded in the same direction as in the field when the tube was pushed into the ground. The sample was then carefully removed from the extruder to a trimming station for preparation for testing. The extruded samples were visually examined prior to sample trimming and preparation for signs of disturbance. Generally the samples exhibited little visual evidence of disturbance; however, many of the BBM samples appeared brittle and non-uniform containing cemented layers and nodules. Trimmings from the strength and/or consolidation test samples were collected for classification and chemical tests.

A limited number of tube samples of the BBM could not be extruded from the sample tubes due to the strength of the marl coupled with cementation or adhesion of the marl to the sides of the steel tube, and therefore were not tested.

At Fugro's geotechnical laboratory in Houston samples for RCTS testing and associated strength tests were stored in a climate-controlled room. Tube samples were cut into appropriate length sections for RCTS and strength tests. Crimped edges where the tube was cut were removed with a de-burring tool.

The cut tube section was placed in the sample extruder. The sample was then slowly extruded vertically from the tube using the extruder. The sample was extruded in the same direction as in the field when the tube was pushed into the ground. (A few of the BBM samples could not be extruded from the tubes due to the strength of the marl coupled with cementation or adhesion of the marl to the sides of the steel tube. In some cases, see photo below, the sample contained cemented nodules and obvious indications of disturbance, in which case the sample was not extruded.) The sample was carefully removed from the extruder to a trimming station for preparation of the sample for testing. The extruded samples were visually examined prior to sample trimming and preparation for signs of disturbance. RCTS test samples were trimmed to 2.0 or 1.4 inches in diameter. Some of the marl samples could not be successfully trimmed due to the hard, brittle nature of marl.

In summary, the degree of disturbance was evaluated visually once the sample was extruded. Those samples not visually disturbed were tested, otherwise they were discarded. Disturbance was kept to a minimum by controlling the sampling, transportation, storage, and extruding/handling in the laboratory. However, the very heterogeneous structure of the BBM probably resulted in significant disturbance of the sample during sampling and extrusion in many instances.

B-4001 UD-4

2.5.4-4 Section 2.5.4.2.2.1 indicates that no new strength (and presumably stiffness) testing is to be performed for the Upper Sand Strata since this material is being excavated from beneath the Category I structures. Without additional information, the staff cannot verify SNC's conclusion on the effect of the two-dimensional velocity configuration of the excavated zone on site response and SSI effects. SNC is requested to provide the assessment of the in-situ velocity profile through the Upper Sand Strata for the staff to complete its evaluation.

Response:

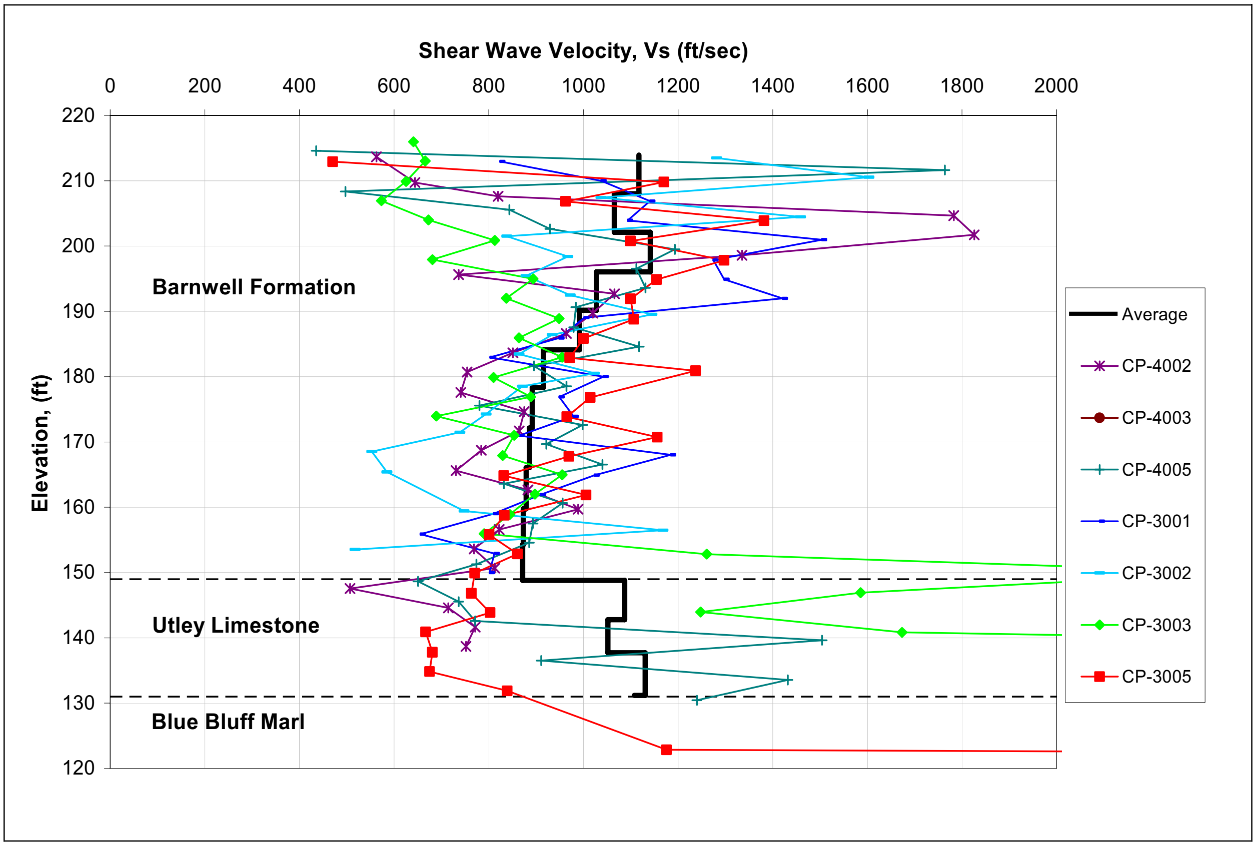
The material in the Upper Sand stratum consists of the Barnwell Group soils as described in the MACTEC Data Report. These soils are predominately interlayered sands (SP), silty sands (SM, SP-SM, SM-SC), and clayey sands (SC, SP-SC). Some layers and zones of silts (ML), clays (CL), and shells are also encountered in these soils along with calcareous sands. Soft zones and zones of drilling fluid loss were occasionally encountered. The Utley Limestone is located at the lower portion of the Barnwell Group. This sub-unit is mostly calcareous and is characterized as a well indurated, fossiliferous limestone which grades locally into coquina. Numerous fossils, well cemented zones, and soft zones were encountered in this layer. The lower portion of the Barnwell Group section includes some calcareous soils which were generally sampled as sand with varying silt and clay content, silts, and clays. Large oyster shells, and other unidentified shell and phosphatic fragments were frequently observed. Some layers contained an appreciable concentration of shells. The bottom portion of the Barnwell Group often consists of pale olive green clayey silt with abundant distinct, very thin, subhorizontal yellowish brown sand lenses.

During the COL investigation, additional laboratory shear strength testing and shear wave measurements were performed in the Upper Sand in the power block and surrounding areas. Laboratory strength testing included 10 consolidated undrained triaxial shear tests from relatively undisturbed sample taken in the Upper Sand Stratum. A summary of these data is provided in the table below.

Summary of Laboratory Test Results of Upper Sand Stratum

ITEMS	ATTERBERG LIMITS			SHEAR STRENGTH				CHEMICAL TESTS		
	LL	PL	PI	Effective Stress		Total Stress		pH	Chloride	Sulfate
				φ'	c'	φ	c			
	(%)			(deg)	(psi)	(deg)	(psi)		(ppm)	(ppm)
Number of Tests	17	17	17	10	10	10	10	5	5	5
Minimum	34	18	16	20.7	0.0	0.0	0.0	5.1	130	14
Maximum	137	58	106	33.4	7.7	30.0	19.0	9.2	390	30
Average	72	33	39	29.7	1.8	18.0	6.8	6.8	188	21
Median	63	30	32	30.7	1.2	21.1	5.7	5.5	140	20

Shear wave velocity data were collected in the Upper Sand in the power block/cooling tower area. Eight SCPTu soundings were taken as described in the above response to RAI 2.5.4-1. The shear wave velocity measurements from seven of these soundings along with the average velocity profile are presented on the figured below. The data from the eighth sounding, C-4001, was not plotted and incorporated into the average value. In this sounding velocity values of 4,000 fps were encountered at the top and bottom of the US stratum and the data were judged to be unreliable.



Shear Wave Velocity Measurements in the Upper Sand Stratums Measured by COL SCPTu

2.5.4-5 Section 2.5.4.2.2.2 presents a general description of the BBM. The staffs previous review of the ESP application found that some samples below the BBM had extremely low blow count that led to questions on the potential adequacy of this soil material for settlement and bearing capacity. In the LWA application, the staff could not find any significant discussion of this issue. During the September 5-6, 2007, LWA site visit, SNC indicated that these results were anomalies. The staff requests SNC to provide a basis for making these conclusions.

Response:

As previously discussed, 42 borings in the power block area penetrated the BBM and 611 linear feet of drilling was conducted in the Lower Sands. One hundred and eleven SPT split barrel samples were collected in this stratum. The average corrected blow count reading (N_{60}-value) in this stratum was 75 bpf indicating a very high relative density. A summary of SPT data from the COL investigation was previously presented in response to RAI 2.5.4-2. With the exception of one value, all of the N_{60}-values taken in the LS are greater than 30 bpf indicating dense to very dense material. In addition, SPT N-values appear to behave as expected, increasing with depth. The one N-value (B-4001, SS-38: WOH/18) taken in this stratum indicated a very loose material. This sample was taken in the Still Branch Formation of the LS strata at an elevation of -41.5 to -43 feet. No recovery was obtained in the split barrel sampler. An undisturbed sample (UD-11) was attempted prior to SS-38 from elevation -39.5 to -41.5 and no recovery was obtained in this sample. The material above this elevation was identified as light gray SAND (SP). The difficulty in sampling this material along with the weight of hammer reading in SS-38 is considered an anomaly and can be attributed to disturbed soil conditions at the bottom of the borehole. These conditions are likely the result of a hydrostatic pressure imbalance between the borehole and the in situ hydrostatic pressure. The resulting imbalance likely caused a quick condition to develop in the poorly graded sands at the sampling depth. Such quick conditions are difficult to sample, as evidenced by the lack of sample recovery in SS-38 and UD-11, as the now disturbed poorly graded sand will flow out of the sampler. Besides this anomalous condition, no other evidence of soft zones or loose material was encountered in the 611 linear feet of drilling conducted in the Lower Sands.

2.5.4-6 On page 2.5.4-7 of the application, SNC discussed a design value for cohesion of the BBM of 10,000 psf. It is important for the staff to understand the basis for this evaluation and if any laboratory tests data are available to support this design value. Of equal importance, the staff needs to understand where in the facility evaluation this parameter is to be used. This concern was identified during the ESP review and was also discussed during the September 5-17, 2007, LWA site visit. SNC is requested to provide a basis for the determination of this design value and how this value is to be used.

Response:

1) The design value of 10,000 psf for cohesion of the BBM presented in the ESP application was based on evaluating empirical correlations and laboratory test data from the ESP geotechnical investigation. A discussion of these data was presented in response to RAI 2.5.4-7 dated March 15, 2007. The laboratory test data included 15 UU tests.

The recent COL investigation provided additional field and laboratory testing on the BBM to verify the design value developed during the ESP investigation. This verification utilized field and laboratory test results. Field data includes 742 SPTs from 70 borings and shear wave velocity measurements in 6 boreholes as summarized in the response to RAI 2.5.4-2. A summary of laboratory test data was also presented in the response. The laboratory test data includes 90 grain size analyses, 92 Atterberg Limit tests, 27 unconfined compression tests, 11 UU triaxial tests, 27 CU triaxial tests, and 18 consolidation tests.

The UU and CU triaxial tests were conducted at various confining pressures. Test results disclosed that the shear strength of the BBM increased with increasing confining pressure, as expected. The BBM is approximately located from a depth of 90 to 165 feet with a design ground water level at a depth of 55 feet. Based on this overburden condition, the range of confining pressures in the BBM is between 6.5 ksf and 9.7 ksf. Within this range, UU test results disclosed a minimum shear strength of 1.7 ksf and a maximum of 11.7 ksf. The average value was 6.5 ksf. The CU test results disclosed a minimum value of 2.8 ksf and a maximum value of 32.2 ksf for shear strength at this range of confining pressure. The average value was 9.3 ksf.

