

November 17, 2011

Mr. Ron Clary  
Vice President, New Nuclear Deployment  
MC P40  
South Carolina Electric and Gas, LLC  
P.O. Box 88  
Jenkinsville, SC 29065-0088

SUBJECT: NRC INSPECTION REPORT NO. 05200027/2011-201 AND 05200028/2011-201

Dear Mr. Clary:

On October 4–6, 2011, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the South Carolina Electric and Gas, LLC, V.C. Summer Nuclear Station facility in Jenkinsville, SC. The inspection focused on quality assurance policies and procedures implemented for the proposed geologic mapping License Condition associated with the V.C. Summer Nuclear Station Unit 3 combined license. The purposes of this inspection were to verify (1) that South Carolina Electric and Gas, LLC, and its contractors are characterizing all geologic features exposed at the top of sound rock on the floor of the excavation consistent with descriptions of geologic site characteristics presented in the V.C. Summer Nuclear Station combined license application in Final Safety Analysis Report Sections 2.5.1 and 2.5.3 and (2) that the South Carolina Electric and Gas, LLC, geologic mapping activities are consistent with Regulatory Guide 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion,” issued March 2007.

The inspection also verified the implementation of an adequate quality assurance program that complies with the requirements of Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities.” The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance program.

Within the scope of this inspection, no violations or nonconformances were identified, and no response is required. If you choose to respond to this letter, please include the inspection report numbers in the title of your response. Additionally, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

In accordance with 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding,” of the NRC’s “Rules of Practice,” a copy of this letter and its enclosure and any response received from you related to this inspection will be made available electronically for public

R. Clary

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inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, accessible at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

*/RA/*

Richard A. Rasmussen, Chief  
Quality and Vendor Branch 2  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

Docket No.:  
05200027  
05200028

Enclosure:

1. Inspection Report No. 05200027/2011-201 and 05200028/2011-201 and Attachments

R. Clary

- 2 -

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Richard A. Rasmussen, Chief  
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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NEW REACTORS  
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS**

Docket No.: 05200027 and 05200028

Report Nos.: 05200027/2011-201 and 05200028/2011-201

Applicant: South Carolina Electric and Gas, LLC  
P.O. Box 88  
Jenkinsville, SC 29065-0088

Applicant Contact: Ms. Amy Monroe  
Licensing Engineer  
amonroe@scana.com  
1-803-345-4106

Background: South Carolina Electric and Gas, LLC, has submitted a combined license application to the U.S. Nuclear Regulatory Commission in accordance with the requirements of Subpart C, "Combined Licenses," of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," for V.C. Summer Nuclear Station (VCSNS) Unit 3. As a result of a proposed Unit 3 License Condition, the NRC routine inspection focused on several quality activities related to the ongoing geologic mapping at the VCSNS Unit 3 site.

Inspection Dates: October 4–6, 2011

Inspectors: George Lipscomb NRO/DCIP/CQVB Team Leader  
Amrit Patel NRO/DCIP/CQVB  
Frank Talbot NRO/DCIP/CQVA  
Alice Stieve NRO/DSER/RGS2  
Meralis Plaza-Toledo NRO/DSER/RGS1  
Mina Sheikh R-II/DCP/CPB4  
Patrick Donnelly R-II/DCP/CPB4

Project Manager: Anthony Minarik NRO/DNRL/DDLO/NWE1

Approved by: Richard A. Rasmussen, Chief  
Quality and Vendor Branch 2  
Division of Construction Inspection  
and Operational Programs  
Office of New Reactors

## **EXECUTIVE SUMMARY**

South Carolina Electric and Gas, LLC  
Inspection Report Nos. 05200027/2011-201 and 05200028/2011-201

The U.S. Nuclear Regulatory Commission (NRC) inspection focused on quality assurance (QA) policies and procedures implemented for the proposed geologic mapping License Condition associated with the V.C. Summer Nuclear Station (VCSNS) Unit 3 combined license. The purposes of this inspection were to verify (1) that South Carolina Electric and Gas, LLC (SCE&G) and its contractors are characterizing the geologic features exposed at the top of sound rock on the floor of the excavation consistent with the geologic site characteristics described in the VCSNS combined license application (COLA) in Final Safety Analysis Report (FSAR) Sections 2.5.1 and 2.5.3 and (2) that geologic mapping activities are consistent with Regulatory Guide (RG) 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion," issued March 2007. The inspection also verified the implementation of an adequate QA program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities."

The NRC based its inspection on the provisions in Appendix B to 10 CFR Part 50, and the NRC inspection team implemented Inspection Procedure 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008, during the inspection.

Before this inspection, the NRC had not performed any QA inspections of geologic mapping for the VCSNS Unit 3 site in Jenkinsville, SC. However, the NRC has completed inspections and audits related to VCSNS Units 2 and 3 as documented in the following.

- SCE&G QA implementation inspection report, dated July 15, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML091910321)
- VCSNS geology audit trip report, dated May 9, 2011 (ADAMS Accession No. ML111150574)
- VCSNS geology audit trip report, dated August 30, 2010 (ADAMS Accession No. ML102380451)

### **Training and Qualification**

The NRC inspection team determined that SCE&G contractor Fugro Consultants, Inc. (FCL), has established a program and procedures that adequately implemented the QA requirements related to qualification and certification of geologic mapping personnel in accordance with the regulatory requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. Based on its review, the NRC inspection team determined that FCL is effectively implementing its quality processes for qualifying and certifying personnel in support of the VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

### **Technical Assessment of Geologic Mapping Activities**

After examining the Unit 3 excavation, the NRC inspection team determined that the geologic features exposed at the top of sound rock (an interim level) in the floor of the excavation were consistent with the geologic features described in the VCSNS COLA in FSAR Sections 2.5.1

and 2.5.3, and that the geologic mapping activities were consistent with RG 1.208. No findings of significance were identified.

