June 13, 2013

Mr. Pedro Salas, Director
U.S. EPR New Plants Regulatory Affairs
AREVA NP Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

SUBJECT: NUCLEAR REGULATORY COMMISSION INSPECTION REPORT
NO. 05200020/2013-201 AND NOTICE OF VIOLATION

Dear Mr. Salas:

On April 29 through May 3, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at your AREVA NP Inc. facility in Charlotte, NC. The purpose of this technically-focused, routine, limited-scope inspection was to review quality assurance program implementation in accordance with 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." This inspection focused primarily on the control and use of MTR-System for Analysis of Soil-Structure Interaction (MTR/SASSI) software in support of your Design Certification application that is currently under NRC review. The enclosed report presents the results of this inspection. This NRC inspection report does not constitute NRC endorsement of your overall quality assurance or 10 CFR Part 21, "Reporting of Defects and Noncompliance," programs.

Based on the results of this inspection, the NRC staff has determined that a Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy, which is available on the NRC's web site at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The violation is cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice because the NRC inspectors identified that AREVA failed to establish measures for the selection and review for suitability of its soil-structure interaction analysis computer program. Specifically, AREVA did not perform an adequate commercial-grade dedication technical evaluation to sufficiently identify the performance requirements and critical characteristics for the MTR/SASSI program and did not include or reference the limits of the dedicated capabilities within the related dedication plans.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. Your response to the Notice should also address the extent of condition for the MTR/SASSI software as well as other types of engineering design and application software. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding,” of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the Public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, “Protection of Safeguards Information: Performance Requirements.”

Sincerely,

/RA/

Kerri A. Kavanagh, Chief
Quality Assurance Branch
Division of Construction Inspection
and Operational Programs
Office of New Reactors

Docket No.: 05200020

Enclosures:
1. Notice of Violation
2. Inspection Report No. 05200020/2013-201

In accordance with 10 CFR 2.390, “Public Inspections, Exemptions, Requests for Withholding,” of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the Public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request that such material is withheld from public disclosure, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, “Protection of Safeguards Information: Performance Requirements.”

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ADAMS Accession No.: ML13154A073 *via e-mail NRC-001

OFFICE	NRO/DCIP/CQAB	NRO/DE/SEB2	NRO/DE/SEB2	NRO/DCIP/CQAB
NAME	LTrocine	SPark *	JXu *	FTalbot *
DATE	06/04/2013	06/04/2013	06/04/2013	05/30/2013 and 06/05/2013
OFFICE	NRO/DCIP/CEVB	NRO/DCIP/CAEB	NRO/DCIP/CQAB	
NAME	GLipscomb	TFrye	KKavanagh	
DATE	06/04/2013	06/06/2013	06/13/2013	

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NOTICE OF VIOLATION

AREVA NP Inc. Docket No. 05200020
Charlotte, NC

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted at the AREVA NP Inc. facility in Charlotte, NC, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Criterion III, "Design Control," 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," states in part that measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components.

Section 7.3.1, "Dedication of Commercial Grade Items and/or Services," of AREVA NP Inc.'s ANP-10266, Revision 4, "AREVA NP, Inc., Quality Assurance Plan (QAP) Design Certification of the U.S. EPR™ Topical Report," dated December 13, 2012, states in part that commercial-grade items and/or services for safety-related applications may be procured from suppliers where specific quality controls for nuclear applications cannot be imposed in a practical manner. In these instances, an evaluation of the suitability of the item or service for nuclear applications is performed by the responsible technical manager and quality organization. The critical characteristics of the item or service are also determined and documented as part of this evaluation. Section 7.2, "General," states in part that the control of purchased safety-related materials, items, and services are in accordance with written procedures and instructions.

Section 4.4.1, "Technical Evaluation," of AREVA NP Inc.'s Administrative Procedure AP 0902-29, "Procurement of Engineering Application Software," Revision 005, dated July 27, 2012, states in part that the technical evaluation shall be performed by the responsible engineering organization to identify performance requirements and to identify the critical characteristics including acceptance criteria.

Section 4.4.10 of AREVA NP Inc.'s Administrative Procedure AP 0902-29, states in part that the dedication plan shall include instructions for use of the software within the limits of the dedicated capabilities or identification of a related document containing these instructions.

Contrary to the above, as of May 3, 2013, AREVA failed to establish measures for the selection and review for suitability of its soil-structure interaction analysis computer program. Specifically, AREVA did not perform an adequate commercial-grade dedication technical evaluation to sufficiently identify the performance requirements and critical characteristics for the MTR – System for Analysis of Soil-Structure Interaction (MTR/SASSI) program and did not include or reference the limits of the dedicated capabilities within the related dedication plans. Furthermore, the tested limits of impedance frequency calculations for soil-structure interaction analyses and half-space boundary conditions for uniform site profiles during dedication of MTR/SASSI Version 9.5 HPC (high performance computing) and Version 9.4.2 were not sufficient to

cover the full range of the use of MTR/SASSI in support of AREVA's U.S. EPR™ Design Certification application.

This issue has been identified as Violation 05200020/2013-201-01.

This is a Severity Level IV violation (Section 6.5.d of the NRC Enforcement Policy).

Pursuant to the provisions of 10 CFR 2.201, "Notice of Violation," AREVA NP Inc. is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-001, with a copy to the Chief, Quality Assurance Branch, Division of Construction Inspection and Operational Programs, Office of New Reactors, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system, accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or Safeguards Information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If Safeguards Information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21, "Protection of Safeguards Information: Performance Requirements."

In accordance with 10 CFR 19.11, "Posting of Notices to Workers," you may be required to post this Notice within 2 working days of receipt.

