

June 30, 2016

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

Duane Arnold Energy Center  
Docket No. 50-331  
Renewed Facility Operating License No. DPR-49

NextEra Energy Duane Arnold, LLC's Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

- References:
1. Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013 (ML13130A067)
  2. NextEra Energy Duane Arnold LLC's Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109, dated December 10, 2014 (ML14349A324)
  3. NextEra Energy Duane Arnold, LLC's Six-Month Status Report and Phase 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109) dated December 22, 2015 (ML15358A043)

On June 6, 2013, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an Order (Reference 1) to NextEra Energy Duane Arnold, LLC. Reference 1 was immediately effective and directs NextEra Energy Duane Arnold, LLC (hereafter NextEra Energy Duane Arnold) to install a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of a Phase 1 Overall Integrated Plan (OIP) pursuant to Section IV, Condition D, and status reports at six-month intervals thereafter. NextEra

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NG-16-0130

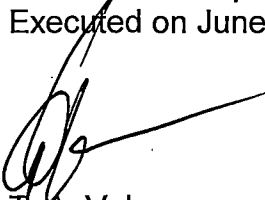
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NextEra Energy Duane Arnold submitted the Phase 1 OIP by letter dated December 10, 2014 (Reference 2). Reference 3 included the required six-month status update, as well as the Phase 2 OIP submittal. The consolidated Phase 1 and 2 OIP document provided a list of the Phase 1 OIP open items, and addressed the NRC Interim Staff Evaluation open items for Phase 1. This letter is being submitted to satisfy the requirements for providing the six-month updates for Phase 1 and 2 of the Order in accordance with Section IV, Condition D.3, of Reference 1.

This letter contains no new regulatory commitments. If you have any questions regarding this submittal, please contact Tim Holt at 319-851-7345.

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

Executed on June 30, 2016.



T. A. Vehec

Vice President, Duane Arnold Energy Center  
NextEra Energy Duane Arnold, LLC

Enclosure

cc: Director, Office of Nuclear Reactor Regulation  
USNRC Regional Administrator Region III  
USNRC Project Manager, Duane Arnold Energy Center  
USNRC Resident Inspector, Duane Arnold Energy Center

Enclosure to NG-16-0130

NextEra Energy Duane Arnold, LLC's Six-Month Status Report in Response to  
June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened  
Containment Vents Capable of Operation Under Severe Accident Conditions  
(Order Number EA-13-109)

8 pages follow

## **1 Introduction**

NextEra Duane Arnold Energy Center, LLC developed an Overall Integrated Plan (Reference 1 in Section 8), documenting the planned installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2. Starting with this six month status report, updates of milestone accomplishments will be based on the combined Phase 1 and 2 Overall Integrated Plan dated December 22, 2015.

NextEra Duane Arnold Energy Center, LLC developed an updated and combined Phase 1 and 2 Overall Integrated Plan (Reference 7), documenting:

1. The planned installation of a Hardened Containment Vent System (HCVS) that provides a reliable hardened venting capability for pre-core damage and under severe accident conditions, including those involving a breach of the reactor vessel by molten core debris, in response to Reference 2.
2. An alternative venting strategy that makes it unlikely that a drywell vent is needed to protect the containment from overpressure related failure under severe accident conditions, including those that involve a breach of the reactor vessel by molten core debris, in response to Reference 2.

This enclosure provides an update of milestone accomplishments since submittal of the combined Phase 1 and 2 Overall Integrated Plan, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

## **2 Milestone Accomplishments**

The following milestone(s) have been completed since the development of the combined Phase 1 and 2 Overall Integrated Plan (Reference 7), and are current as of June 1, 2016.

