

November 30, 2009

APPLICANT: AREVA NP, INC.

PROJECT: U.S. EPR SOFTWARE PROGRAM MANUAL TOPICAL REPORT

SUBJECT: October 14 and 15, 2009, SUMMARY OF MEETING WITH AREVA TO DISCUSS SOFTWARE PROGRAM MANUAL TOPICAL REPORT (ANP-10272P) (MD3971)

On October 14 and 15, 2009, Category 1 public meetings were held between the U.S. Nuclear Regulatory Commission (NRC) staff and members of the AREVA NP, Inc. The purpose of this meeting was to discuss staff concerns regarding the Software Program Manual (SPM) Topical Report (ANP-10272P), Revision 1 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092300439). A list of attendees is provided as Enclosure 1.

On October 14, 2009, the meeting started at 8:30 A.M. Maria Guardiola of the NRC brought the meeting to order. The members of the public attending via the telephone conference line and the attendees present introduced themselves to begin the business portion of the meeting.

As the intention of this specific meeting was to provide AREVA with a complete list of the outstanding issues remaining for the SPM Topical Report, the meeting consisted of a series of presentations by the NRC staff on their understanding of the outstanding issues followed by discussion.

The first two items on the agenda addressed information that had been previously identified and submitted to the NRC by AREVA as proprietary information. The members of the public on the conference call were notified that, as identified in the agenda, the first two presentations would be closed to the public and the public was invited to call back at the conclusion of these presentations at the published time of 10:40 A.M.

As the first item on the agenda, the staff addressed the AREVA NP, Inc., Engineering Information Record 51-9047411-001, "Alignment of the TXS Software Program Manual Topical Report with NRC Branch Technical Position (BTP) 7-14" (ADAMS ML092300441-proprietary). The staff noted that the alignment document did not address the various regulatory guides referenced in BTP 7-14. AREVA commented that a great deal of that level of information was included in the SPM itself. After some discussion regarding the Part 50 vs. Part 52 application of the SPM and implementation and change processes, a call for any specific additional comments on this document was made and it was noted that there were no other substantive comments on the document,

The next agenda item addressed assessment of the second proprietary, security-related document, Engineering Information Record 51-9118047-000, "Teleperm XS Cyber Security Features." A presentation handout was provided (ADAMS ML092890583-proprietary) for the purpose of addressing the impacts of this document. The staff prefaced their presentation by identifying that cyber security requires a system level evaluation that assesses both internal and external security measures to prevent tampering or malicious attack. AREVA noted that they

provided (non-proprietary) discussion in the SPM related to the Teleperm platform for cyber security and will enhance the cyber information to better identify the sections applicable to the Alpharetta, Georgia facility. AREVA was requested during the presentation to consider providing a description of the Information Security Program that will be employed to secure the application software development environment. Staff noted that alignment is provided and measures are in place as part of development of the platform which can and should be credited as part of the cyber security strategy.

At 10:40 A.M. it was necessary to notify the members of the public that we needed 5 more minutes to conclude the closed discussions. The meeting was then opened to the public.

The Next item on the agenda, "NRC Evaluation of RAI responses related to the 11 issues Identified in NRC letter of March 9, 2009 (ADAMS ML090580109)," was addressed using the handout identified as, "SPM Concerns and Additional Comments," which also included the Office of Nuclear Reactor Regulation (NRR) notes for the final agenda item, "Issues informed by completion of the Oconee License Amendment Request Review." The first 11 addressed the March 9, 2009, letter issues.

The remainder of this meeting summary will address the 27 concerns identified in this document and the proposed answer or resolution actions related to those concerns.

Concerns 1, 3, and 4 have been adequately addressed at this time in the Revision 1 submittal.

Concern 2

The staff has not been able to identify any convention that is being followed to distinguish between descriptive material and the statement of requirements for lower tier documents.

The response to RAI 66 noted that, "No specific convention was used to denote requirements. Instead, optional or conditional items are described using the terminology 'may'." This was not seen by the staff as fully addressing the concern above as stated. AREVA agreed to more clearly capture the response for the forthcoming revision.

