



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

February 4, 2014

LICENSEE: PSEG Nuclear, LLC  
FACILITY: Hope Creek Generating Station, Unit 1  
SUBJECT: SUMMARY OF SEPTEMBER 11, 2013, PRE-LICENSING MEETING WITH PSEG REGARDING DIGITAL UPGRADE OF POWER RANGE NEUTRON MONITOR (TAC NO. MF1896)

On September 11, 2013, 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 submittal of the license amendment to install a digital Power Range Neutron Monitor (PRNM) System at the Hope Creek Generating Station. PSEG discussed the need and the plan to replace the current Neutron Monitoring System (NMS) with the General Electric-Hitachi (GEH) Nuclear Measurement Analysis and Control (NUMAC) digital PRNM system at the Hope Creek Generating Station. A list of attendees is enclosed.

The licensee submitted proprietary and non-proprietary versions of the presentation to the NRC. The non-proprietary version can be viewed in ADAMS under Accession No. ML13240A293. A summary of the items discussed at the meeting is provided below:

Scope

The scope of the proposed upgrade is to replace the current Power Range Monitoring (PRM) system with the digital NUMAC PRNM system. The current PRM system 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. The PRNM also incorporates the Oscillation Power Range Monitoring (OPRM) system. Other elements of the NMS are not changed by the PRNM upgrade (i.e., the Local Power Range Monitor (LPRM), Source Range Monitor (SRM) and IRM systems).

The licensee explained that the NUMAC PRNM upgrade will permit full implementation of Average Power Range Monitor, Rod Block Monitor, and Technical Specifications (ARTS) as well as Oscillation Power Range Monitoring (OPRM). The licensee plans to follow the licensing process described in D&IC-ISG-06.

### Need for Replacement

The current system is old and no longer reliable and has built-in limitations based on its old design. The licensee explained that this upgrade will enhance the Average Power Range Monitor (APRM) features which include improved system operation, use of Operator Display Assemblies 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 INOP [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 Boiler 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 D&IC-ISG-04, "Highly-Integrated Control Rooms—Communications Issues (HICRc)," Revision 1 (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 Operator Display Assemblies (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 D&IC-ISG-06 and D&IC-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 non-safety but important to a safety system. Therefore, the NRC staff will need to confirm the establishment of independence 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 D&IC-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 GEH 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, the licensee explained that GEH has

developed and implemented a digital I&C system life cycle program that addresses the staff concerns raised in previous license amendment request (LAR) reviews (e.g., CGS). Therefore, the licensee will submit the software plans developed for the Hope Creek Generating Station NUMAC system.

#### Diversity

Diversity analysis will be provided per the guidance of D&IC-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

Consistent with ISG-06, Section D.5 guidance, 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 LSSS [Limiting Safety System Setting] Functions"

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

Based on the meeting, the NRC staff offered the following comments regarding the upcoming LAR:

1. Safe Development and Operational Environment review and submittal should be conducted using the criteria in NRC Regulatory Guide 1.152, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants," dated January 2006 (ADAMS Accession No. ML053070150). Any material submitted in support of cyber security will be subject to inspection by the Office of Nuclear Security and Incident Response. The Office of Nuclear Reactor Regulation will, however, review cyber security provisions to ensure that these provisions do not adversely affect the operation of reactor safety systems.
2. The licensee should verify that software V&V fully meet the guidance of the Institute of Electrical and Electronics Engineers (IEEE) Standard 1012, "IEEE Standard for Software Verification and Validation," 2004 revision, and regulatory guidance in Regulatory Guide 1.168, "Verification, Validation, Reviews, and Audits for Digital Computer Software used in Safety Systems of Nuclear Power Plants," Revision 2, dated July 2013.
3. The NRC staff stated that full set point methodology calculations and summary sheets will need to be reviewed. The licensee stated that since GEH calculations are not docketed, they will coordinate, as appropriate, the review of set point calculation spreadsheets at NRC headquarters.

4. The NRC staff stated that it will work with the PSEG staff to help clarify and resolve any issues with D&IC-ISG-06 submittal schedules or requests to consider the possibility of audits or inspection in lieu of submitting the documents on the docket. However, the NRC staff clarified that any information needed for reaching a safety conclusion must be docketed. The NRC staff also informed the licensee that based on the submittal schedule, the lead staff reviewer will be assigned at a later time.
5. The licensee proposed a preliminary schedule for the LAR. Per the licensee-proposed schedule, the LAR will be submitted on March 31, 2015, with the approval date request of September 15, 2017. The NRC staff informed the licensee that the LAR review cycle should be no more than 2 years based on the need for conserving the agency and the licensee resources, as well as the congressional guidance for completing such reviews within 24 months. The licensee proposed that the implementation period for the amendment be tied to the 2018 installation outage; this would allow for amendment issuance within the 2-year review cycle. The licensee would manage any additional technical specification changes during the time between issuance and implementation. The NRC staff noted that implementation periods were typically in the range of 60 days, but this was not fixed. The licensee took the action to consider its schedule further to meet the staff guidance.
6. The licensee was also informed of the need to submit how the compliance requirements in the applicable Licensing Topical Report (LTR) are met and specifically discuss any deviations from the LTR. In addition, the licensee should address all hardware and software changes since the original LTR was approved by the NRC staff.

The NRC staff stated that another Phase 0 meeting (via teleconference) would be useful to discuss open items from this first meeting (e.g. system interfaces and schedule) and any additional updates on the planned upgrade. A suitable time for this meeting remains to be determined. The NRC staff indicated that meetings approximately every 6 months would be useful.

Members of the public were in attendance via teleconference. Public Meeting Feedback forms were not received. Please direct any inquiries to me at 301-415-3204, or [John.Hughey@nrc.gov](mailto:John.Hughey@nrc.gov).



John D. Hughey, 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

SEPTEMBER 11, 2013, PUBLIC MEETING WITH PSEG, LLC

HOPE CREEK GENERATING STATION, UNIT 1

PRESUBMITTAL MEETING

DIGITAL UPGRADE OF POWER RANGE NEUTRON MONITOR

<b>Name</b>	<b>Organization</b>
Richard Stattel	NRC
Sam Miranda	NRC
Rossnyev Alvarado	NRC
Singh Gursharan	NRC
Veronica Rodriguez	NRC
John Hughey	NRC
Jeff Rady	NRC
Jerry Humphreys	NJ Department of Environmental Protection
Kenneth Knaide	PSEG
Keith Swing	PSEG
Chuck Lukacsy	PSEG
Robert Gallaher	PSEG
Brian Thomas	PSEG
Robert Hoffman	PSEG
Ron Veideman	PSEG
Larry Chi	GE-Hitachi
Kahlim Miller	GE-Hitachi
Sarah Rudy	GE-Hitachi
Frank Novak	GE-Hitachi
Dave Heinig	Sargent & Lundy
Chad Modro*	Mitsubishi Electric Power Products Inc.
Rebecca Menes*	SoHaR Inc
Herb Hecht*	SoHaR Inc

\* via telephone

Enclosure

4. The NRC staff stated that it will work with the PSEG staff to help clarify and resolve any issues with D&IC-ISG-06 submittal schedules or requests to consider the possibility of audits or inspection in lieu of submitting the documents on the docket. However, the NRC staff clarified that any information needed for reaching a safety conclusion must be docketed. The NRC staff also informed the licensee that based on the submittal schedule, the lead staff reviewer will be assigned at a later time.
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*/ra/*

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\*via e-mail

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