Exelon Generation

Order No. EA-12-049

RS-15-022
RA-15-008

February 27, 2015

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: Fourth Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

References:

1. NRC Order Number EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012
2. NRC Interim Staff Guidance JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," Revision 0, dated August 29, 2012
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August 2012
4. Exelon Generation Company, LLC's Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated October 25, 2012
5. Exelon Generation Company, LLC Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2013 (RS-13-023)
6. Exelon Generation Company, LLC First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2013 (RS-13-125)
7. Exelon Generation Company, LLC Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated February 28, 2014 (RS-14-013)
8. Exelon Generation Company, LLC Third Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), dated August 28, 2014 (RS-14-211)

9. NRC letter to Exelon Generation Company, LLC, Oyster Creek Nuclear Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC No. MF0824), dated February 19, 2014

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Exelon Generation Company, LLC (EGC). Reference 1 was immediately effective and directs EGC to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the EGC initial status report regarding mitigation strategies. Reference 5 provided the Oyster Creek Nuclear Generating Station overall integrated plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. References 6, 7, and 8 provided the first, second, and third six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for Oyster Creek Nuclear Generating Station. The purpose of this letter is to provide the fourth six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The enclosed report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. The enclosed report also addresses the NRC Interim Staff Evaluation Open and Confirmatory Items contained in Reference 9.

This letter contains no new regulatory commitments. If you have any questions regarding this report, 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 27th day of February 2015.

Respectfully submitted,

James Barstow
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Oyster Creek Nuclear Generating Station Fourth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

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
Ms. Jessica A. Kratchman, NRR/JLD/PMB, NRC
Mr. Jack R. Davis, NRR/DPR/MSD, NRC
Mr. Eric E. Bowman, NRR/DPR/MSD, NRC
Mr. Jeremy S. Bowen, NRR/DPR/MSD/MSPB, NRC
Mr. Robert L. Dennig, NRR/DSS/SCVB, NRC
Mr. John D. Hughey, NRR/JLD/JOMB, NRC
Manager, Bureau of Nuclear Engineering – New Jersey Department of Environmental Protection
Mayor of Lacey Township, Forked River, NJ

Enclosure

Oyster Creek Nuclear Generating Station

Fourth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

(8 pages)

Enclosure

Oyster Creek Nuclear Generating Fourth Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

1. Introduction

Oyster Creek Nuclear Generating Station developed an Overall Integrated Plan (Reference 1), documenting the diverse and flexible strategies (FLEX), in response to NRC Order Number EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Reference 2). This enclosure provides an update of milestone accomplishments since submittal of the last status report including any changes to the compliance method, schedule, or need for relief / relaxation and the basis, if any.

2. Milestone Accomplishments

The Third 6 Month Update was submitted in August 2014.

3. Milestone Schedule Status

The following provides an update to Attachment 2 of the 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.

The revised milestone target completion dates do not impact the order implementation date.

Milestone Schedule

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	October 2012	Complete	
Submit Overall Integrated Plan	February 2013	Complete	
Contract with RRC		Complete	
Submit 6 Month Updates:			
Update 1	August 2013	Complete	
Update 2	February 2014	Complete	
Update 3	August 2014	Complete	
Update 4	February 2015	Complete with this submittal	
Update 5	August 2015	Not Started	
Update 6	February 2016	Not Started	
Update 7	August 2016	Not Started	

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
Submit Completion Report	October 2016	Not Started	

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
Modification Development			
Modification Development (All FLEX Phases)	August 2016	Started	Revised in August 2013 update
Modification Implementation (All FLEX Phases)	October 2016	Not Started	No Change
Procedures:			
Create Site-Specific Procedures	October 2016	Started	No Change
Validate Procedures (NEI 12-06, Sect. 11.4.3)	October 2016	Not Started	No Change
Create Maintenance Procedures	October 2016	Started	No Change
Perform Staffing Analysis	June 2016	Not Started	No Change
Storage Plan and Construction	October 2016	Started	No Change
FLEX Equipment Acquisition	October 2016	Started	No Change
Training Completion	October 2016	Not Started	No Change
Regional Response Center Operational	December 2015	Started	Revised in August 2014 update
Unit 1 FLEX Implementation	October 2016	Not Started	No Change
Full Site FLEX Implementation	October 2016	Not Started	No Change

4. Changes to Compliance Method

None

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

None

6. Open Items and Confirmatory items from Overall Integrated Plan and Interim Safety Evaluation

The following tables provide a summary of the open and Confirmatory items documented in the Overall Integrated Plan or the Draft Safety Evaluation (SE) and the status of each item.

