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PSEG
Nuclear LLC

Order EA-13-109

LR-N17-0162

DEC 19 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Hope Creek Generating Station's Seventh Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

References:

1. NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (ADAMS Accession No. ML13143A321)

2. PSEG Letter LR-N14-0155, "PSEG Nuclear LLC's Phase 1 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 25, 2014 (ADAMS Accession No. ML14177A508)

3. PSEG Letter LR-N14-0258, "Hope Creek Generating Station's First Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 19, 2014 (ADAMS Accession No. ML14353A076)

4. PSEG Letter LR-N15-0129, "Hope Creek Generating Station's Second Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 18, 2015 (ADAMS Accession No. ML15173A026)

5. PSEG Letter LR-N15-0257, "Hope Creek Generating Station's Phase 1 and Phase 2 Overall Integrated Plan and Third Six-Month Status Report (Phase 1) in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 28, 2015 (ADAMS Accession No. ML15362A580)

6. PSEG Letter LR-N16-0118, "Hope Creek Generating Station's Fourth Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 29, 2016 (ADAMS Accession No. ML16181A210)

7. PSEG Letter LR-N16-0218, "Hope Creek Generating Station's Fifth Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 22, 2016 (ADAMS Accession No. ML16358A254)

8. PSEG Letter LR-N17-0075, "Hope Creek Generating Station's Sixth Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 27, 2017 (ADAMS Accession No. ML17178A300)

9. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015 (ADAMS Accession No. ML15113B318)

10. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," dated November 14, 2013 (ADAMS Accession No. ML13304B836)

11. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," dated April 2015 (ADAMS Accession No. ML15104A118)

12. NRC Letter to PSEG, "Hope Creek Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC NO. MF4458)," dated February 12, 2015 (ADAMS Accession No. ML14332A154)

13. NRC Letter to PSEG, "Hope Creek Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (CAC NO. MF4458)," dated August 2, 2016 (ADAMS Accession No. ML16103A320)

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued Order EA-13-109 (Reference 1) to all licensees that operate boiling-water reactors (BWRs) with Mark I and Mark II containment designs. The Order was effective immediately and requires the Hope Creek Generating Station (HCGS) to install a reliable hardened venting capability for pre-core damage and severe accident conditions, including those involving a breach of the reactor vessel by molten core debris. Specific requirements are outlined in Attachment 2 of NRC Order EA-13-109.

Section IV of NRC Order EA-13-109 requires transmittal of an Overall Integrated Plan (OIP) for Phase 1 by June 30, 2014, status reports at six-month intervals thereafter, and an OIP for Phase 2 by December 31, 2015. PSEG submitted the Phase 1 OIP for HCGS via Reference 2. References 3 and 4, respectively, provided the first two six-month status reports for Phase 1 implementation. Via Reference 5, PSEG transmitted Revision 1 of the OIP, which addresses Phase 2 requirements and includes the third six-month status report. PSEG transmitted subsequent six-month status reports via References 6, 7 and 8. The purpose of this letter is to provide the seventh six-month status report pursuant to Condition IV.D.3 of NRC Order EA-13-109.

Attachment 1 contains the seventh six-month status report for HCGS implementation of NRC Order EA-13-109, following the report content guidance of Nuclear Energy Institute (NEI) Report 13-02 (Reference 9) as endorsed by NRC Interim Staff Guidance documents JLD-ISG-2013-02 (Reference 10) and JLD-ISG-2015-01 (Reference 11). The attached report provides an update of the milestone accomplishments since the submittal of the previous six-month status report (Reference 8), including any changes to the compliance method, schedule, and the need and basis for relief or relaxation from specific requirements of NRC Order EA-13-109. The status of open items identified in the NRC's Interim Staff Evaluations (ISEs) for Phase 1 (Reference 12) and Phase 2 (Reference 13) is included in the attached update.