Previous studies of the BBM and existing field test results (high SPT and high shear wave velocity measurements) indicate that this material is highly overconsolidated. If a conservative overconsolidation ratio (OCR) of 2 is assumed, the confining pressures within the BBM range from 13 ksf to 19.5 ksf. These pressures correspond to the upper limit of 16 ksf that was used in conducting the UU and CU triaxial test. At this higher confining pressure, the average UU and CU test results are 8.6 ksf and 14.9 ksf, respectively. An average of these values is 11.8 ksf.

A review of the empirical correlations that were presented in the March 15, 2007 RAI response indicates:

Empirical correlation between SPT N-value and undrained strength, s_u, as presented in Figure 1.22 on page 38 of Winterkorn & Fang 1975, is calculated from Terzaghi's correlation with the SPT N-value.

This correlation is gives

$s_u = N/8$ (ksf), where
N = SPT N-value in blows per foot (bpf)
If we use the average N-value of $N_{60} = 96$ bpf we get
$s_u = 96/8 \cong 12$ ksf

Empirical correlations between shear wave velocity and undrained shear strength, Table 2 of Senapathy et al. (2001) summarizes values of G_{max}/s_u from 15 clay sites. The values ranged from 535 to 1,539 with a median value of 828, and average value of 892.

We know that

$$G_{max} = (V_s)^2 \cdot \gamma / g$$

Using V_s = 2,225 fps (average for the Lisbon Formation based on results from 6 P-S logging boreholes taken for the COL investigation), and γ=115 pcf, then the average G_{max} for the Lisbon Formation is

$$G_{max} = (2{,}225)^2 \cdot 115/32.2 \cong 17{,}680804 \text{ psf} = 17{,}680 \text{ ksf}$$

If we use the minimum and maximum values of G_{max}/s_u reported by Senapathy et. al. (2001), we obtain:

$s_u = 17{,}680/535 \cong 33$ ksf, for $G_{max}/s_u = 535$

and,

$s_u = 17{,}680/1{,}539 \cong 11.5$ ksf, for $G_{max}/s_u = 1{,}539$

In conclusion, a review of field and laboratory test data taken during the recent COL investigation finds the following in regards to the design undrained strength value of 10 ksf:

1. UU and CU test conducted at confining pressures of 16 ksf support the design value of 10 ksf
2. Empirical correlation with N-value supports the design value of 10 ksf
3. Empirical correlation with shear wave velocity supports the design value of 10 ksf

2) The undrained shear strength of the BBM was used to evaluate the bearing capacity of the nuclear island. Specifically, the shear strength value was incorporated into the calculation of allowable bearing pressure through superposition as described by Vesic 1975, pages 128 through 142 using the bearing capacity equation (1). Finish grade is at El. 220 ft and top of BBM is at El. 137 ft. Bottom of nuclear island foundation is approximately 39.9 ft below finish grade and 43.5 ft above top of the BBM.

$$q_o = c \cdot N_c \cdot \zeta_c + q \cdot (N_q) \cdot \zeta_q + 0.5 \cdot \gamma' \cdot B \cdot N_\gamma \cdot \zeta_\gamma \qquad (1)$$

where:
q_o = ultimate bearing pressure (ksf)
c = soil cohesion (ksf)
q = effective overburden pressure at bottom of foundation level (ksf)
γ' = effective unit weight of soil (kcf)
B = foundation width (ft) = 101 ft
L = foundation length (ft) = 254 ft
N_c, N_q, N_γ = bearing capacity factor
ζ_c, ζ_q, ζ_γ = foundation shape factor

In this superposition analysis, the foundation is placed on a "strong" layer (compacted structural fill) that is underlain by a "weaker" layer (BBM). The capacity of the "strong" layer is evaluated alone to obtain q_o'. The capacity of the "weaker" layer is evaluated alone to obtain q_o''. The governing capacity, q_o, is determined by evaluating the effect of the "weaker" layer on the bearing capacity by the following equation:

$$q_o = q_o'' \cdot \exp\{0.67 \cdot [1+(B/L)] \cdot (H/B)\} \qquad (2)$$

$q_a = q_o/FS$, with Factor of Safety (FS) = 3

where:
q_o'' = ultimate bearing pressure of the foundation sitting on the surface of the Blue Bluff Marl (ksf)
H = thickness of compacted structural fill between the bottom of the foundation and the top of the BBM (ft) (H=43.5ft)
q_o = ultimate bearing pressure at the foundation level
q_a = allowable bearing pressure at the foundation level

For the "strong" (backfill) layer where: $\phi = 34^0$, γ'_{moist} = 120 pcf, , γ'_{sat} = 130 pcf

N_c = 42.16	N_q = 29.44	N_γ = 41.06
ζ_c = 1.28	ζ_q = 1.27	ζ_γ = 0.84
q = 4.74 ksf	γ' = 0.076 kcf	

From equation (1)

q_o' = 0.0 x 42.16 x 1.28 + 4.74 x (29.44) x 1.27 + 0.5 x 0.076 x 101 x 41.06 x 0.84 ≅ 0 + 177.2 + 132.4 = 309.6 ksf

For the "weak" (Blue Bluff Marl) layer where: c = 10 ksf

$N_c = 5.14$ $N_q = 1.0$ $N_\gamma = 0.0$ $\zeta_c = 1.08$

$\zeta_q = 1.0$ $\zeta_\gamma = 0.84$ q = 8.49 ksf

From equation (1)
q_o" = 10 x 5.14 x 1.08 + 8.49 x (1.0) x 1 = 55.5 + 8.5 = 64 ksf

Through superposition using equation (2), the ultimate bearing pressure at the foundation level is:
q_o = 64 x exp{0.67 x [1+(101/254)] x (43.5/101)} = 95.8 ksf

Thus, with a factor of safety of 3 and the s_u of the BBM = 10 ksf, the allowable bearing pressure at the foundation level is:
q_a = 95.8/3 or 31.9 ksf

This same procedure was used to evaluate the allowable bearing pressure for a s_u of the BBM = 6.5 ksf with the following results. (s_u = 6.5 ksf is the average UU test strength at the average overburden condition)
q_o" = 6.5 x 5.14 x 1.08 + 8.49 x (1.0) x 1 = 44.6 ksf
q_o = 66.8 ksf
q_a = 66.8/3 or 22.3 ksf

Now, considering the contact pressure of the foundation and the contact pressure projected to the top of the BBM, it can be shown that the foundation pressure decreases significantly with depth. Based on the AP1000 standard plant design, the foundation pressure is 8.6 ksf.

Foundation Load = area x foundation pressure = 254ft x 101ft x 8.6ksf = 220,625 kips

Foundation pressure influence at the top of BBM =
Foundation Load / projected area, so
220,625 / (297.5ft x 144.5ft) = 5.1 ksf

Where: projected area = {(L + 2(H x s)) x (W + 2(H x s))}
H = 43.5 ft
s = slope of zone of influence (1v:2h) = 0.5

In conclusion, the influence of the foundation load decreases with depth such that at the top of the BBM, the load has diminished by 41% (5.1/8.6). Based on the above, using s_u = 10 ksf for the BBM:

- With the NI founded on the fill, the FS against bearing failure is 958/5.1 = 18.8
- With the NI founded directly on the BBM, FS = 64/8.6 = 7.4

Using s_u = 6.5 ksf for the BBM:

- With the NI founded on the fill, the FS = 66.8/5.1 = 13.1
- With the NI founded directly on the BBM, FS = 44.6/8.6 = 5.2

Reference:
Vesic 1975. Vesic, AS (1975). "Bearing Capacity of Shallow Foundations", Chapter 3 in *Foundation Engineering Handbook*, edited by HF Winterkorn and HY Chang, Van Nostrand Reinhold Company, New York, NY, pp. 121-147.

2.5.4-7 Subsections 2.5.4.5.2 and 2.5.4.5.3 discuss excavation and backfill issues. However, there is no discussion related to the required shear wave velocity conditions that need to be met to ensure that the backfill soil will satisfy the analysis criteria used for the SSI calculations of the API000 standard plant design. The staff's concerns refer to both minimum shear wave velocity values as well as consideration of acceptable variability of the measured velocity over the footprint of the NI. SNC is requested to provide additional information to address these issues.

Response:

As previously discussed in these RAI responses, a large volume (approximately 3.6 million cubic yards) of backfill will be placed at the site for the construction the Units 3 and 4. The primary borrow source will be the stockpiled material located north of the power block area in the future switchyard. Alternative borrow sources include suitable material removed from the power block excavation and Borrow Area 4, about 4,000 feet north of the power block. A description of these borrow sources is provided in the response to RAI 2.5.4-10.

The general backfill design program for Units 3 and 4 is being modeled after the backfill program for Units 1 and 2. This program includes limiting the fines content of the borrow to no more than 25 percent passing the No. 200 sieve, providing a sand or silty sand backfill, and utilizing the modified Proctor test (ASTM D 1557) as the laboratory compaction standard.

Details of the site specific backfill design are currently being developed through a two-phase backfill test pad program. Phase 1 will be conducted in late 2007. The purpose of the Phase 1 program is to develop representative backfill soil properties and to provide additional testing and analysis to demonstrate that the VEGP silty-sand borrow material will satisfy the AP1000 standard plant design siting criteria. Phase 2 will follow in 2008 and will develop placement and compaction methodologies for the construction program. The results of these two phases will be used to finalize the details of the backfill construction program including material properties criteria, construction methods, compaction methods and requirements, and testing protocol.

Phase 1 will entail a test pad, constructed below grade, approximately 20 feet thick using on site borrow from the switchyard area borrow source. The backfill will be placed in 6 inch loose lifts and compacted to 95 percent of the maximum dry density as determined by ASTM D 1557. The placement of the backfill will be comprehensively monitored and tested. During backfill placement, field testing will include compaction and shear wave velocity testing utilizing surface wave methods (SASW). Parallel testing will be performed in the laboratory for density, grain size, moisture, and plasticity. On completion of test pad construction, SPT borings will be drilled through the test pad and sampled continuously in the backfill and at 5-foot intervals to a depth of 20 feet in the in situ soil. Shear wave velocity will be measured in the test pad using cross-hole techniques in accordance with ASTM D4428. Shear wave velocity measurements will also be taken at the finished surface of the test pad using surface wave methods. Results of the test pad field and laboratory measurements will be used to develop expected shear wave velocity characteristics of the backfill. Shear wave velocity data developed during Phase 1 will be evaluated against the assumed shear wave and soil degradation characteristics of the backfill used in ESP Revision 2. If significant differences are found between the ESP application Revision 2 characteristics and the test pad characteristics, the backfill soil characteristics will be revised and reflected in ESP application Revision 4.

The current schedule for completion of the resonant column torsional shear (RCTS) testing on COL boring samples indicates the testing and supporting reports will be complete by January 2008. This RCTS data along with the test pad data will be evaluated in January 2008. The revised characteristics and the evaluation of the data developed from the test pad and RCTS testing will be presented in ESP application Revision 4. As a part of the data evaluation, the backfill and soil column characteristics will be revised as needed and the significance of those revisions will be reviewed.

Phase 2 will entail a test pad or pads constructed to establish the placement and compaction methods, including types of compactors, thicknesses of lifts, compactor speed and vibratory intensity, number of passes, etc., to be used during construction. Phase 2 borrow material will be taken from the switchyard area and the Units 3 and 4 excavation. Laboratory testing will be conducted to monitor the material characteristics to ensure the backfill material is within acceptable limits. Shear wave velocity measurements will be taken to compare the results with those developed in Phase 1.

As stated above, the results of a two-phase backfill design program will be used to develop specific required backfill characteristics and construction methods for the backfill. Field and laboratory testing requirements will be established to ensure consistency and placement of the material. A quality control program will be developed to ensure that the backfill is placed as specified by the design requirements. These measures will ensure that the variability of the backfill properties is minimized and the backfill will achieve acceptable results required by the AP1000 standard plant design.

2.5.4-8 In Subsection 2 .5.4.5.3 of the application, SNC stated that the backfill soil was classified into two categories. Seismic Category 1 backfill will be compacted to an average of 97 percent and a minimum of 93 percent, with no more than 10 percent of field compaction below 95 percent of the maximum dry density; and seismic Category 2 backfill will be compacted to an average of 95 percent and a minimum of 93 percent, with no more than 10 percent of field compaction tests less than 95 percent of the maximum dry density. In order to assist the staff to reach a review conclusion on the compaction criteria described above, SNC is requested to provide the following:

(a) A correlation between density and velocity to ensure that the site characteristic requirements (e.g., shear wave velocity) of the backfill are being met.

(b) A justification (or analyses) to ensure that use of the 93% minimum under Category 1 structures will not adversely impact soil density to the point that the minimum measured shear wave velocity falls below the minimum velocity requirement.