Dated this 13th day of June 2013

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NEW REACTORS
DIVISION OF CONSTRUCTION INSPECTION AND OPERATIONAL PROGRAMS
VENDOR INSPECTION REPORT

Docket No.:	05200020
Report No.:	05200020/2013-201
Applicant:	AREVA NP Inc. 7207 IBM Drive Charlotte, NC 28262
Applicant Contact:	Dennis Williford, P.E. U.S. EPR™ Design Certification Licensing Manager Phone: 704-805-2223 E-mail: Dennis.Williford@areva.com
Nuclear Industry Activity:	AREVA is in charge of building the U.S. EPR™ (an advanced, third-generation, pressurized water reactor design) and is using the MTR/System for Analysis of Soil-Structure Interaction software to perform seismic analyses to establish seismic demands for design of seismic Category I structures included in the U.S. EPR™ Design Certification application, which is currently under NRC review.
Inspection Dates:	April 29 through May 3, 2013

Inspectors:			
	George Lipscomb	NRO/DCIP/CEVB	Team Leader
	Sunwoo Park	NRO/DE/SEB2	
	Frank Talbot	NRO/DCIP/CQAB	
	Leigh Trocine	NRO/DCIP/CQAB	
	Jim Xu	NRO/DE/SEB2	

Approved by:	Kerri A. Kavanagh, Chief Quality Assurance Branch Division of Construction Inspection and Operational Programs Office of New Reactors

EXECUTIVE SUMMARY

AREVA NP Inc.
05200020/2013-201

The U.S. EPR™ is an advanced, third-generation, pressurized water reactor design that has been designed and developed mainly by Framatome (now AREVA NP Inc.), Electricité de France (also known as EDF) in France, and Siemens AG in Germany. In Europe, this reactor design was called European Pressurized Reactor. The internationalized name of this reactor is Evolutionary Power Reactor, but it is now simply named EPR by AREVA NP Inc. (AREVA). AREVA is in charge of building the U.S. EPR™ and is using a version of the System for Analysis of Soil-Structure Interaction (SASSI) software for the seismic analysis and design of safety-related U.S. EPR™ structures. More specifically, AREVA is using the SASSI software to perform seismic analyses to establish the seismic demands for design of seismic Category I structures included in the U.S. EPR™ Design Certification application. AREVA obtained its version of the SASSI software (MTR/SASSI) from a commercial vendor and has evaluated it through the AREVA commercial-grade dedication (CGD) process.

From April 29 through May 3, 2013, the U.S. Nuclear Regulatory Commission (NRC) inspectors conducted a technically-focused, routine, limited-scope inspection at the AREVA facility in Charlotte, NC. The purpose of this inspection was to verity that AREVA's quality assurance (QA) program, associated policies and procedures, contractor oversight, and CGD activities support the AREVA U.S. EPR™ Design Certification application that is currently under NRC review and meet 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 primary focus of the inspection was the evaluation of the quality activities associated with the control and use of MTR/SASSI software in developing seismic load demands for safety-related structures and systems in accordance with the guidance in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," Section 3.7.2, "Seismic System Analysis," and Section 3.7.3, "Seismic Subsystem Analysis." The scope of the inspection also included an evaluation of whether the MTR/SASSI solution approach is valid and sufficiently accurate over the range of input parameters important to the U.S. EPR™ Design Certification, a review of the implementation of AREVA's QA program including training and personnel qualification associated with MTR/SASSI acceptance and use, as well as a review of the programs for nonconformances and corrective actions related to AREVA's MTR/SASSI software.

More specifically, concerning MTR/SASSI software CGD, the inspectors evaluated AREVA's software CGD process in connection with the MTR/SASSI software, procurement of the software, MTR/SASSI CGD technical evaluation, and MTR/SASSI CGD methods of acceptance. Regarding control and use of the MTR/SASSI software, the inspectors assessed AREVA's access controls, internal configuration controls, control of input data for design analysis, control of processing, control of post processing, compatibility of the processing operating system, control of files during internet transfer for processing, and procurement of supercomputing and post-processing services.

The following regulations served as the bases for the NRC inspection:

- Appendix B to 10 CFR Part 50 and
- 10 CFR Part 21, "Reporting of Defects and Noncompliance."

During this inspection, the inspectors implemented portions of the following inspection procedures (IPs):

- IP 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008;
- IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011; and
- IP 65001.22, "Inspection of Digital Instrumentation and Control (DI&C) System/Software Design Acceptance Criteria (DAC) – Related to [Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)]," dated December 19, 2011.

This is the first NRC inspection of AREVA at its facility in Charlotte, NC.

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors determined that, with the exception of the violation described below, AREVA is effectively implementing its QA programs as it pertains to MTR/SASSI software in support of the AREVA U.S. EPR™ Design Certification application that is currently under NRC review. The information below summarizes the results of this inspection.

Commercial-Grade Dedication

The inspectors determined that AREVA has established a program that adequately controls software CGD in accordance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. However, while assessing the implementation of MTR/SASSI CGD, the inspectors determined that AREVA conducted multiple technical evaluations in support of safety-related U.S. EPR™ seismic design that did not meet regulatory requirements. Specifically, the tested limits of impedance frequency calculations for soil-structure interaction analyses and half-space boundary conditions for uniform site profiles for MTR/SASSI software Versions 9.5 HPC (high performance computing) and 9.4.2 were not sufficient to cover the full range of the use of MTR/SASSI in support of AREVA's U.S. EPR™ Design Certification application as required by Administrative Procedure (AP) 0902-29, "Procurement of Engineering Application Software," Revision 005, dated July 27, 2012. Additionally, the limitations of the same dedication testing were not included or referenced within the related dedication plans as required by AP 0902-29. These issues are identified as Violation 05200020/2013-201-01.

MTR/SASSI Software Design Control and Use

Based on the interviews of AREVA and Scientific Computing (SC) Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded that, with the exception of the violation documented in Section 1.b.iii of this report, the implementation of AREVA's programs for the design control of the MTR/SASSI software were consistent with the regulatory requirements in Criterion III of Appendix B to 10 CFR Part 50.

The inspectors also determined that, for the limited sample reviewed, AREVA is effectively implementing its QA policies and procedures regarding the control and use of the MTR/SASSI software. The inspectors identified no findings of significance.

Procurement Document Control

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded the AREVA purchase orders required SC Solutions to work under the AREVA QA and 10 CFR Part 21 programs and that these programs were consistent with the requirements in Criterion IV, "Procurement Document Control," of Appendix B to 10 CFR Part 50. The inspectors also determined that, for the limited sample reviewed, AREVA is effectively implementing its QA program policies and procedures for procurement document control as it pertains to the MTR/SASSI software. The inspectors identified no findings of significance.

Training and Qualification of Personnel

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded that the implementation of AREVA's program for the training and qualification of personnel is consistent with the requirements of Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. The inspectors also concluded that, for the limited sample reviewed, AREVA is effectively implementing its programs for the training and qualification of personnel as it pertains to the MTR/SASSI software acceptance, control, and use. The inspectors identified no findings of significance.

