



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 26, 2014

LICENSEE: PSEG Nuclear, LLC

FACILITY: Hope Creek Generating Station, Unit 1

SUBJECT: SUMMARY OF AUGUST 12, 2014, PRE-LICENSING MEETING WITH PSEG
REGARDING DIGITAL UPGRADE OF POWER RANGE NEUTRON MONITOR
(TAC NO. MF1896)

On August 12, 2014, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of PSEG at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. Digital Instrumentation and Controls (DI&C) Interim Staff Guidance (ISG)-06, "Task Working Group #6: Licensing Process," Revision 1 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML110140103), provides the licensing process to be used in the review of DI&C system modifications in operating plants. As described in this guidance, a pre-licensing (Phase 0) meeting was held to discuss the submission of the license amendment request (LAR) to install a digital Power Range Neutron Monitor (PRNM) System at the Hope Creek Generating Station. PSEG discussed the issues raised at the previous pre-submittal meeting held on September 11, 2013, as well as other issues and the next steps. The meeting was noticed on the NRC public webpage on July 24, 2014 (ADAMS Accession No. ML14205A192). A list of attendees is enclosed.

SUMMARY OF MEETING HELD ON SEPTEMBER 11, 2013

Since this pre-submittal meeting was a follow-up from the previous pre-submittal meeting, the NRC staff provided an overview of the meeting held on September 11, 2013. A more detailed summary is available in a document dated February 4, 2014 (ADAMS Accession No. ML13364A242).

Scope

The scope of the proposed upgrade is to replace the current neutron monitoring system (NMS) with the digital NUMAC PRNM system. The current NMS provides trip outputs to the Reactor Protection System (RPS) when appropriate trip levels are reached. These trip signals are used in the RPS to trip the reactor. The PRNM will provide the reactor trip outputs to initiate a reactor trip above the Intermediate Range Monitoring (IRM) neutron flux level. Other lower power range instrumentation (i.e., Source Range Monitor (SRM) and IRM) are not covered by the PRNM. These low-power instruments will not be affected by the proposed PRNM modifications. The NUMAC upgrade will include implementation of Average Power Range Monitor, Rod Block Monitor, and Technical Specifications (ARTS) as well as Oscillation Power Range Monitoring (OPRM). PSEG plans to follow the licensing process described in D&IC-ISG-06.

Need for Replacement

The current system is old, and has built-in limitations based on its old design. The proposed upgrade will enhance the Average Power Range Monitor (APRM) features which include improved system operation, use of Operator Display Assemblies (ODAs) on the front panel in the control room in lieu of current meters, automated surveillance testing, built-in auto calibration, and self-test functions. Further, the licensee expects a reduction in half scrams, more accurate and reliable operation, and elimination of the use of the inoperable inhibit button.

In addition, upgrade to the NUMAC PRNM will allow full implementation of the ARTS and replacement of the existing OPRM (which utilizes the Boiling-Water Reactors Owners Group (BWROG) Option III stability) with the GE OPRM, which includes BWROG Option III and Detect and Suppress Solution – Confirmation Density (DSS-CD) stability function.

Cross-Channel Communication

The proposed design includes cross-channel communication. This communication will follow the guidance contained in DI&C-ISG-04, "Highly-Integrated Control Rooms-Communications Issues (HICRC)," Revision 1, Interim Staff Guidance (ADAMS Accession No. ML083310185), similar to the communication methods used in other PRNM upgrades including Grand Gulf Nuclear Station (GGNS) and Columbia Generating Station (CGS).

Safety Related to Non-Safety Related Communications

The proposed design includes a communications link to the ODAs and to the existing Process Plant Computer (PPC). The ODAs are non-safety related and the communication with the ODAs is one-way from the PRNM to the ODAs. The licensee was informed by the NRC staff that enforcement of this one-way communication should be hardware based. The interface with the PPC was not well defined and the licensee was informed to include details of this interface consistent with the guidance of DI&C-ISG-06 and DI&C-ISG-04.