(c) Justification for Category 2 backfill to ensure that if the average dry density will meet the 95 percent compaction requirement that no more than 10 percent will fall below 95 percent.

<u>Response</u>:

(a) The correlation between velocity to the backfill design and construction requirements, including density, will be established based on the two phased backfill design/test pad program described in the response to RAI 2.5.4-7. This test pad program will result in detailed design and construction parameters including the backfill selection criteria, placement techniques, compaction methods and requirements, and a testing protocol. Placement of backfill that meets these backfill design and construction requirements will assure that the expected shear wave velocity profile will be achieved.

(b) SNC has revised the backfill compaction specification to a single compaction requirement. Category 1 and Category 2 backfill shall be compacted to a minimum of 95 percent of the maximum dry density per the modified Proctor (ASTM D 1557) compaction standard. This compaction requirement will be for all backfill within the excavated area of each unit. This will provide uniformity in placement and strength of the backfill.
(c) The same compaction requirements will be used for Category 1 and Category 2 backfill.

2.5.4-9 As stated in Subsection 2.5.4.6.3, the two backfills are to be compacted to given Proctor density requirements based on field density measurements of one density test per 10,000 square feet of lift. SNC is requested to provide the basis of this testing density and how this number of density tests will provide assurance of adequate uniformity of shear wave velocity as used in the SSI analyses of the AP1000 standard design.

Response:

An evaluation was performed to provide a justifiable testing frequency for performing field density testing for VEGP Unit 3 and 4 engineered backfill. This evaluation identified that ASME NQA-1-2004, "Quality Assurance Requirements for Nuclear Facility Applications," Section 506, "In-Process Tests on Compacted Fill," establishes a recommended testing frequency for mass earthwork at nuclear facilities. As indicated in Table 506 in Part II, Subpart 2.5 of NQA-1-2004, the recommended frequency for performing field density tests for mass earthwork at nuclear facilities is to perform one test for every 2,000 cubic yards of compacted material placed.

SNC will revise ESP application Section 2.5.4.5.3 in Revision 3 to conform to the testing frequency recommended by NQA-1-2004, Section 506 "In-Process Tests on Compacted Fill."

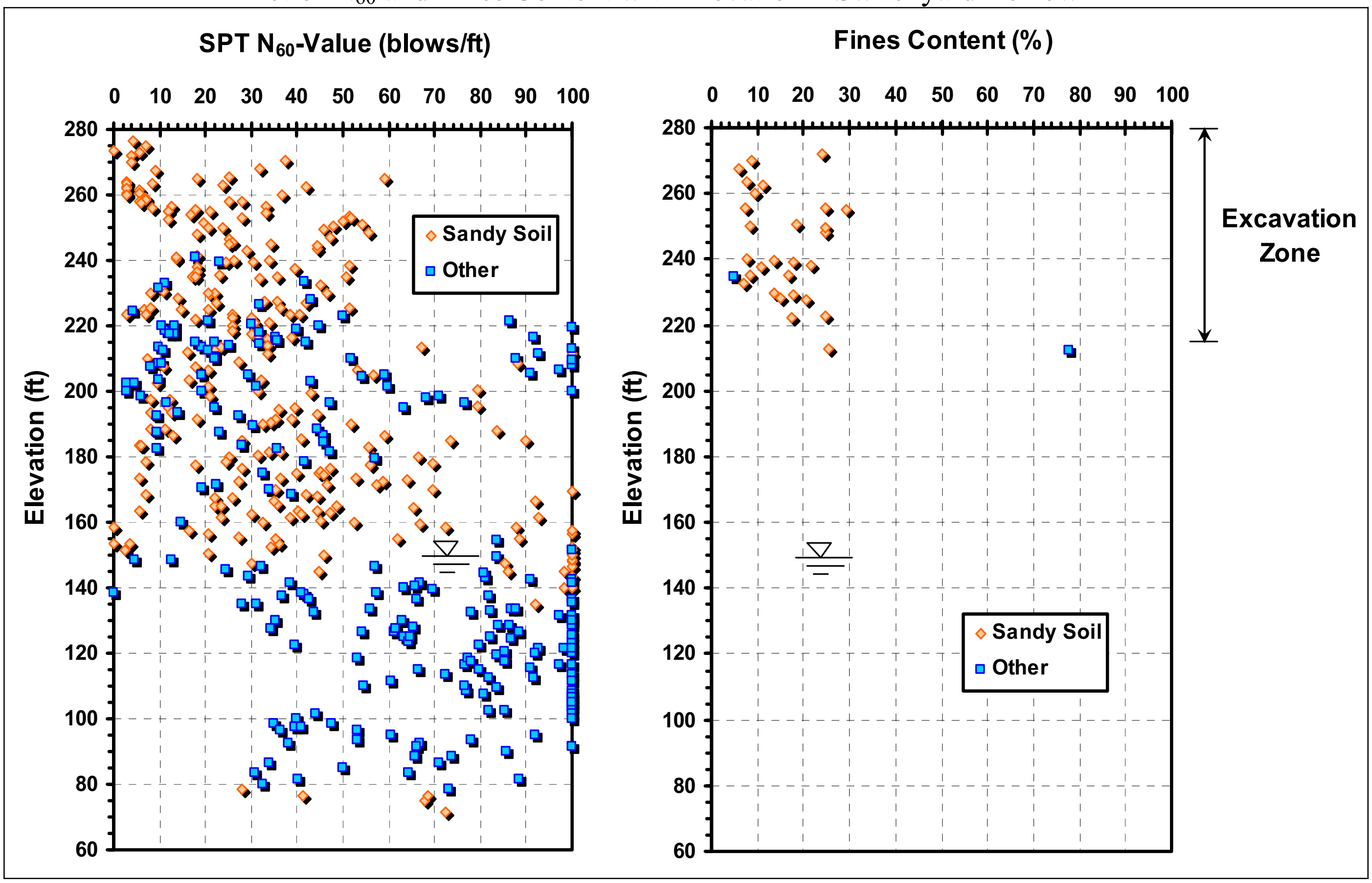
As indicated in response to RAI 2.5.4-7, SNC has established a two phase test pad program to develop the final backfill specification for construction including the placement methodology that will include establishing lift thicknesses and number of passes for the type of equipment used. Adopting the ASME NQA-1 Section 506 standard will provide an accepted consistent industry testing frequency, not tied to lift thicknesses, for the development of the final construction specification.

2.5.4-10 Section 2.5.4.5.3 states that approximately 3.9M cubic yards of material will be excavated for the power block area and that approximately 3.8M cubic yards will be required as structural backfill. Only about 30% of the excavated material will be suitable far reuse as structural backfill. An additional 2.5M cubic yards will be required and therefore, SNC is requested to perform additional investigations and testing, using horizontal and vertical intervals sufficient to determine material variability of the borrowed soil.

Response:

Sufficient borrow material for the VEGP Unit 3 and 4 construction has been identified and no additional investigations and testing is necessary. Previous stockpiled borrow materials identified in the switchyard area were evaluated during the COL level investigation through field and laboratory testing. Fifteen SPT borings were drilled through these materials and five test pits were excavated. Generally, the sandy soils identified for borrow were located above elevation 220 ft. These materials were classified according to ASTM D 2488 as silty sands (SM), poorly graded sands (SP), and lesser amounts of clayey sands (SC). From the SPT borings, 115 split barrel samples were taken in these sandy soils. A variety of laboratory tests were conducted on representative samples. These tests included grain size, chemical test, and compaction tests. Results are summarized in the figures and table below. It is estimated that approximately 2,500,000 cubic yards of suitable borrow exists at the switchyard borrow source.

Plot of N_{60} and Fines Content with Elevation – Switchyard Borrow



Presentation of test results for soils at the switchyard area: (a) SPT N60-value; (b) Fines content (MACTEC, 2007).

Note: It is assumed the measured SPT N = 100 blows/ft for refusal, and SPT N = 50 + 50/Δ/10 blows/ft for recorded blow counts of 50/(Δ ft). The energy-corrected SPT N_{60} does not exceed 100 blows/ft.

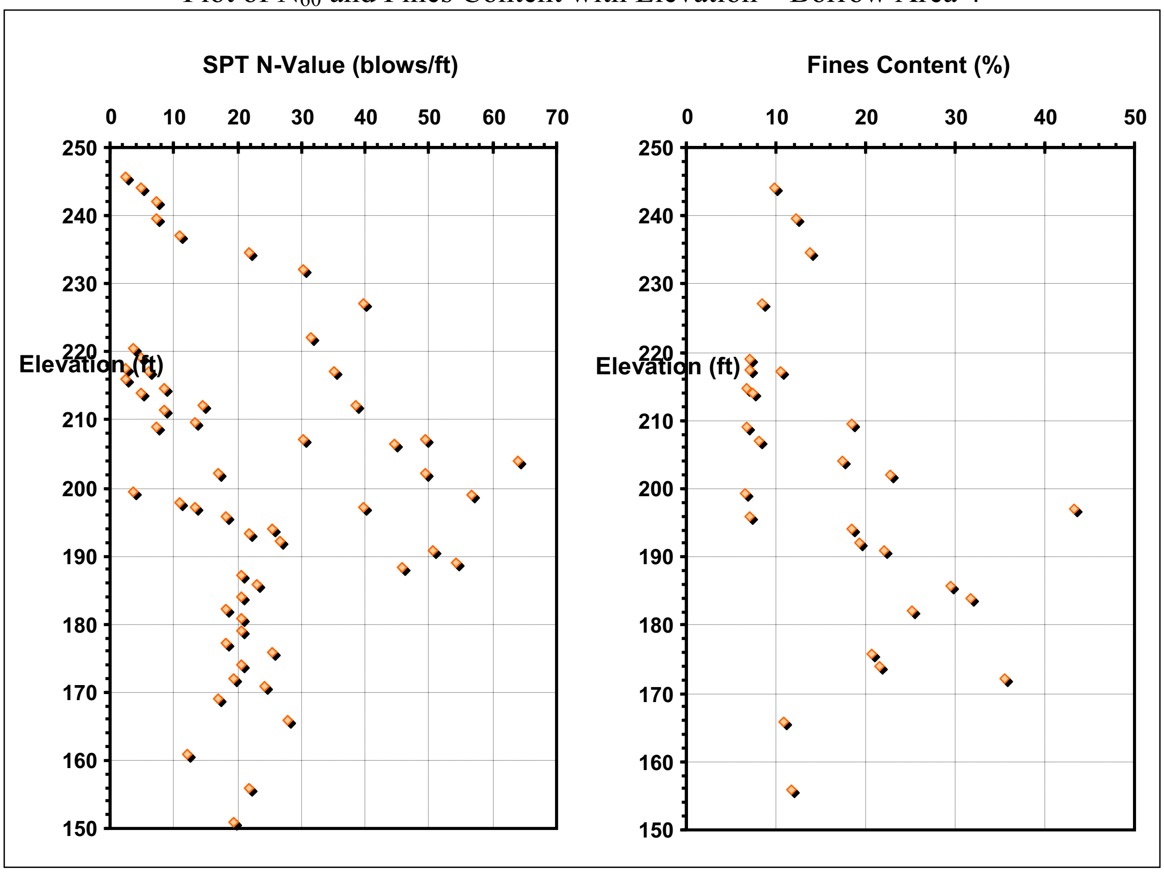
Summary of Field and Laboratory Test Results – Switchyard Borrow

ITEMS	SPT BLOW COUNTS		SIEVE ANALYSIS	CHEMICAL TESTS			COMPACTION	
	N	N_{60}	Fines	pH	Chloride	Sulfate	Optimum Moisture Content	Maximum Dry Density
	(blows/ft)		(%)		(ppm)	(ppm)	(%)	(pcf)
Number of Tests	115	115	27	2	2	2	2	2
Minimum	0	0	5.9	5.1	71.0	8.6	5.1	111.3
Maximum	45	59	29.2	5.3	80.0	11.0	14.8	120.0
Average	18	24	15.4	5.2	75.5	9.8	10.0	115.7
Median	17	24	15.0	5.2	75.5	9.8	10.0	115.7

Additional testing will be conducted on the borrow materials in the switchyard area during the upcoming Phase 1 backfill test pad program as described in response to RAI 2.5.4-7.

During the Units 3 & 4 COL geotechnical investigation , the alterative borrow source, Borrow Area 4, located about 4,000 feet north of the power block area was explored with four SPT borings and three test pits. This area was previously explored but not utilized during the design and construction of Units 1 and 2. Results of the COL field and laboratory test are summarized in the figures and table below.

