



RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) REQUEST

FOIA

2016-0558

RESPONSE NUMBER

1

RESPONSE TYPE

INTERIM

FINAL

REQUESTER:

Paul Gunter

DATE:

07/07/2017

DESCRIPTION OF REQUESTED RECORDS:

Communications and analysis of the Exelon's Oyster Creek "Request for Extension to Comply with NRC Order EA-2013-109 Modifying Licenses with Regard to Reliable Hardened Containment Vent Capable of Operation Under Severe Accident Conditions" and the NRC decision regarding EA-2013-109.

PART I. -- INFORMATION RELEASED

You have the right to seek assistance from the NRC's FOIA Public Liaison. Contact information for the NRC's FOIA Public Liaison is available at <https://www.nrc.gov/reading-rm/foia/contact-foia.html>

- Agency records subject to the request are already available on the Public NRC Website, in Public ADAMS or on microfiche in the NRC Public Document Room.
- Agency records subject to the request are enclosed.
- Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.
- We are continuing to process your request.
- See Comments.

PART I.A -- FEES

NO FEES

AMOUNT*

\$0.00

*See Comments for details

- You will be billed by NRC for the amount listed.
- You will receive a refund for the amount listed.
- Fees waived.

- Minimum fee threshold not met.
- Due to our delayed response, you will not be charged fees.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

- We did not locate any agency records responsive to your request. *Note:* Agencies may treat three discrete categories of law enforcement and national security records as not subject to the FOIA ("exclusions"). 5 U.S.C. 552(c). This is a standard notification given to all requesters; it should not be taken to mean that any excluded records do, or do not, exist.
 - We have withheld certain information pursuant to the FOIA exemptions described, and for the reasons stated, in Part II.
 - Because this is an interim response to your request, you may not appeal at this time. We will notify you of your right to appeal any of the responses we have issued in response to your request when we issue our final determination.
- You may appeal this final determination within 90 calendar days of the date of this response by sending a letter or e-mail to the FOIA Officer, at U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or FOIA.Resource@nrc.gov. Please be sure to include on your letter or email that it is a "FOIA Appeal." You have the right to seek dispute resolution services from the NRC's Public Liaison, or the Office of Government Information Services (OGIS). Contact information for OGIS is available at <https://ogis.archives.gov/about-ogis/contact-information.htm>

PART I.C COMMENTS (Use attached Comments continuation page if required)

This first interim release contains responsive documents from NRC Region 1, and additional NRC documents released in their entirety.

Signature - Freedom of Information Act Officer or Designee

Karen Damore



RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) REQUEST

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PART II.A -- APPLICABLE EXEMPTIONS

Records subject to the request are being withheld in their entirety or in part under the FOIA exemption(s) as indicated below (5 U.S.C. 552(b)).

- Exemption 1: The withheld information is properly classified pursuant to an Executive Order protecting national security information.
- Exemption 2: The withheld information relates solely to the internal personnel rules and practices of NRC.
- Exemption 3: The withheld information is specifically exempted from public disclosure by the statute indicated.
 - Sections 141-145 of the Atomic Energy Act, which prohibits the disclosure of Restricted Data or Formerly Restricted Data (42 U.S.C. 2161-2165).
 - Section 147 of the Atomic Energy Act, which prohibits the disclosure of Unclassified Safeguards Information (42 U.S.C. 2167).
 - 41 U.S.C. 4702(b), which prohibits the disclosure of contractor proposals, except when incorporated into the contract between the agency and the submitter of the proposal.
- Exemption 4: The withheld information is a trade secret or confidential commercial or financial information that is being withheld for the reason(s) indicated.
 - The information is considered to be proprietary because it concerns a licensee's or applicant's physical protection or material control and accounting program for special nuclear material pursuant to 10 CFR 2.390(d)(1).
 - The information is considered to be another type of confidential business (proprietary) information.
 - The information was submitted by a foreign source and received in confidence pursuant to 10 CFR 2.390(d)(2).
- Exemption 5: The withheld information consists of interagency or intraagency records that are normally privileged in civil litigation.
 - Deliberative process privilege.
 - Attorney work product privilege.
 - Attorney-client privilege.
- Exemption 6: The withheld information from a personnel, medical, or similar file, is exempted from public disclosure because its disclosure would result in a clearly unwarranted invasion of personal privacy.
- Exemption 7: The withheld information consists of records compiled for law enforcement purposes and is being withheld for the reason(s) indicated.
 - (A) Disclosure could reasonably be expected to interfere with an open enforcement proceeding.
 - (C) Disclosure could reasonably be expected to constitute an unwarranted invasion of personal privacy.
 - (D) The information consists of names and other information the disclosure of which could reasonably be expected to reveal identities of confidential sources.
 - (E) Disclosure would reveal techniques and procedures for law enforcement investigations or prosecutions, or guidelines that could reasonably be expected to risk circumvention of the law.
 - (F) Disclosure could reasonably be expected to endanger the life or physical safety of an individual.
- Other

PART II.B -- DENYING OFFICIALS

In accordance with 10 CFR 9.25(g) and 9.25(h) of the U.S. Nuclear Regulatory Commission regulations, the official(s) listed below have made the determination to withhold certain information responsive to your request.

DENYING OFFICIAL	TITLE/OFFICE	RECORDS DENIED	APPELLATE OFFICIAL	
			EDO	SECY
Stephanie Blaney	FOIA Officer/OCIO	Oyster Creek reports	<input checked="" type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>

Appeals must be made in writing within 90 calendar days of the date of this response by sending a letter or email to the FOIA Officer, at U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or FOIA.Resource@nrc.gov. Please be sure to include on your letter or email that it is a "FOIA Appeal."

Hughey, John

From: McNamara, Nancy
Sent: Monday, October 26, 2015 12:41 PM
To: Hughey, John
Subject: Automatic reply: Pre-decisional Information: Oyster Creek Hardened Vent Order Phase I Relaxation

I will be on travel and returning on Tuesday, November 2, 2015. If you need RSLC assistance, please call my cell at XXX-XXX-XXXX. I will also be checking email. Thank you.



Exelon Generation

RS-14-318
RA-14-092

This document is publicly
available in ADAMS at
ML14329A263.

November 25, 2014

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

Oyster Creek Nuclear Generating Station
Renewed Facility Operating License No. DPR-16
NRC Docket No. 50-219

Subject: Supplemental Response to Request for Additional Information Regarding Request for Extension to Comply with NRC Order EA-13-109: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (TAC No. MF4352)

References:

1. NRC Order EA-13-109, Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, dated June 6, 2013
2. Exelon Generation Company, LLC Letter to USNRC, Request for Extension to Comply with NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 2, 2014 (RS-14-081)
3. NRC letter to Exelon Generation Company, LLC, Request for Additional Information Regarding Request for Extension to Comply with NRC Order EA-13-109: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, dated August 27, 2014
4. Exelon Generation Company, LLC Letter to USNRC, Response to Request for Additional Information Regarding Request for Extension to Comply with NRC Order EA-13-109: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions, dated September 26, 2014

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued Order EA-13-109 (Reference 1) to all licensees that operate boiling-water reactors with Mark I and Mark II containment designs. The Order was effective immediately and is applicable to Oyster Creek Nuclear Generating Station (Oyster Creek). In Reference 2, Exelon Generation Company, LLC (EGC) requested an extension of the final compliance dates of Order EA-13-109 requirements in Section IV of NRC Order EA-13-109 concerning implementation of the Phase 1 (wetwell vent) and Phase 2 (drywell vent) at Oyster Creek until January 31, 2020. Also in Reference 2, EGC

stated that it will submit a request for relief from NRC Order EA-13-109 no later than January 31, 2020 based upon the permanent shutdown condition of the plant at that time. In Reference 3, the NRC issued a request for additional information (RAI) in order for the NRC staff to complete its technical review of the EGC extension request. Reference 4 provided the EGC response to the NRC request for additional information.

The purpose of this letter is to provide supplemental revised responses to the NRC RAI Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, and 13 describing additional compensatory measures that will be implemented at Oyster Creek in order to provide enhanced containment vent capability and reliability and further reduction of severe accident risk at Oyster Creek for the period of the extension request. The supplemental revised responses to these NRC RAIs are provided in Enclosure 1 to this letter, and replace the corresponding RAI responses previously submitted in Reference 4.

This letter contains new regulatory commitments, which are identified in Enclosure 2 to this letter.

If you have any questions regarding this response, please contact David P. Helker at 610-765-5525.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 25th day of November 2014.

Respectfully submitted,



David P. Helker
Manager - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Oyster Creek Nuclear Generating Station – Supplemental Response to Request for Additional Information Regarding Request for Extension to Comply with NRC Order EA-13-109: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (TAC No. MF4352)
2. Summary of Regulatory Commitments

cc: Director, Office of Nuclear Reactor Regulation
NRC Regional Administrator – Region I
NRC Senior Resident Inspector – Oyster Creek Nuclear Generating Station
NRC Project Manager, NRR – Oyster Creek Nuclear Generating Station
Mr. John D. Hughey, NRR/JLD/JOMB, NRC

Enclosure 1

Oyster Creek Nuclear Generating Station

Supplemental Response to Request for Additional Information

**Regarding Request for Extension to Comply with NRC Order EA-13-109: Order
Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable
of Operation Under Severe Accident Conditions (TAC No. MF4352)**

(27 pages)

RAI-1

EA-13-109, Attachment 2, Requirement 1.1.2: (NEI 13-02 Section 4.2.5 and 4.2.6)

The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system.

Section 6.2.7.2.2 of OCNCS Updated Final Safety Analysis Report (UFSAR) describes the operation of the Hardened Vent System and states in part:

To start the venting operation, an operator will be dispatched to align the hardened vent system by closing the Nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). Once these valves are aligned manually, the venting operation can be performed by opening either the Drywell isolation valves V-23-13 and 14 or the Torus isolation valves V-23-15 and 16 from the Control Room.

Question

Discuss the environmental conditions to which the operators would be subjected in order to accomplish these actions. Discuss the availability of operator aids (such as ice vests or self-contained breathing apparatus) needed to perform these tasks, if applicable.

Response

The Hardened Containment Vent System (HCVS) as currently installed is capable of performing as follows during a Station Blackout (SBO) event. AC power to the pilot solenoids controlling the motive force (compressed air) to the HCVS Air-Operated Valves (AOV) would still be available from a currently installed battery backed continuous instrument panel. The time this power will remain available is discussed in the response to RAI-6 below. The AOV motive force will be available from installed accumulators. The time that accumulators can supply this motive force is discussed in the response to RAI-5 below.

To commence the venting operation, an operator will be dispatched to align the HCVS by manually closing the nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). These valves are located at ground level on the outside of the northeast corner of the Reactor Building and are manually operated by reach rods through a shield wall. Since the HCVS containment AOVs are still closed at this time, and venting has yet to commence, radiation levels at the shield wall area will be at their lowest. The operator would be exposed only to the environmental conditions outside of the northeast corner of the Reactor Building. Once these valves are aligned manually, venting operations can commence by opening the air-operated HCVS isolation valves from the Main Control Room (MCR). The use of operator devices (such as ice vests or self-contained breathing apparatus) would not be required in order to operate the HCVS.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The compensatory measures would not expose the operators to environmental conditions that would require the use of supplemental operator aids. Additionally, the modifications described would increase system operational capabilities during an Extended Loss of AC Power (ELAP) and limit operator environmental and radiological exposure when implementing compensatory actions.

RAI-2

EA-13-109, Attachment 2, Requirement 1.1.3: (NEI 13-02 Section 4.2.5)

The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response.

Question

Discuss the operator's ability to complete the tasks in the assumed dose fields. Has a site-specific analysis in accordance with the guidance of NEI 13-02, Appendices F and G been performed to determine the predicted radiological conditions which would be applicable at OCNCS following a severe accident? If not, discuss the differences between the NEI 13-02, Appendices F and G analysis and the dose assumptions used at OCNCS.

Response

NEI 13-02, Appendix F requires evaluation of operator dose under the severe accident conditions that may be present under an NRC Order EA-13-109 scenario. NEI 13-02, Appendix G requires evaluation of source terms for the HCVS under severe accident conditions. A site-specific analysis in accordance with the guidance of NEI 13-02, Appendices F and G has not been performed to determine the predicted radiological conditions which would be applicable at OCNCS following a severe accident.

The Oyster Creek NRC GL 89-16 HCVS was specifically designed to vent the equivalent of 1% thermal energy in response to the TW¹ sequence. The TW sequence is described in NUREG - 75/014, Appendix V, page V-58 as a failure of long term decay heat removal from the containment following a plant transient and trip from hot operating conditions. For this sequence, the reactor is sub-critical, steam is released to the suppression pool via the main steam safety valve(s) and makeup to the reactor is available (Reference 5). A site specific dose rate calculation was performed for the NRC GL 89-16 response. Using the methodology in NUREG-1228, which estimates the piping shine dose rates associated with the hardened vent at Oyster Creek, once the hardened vent path is aligned during a TW sequence and assuming no fuel damage, the radiation dose rates of the entire vent path of the HCVS are less than 1 mrem/hr (References 1 and 2). NUREG-1228 states: "the consensus is that even for the worst accident analyzed, if the plant safety systems work as designed, less than 20% of fuel pin cladding will fail, releasing a large fraction of gap in those pins" (Reference 4). Thus, 20% fuel pins damaged was assumed when determining the shine dose rates for the limiting case. If the Torus is vented 24 hours after an event (scrubbed venting) with 20% fuel damage, the dose rate behind the radiation shield wall at the valve station discussed in RAI-1 above is 700 mrem/hr (References 1 and 3).

¹ BWR Accident Sequence Symbols: T = Transient event, W = Failure to remove residual core heat.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The modification will allow for a connection of supplemental compressed gas to the Torus HCVS isolation valves. A connection for supplemental compressed gas will be provided outside of secondary containment providing the operators protection from environmental and radiological conditions in secondary containment. The location of the connections for supplemental gas supply and solenoid valve control will be reviewed for radiological conditions at the connection / control points assuming severe accident conditions. The operator dose assessment will use the guidelines from NEI 13-02, Appendix F and G.

References

1. UFSAR 6.2.7.3, Rev. 18, Design Evaluation
2. C-1302-242-5340-011, Rev. 0, Hardened Vent Doserates (No fuel damage)
3. C-1302-242-5340-009, Rev 0, Hardened Vent Doserates NUREG-1228
4. NUREG- 1228, Source Term Estimation During Incident Response to Severe Nuclear Power Plant Accidents
5. EXLNOC094-PR-01, Rev. 0, Assessment of the Oyster Creek Hardened Vent System

RAI-3

EA-13-109, Attachment 2, Requirement 1.2.2: (NEI 13-02 Section 4.1.5.2.3)

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

NEI 13-02, Section 4.1.5.2.3:

The release stack or structure exposed to outside should be designed or protected to withstand missiles that could be generated by the external events that screen in for the plant site using the guidance in NEI 12-06 as endorsed by JLD-ISG-12-01.