#### Software Control

The NRC inspection team concluded that SCE&G contractors Shaw and FCL used ArcGIS software to illustrate rock types and geologic structures underlying the nuclear island for VCSNS Unit 3; however, ArcGIS software did not perform a safety-related function and no other types of software were used for geologic mapping of the VCSNS Unit 3 excavation. No findings of significance were identified.

#### Procurement Document Control

The NRC inspection team determined that SCE&G and its contractors have established programs and procedures that adequately implemented the procurement process in accordance with the regulatory requirements of Criterion IV, "Procurement Document Control," of Appendix B to 10 CFR Part 50. Based on its review, the NRC inspection team determined that SCE&G and its contractors have effectively implemented their procurement processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

#### Procedures, Drawings, and Instructions

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately controls procedures, drawings, and instructions in accordance with the regulatory requirements of Criterion V, "Instructions, Procedures, and Drawings," of Appendix B to 10 CFR Part 50. Based on its review, the NRC inspection team determined that FCL is effectively implementing these control processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

#### Document Control

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately implemented document control for geologic mapping consistent with the requirements of Criterion VI, "Document Control," of Appendix B to 10 CFR Part 50. The NRC inspection team determined that FCL is effectively implementing its document control processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

#### Corrective Action

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately establishes corrective action requirements for geologic mapping activities consistent with the requirements of Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. Based on the sample reviewed, the NRC inspection team determined that FCL is effectively implementing its corrective action processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

#### Quality Assurance Records

The NRC inspection team concluded that geologic mapping records stored in fire-rated cabinets

met the requirements of Criterion XVII, "Quality Assurance Records," of Appendix B to 10 CFR Part 50. No findings of significance were identified.

### Audits

The NRC inspection team determined that SCE&G contractors have established programs and procedures that adequately implemented the audit process in support of geologic mapping activities, in accordance with the regulatory requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. Based on its review, the NRC inspection team determined that SCE&G contractors are effectively implementing their audit policies and procedures in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

## REPORT DETAILS

### 1. Training and Qualification

#### a. Inspection Scope

The NRC inspection team reviewed the qualifications and training documentation of SCE&G contractor FCL for those employees performing safety-related geologic mapping activities and internal QA audits in accordance with FCL's Quality Assurance Procedures (QAPs). Part of this inspection included a review of the training records that support the qualifications and training of the employees in order to verify compliance with the regulatory requirements of Criterion II of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed the following documents for this inspection area:

- SCE&G New Nuclear Deployment, "Quality Assurance Plan," Revision 2, dated June 4, 2009
- "Shaw Nuclear Quality Assurance Program, SWSQAP-1-74A," Revision B, dated August 31, 2011
- FCL QAP-01, "Project Organization and Personnel Qualifications," Revision 5, effective May 12, 2011
- FCL QAP-02D, "Quality Assurance Training," Revision 3, effective January 1, 2011

#### b. Observations and Findings

##### b.1 Personnel Qualifications

During the review of FCL QAP-01, the NRC inspection team concentrated on the requirements for the technical qualifications of geologists performing safety-related mapping activities, in addition to requirements for employees who manage and oversee their work. Additionally, the inspectors reviewed a sample of qualification records maintained by FCL and compared Attachment 6.2, "Certificate of Personnel Qualification for Nuclear Safety-Related Activities," of FCL QAP-01 with Form QAP-01-2 from the training records. The inspectors found that all FCL personnel performing geologic mapping activities and providing oversight to these activities had the proper qualifications and all forms reviewed were consistent with the example given in FPL QAP-01.

##### b.2 Quality Assurance Training

The NRC inspection team reviewed FCL QAP-02D with respect to the requirements for the training of employees performing safety-related activities. The inspectors reviewed a sample of training records of FCL employees who performed geologic mapping activities for VCSNS Unit 3. The inspectors determined that the selected employees had completed the required QA training before the start of safety-related work and the training documentation was consistent with FCL QAP-02D



requirements. The inspectors determined that documentation was missing for one employee; however, the employee in question participated in only nonsafety-related work, as indicated by an FCL employee's inspection of field records.

c. Conclusions

The NRC inspection team determined that SCE&G contractor FCL has established a program and procedures that adequately implemented the QAP requirements related to the qualification and certification of geologic mapping personnel in accordance with the regulatory requirements of Criterion II of Appendix B to 10 CFR Part 50. Based on their review, the inspectors determined that FCL is effectively implementing its quality processes for qualifying and certifying personnel in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

2. Technical Assessment of Geologic Mapping Activities

a. Inspection Scope

The NRC inspection team reviewed SCE&G geologic mapping activities for consistency with regulatory requirements and the associated proposed Unit 3 License Condition. Specifically, the inspectors reviewed the VCSNS Unit 3 excavation activities to ensure that they were performed in accordance with the commitments in Section 2.5 of the COLA and in accordance with RG 1.208.

To obtain background reference information, the NRC inspection team examined rock units and geologic features exposed and mapped in the VCSNS Unit 2 excavation. The inspectors also examined the completed geologic map of the floor and walls of the final excavation foundation level for the Unit 2 nuclear island. In addition, the inspectors examined the geographic information system (GIS) project file to observe the ability to locate and retrieve the underlying photographic panels, sample sites, geologic data, and detailed photographs of certain geologic features in the Unit 2 excavation.