Nonconforming Materials, Parts, or Components and Corrective Actions

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors determined that the implementation of AREVA's programs for the control of nonconforming materials, parts, or components and the control of corrective actions were consistent with the regulatory requirements in Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The inspectors determined that, for the limited sample reviewed, AREVA is effectively implementing its programs for the control of nonconforming materials, parts, or components and the control of corrective actions as it pertains to the acceptance, control, and use of the MTR/SASSI software. The inspectors identified no findings of significance.

REPORT DETAILS

MTR-System for Analysis of Soil-Structure Interaction (MTR/SASSI) software calculations support the seismic design basis for AREVA NP Inc.'s (AREVA's) U.S. EPR™ as outlined in Section 3.7, "Seismic Design," of the U.S. EPR™ Final Safety Analysis Report (FSAR) Tier 2. AREVA utilizes different versions of the MTR/SASSI software for calculations that support the seismic design basis for the various structures. For example, MTR/SASSI Versions 9.5 HPC (high performance computing), 9.5, and 9.5.1 are being applied to the U.S. EPR™ nuclear island common basemat structures including the nuclear auxiliary building; MTR/SASSI Versions 9.2.2 and 9.4.2 are being applied to the U.S. EPR™ emergency power generating building; and MTR/SASSI Versions 9.5 HPC, 9.6 HPC, 9.5.1, and 9.6 are being applied to the U.S. EPR™ emergency service water building. Additionally, some of the different versions are located on different computers in different locations.

1. Commercial-Grade Dedication (CGD)

a. Inspection Scope

The U.S. Nuclear Regulatory Commission (NRC) inspectors evaluated AREVA software CGD policy, procedures, and implementation to verify compliance with applicable regulatory requirements. With regard to CGD, the inspectors assessed MTR/SASSI software Versions 9.5 HPC and 9.4.2.

This assessment included a review of the procedures governing the implementation of CGD activities, interviews with AREVA personnel, and review of related documentation. Specifically, the inspectors reviewed procurement of MTR/SASSI software and engineering services used during CGD, MTR/SASSI technical evaluations and methods of acceptance, and the technical adequacy of MTR/SASSI CGD by tracing a sample of critical characteristics to specific test cases.

The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

i. Software CGD Process

The inspectors found that the software dedication process is controlled primarily by Administrative Procedure (AP) 0902-29, "Procurement of Engineering Applications Software," Revision 005, dated July 27, 2012, which included instructions for software acquisition, software control, performance of the technical evaluation, and preparation of the dedication plan and related dedication report. Performance of the technical evaluation included development of critical characteristics, acceptance criteria, and methods of verification. The inspectors noted that AP 0902-29 required that only the inspection/test method of verification be used as part of CGD.

ii. Procurement of Software and Services Used in MTR/SASSI CGD

The inspectors found that all MTR/SASSI software dedication activities were procured under a single commercial purchase order (PO) with Scientific Computing Solutions (SC Solutions). This PO included provisions for software licensing, computer program verification and validation, computing services at two data center

locations, and training of SC Solutions personnel. The inspectors noted that SC Solutions was to conduct dedication activities under the AREVA quality assurance (QA) program and that all of the AREVA QA program training was to be complete before the start of work.

iii. MTR/SASSI CGD Technical Evaluation and Methods of Acceptance

The inspectors found that each MTR/SASSI version had a CGD technical evaluation documented in the associated dedication plan. Each dedication plan outlined planning and documentation requirements; provided a table of physical, performance, and dependability critical characteristics; and provided a table of test cases and associated acceptance criteria. Results of the test cases analyses and CGD activities are documented in the associated dedication report.

The inspectors selected MTR/SASSI Versions 9.5 HPC and 9.4.2 as a sample for verification of CGD implementation. The inspectors verified that each test plan included critical characteristics and the acceptance method and criteria and verified that each test plan provided specific test cases. Each dedication plan identified both physical and performance critical characteristics supported by 53 to 55 test cases. The inspectors also evaluated the technical adequacy of a sample of specific test cases and verified that the test cases traced to specific critical characteristics.

The inspectors also verified that the range of testing completed during MTR/SASSI dedication encompassed the range of use for a sample of parameters deemed significant in seismic design of the AREVA U.S. EPR™. In particular, the inspectors focused on parameters such as: Poisson's ratio, frequencies included in impedance calculations, and effect of half-space boundary conditions. The inspectors found the range of frequencies used in CGD test cases was not sufficient to cover the hard-rock, high-frequency (HRHF), ground-motion characteristics in support of AREVA's U.S. EPR™ Design Certification application. The inspectors also found that the CGD test cases for HRHF did not evaluate for a full spectrum of frequencies up to 50 Hz as required to capture HRHF ground motion response characteristics for the U.S. EPR™ seismic design. Additionally, the CGD test cases used to address half-space boundary conditions did not adequately capture the generic site profiles for the U.S. EPR™ seismic design.

The inspectors found this to be a failure to implement the requirements of AP 0902-29, Revision 005, Section 4.4.1, "Technical Evaluation," which requires the CGD technical evaluation to properly identify performance requirements and critical characteristics, including acceptance criteria.

Further, the inspectors found that the dedication plans for MTR/SASSI Versions 9.4.2 and 9.5 HPC refer the users to broader limitations contained in the related MTR/SASSI software user manuals instead of the limits of testing that occurred during dedication. The inspectors found this to be a failure to implement the requirements of AP 0902-29, Revision 005, Section 4.4.10, which requires the dedication plan to include instructions to the user about the limitations of the dedication. The inspectors noted that dedication plans for other types of engineering application software provided the user instructions for the limits of the software CGD.

These issues are identified as Violation 05200020/2013-201-01. AREVA created Condition Report (CR) No. 2013-3699 in response to this issue.

c. Conclusions

Based on the limited sample of MTR/SASSI software CGD documents reviewed, the inspectors determined that AREVA has established a program that adequately controls software CGD in accordance with the regulatory requirements of Criterion III, "Design Control," 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," and with the exception of Violation 05200020/2013-201-01, is implementing MTR/SASSI software CGD activities in accordance with the regulatory requirements.