Per NEI 12-06 guidance, hurricanes and tornado hazards are applicable to Oyster Creek. In addition, Section 3.5.1.4.1 of the OCNCS UFSAR lists potential missiles.

Question

Provide a description of the differences, if any, between the guidance stated in NEI 13-02, Section 4.1.5.2.3, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the Order and described in the guidance.

Response

The Oyster Creek NRC GL 89-16 external hardened vent path was not analyzed or protected against wind (hurricane or tornado) generated missiles. The HCVS utilizes the Nitrogen Purge isolation valves. Isolation valves V-23-13 and 14 are located in the west side of the Reactor Building at elevation 75'3". Isolation valves V-23-15 and 16 are located in the southwest side of the Reactor Building at elevation 23'6". The pipe lines from the Drywell isolation valve V-23-13 and the Torus isolation valve V-23-15 join together at floor elevation 51'3" at the south side of the Reactor Building. From this location, the line runs along the east wall, down to elevation 14'9" and surfaces outside above the ground at the northeast corner of the Reactor Building. From the northeast corner, the vent pipe is routed along the east wall of the Reactor Building and along the south wall of the railroad airlock. The main stack penetration is provided with an industrial quality rubber boot to seal the gap between the main stack and the vent pipe and to allow for thermal movement of the pipe. The vent discharge is directed upward and ends at elevation 38' (approximately) inside the main stack. The main stack release is vented at elevation 368' above the grade elevation of 23' (References 1 and 2). The section of piping from the northeast corner of the Reactor Building to the stack penetration is external to the Reactor Building.

The tornado risk to Oyster Creek is considered negligible. As part of the NRC Systematic Evaluation Program (SEP) conducted for older plants, the tornado risk to Oyster Creek was evaluated. This evaluation did not credit the hardened vent since it preceded the NRC GL 89-16 requirement and implementation. The SEP effort documented that tornado winds and associated missiles represented a negligible contributor to the Oyster Creek overall core melt

probability. The risks of tornado missiles disabling electrical systems were based on (Reference 3):

- Scenario 1: a missile hit to the diesel exhaust stack line on one of the two on-site emergency diesels, with the realistic assumption that off-site power was lost due to the tornado, and the conservative assumption that the second diesel failed to start resulting in a loss of all AC power. The probability of a disabling missile hit to a diesel was $1.0E-7$ /reactor year. The core melt frequency of this scenario was calculated as $1.0E-11$ /reactor year.
- Scenario 2: loss of safety related equipment in the vicinity of the Reactor Building air-lock due to a missile penetrating the outer door of the air-lock with the assumption that the inner door was always open. It is conservatively assumed that the missile disabled a number of safety-related components. The core melt frequency of this scenario was calculated as $1.4E-7$ /reactor year.

The NRC's review of the tornado risk to the diesel generator buildings is documented in Reference 4, and determined that the probability of a disabling missile was low, in the order of $10E-7$.

A re-evaluation of the above Scenario 2, as documented in Reference 5, demonstrated that with a failure of the components in the vicinity of the open inner airlock door, "a system consisting of the isolation condenser (IC), Torus, and core spray pump is available both for shutting the plant down and for maintaining it in the shutdown mode, and, therefore, acceptable".

As described above, portions of the existing vent path installed in response to NRC GL 89-16 exist outside safety-related structures. A valve station also exists at ground level in a narrow space between two buildings and is protected from direct wind generated missiles by steel plate. The vent pipe is located on the eastern side of the Reactor Building. This location effectively protects the vent from tornado generated missiles or debris since the predominant path of tornadoes originates from the west and west-south west directions at Oyster Creek.

A review of historical tornado storm data provided by National Weather Service (NOAA) for the plant locale and for New Jersey's Ocean County from 1950 to 2013 (Reference 9) reveals no high intensity (F4-F6) tornadoes have been experienced. The tornado-generated missile flux from low intensity tornadoes (F1-F3) is not as extensive or damaging as those of higher intensity. Tornado path length (lifetime) is shorter and also contributes to lower missile generation potential and strike probability. In addition, the conditions needed for tornado development do not exist over the entire course of the year, they are seasonal. Lastly, the potential for a tornado, or tornado-generated missiles to concurrently impact the installed methods of heat removal from containment, Isolation Condensers, and the vent while simultaneously causing the Extended Loss of AC Power (ELAP) are extremely small.

A review of wind and tornado loading responses at Oyster Creek was developed by the Franklin Research Center for the NRC (Reference 6). An evaluation of the vent stack indicates wind related loadings will not cause failure or collapse of the vent stack.

The Oyster Creek IPEEE Report (Reference 7) and corresponding NRC Safety Evaluation Report (SER) (Reference 8) considered the impact of external hazards on the existing vent.

Installation of this vent was prior to the study and thus evaluated for potential missile risk related to hurricanes and tornadoes. The IPEEE report, Section 1.5.1 states: "In the case of other external events, only the high winds analysis produced quantitative results. An upper bound value of $9.9E-07$ per year or 8.1% of the total external event core damage frequency was estimated from high winds. The NRC IPEEE SER, Section 2.0 states: "staff estimates that core damage frequency from high winds and tornadoes to be less than the screening criterion of $1E-06$ per year."

Exelon procedure OP-AA-108-111-1001, "Severe Weather and Natural Hazard Guidelines," requires if high winds, hurricane, or tornado activity is forecasted for the site or likely to occur, then walk-downs of the site should be performed to identify items and take action to reduce the potential threat of projectiles in high wind situations.

The consideration of wind hazards associated with NRC Order EA-13-109 requires the hazard to not only create ELAP conditions but also fail the vent simultaneously. Given the above considerations, the limited extension time, and recognized low probability of occurrence of wind hazards, use of the existing vent meets the requirements of NRC Order EA-13-109 by virtue of exhibiting "similar capabilities" from wind driven missiles.

Compensatory Measures

Oyster Creek procedure OP-OC-108-109-1001, "Severe Weather Preparation T&RM for Oyster Creek," will be revised to ensure the northeast corner of the Reactor Building near the HCVS manual valve station is clear of loose objects that could become wind driven missiles.

Similar Capabilities

The original design basis for Oyster Creek includes safety-grade, redundant isolation condenser trains that do not require AC power. The original design basis for the isolation condenser system includes a station black-out (SBO) event. Accordingly, during an ELAP event, the isolation condenser system would be expected to remain available. ICS usage prevents any significant containment pressurization since it releases the reactor decay heat directly to the outside atmosphere. The RPV steam condensed in the isolation condenser is returned to the RPV, thereby minimizing the loss of RPV inventory.

In response to NRC Order EA-12-049, water make-up sources are being added to the isolation condenser shell-side for an ELAP event, which are not dependent on permanently installed equipment. These NRC Order EA-12-049 actions will provide increased availability of the Station's DC power required to maintain isolation condenser system operability. The NRC Order EA-12-049 FLEX modifications are being implemented in the OC1R26 Refueling Outage (Fall 2016) in accordance with the Order completion milestone schedule. The availability of redundant isolation condenser trains in an ELAP prevents any significant containment pressurization and, by returning the condensate to the reactor, reduces the risk of core damage. Accordingly, the isolation condenser system would be used in an ELAP instead of the hardened vent path for decay heat removal and as such provides equivalent or similar capabilities.

References

1. UFSAR 6.2.7.2.1, Rev. 18, System Arrangement
2. UFSAR 3.8.4.1.4, Rev. 18, Ventilation Stack
3. Oyster Creek Tornado Missile Risk Analysis Rev 0 PLG-0276 (Oyster Creek Document Number 990-2491)
4. NRC Letter to Oyster Creek 1990-02-26 "Evaluation of Diesel Generator Buildings Subject to Tornado Wind Generated Loading – Oyster Creek"
5. NRC letter to Oyster Creek December 7, 1992 (tornado wind at reactor building)
6. Technical Evaluation Report "Review of Wind and Tornado Loading Responses", NRC TAC No. 49392, Franklin Research Center, October 31, 1984
7. Oyster Creek Nuclear Generating Station, "Oyster Creek Individual Plant Examination for External Events (IPEEE) for Severe Accident Vulnerabilities," GPU Nuclear Corporation, December 29, 1995.
8. NRC Safety Evaluation Report for Oyster Creek IPEEE, Letter from Helen N. Pastis, NRC, to Ronald J. DeGregorio, AmerGen, dated February 1, 2001.
9. NOAA National Weather Service (<http://www.spc.noaa.gov/wcm/>)

RAI-4

Section 6.2.7.2.2 of OCNGS Updated Final Safety Analysis Report (UFSAR) describes the operation of the Hardened Vent System and states in part:

To start the venting operation, an operator will be dispatched to align the hardened vent system by closing the Nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). Once these valves are aligned manually, the venting operation can be performed by opening either the Drywell isolation valves V-23-13 and 14 or the Torus isolation valves V-23-15 and 16 from the Control Room.

EA-13-109, Attachment 2, Requirement 1.2.4: (NEI 13-02 Section 4.2.2.1.4)

The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.

NEI 13-02, Section 4.2.2.1.4:

The controls/control location design should preclude the need for operators to move temporary ladders or operate from atop scaffolding to access the HCVS valves or remote operating locations.

Question

For the actions listed in the OCNGS UFSAR Section 6.2.7.2.2 quoted above, clarify whether any of the proposed operator actions require temporary ladders or operations atop scaffolding to accomplish the objectives.

Response

For the actions listed in OCNGS UFSAR, Section 6.2.7.2.2, the HCVS will be operated as described in the response to RAI-1 above and would not require the use of ladders or scaffolding. The manual valves in the system are operated outside of secondary containment from behind a shield wall at ground level. Air operated isolation valves would be operated from a panel located in the Main Control Room.

If manual operation of the air operated isolation valves as described in the response to RAI-7 below was required, the procedure and system configuration as currently designed require working from scaffolding or a portable ladder to connect a regulated high pressure nitrogen supply directly to the air operator for the HCVS isolation valves. The modifications described below will eliminate the need for scaffolding or ladders.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The compensatory measures will provide a means to reposition Torus HCVS isolation valve control solenoids from a remote location during a loss of all station AC, DC and control air supply. The compensatory measures would not require operators to move temporary ladders or operate from atop scaffolding to access the Torus HCVS valves or remote operating locations.

RAI-5

EA-13-109, Attachment 2, Requirement 1.2.6: (NEI 13-02 Section 4.2.2.1.1.1 and 4.2.6.1.2.2)

The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of [alternating current] AC power.

The subject extension request and the OCNCS UFSAR, Section 6.2.7.2.2, each state that in the event of a loss of instrument air, venting operations can be performed a maximum of six times utilizing the permanently installed accumulators.

Question

Provide a site-specific justification which describes how the six cycles of motive force available in the accumulators is sufficient to support the OCNCS procedural actions to cope with the first 24 hours of a postulated severe accident. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the Order and described in the guidance during the requested period of extension.

Response

Containment Isolation Valves (CIV) V-23-13, V-23-14, V-23-15 and V-23-16 are utilized as part of the HCVS. The valve accumulators are designed to open and be cycled up to six times postulating a loss of instrument air. The basis for the six cycles is described in Reference 1, which was developed for beyond-design-basis conditions for venting the containment. Five cases were run where venting commenced when the Primary Containment Pressure Limit (PCPL) of 55 psig was reached and stopped when the containment pressure drops to 45 psig in accordance with the Emergency Operating Procedures (EOP) guideline. In all the cases run, the containment isolation valves had to be cycled 6 times within 24 hours (Reference 1).

There is a separate accumulator for Drywell valves V-23-13 (Y-6-42) and V-23-14 (Y-6-43). One accumulator is shared by Torus valves V-23-15 and V-23-16 (Y-6-44). The volume for the installed air accumulators is obtained from the Component Record List (CRL) for components Y-6-42, Y-6-43 (60 gallons each) and Y-6-44 (80 gallons). The mass of air required for a single valve stroke is 0.137 pounds and 0.823 pounds are required for six strokes per valve. The required volume is 4.075 cubic feet for each valve. The shared accumulator would need to have double that volume as it supplies two valves (8.15 cubic feet). The available margin is 3.947 cubic feet for the single valve accumulators and 2.546 cubic feet for the shared accumulator. In terms of additional valve strokes, the single valve accumulator can provide 5 additional strokes in a 24-hour postulated loss of instrument air. The shared valve accumulator can provide 1 additional stroke for each valve in a 24-hour postulated loss of instrument air (Reference 2).

A 2-year frequency preventative maintenance activity is performed to test the instrument air piping and associated accumulators to minimize the potential for valve failure of the hardened vent containment isolation valves. The air leak test removes the tubing between the isolation

check valve and the instrument air system to simulate a complete loss of instrument air, and to provide the check valve with a leak path. If the pressure drop is greater than the acceptance criteria, then the instrument air piping is reworked as needed to satisfy the acceptance criteria.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The compensatory measure will install a connection that will provide a supplemental compressed gas supply. This gas supply to the Torus HCVS isolation valves will extend operation past the six cycles of the currently installed system. The location of this connection will allow for change-out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. A means of operating Torus HCVS isolation valve control solenoids independent of currently installed plant systems will also be provided.

References

1. C-1302-243-5450-062, Rev 0, Containment vent valve cycle at beyond design basis accidents
2. C-1302-242-5360-012 Rev.1, Accumulator Sizing for V-23-13, 14, 15, & 16

RAI-6

Question

The extension request states that, "Power for the solenoid valves is available as long as "B" battery can supply power and indefinitely once the FLEX generator restores the "B" battery charger. What is the length of time the "B" battery can supply power to the solenoid valves before the FLEX generator is required?"

Response

Oyster Creek Generating Station Battery Coping Evaluation Report, Document No.: 12-4159.OCGS Rev 0 02/08/2013, built an Electrical Transient Analyzer Program (ETAP) model of the OCGS 125VDC distribution system to provide approximate coping times for Batteries A, B, and C for various load profiles. The coping time is defined as how long the battery will continue to supply adequate voltage to the loads (load profile) until the minimum required battery voltage (based on specified end of discharge volts per cell) is reached. The study found that the "B" battery would provide power during an SBO/ELAP event for 351 minutes (5.85 hours) with no DC load shedding. Preliminary deep load shedding analysis of "B" battery where load shedding is not complete until 1 hour, 2 hours, and 2.3 hours, indicated that up to 10 hours of battery life can be expected from the worst case of 2.3 hours. However, for the best case of completing the load shed within 1 hour, 13 hours of battery life can be expected. Oyster Creek is developing its load shed procedure based on the above report to support the FLEX strategies. Additional loads to those identified on the battery coping report could be shed thereby improving battery life.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with

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a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The modification will provide a connection to an independent means of controlling Torus HCVS isolation valve solenoids. The control method will be available for use if "B" battery and the 500Kw FLEX generator are not available.