Plot of N_{60} and Fines Content with Elevation – Borrow Area 4



Presentation of test results for soils at Borrow Area 4: (a) SPT N60-value; (b) Fines content (MACTEC, 2007).

Note: It is assumed the measured SPT N = 100 blows/ft for refusal, and SPT N = 50 + 50/Δ/10 blows/ft for recorded blow counts of 50/(Δ ft). The energy-corrected SPT N_{60} does not exceed 100 blows/ft.

Summary of Field and Laboratory Test Results – Borrow Area 4

ITEMS	SPT BLOW COUNTS		SIEVE ANALYSIS	CHEMICAL TESTS			COMPACTION	
	N	N_{60}	Fines	pH	Chloride	Sulfate	Optimum Moisture Content	Maximum Dry Density
	(blows/ft)		(%)		(ppm)	(ppm)	(%)	(pcf)
Number of Tests	56	56	31	3	3	3	3	3
Minimum	2	2	6.6	5.2	74.0	15.0	5.4	112.8
Maximum	53	64	43.3	5.7	250.0	18.0	15.1	120.7
Average	19	22	16.4	5.4	138.3	16.3	9.0	115.6
Median	17	21	12.3	5.3	91.0	16.0	6.6	113.2

2.5.4-11 In Subsection 2.5.4.6.3, there is no discussion regarding the number of grain size tests to be made to control the uniformity of the backfill. It is the staffs expectation that the maximum dry density and optimum water content for fill placement will be related to the grain size distribution of the backfill. In order to ensure that the backfill both under and to the side of the NI satisfies the AP1000 SS1 analysis criteria, SNC is requested to provide, in the application, a description regarding the program needed to assure that the correlation of the grain size distribution of the borrow material, the corresponding maximum dry density and associated shear wave velocity is defined.

Response:

As discussed in the response to RAI 2.5.4-7 a two-phase test pad backfill program will evaluate the range of acceptable backfill material properties including the maximum dry density and optimum water content for fill placement related to grain size distribution, density, and shear wave velocity. Results of the backfill design program will be used to develop the specification for production placement of the backfill. This specification will include material properties criteria for the borrow material as well as field and laboratory testing criteria. These controls on the construction of the backfill will ensure that the material will be placed uniformly and conform to AP1000 standard plant criteria.

2.5.4-12 In Subsection 2.5.4.5.3, SNC indicated that a flowable fill may be used in place of the compacted backfill. During the September 5-6, 2007, LWA site visit, SNC stated that the extent to which this material will be used is to be very limited. SNC is requested to specify in the application: (1) what are the target properties of this material, (2) the required uniformity of these properties, (3) how should it relate to the remainder of the compacted backfill, and (4) the description of the potential extent of its usage.

Response:

The use of flowable fill material will be limited to the Category II backfill (above the NI baseslab) for areas that it is not possible or practical to backfill with soil. Typical uses in the soil adjacent the NI would be around pipes and electrical conduits.

Flowable fill mixtures possess the characteristics of a high-quality compacted earth backfill after hardening, while resembling a very workable, lean concrete mix when produced, transported, and placed. Flowable fill will be used as multi-purpose fill material for limited application. The mixture will be designed to be fluid or flowing, which will allow it to fill the desired area without the need for tamping or compacting. The specification has not been prepared yet. It will be ensured that target properties are controlled by a specification and/or procedure.

(1) Target properties of the material:

At present, the design of the balance of plant has not progressed to the point that the flowable fill requirements have been developed. Following flowability, the key property will be the 28-day compressive strength, which will be specified based on the application. It is expected to range from less than 50 psi in applications where it may be desirable to easily excavate the fill in the future using conventional excavation techniques is important, to as high as 1,200 psi in applications where high bearing strength is important; e.g., pipe bedding under roads required to support heavy loads.

Unit Weight
The unit weight of the hardened flowable fill is expected to be in the range of 120 pcf to 140 pcf, which is not much different than the moist unit weight of compacted structural fill.

Shear wave velocity:
The shear wave velocity of a soil layer can be determined by following empirical formula as shown below:

$V_s = (G_0/p)^{0.5}$ where V_s = shear wave velocity, p is the soil density determined from soil unit weight, and G_0 is shear modulus.

Considering that flowable fill is stronger than backfill soil, it is expected that shear modulus of the flowable fill will be greater than the backfill soil. The resulting shear wave velocity will be greater than required shear wave velocity.

(2) Required uniformity of the properties:

The flowable fill mix proportions will be adjusted as required to produce a uniform mix that will flow freely and meet the strength requirements of the particular application. Trial batches will be prepared to test the mix design to ensure that it meets the desired fresh and hardened properties for consistency and uniformity.

The flowable fill will be produced in a ready-mixed concrete batch plant, which will ensure that high degrees of consistency and uniformity will be obtained for each particular mix design. It will be delivered to the locations where it will be used using standard concrete mixing trucks and placed using industry-standard practices for placement of concrete. These techniques will minimize the potential for separation of the various components comprising the flowable fill mixture before or during placement, further ensuring the uniformity of the flowable fill.

Most of the anticipated applications of flowable fill (e.g., pipe bedding under roads or for stormwater drainage system) will be at distances that are well removed from the safety-related structures associated with the AP1000. The uniformity of the flowable fill used in those applications is not of great concern, because the flowable fill is being used in those applications mainly to ensure that all of the void spaces beneath and around the pipe are filled. Other characteristics, such as the strength and unit weight, typically are of little concern for such applications. Greater care and oversight will be required where flowable fill may be used in the vicinity of structures to ensure that the minimum required strength and uniformity is obtained.

(3) Relation to the remainder of the compacted backfill:

Typically, load-carrying capacities of the flowable fill are higher than those of the compacted fill. A better uniformity can be achieved due to fewer voids during placement and lesser potential of settling under loading.

The bearing strength of flowable fill mixtures is directly related to their unconfined compressive strength. Based on industry experience, a flowable fill mixture with a 28-day unconfined compressive strength of (150 lb/in^2) has a bearing strength of approximately (10 $tons/ft^2$). This is roughly three times greater than the bearing strength of a high quality, well-compacted granular soil. As the unconfined compressive strength of the mixture increases over time, so does the bearing strength.

(4) Potential extent of its usage:

The potential usage will be in areas/locations where placement, compaction, and testing of the compacted backfill is difficult to accomplish due to restricted access, and to facilitate construction in limited areas. As indicated above, most of the anticipated applications of flowable fill will be at distances that are well removed from the safety-related structures associated with the AP1000. These will include backfilling sewer and utility trenches, road base, pipe bedding, and slope stabilization. The usage of flowable fill material will be controlled by a specification and/or procedure as required, and the locations of where it is used will be documented on drawings.

2.5.4-13 In Subsection 2.5.4.5.5, SNC indicated that a mechanically stabilized earth (MSE) wall will be constructed and will be used as a form against which the NI structures will be poured. It is not obvious that the backfill placed immediately behind the MSE wall will be able to be compacted to the same density criteria as the remainder of the fill without disturbing the MSE wall (e.g., deflection toward the NI structures due to backfill compaction). Based on the staff's previous review experience, the individual sections of the MSE wall cannot be expected to sustain significant lateral deflections during compaction without causing problems for placement of waterproofing. If the density of the backfill soil immediately adjacent to the wall is less compact, this material may have velocity properties different from that of the rest of the backfill. SNC is requested to provide, in the application, the procedures for compaction of the backfill immediately adjacent to the wall.

Response:

Each backfill lift shall be compacted using a large smooth drum vibratory roller, except within the five foot zone directly behind the panels. In this five foot zone from the back of the panels, the backfill will be placed in thinner lifts than are applicable for compaction using the large vibratory roller. Small single or double-drum vibratory walk-behind rollers, walk behind vibratory plate compactors, and jumping jack compactors will be used to achieve specified backfill compaction and to prevent misalignment of panels. It is expected that the fill that will be compacted using these smaller types of compactors will be approximately 4 inches thick before compaction. The actual thickness to be used for construction will be determined based on the results of a test fill program that demonstrates that the specified degrees of compaction are consistently achieved by the methods employed (e.g. lift thickness, moisture control, and number of passes of compactor). The end result of these anticipated methods will be that the compacted backfill will meet or exceed the specification established for Vogtle Units 3 and 4.

2.5.4-14 SNC is requested to provide, in the application, a discussion of how velocity testing of the compacted backfill will be performed and how assurance will be provided that the resulted velocities will meet target velocity requirements in the completed condition.

Response:

Velocity testing of compacted backfill will be performed as part of the backfill test program described in the response to LWA RAI 2.5.4-7. The results of the backfill test program supplemented by RCTS testing of sample backfill will provide the relationship of the shear wave velocity profile to the backfill design and construction requirements. Assuring that the in-placed backfill meets the backfill design and construction requirements will provide the assurance that the shear wave velocity profile of the in-place backfill falls within an acceptable range consistent with the appropriate requirements stated in the Westinghouse Design Control Document and the Vogtle site-specific analyses including the development of the GMRS and FIRS and the soil-structure interaction analyses.

2.5.4-15 In Subsection 2.5.4.5.3.2, SNC discussed the ITAAC for the backfill soil. SNC is requested to address the following issues identified by the staff:

(a) The "Design Requirement" column should also include the requirement of minimum shear wave velocity of 1,000 ft/sec.

(b) In the "Inspection and tests" column, SNC stated that testing will be performed during the placement of the backfill materials. A detailed description of the testing program should be provided in the application.

(c) The "Acceptance Criteria" states that "a report exists ..." A detailed description of this report should be provided in the application.

(d) The "Acceptance Criteria" should also include the criterion of minimum shear wave velocity of 1,000 ft/sec.

Response:

SNC will provide additional discussion to 2.5.4.5.3.2 to describe the design of engineered backfill. The discussion will describe the test pad program and RCTS testing that provides the assurance that the minimum shear wave velocity will be met. Included in the description will be the details of the test pad program. SNC will provide information in the ESP application to demonstrate that the shear wave velocity requirement will be met. Conformance to shear wave velocity should be demonstrated through the test pad program and not through the ITAAC process. A description of the report will be provided in the application for the Acceptance Criteria report.

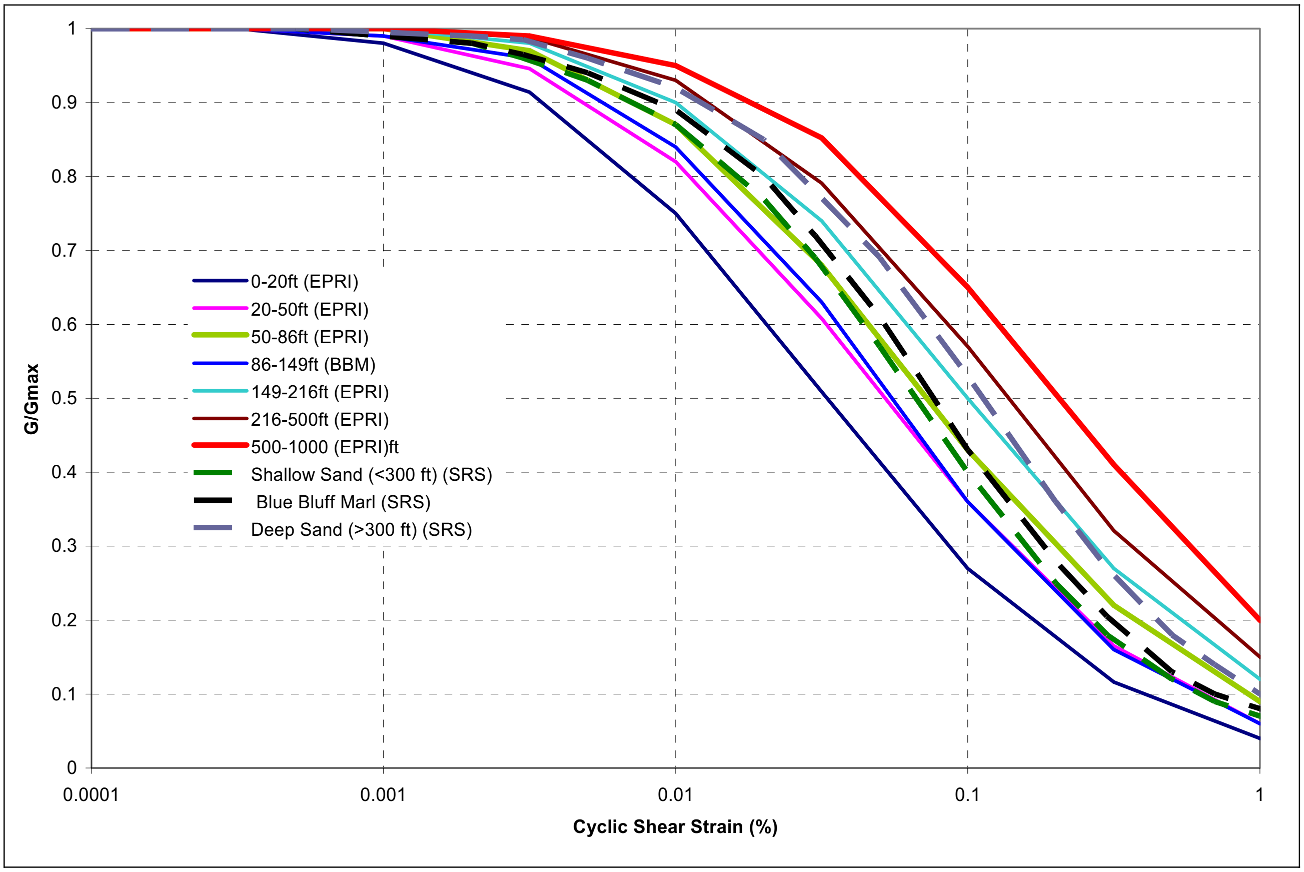
2.5.4-16 In Subsection 2.5.4.7.1, SNC discussed the shear wave velocity profile to characterize the site, but the discussion did not cover the backfill material. In Subsection 2.5.4.7.2, SNC described EPRI 1993 soil degradation models as well as SRS models. However, no significant discussion is presented of how these two models compare, which is more appropriate to use for Vogtle site response analyses, and how significant the models are to both site response and SSI analyses. SNC is requested to address these three issues.