Concern 5

Staff needs to have a clear understanding of what guidance documents and standards will be followed, and to what degree they will be followed.

This concern was addressed in the revision, but the degree of conformance may be subject to interpretation during an application review.

Concern 6

Regarding component verification and validation testing:

1. In the revised SPM, the staff's interpretation is that all component testing is done under the generic TXS process and procedures, and that no new components will be developed under the application software process as described in the SPM. AREVA confirmed that no new or custom blocks are allowed.
2. The Software Verification and Validation Plan (SVVP) was changed to reflect that, "The Technical Manager and the Quality Assurance (QA) organization are responsible for reviewing the SVVP to assess its appropriateness to the scale

and complexity of the project.” AREVA clarified that the Technical Manager and the QA organization are responsible for review. The Verification and Validation (V&V) group manager has responsibility for implementation and sole authority for issuance. AREVA concurred that the changes as shown in the SPM should reflect the understanding arrived at on the Oconee review. They will amplify the table and its linkages for Table 13-1 and Table 13-4 and add the word “approve” to page 11.4.

3. Section 11.8 now states the V&V personnel are responsible for preparation of the software and system validation test documents and may get assistance from the design groups as allowed but under direction of the V&V group. This issue is adequately addressed.

Concern 7

The SPM now states the Project Engineer is chairman of the Application Software Configuration Control Board (CCB) and serves with the software supervisor and the Lead Software Designer as members of the Board. Participation by QA and the V&V Group is typically included to ensure compliance with project requirements. It appears that this issue is adequately addressed in the SPM.

However, the use of a CCB as stated in the SPM is not consistent with how the CCB would be implemented in the new Software Configuration Management Plan (SCMP) Operating Instruction (OI)1460-10 credited in the Oconee review. SPM Section 12.2.2, states that AREVA NP uses CCBs for the development of TELEPERM XS Application Software for control of changes to functional requirements after the Application Software has been developed to the baseline stage. Operating Instruction 1460-10 says that use of CCB is optional so this comment is not resolved.

AREVA agreed to look at Sections 12.2.2 and 4.7.1 of the SPM and will propose better clarifying language to address what issues do not need to be evaluated by the CCB. AREVA will look at Institute of Electrical and Electronics Engineers (IEEE) STD 828 and agreed to tighten up the language to better align the requirements.

Concern 8

References to SIVAT have been removed from the SPM up to Appendix B. This includes removal of SIVAT in the definitions, discussion in the Application Software Validation Testing, Tools for Verification and Validation Testing as well as the Software Configuration Manual Program (SCMP). The only reference to a simulation test tool is an “NRC approved simulation test tool.” However, in Appendix B, it is stated, “The Software Program Manual describes the specific system qualification process for TELEPERM XS projects in the U.S. This process uses the SIVAT tool, as described below.” Therefore, this appears to the staff to be an inconsistent reference to SIVAT. AREVA is requested to revise the SPM to address SIVAT consistently. AREVA agreed that Appendix B will be changed for consistency.

Concern 9

Revision 1 of the SPM now states there is a Software Safety Plan (SSP) and the Technical Manager is responsible for it, although there is no Software Safety Team or organization. The staff has the following issues to be resolved with regards to this plan:

1. BTP HICB-14 states that the SSP should include a requirement that a safety analysis be performed and documented on each of the principal documents; requirements, design descriptions and source code. AREVA believes they meet this requirement and points to Section 10.3 to identify the safety review analyses requirements. Staff to evaluate.
2. BTP HICB-14 states that the SSP should identify all documentation required for the proper and safe operation of the software. AREVA identified that the preliminary hazards analysis includes the Teleperm development in concert with the SPM and a D3 analysis to address the intent of the hazards analysis. In this area they are unsuccessful in complying with IEEE STD 1028 (unendorsed), but do meet the intent. NUREG/CR-6101, "Software Reliability and Safety in Nuclear Reactor Protection Systems," has a description of what the staff intends for a preliminary hazards analysis. The verbiage regarding intent should accurately reflect this intent vs. conform position on the IEEE STD 1028 and NUREG/CR-6101 guidance as an alternate approach, as should Section 4.2 of the SPM. AREVA is to address this issue in the final revision.
3. The SSP discusses the use of the, "Specification and Coding Environment (SPACE) tool." BTP HICB-14 states that all tools used to carry out the application software development should be discussed and, in particular, a description of the method for preventing inadvertent introduction of hazards by the use of all projects tools. The Staff requests that all tools be identified (see Sections 4.2 and 13). AREVA is to address in the final revision.
4. Also, BTP HICB-14 states that the SSP should define the safety-related activities to be carried out for each set of life cycle activities, from requirements through operation and maintenance. AREVA stated that the revision identifies their responsibilities up to the licensee's responsibilities. This is acceptable to the staff.