RAI-7

Question

The extension request states, "If there is a loss of station air, AC, and [direct current] DC power, then the current site B.5.b procedures direct manual opening of the HCVS isolation valves." Provide a description of how the manual opening and keeping open of the containment isolation valves is accomplished.

Response

The existing B.5.b procedure EDMG-SPX9, "Manually Opening Containment Vent Valves in a B.5.b Event," opens a selected HCVS containment isolation valve pair using a regulated high pressure nitrogen supply connected directly to the valves' air operators. Gas pressure is then applied to open the HCVS valves. The HCVS valves are visually verified to have stroked open at the valve station. Once the HCVS isolation valves are opened they remain open. The operator then exits the area before the main venting operation is commenced. To commence the venting operation, an operator will be dispatched to align the HCVS by closing the nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). These valves are located outside of secondary containment, at the northeast corner of the Reactor Building. The procedure and system configuration as currently designed require working from scaffolding or a portable ladder to connect a regulated high pressure nitrogen supply directly to the air operator for the HCVS isolation valves.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

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The modification will provide a connection to an independent means of controlling Torus HCVS isolation valve solenoids from a remote location. The modification will also provide a means to connect an independent compressed gas source at a remote location. These connections will allow sustained operation beyond the capacity of the currently installed HCVS system. The location to the connection point will allow changing out of spent supplemental compressed gas supply source during an event.

RAI-8

EA-13-109, Attachment 2, Requirement 1.2.8: (NEI 13-02 Section 4.2.2.)

The HCVS shall include means to monitor the status of the vent system (e.g. valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.

Question

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 4.2.2, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the Order and described in the guidance during the requested period of extension.

Response

NEI 13-02, Section 4.2.2 specifies that a control panel for sustained operation of the HCVS be designed with the ability for manual operation with means of monitoring the status of the vent system (i.e., radiation, temperature, pressure, and valve position indication). The monitoring system shall be designed for sustained operation during an Extended Loss of AC Power (ELAP). The HCVS system should include indications for the containment pressure and wetwell level for determination of vent operation. Other aspects of NEI 13-02, Section 4.2.2 are covered by the response to RAI-2 and RAI-7 above.

There is no effluent temperature monitoring of the HCVS piping. The HCVS utilizes the existing stack radiation monitor and its instrumentation which is currently instrumented to the Main Control Room (MCR). During an ELAP, Radioactive Gaseous Effluent Monitoring System (RAGEMS) is non-functional (as described in the response to RAI-9 below). There is no pressure indication of the HCVS piping in the MCR. However, there is a HCVS pipe pressure gauge located at the manual valve station which provides local pressure indication. Operators will rely on containment pressure and Torus water level indication in making the decision to vent. Narrow range level indication for the Torus will be available during an ELAP, and containment pressure can be obtained using a local pressure gauge near the MCR.

The control switches and status indicating lights of the four (4) containment isolation valves are located in the MCR (Reference 1). A two-position key locked bypass switch labeled "Normal" and "Bypassed" is provided in Panel 12XR to allow for these valves (V-23-13, 14, 15, & 16) to be opened with an isolation signal present (Reference 2). The current plant configuration has a loss of indication for one out of the two hardened containment isolation valves that are connected to the Torus and Drywell (V-23-13 & V-23-15) during an ELAP.

Compensatory Measures

Oyster Creek is currently in the design phase of modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS

during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will supply a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment.

The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement venting operations. Procedures will be developed to perform continuity checks across isolation valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point. These modifications will be scheduled to be installed by completion of the OC1R26 Refueling Outage (Fall 2016).

The compensatory measure modification has the following features which have the capabilities or similar capabilities of those described in NEI 13-02, Section 4.2.2.

- The ability to open/close the Torus HCVS isolation valves multiple times during the event by providing additional motive gas.
- The ability to open/close the Torus HCVS isolation valves multiple times during the event by providing additional methods of controlling operating solenoids.
- The ability to change out spent supplemental compressed gas supply source during an event providing sustained operations greater than 7 days.
- Simple connection/disconnect.
- Modification connection/control points protected from severe external events.
- The location of connection points will be outside secondary containment and take into consideration the temperature and radiological conditions the operating personnel may encounter in transit and at the connection point.
- Staged portable equipment will be consistent with the guidance for NRC Order EA-12-049 which states: "The equipment would be staged and reasonably protected from applicable site-specific severe external events to provide reasonable assurance that the equipment will remain deployable following such an event."
- The modification will remove the need to work from scaffolding or ladders.
- The modification will remove the need for operators to perform actions in the vicinity of the Torus HCVS isolation valves.

Additional compensatory measures will provide the following features:

- Continuity checks across the Torus HCVS isolation valve limit switches from the MCR will provide position indication when normal indication is lost.
- Portable radiation meters at the shield wall will provide gross fuel damage indication.
- Pressures readings can be obtained from the installed pressure gauge at the shield wall.
- If the temperature probe evaluation proves acceptable, then the HCVS piping temperature would be available at a remote location.

References

1. UFSAR 6.2.7.2.1, Rev. 18, System Arrangement
2. UFSAR 6.2.7.6, Rev. 18, Instrumentation Requirements

RAI-9

EA-13-109, Attachment 2, Requirement 1.2.9: (NEI 13-02 Section 4.2.4.1.2.)

The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power.

Section 6.2.7.3 of the OCNCS UFSAR describes the design evaluation of the Hardened Vent System and states in part:

During venting operation coincident with the loss of offsite power, the flow to the stack is less than the design cut-off flow of 94,000 CFM of the RAGEMS [Radioactive Gaseous Effluent Monitoring System]. At this flow condition the RAGEMS will go to automatic default mode using the low range monitor. Since there is no fuel damage when venting on TW sequence [loss of decay heat cooling capability] is performed, the radiation level of the releases will be within the range of the low range monitor.

Question

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 4.2.4.1.2, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the Order and described in the guidance during the requested period of extension.

Response

The power source of the RAGEMS is IP-4C BKR#3 and IP-4B BKR#14. These monitors are emergency diesel powered and are not provided with battery backup power. Therefore, during an Extended Loss of AC Power (ELAP) condition, there would be no capability to monitor the main stack effluent discharge for radioactivity that may be released from operation of the HCVS.

Compensatory Measures

As a compensatory measure, Oyster Creek will develop procedures to use a hand held radiation monitor at the shield wall to determine if there was a transition from no core damage (1 mrem/hr) to 20% fuel pin damage (700 mrem/hr) or greater. The equipment will be staged and reasonably protected from applicable site-specific severe external events to provide reasonable assurance that the equipment will remain deployable following such an event. The procedures will be implemented by the OC1R26 Refueling Outage (Fall 2016).

RAI-10

EA-13-109, Attachment 2, Requirement 1.2.10: (NEI 13-02 Section 2.4.4.1)

The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation while venting steam, hydrogen, and other non-condensable gases and aerosols. The design is not required to exceed the current capability of the limiting containment components.

NEI 13-02, Section 2.4.4.1, states in part:

The PCPL [Primary Containment Pressure Limit] and 545°F, is recommended as the design pressure and temperature for the drywell vent system and any common and shared portions of the vent line...

Question

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 2.4.4.1, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities, as required by the Order and described in the guidance during the requested period of extension.

Response

The existing design was not evaluated for 545°F for drywell venting. Criteria and options have significantly evolved since the issuance of NEI 13-02, Revision 0 and have not been finalized.

The Oyster Creek NRC GL 89-16 hardened vent piping is designed for 75 psig and 305°F (Reference 2). The existing design pressure meets the NRC Order EA-13-109 requirements since it exceeds the Torus design pressure (35 psig) and the Primary Containment Pressure Limit (PCPL) (55 psig) (Reference 1). The design temperature of 305°F was based on the saturation temperature at 55 psig. The CIV seat material is able to withstand 400°F (Reference 3). Since Torus venting assumes saturated conditions in the Torus, the existing design temperature meets the intent of the Order for Torus venting. In addition, NEI 13-02, Section 2.4.4.1.1 addresses the possibility of operation at more extreme temperatures and states that: "Inherent margins above design of the components, such as higher plastic failure temperatures provide assurance of this capability...". The rated capacity is 1% of rated thermal power assuming a containment pressure of 55 psig.

Following a venting operation, condensation of steam will occur in the pipe. The condensed steam in the pipe inside the Reactor Building and in the vertical portion of the vent pipe outside the Reactor Building will be drained through the air trap located in the northeast corner of the building. The condensed water in the horizontal portion of the vent pipe outside the building will flow down towards the stack where it will be drained to the bottom of the stack through the 2"

drain provided at the low point of the vent pipe inside the stack. The floor drain of the stack is utilized to drain the water collected on the stack floor (Reference 4).

The use of the hardened vent is expected to preclude core melt during the TW sequence. Therefore, radiation dose rates resulting from operation of this system during the TW sequence would not preclude system operability and accessibility. The piping was routed in such a way as to minimize the radiation dose rate to the operators and plant personnel (Reference 2).

Upon implementation of EPG/SAG Revision 3, venting for combustible gas control and primary containment pressure control will be directed by steps in the SAMGs and implemented through support procedures. Venting for primary containment pressure control without combustible gas will be directed by steps in the Emergency Operating Procedures (EOPs).

Similar Capabilities

The original design basis for Oyster Creek includes safety-grade, redundant isolation condenser trains that do not require AC power. The original design basis for the isolation condenser system includes a station black-out (SBO) event. Accordingly, during an ELAP event, the isolation condenser system would be expected to remain available. ICS usage prevents any significant containment pressurization since it releases the reactor decay heat directly to the outside atmosphere. The RPV steam condensed in the isolation condenser is returned to the RPV, thereby minimizing the loss of RPV inventory.

In response to NRC Order EA-12-049, water make-up sources will be added to the isolation condenser shell-side for an ELAP event, which are not dependent on permanently installed equipment. These NRC Order EA-12-049 actions will provide increased availability of the Station's DC power required to maintain isolation condenser system operability. The NRC Order EA-12-049 FLEX modifications are being implemented in the OC1R26 Refueling Outage (Fall 2016) in accordance with the Order completion milestone schedule. The availability of redundant isolation condenser trains in an ELAP prevents any significant containment pressurization and, by returning the condensate to the reactor, reduces the risk of core damage. Accordingly, the isolation condenser system would be used in an ELAP instead of the hardened vent path for decay heat removal and as such provides equivalent or similar capabilities.

References

1. UFSAR 6.2.7, Rev. 18 Hardened Vent System
2. MDD-OC-822-A DIV1, Rev 2, Hardened Vent System
3. MDD-OC-822-A DIV 2, Rev. 1, Hardened Vent System
4. SE-402968-001, Rev 2, Hardened Vent Modification

RAI-12

EA-13-109, Attachment 2, Requirement 2.2: (NEI 13-02 Section 5.2 and 5.3)

All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply and instrumentation (local and remote) components.

In addition, the OCNCS UFSAR Section 6.2.7.4 describes the Failure Modes and Effects Analysis (FMEA) of the Hardened Vent System and states in part:

The 10" vent pipe which is not seismic, is provided with anti-fall down pipe supports. In the event of a seismic event, failure of the hardened vent pipes (8" and 10") may occur.

Question

Given the severe accident conditions associated with the Order, address the potential failure of the hardened vent pipes in the response to RAI-12 below.

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 5.2 and 5.3, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the Order and described in the guidance during the requested period of extension.

Response

NEI 13-02 Sections 5.2.1 and 5.3.1.1

The containment isolation valves V-23-13, V-23-14, V-23-15 and V-23-16, operators, containment penetration piping, valve position limit switches, pilot solenoids, power supplies, accumulators and the accumulator's piping/tubing are qualified to seismic class 1 (References 2 and 3). This complies with NEI 13-02, 5.2.1 and 5.3.1.1. HCVS isolation valves and selected associated components are being added to the Expedited Seismic Equipment List (ESEL) to be evaluated under the Expedited Seismic Evaluation Process (ESEP).

NEI 13-02 Sections 5.2.2 and 5.3.1.2

The portions of the Oyster Creek NRC GL 89-16 external hardened vent path that are downstream of the primary containment penetrations consist of 8" and 10" nominal diameter piping. The 8" nominal diameter hardened vent path, which is inside the Reactor Building from the containment penetration to the Reactor Building wall, was part of the original Oyster Creek design for the nitrogen inerting system. The 8" nominal diameter piping analysis did not include any seismic loads (Reference 4). The 10" nominal diameter externally routed hardened vent path from the Reactor Building wall to the main stack was added in 1992 as part of the NRC GL

89-16 modification and is designed to anti-falldown seismic criteria (Reference 4). However, the Electric Power Research Institute (EPRI) has documented the effects of strong earthquakes of magnitude 5.9 to 7.6 in California on various facilities of different vintages in many reports such as NP-7126 (Reference 5), NP-7500-SL (Reference 6), TR-103477 (Reference 7), and TR-103454 (Reference 8).

These reports concluded that welded steel piping generally exhibited excellent earthquake performance, even for piping with only sporadic provisions for seismic loads in pipe support systems. As described in the Oyster Creek UFSAR, Section 2.5.2.3, the "Seismic Probability Map of the United States" (U.S. Coast and Geodetic Survey) assigns New Jersey to seismic Zone 1 (minor damage) as compared with seismic Zone 3 (major damage) for California. The seismicity of the general region of the Oyster Creek Site is sufficiently low that it would be expected to have a low intensity of ground motion. The shocks in this region are too small to be listed in "Seismicity of the Earth" by Gutenberg and Richter, and the U.S. Coast and Geodetic Survey publication does not provide information on the magnitudes of the shocks.

NEI 13-02 Section 5.2.3

"The components including instrumentation external to a seismic category 1 (or equivalent building or enclosure) should be designed to meet the external hazards that screen in for the plant as defined in guidance NEI 12-06, as endorsed by JLD-ISG-2012-01, for NRC Order EA-12-049."

Oyster Creek screens in for Seismic, External Flooding, Snow, Ice and Extreme Cold, Extreme High Temperature, and High Wind Hazard. The Oyster Creek HCVS components satisfy the requirements of NEI 12-06 as described below:

- Seismic is addressed in RAI-12 above.
- External Flooding: The flooding IPEEE results (Reference 11) indicate that HCVS components external to a seismic category 1 structure will not be affected by the most limiting flooding conditions.
- Snow, Ice, and Extreme Cold: Snow and Ice will be addressed by the compensatory measure procedure changes listed below.
- Extreme High Temperature: The highest recorded temperature documented in the UFSAR for southern New Jersey was listed as 106°F (Reference 10). The components external to a seismic category 1 structure will not be affected by the extreme high temperature.
- High Wind Hazards: Wind Hazards are addressed in the compensatory measure procedure changes listed below and as addressed in RAI-3 above.