2. MTR/SASSI Software Design Control and Use

a. Inspection Scope

The inspectors reviewed AREVA's policies and procedures that govern design control activities (including computer and software control) to verify compliance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. As part of this review, the inspectors interviewed AREVA personnel and reviewed source documentation to verify implementation of the design control program as it pertains to the control and use of the MTR/SASSI software.

The inspectors also reviewed the processes and procedures used to control personnel access to the MTR/SASSI and to ensure that only trained and qualified personnel were given access to the MTR/SASSI software. In addition, the inspectors verified that design basis test cases met requirements for configuration controls to ensure that the software met design requirements for the U.S. EPR™ FSAR Tier 2, Section Nos. 3.7.2 and 3.7.3.

Lastly, in order to verify AREVA's MTR/SASSI design analysis controls regarding data input, processing, post-processing of output data, compatibility with the process operating system, and files during internet transfers; the inspectors reviewed (1) the MTR/SASSI software users' manual, which was supplied by the commercial vendor when the software was purchased; (2) AP 0902-30, "Management and Use of Engineering Applications Software," Revision 006, dated September 14, 2012; and (3) AP 0402-01, "Calculations," Revision 044, dated February 19, 2013. Regarding files during internet transfers, the inspectors evaluated the controls AREVA and SC Solutions imposed on MTR/SASSI files being transferred for processing to the Ohio Supercomputer Center and Amazon Web Services.

The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

i. MTR/SASSI Access Controls

The inspectors found that AREVA's QA Plan for the U.S. EPR™ Design Certification commits AREVA to American Society of Mechanical Engineers (ASME) Nuclear

Quality Assurance-1 (NQA-1) Standard, "Quality Assurance Requirements for Nuclear Facilities Applications," 1994 Edition. The inspectors also noted that access controls are in place for all of the MTR/SASSI software used by AREVA in accordance with AP 0902-30, Step 4.2, "Accessing Software Listed on the [Engineering Application Software Index (EASI)]." The inspectors also found that there are only about ten users of the MTR/SASSI software. It was determined that the users setup accounts for use through two computer data service centers and that the users are provided security key access codes with user permissions given to only certain AREVA staff and its consultants.

ii. MTR/SASSI Internal Configuration Controls

The inspectors found that AREVA provides guidance for configuration control of MTR/SASSI production runs in AP 0902-30, Step 4.3.2. The inspectors noted that AREVA and its consultants maintain configuration control of changes to MTR/SASSI software pre-installation and post-installation testing on the computer platform. Additionally, the inspectors validated that the baseline installation test case is the dedicated test case loaded into the Ohio Supercomputer Center (for Version 9.5 HPC) and Amazon Web Services (for Version 9.6 HPC) and that AREVA was controlling the configuration of the MTR/SASSI platform hardware and software.

iii. Controls of MTR/SASSI Input Data for Design Analysis, Processing for Design Analysis, Post-Processing of Output Data for Design Analysis, Compatibility of MTR/SASSI Process Operating System, and Files during Internet Transfer for Processing

The inspectors found that, for the personal computer (PC) environment, the AREVA MTR/SASSI users' manual and AP 0402-01, Step 4.1.8.1, require the preparer or user of the MTR/SASSI software to (1) identify all software within the software section of the calculations; (2) document the program identification (including version, revision, build, operating system, and identification number) within the software section of the calculations; and (3) ensure that the documentation requirements of AP 0902-30 are met (e.g., installation tests, script, macros, function). The inspectors found that, for the PC Windows environment, the input data are processed via Windows batch files, which automatically read the input data files and generate two types of output files – namely, the standard output files in text format for the user to review the results and binary output files that are used as inputs to other program logic modules. Regarding controls of the post-processing of output data, the inspectors noted that the program generates an error file for user review and response. For the HPC MTR/SASSI environment, the inspectors also found that the input data are also processed in a manner similar to the PC but via LINUX script batch files.

Regarding the compatibility with the process operating system, the inspectors found that the LINUX and Windows environments recognize the same binary files and that there is no need for file conversion. The inspectors also found that AREVA and SC Solutions impose controls on MTR/SASSI files being transferred for processing to the Ohio Supercomputer Center and Amazon Web Services with an internet file transfer protocol via a Secure Shell (SSH) client – a software program that uses the industry standard SSH protocol to connect to remote computers.

c. Conclusions

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded that, with the exception of the violation documented in Section 1.b.iii of this report, the implementation of AREVA's programs for the design control of the MTR/SASSI software were consistent with the regulatory requirements in Criterion III of Appendix B to 10 CFR Part 50. The inspectors also determined that, for the limited sample reviewed, AREVA is effectively implementing its QA policies and procedures regarding the control and use of the MTR/SASSI software. The inspectors identified no findings of significance.

3. Procurement Document Control

a. Inspection Scope

The inspectors reviewed AREVA's policies and procedures governing procurement document control to verify compliance with the QA requirements of Criterion IV, "Procurement Document Control," of Appendix B to 10 CFR Part 50. Specifically, the inspectors assessed how those guidelines have been applied to the AREVA U.S. EPR™ Design Certification application activities. The inspectors reviewed POs, PO change orders, and methods used by AREVA to qualify suppliers of items and services to verify that they met the requirements of the AREVA's QA program.

The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

Based on a review of the POs AREVA used to contract SC Solutions to perform soil-structure interaction (SSI) analysis calculations using purchased MTR/SASSI Versions 9.2.2, 9.2.4, 9.5, 9.5.1, and 9.6; the inspectors found that AREVA originally purchased the commercial-grade MTR/SASSI software using AREVA PO Nos. 10112033640 and 1012043090. AREVA then issued PO Nos. 1012043090, 1012094285, 1013017598, and 1013018397 with numerous change orders to SC Solutions to dedicate the MTR/SASSI software, perform MTR/SASSI installation tests on the computer and super computer logic platforms, and then perform SSI analysis production runs under the AREVA's 10 CFR Part 21, "Reporting of Defects and Noncompliance," and QA programs.

c. Conclusions

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded the AREVA POs required SC Solutions to work under the AREVA QA and 10 CFR Part 21 programs and that these programs were consistent with the requirements in Criterion IV of Appendix B to 10 CFR Part 50. The inspectors also determined that, for the limited sample reviewed, AREVA is effectively implementing its QA program policies and procedures for procurement document control as it pertains to the MTR/SASSI software. The inspectors identified no findings of significance.