Concern 10

The addition of Section 4.2 provided a listing of development support tools that are "part of" the SPACE Engineering Tool. However, this section does not attempt to demonstrate software quality of these tools. The description of these tools should identify if they were written and developed by AREVA at the same time, and as part of, the SPACE engineering tool, pre-developed, or as an alternative development items. The listing does not include "Rediff" or identify that this is a complete listing (i.e., are there any SPACE tool substitutions or are any compilers or software loaders to be used?).

The only tools credited are the code generators. "Rediff" is not run independently; it's an aid, but not the sole source for decision-making. Plan documents should identify how these tools are used and/or credited. AREVA will amplify the text, add "rediff" and exel-match, and will look at others. They will also identify "available" vs. "required" class of tools and add discussion for the topical on development processes.

Concern 11

1. The responsibility for the V&V functions has been clarified to identification of the V&V organization. This issue was adequately addressed in Revision 1.

2. The review guidance for the Software Quality Assurance Program (SQAP) in Section B.3.1.3.4 of BTP 7-14 states, "The organization of the software QA organization should be checked to ensure that there is sufficient authority and organizational freedom, including sufficient independence from cost and schedule to ensure that the effectiveness of the QA organization is not compromised. Institute of Electrical and Electronics Engineers (IEEE) STD 1028-1988 can be used as guidance."

Staff recommends that additional description for the segregation of responsibilities define the technical manager's role with regard to oversight of the SQAP.

Staff pointed out that the statement should not read "manage" but more appropriately read "maintains" the plans. AREVA agreed with this change.

3. The SPM does not address the closure of open items.

Section 3.5.2 of the revision, (pg 3-19) addresses the V&V group's requirement to V&V implementation of open item solutions for S/W or H/W issues. The selection of the solution is part of the normal design V&V activities. Staff requested that a line be added to place this activity in the context of being inside the normal process for design and design change development under the AREVA program.

4. The SPM now states, "The use of the SPACE Engineering Tool ensures that no unused code is inserted in the Application Software." This issue was adequately addressed.

Concern 12 **Software Test Plan**

1. The SPM does not indicate the organization or personnel responsible preparing the test plan. Also, in accordance with IEEE STD 1012-1998, testing is the responsibility of the V&V group. AREVA is to identify how Section 3.3.7, "Testing," meets these guidelines with the testing team performing hardware checkouts, but the V&V group identified as the responsible organization. Section 11.8 of the revision should address this item.
2. If roles and responsibilities are to be delineated at the Test Specification level, then some guidance would be expected in the Software Test Plan to ensure compliance with the Standards.

AREVA identified that Roles and Responsibilities have been added to Section 3.3. regarding who prepares test specifications; AREVA identified page 11-7 as defining test documents including the test specifications, which are owned by the V&V group.

Section 4.5.8 does not identify who has the responsibilities. Section 11 provides these distinctions. Staff is to verify adequacy.

3. Even though the SPM lists separate activities, it is silent on the acceptability of combining activities. Per AREVA, lacking the SIVAT, activities are not

necessarily combined but system testing will be done during the Factory Acceptance Test (FAT) location.

4. Section 4.5.8 was not expanded in line with the distinction between white box and black box testing. AREVA will also correct to address software and system test.
5. BTP 7-14 states the procedure for specifying the release code with the associated testing documentation should be identified.

