August 28, 2008

MEMORANDUM TO: Patricia A. Silva, Chief
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Special Projects and Technical
Support Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

FROM: David L. Rahn, Sr. I&C Engineer **/RA/**
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SUBJECT: SUMMARY OF THE JULY 29, 2008, CATEGORY 2 PUBLIC MEETING AND TELECONFERENCE WITH THE NUCLEAR ENERGY INSTITUTE AND INDUSTRY TO DISCUSS TASK WORKING GROUP #7, DIGITAL INSTRUMENTATION AND CONTROL FOR FUEL CYCLE FACILITIES

On July 29, 2008, Task Working Group (TWG) #7 held a Category 2 Public Meeting and Teleconference to discuss various issues related to fuel cycle facility digital instrumentation and control (I&C) problem statements and proposed licensing methodology.

The U. S. Nuclear Regulatory Commission (NRC) staff proposed a revision to the schedule for completing all the problem statements in the project plan. This schedule indicated that draft Interim Staff Guidance documents (ISG's) for all five problem statements be completed and sent out for public comment by November 30, 2008, followed by the scheduling of a public meeting regarding these comments around December 15, 2008. Final issuance of the ISGs for use was scheduled for February 28, 2009. The NRC staff requested that all participants at the meeting review this schedule and report to the NRC as to whether any proposed license applications would be impacted by the issuance of these ISG's for use by February 28, 2009 (to date, only representatives of the Westinghouse Columbia, SC fuel manufacturing facility have responded to this request).

A discussion was held regarding the desire for NRC reviewers to be able to evaluate the capability, availability, and reliability of digital I&C in safety applications for fuel cycle facilities from the standpoint of how well license applications meet appropriate proposed I&C design acceptance criteria. Such acceptance criteria should be sufficiently broad as to be applicable to the use of a variety of design approaches (e.g., close adherence to ANSI/ISA S84.00.01/IEC 61508/61511 criteria, or alternative approaches that accomplish the same principles) but are sufficiently well-defined to ensure that the principles advocated in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 70 are not invalidated. Such criteria should be based on addressing specific design principles, such as defense-in-depth, diversity, controls partitioning,

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independence for control measures used to meet the double contingency principle, etc. Licensees would state within their applications for new facilities exactly how they intend to comply with those principles. Glen Smith of Global Nuclear Fuels offered to draft a set of digital I&C safety system design criteria for consideration by the NRC staff (and for discussion at our next meeting) pertaining to an alternative approach for evaluating independence of digital controls used as Items Relied on for Safety, when meeting the double-contingency principle.

NRC Staff again raised the issue regarding the fact that the use of digital I&C equipment in fuel cycle facilities has to date relied upon (and will likely continue to rely upon) the use of commercial grade equipment and that there has been little or no use of custom software in most fuel cycle facility implementations. When there is an opportunity to utilize custom software in an application, there is a greater opportunity to apply the software lifecycle design processes described in the Institute of Electrical and Electronics Engineers (IEEE) and NQA-1 standards. However, when commercial grade Programmable Logic Controllers are procured for use in fuel cycle applications, they are usually accompanied by a customizable software package that was developed for use with that equipment. That software usually includes a pre-designed "library" of functional logic blocks that are "tailored" for use within the user's facility to meet the user's functional requirements specifications, and which sometimes allows the use of ladder logic or limited script logic capabilities. Some of these newer digital control systems have been "certified" to meet International Electronical Commission (IEC)-61508 criteria.

Annex D of IEEE Standard 1012-2004, "IEEE Standard for Software Verification and Validation," contains a set of criteria which may be used by the implementer of third-party Commercial Off-The-Shelf software that is tailored for use in process applications. Specifically, there is a set of "substitute alternative analysis and test methods" which may be used in lieu of the IEEE Std 1012 requirement V&V tasks to generate objective conclusions about the correctness, completeness, accuracy, and usability of the vendor-supplied (reused) software. These analysis and test methods describe "black-box" testing and validation, vendor-furnished user's manual analysis, review of the original developer's quality assurance processes, evaluation of the vendor's operational history, audit performance, evaluation of software artifacts, reverse engineering analysis, prototyping, and comparison with prior system results (i.e., test cases.) (Note: The use of these criteria is further augmented in IEEE Standard 1517-1999, "IEEE Standard for Information Technology—Software Lifecycle Processes—Reuse Processes.")

The next public meeting will be a teleconference to be held Wednesday, September 3, 2008.

ACTION ITEMS:

Item	Description	Responsibility
1.	Prepare set of control system design criteria for consideration by the TWG at the next meeting.	Glen Smith, GNF
2.	Consideration of Nuclear Energy Institute (NEI)/Industry comments into the draft ISG for Problem Statement 3	NRC Staff
3.	Evaluate IEEE 1012 V&V Requirements for Procurement Control and Incoming Quality Control	All
4.	Schedule visit to AREVA Richland, WA fuel manufacturing facility	David Rahn
5.	(From previous meeting) Provide NEI position statement on the use of Digital I&C as Items Relied on for Safety in Criticality Safety applications	Felix Killar

PARTICIPANTS

NRC and external stakeholders, including members of NEI, industry representatives, consultants to the nuclear industry, and interested members of the Public:

NRC	Industry
David Rahn	Ed Prytherch, Westinghouse*
Huda Akhavannik	Steve Powers, AREVA*
Steven Arndt	Janet Schlueter, NEI
Stewart Bailey	Felix Killar, NEI*
	Charlie Vaughan, GNF*
	Glen H. Smith, GNF*
	Gordon Clefton

* Attended via teleconference

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