There are no regulatory commitments contained in this letter. If you have any questions or require additional information, please contact Mr. Brian J. Thomas at 856-339-2022.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 12/19/17
(Date)

Sincerely,

Eric Carr
Site Vice President
Hope Creek Generating Station

Attachment 1: HCGS Seventh Six-Month Status Report for Implementation of NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

cc: Mr. Daniel Dorman, Administrator, Region I, NRC
Mr. Justin Hawkins, NRC Senior Resident Inspector, Hope Creek
Ms. Lisa M. Regner, Senior Project Manager, NRC/NRR/DORL
Mr. Raj Auluck, NRC/NRR/JLD
Mr. Brian Lee, NRC/NRR/JLD
Mr. Patrick Mulligan, Chief, NJBNE
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator
Mr. Lee Marabella, PSEG Corporate Commitment Coordinator

DEC 19 2017

(The bcc list should not be submitted as part of the DCD submittal - remove this page prior to submittal and make the bcc distribution accordingly)

bcc: President and Chief Nuclear Officer
Vice President, Hope Creek
Plant Manager, Hope Creek
Senior Director – Regulatory Operations
Director – Regulatory Compliance
Manager – Emergency Preparedness
Station EP Manager
Manager, Licensing
Document Control

LR-N17-0162

ATTACHMENT 1

HCGS Seventh Six-Month Status Report for Implementation of NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

HCGS Seventh Six-Month Status Report for Implementation of NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions"

References in this attachment are listed in Section 8.

1 Introduction

PSEG Nuclear LLC (PSEG) developed an Overall Integrated Plan (OIP) (Reference 1) for the Hope Creek Generating Station (HCGS), to address the installation of a Hardened Containment Vent System (HCVS), in response to NRC Order EA-13-109 (Reference 2).

PSEG developed an updated and combined Phase 1 and 2 OIP (Reference 5), to address:

1. The installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Phase 1 of NRC Order EA-13-109.

2. An alternative strategy that makes it unlikely that a drywell vent is needed to protect the containment from overpressure related failure under severe accident conditions, including those that involve a breach of the reactor vessel by molten core debris, in response to Phase 2 of NRC Order EA-13-109.

This report provides an update of milestone accomplishments since the previous six-month status report (Reference 16), including any changes to the compliance method, schedule, and the need and basis for relief or relaxation from specific requirements of NRC Order EA-13-109.

2 Milestone Accomplishments

The following milestones have been completed since the previous six-month status report was transmitted to the NRC via Reference 16:

- Overall Integrated Plan and Six-Month Updates – Milestone is complete via submittal of this six-month update. PSEG plans to complete implementation of NRC Order EA-13-109 requirements in May 2018, and submit the completion report and Final Integrated Plan (FIP) within 60 days of startup from the implementation outage.
- Phase 2 Operations Procedure Changes Developed – PSEG has drafted the operations procedure changes for Severe Accident Water Addition / Severe Accident Water Management (SAWA/SAWM) and they are currently in the review and approval process.

3 Milestone Schedule Status

The following table provides an update to the OIP (Reference 5) milestones. The table provides the target completion date and activity status of each item. The dates are planning dates subject to change as design and implementation details are developed.

NRC Order EA-13-109 Milestones			
Milestone	**Target Completion Date**	**Activity Status**	**Comments (Includes Date Changes)**
Overall Integrated Plan and Six-Month Updates			
Submit OIP – Phase 1	Jun 2014	Complete	Reference 1
Update 1	Dec 2014	Complete	Reference 3
Update 2	Jun 2015	Complete	Reference 4
Update 3 and Phase 2 OIP	Dec 2015	Complete	Reference 5
Update 4	Jun 2016	Complete	Reference 6
Update 5	Dec 2016	Complete	Reference 15
Update 6	Jun 2017	Complete	Reference 16
Update 7	Dec 2017	Complete via this Report	
Phase 1 Implementation			
Hold preliminary/conceptual design meeting	Jun 2014	Complete	
Design Engineering On-site/Complete	Oct 2015	Complete	Completed to support Nov 2016 implementation
Implementation Outage	Oct 2016	Complete	Completed Nov 2016
Walk-Through Demonstration/ Functional Test	Nov 2016	Complete	
Operations Procedure Changes Developed	Jun 2016	Complete	Completed to support Nov 2016 implementation

NRC Order EA-13-109 Milestones			
Milestone	**Target Completion Date**	**Activity Status**	**Comments (Includes Date Changes)**
Phase 1 Implementation (continued)			
Site-Specific Maintenance Procedures Developed	May 2018	Started	Periodic maintenance and testing is being addressed by the Preventive Maintenance (PM) process. The milestone date reflects PM activities to support implementation per the frequencies recommended in NEI 13-02 Revision 1 (Reference 7).
Procedure Changes Active	Nov 2016	Complete	Procedure changes to support implementation were issued in Nov 2016
Training Complete	Jun 2016	Complete	Initial / Just-in-time training complete Nov 2016
Submit Completion Report – Phase 1	Dec 2016	Complete	Reference 15