AREVA committed to providing necessary additions to text, addressing the alignment of the release code with the associated testing documentation.

6. From Figure 11-1, "Test Document Work Flow and Control Points," it is not clear who will actually write the test cases.

AREVA stated that the test case is part of the set of documents, which include administrative requirements, procedures and scripts. The figure will be modified.

7. V&V Plan Technical Manager will be identified as reviewing, rather than approving the plan.

Concern 13

To further explain the V&V process there should be identified to indicate that another requirement of V&V will insure that the SPACE function block diagrams adequately and appropriately represent the Software Design Description (SDD). Section 11.9.4 of the revision is understood as addressing this issue.

Concern 14

In the Software Management Plan (SMP), the project manager is responsible for "the adequate budgeting, scheduling, and staffing of the project software activities described in this report, including the timely acquisition of independent Verification and Validation resources for the project." How is financial independence maintained with one person responsible for both the software development and independent V&V resource acquisition?

AREVA identified that the Project Manager (PM) is charged with the administrative and financial responsibility of project, not the technical or quality. Staff recommends a typical (functional) organization alignment figure or chart.

AREVA will provide a suitable figure and will generically address the specifics of BTP 7-14 regarding personnel assignment in Section 4.5.1.

Concern 15 **Software Development Plan (SDP)**

1. SDP should describe the mechanisms for tracking the risk factors and implementing contingency plans per BTP 7-14.

AREVA identified Section 5.14-1 and the attendant reference document (Reference 46(PGM-7)) in Section 15.5, which would probably be subject to an audit to meet the BTP 7-14 requirement. The reference is to a corporate level risk

management document. This appears to be adequate, but may require verification.

2. Project schedules are mentioned as being developed as part of the project plans with no further information as to their content. According to BTP 7-14, these should include reviews, milestones, and audits to avoid unexpected schedule delays. AREVA will expand the project schedule language in Section 4.5.1.
3. The SDP should describe the software development environment, including tools such as software design aids, compilers, loaders, and subroutine libraries. The SDP should require that tools be qualified with a degree of rigor and level of detail appropriate to the safety significance of the software which is to be developed using the tools. These concerns are closely related to those being addressed for Concern 10 and will also be addressed in that area. Staff will verify.

Concern 16 Software Quality Assurance Plan

AREVA's position that Audits conform to Regulatory Guide (RG) 1.168 except as addressed in the AREVA Quality Assurance Manual (QAM) regarding audit mechanics and format conflicts with the IEEE STD 1028 instructions on audit reports. AREVA will add a clarifying statement regarding this difference.

Concern 17 Software Integration Plan

1. In the SPM, does the Software Generation and Download Procedure document include the order in which software components are combined and loaded into the system?

AREVA identified that the steps can be varied based on the specific project task order. The order of activities selected, however, is sequential. A four channel system is not necessarily clearly identified on a channel-by-channel basis with regard to sequence for completion of a load.

AREVA will clarify by expanding the discussion in Section 6 relative to how the SPACE tool does integration for the different processors, including a discussion of the tool and add a clarification in Section 7 regarding AREVA's scope for installation and order of software loading.

2. The SMP should identify the software organization (if there is one) or if the personnel implementing the plan are part of the development organization.

After discussion, the staff determined that the SPM addressed this adequately.

3. The SMP does not state if the Software Generation and Download Procedure identifies or records successful completion of the installation, and what integration tests are performed. If physical integration is done during the pre-FAT stage, there should be identification if any testing is done at this stage and distinguish the differences if there is any credit done for integration testing in the FAT stage.

AREVA stated that Section 6 discusses the first part of how the database is downloaded for combination testing. Section 7 identifies the download into the

files and the sequencing relative to FAT or customer installation. Additional explanation can be provided if necessary. Staff to evaluate.

4. Regarding loading execution scripts, AREVA identified that the scripts are set up to pause for each executable step. Staff recommended that text should be added to address the scripts and its expected controls. AREVA agreed to add some description.

