

August 8, 2013

Mr. Daniel P. Stout, Senior Manager  
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1101 Market Street LP 5A  
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SUBJECT: AUDIT OF SUBSURFACE INVESTIGATION ACTIVITIES AT THE CLINCH  
RIVER SITE

Dear Mr. Stout:

This letter provides a summary of an audit of subsurface investigation work performed at the Clinch River site on July 17-18, 2013. This audit was conducted in accordance with Office of New Reactors (NRO) office instruction NRO-REG-108, "Regulatory Audits,"<sup>1</sup> with additional guidance from Inspection Procedure (IP) 45052, "Review of Geotechnical and Site Characterization Activities."<sup>2</sup>

As described in the audit summary (Attachment 1), NRC staff verified that activities were conducted in accordance with the quality assurance requirements of 10 CFR 50 Appendix B. The staff also monitored selected site activities. No discrepancies were identified.

Enclosure 2 lists participants in the entrance meeting conducted on July 17, 2013. Documents reviewed by NRC staff are listed in Enclosure 3.

Questions regarding this audit can be directed to me via email at [joseph.williams@nrc.gov](mailto:joseph.williams@nrc.gov), or by phone at 301-415-1470.

Sincerely,  
*/RA/*

Joseph F. Williams, Senior Project Manager  
Small Modular Reactor Licensing Branch 1  
Division of Advanced Reactors and Rulemaking  
Office of New Reactors

Project 785

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<sup>1</sup> Agencywide Documents Access and Management System (ADAMS) accession number ML081910260.

<sup>2</sup> ADAMS accession number ML072500062.

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NRO-002

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Audit Summary  
Clinch River Subsurface Investigation Activities  
July 17-18, 2013

Quality Assurance

Geotechnical subsurface investigation work activities were being performed by AMEC Environmental & Infrastructure, Inc. The site team verified that these activities were performed under the AMEC Quality Assurance (QA) Program or by subcontractors whose QA Programs were verified, by AMEC, to be adequate and in accordance with 10 CFR 50 Appendix B. The team also verified that TVA, Generation mPower, and Bechtel had adequate QA programs in place for the geotechnical subsurface activities

The team reviewed plans and reports for audits and surveillances performed by TVA, Bechtel, and AMEC. The team verified that audits and surveillances were performed by appropriate personnel and that results were reported to the responsible management. The team also verified the adequacy of follow-up actions associated with deficient areas identified through audits and surveillances.

The team reviewed the AMEC corrective action program to verify that measures exist to promptly identify and resolve non-conformances and conditions adverse to quality in a timely manner; and for significant conditions adverse to quality, measures exist to ensure the cause of the condition is determined, and corrective action to prevent recurrence is taken. The team reviewed a sample of corrective action documents, including Condition Reports (CRs) and Supplier Deviation Disposition Requests (SDDR), to verify that deficiencies were properly resolved.

The team verified that procedures governed the control of Measuring and Test Equipment (M&TE). The team sampled M&TE to verify that it was in good working order, properly calibrated, and uniquely identifiable. The team also verified that calibration services were provided by suppliers listed on the AMEC Project Approved Suppliers List.

Geotechnical Activities

NRO geotechnical staff reviewed the site investigation plan and preliminary results presented by the applicant at the briefing, interviewed selected on-site technical personnel, and reviewed their personnel qualification documentation.

After review of the site investigation plan and preliminary results, the staff did not observe any discrepancies from the guidelines of Regulatory Guide (RG) 1.132, "Site Investigations for Foundations of Nuclear Power Plants,"<sup>1</sup> and RG 1.138, "Laboratory Investigations Of Soils And Rocks For Engineering Analysis And Design Of Nuclear Power Plants,"<sup>2</sup> and is suitable for siting characterization at Clinch River site. The staff discussed issues related to the siting for the planned mPower small modular reactors (SMRs), and potential challenges associated with the design and the geological features of the Clinch River site. SMRs are expected to have a

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<sup>1</sup> ADAMS accession number ML032800710

<sup>2</sup> ADAMS accession number ML033510166

smaller footprint and will also have structures much further below grade than existing large light water reactors.

The staff interviewed the site manager on duty (Stephen Criscenzo), two on-site Rig Geologists (Kristen Lloyd and Nicolas Smith), a Geologist (James Goddard) who was conducting a packer test, and a subcontractor (Charles Carter from GeoVision) who performed the P-S (i.e., compression and shear wave) suspension logger and geophysical logger tests for water temperature, electromagnetic conductivity and Gamma. The staff reviewed their resumes from on-site documentation. The staff found that all personnel interviewed have adequate knowledge in their specific field and meet the qualification in respect to educational background and working experience requirements specified in relevant procedures.

The official qualification and training records were kept on a Sharepoint site to record the qualification level, indoctrination training completion and additional technical training. Hard copies of the records were kept as a back-up, but not as official records. The staff verified that technical personnel were given project indoctrination training in accordance with the procedure.

Staff also observed the following site investigation activities:

- Normal and angled drillings with core sample collections,
- Packer hydraulic conductivity test,
- Borehole geophysical logger test for water temperature, electromagnetic conductivity and Gamma measurements, and
- P-S suspension logger test (observation was at the end of testing).