NRC Order EA-13-109 Milestones			
Milestone	**Target Completion Date**	**Activity Status**	**Comments (Includes Date Changes)**
Phase 2 Implementation			
Hold preliminary/conceptual design meeting	Dec 2015	Complete	
Submit Overall Integrated Implementation Plan	Dec 2015	Complete	
Design Engineering On-site/Complete	April 2017	Complete	Design Change Package 80118721, Revision 0 (Reference 17)
Operations Procedure Changes Developed	Dec 2017	Complete	
Site-Specific Maintenance Procedures Developed	May 2018	Started	Prior to startup from refuel outage
Training Complete	May 2018	Not started	Prior to startup from refuel outage
Implementation Outage	May 2018	Not started	
Procedure Changes Active	May 2018	Not started	Prior to startup from refuel outage
Walk Through Demonstration/Functional Test	May 2018	Not started	Prior to startup from refuel outage
Submit Completion Report	July 2018	Not started	Within 60 days of startup from refuel outage

4 Changes to Compliance Method

The fourth and fifth six-month status reports (References 6 and 15) describe changes in methods of compliance with the requirements of Phase 1 of the NRC Order EA-13-109, subsequent to PSEG's submittal of OIP Revision 1 (Reference 5). There are no additional Phase 1 changes for this reporting period.

The following is an update to the Phase 2 changes that were described in the sixth six-month status report (Reference 16):

SAWA Design for Flooded Condition

The current approach to compliance using Severe Accident Water Addition and Severe Accident Water Management (SAWA/SAWM) is fundamentally the same as the approach described in OIP Revision 1 (Reference 5). However, there are key differences in implementation details based on the current design, as summarized below.

The conceptual SAWA design for a flooding scenario is described in Reference 5 as consisting of four electric motor-driven submersible pumps with a total flow rate of 500 gpm taking suction from primary condensate header, with two additional pumps taking suction from the Turbine Building floor at 54 ft. elevation when flooded. The final design in Design Change Package (DCP) 80118721 (Reference 17) uses a vendor-supplied pump skid with a total of three electric motor-driven submersible pumps, with each pump capable of providing 250 gpm for the high flow condition and 100 gpm for low flow. Two of the pumps provide a total flow rate of 500 gpm taking suction from the primary condensate header, with the third pump taking suction from the Turbine Building floor at 54 ft. elevation when flooded. These SAWA pumps discharge to the existing Condensate Storage and Transfer System, which ties into the Residual Heat Removal System for injection into the Reactor Pressure Vessel.

The SAWA design for the flooded condition includes a new flow control valve (AP-V200), a flow element, and local flow indication at 75 ft. elevation of the radwaste area in the Auxiliary Building, which is flood-protected. Pump flow can be throttled back to approximately 100 gpm by powering off one of the pumps and manually adjusting valve AP-V200. The valve is located in a pipe chase in the radwaste area (Room 3187), which is a high radiation area. A reach rod enables manual valve operation from the adjacent corridor (Room 3197), which is a mild environment as defined in Reference 18. Local flow indication is also provided in Room 3197. This design enables the operator to control and monitor SAWA flow without entering the high radiation area.

Power to the submersible pumps is provided via new 480 VAC SAWA motor control center (MCC) 10B378, which supports operation of any two of the three pumps to meet the SAWA flow requirements. MCC 10B378 is powered from MCC 10B313, which gets its power from Class 1E A-Channel Unit Substation 10B410 and is backed up with 480 VAC FLEX power. MCCs 10B378 and 10B313 are non-1E and are located in a

mild environment in the heating and ventilation area of the 153 ft. elevation of the flood-protected Auxiliary Building.

SAWA Design for Non-Flooded Condition

OIP Revision 1 (Reference 5) describes the use of portable flow instrumentation to monitor FLEX diesel pump flow to control SAWA flow via a manual valve. The final design in DCP 80118721 (Reference 17) installs a flow element (H1BC-1BCFE-0100) on new 4" line (1-BC-209) located near the stairway in the Control/Diesel area of the Auxiliary Building at 102 ft. elevation. Reference 17 also installs a mechanical flow indicator (H1BC-1BCFI-0100) in the Control/Diesel area of the Auxiliary Building at 102 ft. elevation, near the manual flow control valve BC-V643 which is used to control SAWA flowrate.

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

For Phase 1 of NRC Order EA-13-109, a vent release point height relaxation was addressed by PSEG's relaxation request submittals (References 12 and 13), and was approved by the NRC staff via Reference 14.