4. Training and Qualification of Personnel

a. Inspection Scope

The inspectors reviewed AREVA's training policies and procedures to verify that AREVA was implementing training activities associated with MTR/SASSI software in a manner consistent with regulatory requirements and industry standards and to verify conformance with the requirements in Criterion II, "Quality Assurance Program," of Appendix B to 10 CFR Part 50. To verify that SC Solutions personnel using the MTR/SASSI software were trained to work under the AREVA QA and 10 CFR Part 21 programs and procedures, the inspectors also examined the personnel training and qualification records for AREVA and SC Solutions personnel involved with the acceptance, control, and use of the MTR/SASSI software with emphasis on Versions 9.4.2 and 9.5 HPC.

Additionally, the inspectors reviewed the signature block pages for Revision 000 of the dedication plans (engineering information records) and dedications reports (calculations) for MTR/SASSI Version Nos. 9.2.2, 9.2.4, 9.5 HPC, 9.5.1, 9.6 HPC, and 9.6 to determine the sample population of test personnel. The sample included an engineer, project engineer, principal engineer, chief engineer, and senior engineer from SC Solutions as well as an advisory engineer and manager from AREVA. The inspectors also examined applicable POs, SC Solutions and AREVA training logs, SC Solutions learning histories from Portfolio (an electronic training repository), training documentation for MTR/SASSI Versions 9.4.2 and 9.5 HPC, and several Quality Engineering surveillances.

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The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

The inspectors noted that Step 4.1.7 of AP 1702-22 required personnel to complete initial training requirements within 60 days of assignment and prior to performing any quality affecting work activities and noted that the MTR/SASSI software POs contained the training requirements for the SC Solutions personnel. The inspectors also found that, through the PO process, AREVA required SC Solutions personnel to complete QA and 10 CFR Part 21 training and to submit QA and 10 CFR Part 21 training records when SC Solutions personnel use the MTR/SASSI code to perform SSI analysis on safety-related structures for the U.S. EPR™ design.

However, the inspectors determined that the POs, training records, and surveillances only referenced training of SC Solutions personnel related to AREVA's QA program. The related information did not include requirements or document that the SC Solutions individuals were technically qualified to utilize the MTR/SASSI software. For this project, the inspectors found that AREVA made use of a note under Step 4.2.3.5 of AP 1212-18, "Purchasing Supplier Assessment," Revision 002, effective February 19, 2010, which stated that, for potential suppliers of specific engineering, analysis, or consulting services; a summary of the potential supplier's technical capability and/or technical resumes of key personnel may be used in lieu of Form 1212-18-F01, "Purchasing Supplier Assessment Form."

In order to evaluate that technical qualifications of the individuals associated with the MTR/SASSI work, the inspectors reviewed a sampling of six resumes for SC Solutions personnel. The years of experience ranged from 1 to 38 years, and the average was 26.8 years of experience. The inspectors also performed detailed interviews (including questions regarding some of the technical aspects of the MTR/SASSI software) via telephone with a Principal Engineer from SC Solutions in California as well as face-to-face with an advisory engineer from AREVA. The inspectors concluded that the applicable AREVA and SC Solutions personnel were technically qualified to perform MTR/SASSI-related activities and that the lack of documentation of technical qualifications was of minor safety significance. AREVA originated CR No. 2013-3911, "Best Practice for Documenting Supplier Technical Qualifications," on May 8, 2013, in response to this issue.

c. Conclusions

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors concluded that the implementation of AREVA's program for the training and qualification of personnel is consistent with the requirements of Criterion II of Appendix B to 10 CFR Part 50. The inspectors also concluded that, for the limited sample reviewed, AREVA is effectively implementing its programs for the training and qualification of personnel as it pertains to the MTR/SASSI software acceptance, control, and use. The inspectors identified no findings of significance.

5. Nonconforming Materials, Parts, or Components and Corrective Actions

a. Inspection Scope

The inspectors reviewed AREVA's nonconformance and corrective actions policies and procedures to verify compliance with 10 CFR Part 50, Appendix B, Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action." The inspectors verified that procedures had been established and implemented for correcting conditions adverse to quality and that nonconformances were promptly identified and corrected. With regard to significant conditions adverse to quality (SCAQ), the inspectors confirmed that AREVA had established and implemented procedures to ensure (1) proper identification of the causes, (2) documentation of the corrective actions to prevent recurrence, and (3) reporting of the SCAQs and actions taken to the appropriate levels of management. The inspectors also noted that procedures had been established and implemented to ensure that corrective action controls extend to subcontractors and suppliers. In addition, the inspectors confirmed that the Corrective Action Program (CAP) provides a connection to 10 CFR Part 21 procedures.

The attachment to this inspection report lists the documents reviewed by the inspectors.

b. Observations and Findings

The inspectors found that AREVA utilized AP 1717-06, "Corrective Action Program, Revision 007, effective October 17, 2012, to implement the requirements of its quality program for promptly identifying, investigating, reporting, tracking, and correcting SCAQs, conditions adverse to quality, near misses, unsafe conditions, customer-identified or regulator-identified problems and complaints, areas for

improvement identified by company employees, and other events or conditions as directed by management within the CAP. Issues entered in AREVA's electronic CAP (WebCAP) were categorized into one of four significance levels (based on SCAQs, conditions adverse to quality, CRs, nonconformances, recommendations, etc.). AREVA also made use of WebCAP to determine lessons learned or software impact assessments as well as to electronically track and trend these issues.

The inspectors verified through interviews that AREVA management and MTR/SASSI software technical personnel were knowledgeable of the CAP and CR processes. To verify the adequacy of AREVA's implementation and control over nonconforming quality materials, parts, or components; the inspectors also traced the closeout process of a complex CR through WebCAP and evaluated disposition of 15 out of 25 CRs associated with the acceptance and use of the MTR/SASSI software from 2009 through 2013.