The licensee explained that communication with the Rod Block Monitor (RBM) channel will be through a safety to non-safety related interface. The RBM is considered to be a non-safety, but important to safety system. Therefore, the staff will need to confirm the establishment of independence and isolation between the safety system and the RBM across this two-way communications interface. During the meeting the licensee explained that interface with the RBM will follow the guidance of DI&C-ISG-04, similar to GGNS and CGS. The licensee should provide further information on communication and isolation of communication in the next Phase 0 meeting. This interface will be looked at more closely during the NRC staff's review and evaluation.

Software Development

The original software for the PRNM system was developed by GE based on the regulatory guidance available at the time the PRNM system design was completed and approved by the NRC staff. The licensee stated that the software submittal documentation has been updated such that no special critical design review will be needed for software validation and verification (V&V) as was done for GGNS and CGS. Specifically, PSEG explained that GE has developed and implemented a DI&C system life cycle program to address the NRC staff concerns raised in

previous license amendment request reviews (e.g., CGS). Therefore, PSEG will submit the software plans developed for the Hope Creek NUMAC system.

Diversity

Diversity analysis will be provided per the guidance of DI&C-ISG-06. This analysis uses other plant parameters in case of a partial loss or a complete loss of PRNM software. A similar approach has been used for GGNS and CGS.

Equipment Qualification

The NRC staff requested that the licensee submit the associated equipment qualification per Regulatory Guide 1.180, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems," dated October 2003, (ADAMS Accession No. ML032740277). The licensee was also requested to provide an Equipment Qualification Summary document which explains how the qualification requirements have been met without going in to the details of actual testing.

Technical Specification Task Force (TSTF) Traveler 493, "Clarify Application of Setpoint Methodology for Limiting Safety System Setting (LSSS) Functions"

Consistent with industry practice, PSEG will implement TSTF-493, Option A for the PRNM affected LSSS functions.

SUMMARY OF MEETING HELD ON AUGUST 12, 2014

PSEG submitted the presentation to the NRC. The presentation material can be viewed in ADAMS under Accession No. ML14224A136.

PSEG discussed the following topics: (1) schedule; (2) communication; (3) PPC/cyber security; (4) setpoint calculations; (5) power supply/flow transmitters; and (6) other issues/next steps.

Schedule

PSEG plans to provide the NRC the Phase 1 LAR by the end of third quarter 2015, and the Phase 2 supplement by the end of third quarter 2016. PSEG will request the NRC to complete the amendment by the end of the fourth quarter 2017, to support installation in the spring 2018. PSEG plans to cite the CGS PRNM amendment dated January 31, 2014 (ADAMS Accession No. ML13317B623), as a precedent.

Communication

PSEG plans to include DI&C-ISG-06 in the Phase 1 LAR that will address communications independence. PSEG will not take credit for communications independence between the NUMAC interface computer (NIC) and the Plant Computer or between NIC and RBM.

PPC/Cyber Security

Hope Creek has established an NRC-approved cyber security defensive strategy that is compliant with NEI 08-09, "Cyber Security Plan for Nuclear Power Reactors," approved by NRC license amendments 189 and 192, and plant procedure IT-AA-214. Plant procedure IT-AA-214 establishes 4 security levels: (1) corporate wide area network; (2) site local area network; (3) data acquisition network (plant computer system network and associated components for collecting plant data); and (4) control and safety system network (plant control systems). Cyber security boundary devices are defined according to NEI 08-09.

Setpoint Calculations

PSEG will request a meeting with the NRC after setpoint calculations are complete. PSEG expects this to be approximately 3 months after the Phase 1 LAR is submitted.

Power Supply/Flow Transmitters

Quad low voltage power supplies provide auctioneered power from both A and B PRNM buses to each PRNM channel. Voters are powered directly from a single PRNM bus. PRNM buses are powered from two non-1E inverters. RPS buses are powered from 1E motor-generator sets.

The APRMs perform the flow signal filtering and the calibration corrections, and the RBMs perform the flow comparisons between APRM channels. An alarm is issued if the largest channel-to-channel delta exceeds the flow mismatch setpoint.

Other Issues/Next Steps

PSEG questioned whether DI&C-ISG-06 will be revised in the near future. The NRC staff stated that lessons learned from DI&C-ISG-06 will be incorporated into the Standard Review Plan (SRP). The NRC did not know when the updated SRP would be issued.