The NRC inspection team reviewed the following documents for this inspection area:

- FCL annotated maps:
  - Y\_Z\_14\_15
  - Y\_Z\_15\_16\_17
  - Z\_AA\_14\_15\_16
  - Z\_AA\_16\_17\_18
  - Z\_AA\_BB\_13\_14
  - AA\_BB\_16\_17
  - AA\_BB\_17\_18
  - BB\_CC\_DD\_16\_17
  - CC\_DD\_18\_19
  - FF\_GG\_HH\_10\_11
  - GG\_HH\_12\_13
  - HH\_JJ\_KK\_10\_11
  - JJ\_KK\_LL\_9\_10
  - KK\_LL\_MM\_10\_11
  - CC\_DD\_11\_12

- FCL geologic photographic panels:
  - 150–151, lifts 1–7
  - 151–152, lifts 1–7
  - 153–154, lifts 1–6

b. Observations and Findings

b.1 Site Excavations

The NRC inspection team observed the status of the VCSNS Unit 3 excavation, completed to the top of sound rock (an interim level), to review the rock units and geologic features exposed and mapped for Unit 3. The inspectors noted that the exposed rock features on the floor of the excavation were properly cleaned and prepared for inspection (Attachment 1, Figure 1). The inspectors interviewed FCL geologists about the rock units and geologic features exposed in this excavation and learned that Unit 3 revealed a less complex, more homogeneous portion of the local geology compared to the geologic features exposed in Unit 2. The inspectors also learned that, although the local geology is less complex, all rock types and geologic structural relationships are the same as observed in the Unit 2 excavation.

The NRC inspection team examined Unit 2 and Unit 3 excavations to verify the complexity of the rock units and geologic features. The inspectors observed that Unit 3 mostly contains the coarse-grained Phase 2 intrusive igneous body, a quartz monzonite in composition, with lesser amounts of the earlier Phase 1 igneous intrusive rock mass (i.e., the quartz diorite) and metamorphic rocks of the Charlotte Terrane. The inspectors also examined the locations of Unit 3 samples used for additional age dating and noted that the sample locations were consistent with the sampling strategy developed for Unit 2.

b.2 Field Mapping

The NRC inspection team observed FCL geologists mapping on the photographic basemap panels in accordance with FCL work instructions (WIs). This effort included examination of notations in the project field book of the surveyed position and photographic basemap panel identification, a description of lithologic units and structural elements, and the orientation measurements (Attachment 1, Figure 2). During the observation, the inspectors conducted a field check of a previously mapped photographic basemap panel of the floor of the Unit 3 excavation by examining the geologic contacts recorded on the basemap and directly comparing the mapped contacts to the same contacts exposed in the excavation. The inspectors also evaluated previously mapped vertical saprolite exposures of the larger excavation by examining two vertical strips of photographic basemap panels from the VCSNS Unit 3 site files. The two strips were adjacent to each other and included all the lifts geologically mapped for that section of the excavation.

Additionally, the NRC inspection team examined the results of geologic mapping of vertical walls of the Unit 2 excavation. The inspectors noted that the FCL and Shaw geologists opened the GIS project file and demonstrated how records, specifically annotated photographic basemap panels and field description notebooks, were

retrievable. The inspectors also examined all of the photographic basemap panels that have been mapped for the floor of the Unit 3 excavation. The inspectors learned that, to date, about 17 percent of the floor of the Unit 3 excavation had been geologically mapped. Additionally, the inspectors noted that the geologic mapping data were captured in a format that was retrievable and could be cross-referenced to the specific location of the observation.

c. Conclusions

After examining the Unit 3 excavation, the NRC inspection team determined that the rock types and geologic features exposed at the top of sound rock (an interim level) on the floor of the excavation were consistent with the geologic site characteristics described in FSAR Sections 2.5.1 and 2.5.3 of the VCSNS COLA, and that the geologic mapping activities were consistent with RG 1.208. No findings of significance were identified.

3. Software Control

a. Inspection Scope

The NRC inspection team reviewed the implementation of software controls by SCE&G contractors Shaw and FCL in support of the COLA for VCSNS Unit 3, related to the proposed geologic mapping License Condition. Specifically, the inspectors reviewed the policies and procedures governing Shaw and FCL implementation of software controls for geologic mapping software, the mapping software used to illustrate the rock types and geologic structures lying beneath VCSNS Units 2 and 3, to verify compliance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed the following documents for this inspection area:

- SCE&G New Nuclear Deployment, "Quality Assurance Plan," Revision 2, dated June 4, 2009
- "Shaw Nuclear Quality Assurance Program, SWSQAP-1-74A," Revision B, dated August 31, 2011
- "Shaw Nuclear Services Engineering Service Scope of Work (ESSOW) No. 132177-E-G-004-1, William Lettis and Associates (WLA) Consulting Services for Geologic Mapping for SCE&G, V.C. Summer Nuclear Station Units 2 & 3," dated May 31, 2011
- "Shaw Job Number 1321177, Supplier: Fugro William Lettis and Associates, ARCGIS Software Validation," dated June 1, 2010
- "Shaw Job Number 132177-1166-0011, ArcGIS Software Validation, Approval of Safety-Related Software for Use, FCL Validation Documentation for Conversion of Commercial Software to Safety-Related Software," dated September 4, 2009 (Shaw date June 1, 2010)

- “Shaw Job Number 132177-1166-0011, ArcGIS Software Validation, Approval of Safety-Related Software for Use, FCL Validation Documentation for Conversion of Commercial Software to Safety-Related Software,” dated September 30, 2011
- FCL, “Quality Assurance Manual (QAM),” Revision 8, dated September 1, 2011
- FCL QAP-03E, “Software Control,” Revision 4, dated March 10, 2011

The NRC inspection team reviewed the following FCL annotated maps:

- CC-DD-EE-16-17, dated March 14, 2011
- EE-FF-14-15, dated April 7, 2011
- KK-LL-MM-14-15, dated June 20, 2011
- HH-JJ-9-10-11, dated June 29, 2011
- QQ-RR-10-11-12, dated April 8, 2011

The NRC inspection team reviewed the following FCL stitched maps:

- FFG Floor 1, dated September 2, 2011
- FFG Floor 2, dated September 18, 2011
- FCL Field Book-2091-21, “Virgil C. Summer Unit 2 Nuclear Island and CWS/Turbine Building Basement Area Final Foundation Geologic Mapping”
- FCL, “Geologic Mapping of Final Foundation Nuclear Island Excavation Plate 6a”

b. Observations and Findings

The NRC inspection team interviewed FCL staff to discuss FCL methods used to map rock types and geologic structures underlying the nuclear island, turbine building, circulating water system, and power block. The inspectors learned that annotated geologic maps (quality records under 10 CFR Part 50, Appendix B) are digitally imported into the ArcGIS mapping software. However, the inspectors found that the commercially procured ArcGIS mapping software only provides an overview geologic map (a presentation tool) of final foundation-grade excavations for the VCSNS Unit 2 and 3 nuclear islands, and did not perform a safety-related function. No other types of software were used for geologic mapping of the VCSNS Unit 3 excavation.

c. Conclusions

The NRC inspection team concluded that SCE&G contractors Shaw and FCL used ArcGIS software to illustrate rock types and geologic structures underlying the nuclear island for VCSNS Unit 3; however, ArcGIS software did not perform a safety-related function and no other types of software were used for geologic mapping of the VCSNS Unit 3 excavation. There were no inspection findings in this area.

#### 4. Procurement Document Control

##### a. Inspection Scope

To verify compliance with Criterion IV of Appendix B to 10 CFR Part 50, the NRC inspection team reviewed the QA program requirements and the implementation of the controls for the procurement of material, equipment, and services by SCE&G and its contractors, Shaw and FCL, for safety-related geologic mapping activities. The inspectors reviewed SCE&G's applicable implementing documents that govern the establishment of measures to document that the documents for procurement suitably include or reference applicable regulatory and other QA requirements. In addition, the inspectors reviewed sections of the EPC Agreement between SCE&G, Westinghouse, and Shaw, purchase orders (POs), work scopes, contract services requirements, supplier QA program descriptions, and methods used by the purchasing organizations to qualify suppliers of safety-related items and services.

Within the scope of this area of the inspection, the NRC inspection team reviewed the following documents:

- SCE&G New Nuclear Deployment, "Quality Assurance Plan," Revision 2, dated June 4, 2009
- "Engineering, Procurement and Construction (EPC) Agreement between SCE&G and a Consortium Consisting of Westinghouse Electric Company, LLC and Stone & Webster, Inc., as Contractor for AP1000 Nuclear Power Plants," dated May 23, 2008
- "Shaw ESSOW No. 132177-E-G-0040-0, for Consulting Services for Geologic Mapping from Fugro," dated July 23, 2009
- "Shaw Nuclear Services Quality Assurance Topical Report," dated March 22, 2011
- FCL QAM, Revision 8, Section 4.0, "Procurement Document Control," dated September 1, 2011
- FCL QAP-04, "Procurement of Subcontractor Services," Revision 5, dated January 1, 2011
- FCL QAP-07, "Control of Subcontractor Services," Revision 7, dated January 1, 2011
- PO 2091-GRI-01, FCL agreement with Geological Research, Inc. (GRI). GRI provided laboratory testing service by performing microprobe analysis and argon-40/argon-39 geochronology testing.
- PO 2091-ZIR-01, FCL agreement with ZirChron, LLC. ZirChron provided mineral separation services to support the determination of the age of rocks.

b. Observations and Findings

b.1. Policy and Procedures of Procurement Documents

The NRC inspection team learned that SCE&G's program had provisions to ensure that procurement documents include or incorporate applicable regulatory, technical, and QA program requirements.

The inspectors also learned that SCE&G contractor, Shaw, entered a contract with FCL through a subcontract agreement. Attachment A to this subcontract describes ESSOW No. 132177-E-G-004, which in turn describes geotechnical activities. The inspectors noted that the ESSOW had provisions to ensure that procurement documents include or incorporate applicable regulatory, technical, and QA program requirements.

b.2. Implementation of Procurement Document Controls

The NRC inspection team confirmed that procurement documents were reviewed and approved in accordance with FCL QAP-04. The inspectors noted that procurement documents included a detailed scope of work, appropriate technical requirements, identification of acceptance requirements, requirements for use of the audited and approved QA program under Appendix B to 10 CFR Part 50, access to the supplier's facilities and records for inspection or audit, requirements for documentation submission, and requirements for reporting nonconformances. The inspectors also verified that provisions exist to ensure that changes to procurement documents are subject to the same degree of control, review, and approval as those used in the preparation of the original documents.

c. Conclusions

The NRC inspection team determined that SCE&G and its contractors have established programs and procedures that adequately implemented the procurement process in accordance with the regulatory requirements of Criterion IV of Appendix B to 10 CFR Part 50. Based on their review, the inspectors determined that SCE&G and its contractors have effectively implemented their procurement processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

5. Procedures, Drawings, and Instructions

a. Inspection Scope

The NRC inspection team reviewed three project instruction (PI) documents, which defined the geologic mapping project plan, as well as three WIs, which were procedures for completing field work, to determine if the procedures and instructions developed by the contractor were in compliance with the regulatory requirements of Criterion V of Appendix B to 10 CFR Part 50. Within the scope of this area of the inspection, the inspectors reviewed the following documents:

- FCL 2091-WI-01-1, "Field Records," Revision 1, dated September 26, 2011
- FCL 2091-WI-03-0, "Field Mapping Standards", Revision 0, dated May 3, 2011

- FCL 2091-WI-08-1, "Units 2 and 3 Nuclear Island and Circulating Water System Area Preliminary Geologic Mapping," Revision 1, dated October 3, 2011
- FCL 2091-PI-01, "Geologic Mapping Data Collection Plan," Revision 3, dated May 4, 2011
- FCL 2091-PI-02, "Laboratory Testing Plan," Revision 6, dated June 23, 2011
- FCL 2091-PI-03, "Geoscience Evaluation and Analysis Plan," Revision 2, dated September 22, 2011
- FCL Corrective Action Request (CAR) 2091-CAR-S-2010-12, "Not Receiving Project Input via Signed Letter Transmittals from Authorized Individuals," dated May 3, 2010
- FCL 2091-CAR-2011-09, "Requirements for Recording Magnetic Declinations Were Not Recorded on Base Maps," dated April 11, 2011

b. Observations and Findings

The NRC inspection team observed and interviewed the field geologists mapping the top of sound rock in the VCSNS Unit 3 excavation and compared the actual observed field activities to the appropriate instructions and procedures. The inspectors found that the field geologists were knowledgeable of the procedures, and their field activities appropriately captured the requirements of the instructions and procedures.