The inspectors evaluated AREVA's corrective actions with regard to a 10 CFR Part 21 report from another facility concerning a different version of the SASSI software – Advanced Computer Software – System for Analysis of Soil-Structure Interaction (ACS/SASSI). The inspectors noted that AREVA generated CR No. 2009-7168, "NRC Event Report on ACS/SASSI Error," and entered it into WebCAP on October 23, 2009, and that AREVA management distributed the event notification report. The inspectors also found that AREVA performed an assessment and concluded that AREVA does not use ACS/SASSI and that the analysis results for high numbers of soil layers at AREVA are consistent with input ground motion. Additionally, the inspectors found that SC Solutions included additional test problems to verify MTR/SASSI runs with large numbers of soil layers for its latest version (at the time – Version 8.2.01) for additional assurance. CR No. 2009-7168 was closed on March 15, 2010.

c. Conclusions

Based on the interviews of AREVA and SC Solutions personnel and on the limited sample of MTR/SASSI software documents reviewed, the inspectors determined that the implementation of AREVA's programs for the control of nonconforming materials, parts, or components and the control of corrective actions were consistent with the regulatory requirements in Criteria XV and XVI of Appendix B to 10 CFR Part 50. The inspectors determined that, for the limited sample reviewed, AREVA is effectively implementing its programs for the control of nonconforming materials, parts, or components and the control of corrective actions as it pertains to the acceptance, control, and use of the MTR/SASSI software. The inspectors identified no findings of significance.

6. Entrance and Exit Meetings

On April 29, 2013, the inspectors discussed the scope of the inspection with Mr. Nawar Alchaar, Manager, Civil and Layout Engineering; Mr. Len Gucwa, Manager, Regulatory Affairs; Mr. Michael Morgan, Quality Manager, Engineering and Projects/New Builds; other members of AREVA's management and staff; and a representative from SC Solutions. On May 3, 2013, the inspectors presented the inspection results and observations during an exit meeting with Mr. Mike Carpenter, Vice President, Design Engineering, and other members of AREVA's management and staff.

The attachment to this report lists the entrance and exit meeting attendees as well as those interviewed by the inspectors.

ATTACHMENT

1. ENTRANCE AND EXIT MEETING ATTENDEES AND INDIVIDUALS INTERVIEWED

Name	Title	Affiliation	Entrance	Exit	Interviewed
Kerri Kavanagh	Chief, Quality Assurance Branch, Division of Construction Inspection and Operational Programs (DCIP)	U.S. Nuclear Regulatory Commission (NRC)/Office of New Reactors (NRO)		X	
George Lipscomb	Inspection Team Lead	NRC/NRO/ DCIP	X	X	
Sunwoo Park	Inspector	NRC/NRO/ Division of Engineering (DE)	X		
Francis X. Talbot	Inspector	NRC/NRO/ DCIP	X	X	
Leigh Trocine	Inspector	NRC/NRO/ DCIP	X	X	
Jim Xu	Inspector	NRC/NRO/DE	X	X	
Victor Abayan	Project Engineer	AREVA	X	X	
Nawar Alchaar	Manager, Civil and Layout Engineering	AREVA	X	X	
Aejaz Ali	Advisory Engineer (Civil)	AREVA	X	X	X
Mike Carpenter	Vice President, Design Engineering	AREVA		X	
Craig J. Chiodo	Corrective Action Program Manager	AREVA		X	X
Thomas F. Ehrhorn	Quality Engineer (Software Quality Assurance (QA) Lead)	AREVA	X	X	X
Len Gucwa	Manager, U.S. EPR™ Projects – Regulatory Affairs	AREVA	X	X	
John Leighliter	Project Engineer	AREVA		X	
Ray Lewis	Licensing Engineer	AREVA	X	X	
Brian Loseke	Engineering Manager	AREVA	X	X	X
Michael Morgan	Quality Manager, Engineering and Projects/New Builds	AREVA	X	X	X
Tom Ryan	Licensing Engineer, Regulatory Lead	AREVA	X	X	X

Name	Title	Affiliation	Entrance	Exit	Interviewed
Pedro Salas	Director, Regulatory Affairs	AREVA		X	
Brian Vance	U.S. EPR™ Project Manager	AREVA		X	
George Wadkins	Licensing Engineer	AREVA			X
Tara Werner	Manager, Corporate Quality	AREVA	X		
Dennis Williford	U.S. EPR™ DC Licensing Manager	AREVA	X	X	
Calvin Wong	Supervisor, Engineering/ Advisory Engineer (Civil)	AREVA	X	X	X
Basilio Sumododila	Principal Engineer	Scientific Computing Solutions (SC Solutions)			X
Mansour Tabatabaie	Chief Engineer	SC Solutions	X		X

2. INSPECTION PROCEDURES USED

a. Inspection Procedure (IP) 35017, "Quality Assurance Implementation Inspection," dated July 29, 2008.

b. IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated April 25, 2011; and

c. IP 65001.22, "Inspection of Digital Instrumentation and Control (DI&C) System/Software Design Acceptance Criteria (DAC) – Related to [Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)]," dated December 19, 2011.

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

The following item was found during this inspection.

Item Number	Status	Type	Description
05200020/2013-201-01	Opened	Violation	Criterion III

4. DOCUMENTS REVIEWED

a. Quality Management Procedures

- AREVA U.S. EPR™ Design Certification Application Section 3.7, "Seismic Design," Revision 4, dated November 15, 2012.

- AREVA QA Manual, American Society of Mechanical Engineers (ASME) Section III & Section XI/National Board Inspection Code (NBIC), "Quality Assurance Manual for

Fabrication and Shop Assembly of N, NA, NPT, NS Items and as a Material Organization and for Nuclear Repairs in Accordance with NBIC," Document No. 56-1151178-31, Revision 31, dated September 16, 2011.

- ANP-10266, "AREVA NP Inc. Quality Assurance Plan (QAP) for Design Certification of the U.S. EPR – Topical Report," Revision 4, dated December 2012.

- AREVA QA Program, Document No. 56-9141754-001, dated April 16, 2012.

- AREVA QA Topical Report (QATR) 43-10266-004, AREVA QAP for the Design Certification of the U.S. EPR™, ANP-10266, Revision 4, dated December 2012.

- Administrative Procedure (AP) 0402-01, "Calculations," Revision 044, dated February 19, 2013.

- AP 0405-05, "Contract Variation Approval Request," Revision 027, dated October 8, 2010.

- AP 0405-30, "Design Verification Testing," Revision 022, effective September 18, 2012.

- AP 0504-16, "Nuclear Products Advisory Bulletins (NPAB)," Revision 011, effective January 11, 2013.

- AP 0508-04, "Training, Qualifying, and Certifying Field Service Personnel."

