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Order EA-13-109

LR-N16-0118

JUN 29 2016

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 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)

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
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
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
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

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
6. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015
7. 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
8. 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
9. 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

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. The purpose of this letter is to provide the fourth six-month status report pursuant to Condition IV.D.3 of NRC Order EA-13-109.

Attachment 1 contains the fourth 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 6) as endorsed by NRC Interim Staff Guidance documents JLD-ISG-2013-02 (Reference 7) and JLD-ISG-2015-01 (Reference 8). The attached report provides an update of the milestone accomplishments since the submittal of the previous six-month status report (Reference 5), 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 Evaluation for Phase 1 (Reference 9) 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 do not hesitate to contact Mr. Brian J. Thomas at 856-339-2022.

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

Executed on June 29, 2016
(Date)

Sincerely,



Paul J. Davison
Site Vice President
Hope Creek Generating Station

Attachment 1: HCGS Fourth 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. Carleen J. Parker, Project Manager, NRC/NRR/DORL
Dr. Rajendra Auluck, Project Manager, NRC/NRR/JLD
Mr. Patrick Mulligan, Chief, NJBNE
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator
Mr. Lee Marabella, PSEG Corporate Commitment Coordinator

**HCGS Fourth 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 Fourth 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 under 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 submittal of the combined Phase 1 and 2 OIP, 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

No milestones have been completed since the third six-month status report was transmitted to the NRC via Reference 5.

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 via this Report | |
| Update 5 | Dec 2016 | Not Started | Includes Phase 1 Completion |
| Update 6 | Jun 2017 | Not Started | |
| Update 7 | Dec 2017 | Not Started | |
| Phase 1 Implementation | | | |
| Hold preliminary/conceptual design meeting | Jun 2014 | Complete | |
| Design Engineering On-site/Complete | Oct 2015 | Started | Design Change Packages (DCPs) Issued and Being Revised - Target is September 2016 |
| Implementation Outage | Oct 2016 | Not started | |
| Walk-Through Demonstration / Functional Test | Nov 2016 | Not started | |
| Operations Procedure Changes Developed | Jun 2016 | Started | Coordinated with DCPs – Revised Target is September 2016 |
| Site-Specific Maintenance Procedures Developed | Jun 2016 | Not started | Coordinated with DCPs – Revised Target is October 2016 |
| Procedure Changes Active | Nov 2016 | Not started | |

| Milestone | Target Completion Date | Activity Status | Comments (Includes Date Changes) |
|--|-------------------------------|------------------------|--|
| Phase 1 Implementation (continued) | | | |
| Training Complete | Jun 2016 | Started | Coordinated with DCPs – Revised Target is October 2016 |
| Submit Completion Report – Phase 1 | Dec 2016 | Not started | Include with Fifth Six-Month Update |
| 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 | Started | |
| Operations Procedure Changes Developed | Dec 2017 | Not started | |
| Site-Specific Maintenance Procedures Developed | Dec 2017 | Not started | |
| Training Complete | Feb 2018 | Not started | |
| Implementation Outage | April 2018 | Not started | |
| Procedure Changes Active | April 2018 | Not started | |
| Walk Through Demonstration/Functional Test | April 2018 | Not started | |
| Submit Completion Report | June 2018 | Not started | |

4 Changes to Compliance Method

PSEG identified planned alternatives to NEI 13-02 (Reference 6) and NRC Interim Staff Guidance documents JLD-ISG-2013-02 (Reference 7) and JLD-ISG-2015-01 (Reference 8) in Revision 1 to the OIP (Reference 5). These alternatives pertain to 1) monitoring the status of vent operation and 2) the height of the torus vent release point, and are associated with open items in the NRC Interim Staff Evaluation (ISE) (Reference 9) for compliance with Phase 1 of NRC Order EA-13-109. Sections 4.1 and 4.2 provide the current status of these items.

4.1 Monitoring the Status of Vent Operation

The following information was provided in OIP Revision 1 (Reference 5), and is repeated here for convenience:

Hope Creek is taking an alternative approach to vent monitoring. JLD-ISG-2013-02 requires temperature and pressure monitoring of the vent piping as an indication of flow. Hope Creek currently has a dual-element flow monitor (high/low range) as part of the existing Hardened Torus Vent (HTV) radiation monitoring system. The vent flow signal will be displayed at the POS in lieu of vent pipe temperature and pressure. The vent operation will be monitored by HCVS valve position, vent flow, and effluent radiation levels. Containment parameters of pressure, torus level and temperature from the Main Control Room (MCR) instrumentation will be used to monitor effectiveness of the venting actions [ISE #6].

4.2 Vent Release Point Height

In Reference 10, PSEG requested relaxation from NRC Order EA-13-109 Attachment 2, Requirement 1.2.2, which states:

“The HCVS shall discharge the effluent to a release point above main plant structures.”

The relaxation request is tracked as NRC ISE Open Item #13 (Reference 9).

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

The vent release point height relaxation request described in Section 4.2 is an exception to NRC Order EA-13-109 Attachment 2, Requirement 1.2.2. The need and basis for the relaxation are provided in Reference 10.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

| 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. | Started. Anticipatory venting time constraints are included in the FLEX strategy timeline which assumes torus venting is initiated approximately four hours following an ELAP event, based on torus water temperature of 200 degrees F. HCGS is following EPG/SAG R3. MAAP analysis is in progress to support venting prior to vessel breach to prevent PCPL exceedance. |
| 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. |
| ISE #3 OIP #6 | Provide the seismic and tornado missile final design criteria for the HCVS stack. | Started. The HCVS design change is addressing seismic and missile design criteria. |

| Phase 1 Open Items | | |
|---------------------------|---|--|
| Item Ref. | Action | Comment |
| 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 (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. | Started. Evaluations are being finalized. |
| 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. | Started. The HCVS design change includes qualification of instrumentation and controls. This includes indication of HCVS valve position, vent flow, and effluent radiation levels as an alternative to vent piping temperature and pressure monitoring. Containment parameters of pressure, torus level and temperature from the Main Control Room (MCR) instrumentation will be used to monitor effectiveness of the venting actions. |
| ISE #7 | Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation. | Started. Evaluations are being finalized. |
| ISE #8 | Make available for NRC staff audit documentation of the HCVS nitrogen pneumatic system design including sizing and location. | Complete. |

| Phase 1 Open Items | | |
|---------------------------|---|--|
| Item Ref. | Action | Comment |
| 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. | Started. Completion requires documentation for upgraded radiation monitor. |
| 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. |
| 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. | Started. Evaluations are being finalized. |
| ISE #12 OIP #5 | Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration. | Started. Evaluations are being finalized. |
| 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 (Reference 10). |

| Phase 2 Open Items | | |
|---------------------------|---|----------------|
| Item Ref. | Action | Comment |
| OIP #7 | Finalize design of SAWA flow control and indication for flooded condition | |
| OIP #8 | Evaluate Control/Diesel Building temperature, humidity, and radiological conditions during a non-flooding event. | |
| OIP #9 | Evaluate Turbine and Auxiliary Building temperature, humidity, and radiological conditions during a flooding event. | |
| OIP #10 | Evaluate SAWA equipment and connections external to protected buildings. | |
| OIP #11 | Procedures for Phase 2 SAWA/SAWM | |

7 Interim Staff Evaluation Impacts

Items identified in the Phase 1 ISE (Reference 9) are addressed in the Phase 1 Open Items table 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
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
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
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
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
6. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015
7. 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
8. 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

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Attachment 1

9. 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
10. 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