c. Conclusions

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately controls the procedures, drawings, and instructions in accordance with the regulatory requirements of Criterion V of Appendix B to 10 CFR Part 50. Based on their review, the inspectors determined that FCL is effectively implementing these control processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

6. Document Control

a. Inspection Scope

To verify compliance with Criterion VI of Appendix B to 10 CFR Part 50, the NRC inspection team reviewed the policies and procedures governing the implementation of document control by SCE&G contractor FCL in support of the COLA for VCSNS Unit 3 geologic mapping activities. Specially, the inspectors discussed the document control program with FCL staff to verify that applicable regulatory requirements are being effectively implemented. The inspectors also reviewed a sample of controlled documents used to implement geologic mapping activities at VCSNS Units 2 and 3 to ensure they were properly controlled.

The NRC inspection team reviewed the following documents for this inspection area:

- SCE&G New Nuclear Deployment, "Quality Assurance Plan," Revision 2, dated June 4, 2009
- "Shaw Nuclear Quality Assurance Program, SWSQAP-1-74A," Revision B, dated August 31, 2011
- FCL QAM, Revision 8, Section 6.0, "Document Control," dated September 1, 2011
- FCL Project Planning Document (PPD) No. 2091-PPD, "Geological Mapping Services," Revision 4, ESSOW No. 132177-E-G-004, VCSNS Units 2 and 3 for SCE&G, dated May 4, 2011
- FCL 2091-PI-01, "Geological Mapping Data Collection Plan," Revision 3, VCSNS Units 2 and 3 for SCE&G, dated May 4, 2011
- FCL 2091-PI-02, "Laboratory Testing Plan," Revision 6, VCSNS Units 2 and 3 for SCE&G, dated June 23, 2011
- FCL 2019-PI-03, "Geo-Science Evaluation and Analysis Plan," Revision 1, VCSNS Units 2 and 3 for SCE&G, dated May 4, 2011
- FCL 2091-WI-01-0, "Field Records," Revision 0, dated March 6, 2010
- FCL 2091-WI-02-0, "Survey Control," Revision 0, dated March 6, 2010
- FCL 2091-WI-03-1, "Field Mapping Standards," Revision 1, dated May 2, 2011
- FCL 2091-WI-04-1, "Sampling, Protocol, Handling and Storage," Revision 1, dated May 2, 2011
- FCL 2091-WI-05-1, "Compilation and Verification of Excavation Monitoring and Reconnaissance," Revision 1, dated May 4, 2011
- FCL 2091-WI-06-2, "Excavation Wall Photography and Mapping VC Summer Units 2 and 3," Revision 2, dated May 3, 2011
- FCL 2091-WI-07-1, "GPS Unit Accuracy Verification VC Summer Units 2 and 3" Revision 1, dated March 6, 2010
- FCL 2091-WI-08-0, "Unit 2 Nuclear Island and Circulating Water System Area Preliminary Geologic Mapping, VC Summer Units 2 and 3," Revision 0, dated August 2, 2010
- FCL 2091-WI-09-0, "Unit 2 Nuclear Island and Circulating Water System/Turbine Basement Area Final Foundation Geologic Mapping, VC Summer Units 2 and 3," Revision 0, dated December 16, 2010



b. Observations and Findings

The NRC inspection team noted that FCL controlled changes to geologic mapping Tier 2 QAPs, PIs, and WIs using the guidance in FCL QAM, Section 6.0. The inspectors reviewed a sample of documentation to evaluate change control of Tier 2 QAPs, PIs, and WIs. The inspectors found, for the sample selected, that FCL appropriately controlled document changes and ensured the proper document version was used by employees performing geologic mapping activities.

c. Conclusions

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately implemented document control for geologic mapping consistent with the requirements of Criterion VI of Appendix B to 10 CFR Part 50. The inspectors determined that FCL is effectively implementing its document control processes in support of the VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

7. Corrective Actions

a. Inspection Scope

The NRC inspection team reviewed FCL policies and procedures that govern the corrective action process for VCSNS Unit 3 excavation geologic mapping to ensure that they adequately describe the process and implement the requirements of Criterion XVI of Appendix B to 10 CFR Part 50. The inspectors reviewed a sample of FCL CARs, including associated Shaw corrective action reports, to determine whether they document and adequately describe conditions adverse to quality (CAQs), the cause of these conditions, and the corrective actions taken to prevent recurrence. The inspectors discussed the corrective action process with FCL and Shaw staff to verify that applicable regulatory requirements are being effectively implemented.

The NRC inspection team reviewed the following documents within the scope of this inspection:

- FCL QAM, Revision 8, Section 16.0, "Corrective Action," dated September 1, 2011
- FCL QAP-16A, "Corrective Action and Stop Work," Revision 5, effective January 1, 2011
- FCL CAR 2091-CAR-S-2010-03, "Start of Safety-Related Field Activities Prior to Completion of Pre-Work Surveillance," dated March 25, 2010
- FCL CAR 2091-CAR-S-2010-04, "Start of Safety-Related Field Activities Prior to Providing Qualification and QA Training Records to Client," dated April 2, 2010
- FCL CAR 2091-CAR-S-2010-12, "Not Receiving Project Input via Signed Letter Transmittals from Authorized Individuals," dated May 3, 2010

- FCL CAR 2091-CAR-2011-08, “Sample Inventory Log Does Not Include Some Required Information,” dated April 11, 2011
- Shaw Corrective Action Report 2011-04-04-1186, identified March 16, 2011

b. Observations and Findings

FCL QAP-16A establishes roles, responsibilities, and requirements for identification, screening, and correction of CAQs and significant conditions adverse to quality, including the issuance of stop work orders. The inspectors learned that no stop work orders or 10 CFR Part 21 evaluations had been initiated for VCSNS excavation geologic mapping.