Concern 18 Software Installation Plan (SInSP)

1. The SInSP states the Software Design Group implements the Software Generation and Download Procedure. Is software installed only using this procedure, under all circumstances? AREVA confirmed this to be true.
2. Checks should be required to ensure that the computer system is functional, that the sensors and actuators are functional, that all cards are present and installed in the correct slots.

AREVA will expand that the procedure records that the software is loaded and compiled. Site operations are outside of the scope of the SPM in this area. SPM can be amplified to identify this limitation of the scope. Because of the close correspondence to BTP 7-14 sectional identification, clarification can be done in the installation, operation and maintenance sections regarding the scope limitations.

3. Installation tools should be qualified with a rigor and level of detail appropriate to the safety significance of the software being installed. AREVA will add a treatment of software loads for service equipment to the description. A redacted security sensitive appendix was requested for the cyber security report to aid in addressing control aspects relative to the service unit, laptop configuration and other aspects of the report.

Concern 19 Software Maintenance and Operations Plans

1. This plan should describe the boundaries between the software maintenance organization and other company organizations.

Section 3.1.4 and Figure 3-3 identify the relationship of the SPM to BTP 7-14 which identifies also that Operation and Maintenance (O&M) and training remains out of scope for the SPM. The sections in the SPM delineate the relationship of AREVA in this area to those BTP 7-14 requirements. These inclusions are supportive plans, not the plans intended to be addressed in fulfilling BTP 7-14 criteria within the SPM. These aspects must, however, be addressed by the applicant in the appropriate project, on the appropriate docket.

2. The staff does not understand the intent to combine the Maintenance and Operations Plans. That is an option that can be done at AREVA's request; however, the guidelines from BTP 7-14 and IEEE STD 1074 on Operations plans should also be included. Section B.3.1.8 should be reviewed to include the listed Management, Implementation and Resource Characteristics of the Software Operations Plans. These include, but are not limited to:

- a. Specifying operator interface stations and actions required to support operation
- b. Describing the procedures necessary to start, operate and stop the software system
- c. Including a list of error messages, giving a description of the error indication
- d. Probable interpretation of error indications, and steps to be taken to resolve situations

BTP 7-14 needs to be addressed by the Design Certification directly through Chapter 7, ITAAC and/or COLA action items in these areas in the appropriate project, on the appropriate docket.

The discussion above ended the first day of discussion, with a call for public comment and adjournment at 4:30 P.M.

On October 15, 2009, Maria Guardiola of the NRC brought the meeting to order at 8:30 A.M. to continue the discussions begun the day before regarding the concerns delineated in the "SPM Concerns and Additional Comments" handout document. This document also included the NRR notes regarding the "Issues informed by completion of the Oconee License Amendment Request Review," agenda item.

Concern 20 Software Verification and Validation Plan (SVVP)

1. If the SIL Level scheme is not defined in the SVVP, how can a reviewer ensure that the safety software will meet the minimum requirements of SIL 4 equivalent? SIL levels have been identified in a satisfactory manner in Revision 1.
2. Specific V&V activities are not defined. How will V&V activities integrate with the Phases of SW life cycle? Appendix A discusses activities at the global level, Table 4.1 identifies the V&V activities relative to the project phases laid out in IEEE STD 1074.
3. V&V Activity Summary Reports are not defined or described in the SVVP. The V&V Summary Reports as identified from Operating Instructions (OIs) in the Oconee review are now reflected in the SPM. The new revision of the SPM, however, does not identify what should be contained in the summary reports. Section 11.13 captured some basics, but will be expanded by AREVA to a level of detail which can support the Safety Evaluation (SE) as it addresses the implementing activities for a project.

Concern 21

1. Will all TXS applications use the same software lifecycle (SLC) model? AREVA identified that this is true. All TXS applications do use the same lifecycle model.
2. IEEE STD 1074 requires that the SLC model processes. Input and Output activities are to be defined.

AREVA identified the sections that identify the lifecycle. The I/O should be described in them. Staff is looking for coherence in the identification of handoffs throughout the lifecycle. AREVA will insert a series of tables to reflect the additional level of detail in Section 4.3.