- Design Complete Phase 1
- Submit 6 Month Status Report (Complete with this submittal)

## **3 Milestone Schedule Status**

The following provides an update to Part 5 of the combined Phase 1 and 2 Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Enclosure to NG-16-0130 - NextEra Energy Duane Arnold, LLC's Six Month Status Report for the Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions

Phase 1 Milestone Schedule:

Milestone	Target Completion Date	Activity Status	Comments {Includes date changes}
Issue preliminary/conceptual design report	June 2014	Complete	
Submit Overall Integrated Implementation Plan	June 2014	Complete	
Initial Outage for Phase 1 Planning	Nov. 2014	Complete	
Submit 6 Month Status Report	Dec. 2014	Complete	
Submit 6 Month Status Report	June 2015	Complete	
Submit 6 Month Status Report	Dec. 2015	Complete	
Design Complete Phase 1	Mar. 2016	Complete	
Submit 6 Month Status Report	June 2016	Complete with this submittal	
Operations Procedure Changes Developed	Oct. 2016	Started	
Site Specific Maintenance and Testing Procedures Developed	Oct. 2016	Started	
Training Complete	Oct. 2016	Started	
Implementation Outage	End of RFO25	Not Started	
Procedure Changes Active	End of RFO25	Not Started	
Walk Through Demonstration/Functional Test	End of RFO25	Not Started	
Submit Completion Report	60 days after RFO25	Not Started	

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Phase 2 Milestone Schedule

Milestone	Target Completion Date	Activity Status	Comments {Include date changes in this column}
Submit Overall Integrated Implementation Plan	Dec. 2015	Complete	
Hold preliminary/conceptual design meeting	June 2016	Not Started	
Submit 6 Month Status Report	June 2016	Complete with this submittal	
Submit 6 Month Status Report	Dec. 2016	Not Started	
Submit 6 Month Status Report	June 2017	Not Started	
Design Engineering On-site/Complete	Jan. 2018	Not Started	
Submit 6 Month Status Report	Dec. 2017	Not Started	
Submit 6 Month Status Report	June 2017	Not Started	
Operations Procedure Changes Developed	Oct. 2018	Not Started	
Site Specific Maintenance Procedure Developed	Oct. 2018	Not Started	
Training Complete	Oct. 2018	Not Started	
Implementation Outage	RFO 26	Not Started	
Procedure Changes Active	RFO26	Not Started	
Walk Through Demonstration/Functional Test	RFO 26	Not Started	
Submit Completion Report	RFO 26	Not Started	

#### 4 Changes to Compliance Method

There are no changes to the compliance method as documented in the combined Phase 1 and 2 Overall Integrated Plan (Reference 7). However, changes have been made to the design details which affect descriptions contained in Reference 7.

- The HCVS "Nitrogen Supply Isolation at 1A3 ROS" (V43-0642) will be normally closed and locked to prevent inadvertent vent operation. This valve will have to be manually opened at the Remote Operating Station (ROS) in the 1A3 Essential Switchgear Room to supply nitrogen for CV operation and purging.
- The Uninterruptible Power Supply (UPS) originally had the normal power supply from 1B32. Analysis identified that 1B32 did not have adequate margin to add this load; therefore the normal power supply has been changed to 1B15. A receptacle will be installed at the UPS for direct connection to the portable 480 VAC generator. The power to 1B15 will be lost during an ELAP. The UPS will provide power for 24 hours; the FLEX 480 VAC generator will provide power beyond 24 hrs.

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

NextEra Duane Arnold Energy Center, LLC expects to comply with the order implementation date and no relief/relaxation is required at this time.

#### 6 Open Items from Combined Phase 1 and 2 Overall Integrated Plan and Interim Staff Evaluations

The following tables provide a summary of the open items documented in the combined Phase 1 and 2 Overall Integrated Plan or the Interim Staff Evaluation (ISE) and the status of each item.