The NRC inspection team reviewed a sample of four FCL CARs related to VCSNS excavation geologic mapping to assess corrective action program implementation. The inspectors learned that the CARs did not require root cause evaluations, but apparent cause evaluations were completed in all cases. The inspectors determined that the CARs were appropriately described, classified, reviewed, and closed.

c. Conclusions

The NRC inspection team determined that SCE&G contractor FCL has established a program that adequately provides corrective action requirements for geologic mapping activities consistent with the requirements of Criterion XVI of Appendix B to 10 CFR Part 50. Based on the sample reviewed, the NRC inspection team determined that FCL is effectively implementing its corrective action processes in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

8. Quality Assurance Records

a. Inspection Scope

The NRC inspection team reviewed the policies and procedures of SCE&G contractors Shaw and FCL for QA records related to geologic mapping in support of the COLA for VCSNS Unit 3. Specifically, the inspectors discussed the QA records program processes with members of Shaw and FCL staff to verify compliance with Criterion XVII of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed the following documents for this inspection area:

- “Shaw Job Number 1321771104, Nuclear Surveillance Report S-132177-2010-008, Project, V.C. Summer Unit 2—Shaw Engineering (Geologic) & William Lettis & Associates (WLA—Subcontractor), Title: Geologic Mapping—VC Summer Units 2 & 3 Power Block/Nuclear Island,” dated April 22, 2010
- “Shaw Job Number 1321771104, Nuclear Surveillance Report S-132177-2010-0013, Project, V.C. Summer Unit 2—Shaw Engineering

(Geologic) & William Lettis & Associates (WLA—Subcontractor),” dated June 23, 2010

- “Shaw Job Number 1321771104, Nuclear Surveillance Report S-132177-2011-006, Project, V.C. Summer Unit 2—Shaw Engineering (Geologic) & William Lettis & Associates (WLA—Subcontractor),” dated April 4, 2011
- SCE&G New Nuclear Deployment, “Quality Assurance Plan,” Revision 2, dated June 4, 2009
- “Shaw Nuclear Quality Assurance Program, SWSQAP-1-74A,” Revision B, dated August 31, 2011
- FCL QAM, Revision 8, Section 17.0, “Quality Assurance Records,” dated September 1, 2011
- FCL PPD No. 2091-PPD, “Geological Mapping Services,” Revision 4, ESSOW No. 132177-E-G-004, VCSNS Units 2 and 3 for SCE&G, dated May 4, 2011
- FCL QAP-03F, “Control of Geographic Information System (GIS) Documents,” Revision 3, dated September 1, 2011
- FCL 2091-WI-01-0, “Field Records,” Revision 0, dated March 6, 2010
- FCL 2091-WI-09-0, “Unit 2 Nuclear Island and Circulating Water System/Turbine Basement Area Final Foundation Geologic Mapping, V.C. Summer Units 2 and 3,” Revision 0, dated December 16, 2010
- FCL Field Book-2091-21, “Virgil C. Summer Unit 2 Nuclear Island and CWS/Turbine Building Basement Area Final Foundation Geologic Mapping”
- FCL, “Geologic Mapping of Final Foundation Nuclear Island Excavation Plate 6a”

The NRC inspection team reviewed the following FCL annotated maps:

- CC-DD-EE-16-17, dated March 14, 2011
- EE-FF-14-15, dated April 7, 2011
- KK-LL-MM-14-15, dated June 20, 2011
- HH-JJ-9-10-11, dated June 29, 2011
- QQ-RR-10-11-12, dated April 8, 2011

The NRC inspection team reviewed the following FCL stitched maps:

- FFG Floor 1, dated September 2, 2011

- FFG Floor 2, dated September 18, 2011

b. Observations and Findings

The NRC inspection team found that the FCL data management requirements are set forth in FCL QAM, Section 17.0, and FCL QAP-03F, and that Shaw surveillance reports documented FCL adherence to data management and record retention requirements for the ongoing VCSNS Unit 2 and 3 excavation and geologic mapping activities.

Additionally, the inspectors found that FCL retained and secured hard copies of all geologic mapping field records in an SCE&G trailer at the VCSNS Unit 2 and 3 site in two fireproof cabinets meeting the minimum 1-hour rating (SCHWAB-5000 fire-rated cabinets). The inspectors learned that SCE&G and its contractors use the annotated maps both as the official QA record and to reach safety-related conclusions on the geologic features for VCSNS Units 2 and 3.

c. Conclusions

The NRC inspection team concluded that geologic mapping records stored in fire-rated cabinets met the requirements of Criterion XVII of Appendix B to 10 CFR Part 50. There were no inspection findings in this area.

9. Audits

a. Inspection Scope

To verify compliance with the requirements of Criterion XVIII of Appendix B to 10 CFR Part 50, the NRC inspection team reviewed the policies and implementing procedures of SCE&G contractors Shaw and FCL that govern the audit process. The inspectors also evaluated a sample of Shaw and FCL audit and surveillance reports to verify compliance with program requirements and adequate implementation.