Response:

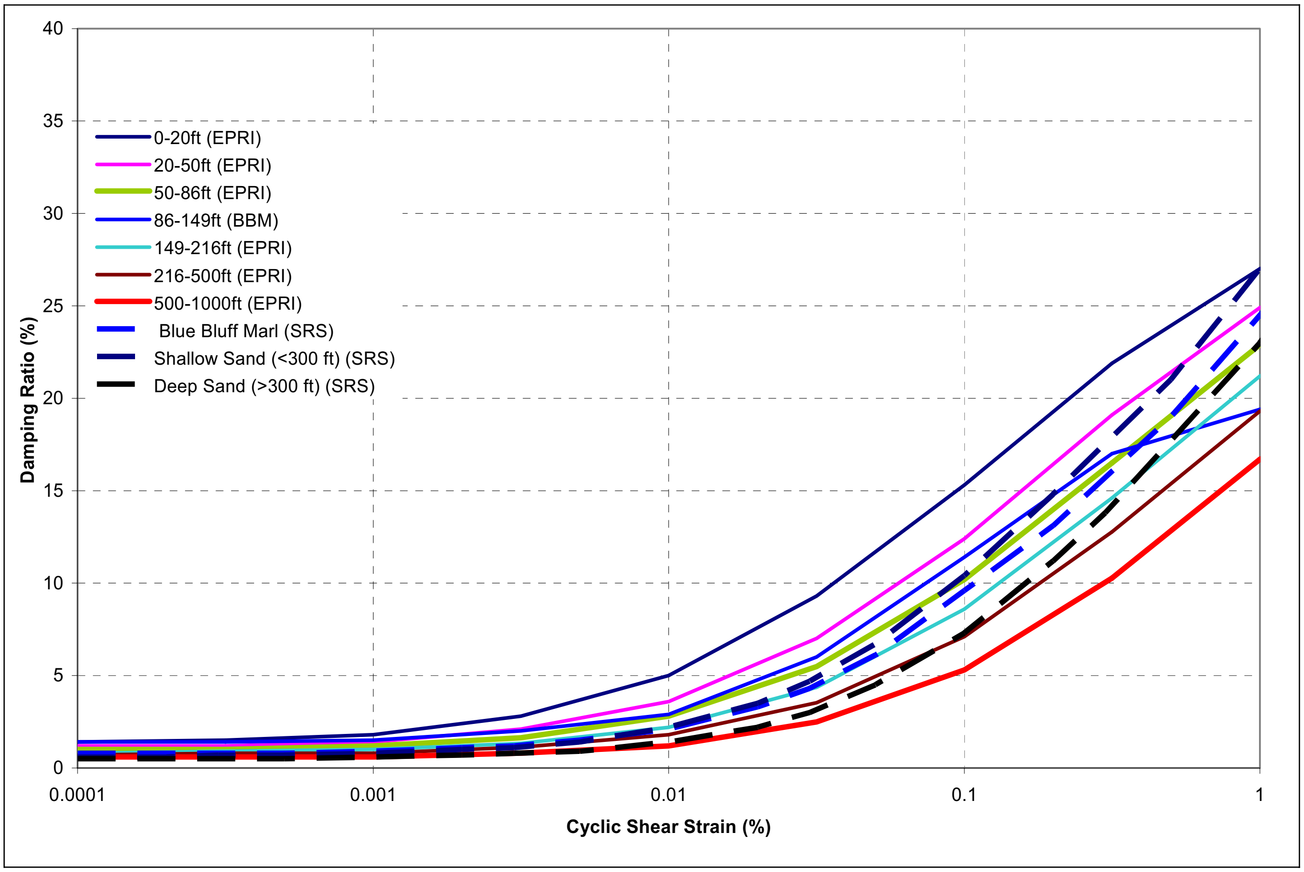
1) ESP application Subsection 2.5.4.7.1.1 acknowledges that the shear wave velocity for the compacted backfill was not determined during the ESP application subsurface investigation. The velocity values for the backfill provided in Table 2.5.4-10 were taken from data for existing Units 1 and 2. This table will be revised as necessary pending the results of the upcoming Phase 1 test pad program as outlined in response to RAI 2.5.4-7.

2) ESP application Subsection 2.5.4.7.2 discusses shear modulus and soil damping for the compacted backfill, BBM, and Lower Sand strata. These subjects were further discussed in the March 15, 2007 response to RAI 2.5.4-17. These discussions included descriptions of which EPRI curves were used to derive the soil degradation values for input to the SHAKE analysis. Soil degradation values from the neighboring SRS site were also used for input to SHAKE. Figures 2.5.4-9 and 2.5.4-11 in the ESP application illustrate the EPRI soil degradation values, while Figures 2.5.4-10 and 2.5.4-12 illustrate the SRS soil degradation values. The modulus reduction curves for EPRI and SRS have been plotted together in the figure below to illustrate the relationship between these models. Likewise, the same has been done for the damping ratio curves. Note that the SRS curves were selected based on their stratigraphic relationship to the Vogtle 3 and 4 site. The SRS curve labeled as Blue Bluff Marl on the figures below is

based on the Dry Branch Formation and the Santee Formation, the SRS stratigraphic equivalent to the Vogtle Blue Bluff Marl Both data sets were used to include variability in the model and each is weighted equally. RCTS testing is currently being conducted to develop site-specific data. When these data become available, the results will be evaluated and the site response analysis will be re-run if appropriate.



Modulus Reduction Curves for EPRI and SRS Models



Damping Ratio Curves for EPRI and SRS Models

2.5.4-17 The MACTEC report (attachments to the application) discusses the use of the REMI method for site geophysical testing. SNC is requested to provide a description of how this method was applied in determining S- and P-wave velocity profiles and provide a justification to demonstrate the adequacy of using these data in determining site properties and its impact on response analyses.

Response:

REMI testing was conducted in the power block areas of the existing VEGP Units 1 and 2 and in the footprint of proposed Units 3 and 4. Two arrays each were conducted at Units 1 and 2 and Units 3 and 4. The original intent of collecting these data was to establish the shear wave velocity characteristics of existing backfill at Units 1 and 2. During collection of the data, it was readily apparent that the vibration frequency of the nearby operating plant equipment was interfering with the REMI data. Unsuccessful attempts were made in the field to overcome this interference. SNC requested Dr. K Stokoe of the University of Texas–Austin to review the REMI results. He expressed doubt that the test results truly represented the shear wave velocity profile. Therefore these data have not been considered in the COL geophysical survey.

2.5.4-18 Section 5 of the MACTEC report indicates that Dr. K. H. Stokoe will be used to review the resonant column torsional shear (RCTS) data generated on the program. SNC is requested to provide a description of the details of the depth and completeness of Dr. Stokoe's review to ensure that the quality of the data generated is appropriate for use in the site evaluations

Response:

All scheduled RCTS testing has or will be performed by Fugro Consultants, Inc. at their facilities in Houston, Texas. By contract between MACTEC and Fugro, Dr. Stokoe reviews each RCTS draft report for Vogtle to assure quality of the results. The RCTS reports are not finalized until he concurs with the test results. Dr. Stokoe's review is documented by a signed cover sheet for each report. The signed cover sheet documenting Dr. Stokoe's review for test specimen B3002-UD3 is included with this RAI response as an example.

In addition, Dr. Stokoe has been involved in the initial setup and review of the Fugro test facility. The test cells being used at Fugro were fabricated to specifications provided by Dr. Stokoe. Fugro's lead engineer responsible for the RCTS testing met with Dr. Stokoe and his staff on several occasions to discuss the RCTS testing and is thoroughly familiar with the RCTS test protocol developed by Dr. Stokoe. Prior to commencing RCTS testing at Fugro, conformance tests were run on an Ottawa Sand sample, the results of which were reviewed by Dr. Stokoe and compared with results produced on a similar sample by RCTS cells at the University of Texas. This provided Dr. Stokoe assurance that the test equipment and data reduction software being used by Fugro for RCTS testing were consistent with the equipment and data reduction software being used at the University of Texas. Prior to MACTEC releasing the Fugro lab to begin RCTS testing, Dr. Stokoe visited the Fugro lab and reviewed their lab setup and procedures.

MACTEC has performed an audit of the Fugro test facility including test equipment, test procedures, qualification of the technicians performing the tests, and conducted surveillances of RCTS testing in progress.

SSAR Section 3.8.5 Foundations

3.8.5-1 In the one page description of Section 3.8.5, SNC did not provide any information on how the quality of the backfill (grain size, compaction, uniformity, etc.) is going to be used to ensure the adequacy of the foundation design. SNC is requested to provide information on this issue.

Response:

SNC is currently developing a backfill design program to develop the soil properties representative of the backfill properties to ensure that the backfill will satisfy the criteria used in the AP1000 standard plant design. This program consist of be a two-phase backfill test pad program and will include the evaluation of material properties, compaction criteria and construction methods. Additional details of this program are provided in response to RAI 2.5.4-7.

3.8.5-2 Regarding the dynamic stability of the NI structures sited at the Vogtle ESP site, SNC is requested to provide additional information to demonstrate how the sliding criteria assumed during the APl000 SSI analyses (sliding friction value of 0.7) are in fact to be attained from the backfill soil-mudmat-water proofing system at the ESP site.

Response:

The sliding friction value of 0.45 that was stated in ESP Application Revision 2 is appropriate for the Vogtle site (soil foundation). Westinghouse is in the process of evaluating the stability of the AP1000 for the Vogtle site-specific conditions using a friction value of 0.45. This evaluation will be included in ESP Application Revision 4.

SSAR Section 13.7 Fitness for Duty

13.7-1 In an August 16, 2007, letter from NRC to Nuclear Energy Institute, the NRC described how an applicant for a Combined License (COL) could satisfy the requirement in 10 CFR 52.79(a)(44) that a COL applicant describe its 10 CFR Part 26 Fitness for Duty (FFD) program in the COL application's Final Safety Analysis Report. The guidance in that letter concerning an FFD program during construction also applies to an applicant for an Early Site Permit and Limited Work Authorization. Please provide a description of your FFD program and its implementation that is consistent with this guidance and the NRC's regulations.

Response:

The FFD program during construction of VEGP Units 3 and 4 is provided in Enclosure 2 to this letter. The VEGP Units 3 and 4 FFD Program document will be incorporated into the Vogtle ESP Application at the next revision of the application.

Also as provided in the above referenced letter, NRC listed 10 points relating to the proposed approach to describe a Fitness for Duty (FFD) program. These points are identified below, along with locations within Enclosure 2 where [in brackets] the answers can be found.