PSEG expects to comply with Phase 2 of the Order and no relief or relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The table below provides a status of the open items from Revision 1 of the HCGS OIP (Reference 5) and the NRC Interim Staff Evaluations (ISE) for Phase 1 and Phase 2 (References 10 and 11, respectively). PSEG reported completion of all Phase 1 items in the fifth and sixth six-month status reports (Reference 15 and 16), and discussed the closure basis of the Phase 1 items with the NRC staff during a conference call on June 15, 2017. The Phase 1 items remain complete. Changes to the table from the previous update (Reference 16) are shown by revision bars.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #1 OIP #1	Finalize time constraints and their bases. Make available for NRC staff audit the finalized time constraints for remote manual operations and their bases.	Complete. Anticipatory venting time constraints are included in the FLEX strategy timeline which assumes torus venting is initiated approximately four hours following an Extended Loss of AC Power (ELAP) event, based on torus water temperature of 200 degrees F. MAAP analyses (HC-MISC-005) have been revised to reflect the modified vent design. NRC review of the OIP (Reference 5) timeline for HCVS is documented in Section 3.3.1 of the Phase 2 ISE (Reference 11).

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #2 OIP #2	Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit.	Complete. Calculation GS-0026, "Hardened Containment Vent Capacity," shows that the HCVS 12-inch vent can accommodate the required steam/energy equivalent of one percent of licensed/rated thermal power flow. Calculation GS-0027, "Disc Rupture Fluid Transient Analysis in Hardened Containment Vent Piping," shows that the piping can accommodate the fluid dynamics of the steam/energy equivalent of one percent of licensed/rated thermal power flow. Vendor Technical Document (VTD) 432633, "Suppression Pool Energy Capacity," shows that the suppression pool has sufficient capacity to absorb the energy released into the torus for the first three hours following an ELAP event, with approximately 60% margin. MAAP analyses (HC-MISC-005) support anticipatory venting at four hours based on torus water temperature of 200 degrees F and acceptable containment response thereafter.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #3 OIP #6	Provide the seismic and tornado missile final design criteria for the HCVS stack.	Complete. Design Change Package (DCP) 80115583, "Hardened Containment Vent Modification," addresses the seismic design of the HCVS stack and includes a Technical Evaluation of tornado missile protection following NEI white paper HCVS-WP-04 as endorsed by NRC letter to NEI dated September 14, 2015 (ADAMS Accession No. ML15240A072).
ISE #4	Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions.	Complete as documented in the OIP (Reference 5).
ISE #5 OIP #4	Perform dose evaluation for venting actions (OIP #4). Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Complete. The GOTHIC model Vendor Technical Documents (VTDs) 432340 (001) (Auxiliary Building GOTHIC model) and 432611 (001) (Room 5301 and TSC areas GOTHIC model) as well as HCVS Dose Evaluation VTD 432634 (001), show that the temperatures and radiation levels are acceptable for personnel ingress/egress.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #6	Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods.	Complete. Parameters of drywell pressure, torus pressure, torus level, torus water temperature, and reactor pressure on Main Control Room (MCR) instrumentation allow monitoring effectiveness of torus venting actions. For these parameters, HCGS uses existing instrumentation and MCR displays qualified to Regulatory Guide 1.97 and provided with Class 1E electrical power (Updated Final Safety Analysis Report, Table 7.5-1). HCVS operation is monitored by vent valve position, vent flow, and effluent radiation levels. DCP 80113942, "Hardened Containment Vent Electrical," provided instrumentation and controls at the Primary Operating Station (POS) at the Remote Shutdown Panel in Room 3576 at elevation 137' in the Auxiliary Building, and at the Remote Operating Station (ROS) in the Electrical Chase Area (Room 5301) on EL 102'-0" of the Auxiliary Building. HCVS flow rate is displayed via a recorder in the POS and flow indicator in the ROS. The HCVS instruments are qualified by using one or more of the three methods described in JLD-ISG-2013-02 (Reference 8).