Specifically, the inspectors reviewed the following documents:

- SCE&G New Nuclear Deployment, "Quality Assurance Plan," Revision 2, dated June 4, 2009
- "Shaw ESSOW No. 132177-E-G-0040-0, for Consulting Services for Geologic Mapping from Fugro," dated July 23, 2009
- "Shaw Nuclear Services Quality Assurance Topical Report," dated March 22, 2011
- FCL QAM, Revision 8, Section 18.0, "Audits and Surveillances," dated September 1, 2011
- FCL PPD No. 2091-PPD, "Geological Mapping Services," Revision 4, ESSOW No. 132177-E-G-004, VCSNS Units 2 and 3 for SCE&G, dated May 4, 2011
- FCL QAP-07, "Control of Subcontractor Services," Revision 7, dated January 1, 2011

- Shaw Nuclear Services, Audit No. V2009-07, "Quality Assurance Audit of William Lettis & Associates," dated September 17, 2009
- Shaw Nuclear Services, Audit No. V2010-15, "Quality Assurance Implementation Audit of William Lettis & Associates," dated August 30, 2010
- FCL Surveillance 2091-SR-2011-22, "Quality Assurance Surveillance of GRI," dated August 25, 2011
- FCL Surveillance 2091-SR-2011-08, "Quality Assurance Surveillance of ZirChron," dated June 3, 2011
- FCL Surveillance 2091-SR-2011-23, "Quality Assurance Surveillance of ZirChron," September 16, 2011.
- FCL CAR 2091-CAR-S-2010-03, "Start of Safety-Related Field Activities Prior to Completion of Pre-Work Surveillance," dated March 25, 2010
- FCL QAP-18A, "Quality Assurance Audits and Surveillances," Revision 5, effective date of January 1, 2011
- FCL QAP-18B, "Qualification of Quality Assurance Audit Personnel," Revision 3, effective date of January 1, 2011

b. Observations and Findings

The NRC inspection team observed that SCE&G had established an internal and external audit program under Section 21 of its QAP. Section 3.7, "Audits and Surveillances," of ESSOW No. 132177-E-G-0040-0 also provided provisions to meet the requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Because of the limited scope of this inspection, the NRC inspection team focused on the review of documents associated with FCL, the contractor providing geologic mapping services.

b.1 Implementing Procedures and FCL Audits

The inspectors noted that FCL QAP-18A provided guidance for preparing audit plans, performing audits, reporting conditions, closing out audits, and documenting the audit, while FCL QAP-18B provided guidance and requirements for QA audit personnel qualification. The team noted that FCL's QAP provides general timeliness requirements for the conduct of audits and identified requirements for audit team composition and qualifications.

The inspectors reviewed Shaw Nuclear Services Audit Nos. V2010-15 and V2009-07 which evaluated FCL geologic mapping processes. The objective of the audits was to evaluate FCL's compliance with applicable portions of Appendix B to 10 CFR Part 50 associated with the ESSOW. The inspectors determined that the audits were adequate.

## b.2 Quality Assurance Audit Personnel Qualification

The NRC inspection team selected a sample of auditor qualification records to evaluate compliance with FCL and regulatory requirements. The inspectors noted that Attachment 6.2, "FCL Lead Auditor Qualification Record," to FCL QAP-18B was used to document initial auditor qualification, and FCL Form QAP-18B-02, "Lead Auditor Annual Evaluation Record," also included in FCL QAP-18B, was used to document auditor continued qualification. For the sample of qualification records selected, the inspectors determined that all appropriate criteria were met in accordance with FCL QAP-18B and the content of the sample records was consistent with FCL Form QAP-18B-02.

## c. Conclusions

The NRC inspection team determined that SCE&G contractors have established programs and procedures that adequately implemented the audit process in support of geologic mapping activities, in accordance with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Based on their review, the inspectors determined that SCE&G contractors are effectively implementing their audit policies and procedures in support of VCSNS Unit 3 geologic mapping activities. No findings of significance were identified.

## 10. Entrance and Exit Meetings

On October 4, 2011, the NRC inspection team presented the inspection scope during an entrance meeting with Mr. Ron Clary, Vice President of New Nuclear Deployment for SCE&G. The meeting also included other SCE&G, Shaw, FCL, and Westinghouse personnel.

Immediately following the entrance meeting, SCE&G, Shaw, and FCL personnel provided a series of presentations related to VCSNS Unit 2 and 3 geologic mapping:

- "Unit 2 Report: Preliminary Geologic Results and Observations" (ADAMS Accession No. ML11293A084)
- "Geologic Program Overview" (ADAMS Accession No. ML11293A085)
- "V.C. Summer Units 2 and 3 Excavation Sequence: Geologic Mapping Process Data Management—QA Records" (ADAMS Accession No. ML11293A086)
- "NRC Geologic and Region II Visit" (ADAMS Accession No. ML11293A088)

On October 6, 2011, the NRC inspection team presented the inspection results during an exit meeting with Mr. Alan Torres, SCE&G General Manager for Nuclear Plant Construction, and other SCE&G, Shaw, FCL, and Westinghouse personnel. Attachment 2 to this report lists entrance and exit meeting attendees.