(1) How the FFD program personnel responsibilities will be assigned by the licensee and implemented within the licensee's organizational units. [Section 4, page 3 and Section 5.3, pages 8 and 9]

(2) The estimated number of persons to be assigned to implement the FFD program. [Section 5.3, page 8]

(3) The general educational and experience requirements for positions or classes of positions necessary to implement the FFD program. [Section 4, page 3 and Section 5.3, pages 8 and 9]

(4) FFD program equipment maintenance and calibration procedures. [Section 5.3, page 7]

(5) Quality assurance procedures for operations and maintenance of FFD program equipment. [Section 6.3, pages 13 and Section 6.9, pages 16 and 17]

(6) Training of supervisors, escorts, and FFD program personnel. [Section 5, pages 5 and 6, and Section 5.3, pages 8 and 9]

(7) Random drug and alcohol testing rates. [Section 6.2.3, page 12]

(8) The drugs the licensee will test for and the cutoff level for each of these drugs. [Section 5.3, pages 7 and 8]

(9) The alcohol testing cutoff level. [Section 5.3, pages 7 and 8]

(10) Procedures for establishing which substances the licensee will test for, other than the substances required by 10 CFR Part 26. [Section 5.3, page 8]

Southern Nuclear Operating Company

AR-07-1802

Enclosure 2

Vogtle Electric Generating Plant

Units 3 and 4

Fitness For Duty Program

During Plant Construction

NOTE: Enclosed following this sheet is a 22-page document, which includes an Attachment A.

Vogtle Electric Generating Plant

Units 3 and 4

Fitness For Duty Program

During Plant Construction

TABLE OF CONTENTS

1 INTRODUCTION 1
2 PURPOSE AND SCOPE 1
3 RESPONSIBILITY 2
4 DEFINITIONS 2
5 DRUG AND ALCOHOL POLICY & PROCEDURES 4
5.1 USE, POSSESSION, OR SALE OF DRUGS OR ALCOHOL 6
5.1.1 Illegal Drugs 6
5.1.2 Alcohol 6
5.1.3 Reporting of Legal Actions 6
5.2 DISCIPLINARY ACTIONS 6
5.3 DRUG AND ALCOHOL TESTING 6
6 DRUG AND ALCOHOL TESTING PROCEDURE 10
6.1 CONSENT FORM 10
6.2 TESTING PROCEDURES 10
6.2.1 Pre-Access 10
6.2.2 For Cause 10
6.2.3 Random Drug and Alcohol Testing 12
6.3 SPECIMEN COLLECTION AND LABORATORY 13
6.4 SPECIMEN PROCESSING 14
6.5 POSITIVE RESULTS 14
6.6 REVIEW PROCESS 15
6.7 BEHAVIORIAL OBSERVATION PROGRAM 15
6.8 RECORDKEEPING AND CONFIDENTIALITY 15
Electronic Format Records 16
Hardcopy Records 16
6.9 AUDITS 16

VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4 FITNESS FOR DUTY PROGRAM DURING PLANT CONSTRUCTION

1 INTRODUCTION

This document provides Vogtle Electric Generating Plant (VEGP) Units 3 and 4 construction site entities a process to authorize and maintain a worker's status in the construction site entity Fitness for Duty (FFD) Program in order to allow an individual to work on a construction site. It is acknowledged that entities implementing this guidance may be Southern Nuclear Operating Company (SNC), contractor/vendors (C/V), or other entities authorized by the NRC and shall hereafter be referred to as construction site entities.

2 PURPOSE AND SCOPE

This document is applicable to the VEGP Units 3 and 4 construction site entity and applies only to persons who will construct, at the location where the nuclear plant will be constructed and operated, safety and security related structures, systems, and components (SSCs) that are required to be described in the construction entities site safety analysis report or physical security plans. This document ensures consistent application of regulations and is intended to serve as the FFD Program description for VEGP Units 3 and 4 construction site as required in 10 CFR 52.

The FFD program described herein applies only to construction activities that are performed at the location within the footprint of the new power reactor as well as the nearby areas where safety- and security-related SSCs will be installed and operate when the plant begins operation. Construction activities include any fabrication, erection, integration, or testing of safety- or security-related SSCs. Construction activities conducted at facilities outside this prescribed area such as another location, city, state, or outside of the U.S. would not be subject to the program described herein.

Management and oversight personnel, as listed below, shall be subject to the full VEGP operating plant FFD program that meets the requirements of 10 CFR 26.

- security personnel required by the NRC
- those who perform quality assurance/quality control/quality verification activities related to safety- or security-related construction activities
- individuals directly involved in witnessing or determining inspections, tests, and analyses (ITAAC) certification
- designated individuals to monitor the fitness of individuals
- individuals responsible for oversight and implementation of the licensee fitness-for-duty and access authorization programs
- second-level and higher supervisors and managers

3 RESPONSIBILITY

Each construction site entity is responsible to ensure that the applicable elements of 10 CFR 26 are implemented at their construction sites. In ensuring this is completed, a construction site entity may rely on program elements completed by another construction site entity program. Once it has been determined that an individual has provided a negative drug and alcohol test, the individual may be eligible to gain access to the construction facility. A construction site entity can maintain an individual in this status as long as the person remains in the construction site entity random fitness for duty testing program for new plant construction.

Each construction site entity approving a C/V program shall ensure the latest revision of this document has been provided to each of its C/Vs for use and require that the criteria herein be met. Audits are used to assure that licensee and licensee-approved C/V programs supporting the fitness for duty program for the construction site meet regulatory requirements. Construction site entities are responsible for ensuring that program deficiencies are corrected.

4 DEFINITIONS

NOTE: These definitions expand upon but do not replace those found in regulatory documents.

Construction Site – The defined physical location within the owner-controlled area (OCA) where the nuclear plant's security and safety related systems, structures, and components (SSCs) will be constructed and operated

Contractor/Vendors – Any company or individual not employed by the construction site entity that is providing work or services either by contract, purchase order, oral agreement, or other arrangement.

Conviction - A finding of guilt (including a plea of nolo contendere), or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the federal or state criminal drug and/or alcohol statutes.

Criminal Drug Statute - A federal or non-federal, criminal statute involving the manufacture, distribution, dispensing, possession, or use of any controlled substance.

First Level Supervisors – The first level supervisory position that does not perform manual work.

HHS-certified laboratory - *a* laboratory that is certified to perform urine drug testing under the Department of Health and Human Services Mandatory Guidelines for Federal Workplace Drug Testing Programs (the HHS Guidelines), which were published in the Federal Register on April 11, 1988 (53 FR 11970), and as amended, June 9, 1994 (59 FR 29908), November 13,1998 (63 FR 63483), and April 13, 2004 (69 FR 19643).

Illegal Drugs - Any drug that is included in Schedules I to V of Section 202 of the Controlled Substances Act [21 U.S.C 812], but not when used pursuant to a valid prescription or when otherwise authorized by law.

Legal Action - A formal action taken by a law enforcement authority or court of law, including an arrest, an indictment, the filing of charges, a conviction, or the mandated implementation of a plan for substance abuse treatment in order to avoid a permanent record of an arrest or conviction, in response to any of the following activities:

- The use, sale, or possession of illegal drugs;
- The abuse of legal drugs or alcohol; or
- The refusal to take a drug or alcohol test.

Under the Influence – A determination that an individual is affected by drugs or alcohol in any detectable manner. The symptoms of influence include but are not confined to those consistent with aberrant behavior or obvious impairment of physical or mental abilities such as slurred speech or difficulty in maintaining balance.

Management and Oversight - The following position classifications are defined as management and oversight personnel:

- security personnel required by the NRC
- those who perform quality assurance/quality control/quality verification activities related to safety- or security-related construction activities
- individuals directly involved in witnessing or determining inspections, tests, and analyses (ITAAC) certification
- designated individuals to monitor the fitness of individuals
- individuals responsible for oversight and implementation of the licensee fitness-for-duty and access authorization programs
- second-level and higher supervisors and managers

MRO (Medical Review Officer) –a licensed physician who is responsible for receiving laboratory results generated by a 10 CFR 26 drug testing program and who has the appropriate medical training to properly interpret and evaluate an individual's drug and validity test results together with his or her medical history and any other relevant biomedical information.

SSC (Systems, Structures or Components)

- *Safety-related SSCs* mean those structures, systems, and components that are relied on to remain functional during and following design basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 10 CFR 50.34(a)(1).

- *Security-related SSCs* mean those structures, systems, and components that the licensee will rely on to implement the licensee's physical security and safeguards contingency plans that either are required under 10 CFR 73 if the licensee is a construction permit applicant or holder as described in 10 CFR 26.3(c), or are included in the licensee's application if the licensee is a combined license applicant or holder as described in 10 CFR 26.3(c).

5 DRUG AND ALCOHOL POLICY & PROCEDURES

Drug and Alcohol Policy

Each construction site entity who implements this FFD program shall ensure that a clear, concise, written FFD policy statement is provided to individuals who are subject to the program. The policy statement must be written in sufficient detail to provide affected individuals with information on what is expected of them and what consequences may result from a lack of adherence to the policy. At a minimum, the written policy statement must:

- Describe the consequences of the following actions:
  i. The use, sale, or possession of illegal drugs on or off site;
  ii. The abuse of legal drugs and alcohol;

- Describe the requirement that individuals who are notified that they have been selected for random testing must report to the collection site within the time period specified by the licensee or other entity;

- Describe the actions that constitute a refusal to provide a specimen for testing, the consequences of a refusal to test, as well as the consequences of subverting or attempting to subvert the testing process;

- Prohibit the consumption of alcohol, at a minimum
  i. Within an abstinence period of 5 hours preceding the individual's arrival at the licensee's or other entity's facility, and
  ii. During the period of any tour of duty;

- Convey that abstinence from alcohol for the 5 hours preceding any scheduled tour of duty is considered to be a minimum that is necessary, but may not be sufficient, to ensure that the individual is fit for duty;

- Describe the consequences of violating the policy;

- Describe the individual's responsibility to report legal actions,

- Describe the responsibilities of managers and supervisors to report FFD concerns;

- Describe the individual's responsibility to report FFD concerns.

Procedures

Construction site entities shall develop, implement, and maintain written procedures that address the following topics:

The methods and techniques to be used in testing for drugs and alcohol, including procedures for protecting the privacy of an individual who provides a specimen, procedures for protecting the integrity of the specimen, and procedures used to ensure that the test results are valid and attributable to the correct individual;

- The immediate and follow-up actions that will be taken, and the procedures to be used, in those cases in which individuals who are subject to the FFD program are determined to have:
  - i. Been involved in the use, sale, or possession of illegal drugs;
  - ii. Consumed alcohol to excess before or while constructing safety- or security-related SSCs, as determined by a test that accurately measures breath alcohol content (BAC);
  - iii. Attempted to subvert the testing process by adulterating or diluting specimens (in vivo or in vitro), substituting specimens, or by any other means;
  - iv. Refused to provide a specimen for analysis; or
  - v. Had legal action taken relating to drug or alcohol use; and

- The process to be followed if an individual's behavior or condition raises a concern regarding the possible use, sale, or possession of illegal drugs on or off site; the possible use or possession of alcohol while constructing safety- or security-related SSCs; or impairment from any cause which in any way could adversely affect the individual's ability to safely and competently perform his or her duties.

Training

All individuals will receive FFD training as new employees and prior to initial granting of unescorted access to vital and protected areas of the plant. Refresher training will be conducted at nominal 12-month intervals. All individuals will be trained in behavioral observation techniques per NRC requirements to be able to recognize behavior adverse to the safe operation and security of the facility, and to detect and report aberrant behavior that might reflect negatively on an individual's trustworthiness or reliability. In addition, all badged individuals shall be trained as escorts per NRC requirements.

Managers and supervisors will be trained regarding their role and responsibility in implementing the program. Training will include the role of the medical and Employee Assistance Program staff, techniques for recognizing drugs and indication of the use, sale, or possession of drugs, behavioral observation techniques, and procedures for initiating corrective action including referrals for mandatory Fitness For Duty evaluations. Managers and Supervisors will be trained regarding their role in documentation of behavioral observation. New supervisors will be trained within 3 months after initial supervisory assignment. Refresher training will be conducted at nominal 12-month intervals.

Escorts will be trained in techniques for recognizing drugs and indications of the use, sale, or possession of drugs; techniques for recognizing aberrant behavior; and the procedure for reporting problems to supervisory personnel. Escorts will be trained prior to their assignment and refresher training will be conducted at nominal 12-month intervals.

5.1 USE, POSSESSION, OR SALE OF DRUGS OR ALCOHOL

5.1.1 Illegal Drugs

Using, selling, manufacturing, purchasing, transferring, dispensing, distributing, or possessing illegal drugs by any individual while on the construction site is strictly prohibited.

5.1.2 Alcohol

Using, selling, purchasing, transferring, dispensing, distributing, or possessing alcohol by an individual subject to this program while on a construction site is strictly prohibited.

Consumption of alcohol onsite or within 5 hours of performing construction work to safety-related or security-related SSCs is strictly prohibited. Abstinence from alcohol for the 5 hours preceding any scheduled work is considered to be the minimum that is necessary, but may not be sufficient, to ensure and individual is fit for duty.