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #7	Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation.	Complete. Details are provided in Section 4.3 of Reference 15.
ISE #8	Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location.	Complete. DCP 80113941, "Hardened Containment Vent Mechanical," provided a permanently installed nitrogen supply at the ROS in the Electrical Chase Area (Room 5301) on elevation 102'-0" of the Auxiliary Building. The ROS is protected from all external hazards. VTD 432632, "Backup Nitrogen Supply for Hardened Vent," shows that the system possesses enough volume for 8 cycles of the HCVS valves. DCP 80113941 also installed the capability to manually breach the HCVS rupture disk from the ROS using a separate nitrogen source.
ISE #9	Make available for NRC staff audit the descriptions of local conditions (temperature, radiation, and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions.	Complete. Functionality of HCVS components during ELAP and severe accident conditions is supported by the documents referenced in response to ISE #5, combined with DCPs 80113941, 80113942 and 80115583. This includes the vendor-supplied Digital Technology Systems Quality Assurance (DTSQA) documentation for the radiation monitoring modifications in DCP 80113942.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #10	Make available for NRC staff audit an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.	Complete. The HCVS containment isolation valves (H1GS-HV-11541 and H1GS-HV-4964) are shown to have a disc design differential pressure of 65 psig per VTDs 315211 and 315212, respectively. The Primary Containment Pressure Limit is 65 psig.
ISE #11	Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings.	Complete. The release point elevation and plume rise during venting (described in References 12 and 13) will minimize migration and ingress of hydrogen into buildings. Vendor Technical Document (VTD) 432628 Volume 2, "Hydrogen Leakage from the CIVs of HCVS into the Enclosed CPCS Duct Return Line," shows that the in-leakage of hydrogen into the vent is minimal in the time between venting operations. When the HCVS valves are closed, the vent piping will be purged with Argon gas using Emergency Operating Procedure HC.OP-EO.ZZ-0318, "Containment Venting" (EOP-0318) if hydrogen is expected.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #12 OIP #5	Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration.	Complete. Measures to prevent hydrogen deflagration/detonation have been established by EOP-318 and the argon purge system installed via DCP 80113941, "Hardened Containment Vent System Mechanical." EOP-0318 has been revised in order to require an argon purge of the HCVS prior to opening the containment isolation valves in an accident scenario where hydrogen generation is expected, and to keep the HCV operating unless containment pressure approaches zero psig. Vendor Technical Document (VTD) 432631 demonstrates that the volume of argon gas used to purge the HCVS is sufficient in order to prevent hydrogen detonation/deflagration by completely filling the HCV downstream of HV-11541. The compressed gas purge system uses argon gas to fill the HCVS piping from valve HV-11541 (V-201) to the release point and prevent oxygen from entering the vent piping after a vent cycle.

Phase 1 Open Items		
Item Ref.	**Action**	**Comment**
ISE #13 OIP #3	Finalize χ/Q analysis (OIP #3). Submit a relaxation request as stated in the Order for the deviation from Order EA-13-109 provision 1.2.2, "The HCVS Section 3.2.2.3 shall discharge the effluent to a release point above the main plant structures," which includes a technical justification for the deviation.	Complete (References 12, 13, and 14).

Phase 2 Open Items		
Item Ref.	**Action**	**Comment**
ISE #1	Licensee shall provide the finalized design of HCVS discharge location.	Complete. Design Change Package (DCP) 80115583 (Reference 19) provides the final discharge location design consistent with relaxation of the release point height requirement (Reference 14).
ISE #2	Licensee shall provide the finalized design, which demonstrates the capability to inject the necessary Severe Accident Water Addition (SAWA) flow rate and the ability to control that flow under a flooded condition.	Complete. DCP 80118721 (Reference 17) provides the SAWA design to inject the required flow rate and to control flow under a flooded condition, as summarized in Section 4 above. Section 4 has been updated since the previous status report (Reference 16) to include additional details.

Phase 2 Open Items		
Item Ref.	**Action**	**Comment**
ISE #3	Licensee to confirm through analysis the temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment.	Started.
ISE #4	Licensee to demonstrate how instrumentation and equipment being used for SAWA and supporting equipment is capable to perform for the sustained operating period under the expected temperature and radiological conditions.	Started.
ISE #5	Licensee to demonstrate that containment failure as a result of overpressure can be prevented without a drywell vent during severe accident conditions.	Started.
ISE #6	Licensee shall demonstrate how the plant is bounded by the reference plant analysis that shows the SAWM strategy is successful in making it unlikely that a drywell vent is needed.	Started.
ISE #7	Licensee to demonstrate that there is adequate communication between the MCR and the operator at the FLEX manual valve during severe accident conditions.	Complete. The SAWA design includes mechanical flow indicator (H1BC-1BCFI-0100) in the Control/Diesel area of the Auxiliary Building at 102 ft. elevation, near the manual flow control valve BC-V643, which is used to control SAWA flowrate. Communication between the operator locally controlling SAWA flow and the MCR is via UHF radio or Plant Page, and is similar to communications capability available during FLEX strategy implementation.