- AP 0412-76, "Commercial Grade Dedication," Revision 011, dated April 5, 2013.

- AP 0902-19, "Engineering Software Error Reporting and Evaluation," Revision 007, dated September 14, 2012.

- AP 0902-28, "Development of Engineering Application Software," Revision 004, effective August 31, 2012.

- AP 0902-29, "Procurement of Engineering Applications Software," Revision 005, dated July 27, 2012.

- AP 0902-30, "Management and Use of Engineering Applications Software," Revision 006, dated September 14, 2012.

- AP 1212-12, "Integrated Procurement and Material Management Process," Revision 036, dated December 7, 2012.

- AP 1212-18, "Purchasing Supplier Assessment," Revision 002, effective February 19, 2010.

- AP 1212-21, "Purchase Requisition Requirements and Management," Revision 002, dated August 27, 2012.

- AP 1212-22, “Purchase Order Requirements and Management,” Revision 002, dated November 13, 2012.

- AP 1702-22, “Employee Training,” Revision 032, effective August 23, 2012.

- AP 1703-01, “Restraint Order,” Revision 029, effective February 17, 2011.

- AP 1717-06, “Corrective Action Program (WebCAP),” Revision 007, effective October 17, 2012.

- AP 1719-23, “Qualification of Quality Assurance Audit Personnel,” Revision 023, effective September 15, 2011.

- AP 1719-32, “Focused Self Assessment,” Revision 007, effective March 29, 2013.

- AP 1721-01, “Quality Engineering (QE) Surveillance of Engineering Activities,” Revision 009, effective August 15, 2012.

- AP 1727-01, “Quality, Safety, and Regulatory Alerts,” Revision 003, effective October 11, 2010.

- AP 1729-01, “Quality, Safety, and Environmental management System Management Reviews,” Revision 004, effective March 22, 2013.

- Engineering Guideline No. 01, ‘Engineering & Projects U.S. Training Program,” Revision 004, effective May 1, 2012.

- Engineering Guide No. 07, “Engineering Qualification Process,” Revision 000, effective January 12, 2009.

b. <u>Software Documents</u>

- Form 0902-30-F01, “Software Release Authorization,” Revision 5, for MTR-SASSI-9.5 HPC (high performance computing) software, updated April 18, 2013.

- Form 0902-30-F01, “Software Release Authorization,” Revision 5, for MTR-SASSI-9.4.2 software, updated April 24, 2013.

- Software User’s Manual for MTR/SASSI, Document No. SA4.26-2A4-MTR-SASSI-9.5HPC_SUM, Version 9.5HPC, Revision 1, dated December 4, 2012.

c. <u>Dedication Records</u>

- Document No. 51-7012301-002, “Dedication Plan for MTR/SASSI, Version 9.5 HPC,” dated April 5, 2013.

- Document No. 32-7012306-001, “Dedication Report for MTR/SASSI, Version 9.5 HPC,” dated April 14, 2013.

- Document No. 51-7012323-004, “Dedication Plan for MTR/SASSI, Version 9.4.2,” dated April 5, 2013.

- Document No. 32-7012324-002, “Dedication Report for MTR/SASSI, Version 9.4.2,” dated April 11, 2013.

- Document No. 51-9172913-003, “Software Dedication Plan, Hydraulic Analyzer of Sprinkler Systems (HASS),” undated.

- Document No. 32-9172963-003, “Software Dedication Report, Hydraulic Analyzer of Sprinkler Systems (HASS),” undated.

- Document No. 51-9179736-000, “Commercial Grade Dedication Plan for GOTHIC v8.0,” dated April 25, 2012.

d. <u>AREVA Procurement Documents</u>

- AREVA Purchase Order (PO) No. 10112033640, MTR and Associates, Maintenance of MTR/SASSI Software, Purchase of MTR/SASSI V9.2.2, dated April 30, 2012.

- PO No. 1012043090 to SC Solutions and attachments for dedication of MTR/SASSI software (Commercial Purchase of MTR/SASSI to perform SASSI seismic design analysis), Version 0, dated June 8, 2012.

- PO No. 1022043090, SC Solutions Change Order 1, dated August 7, 2012.

- PO No. 1012043090, SC Solutions Change Order 2, dated August 7, 2012.

- PO No. 1012043090 to SC Solutions for dedication of MTR/SASSI software, Version 2, dated November 30, 2012.

- PO No. 1012043090, SC Solutions Change Order 3, Item 10, SC Soil Phase I MTR/SASSI; Item 30, Change Order 1 – Additional Funds for 2nd Data Center; Item 50, Change Order 2, “Ohio Supercomputer Center (OSC) Data Center Support,” dated November 30, 2012.

- Purchase Request No. 40200926 related to PO No. 1012043090 to SC Solutions for dedication of MTR/SASSI software, Revision 3, dated November 30, 2012.

- PO No. 1013017598**,** SC Solutions, dated April 2, 2013, Change Order 1, Increase Funding on Line Item 60, Change Order 2, Increase Funding for Line Items 40, 50, 60, and 120.

- PO No. 1013018397 to MTR and Associates, Inc. for MTR/SASSI Version 9.4.2 Software and Maintenance, Version 0, dated March 5, 2013.

- PO No. 1013018397, MTR and Associates, Change Order, dated March 5, 2013

e. Training Documents

- QE Surveillance No. EPR-FHS-12-04 for MTR/SASSI Version 9.2.2, Dedication Report No. 32-7011394-000 and Dedication Plan No. 51-7011393.

- QE surveillance training documentation from QE Surveillance No. EPR-FHS-12-03 for MTR/SASSI Version 9.4.2, Dedication Report No. 32-7012324-000 and Dedication Plan No. 51-7012323-001.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.2.2, Revision 000, Document No. 51-7011393-000, signed between September 29 and October 3, 2011.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.4.2, Revision 000, Document No. 51-7012323-000, signed between August 13 and 17, 2012.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.5 HPC, Revision 000, Document No. 51-7012301-000, signed between September 12 and 14, 2012.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.5.1, Revision 000, Document No. 51-7012775-000, signed between January 8 and 11, 2013.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.6 HPC, Revision 000, Document No. 51-7012834-000, signed between January 18 and 19, 2013.