5.1.3 Reporting of Legal Actions

An individual engaged in the performance of construction site entity work at the construction site is required to notify the construction site entity of any legal action involving drugs or alcohol as required by the construction site entity policies.

5.2 DISCIPLINARY ACTIONS

Individuals requiring access to the construction site shall sign a Consent Form (As an example, see Attachment A.), prior to gaining access, attesting to their understanding of the consequences for a violation of this policy.

The construction site entity shall establish sanctions for FFD policy violations that, at a minimum, prohibit the individuals from being assigned to construct safety- or security-related SSCs unless or until the licensee or other entity determines that the individual's condition or behavior does not pose a potential risk to public health and safety or the common defense and security.

5.3 DRUG AND ALCOHOL TESTING

The construction site entity shall employ urinalysis, breath tests or other methods approved by 10 CFR 26 to determine fitness for duty, including but not limited to pre-access, for-cause and random testing. An individual must consent to submit to such tests as a condition of access to the construction site entity and refusal to consent shall result in denial of access to the construction site.

Testing of urine specimens for drugs and validity, except validity screening and initial drug and validity tests that may be performed by a construction site entity testing facilities, must be performed in a laboratory that is certified by HHS for that purpose, consistent with its standards and procedures for certification. Any initial drug test performed by a construction site entity subject to this subpart must use an immunoassay that meets the requirements of the Food and Drug Administration for commercial distribution. Urine specimens that yield positive, adulterated, substituted, or invalid initial validity or drug test results must be subject to confirmatory testing by the HHS-certified laboratory, except for invalid specimens that cannot be tested. Other specimens that yield positive initial drug test results must be subject to confirmatory testing by a laboratory that meets stringent quality control requirements that are comparable to those required for certification by the HHS.

Testing for alcohol will be conducted through breath measurement. The initial test for alcohol performed at the collection site shall be conducted by a breath measurement device which meets the requirements of the National Highway Traffic Safety Administration (NHTSA) standards (49 FR 48855) and to any applicable State of Georgia statutes or by using oral fluids (e.g., saliva) using acceptable alcohol screening devices (ASDs) that are listed on the most recent version of NHTSA's Conforming Products List (CPL) for ASDs.

The following initial cutoff levels shall be used when testing specimens to determine whether they are negative for the indicated substances:

Initial Test Cutoff Levels (ng/ml)

Substance*	**Cutoff level (ng/ml)**
Marijuana metabolites	>50
Cocaine metabolites	>300
Opiate metabolites	>2000**
Phencyclidine	>25
Amphetamines	>1000
Alcohol (1)	>0.04% BAC

(1) Applicable only for breath measurement devices
* Construction site entities may specify more stringent cutoff levels as well other illegal drugs as determined. Results shall be reported for both levels in such cases.
**25 ng/ml is immunoassay specific for free morphine.

Confirmation testing for alcohol must be conducted using a breath measurement device.

Confirmation testing for drugs or drug metabolites must be conducted by a HHS-certified laboratory.

Confirmatory test cut-off levels

Drug	Cut-off level (ng/ml)
Marijuana metabolite	>15*
Cocaine metabolite	>150**
Opiates: Morphine	>2000
Opiates: Codeine	>2000
Opiates: 6-acetylmorphine	>10***
Phencyclidine	>25
Amphetamines: Amphetamine	>500
Amphetamines: Methamphetamine	>500****
Alcohol (1)	>0.04% BAC

(1) Applicable only for breath measurement devices
*Delta-9-tetrahydrocannabinol-9-carboxylic acid.
**Benzoylecgonine
*** Test for 6-AM when the confirmatory test shows a morphine concentration > 2,000ng/ml
****Specimen must also contain amphetamine at a concentration ≥ 200 ng/ml

Testing for additional substances may be ordered on individuals at the direction of the Medical Review Officer for follow-up and for-cause FFD tests. Appropriate cut-off limits shall be established by construction site entities per the protocols of the certified Department of Health and Human Services laboratory. Any individual subject to testing of additional substances at the direction of the MRO shall be informed of this requirement. In addition, construction site entities may specify more stringent cut-off levels. Results shall be reported for both levels in such cases.

On-site Testing Facilities

If used, any construction site entity testing facility shall have an individual to be responsible for day to-day operations and to supervise the testing technicians. The number of individuals required for the facility will be based on the needs of construction staffing and observation. This individual(s) shall have at least a bachelor's degree in the chemical or biological sciences or medical technology or equivalent. He or she shall have training and experience in the theory and practice of the procedures used in the licensee testing facility, resulting in his or her thorough understanding of quality control practices and procedures; the review, interpretation, and reporting of test results; and proper remedial actions to be taken in response to detecting aberrant test or quality control results.

Collector qualifications and responsibilities:

The construction site entity shall ensure the following:

- Urine collector qualifications: Urine collectors shall be knowledgeable of the requirements of the construction site FFD policy and procedures and shall keep current on any changes to urine collection procedures. Collectors shall receive qualification training that meets the requirements of this paragraph and demonstrate proficiency in applying the requirements of this paragraph before serving as a collector. At a minimum, qualification training must provide instruction on the following subjects:

  i. All steps necessary to complete a collection correctly and the proper completion and transmission of the custody-and-control form;
  ii. Methods to address "problem" collections, including, but not limited to, collections involving "shy bladder" and attempts to tamper with a specimen;
  iii. How to correct problems in collections; and
  iv. The collector's responsibility for maintaining the integrity of the specimen collection and transfer process, carefully ensuring the modesty and privacy of the donor, and avoiding any conduct or remarks that might be construed as accusatorial or otherwise offensive or inappropriate.

- Alcohol collector qualifications: Alcohol collectors shall be knowledgeable of the requirements of the construction site FFD policy and procedures and shall keep current on any changes to alcohol collection procedures. Collectors shall receive qualification training meeting the requirements of this paragraph and demonstrate proficiency in applying the requirements of this paragraph before serving as a collector. At a minimum, qualification training must provide instruction on the following subjects:

  i. The alcohol testing requirements of this part;
  ii. Operation of the particular alcohol testing device(s) [i.e., the the alcohol screening devices (ASDs) or Evidentiary Breath Test (EBTs)] to be used, consistent with the most recent version of the manufacturers' instructions;
  iii. Methods to address "problem" collections, including, but not limited to, collections involving "shy lung" and attempts to tamper with a specimen;
  iv. How to correct problems in collections; and
  v. The collector's responsibility for maintaining the integrity of the specimen collection process, carefully ensuring the privacy of the donor, and avoiding any conduct or remarks that might be construed as accusatorial or otherwise offensive or inappropriate.

Alternative Collection and Testing

Construction site entities who are subject to this procedure may rely on a local hospital or other organization that meets the requirements of 49 CFR 40, "Procedures for Department of Transportation Workplace Drug and Alcohol Testing Programs" (65-FR-41944; August 9, 2001) to collect and test specimens for the FFD program listed herein.

6 DRUG AND ALCOHOL TESTING PROCEDURE

6.1 CONSENT FORM

Individuals are required to sign the Consent Form (Attachment A) as a condition of access to the construction site. Included in the consent form is the agreement to submit to periodic unannounced (random) testing during the course of their access to the construction site. Refusal to cooperate with or submit to such testing shall result in immediate termination of access to the construction site.

6.2 TESTING PROCEDURES

6.2.1 Pre-Access

Within 30 days of gaining access to the construction site, each individual scheduled to work on SSCs shall have a drug and alcohol test which results in a negative result. Individuals who test positive will be denied access to the construction site.

6.2.2 For Cause

Post Accident

As soon as practical after an event involving a human error that was committed by an individual subject to this plan where the human error may have caused or contributed to the accident. The construction site entity shall test the individual(s) who committed the error(s), and need not test individuals who were affected by the event but whose actions likely did not cause or contribute to the event. Individuals involved in a work-related accident shall be required to submit to a drug and alcohol test at a designated testing facility.

In all cases treatment of an individual's illness or injury takes precedence over drug and alcohol testing.

For purposes of this policy, an "accident" is defined as the following:

- Work-related injury/illness – A~~n~~ injury or illness, resulting in an OSHA Recordable Incident.
- Work-related motor vehicle accident -- A significant on-site accident that occurs while an individual is in a vehicle performing construction site entity business, as defined the construction entity's procedures.
- Significant property damage -- Damage, during construction, to any safety- or security-related SSC in excess of $100,000.

Occupational Injury and Illness Resulting in an OSHA Recordable Incident

A significant illness or personal injury to the individual to be tested or another individual, which within 4 hours after the event is recordable under the Department of Labor standards contained in 29 CFR 1904.7, and subsequent amendments thereto, and results in death, days away from work, restricted work, transfer to another job, medical treatment beyond first aid, loss of consciousness, or other significant illness or injury as diagnosed by a physician or other licensed health care professional, even if it does not result in death, days away from work, restricted work or job transfer, medical treatment beyond first aid, or loss of consciousness.

- The injured individual must notify their onsite supervisor of the injury or illness if able.
- The construction site entity management shall make arrangements for the individual to submit for a drug and alcohol test at a designated testing facility.
- The results of the drug and alcohol test shall be submitted to the construction site entity management.

Significant Property Damage

- The supervisor shall notify the respective construction site entity management that an incident has occurred that resulted in damage to safety- or security-related SSC in excess of $100,000.
- Construction site entity management shall make arrangements for the individuals involved in the damage to submit for a drug and alcohol test at a designated testing facility.
- The results of the drug and alcohol test shall be submitted to the construction site entity management.

Observed Behavior

- If observed behavior or a physical condition creates a reasonable suspicion of possible substance abuse, the construction site entity shall perform drug and alcohol testing. The results must be negative before the individual returns to performing on SSCs.
- If credible information is received that an individual is engaging in substance abuse, the construction site entity shall perform drug and alcohol testing.
- If the physical condition is the smell of alcohol with no other behavioral or physical indications of impairment, then only an alcohol test is required.
- For other indications of possible impairment that do not create a reasonable suspicion of substance abuse, the construction site entity may permit the individual to return to work only after the impairing or questionable conditions are resolved and the MRO has determined that the individual is fit to safely and competently perform his or her duties.

6.2.3 Random Drug and Alcohol Testing

Random Selection and Frequency

Random testing shall be accomplished for the construction site at the rate of 50 % of the population that is subject to FFD testing for the calendar year. Testing will be conducted during all types of work periods, including weekends and holidays at various times of the day throughout the calendar year. If an individual is selected and is not at work, the individual is not required to report to work for the purposes of random testing. Test selection is statistically random and unannounced, so that all individuals in the population subject to testing have an equal probability of being selected and tested. Testing will be administered in a manner that provides reasonable assurance that individuals are unable to predict the time periods during which specimens will be collected.

Random testing for individuals concurrently authorized Unescorted Access to an operating power reactor shall be deemed adequate to maintain access to a construction site without being subject to additional random testing.

Random selection includes all individuals in the FFD testing pool, for the construction site, on the date the random list is generated. Individuals to be tested (hereinafter the "subject") shall be chosen by use of a method which randomly selects the number of subjects from among the individuals in the random pool for the construction site. The construction site entity will develop procedures to detail the implementation of the random testing selection process as required herein.

Notification Procedures

At the time of random drug and alcohol testing, the following steps shall be taken:

- A record of the individuals selected for random testing shall be documented.
- The construction site entity shall notify the subject individuals and request they report to the designated collection facility by a specific time.
- If an individual refuses to submit to the testing, the onsite supervisor shall attempt to inform the individual that access to the construction site shall be terminated unless he/she submits to testing.
- Individuals selected for testing from the random pool will be immediately available to be selected the next time the random list is generated.
- Individuals not onsite the day the random selection is determined will not be subject to testing unless they are selected randomly again.
- When the construction site entity receives the results of the tests appropriate action shall be taken in the event of positive results.
- The laboratory forwards a written report to the construction site entity for the drug testing file.

6.3 SPECIMEN COLLECTION AND LABORATORY

Any initial test performed by a construction site testing facility or a HHS-certified laboratory, and the confirmatory test performed by a HHS-certified laboratory, shall use a process which meets the requirements of the Food and Drug Administration (FDA). Testing for drugs and drug metabolites will be conducted through the analysis of urine specimens or other process which meets the requirements of the FDA. Testing for alcohol will be conducted through breath measurement or oral fluids (e.g., saliva). The initial test for alcohol performed at the collection site shall be conducted by a breath measurement device which meets the requirements of the NHTSA standards (49 FR 48855) and to any applicable State of Georgia statutes, or by using oral fluids (e.g., saliva) using acceptable ASDs that are listed on the most recent version of NHTSA's CPL for ASDs.