Phase 2 Open Items		
Item Ref.	**Action**	**Comment**
OIP #7	Finalize design of SAWA flow control and indication for flooded condition.	Complete. The SAWA design for the flooded condition includes a control valve and local flow indication in the Radwaste area of the Auxiliary Building at 75 ft. elevation as described in DCP 80118721 (Reference 17) and summarized in Section 4 above.
OIP #8	Evaluate Control/Diesel Building temperature, humidity, and radiological conditions during a non-flooding event.	Started.
OIP #9	Evaluate Turbine and Auxiliary Building temperature, humidity, and radiological conditions during a flooding event.	Started.
OIP #10	Evaluate SAWA equipment and connections external to protected buildings.	Complete. SAWA uses FLEX equipment and connections and additional equipment and connections installed by DCP 80118721 (Reference 17). Equipment and connections are protected from the applicable hazards (non-flood and flood scenarios). Equipment used for the flood scenario is either protected from flooded conditions in a flood-protected building or has the ability to operate submerged in water.
OIP #11	Procedures for Phase 2 SAWA/SAWM.	Started.

7 Interim Staff Evaluation Impacts

Items identified in the Phase 1 ISE (Reference 10) and Phase 2 ISE (Reference 11) are addressed in Section 6, above. There are no other impacts to the ISE identified at this time.

8 References

1. PSEG letter LR-N14-0155, "PSEG Nuclear LLC's Phase 1 Overall Integrated Plan in Response to June 6, 2013, Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 25, 2014 (ADAMS Accession No. ML14177A508)
2. NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Effective Immediately)," dated June 6, 2013 (ADAMS Accession No. ML13143A321)
3. PSEG Letter LR-N14-0258, "Hope Creek Generating Station's First Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 19, 2014 (ADAMS Accession No. ML14353A076)
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7. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015 (ADAMS Accession No. ML15113B318)

8. NRC Interim Staff Guidance JLD-ISG-2013-02, “Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions,” dated November 14, 2013 (ADAMS Accession No. ML13304B836)
9. NRC Interim Staff Guidance JLD-ISG-2015-01, “Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions,” Revision 0, dated April 2015 (ADAMS Accession No. ML15104A118)
10. NRC Letter to PSEG, “Hope Creek Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC NO. MF4458),” dated February 12, 2015 (ADAMS Accession No. ML14332A154)
11. NRC Letter to PSEG, “Hope Creek Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 2 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (CAC NO. MF4458),” dated August 2, 2016 (ADAMS Accession No. ML16103A320)
12. PSEG Letter LR-N16-0041, "Hope Creek Generating Station’s Request for Relaxation from the Hardened Containment Vent Release Point Height Requirement of NRC Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated June 21, 2016 (ADAMS Accession No. ML16174A086)
13. PSEG Letter LR-N16-0148, "Supplemental Information Regarding Hope Creek Generating Station’s Request for Relaxation from the Hardened Containment Vent Release Point Height Requirement of NRC Order EA-13-109," dated September 7, 2016 (ADAMS Accession No. ML16251A309)
14. NRC Letter to PSEG, “Hope Creek Generating Station – Request for Relaxation of the Release Point Height Requirement of NRC Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions (CAC No. MF4458),” dated September 30, 2016 (ADAMS Accession No. ML16256A655)
15. PSEG Letter LR-N16-0218, ”Hope Creek Generating Station's Fifth Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109),” dated December 22, 2016 (ADAMS Accession No. ML16358A254)
16. PSEG Letter LR-N17-0075, ”Hope Creek Generating Station's Sixth Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109),” dated June 27, 2017 (ADAMS Accession No. ML17178A300)

17. Design Change Package (DCP) 80118721, "HC Severe Accident Water Addition," Revision 0
    a. DCP 80118721 Supplement 1, "Hope Creek Generating Station Severe Accident Water Addition (SAWA) Master Diagram – Block Diagram," Revision 0
    b. DCP 80118721 Supplement 2, "Hope Creek Hardened Containment Vent – Phase 2 (SAWA) Master Diagram," Revision 0
18. PSEG Calculation D7.5, "Hope Creek Generating Station Environmental Design Criteria," Revision 24
19. DCP 80115583, "Hope Creek Hardened Torus Vent Modification," Revision 2