NEI 13-02 Sections 5.3.1.3 and 5.3.1.4

The compensatory HCVS modification(s) described in RAI-1, 2, 4, 5, 6, 7, and 8 will comply with NEI 13-02, Section 5.2, Seismic and External Conditions and NEI 13-02, Section 5.3, Quality Requirements.

The potential failure of the hardened vent piping during a seismic event could result in venting the primary containment into the Reactor Building, which has a potential for unmonitored ground releases of radioactive materials. As discussed in the OCNCS UFSAR, Section 6.2.7.4 (Reference 1), the consequence of a failure of the primary containment is more severe than the

consequences of a controlled venting of the primary containment with a potential for ground releases.

Compensatory Measures

Oyster Creek procedure OP-OC-108-109-1001, "Severe Weather Preparation T&RM for Oyster Creek," will be revised to ensure a snow and ice removal plan is in place to provide access to the manual valve station for the HCVS located at the northeast corner of the Reactor building. The procedure will also include steps to ensure the northeast corner of the Reactor Building near the HCVS manual valve station is clear of loose objects that could become wind driven missiles. The procedure will be implemented by the OC1R26 Refueling Outage (Fall 2016).

Similar Capabilities

The original design basis for Oyster Creek includes redundant isolation condenser trains that are designed to Seismic Class 1 criteria and do not require AC power. The original design basis for the isolation condenser system includes a station black-out (SBO) event. Accordingly, following a seismic event and an Extended Loss of AC Power (ELAP) event, the isolation condenser system would be expected to remain available. ICS usage prevents any significant containment pressurization since it releases the reactor decay heat directly to the outside atmosphere. The RPV steam condensed in the isolation condenser is returned to the RPV, thereby minimizing the loss of RPV inventory.

In response to NRC Order EA-12-049, water make-up sources will be added to the isolation condenser shell-side for an ELAP event, which are not dependent on permanently installed equipment. The NRC Order EA-12-049 actions will provide increased availability of the Station's DC power required to maintain isolation condenser system operability. The NRC Order EA-12-049 FLEX modifications are being implemented in the OC1R26 Refueling Outage (Fall 2016) in accordance with the Order completion milestone schedule. The availability of Seismic Class 1 redundant isolation condenser trains following an ELAP prevents any significant containment pressurization and, by returning the condensate to the reactor, reduces the risk of core damage. Accordingly, the isolation condenser system would be used following a seismic event and an ELAP instead of the hardened vent path for decay heat removal and as such provides equivalent or similar capabilities.

References

1. UFSAR 6.2.7.4, Rev. 18 Failure Modes and Effects Analysis (FMEA)
2. C-1302-822-5320-044, Hardened Vent Modification Seismic Support for Air Accumulators
3. SE-402968-001, Rev 2, Hardened Vent Modification
4. C-1302-822-5320-041, Rev 0. Hardened Vent Piping
5. EPRI NP-7126, "The October 1, 1987, Whittier Earthquake: Effects on Selected Power, Industrial, and Commercial Facilities", prepared by EQE Engineering, December 1990.
6. EPRI NP-7500-SL, "The October 17, 1989, Loma Prieta Earthquake: Effects on Selected Power and Industrial Facilities", prepared by EQE Engineering, September 1991.

7. EPRI Report TR-103477, "The Cape Mendocino Earthquake Sequence of April 25 and 26, 1992: Effects on Electric Power Facilities", prepared by EQE International, November 1994.
8. EPRI Report TR-103454, "The June 28, 1992, Landers and Big Bear Earthquakes: Effects on Power and Industrial Facilities", prepared by EQE Engineering, December 1993
9. Oyster Creek UFSAR Section 2.5.2.3
10. Oyster Creek UFSAR, Table 2.3-2
11. Oyster Creek UFSAR Section 2.4.2.1

RAI-13

EA-13-109, Attachment 2, Requirement 3.1:

The Licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of AC power.

EA-13-109, Attachment 2, Requirement 3.2:

The Licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during an extended loss of AC power.

Question

Provide a description of procedure changes and/or changes to the training curricula, if any, to support the use of the containment venting system during the requested period of extension.

Response

Oyster Creek has requested an extension for implementation of NRC Order EA-13-109. The extension, if granted, would not significantly change the design of the HCVS system. Procedures and training curriculum for the normal and off normal operation of the HCVS, as currently designed, have been developed and implemented at the site. The approved procedure set includes the operation of the HCVS during a B.5.b event. The B.5.b event assumes damage to site systems and components such that local operation of the HCVS isolation valves would be required as described in the response to RAI-7 above. Operator training for operation of the HCVS system currently consists of classroom lectures, infield walk downs, and a demonstration laboratory where a mockup is used to manually open an air operated valve.

Upon implementation of EPG/SAG Revision 3, venting for combustible gas control and primary containment pressure control will be directed by steps in the SAMGs and implemented through support procedures. Venting for primary containment pressure control without combustible gas will be directed by steps in the Emergency Operating Procedures (EOPs). These changes affecting the use and control of the HCVS would be incorporated into the procedures and training required for the implementation of the overall FLEX strategies and EPG/SAG Revision 3.

Compensatory Measures

Training for the operation of the compensatory modifications and associated procedures are controlled by the modification process and included in FLEX training programs to be completed in accordance with the NRC Order EA-12-049 milestone schedule. Training for EPG/SAG Revision 3 would also include training on operation of the HCVS.

Enclosure 2

SUMMARY OF REGULATORY COMMITMENTS

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
<p>1. Oyster Creek will implement modifications for the Torus HCVS isolation valves V-23-15 and V-23-16. The modifications will enhance the capability of the Torus HCVS during Extended Loss of AC Power (ELAP) conditions. The modifications, once completed, will provide a supplemental compressed gas connection to the Torus HCVS isolation valves, extending the availability of this motive force. The location of this connection will allow for change out of the compressed gas source extending indefinitely the availability of the Torus HCVS isolation valve motive force. The modification and procedure changes will provide a means of operating Torus HCVS isolation valve control solenoids with a total loss of station AC, DC and control air supply from a remote location. The supplemental compressed gas connection and means of Torus HCVS isolation valve solenoid control will be located outside of secondary containment. The location of the modification connection points is being determined, and will take into consideration the environment and radiological conditions that the operator would be exposed to during an event. The location of the modification connection points will be protected from severe external events. The design requires the connections to be simple and not require the disassembly and reassembly of components. The use of ladders or scaffolding will not be required to make required connections or implement the modification. Procedures will be developed to perform continuity checks across isolation</p>	<p>Prior to startup from OC1R26 Refuel Outage (Fall 2016)</p>	<p>Yes</p>	<p>No</p>

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
<p>valve position indication switches as a means of determining valve position from the main control room when position indication is lost. Additionally, Oyster Creek is evaluating the use of a temperature probe that could be read with a portable device at the connection/control point.</p> <p>The operator dose assessment will use the guidelines from NEI 13-02, Appendix F and G.</p> <p>Means to reposition Torus HCVS isolation valve control solenoids from a remote location during a loss of all station AC, DC, and control air supply will be provided. These means will not require operators to move temporary ladders or operate from scaffolding to access the Torus HCVS valves or remote operating locations.</p> <p>The gas supply to the Torus HCVS isolation valves will extend operation past the six cycles of the currently installed system. The location of this connection will allow for change-out of the compressed gas source extending indefinitely the availability of the torus HCVS isolation valve motive force during an event. A means of operating Torus HCVS isolation valve control solenoids independent of currently installed plant systems will be provided, including unavailability of the "B" battery and the 500Kw FLEX generator.</p> <p>Components installed as part of the HCVS modification will comply with NEI 13-02, Section 5.2 Seismic and External Conditions, and NEI 13-02, Section 5.3 Quality Requirements.</p> <p>The modification has the following features which have the capabilities or similar capabilities of those described in NEI 13-02, Section 4.2.2.</p>			

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
<ul style="list-style-type: none"> • The ability to open/close the Torus HCVS isolation valves multiple times during the event by providing additional motive gas. • The ability to open/close the Torus HCVS isolation valves multiple times during the event by providing additional methods of controlling operating solenoids. • The ability to change out spent supplemental compressed gas supply source during an event providing sustained operations greater than 7 days. • Simple connection/disconnect. • Modification connection/control points protected from severe external events. • The location of connection points will be outside secondary containment and take into consideration the temperature and radiological conditions the operating personnel may encounter in transit and at the connection point. • Staged portable equipment will be consistent with the guidance for NRC Order EA-12-049 which states: "The equipment would be staged and reasonably protected from applicable site-specific severe external events to provide reasonable assurance that the equipment will remain deployable following such an event." • The modification would remove the need to work from scaffolding or ladders. • The modification would remove the need for operators to perform actions in the vicinity of the Torus HCVS isolation valves. • Continuity checks across the Torus HCVS isolation valve limit switches from the Main Control Room (MCR) will provide position indication when normal indication is lost. 			

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
<ul style="list-style-type: none"> • Portable radiation meters at the shield wall will provide gross fuel damage indication. • Pressures readings can be obtained from the installed pressure gauge at the shield wall. • If the temperature probe evaluation proves acceptable, then the HCVS piping temperature would be available at a remote location. 			
2. Oyster Creek procedure OP-OC-108-109-1001, "Severe Weather Preparation T&RM for Oyster Creek," will be revised to ensure the northeast corner of the Reactor Building near the HCVS manual valve station is clear of loose objects that could become wind driven missiles.	Prior to startup from OC1R26 Refuel Outage (Fall 2016)	No	Yes
3. Oyster Creek will develop procedures to use a hand held radiation monitor at the shield wall to determine if there was a transition from no core damage (1 mrem/hr) to 20% fuel pin damage (700 mrem/hr) or greater. The equipment will be staged and reasonably protected from applicable site-specific severe external events to provide reasonable assurance that the equipment will remain deployable following such an event.	Prior to startup from OC1R26 Refuel Outage (Fall 2016)	No	Yes
4. Oyster Creek procedure OP-OC-108-109-1001, "Severe Weather Preparation T&RM for Oyster Creek," will be revised to ensure a snow and ice removal plan is in place to provide access to the manual valve station for the HCVS located at the northeast corner of the Reactor Building. The procedure will also include steps to ensure the northeast corner of the Reactor Building near the HCVS manual valve station is clear of loose objects that could become wind driven missiles.	Prior to startup from OC1R26 Refuel Outage (Fall 2016)	No	Yes

August 27, 2014

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION - REQUEST FOR
ADDITIONAL INFORMATION REGARDING REQUEST FOR EXTENSION TO
COMPLY WITH NRC ORDER EA-13-109: ORDER MODIFYING LICENSES
WITH REGARD TO RELIABLE HARDENED CONTAINMENT VENTS CAPABLE
OF OPERATION UNDER SEVERE ACCIDENT CONDITIONS
(TAC NO. MF4352)**

Dear Mr. Pacilio:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A694), the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-50 to All Operating Boiling-Water Reactor Licensees with Mark I and Mark II Containments. The order, in part, required licensees to install a reliable hardened containment vent system. By letter dated June 6, 2013 (ADAMS Accession No. ML13143A334), the NRC superseded the requirements of Order EA-12-050, with Order EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions."

Section IV of Order EA-13-109 states that licensees proposing to deviate from requirements of the order may request that the Director, Office of Nuclear Reactor Regulation, relax or rescind certain requirements. By letter dated June 6, 2014 (ADAMS Accession No. ML14153A421), Exelon Generation Company, LLC (Exelon, the licensee) requested an extension of the final compliance dates of Order EA-13-109. Specifically, the licensee requested an extension to comply with the requirements in Section IV of NRC Order EA-13-109 concerning implementation of the Phase 1 (wetwell vent) and Phase 2 (drywell vent) at Oyster Creek Nuclear Generating Station (OCNGS) until January 31, 2020.

By letter dated January 7, 2011 (ADAMS Accession No. ML110070507), the licensee notified the NRC of Exelon's intent to permanently shut down OCNGS and cease operation no later than December 31, 2019. The licensee's extension request dated June 6, 2014, also stated that Exelon will submit a request for relief from NRC Order EA-13-109 no later than January 31, 2020, based on the shutdown condition of the plant at that time.

- 2 -

M. Pacilio

The NRC staff has reviewed the June 6, 2014, extension request submitted by the licensee and has determined that a request for additional information is needed to complete its technical review. The specific information requested is addressed in the enclosure to this letter. The NRC staff requests that Exelon provide a response within 30 days from the date of this letter.

If you have any questions regarding this letter, please feel free to contact me at (301) 415-3204.

Sincerely,

/RA/

John D. Hughey, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

M. Pacilio

- 2 -

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OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/DORL/LPL1-2/PM*	NRR/JLD/JCBB/TR
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NAME	SBailey	MHalter	JHughey	
DATE	08/13/14	08/15/14	08/27/14	

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REQUEST FOR ADDITIONAL INFORMATION
RELATED TO EXTENSION REQUEST REGARDING
COMPLIANCE WITH NRC ORDER EA-13-109
OYSTER CREEK NUCLEAR GENERATING STATION
EXELON GENERATING COMPANY, LLC
DOCKET NO. 50-219

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By letter dated January 7, 2011 (ADAMS Accession No. ML110070507), the licensee notified the NRC of Exelon's intent to permanently shut down OCNGS and cease operation no later than December 31, 2019. The licensee's extension request dated June 6, 2014, also stated that Exelon will submit a request for relief from NRC Order EA-13-109 no later than January 31, 2020, based on the shutdown condition of the plant at that time.

As stated in Order EA-13-109, BWRs with Mark I and Mark II containments shall have a reliable, severe accident capable hardened containment venting system (HCVS). In Phase 1, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell during severe accident conditions. Severe accident conditions include the elevated temperatures, pressures, radiation levels, and combustible gas concentrations, such as hydrogen and carbon monoxide, associated with accidents involving extensive core damage, including accidents involving a breach of the reactor vessel by molten core debris.

Enclosure

The NRC staff has reviewed the June 6, 2014, submittal by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its technical review. Each of the requests below correspond to a requirement of Attachment 2 of Order EA-13-109 and/or an excerpt from the Nuclear Energy Institute (NEI) guidance document NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109: BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (ADAMS Accession No. ML13316A853), which was endorsed by Japan Lessons-Learned Project Directorate (JLD) Interim Staff Guidance (ISG) Document, JLD-ISG-2013-02 (ADAMS Accession No. ML13304B836).

EA-13-109, Attachment 2, Requirement 1.1.2: (NEI 13-02 Section 4.2.5 and 4.2.6)

The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system.