Analytic methods used for testing will be urinalysis, saliva analysis, or any other method approved in 10CFR26. Testing indicates the presence of specific drugs or drug metabolites, but is not an indication of impairment due to drug use.

Initial analysis and validity testing may be performed by construction site entity testing facility or by HHS-certified laboratories. Confirmatory analysis is performed by a laboratory that meets stringent quality control requirements that are comparable to those required for certification by the HHS. Breath analysis may be performed at the construction site entity collection facility.

Initial cut-off levels shall be detailed in the construction site entity procedures. Those specimens that test negative on the initial test are not subject to further testing unless they are suspected of having been adulterated or diluted.

Confirmatory testing must be performed after a presumptive positive test. Confirmatory drug testing is performed using gas chromatography (GC/MS) techniques. Breath analysis confirmation is performed by use of a breath measurement device. Specimens that are negative on the confirmatory test are reported as negative and are not subject to further testing unless they are suspected of having been adulterated or diluted. If the test is positive for morphine, a test for 6-monoacetylmorphine (6-MAM) shall be included in the confirmatory test for opiates to aid the MRO in determining whether the morphine is from legal drugs.

Specimens with a confirmed positive laboratory result for drugs, other than alcohol, will be evaluated by the MRO who will determine whether there is a legitimate medical reason for the presence of that drug in that specimen. This may involve review of medication history, physical examination and/or personal interview.

Vendor-operated testing facilities authorized by the construction site entity to conduct testing shall comply with the provisions of this program through the use of detailed procedures and shall be subject to assessment by the construction site entity or its representatives prior to implementation of the service and at a specified periodicity to assure continued effectiveness of service.

6.4 SPECIMEN PROCESSING

Construction site entity shall arrange for all testing to be performed either on the construction site or at a nearby qualified facility. The testing should be done as soon as is reasonable after appropriate medical care if required.

Collection site personnel shall arrange to transfer the collected specimens to the HHS-certified laboratory or SNC testing facility. The construction site entity shall take appropriate and prudent actions to minimize false negative results from specimen degradation. Specimens that have not been shipped to the HHS-certified laboratory or SNC testing facility within 24 hours of collection, and any specimen that is suspected of having been substituted, adulterated, or tampered with in any way, must be maintained cooled to not more than 6 °C (42.8 °F) until they are shipped to the HHS-certified laboratory. Specimens must be shipped from the collection site to the HHS-certified laboratory or SNC testing facility as soon as reasonably practical but, except under unusual circumstances, the time between specimen shipment and receipt of the specimen at the SNC testing facility or HHS-certified laboratory should not exceed two business days.

The specimen collection and alcohol testing process will be detailed in the construction site entity procedures and will meet or exceed the requirements of specimen collection as stated in 10 CFR 26. For alternative methods not described in 10 CFR 26, the construction site entity will develop detailed collection and specimen testing procedures.

6.5 POSITIVE RESULTS

A positive confirmatory breath alcohol test indicates a violation of the FFD program.

A presumptive positive drug test result does not always indicate a violation of the FFD program. All presumptive positive drug test results confirmed by the HHS certified laboratory as positive shall be reviewed by the MRO. The MRO will determine whether a legitimate medical reason exists for the positive result and will be the final determination as to whether an individual is in violation of the FFD program. If the MRO determines that there is a legitimate medical explanation for the presumptive positive result, the MRO shall report the result as negative. Substituted, adulterated or diluted samples will also be subject to MRO review for final determination.

Only the MRO can authorize the reanalysis of the original specimen, or the analysis of an aliquot of a split sample. The donor may request the MRO to authorize reanalysis. Such reanalysis shall be conducted by an HHS-certified laboratory.

The MRO shall report all positive results to the construction site entity management person responsible for the FFD program. The construction site entity shall ensure that appropriate action is taken as detailed in the construction site entity procedures. These procedures shall clearly state the consequences of violating FFD program requirements.

6.6 REVIEW PROCESS

The construction site entity shall have an alternative review process that is independent and impartial. The construction site entity shall include a description of the process to be used in the procedures that implement this requirement. Construction site entity programs are not intended to modify, subjugate, or abrogate any review rights that currently exist for individuals with their respective employers. An individual who has been denied access to the construction site or whose access has been terminated due to a violation of the FFD program shall have the capability to:

- Be provided the basis for the denial of access;
- Have an opportunity to provide additional information, and;
- Be provided the opportunity to have the decision, together with any additional information, reviewed by another designated construction site entity manager who is equivalent or senior to and independent of the individual who made the decision to deny or terminate access to the construction site due to the program violation. The determination from this independent review is final.

6.7 BEHAVIORIAL OBSERVATION PROGRAM

The construction site entity's Behavioral Observation Program is the primary means to detect behavior that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol onsite or while on duty; or any physical impairment or any cause that, if left unattended, may constitute a risk to public health and safety or the common defense and security. Supervision that are responsible for observing individuals subject to a Behavioral Observation Program shall report any FFD concerns about individuals to the personnel designation in the construction site entity's policy.

Supervision that is responsible to observe individuals subject to the Behavioral Observation Programs must be trained to have sufficient awareness and sensitivity to detect degradation in performance which may be the results of being under the influence of any substance, legal or illegal, physical or mental impairment which in any way may adversely affect their ability to safety and competently perform their duties. Training shall communicate the expectation of promptly reporting noticeable changes in behavior or FFD concerns about other individuals to the construction site entity designated personnel for appropriate evaluation and action in accordance with the FFD policy.

6.8 RECORDKEEPING AND CONFIDENTIALITY

Personal information, whether electronic or hardcopy, must not be disclosed to unauthorized persons. The construction site entity shall obtain a signed consent that authorizes the disclosure of the personal information collected and maintained before disclosing the personal information, except for disclosures to the following persons who are authorized:

- Operating plant licensees and other licensees or construction site entities seeking the information as required for determinations of access to construction sites;
- NRC representatives;

- Appropriate law enforcement officials under court order;
- The subject individual or his/her representative who has been designated in writing;
- Licensee or construction site entity representatives who have a need to have access to the information in performing assigned duties, including audits of licensee, contractor or vendor programs, except where specifically excluded by regulation;
- Persons deciding matters on review or appeal;
- Persons who have the authority to change personal data in electronic records, or
- Other persons pursuant to court order.

The construction site entity will establish and maintain a system of files and procedures that clearly indicate that test records and associated documentation shall be retained and used with the highest regard for individual privacy and confidentiality.

Records which must be retained and the retention period shall be identified in the construction site entity program procedures.

Electronic Format Records

For information stored or transmitted in electronic format, access to personal information will be controlled by password protection to control access to personal data and limiting data entry to each authorized individual's area of responsibility.

Hardcopy Records

Hard copy records shall be maintained in secured storage or lockable file cabinets when not in review. Access to the FFD area where files and file cabinets are contained is limited to those authorized above.

Reporting

Construction site entities shall make the following reports:

- Reports to the NRC Operations Center by telephone within 24 hours after the entity discovers any intentional act that casts doubt on the integrity of the FFD program and any programmatic failure, degradation, or discovered vulnerability of the FFD program that may permit undetected drug or alcohol use or abuse by individuals who are subject to the FFD program. These events must be reported under 10 CFR 26.73, rather than under the provisions of 10 CFR 73.71; and
- Annual program performance reports for the FFD program.

6.9 AUDITS

Construction site entities who implement an FFD program shall ensure that audits are performed to assure the continuing effectiveness of the FFD program, including FFD program elements that are provided by C/Vs, and the FFD programs of C/Vs that are accepted by the licensee or other entity.

Construction site entity shall ensure that these programs are audited at a frequency that assures their continuing effectiveness and that corrective actions are taken to resolve any problems identified. Construction site entities may conduct joint audits, or accept audits of C/Vs conducted by others, so long as the audit addresses the relevant C/Vs' services.

Construction site entities need not audit HHS-certified laboratories or the specimen collection and alcohol testing services that meet the requirements of 49 CFR 40 on which the construction site entity may rely to meet the drug and alcohol testing requirements of 10 CFR 26.

The construction site entity will develop procedures to address the implementation of the audit requirements herein.

ATTACHMENT A

CONSENT FORM

The individual applying for access is required to sign a Consent that authorizes a construction site entity and it authorized agents to test the individual for drug and alcohol use as determined by the construction site entity.

The individual's signature on the Consent confirms that the individual has read and understands the Consent, and has voluntarily agreed to authorize the construction site entity and it authorized agents performing drug and alcohol testing and the individuals and entities releasing information to take the actions set out in the Consent. The Consent includes the following:

- Blank lines to be filled in with the name of the construction site entity and its authorized agent obtaining the Consent.
- Authorization to performing drug and alcohol testing for use in access decisions and the transfer of information among construction site entities and their authorized agents, and their employees who have a need-to-know.
- Authorization to use the information collected solely for the purpose of determining eligibility for access and subsequent work within the boundary of the nuclear power plant construction site.
- Authorization of the retention of collected information in files that are secure for a period required by NRC.
- Language to convey to the applicant that participation in drug and alcohol testing is voluntary. If an individual will not sign the consent or withdraws consent, or does not cooperate with the test process, the process cannot continue. In any of these cases, access to the nuclear plant construction site shall be denied or withdrawn immediately.
- The Consent serves to release construction site entities and their authorized agents, and the officers, employees, representatives, agents, and records custodians of each as well as the officers, employees, representatives, agents, and records custodians of any entity or individual supplying drug and alcohol testing services from any and all liability based on their authorized receipt, disclosure, and use of the information obtained based on the individual's consent.
- The individual's rights and responsibilities relative to reviewing the records collected pursuant to this consent.
- Notice that nothing in the Consent is to be construed to waive any right or responsibility that the individual granting consent, the construction site entity or if different from the construction site entity, the individual's employer may have under Section 211 of the Energy Reorganization Act of 1974, as amended. Section 211 addresses "protected activity" by workers in the nuclear industry.

CONSENT FORM

______________________________ has my consent to drug and alcohol testing necessary to determine whether to grant me access to a nuclear power plant construction site and to allow me to maintain such access. The Nuclear Regulatory Commission (NRC) requires that this information be used in determining that an individual is fit-for-duty prior to granting and while maintaining access. The results of this determination may be available to other construction site entities.

I understand that the information may be transferred, electronically or otherwise, to other construction site entities and contractor/vendors or the agents of each. This information shall include, but is not limited to:

- Name and Social Security Number;
- Dates when any of the following are completed: drug testing, alcohol testing;
- Dates when access has been authorized or terminated; and
- Dates associated with drug and/or alcohol follow-up testing, if applicable.

I authorize any individual, organization, institution, or entity that now has, or obtains in the future, drug and/or alcohol testing information about me (examples of which are provided in the above paragraph), to release any such information in order to perform the evaluation required for access.

I understand that information obtained pursuant to this Consent shall be treated as confidential. The release of access-related information about me shall be limited to regulatory agencies and such personnel of construction site entities and their contractors/vendors who have been designated as having a "need to know" the information in order to do their jobs.

I understand that all information about me in the database shall be maintained as securely as reasonably practicable for a period determined by the NRC.

I understand that, upon my written request to ____________________, and at no cost to me, I shall be provided, within ten (10) working days, with a printed copy of the information about me which is in the construction site entity files. If, after my review of such information, I can show that any of the information is incorrect or incomplete, such information shall be corrected and/or completed as soon as is reasonably practical.

I hereby release ____________________, and the officers, employees, representatives, agents, and records custodians of each as well as the officers, employees, representatives, agents, and records custodians of any entity or individual supplying or using such information from any and all liability based on their authorized receipt, disclosure, or use of the information obtained pursuant to this Consent and to determine my eligibility for construction site access.

I understand that this Consent is not intended to and does not affect any right or responsibility that I, my employer (if not ________________), or ____________________ may have under Section 211 of the Energy Reorganization Act of 1974, as amended. I further understand that nothing herein (1) affects my right or my responsibility to bring potential safety concerns to my employer (if not ________________), ____________________, or the NRC; or (2) prohibits me from participating in any proceeding or investigation regarding such a potential safety concern.

I have read and understand this Consent and authorize ___________________ to take such actions as are described herein. While I understand that construction site access is dependent upon my accepting the regulatory requirements of this program, the statements made by me in this Consent and my decision to sign this Consent are voluntary. The statements were not induced by any promise nor have I been subjected to any threat, duress or coercion to sign this Consent.
[*Additional provisions required by applicable Georgia State law would be included here.*]

______________________________	______________________________
Applicant's Printed Name	*Social Security No.*
______________________________	______________________________
Applicant's Signature	*Date*