Concern 22

To what degree has conformance to the referenced standards been accomplished in the SPM? The degree to which the SPM conforms to the referenced standard needs to be clarified.

AREVA believes all conformance issues have been addressed in the document. Exceptions have been identified and addressed and Appendix A and the BTP 7-14 alignment documents provide a degree of traceability. A specific traceability matrix is not being undertaken at this time. AREVA will continue to assess the mechanisms for generating such a matrix within the RTM and will consider developing procedure source records as a forward fit item.

In cases where the standard is listed but has not been endorsed (see Table 3.1), AREVA includes a statement that they “meet the intent” to address these lower levels of commitment.

Concern 23

What method is envisioned for the staff to confirm industry standards requirements that can only be verified by review of the implementation documents which are not referenced in the SPM? Staff assumes that OI documents would not be docketed, so would the staff need to do on-site audits to evaluate these implementing requirements?

As those actions are outside of the SPM specific scope, the determination would need to be made as part of the licensing submittal for the specific project. A request for information would be made to identify all documents which implement the requirements of the SPM. Upon audit, any specific documents which are found to be necessary for citation in order to make a safety determination would be required to be docketed to support that action on the subject project.

Concern 24

What methods would be used to ensure consistency is established and maintained between the SPM and the various OI's that constitute the implementing instructions for the SPM? There should be some sort of audit provision for this included in the SPM. AREVA's change management is discussed in the SPM as well as QA audit requirements (Section 5.5.4) that address this issue. The tracing mechanism is through the auditing of the adherence of related OIs to the SPM requirements. The specific concern here is addressed but NRR's ability of accept an audit approach to lower tier implementation verification remains to be confirmed.

Concern 25

Safety Evaluations are dependent on both the vendor planning documents and the licensee's planning and implementation documents. The use of the SMP would standardize the vendor side of things, but each applicant would still need to provide a set of application specific documents to cover the licensee side. The same applies for other aspects of the SW such as V&V, SQA, SSP and SCMP.

AREVA confirmed that SCMP becomes the licensee's responsibility at implementation installation. AREVA points to Section 3.1.6. to identify the hand off to the licensee. The staff understands and AREVA agrees that the SPM is an AREVA document for their programs and processes only.

Concern 26

In Chapter 5.14.1, AREVA NP stated that risk management process satisfies the requirements in IEEE STD 7-4.3.2-2003 clause 5.3.6, as endorsed by RG 1.152. AREVA is requested to use consistent wording for meeting a requirement throughout the SPM. In other parts of the SPM, "conforms" was used. AREVA will standardize to language to use "conform" throughout the document.

Concern 27

What is a pre-FAT stage, and how is it different from FAT?

When certain prerequisites are met, a transition to the next stage is achieved. It occurs on the FAT floor, but is not really part of the FAT. AREVA referenced Section 13.4.1. AREVA will remove the "PRE-FAT" term to align with Section 13.4.1, FAT prerequisite verbiage.

After some off-topic discussion, AREVA also identified they would add into the introduction section, a paragraph on how they see this document being used going forward, with regard to the licensing and project development processes.

The meeting adjourned at 12:15 P.M. on October 15, 2009.

Members of the public attended via the conference call only. No comments were received from members of the public and no Public Meeting Feedback forms were received.

Questions regarding this meeting can be directed to Mike Canova at michael.canova@nrc.gov

Sincerely,

/RA/

Michael A. Canova, Project Manager
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Dockets/Projects: 52-020

Enclosure:

List of Attendees

cc w/encls: See DC- AREVA EPR Mailing List

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The meeting adjourned at 12: 15 PM on October 15, 2009.

Members of the public attended via the conference call only. No comments were received from members of the public and no Public Meeting Feedback forms were received.

Questions regarding this meeting can be directed to Mike Canova at michael.canova@nrc.gov

Sincerely,

/RA/

Michael A. Canova, Project Manager
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Office of New Reactors

Dockets/Projects: 52-020

Enclosure:

List of Attendees

cc w/encls: See DC- AREVA EPR Mailing List

ADAMS ACCESSION Number: ML092960407

NRO-002

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(Revised 10/01/2009)

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