Section 6.2.7.2.2 of OCNCS Updated Final Safety Analysis Report (UFSAR) describes the operation of the Hardened Vent System and states in part:

To start the venting operation, an operator will be dispatched to align the hardened vent system by closing the Nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). Once these valves are aligned manually, the venting operation can be performed by opening either the Drywell isolation valves V-23-13 and 14 or the Torus isolation valves V-23-15 and 16 from the Control Room.

RAI-1:

Discuss the environmental conditions to which the operators would be subjected in order to accomplish these actions. Discuss the availability of operator aids (such as ice vests or self-contained breathing apparatus) needed to perform these tasks, if applicable.

EA-13-109, Attachment 2, Requirement 1.1.3: (NEI 13-02 Section 4.2.5)

The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response.

RAI-2:

Discuss the operator's ability to complete the tasks in the assumed dose fields. Has a site-specific analysis in accordance with the guidance of NEI 13-02, Appendices F and G been performed to determine the predicted radiological conditions which would be applicable at OCNCS following a severe accident? If not, discuss the differences between the NEI 13-02, Appendices F and G analysis and the dose assumptions used at OCNCS.

EA-13-109, Attachment 2, Requirement 1.2.2: (NEI 13-02 Section 4.1.5.2.3)

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

NEI 13-02, Section 4.1.5.2.3:

The release stack or structure exposed to outside should be designed or protected to withstand missiles that could be generated by the external events that screen in for the plant site using the guidance in NEI 12-06 as endorsed by JLD-ISG-12-01.

Per NEI 12-06 guidance, hurricanes and tornado hazards are applicable to Oyster Creek. In addition, Section 3.5.1.4.1 of the OCNCS UFSAR lists potential missiles.

RAI-3:

Provide a description of the differences, if any, between the guidance stated in NEI 13-02, Section 4.1.5.2.3, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

EA-13-109, Attachment 2, Requirement 1.2.4: (NEI 13-02 Section 4.2.2.1.4)

The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.

NEI 13-02, Section 4.2.2.1.4:

The controls/control location design should preclude the need for operators to move temporary ladders or operate from atop scaffolding to access the HCVS valves or remote operating locations.

RAI-4:

For the actions listed in the OCNCS UFSAR Section 6.2.7.2.2 quoted above, clarify whether any of the proposed operator actions require temporary ladders or operations atop scaffolding to accomplish the objectives.

EA-13-109, Attachment 2, Requirement 1.2.6: (NEI 13-02 Section 4.2.2.1.1.1 and 4.2.6.1.2.2)

The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of [alternating current] AC power.

The subject extension request and the OCNCS UFSAR, Section 6.2.7.2.2, each state that in the event of a loss of instrument air, venting operations can be performed a maximum of six times utilizing the permanently installed accumulators.

RAI-5:

Provide a site-specific justification which describes how the six cycles of motive force available in the accumulators is sufficient to support the OCNCS procedural actions to cope with the first 24 hours of a postulated severe accident. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

RAI-6:

The extension request states that, "Power for the solenoid valves is available as long as "B" battery can supply power and indefinitely once the FLEX generator restores the "B" battery charger." What is the length of time the "B" battery can supply power to the solenoid valves before the FLEX generator is required?

RAI-7:

The extension request states, "If there is a loss of station air, AC, and [direct current] DC power, then the current site B.5.b procedures direct manual opening of the HCVS isolation valves." Provide a description of how the manual opening and keeping open of the containment isolation valves is accomplished.

EA-13-109, Attachment 2, Requirement 1.2.8: (NEI 13-02 Section 4.2.2.)

The HCVS shall include means to monitor the status of the vent system (e.g. valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power.

RAI-8:

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 4.2.2, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

EA-13-109, Attachment 2, Requirement 1.2.9: (NEI 13-02 Section 4.2.4.1.2.)

The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power.

Section 6.2.7.3 of the OCNCS UFSAR describes the design evaluation of the Hardened Vent System and states in part:

During venting operation coincident with the loss of offsite power, the flow to the stack is less than the design cut-off flow of 94,000 CFM of the RAGEMS [Radioactive Gaseous Effluent Monitoring System]. At this flow condition the RAGEMS will go to automatic default mode using the low range monitor. Since there is no fuel damage when venting on TW sequence [loss of decay heat cooling capability] is performed, the radiation level of the releases will be within the range of the low range monitor.

RAI-9:

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 4.2.4.1.2, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

EA-13-109, Attachment 2, Requirement 1.2.10: (NEI 13-02 Section 2.4.4.1)

The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation while venting steam, hydrogen, and other non-condensable gases and aerosols. The design is not required to exceed the current capability of the limiting containment components.

NEI 13-02, Section 2.4.4.1, states in part:

The PCPL [Primary Containment Pressure Limit] and 545°F, is recommended as the design pressure and temperature for the drywell vent system and any common and shared portions of the vent line...

RAI-10:

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 2.4.4.1, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities, as required by the order and described in the guidance during the requested period of extension.

EA-13-109, Attachment 2, Requirement 1.2.11: (NEI 13-02 Section 4.1.7)

The HCVS shall be designed and operated to ensure the flammability limits of gases passing through the system are not reached; otherwise, the system shall be designed to withstand dynamic loading resulting from hydrogen deflagration and detonation.

RAI-11:

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 4.1.7, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

EA-13-109, Attachment 2, Requirement 2.2: (NEI 13-02 Section 5.2 and 5.3)

All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply and instrumentation (local and remote) components.

In addition, the OCNCS UFSAR Section 6.2.7.4 describes the Failure Modes and Effects Analysis (FMEA) of the Hardened Vent System and states in part:

The 10" vent pipe which is not seismic, is provided with anti-fall down pipe supports. In the event of a seismic event, failure of the hardened vent pipes (8" and 10") may occur.

Given the severe accident conditions associated with the order, address the potential failure of the hardened vent pipes in the response to RAI-12 below.

RAI-12:

Provide a description of the differences, if any, between the guidance in NEI 13-02, Section 5.2 and 5.3, and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

EA-13-109, Attachment 2, Requirement 3.1:

The Licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of AC power.

EA-13-109, Attachment 2, Requirement 3.2:

The Licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during an extended loss of AC power.

RAI-13:

Provide a description of procedure changes and/or changes to the training curricula, if any, to support the use of the containment venting system during the requested period of extension.

As stated in Order EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (ML13143A334), Boiling-Water Reactors (BWRs) with Mark I and Mark II containments shall have a reliable, severe accident capable hardened containment venting system (HCVS). In Phase 1, licensees of BWRs with Mark I and Mark II containments shall design and install a venting system that provides venting capability from the wetwell during severe accident conditions. Severe accident conditions include the elevated temperatures, pressures, radiation levels, and combustible gas concentrations, such as hydrogen and carbon monoxide, associated with accidents involving extensive core damage, including accidents involving a breach of the reactor vessel by molten core debris.

The NRC staff requests additional information to assist in the review of the OCNCS extension request. Each of the requests below correspond to a requirement of Order EA-13-109 and/or an excerpt from the industry guidance document NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109: BWR Mark I & II Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" (ML13316A853), which was endorsed by Interim Staff Guidance Document, JLD-ISG-2013-02 (ML13304B836).

- 1.1.2 The HCVS shall be designed to minimize plant operators' exposure to occupational hazards, such as extreme heat stress, while operating the HCVS system. (NEI 13-02 4.2.5 and 4.2.6)

The OCNCS UFSAR Section 6.2.7.2.2, "Operation of the Hardened Vent System", states,

"To start the venting operation, an operator will be dispatched to align the hardened vent system by closing the Nitrogen line butterfly valve (V-23-357) and opening the vent line butterfly valve (V-23-358). Once these valves are aligned manually, the venting operation can be performed by opening either the Drywell isolation valves V-23-13 and 14 or the Torus isolation valves V-23-15 and 16 from the Control Room."

Discuss the environmental conditions to which the operators would be subjected in order to accomplish these actions. Discuss the availability of operator aids (such as ice vests or SCBA) needed to perform these tasks, if applicable.

- 1.1.3 The HCVS shall also be designed to account for radiological conditions that would impede personnel actions needed for event response. (NEI 13-02, 4.2.5)

Discuss the operator's ability to complete the tasks in the assumed dose fields. Has a site-specific analysis in accordance with the guidance of NEI 13-02, Appendices F and G been performed to determine the predicted radiological conditions which would be applicable at OCNCS following a severe accident? If not, discuss the differences between the NEI 13-02, Appendices F and G analysis and the dose assumptions used at OCNCS.

- 1.2.2 The HCVS shall discharge the effluent to a release point above main plant structures.
(NEI 13-02, 4.1.5.2.3)

NEI 13-02, 4.1.5.2.3 The release stack or structure exposed to outside should be designed or protected to withstand missiles that could be generated by the external events that screen in for the plant site using the guidance in NEI 12-06 as endorsed by JLD-ISG-12-01.

Per NEI 12-06 guidance, hurricanes and tornado hazards are applicable to Oyster Creek, and Section 3.5.1.4.1 of the OCNGS UFSAR lists potential missiles.

Provide a description of the differences, if any, between the requirements of the stated section and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension.

Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

- 1.2.4 The HCVS shall be designed to be manually operated during sustained operations from a control panel located in the main control room or a remote but readily accessible location.
(NEI 13-02, 4.2.2.1.4)

NEI 13-02, 4.2.2.1.4 The controls/control location design should preclude the need for operators to move temporary ladders or operate from atop scaffolding to access the HCVS valves or remote operating locations.

For the actions listed in the OCNGS UFSAR Section 6.2.7.2.2, "Operation of the Hardened Vent System" (quoted in 1.1.2 above), clarify whether any of the proposed operator actions require temporary ladders or operations atop scaffolding to accomplish the objectives.

- 1.2.6 The HCVS shall be capable of operating with dedicated and permanently installed equipment for at least 24 hours following the loss of normal power or loss of normal pneumatic supplies to air operated components during an extended loss of AC power.
(NEI 13-02, 4.2.2.1.1.1 and 4.2.6.1.2.2)

The subject extension request and the OCNGS UFSAR Section 6.2.7.2.2 each state that in the event of a loss of instrument air, venting operations can be performed a maximum of 6 times utilizing the permanently installed accumulators.

Provide a site-specific justification which describes how the 6 cycles of motive force available in the accumulators is sufficient to support the OCNGS procedural actions to

cope with the first 24 hours of a postulated severe accident. Include a complete description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance during the requested period of extension.

Additionally, the extension request states that, "Power for the solenoid valves is available as long as "B" battery can supply power and indefinitely once the FLEX generator restores the "B" battery charger."

What is the length of time the "B" battery can supply power to the solenoid valves before the FLEX generator is required?

Lastly, the extension request states, "If there is a loss of station air, AC, and DC power, then the current site B.5.b procedures direct manual opening of the HCVS isolation valves."

Provide a description of how the manual opening and keeping open of the containment isolation valves is accomplished.

- 1.2.8 The HCVS shall include means to monitor the status of the vent system (e.g. valve position indication) from the control panel required by 1.2.4. The monitoring system shall be designed for sustained operation during an extended loss of AC power. (NEI 13-02, 4.2.2)

Provide a complete description of the differences, if any, between the requirements of the stated section and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension.

Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

- 1.2.9 The HCVS shall include a means to monitor the effluent discharge for radioactivity that may be released from operation of the HCVS. The monitoring system shall provide indication from the control panel required by 1.2.4 and shall be designed for sustained operation during an extended loss of AC power. (NEI 13-02, 4.2.4.1.2)

Provide a description of the differences, if any, between the requirements of the stated section and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension.

Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

Also, the OCNCS UFSAR Section 6.2.7.3, "Design Evaluation of the Hardened Vent System", states,

"During venting operation coincident with the loss of offsite power, the flow to the stack is less than the design cut-off flow of 94,000 CFM of the RAGEMS. At this flow condition the RAGEMS will go to automatic default mode using the low range monitor. Since there is no fuel damage when venting on TW sequence is performed, the radiation level of the releases will be within the range of the low range monitor."

Given the severe accident conditions associated with the order (as opposed to the TW sequence referenced in the UFSAR), address whether additional actions are necessary for OCNCS to monitor effluent releases.

- 1.2.10 The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation while venting steam, hydrogen, and other non-condensable gases and aerosols. The design is not required to exceed the current capability of the limiting containment components.

NEI 13-02, 2.4.4.1 The PCPL and 545°F, is recommended as the design pressure and temperature for the drywell vent system and any common and shared portions of the vent line...

Provide a description of the differences, if any, between the requirements and/or guidance of the stated sections and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension. Include a justification for the adequacy of the proposed configuration and/or capabilities as appropriate.

- 1.2.11 The HCVS shall be designed and operated to ensure the flammability limits of gases passing through the system are not reached; otherwise, the system shall be designed to withstand dynamic loading resulting from hydrogen deflagration and detonation. (NEI 13-02, 4.1.7)

Provide a description of the differences, if any, between the requirements of the stated section and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension.

Include a description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

- 2.2 All other HCVS components shall be designed for reliable and rugged performance that is capable of ensuring HCVS functionality following a seismic event. These items include electrical power supply, valve actuator pneumatic supply and instrumentation (local and remote) components. (NEI 13-02, 5.2 and 5.3)

Provide a description of the differences, if any, between the requirements of the stated section and the actual, physical configuration and/or capabilities of the containment venting system which will be in operation during the requested period of extension.

Include a complete description of compensatory measures, if any, which will be utilized to achieve equivalent or similar capabilities as required by the order and described in the guidance.

Additionally, OCNCS UFSAR Section 6.2.7.4, "Failure Modes and Effects Analysis (FMEA) of the Hardened Vent System" states,

"The 10" vent pipe which is not seismic, is provided with anti-fall down pipe supports. In the event of a seismic event, failure of the hardened vent pipes (8" and 10") may occur."

Address this issue in your response.

- 3.1 The Licensee shall develop, implement, and maintain procedures necessary for the safe operation of the HCVS. Procedures shall be established for system operations when normal and backup power is available, and during an extended loss of AC power.
- 3.2 The Licensee shall train appropriate personnel in the use of the HCVS. The training curricula shall include system operations when normal and backup power is available, and during an extended loss of AC power.

Provide a description of procedure changes and/or changes to the training curricula, if any, to support the use of the containment venting system during the requested period of extension.

From: Lamb, John
Sent: Tuesday, June 02, 2015 3:11 PM
To: Elkhiamy, Sarah
Cc: Hughey, John; Titus, Brett; Patel, Amar; Andrews, Elizabeth; Broaddus, Doug
Subject: RESPONSE: Oyster Creek Annual Assessment Meeting (AAM) follow-up
Attachments: Responses to Public Questions - Oyster Creek AAM- May 28 2015.docx

Importance: High

Sarah,

Attached, as requested, are the responses to the questions posed by the public at the Oyster Creek AAM on May 28, 2015. JLD reviewed the Fukushima-related responses (Hardened Vent).