PSEG asked about the status of the proposed rulemaking for Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a that will reference Institute of Electrical and Electronic Engineers (IEEE)-603 (2009), "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations." The NRC draft proposed 10 CFR 50.55a(h) rule language is contained in ADAMS Accession No. ML14136A089, and PSEG and members of the public are welcome to participate and comment on the proposed rule. During the 616th meeting of the Advisory Committee on Reactor Safeguards (ACRS), on July 9-11, 2014, the ACRS completed its review of the proposed revision for 10 CFR 50.55a to incorporate by reference IEEE-603 (2009), and associated draft Revision 2 to Regulatory Guide (RG) 1.153, "Criteria for the Power, Instrumentation, and Control Systems for Nuclear Power Plants." The ACRS DI&C Systems Subcommittee also reviewed this proposed rulemaking during a meeting on May 20, 2014. During these meetings, ACRS had the benefit of discussions with representatives of the NRC staff. By letter dated August 5, 2014 (ADAMS Accession No. ML14196A137), the ACRS made recommendations to the NRC Executive Director for Operations pertaining to the proposed 10 CFR 50.55a rulemaking. PSEG stated that if the proposed rulemaking gets issued prior to their LAR submittal that they would request another pre-submittal meeting.

PSEG asked about the potential applicability of proposed revisions to RG 1.105, which was followed by a discussion of footnotes added to the technical specification (TS) pages per TSTF-493 Option A. The NRC staff informed the licensee that Revision 4 to RG 1.105 is still in the public comment period, and will not likely be issued as final prior to their planned submittal. The NRC staff also informed the licensee that proposed appropriate marked pages of the plant TS, including the footnotes and revisions to the PRNM function descriptions, should be included within the LAR.

PSEG stated that its LAR will follow the ISG-06 Enclosure E format.

The meeting adjourned at 11:10 am.

There were no members of the public in attendance via teleconference. Public Meeting Feedback forms were not received. Please direct any inquiries to me at 301-415-3100, or John.Lamb@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "John G. Lamb". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosure:
List of Attendees

cc w/encl: Distribution via Listserv

LIST OF ATTENDEES

AUGUST 12, 2014, PUBLIC MEETING WITH PSEG, LLC

HOPE CREEK GENERATING STATION, UNIT 1

PRESUBMITTAL MEETING FOR DIGITAL UPGRADE

OF POWER RANGE NEUTRON MONITOR

Name	Organization
Richard Stattel	NRC
David Rahn	NRC
Carleen Sanders	NRC
Singh Gursharan	NRC
John G. Lamb	NRC
Jerry Humphreys*	NJ Department of Environmental Protection
Paul Duke*	PSEG
Hugo Flores*	PSEG
Robert Gallaher *	PSEG
Keith Swing*	PSEG
Robert Hoffman*	PSEG
James Stavely*	PSEG
Paul Beckman*	PSEG
Brian Thomas*	PSEG
Dave Heinig*	PSEG
Jim Collins*	PSEG
Phil Duca*	PSEG
Larry Chi*	GE-Hitachi
Kahlim Miller*	GE-Hitachi
Ralph Hayes*	GE-Hitachi
Frank Novak*	GE-Hitachi
Ross Merante*	GE-Hitachi
Sara Rudy*	GE-Hitachi

* via telephone

Enclosure

PSEG asked about the potential applicability of proposed revisions to RG 1.105, which was followed by a discussion of footnotes added to the technical specification (TS) pages per TSTF-493 Option A. The NRC staff informed the licensee that Revision 4 to RG 1.105 is still in the public comment period, and will not likely be issued as final prior to their planned submittal. The NRC staff also informed the licensee that proposed appropriate marked pages of the plant TS, including the footnotes and revisions to the PRNM function descriptions, should be included within the LAR.

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/RA/

John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosure:
List of Attendees

cc w/encl: Distribution via Listserv

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RStattel, NRR
RAIvarado, NRR
TWertz, NRR

ADAMS Accession No: ML14224A133

*via e-mail

OFFICE	LPL1-2/PM	LPL1-2/LA	LPL1-2/PM	LPL1-2/BC(A)	LPL1-2/PM
NAME	JLamb	ABaxter	CSanders	RSchaaf	JLamb
DATE	8/20/2014	8/20/2014	8/21/2014	8/25/2014	8/26/2014

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