Combined Phase 1 and 2 OIP Open Item	Status
<b>Phase 1 Open Items</b>	
1. Confirm secondary containment bypass leakage is acceptable without an installed rupture disk or retain an appropriate disk.	Completed. Appropriate rupture disk is included in design of modification.
2. Perform severe accident evaluation for FLEX DG and replacement gas to confirm accessibility for use for post 24 hour actions.	Started
3. Evaluate tornado/missile effects on HCVS components above the protected area of the Reactor Building.	Complete
4. Evaluate the system design for H2/CO measures to be taken.	Complete

Enclosure to NG-16-0130 - NextEra Energy Duane Arnold, LLC's Six Month Status Report for the Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions

Interim Staff Evaluation Open Items	Status
<b>Phase 1 ISE Items</b>	
1. Make available for NRC staff audit documentation of licensee confirmation that secondary containment leakage is acceptable without an installed rupture disk or that an appropriate rupture disk, including procedures for rupture during HCVS operation, is included in the HCVS design. (Section 3.1.2, Section 3.2.2.8)	Started
2. Make available for NRC staff audit analyses demonstrating that HCVS has the capacity to vent the steam/energy equivalent of one (1) percent of licensed/rated thermal power (unless a lower value is justified), and that the suppression pool and the HCVS together are able to absorb and reject decay heat, such that following a reactor shutdown from full power containment pressure is restored and then maintained below the primary containment design pressure and the primary containment pressure limit. (Section 3.2.2.1, Section 3.2.2.2)	Started
3. Make available for NRC staff audit evaluations of tornado missile effects on HCVS components above the protected area of the reactor building. (Section 3.2.2.3)	Started
4. Make available for NRC staff audit additional detail on the design features that minimize unintended cross flow of vented fluids within a unit, including a one line diagram containing sufficient detail to confirm the description in the OIP. (Section 3.2.2.7)	Eliminated.  The design has been modified since issuance of the ISE. The HCVS vent path is a dedicated path, eliminating the possibility of unintended cross flow.
5. Provide a description of the final design of the HCVS to address hydrogen detonation and deflagration. (Section 3.2.2.6)	Started
6. Provide a description of the strategies for hydrogen control that minimizes the potential for hydrogen gas migration and ingress into the reactor building or other buildings. (Section 3.2.2.6)	Started
7. Make available for NRC staff audit documentation that demonstrates adequate communication between the remote HCVS operation locations and HCVS decision makers during ELAP and severe accident conditions. (Section 3.2.2.5)	Started
8. Make available for NRC staff audit an evaluation of temperature and radiological conditions to ensure that operating personnel can safely access and operate controls and support equipment. (Section	Started



Enclosure to NG-16-0130 - NextEra Energy Duane Arnold, LLC's Six Month Status Report for the Implementation of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions

<p>3.2.1, Section 3.2.2.3, Section 3.2.2.4, Section 3.2.2.5, Section 3.2.2.10, Section 3.2.4.1, Section 3.2.4.2, Section 3.2.5.2 and Section 3.2.6)</p>	
<p>9. Make available for NRC staff audit the final sizing evaluation for HCVS batteries/battery charger including incorporation into FLEX DG loading calculation. (Section 3.2.2.4, Section 3.2.3.1, Section 3.2.3.2, Section 3.2.4.1, Section 3.2.4.2, Section 3.2.5.1 and Section 3.2.5.2)</p>	<p>Started</p>
<p>10. Make available for NRC staff audit the final sizing evaluation for pneumatic N2 supply. (Section 3.2.2.4, Section 3.2.3.1, Section 3.2.3.2, Section 3.2.4.1, Section 3.2.4.2, Section 3.2.5.1 and Section 3.2.5.2)</p>	<p>Started</p>
<p>11. Make available for NRC staff audit documentation of an evaluation verifying the existing containment isolation valves, relied upon for the HCVS, will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting. (Section 3.2.2.9)</p>	<p>Eliminated.</p> <p>As stated in NG-15-0169, Six Month Status Update, due to design changes in vent location and routing, existing containment isolation valves will no longer be used for venting. New vent design will utilize a spare torus penetration with two new primary containment isolation valves and a rupture disk.</p> <p>An evaluation will be done to ensure the two new containment isolation valves will open under the maximum expected differential pressure during BDBEE and severe accident wet well venting.</p>
<p>12. Make available for NRC staff audit descriptions of all instrumentation and controls (existing and planned) necessary to implement this order including qualification methods. (Section 3.2.2.10)</p>	<p>Started</p>
<p>13. Make available for NRC staff audit the descriptions of local conditions (temperature, radiation and humidity) anticipated during ELAP and severe accident for the components (valves, instrumentation, sensors, transmitters, indicators, electronics, control devices, and etc.) required for HCVS venting including confirmation that the components are capable of performing their functions during ELAP and severe accident conditions. (Section 3.2.2.3, Section 3.2.2.5, Section 3.2.2.9, Section 3.2.2.10)</p>	<p>Started</p>