Thanks.
John

From: Elkhiamy, Sarah
Sent: Tuesday, June 02, 2015 9:17 AM
To: Lamb, John
Subject: FW: Oyster Creek AAM follow-up

If this helps, these are a more concise, written out form of what we need. I was thinking you may be able to help with the Paul Gunter and/or Jeff Brown questions? Thanks!

-Paul Gunter (1)

- What is the review schedule for Oyster Creek's request for extension to 2020 of the hardened vents?
 - "NRC staff expects to make a decision on the extension request in the near future."
- Requested that the NRC pass on comment that it is unacceptable to move the emergency operations for Oyster Creek to Coatesville, PA.
- Requested that the NRC should consider the recent approach that Canada has taken with regard to door-to-door distribution of KI pills to those within the ~10 km radius of nuclear plants.
 - <http://www.nuclearsafety.gc.ca/eng/resources/educational-resources/feature-articles/potassium-iodide-pills.cfm>

-Jeff Brown (2)

- Mike stated that he would get the Spent Fuel Pool Scoping Study to the individual regarding his concerns about densely packed SFP 75 feet in the air for 60 years.
 - <http://pbadupws.nrc.gov/docs/ML1335/ML13353A249.pdf>

-Ms. Goch(sp?) (3)

- How many years of experience with long term spent fuel pool storage?
- What's the current status of the boron sheets in the Oyster Creek spent fuel pool?

-Ms. Janna Torra (sp?) (4)

- What's the status of the lawsuit on the increase from 30 to 60 years for decommissioning?
 - <http://www.ens-newswire.com/ens/feb2011/2011-02-16-01.html>

Andrew Siwy, P.E.

Project Engineer | Branch 1
Region 1 | ☎:610.337.5376

From: Hughey, John
Sent: Friday, May 22, 2015 8:38 AM
To: Bowman, Eric
Cc: Bailey, Stewart; Titus, Brett; Lamb, John; Halter, Mandy; Brown, Tony
Subject: RE: Oyster Creek EA-13-109 Phase 2 20-day Notification

Thanks, Eric. Definitely interested! ☺

John Hughey
Mitigation Strategies & SFP Instrumentation
Project Manager, NRR/JLD/JOMB
US Nuclear Regulatory Commission
Phone: (301) 415-3204
Office: O13-H08
e-mail: john.hughey@nrc.gov

From: Bowman, Eric
Sent: Friday, May 22, 2015 8:24 AM
To: Hughey, John
Cc: Bailey, Stewart
Subject: Oyster Creek EA-13-109 Phase 2 20-day Notification

FYI. Not an OAR yet, but figured you might be interested.

[View ADAMS P8 Properties ML15141A120](#)
[Open ADAMS P8 Document \(E150521t104011\)](#)

R/E

Eric E. Bowman
Special Advisor
Technical Support Directorate
Japan Lessons Learned Division
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
301-415-2963
Eric.Bowman@nrc.gov

Lamb, John

From: Kennedy, Silas R
Sent: Tuesday, June 28, 2016 4:06 PM
To: LAMB, JOHN G
Cc: ANDREWS, ELIZABETH N; PATEL, AMAR C; SHAFFER, Steve W
Subject: RE: Mid-cycle input
Attachments: OC ROP-16 EOC Plant Performance SummaryFINAL2.docx

John,

Also, could you provide the most recent version of the "Proposed Oyster Creek Decommissioning Submittal List."

The last one you provided is on the last two pages of the attached document.

Thanks!

Silas

From: LAMB, JOHN G
Sent: Tuesday, June 28, 2016 10:39 AM
To: SHAFFER, Steve W <Steve.Shaffer@nrc.gov>
Cc: Kennedy, Silas R <Silas.Kennedy@nrc.gov>; ANDREWS, ELIZABETH N <Elizabeth.Andrews@nrc.gov>; PATEL, AMAR C <Amar.Patel@nrc.gov>
Subject: RE: Mid-cycle input

Steve,

Below are my inputs.

Thanks.
John

- **Project Manager's Performance Observations**
Exelon licensing submittals for Oyster Creek have generally been submitted in a timely manner, thus providing sufficient time for NRR to perform its reviews. In addition, the quality of the submittals has generally been acceptable without requiring extensive requests for additional information.

Also note that the NRC staff is currently reviewing the Oyster Creek preliminary decommissioning cost estimate and expects to complete its review by the end of February August 2016.

From: SHAFFER, Steve W
Sent: Tuesday, June 28, 2016 10:33 AM
To: LAMB, JOHN G <John.Lamb@nrc.gov>
Cc: Kennedy, Silas R <Silas.Kennedy@nrc.gov>
Subject: Mid-cycle input

John:

Could you provide us your PM insights for OC for their Mid-cycle PPS. Also, on page 8 of the attached draft package, we have a line regarding the preliminary decommissioning cost estimate review. Could get me an update on this.

Thanks,

Steve

Oyster Creek Generating Station

ROP-16 End-of-Cycle Plant Performance Summary
January 1, 2015 – December 31, 2015

Performance Overview and Previous Assessment Results

Unit 1	
Current Action Matrix Column Basis	Licensee Response Column All Green findings and performance indicators
Previous Action Matrix Column	Regulatory Response Column
Previous Basis	One White finding for failure of the No. 2 EDG fan shaft (4Q2014) and One White Performance Indicator for Unplanned Scrams per 7000 Critical Hours (2Q2015)

Cross-Cutting Summary	
Cross-Cutting Themes	None
Cross-Cutting Issues	None
Previous Cross-Cutting Themes	None
Previous Cross-Cutting Issues	None

Deviations	
None	

Assessment Letter Information	
Assessment Letter Signature	Division Director

Power History and Event Declarations

03/22/2015	Reactor scram due to high average power range monitor flux caused by an electronic pressure regulator failure. After repairs to the electronic pressure regulator, operators commenced plant startup on March 25, 2015, and returned to full power operation on March 28, 2015. (PI Impact – Unplanned Scrams)
05/07/2015	Reactor scram due to a main turbine trip resulting from a main transformer digital protection relay system failure. Cause of failure unknown and a digital protection relay has been bypassed and replaced with a sudden pressure relay. After the completion of the modification, operators commenced plant startup on May 12, 2015, and returned to full power operation on May 15, 2015. (PI Impact – Unplanned Scrams)

Safety-Significant Inspection and Performance Indicator Results

Issue	The inspectors identified a finding and an associated violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," because Exelon failed to review the suitability of application of a new EDG belt maintenance process that was essential to a safety-related function of the EDGs and to verify the acceptance criteria of that process. Specifically, an evaluation would have
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	reasonably considered the stress placed on the fan shaft due to increasing the belt tension and evaluated the margin in the shaft design considering the controls placed on shaft dimensions, material and surface finish. Additionally, an evaluation would likely have involved discussion with the EDG vendor on this change.
Safety Significance	White
Date	4Q2014
Supplemental Inspection Status	95001 Inspection Report issued 10/15/2015.
Issue	Unplanned Scrams per 7000 Critical Hours Performance Indicator
Safety Significance	White
Date	2Q2015
Supplemental Inspection Status	95001 Inspection Report issued 11/05/2015.
Issue	A finding and associated violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," and Technical Specifications 3.4.B, "Automatic Depressurization System," was identified by Exelon for the failure to establish adequate measures for selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the electromatic relief valves. The violation was determined to meet IMC 0305, Section 11.05, criteria for treatment as an old design issue.
Safety Significance	Yellow/Old Design Issue
Date	1Q2015
Supplemental Inspection Status	95002 Inspection Report issued 12/17/2015.

Traditional Enforcement Summary

- Severity Level IV NCV (Impeding the Regulatory Process), issued May 14, 2015
The inspectors identified a Severity Level IV NCV of 10 CFR 50.9(a) in that Exelon did not provide complete information in reports submitted per 10 CFR 50.72 and 10 CFR 50.73. Specifically, a licensee event report (LER) submitted on November 18, 2014, did not discuss a separate, partially opened secondary containment door that was discovered during the same time frame, which could have prevented the fulfillment of the safety function of secondary containment, and therefore was required to be discussed in the original LER. Exelon entered this issue into the Corrective Action Program (CAP) to issue an LER revision. IP 92702 is not required, per IMC 0305, because the issue will be inspected under IP 71153 closeout of the revised LER.
- Severity Level IV NCV (Impeding the Regulatory Process), issued May 27, 2015
The inspectors identified a Severity Level IV non-cited violation (NCV) of Technical Specification (TS) 6.9.1.f.2 in that Exelon did not obtain NRC approval prior to using a specific analytical method to determine the core operating limits. Specifically, Exelon used

an analytical method (TRACG04P) to determine the core operating limits (the average power range monitor protection settings which were identified in the Core Operating Limits Report (COLR)); however, that particular analytical method was not previously reviewed and approved by the NRC prior to Exelon's use. Exelon entered this issue into the Corrective Action Program (CAP) to evaluate the condition. This violation did not involve willfulness. Therefore, IP 92702 is not required to be performed.

Potential Safety-Significant Inspection Findings

Issue	On November 5, 2015, EDG No. 1 failed to start due to a failed speed relay during a routine bi-weekly surveillance test. The relay coil is fed by the zero speed relay (ZSR). The ZSR did not drop out as it should have. The purpose of the ZSR is to confirm the engine is stopped before it receives another start signal. They replaced the ZSR and CR2A, which is a surge compressor-rectifier that runs parallel to the ZSR, and successfully performed a full load test on the EDG.
Potential Safety Significance	White
NRC Next Steps	DRS PI&R Sample scheduled for 2Q2016.

Issue	On January 4, 2016, Oyster Creek declared the No. 1 EDG inoperable after it automatically shut down during a routine bi-weekly surveillance due to a coolant leak causing low cooling water pressure. Oyster Creek determined that a hose that connects from the cooling water tank (expansion tank) to the suction piping of the cooling water pump had a tear. Oyster Creek repaired the diesel by replacing the hose and completed the PMT on January 5, 2016.
Potential Safety Significance	Potentially greater than Green
NRC Next Steps	Residents follow up via baseline inspection program for 1Q2016. DRS is supporting.

Performance Indicators Close to Threshold

- Mitigating Systems Performance Index, Emergency AC Power System - The current value for Emergency AC Power is 4.20E-07 and the threshold is greater than 1.0E-06. The EDG failures listed above are the cause of challenges to this PI.

Open Unresolved Items

- There are no open unresolved items.

Open OI Investigations

- There are no open OI investigations.

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Third Party Reviews

- There were no third party reviews conducted during the assessment period. The next WANO inspection is scheduled for February 22, 2016.

Analysis of Cross-Cutting Areas (for finding specifics, refer to the PIM)

Area	Aspect	1Q15	2Q15	3Q15	4Q15	Total
Human Performance	H.1 Resources					
	H.2 Field Presence					
	H.3 Change Management					
	H.4 Teamwork					
	H.5 Work Management	1				1
	H.6 Design Margins					
	H.7 Documentation					
	H.8 Procedure Adherence	1				1
	H.9 Training		1			1
	H.10 Bases for Decisions					
	H.11 Challenge the Unknown		2			2
	H.12 Avoid Complacency					
	H.13 Consistent Process		1			1
	H.14 Conservative Bias					
	Total (Backstop)	2	4			6
PI&R	P.1 Identification					
	P.2 Evaluation		1		1	2
	P.3 Resolution					
	P.4 Trending					
	P.5 Operating Experience					
	P.6 Self-Assessment					
	Total (Backstop)		1		1	2
SCWE	S.1 SCWE Policy					
	S.2 Alternate Process for Raising Concerns					
	S.3 Free Flow of Information					
	The licensee has received a chilling effect letter					
	The licensee has received an escalated (SLIII or higher) enforcement action or order involving discrimination.					

Human Performance and PI&R

The branch did not identify any cross-cutting themes during this assessment period.

Summary from Recent PI&R Inspection

During the most recent PI&R team inspection completed on November 21, 2014, the inspectors concluded that Exelon was generally effective in identifying, evaluating, and resolving problems. Exelon personnel identified problems, entered them into the corrective action program at a low threshold, and in general, prioritized issues commensurate with their safety significance. Exelon appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. The inspectors also determined that Exelon implemented corrective actions to address the problems identified in the corrective action program in a timely manner.

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The inspectors concluded that Exelon adequately identified, reviewed, and applied relevant industry operating experience to Oyster Creek operations. In addition, based on those items selected for review, the inspectors determined that Exelon's self-assessments and audits were thorough.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues, nor did they identify any conditions that could have had a negative impact on the site's safety conscious work environment.

No findings were identified.

Safety Conscious Work Environment Concerns

The branch did not identify any safety conscious work environment concerns during this assessment period.