**ATTACHMENT 1**

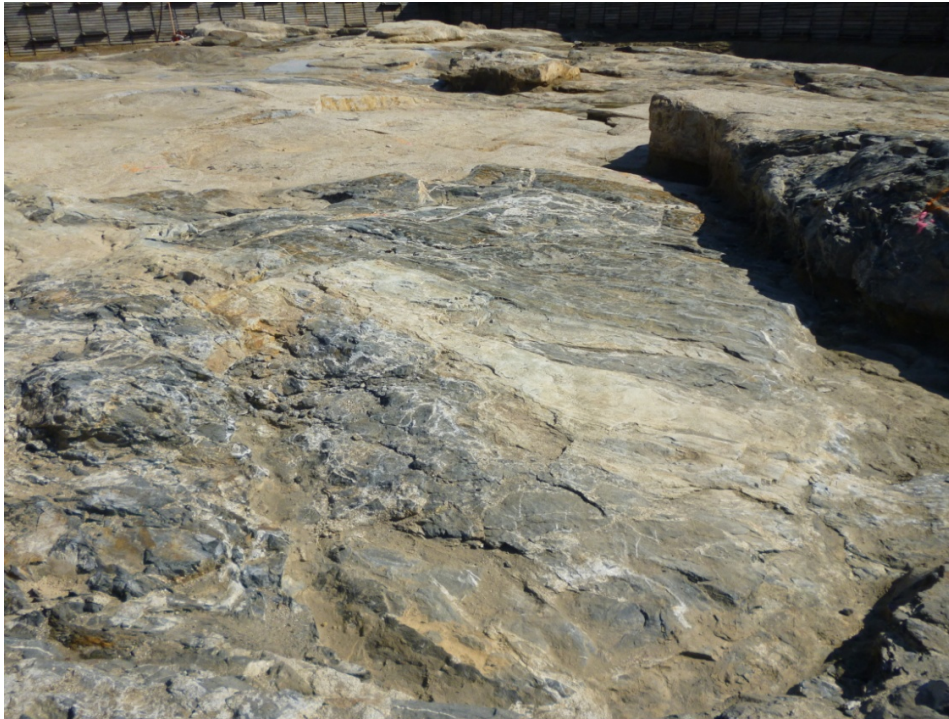


Figure 1 – Unit 3 Excavation October 4<sup>th</sup> 2011



Figure 2 – Fugro personnel showing the NRC Inspection staff field mapping procedures

## ATTACHMENT 2

### 1. ENTRANCE/EXIT MEETING ATTENDEES

<u>Name</u>	<u>Title</u>	<u>Affiliation</u>	<u>Entrance</u>	<u>Exit</u>	<u>Contact</u>
			10/4	10/6	
Al Paglia	Manager, Licensing	SCE&G	X	X	
Thomas Sliva	VP, Consortium Director	Westinghouse	X	X	
Bill Fox	VP, Project Director	Shaw	X	X	
Ron Clary	VP, New Nuclear Deployment	SCE&G	X		
Brad Stokes	Manager, Design Engineer	SCE&G	X	X	
Bob Hoak	Site Director	Shaw	X		
Drew Brunmeia	EH&S	Shaw	X		
Erik Zimmens	EH&S	Shaw	X		
Bill Wood	Site Support Manager	Shaw	X		
Jim Andersen	Field Engineer Manager	Shaw	X	X	
Larry Cunningham	Manager, QS NND	SCE&G	X		
Louis DiChello	Licensing Engineer	Westinghouse	X	X	
William Hutchins	Consortium Site Licensing Manager	Westinghouse	X	X	
Garrett Sanders	Licensing Engineer	SCE&G	X	X	
Amy Monroe	Licensing Engineer	SCE&G	X	X	
Preston Feckel	Construction Engineer	SCE&G	X		
April Rice	Licensing Engineer	SCE&G	X	X	
Joe Gillespie	Licensing Engineer	SCE&G	X	X	
Tim Polich	QC Engineering Supervisor – ITAAC	Shaw	X		
Tim Glidden	Field Geologist	FCL	X	X	X
Justin Cox	Field Geologist	FCL	X	X	X
Brian Loper	Construction Manager	Shaw	X		
Mark Glover	Deputy Site Director	Shaw	X	X	
Alan Torres	GM Construction	SCE&G	X	X	
Todd Young	Civil Field Engineer	Shaw	X		
Adair Stevenson	Field Geologist	Shaw	X		
Gina Ferrugia	Field Geologist	Shaw	X		X
Dennis Wallace	QA	Shaw	X	X	
Joseph Stewart	QA Supervisor	Shaw	X	X	X
Kyle Young	Supervisor, Nuclear Construction	SCE&G	X	X	X



Patrick Gibbons	Construction Engineer	SCE&G	X	X	X
Frank Syms	Project Manager	FCL	X		X
Clinton Eldridge	QA Manager	FCL	X	X	X
Stephanie Briggs	Geologist	FCL	X	X	X
Randy Cumbest	Geologist	FCL	X		X
Matt Cooke	Geologist	Shaw	X	X	X
Everett Washer	Geotechnical Supervisor	Shaw	X	X	X
Findlay Salter	Assistant Licensing Engineer	SCE&G	X	X	X
Bob Whorton	Consulting Engineer	SCE&G	X	X	
Roosevelt Word	Manager, OD&P	SCE&G		X	
Julie Giles	Licensing Engineer	SCE&G		X	
Bryan Barwick	Licensing Engineer	SCE&G		X	
George Lipscomb	Lead Inspector	NRC	X	X	
Frank Talbot	Inspector	NRC	X	X	
Mina Sheikh	Inspector	NRC	X	X	
Patrick Donnelly	Inspector	NRC	X	X	
Alice Stieve	Inspector	NRC	X	X	
Meralis Plaza-Toledo	Inspector	NRC	X	X	
Amrit Patel	Inspector	NRC	X	X	
Anthony Minarik	Project Manager	NRC	X	X	

2. INSPECTION PROCEDURE USED

Inspection Procedures IP 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

No previous NRC inspections related to the VCSNS Unit 3 geologic mapping License Condition have been performed at SCE&G's facility in Jenkinsville, SC prior to this inspection.

4. LIST OF ACRONYMS USED

10 CFR	Title 10 of the Code of Federal Regulations
ADAMS	Agencywide Documents Access and Management System
CAQ	Conditions Adverse to Quality
CAR	Corrective Action Report (Shaw)
CAR	Corrective Action Request (Fugro)
COL	Combined License
COLA	Combined License Application
EPC	Engineering, Procurement and Construction
ESSOW	Engineering Services Scope of Work
FCL	Fugro Consultants, Inc.

FSAR	Final Safety Analysis Report
GIS	Geologic Information System
GRI	Geological Research, Inc.
NRC	Nuclear Regulatory Commission
PI	Project Instruction
PPD	Project Planning Document
QA	Quality Assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Procedure
RG	Regulatory Guide
SCE&G	South Carolina Electric and Gas, LLC
VCSNS	V.C. Summer Nuclear Station
WI	Work Instruction
WLA	William Lettis & Associates