<p>14. Provide a justification for deviating from the instrumentation seismic qualification guidance specified in NEI 13-02, endorsed, in part, by JLD-ISG-2013-02 as an acceptable means for implementing applicable requirements of Order EA-13-109. (Section 3.2.2.9)</p>	<p>Eliminated. As stated in NG-15-0169, Six Month Status Update, the qualification method used for each HCVS instrument will be to the IEEE 344-2004 standard or a substantially similar industrial standard and therefore will not be deviating from NEI 13-02 or JLD-ISG-2013-02.</p>
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Phase 2 Interim Staff Evaluation Open Item	Status
TBD	N/A

## 7 Interim Staff Evaluation Impacts

The June 2015 six-month update (Reference 6) noted the following two potential impacts to the Interim Staff Evaluation:

- 1) One ISE Open Item will be eliminated because the Hardened Pipe Vent will no longer use existing containment isolation valves. The revised vent pipe routing will instead use an existing spare torus penetration and install two new containment isolation valves and a rupture disk. An evaluation will be done to ensure the two new containment isolation valves will open under the maximum expected differential pressure during BDBEE and severe accident wetwell venting.
- 2) The Interim Staff Evaluation (ISE) inadvertently listed a vent pipe process pressure indicator which will not be part of the Duane Arnold design.

In addition, as discussed previously in Section 4:

The HCVS "Nitrogen Supply Isolation at 1A3 ROS" (V43-0642) will be normally closed and locked to prevent inadvertent vent operation. This valve will have to be manually opened at the Remote Operating Station (ROS) in the 1A3 Essential Switchgear Room to supply nitrogen for CV operation and purging.

The Uninterruptible Power Supply (UPS) originally had the normal power supply from 1B32. Analysis identified that 1B32 did not have adequate margin to add this load; therefore the normal power supply has been changed to 1B15. A receptacle will be installed at the UPS for direct connection to the portable 480 VAC generator. The power to 1B15 will be lost during an ELAP. The UPS will provide power for 24 hours; the FLEX 480 VAC generator will provide power beyond 24 hrs.

## 8 References

The following references support the updates to the combined Phase 1 and 2 Overall Integrated Plan described in this Enclosure.

1. NextEra Duane Arnold Energy Center, LLC Phase 1 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 10, 2014.
2. NRC Order Number EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions" dated June 6, 2013.
3. NEI 13-02, "Industry Guidance for Compliance with NRC Order EA-13-109, "To Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 1, dated April 2015.
4. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated November 2013 (Accession No. ML13304B836).
5. NRC Endorsement of Industry "Hardened Containment Venting System (HCVS) Phase 1 Overall Integrated Plan Template (EA-13-109) Rev 0" (Accession No. ML14128A219).
6. NextEra Energy Duane Arnold, LLC's Six-Month Status Report in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated June 18, 2015 (ML15170A333)
7. NextEra Duane Arnold Energy Center, LLC Combined Phase 1 and 2 Overall Integrated Plan in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109), dated December 22, 2015.
8. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," Revision 0, dated April 2015 (Accession No. ML15104A118).