Planned Refueling Outages, Temporary Instructions, and Other Significant Activities

TI-190 Inspection of the Licensee's Proposed Interim Actions as a result of the Near-term Task Force Recommendation 2.1 Flooding Reevaluation	05/02/2016 – 05/06/2016
TI 2800/041, 10 CFR Part 37 Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material at Facilities with a 10 CFR 73 Physical Protection Program	04/18/2016 – 04/22/2016
CDBI	06/13/2016 – 07/15/2016
Refueling Outage (1R26)	09/19/2016 – 10/06/2016
Biennial PI&R Inspection	10/31/2016 – 11/18/2016
(b)(5)	

Proposed Appendix C Inspections through December 31, 2017

IP 92709, Licensee Plans for Coping with Strikes (UGSOA – Security)	November 2016
IP 60855.1, Operation of an ISFSI at Operating Plants	04/25/2016 – 04/29/2016

Planned 2016 PI&R Samples

Core Spray Main Pump B Wire Failure (IR 2388760 - Titled, "Expected response not obtained during ST 610-3.215") – The resident inspector noticed this issue while going through the NSRB package and determined this could be a good sample for corrective actions (aging cables), past operability, and extent of condition.	DRS	1Q2016
Corrosion Rate Change for ESW Pipe Integrity Program (IR 1490523) The average corrosion rate changed from 0.02"/year to 0.037"/year and this PI&R sample would review piping that has been replaced and piping wall thickness of	DRS	1Q2016

remaining piping that is scheduled to be replaced to ensure corrective actions are adequate based on the revised corrosion rate.		
No.1 EDG Failure to Start (IR 2584237) On November 5, 2015, EDG No. 1 failed to start due to a failed speed relay. If there is a performance deficiency this issue could be a white finding.	DRS	2Q2016
High Drywell Temperatures High drywell temperature issues due to drywell recirc fans efficiency issues potentially caused by damper issues (IR 2473100) and historically clogged tubes. Residents looked into using 71111.15 last year, but a different perspective may be warranted.	DRS	2Q2016 or 3Q2016
CRDM O-ring Leakage CRDM O-ring leakage creating greater than 1 gpm UIL (IR 2475490). Residents have looked into this using 71111.22 but a different perspective may be warranted.	DRS	2Q2016 or 3Q2016
(b)(5)		

Other Items of Interest

- **Project Manager's Performance Observations**
Exelon licensing submittals for Oyster Creek have generally been submitted in a timely manner, thus providing sufficient time for NRR to perform its reviews. In addition, the quality of the submittals has generally been acceptable without requiring extensive requests for additional information.
- **Exelon Nuclear Oversight (NOS) Restructure**
In 2016, Exelon has created a new organization called the Organizational Effectiveness and Integrated Performance Assessment (OR&IPA) which will significantly restructure Exelon's on-site NOS organization and function. Although all regulatory-required functions of Audit, Employee Concerns Program (ECP), and Quality Verification (QV) will remain within the NOS organization, Exelon will reduce the number of onsite assessors to one assessor and will create multi-disciplined assessment teams to visit the site on a semi-annual basis. Insufficient run time has occurred to determine if there will be a decrease in effectiveness within Exelon's NOS organization.
- **Hardened Vent Order**
By letter dated January 7, 2011 (ADAMS Accession No. ML110070507), Exelon plans to permanently shut down Oyster Creek and cease operation no later than December 31, 2019. Exelon submitted a letter, dated June 2, 2014 (ADAMS Accession No. ML14153A421), requesting an extension for the plant modifications that would be required to meet the Mitigating Strategies Order Phase 1 (due in Fall 2016 and no later than June 30, 2018), and Phase 2 (due in the Fall 2018 and no later than June 30, 2019) severe accident capable vent requirements specified in this Order. The NRC staff issued a Request for Additional Information (RAI) by letter dated August 27, 2014 (ADAMS Accession No. ML14220A027). Exelon responded to the RAI by letter dated September 26, 2014 (ADAMS Accession No. ML14272A323). Exelon provided a supplement to the RAI by letter dated November 25, 2014 (ADAMS Accession No. ML14329A263). The NRC staff determined

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that good cause existed for the Phase 1 schedule relaxation until January 31, 2020, and has granted the request by letter dated November 16, 2015 (ADAMS Accession No. ML15092A159).

- **Pre-planning for Decommissioning**

Region I management has reviewed and approved an inspection and oversight plan for OC. PB6 will assess Exelon's performance in several identified areas of potential concern (preventive maintenance, corrective maintenance and surveillance testing deferrals, staff attrition, corrective action backlog, etc.) using the IP 71152 semi-annual trend reviews. These samples will be performed by DRP and DRS inspectors. The results of these inspections will support decision-making at the mid-cycle and end-of-cycle meetings regarding the need for deviations from nominal inspection samples/hours and/or additional inspection guidance for sample selections for the inspection modules in Appendix A. Increased NRC senior management involvement, through site visits and phone calls, will also be considered based on the results of these discussions.

During the 4th Quarter 2015, inspectors conducted a semi-annual trend review in accordance to the approved Oyster Creek inspection and oversight plan. The inspection reviewed a sampling of corrective maintenance backlogs, control room deficiency tags, open operability evaluations, and operator work-arounds. The inspector did not identify any concerns and the branch does not recommend adjustments to the inspection plan in relation to potential performance in light of the Oyster Creek 2019 shutdown. Also note that, the NRC staff is currently reviewing the Oyster Creek preliminary decommissioning cost estimate and expects to complete its review by the end of February 2016.

On September 21, 2015, a Category 1 public meeting was held between the NRC and Exelon to discuss the pre-submittal decommissioning licensing actions for Oyster Creek. Exelon developed a proposed list of decommissioning licensing actions (see attached list).

Staffing Levels and Attrition Rates

The site's current staffing count for Oyster Creek is 575 employees. The budget called for 583 at the end of 2015 and 520 employees at the end of 2016. The licensee's staffing plan is to reduce the number of employees to 475 by the end of 2017 and remain at those levels until the end of 2019. Oyster Creek offered a retention package (2016-2020) to their eligible employees (non-union) and approximately 70% of the employees have accepted.

Licensed Operator Pipeline Status

Oyster Creek's last new licensed operator class is projected to complete in the 1st quarter 2016. This class includes (11 SROs). At the completion of this class (assuming they all pass their examinations), Oyster Creek will have 34 SRO's. Of those 34 SRO's, 28 have accepted the retention package.

Plant Investment in Refurbishment

Exelon continues to invest capital in maintaining reliability at Oyster Creek. Such projects include replacing a condensate pump and motor and emergency service water piping. Oyster Creek will enter refueling outage 1R26 in September 2016, and the major outage work include reloading the core, replace 3 EMRVs and 5 SRVs, and approximately 50 valve actuators.

Corrective Action Program Diligence

In general, Exelon is maintaining proper focus on corrective actions at Oyster Creek. The overall inventory (total CRs) has remained steady in recent years except for an increase in

CRs in 2014 due to a refueling outage. There were 8964 CRs in 2013, 9728 in 2014, and 8739 in 2015. Similarly, there does not appear to be a significant decline in the performance of root or apparent causes (2014 was an outage year therefore number increased). 5 root causes, 18 apparent cause evaluations, and 27 equipment apparent cause evaluations were performed in 2013. 8 root causes, 34 apparent cause evaluations, and 24 equipment apparent cause evaluations were performed in 2014. 6 root causes, 13 apparent cause evaluations, and 10 equipment apparent cause evaluations were performed in 2015.

Maintenance Backlogs

Maintenance backlogs appear to be well monitored and controlled by Exelon. There were no online corrective maintenance backlog for critical equipment in December 2015 and in January 2016. The overall corrective maintenance outage backlog was 47 in December 2015 and in January 2016. The station is averaging two maintenance rework per month.

Key Messages

- **(New) Declining Emergency Diesel Generator Reliability:** Residents noticed a downward trend of emergency diesel generator reliability based on numerous unrelated equipment problems. Exelon plans on putting a team together to look at the aggregate issues related to the EDG and determine any common issues and improve EDG reliability. :
 - No. 1 EDG failure (11/5/15) – No. 1 EDG failed to start during a normal surveillance test. The zero speed relay (ZSR) did not de-energize as it should have. The purpose of the ZSR is to confirm the engine is stopped before it receives another start signal. A PIR sample is scheduled for the 2nd quarter 2015.
 - No. 1 EDG failure to run (1/4/16) – No. 1 EDG failed 40 minutes into the one hour surveillance test. A hose that connects the cooling water tank to the suction piping of the cooling water pump had a tear. (1st quarter resident report – normal baseline)
 - No. 2 EDG – silver content was found in a lube oil sample which Oyster Creek management decided to change all 20 cylinders.
- **(New) Improving Operational Department Performance and Standards.** Residents have noticed an improvement of operator performance and standards in the second half of 2015. Oyster Creek has implemented a performance improvement plan based on issues that occurred in the first half of 2015 (downward trend of operator performance and standards in operability screenings, system knowledge, and procedure compliance) and indications have shown improvement.
- **(New) Improving Conservative Decision Making.** Recent equipment issues have indicated improved conservative decision making and a change in philosophy by Exelon such as component replace (20 power packs for the EDG after silver content was found in the lube oil and cam shaft for a flaw indication) vice evaluating degraded components, down powering to limit risk when resetting the AVR, and running the redundant EDG when an EDG is found inoperable vice a common cause evaluation (change to their philosophy).

Attachments

-
1. Plant Specific Action-Matrix History Chart
 2. Plant Issues Matrix (Previous Four Quarters, all cornerstones)
 3. RPS Report 22 and RPS Report 24 (Upcoming 24 Months)
-

10 | Oyster Creek Generating Station

4. Performance Indicators Close to threshold, as applicable
 5. Proposed Oyster Creek Decommissioning Submittal List
-

Oyster Creek Generating Station Unit 1 Action Matrix History Chart

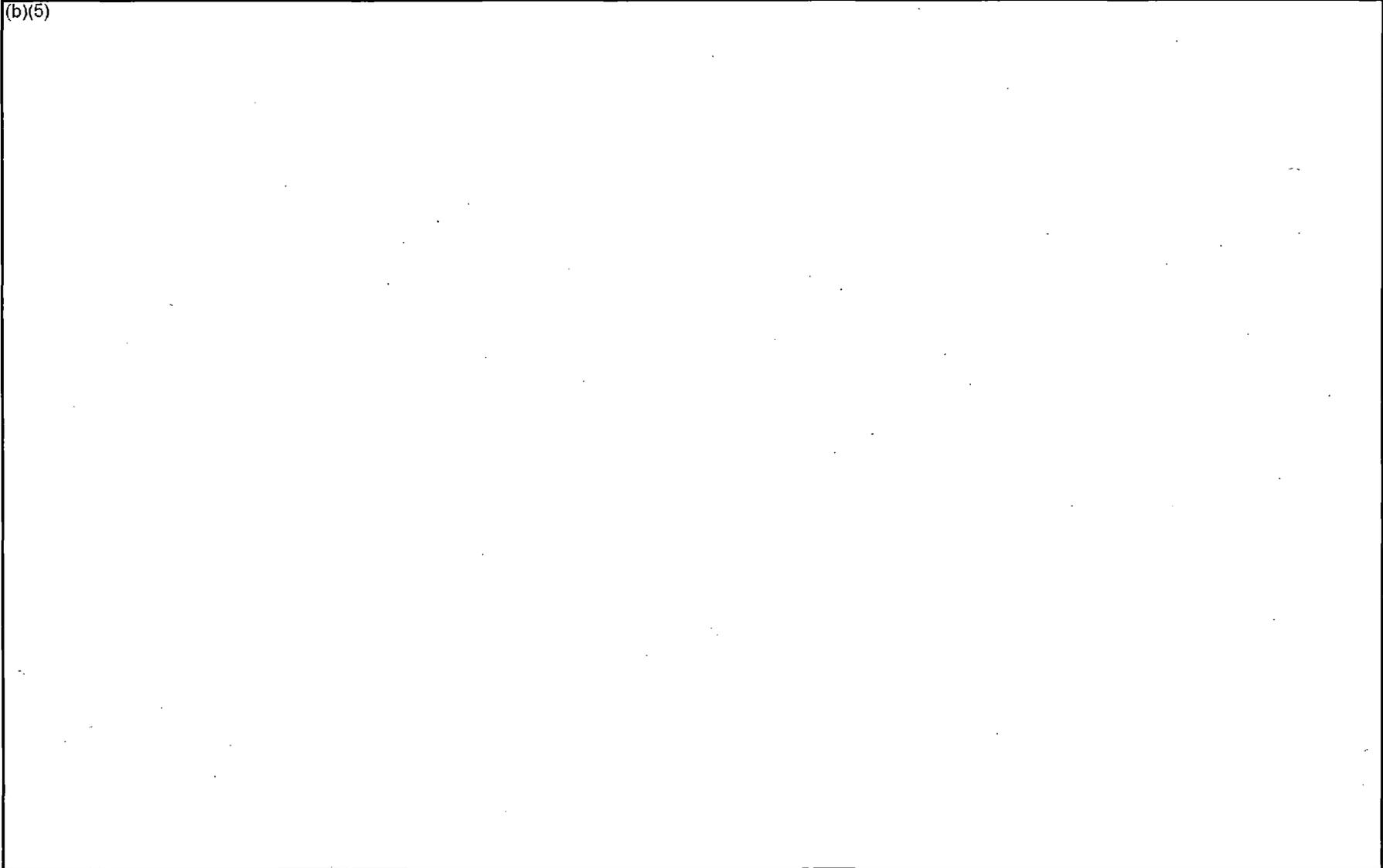
	CY 2012				CY 2013				CY 2014				CY 2015			
	Q1	Q2 ROP-13 MC	Q3	Q4 ROP-13 EOC	Q1	Q2 ROP-14 MC	Q3	Q4 ROP-14 EOC	Q1	Q2 ROP-15 MC	Q3	Q4 ROP-15 EOC	Q1	Q2 ROP-16 MC	Q3	Q4 ROP-16 EOC
IE											W-1			W-3		
MS												W-2	W-2 Y-1*	W-2 Y-1*	W-2 Y-1*	Y-1
BI																
EP																
PUB RAD																
OCC RAD																
SEC																
Action Matrix Column	LR	LR	LR	LR	LR	LR	LR	LR	LR	LR	RR	RR	RR	RR	RR	LR
CCI*																
Theme (no CCI)*																

- W-1 Unplanned Scrams per 7000 Critical Hours Performance Indicator (95001 Completed – December 2014)
- W-2 Emergency Diesel Generator Fan Shaft Failure Violation (95001 Completed – October 2015)
- Y-1* Electromatic Relief Valve Failures Violation (Old Design Issue; did not aggregate with other inputs in determining the Action Matrix column or required NRC response; 95002 Completed December 2015)
- W-3 Unplanned Scrams per 7000 Critical Hours Performance Indicator (95001 Completed – November 2015)

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Proposed Oyster Creek Decommissioning Submittal List

(b)(5)



(b)(5)

Lamb, John

From: SHAFFER, Steve W
Sent: Tuesday, June 28, 2016 10:33 AM
To: LAMB, JOHN G
Cc: Kennedy, Silas R
Subject: Mid-cycle input
Attachments: OC ROP-17 Mid-Cycle Plant Performance Summary.docx

John:

Could you provide us your PM insights for OC for their Mid-cycle PPS. Also, on page 8 of the attached draft package, we have a line regarding the preliminary decommissioning cost estimate review. Could get me an update on this.