During the observations, the staff asked technical personnel to explain the field test purpose and procedures, and observed at least one complete operation cycle for core sample collection during drillings. The staff confirmed that all observed field testing was conducted following the procedures that are either based on industrial standards, or project-approved in-house developed procedures. No discrepancies were observed.

Staff examined core samples, the sample storage facility, and sample storage procedure. The staff examined the core samples collected from one of the principle borings. The cores were placed in the sample boxes and displayed on-site in the sample storage room for NRC staff's viewing. The staff found that the samples were continuously collected from the borings in accordance with RG 1.132 and industrial standards. The storage facility was equipped with temperature control devices and adequately set for the soil and rock samples. The procedures of recording samples and sample storage were adequate to keep the samples well-documented and preserved.

The staff examined the field test data storage and transfer procedure at the site. The staff noticed that the data from all field tests was collected either electronically or on paper. The paper data sheets were then scanned and saved in electronic files. All data files were stored on on-site computers, with backup to digital storage media stored in one-hour fire-proof steel cabinets. Field test data were transferred to the main server at AMEC's headquarters in Atlanta, GA through a secured network. The staff found that the field test data storage and transfer procedure was adequate to effectively preserve the original testing data for further uses.

Clinch River Subsurface Investigation Audit  
Entrance Meeting Participants

<u>Name</u>	<u>Affiliation</u>
Steve Criscenzo	AMEC
John Martin	AMEC
Al Tice	AMEC
Linn Bennett	Bechtel
John Damm	Bechtel
David Fenster	Bechtel
Jerry McLane	Bechtel
Mark Reimnitz	Bechtel
Ram Yelamanchi	Bechtel
Don Calsyn	GmP
Diane Jackson	NRC
Bob Lukes	NRC
Jamin Seat	NRC
Weijun Wang	NRC
Joe Williams	NRC
Jack Brellenthin	TVA
Pete Gaillard	TVA
Doug Jaquith	TVA
Jeff Perry	TVA
Dan Stout	TVA

Clinch River Subsurface Investigation Audit  
Documents Reviewed

AMEC:

- Clinch River Initial Exploration Points Survey Data, June 6, 2013
- Clinch River SMR Project Geotechnical Investigation M&TE Checklist, RCN: CRP-04470, June 27, 2013
- CR List, July 16, 2013
- CR CRP-CR-09, Legibility of Boring Logs, June 25, 2013
- CR CRP-CR-10, Driller not in Possession of Work Instructions, June 25, 2013
- CR CRP-CR-13, Packer testing start up issues, July 8, 2013
- Nuclear Quality Assurance Procedure 12-01, Calibration of AMEC M&TE
- Nuclear Quality Assurance Procedure 16-02, Corrective Action and Performance Improvement
- Nuclear Quality Assurance Procedure 17-01, Quality Assurance Records
- Nuclear Quality Assurance Procedure 18-01, Audits, surveillances, and reviews
- Nuclear Safety-Related Quality Assurance Project Document, Clinch River SMR Project, Rev. 2, May 17, 2013
- Project Approved Supplier List and sample of associated audits/surveillances, May 23, 2013
- Quality Assurance Surveillance Report, CRP-Sv1, Rev. 1, July 15, 2013
- Quality Assurance Surveillance Report, CRP-Sv2, Rev. 0, July 12, 2013
- Readiness Review Report, TVA-Clinch River SMR Project Geotechnical Investigation, Rev. 1, June 30, 2013
- Supplier Audit Report NUK2011EX-ATS, Applied Technical Services, December 30, 2011
- AMEC Qualification Clinch River SMR Project” AMEC Project No. 6468-13-1072.
- QS-20, Personnel Training and Qualifications, from AMEC Environmental and Infrastructure, Inc., Nuclear Quality Assurance Manual, Revision 0, pages 73-76,
- Nuclear Quality Assurance Procedure (NQAP) 20-01, Personnel Training and Qualifications, Revision 0, January 1, 2012
- Nuclear Quality Assurance Procedure (NQAP) 20-02, Project Indoctrination and Training, Revision 0, January 1, 2012

Bechtel:

- Quality Assurance Program Plan, 25665-000-GAQ-00001, Rev. 3, April 29, 2013
- Quality Surveillance Report, 25847-000-QSSS-13-001, Observation and Review of Subsurface Investigation activities being performed by AMEC,
- SDDR CRP-10, Missed soil samples, July 17, 2013
- SDDR CRP-11, Core photos not taken, July 17, 2013
- SDDR CRP-15, No documentation of diamond core bits, July 18, 2013
- Work Plan, Tennessee Valley Authority (TVA) Clinch River SMR Project, 25847-601-V14-CY00-00006-002, Rev. 0, May 22, 2013

Generation mPower:

- Project Quality Assurance Program Plan, GmP-PQAPP-001, Rev. 0, April 15, 2013
- Quality Assurance Program Description, GmP-QAPD-001, Rev. 3, August 2012

TVA:

- Clinch River Project Subsurface Investigation Activities Oversight Plan, Rev. 1, July 18, 2013
- Surveillance Report, ES-N2013-01, TVA Clinch River SMR Project – Subsurface Investigation Activities, Rev. 1, July 17, 2013
- Surveillance Report, ES-N2013-02, TVA Clinch River SMR Project – Subsurface Investigation Activities, Rev. 1, July 17, 2013

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(Revised 07/25/2013)

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