- Signature block page of AREVA dedication plan for MTR/SASSI, Version 9.6, Revision 000, Document No. 51-7013017-000, signed between January 31 and February 2, 2013.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.2.2, Revision 000, Document No. 32-7011394-000, signed between October 3 and 4, 2011.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.4.2, Revision 000, Document No. 32-7012324-000, signed between August 29 and 26, 2012.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.5 HPC, Revision 000, Document No. 32-7012306-000, signed on December 13, 2012.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.5.1, Revision 000, Document No. 32-7012777-000, signed on January 11, 2013.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.6 HPC, Revision 000, Document No. 32-7012836-000, signed between February 5 and 6, 2013.

- Signature block page of AREVA dedication report for MTR/SASSI, Version 9.6, Revision 000, Document No. 32-7013019-000, signed between February 5 and 7, 2013.

- Training documentation for MTR/SASSI Version 9.5 HPC, Dedication Report No. 32-7012306-000 and Dedication Plan No. 51-7012301-001. (Not part of a surveillance.)

f. <u>WebCAP Condition Reports</u>

- Condition Report (CR) No. 2009-7168, "NRC Event Report on ACS/SASSI Error," entered into WebCAP October 23, 2009, closed March 15, 2010.

- CR No. 2009-7293, "Software Configuration Manager (SCM) Not Informed of Software Usage the Document Release Notice for 329081926-002, Which Used Computer Software, did Not Include the SCM on Distribution. This is Contrary to AREVA Procedure 902-21." Entered into WebCAP October 28, 2009, closed March 4, 2010.

- CR No. 2010-2405, "Design Change Control Process Incorrectly Implemented in AREVA Calculations 32-9077488-002 and 32-9011970-003," entered into WebCAP April 8, 2010, closed May 19, 2010.

- CR No. 2011-3542, "The Subtraction Method Used in SASSI Computer Programs Has Been Shown to Produce Unconservative Analysis Results by Some Recent Studies Performed by Various Parties. The Subtraction Method is Used on Both MTR/SASSI and Bechtel's SASSI2000. These Programs Were Used to Analyze the U.S. EPR Structures, and the Potential Impact on Analysis Results Needs to be Addressed." Entered into WebCAP May 13, 2012, closed April 24, 2013.

- CR No. 2011-5784, "Software Error Notice Numbers: MTR_SASSI 2011-01, Software Name and Version: MTR_SASSI 9.2.2," entered into WebCAP August 12, 2011, closed November 8, 2012.

- CR No. 2012-724, "Equivalent Element Radius in the POINT Module is Outside the Recommended Range." Entered into WebCAP January 30, 2012, closed March 13, 2013.

- CR No. 2012-8264, "Dedication Plan and Dedication Report for MTR/SASSI Computer Code did Not Meet Certain Procedural Requirements of AP Procedure 0902-29. QE Surveillance [No.] EPR-FHS-12-03." Entered into WebCAP October 26, 2012, closed December 10, 2012.

- CR No. 2012-8956, "Compliance Issues to AREVA Procedure 0902-29 were Noted Regarding the Software Dedication Process and Accessing Software Listed on the [Engineering Application Software Index (EASI)] for MTR/SASSI Version 9.2.2 Software Code. QE Surveillance [No.] EPR-[FHS-]12-04." Entered into WebCAP November 16, 2012, closed November 30, 2012.

- CR No. 2012-8957, “Level 4 Recommendation to Consider Revising Certain Sections of Procedure 0902-29 for Consistency. QE Surveillance [No.] EPR-FHS-12-04.” Entered into WebCAP November 16, 2012, open as of May 3, 2013.

- CR No. 2012-8958, “Level 4 Recommendation to Consider Revising AREVA Procedure 0402-01 Regarding Software Usage from the EASI. QE Surveillance No. EPR-FHS-12-04.” Entered into WebCAP November 16, 2012, open as of May 3, 2013.

- CR No. 2012-8990, “This is a Track and Trend CR. The Issue is Regarding Training to Sub Contractors. QE Surveillance [No.] EPR-FHS-12-04.” Entered into WebCAP November 19, 2012, closed November 11, 2012.

- CR No. 2013-2228, “U.S. EPR EPGB Shear Key Interaction Nodes Not Included in SASSI Analysis,” entered into WebCAP March 19, 2013, open as of May 3, 2013.

- CR No. 2012-9948, “MTR/SASSI Usage,” entered into WebCAP December 30, 2012, closed January 13, 2013.

- CR No. 2013-2098, “Software Dedication Lessons Learned,” entered into WebCAP March 14, 2013, closed March 20, 2013.

- CR No. 2013-3699, “Parameters Used in Calculation Beyond What was Dedicated in MTR/SASSI,” entered into WebCAP May 1, 2013, closed May 2, 2013.

Acronyms Used:

10 CFR	Title 10 of the *Code of Federal Regulations*
ACS/SASSI	Advanced Computer Software – System for Analysis of Soil-Structure Interaction
ADAMS	Agencywide Documents Access and Management System
AP	Administrative Procedure
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CGD	Commercial-Grade Dedication
CR	Condition Report
DAC	System/Software Design Acceptance Criteria
DCIP	Division of Construction Inspection and Operational Programs
DE	Division of Engineering
DI&C	Inspection of Digital Instrumentation and Control
EASI	Engineering Application Software Index
EDF	Electricité de France
FSAR	Final Safety Analysis Report
HASS	Hydraulic Analyzer of Sprinkler Systems
HPC	High Performance Computing
HRHF	Hard Rock High Frequency
IP	Inspection Procedure
ITAAC	Inspections, Tests, Analyses, and Acceptance Criteria
MTR/SASSI	MTR - System for Analysis of Soil-Structure Interaction

NBIC	National Board Inspection Code
NPAB	Nuclear Products Advisory Bulletins
NRC	Nuclear Regulatory Commission
NRO	Office of New Reactors
NQA-1	Nuclear Quality Assurance-1
OSC	Ohio Supercomputer Center
PC	Personal Computer
PO	Purchase Order
QA	Quality Assurance
QAP	Quality Assurance Plan
QATR	Quality Assurance Topical Report
QE	Quality Engineering
SASSI	System for Analysis of Soil-Structure Interaction
SC Solutions	Scientific Computing Solutions
SCAQ	Significant Conditions Adverse to Quality
SCM	Software Configuration Manager
SSH	Secure Shell
SSI	Soil-Structure Interaction
U.S.	United States