Thanks,

Steve

Oyster Creek Generating Station

ROP-17 Mid-Cycle Plant Performance Summary
July 1, 2015 – June 30, 2016

Performance Overview and Previous Assessment Results

Unit 1	
Current Action Matrix Column	Regulatory Response Column
Basis	One White finding for EDG No. 1 cooling water system flexible coupling hose failure (1Q2016).
Previous Action Matrix Column	Licensee Response Column
Previous Basis	All Green findings and performance indicators

Cross-Cutting Summary	
Cross-Cutting Themes	None
Cross-Cutting Issues	None
Prev. Cross-Cutting Themes	None
Prev. Cross-Cutting Issues	None

Deviations	
None	

Assessment Letter Information	
Assessment Letter Signature	Division Director

Power History and Event Declarations

April/May, 2016	On April 24, 2016, operators commenced a reactor shutdown and entered a planned maintenance outage (1M38). On April 29 th , operators commenced a reactor startup following completion of the planned maintenance outage. On April 30 th , operators manually scrambled the reactor due to a rise in unidentified leak rate caused by 'D' reactor recirculation seal leakage (PI Impact – Unplanned Scrams). On May 4 th , operators commenced a reactor startup following reactor recirculation seal repairs and subsequently shutdown the reactor on May 5 th due to another rise in unidentified leak rate. The rise in leakage was caused by an incorrect clearance of the 'D' reactor recirculation pump coupling internals. Operators returned the unit to 100 percent power on May 13 th following repairs on the 'D' recirculation pump.
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Safety-Significant Inspection and Performance Indicator Results

Issue	The inspectors identified a White finding and associated violation of Title 10 of the <i>Code of Federal Regulations</i> (CFR), Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because Exelon did not appropriately prescribe instructions or procedures for maintenance on the emergency diesel generator (EDG) No. 1 cooling water system to ensure the EDG cooling flexible coupling hose was maintained to support the EDG safety
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2 | Oyster Creek Generating Station

	function. Specifically, Exelon did not have appropriate work instructions to replace the EDG cooling flexible coupling hoses every 12 years as specified by Exelon's procedure and vendor information. As a result, the flexible coupling hose was in service for approximately 22 years and subjected to thermal degradation and aging that eventually led to the failure of EDG No. 1 during operation on January 4, 2016. As a consequence of this inappropriate work instruction issue, Exelon violated Technical Specification 3.7.C because EDG No. 1 was determined to be inoperable for greater than the technical specification allowed outage time of seven days.
Safety Significance	White
Date	1Q2016
Supplemental Inspection Status	The IP 95001 has been scheduled for 3Q2016.
Issue	On November 9, 2015, EDG No. 1 failed to start due to a failed speed relay during a routine bi-weekly surveillance test. The relay coil is fed by the zero speed relay (ZSR). The ZSR did not drop out as it should have. The purpose of the ZSR is to confirm the engine is stopped before it receives another start signal. They replaced the ZSR and CR2A, which is a surge compressor-rectifier that runs parallel to the ZSR, and successfully performed a full load test on the EDG.
Safety Significance	White
Date	2Q2016
Supplemental Inspection Status	The NRC determined that it was not reasonable for Exelon to have been able to foresee and prevent this violation of NRC requirements, and as such, no performance deficiency existed. Therefore, the NRC has decided to exercise enforcement discretion in accordance with Sections 2.2.4 and 3.5 of the NRC Enforcement Policy and refrain from issuing enforcement action for the violation of TS (EA-16-102). Further, because Exelon's actions did not contribute to this violation, it will not be considered in the assessment process or the NRC Action Matrix. As a result, a supplemental inspection is not required.

Traditional Enforcement Summary

- There are no traditional enforcement findings.

Potential Safety-Significant Inspection Findings

- There are no pending potential greater-than-green findings.

Performance Indicators Close to Threshold

- Mitigating Systems Performance Index, Emergency AC Power System – The current value for Emergency AC Power is 6.1E-07 and the threshold is greater than 1E-06. The EDG failures listed above are the cause of challenges to this PI.

Open Unresolved Items

- There are no open unresolved items.

Open OI Investigations

- (b)(5)

Third Party Reviews

- INPO Report Review (documented in NRC Inspection Report 2016003) – The inspectors reviewed the final report for the INPO plant assessment of Oyster Creek Generating Station conducted in 1Q2016. The inspectors evaluated these reports to ensure that NRC perspectives of Oyster Creek performance were consistent with any issues identified during the assessments. The inspectors also reviewed these reports to determine whether INPO identified any significant safety issues that required further NRC follow-up.

Analysis of Cross-Cutting Areas (for finding specifics, refer to the PIM)

Area	Aspect	3Q15	4Q15	1Q16	2Q16	Total
Human Performance	H.1 Resources					
	H.2 Field Presence					
	H.3 Change Management					
	H.4 Teamwork					
	H.5 Work Management					
	H.6 Design Margins					
	H.7 Documentation					
	H.8 Procedure Adherence			1		1
	H.9 Training					
	H.10 Bases for Decisions					
	H.11 Challenge the Unknown					
	H.12 Avoid Complacency					
	H.13 Consistent Process					
	H.14 Conservative Bias					
	Total (Backstop)			1		1
PI&R	P.1 Identification			1		1
	P.2 Evaluation		1			1
	P.3 Resolution					
	P.4 Trending					
	P.5 Operating Experience					
	P.6 Self-Assessment					
	Total (Backstop)		1	1		2
SCWE	S.1 SCWE Policy					
	S.2 Alternate Process for Raising Concerns					
	S.3 Free Flow of Information					
	The licensee has received a chilling effect letter					
	The licensee has received an escalated (SLIII or higher) enforcement action or order involving discrimination.					

Human Performance and PI&R

The branch did not identify any cross-cutting themes during this assessment period.

Summary from Recent PI&R Inspection

During the most recent PI&R team inspection completed on November 21, 2014, the inspectors concluded that Exelon was generally effective in identifying, evaluating, and resolving problems. Exelon personnel identified problems, entered them into the corrective action program at a low threshold, and in general, prioritized issues commensurate with their safety significance. Exelon appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. The inspectors also determined that Exelon implemented corrective actions to address the problems identified in the corrective action program in a timely manner.

The inspectors concluded that Exelon adequately identified, reviewed, and applied relevant industry operating experience to Oyster Creek operations. In addition, based on those items selected for review, the inspectors determined that Exelon's self-assessments and audits were thorough.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues, nor did they identify any conditions that could have had a negative impact on the site's safety conscious work environment.

Safety Conscious Work Environment Concerns

The branch did not identify any safety conscious work environment concerns during this assessment period.

Planned Refueling Outages, Temporary Instructions, and Other Significant Activities

Refueling Outage (1R26)	09/19/2016 – 10/06/2016
Biennial PI&R Team Inspection	10/31/2016 – 11/18/2016

Proposed Appendix C Inspections through June 30, 2017

- There are no proposed Appendix C inspections.

Planned 2016 PI&R Samples

Core Spray Main Pump B Wire Failure (IR 2388760 - Titled, "Expected response not obtained during ST 610-3.215") – The resident inspector noticed this issue while going through the NSRB package and determined this could be a good sample for corrective actions (aging cables), past operability, and extent of condition.	DRS	Complete
Corrosion Rate Change for ESW Pipe Integrity Program (IR 1490523) The average corrosion rate changed from 0.02"/year to 0.037"/year and this PI&R sample would review piping that has been replaced and piping wall thickness of remaining piping that is scheduled to be replaced to ensure corrective actions are adequate based on the revised corrosion rate.	DRS	Complete
No.1 EDG Failure to Start (IR 2584237) On November 9, 2015, EDG No. 1 failed to start due to a failed speed relay. If there is a performance deficiency this issue could be a white finding.	DRS	Complete
High Drywell Temperatures High drywell temperature issues due to drywell recirc fans efficiency issues potentially caused by damper issues (IR 2473100) and historically clogged tubes. Residents looked into using 71111.15 last year, but a different perspective may be warranted.	DRS	3Q2016

CRDM O-ring Leakage CRDM O-ring leakage creating greater than 1 gpm UIL (IR 2475490). Residents have looked into this using 71111.22 but a different perspective may be warranted.	DRS	Complete
No. 1 EDG Failure to Run On January 4, 2016, EDG No. 1 failed during a surveillance test due to a cooling hose failure. White risk significance.	DRP	Complete

Other Items of Interest

- **Project Manager's Performance Observations**
Exelon licensing submittals for Oyster Creek have generally been submitted in a timely manner, thus providing sufficient time for NRR to perform its reviews. In addition, the quality of the submittals has generally been acceptable without requiring extensive requests for additional information.
- **Hardened Vent Order**
Exelon submitted a letter, dated June 2, 2014 (ADAMS Accession No. ML14153A421), requesting an extension for the plant modifications that would be required to meet the Mitigating Strategies Order Phase 1 (due in Fall 2016 and no later than June 30, 2018), and Phase 2 (due in the Fall 2018 and no later than June 30, 2019) severe accident capable vent requirements specified in this Order. The NRC staff determined that good cause existed for the Phase 1 schedule relaxation until January 31, 2020, and has granted the request by letter dated November 16, 2015 (ADAMS Accession No. ML15092A159). The NRC staff is continuing its review of the extension request for schedule relaxation of the phase two (wetwell) requirements.
- **Pre-planning for Decommissioning**
Region I management has reviewed and approved an inspection and oversight plan for OC. PB6 will assess Exelon's performance in several identified areas of potential concern (preventive maintenance, corrective maintenance and surveillance testing deferrals, staff attrition, corrective action backlog, etc.) using the IP 71152 semi-annual trend reviews. These samples will be performed by DRP and DRS inspectors. The results of these inspections will support decision-making at the mid-cycle and end-of-cycle meetings regarding the need for deviations from nominal inspection samples/hours and/or additional inspection guidance for sample selections for the inspection modules in Appendix A. Increased NRC senior management involvement, through site visits and phone calls, will also be considered based on the results of these discussions.

During the 2nd Quarter 2016, inspectors conducted a semi-annual trend review in accordance to the approved Oyster Creek inspection and oversight plan. The inspection reviewed a sampling of corrective maintenance backlogs, control room deficiency tags, open operability evaluations, and operator work-arounds. The inspector did not identify any concerns and the branch does not recommend adjustments to the inspection plan in relation to potential performance in light of the Oyster Creek 2019 shutdown. Also note that, the NRC staff is currently reviewing the Oyster Creek preliminary decommissioning cost estimate and expects to complete its review by the end of August 2016.

Staffing Levels and Attrition Rates

The site's current staffing count for Oyster Creek is 575 employees. The budget called for 583 at the end of 2015 and 520 employees at the end of 2016. The licensee's staffing plan is to reduce the number of employees to 475 by the end of 2017 and remain at those levels

until the end of 2019. Oyster Creek offered a retention package (2016-2020) to their eligible employees (non-union) and approximately 70% of the employees have accepted.

Licensed Operator Pipeline Status

Oyster Creek's last new licensed operator class was completed in the 1st quarter 2016. This class includes (11 SROs). This class passed all their examinations and as a result, Oyster Creek has 34 SRO's. Of those 34 SRO's, 28 have accepted the retention package.

Plant Investment in Refurbishment

Exelon continues to invest in capital and maintaining reliability at Oyster Creek. Oyster Creek entered a maintenance outage starting on April 24, 2016, and ending April 30, 2016. Major work completed included drywell sump pump replacement, feedwater heater repairs, control rod drive mechanism replacement, and 'D' recirculation pump seal replacement.

Oyster Creek outage is scheduled from September 19, 2016, to October 6, 2016. Major work planned includes removal and replacement of a condensate motor and pump; removal, replacement, and testing of EMRVs; main turbine inspections; replacement of 14 CRDMs; and cleaning and eddy current testing of the condenser waterbox.

Corrective Action Program Diligence

In general, Exelon is maintaining proper focus on corrective actions at Oyster Creek. The overall inventory (total CRs) has remained steady in recent years except for an increase in CRs in 2014 due to a refueling outage. There were 8964 CRs in 2013, 9728 in 2014, 8739 in 2015, and 2896 halfway through 2016. Similarly, there does not appear to be a significant decline in the performance of root or apparent causes (2014 was an outage year therefore number increased). 5 root causes, 18 apparent cause evaluations, and 27 equipment apparent cause evaluations were performed in 2013. 8 root causes, 34 apparent cause evaluations, and 24 equipment apparent cause evaluations were performed in 2014. 6 root causes, 13 apparent cause evaluations, and 10 equipment apparent cause evaluations were performed in 2015. 2 root causes, 11 apparent cause evaluations, and 3 equipment apparent cause evaluations were performed in the first half of 2016.

Maintenance Backlogs

Maintenance backlogs appear to be well monitored and controlled by Exelon. There were no online corrective maintenance backlog for critical equipment in the first half of 2016. The overall corrective maintenance outage backlog was 44 in June 2016. The station is averaging one maintenance rework per month.

Key Messages

- **(Continuing) Declining Emergency Diesel Generator Reliability:** Residents noticed a downward trend of emergency diesel generator reliability based on numerous unrelated equipment problems. Exelon's team of industry experts which looked at the aggregate issues related to the EDG, a number of corrective actions to improve EDG reliability. :
 - No. 1 EDG failure (11/5/15) – No. 1 EDG failed to start during a normal surveillance test. The zero speed relay (ZSR) did not de-energize as it should have. The purpose of the ZSR is to confirm the engine is stopped before it receives another start signal. A PIR sample was completed in the 2nd quarter 2016.

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- No. 1 EDG failure to run (1/4/16) – No. 1 EDG failed 40 minutes into the one hour surveillance test. A hose that connects the cooling water tank to the suction piping of the cooling water pump had a tear. (1st quarter resident report – normal baseline)
- No. 2 EDG – silver content was found in a lube oil sample which Oyster Creek management decided to change all 20 cylinders.

The residents have reviewed a sample of corrective actions and have no immediate safety concerns that were identified by Exelon. A 95-001 inspection is scheduled for the last week of July and the branch plans to include a PI&R sample on diesel reliability in 2017.

Attachments

-
1. Plant Specific Action-Matrix History Chart
 2. Draft Mid-Cycle Assessment Letter
 3. Follow-up Assessment Letters issued since the 2015 EOC Assessment Letter, if applicable
 4. Plant Issues Matrix (Previous Four Quarters, all cornerstones)
 5. RPS Report 22 and RPS Report 24 (Upcoming 24 Months)
 6. Performance Indicators Close to threshold, as applicable
-

Oyster Creek Generating Station Unit 1 Action Matrix History Chart

	CY 2013				CY 2014				CY 2015				CY 2016			
	Q1	Q2 ROP-14 MC	Q3	Q4 ROP-14 EOC	Q1	Q2 ROP-15 MC	Q3	Q4 ROP-15 EOC	Q1	Q2 ROP-16 MC	Q3	Q4 ROP-16 EOC	Q1	Q2 ROP-17 MC	Q3	Q4 ROP-17 EOC
IE							W-1			W-3						
MS								W-2	W-2 Y-1*	W-2 Y-1*	W-2 Y-1*		W-4	W-4		
BI																
EP																
PUB RAD																
OCC RAD																
SEC																
Action Matrix Column	LR	LR	LR	LR	LR	LR	RR	RR	RR	RR	RR	LR	RR	RR	RR	RR
CCI*																
Theme (no CCI)*																

- W-1 Unplanned Scrams per 7000 Critical Hours Performance Indicator (95001 Completed – December 2014)
- W-2 Emergency Diesel Generator Fan Shaft Failure Violation (95001 Completed – October 2015)
- W-3 Unplanned Scrams per 7000 Critical Hours Performance Indicator (95001 Completed – November 2015)
- W-4 Emergency Diesel Generator Flexible Coupling Hose Violation (95001 Scheduled – 3Q2016)
- Y-1* Electromatic Relief Valve Failures Violation (Old Design Issue; did not aggregate with other inputs in determining the Action Matrix column or required NRC response; 95002 Completed December 2015)

10 | Plant Name

(b)(5)