Section Reference	Overall Integrated Plan Open Items	Status
Sequence of events (p. 10-12)	The times to complete actions in the Events Timeline are based on operating judgment, conceptual designs, and current supporting analyses. The final timeline will be time validated once detailed designs are completed and procedures developed.	Not Started
Sequence of events (p. 11-12)	Initial evaluations were used to determine the fuel pool timelines. Formal calculations will be performed to validate this information during development of the spent fuel pool cooling strategy detailed design.	Started
Identify how strategies will be deployed in all modes (p. 13)	1. Transportation routes will be developed from the equipment storage area to the FLEX staging areas. 2. Identification of storage areas is an open item. 3. An administrative program will be developed to ensure pathways remain clear or compensatory actions will be implemented to ensure all strategies can be deployed during all modes of operation.	1. Started 2. Started 3. Not Started
Identify how the programmatic controls will be met (p. 14)	An administrative program for FLEX to establish responsibilities, and testing & maintenance requirements will be implemented.	Started

Maintain Spent Fuel Pool Cooling (p.36)	Complete an evaluation of the spent fuel pool area for steam and condensation.	Started
Safety Functions Support (p. 44)	Evaluate the habitability conditions for the Main Control Room and develop a strategy to maintain habitability.	Started
Safety Functions Support (p. 44)	Develop a procedure to prop open battery room doors upon energizing the battery chargers to prevent a buildup of hydrogen in the battery rooms.	Tracked in Interim Safety Evaluation Confirmatory Items reference section 3.2.4.2.A.
Sequence of events (p. 10)	Issuance of BWROG document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines" on 01/31/2013 did not allow sufficient time to perform the analysis of the deviations between Exelon's engineering analyses and the analyses contained in the BWROG document prior to commencing regulatory reviews of the Integrated Plan.	Completed Oyster Creek Station First Six Month Update. (ML13240A267)
Baseline coping capability (p. 27)	In response to NRC Order EA-12-049 and implementation of EPG Rev 3, containment venting will be part of the strategies. As part of the B.5.b response Oyster Creek incorporated Extensive Damage Mitigation Guidelines and developed procedure EDMG-SPX9 Manually Opening Containment Vent Valves in a B.5.b Event. This procedure is designed to allow operation of the Hardened Vents with no air supply, AC or DC power available. Convert EDMG-SPX9 Manually Opening Containment Vent Valves to FSG procedure.	Not Started.

Section Reference	Interim Safety Evaluation Open Items	Status
None	None	NA

Section Reference	Interim Safety Evaluation Confirmatory Items	Status
3.1.1.3.A	Confirm that the licensee develops a reference source describing what actions should be taken if instruments were lost due to a seismic event.	Started
3.1.1.4.A	Confirm the location of the off-site staging area(s) and acceptability of the access routes considering the seismic, flooding, high wind and snow, ice and extreme cold hazard.	Not Started
3.1.2.2.A	Confirm that if temporary flood barriers are used, they are stored such that they can be easily deployed.	Complete Procedure OP-OC-108-109-1001, Severe Weather Preparation T&RM for Oyster Creek was revised to credit sandbags as the temporary flood barriers for the Near Term Task Force (NTTF) reevaluated results.
3.1.3.1.A	Verify that the separation of the planned outdoor storage areas is sufficient to preclude damage of both sets of FLEX equipment.	Started
3.1.3.1.B	Confirm qualified storage locations for the hurricane and extreme snow and icing hazards are identified.	Started
3.1.3.2.A	Confirm that the licensee's evaluation of water quality and resulting action are sufficient to preclude blockage of flow to the core or SFP.	Started
3.2.1.1.A	Confirm that benchmarks are identified and discussed that demonstrate that MAAP is an appropriate code for the simulation of an ELAP event at your facility.	Complete Modular Accident Analysis Program (MAAP) Justification 11385-467 is accepted by the site and entered into The site's Electronic Document Management System (EDMS) as OC-MISC-012. (See Attachment 1)

3.2.1.1.B	Confirm that the collapsed level remains above Top of Active Fuel (TAF) and the cool down rate remains within technical specifications limits.	Complete MAAP Justification 11385-467 is accepted by the site and entered into EDMS as OC-MISC-012. (See Attachment 1)
3.2.1.1.C	Confirm that MAAP is used in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper.	Complete MAAP Justification 11385-467 is accepted by the site and entered into EDMS as OC-MISC-012. (See Attachment 1)
3.2.1.1.D	Confirm that the licensee identifies and justifies the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP Application Guidance, Desktop Reference for Using MAAP Software, Revision 2" (Electric Power Research Institute Report 1020236). This should include response at a plant-specific level regarding specific modeling options and parameter choices for key models that would be expected to substantially affect the ELAP analysis performed for that licensee's plant. Although some suggested key phenomena are identified below, other parameters considered important in the simulation of the ELAP event by the vendor / licensee should also be included. a. Nodalization b. General two-phase flow modeling c. Modeling of heat transfer and losses d. Choked flow e. Vent line pressure losses f. Decay heat (fission products / actinides / etc.)	Complete MAAP Justification 11385-467 is accepted by the site and entered into EDMS as OC-MISC-012. (See Attachment 1)

3.2.1.1.E	Confirm that the specific MAAP analysis case that was used to validate the timing of mitigating strategies in the Integrated Plan is identified and available on the ePortal for NRC staff to view. Alternately, a comparable level of information may be included in the supplemental response. In either case, the analysis should include a plot of the collapsed vessel level to confirm that TAF is not reached (the elevation of the TAF should be provided) and a plot of the temperature cool down to confirm that the cool down is within technical specifications limits.	Complete MAAP Justification 11385-467 is accepted by the site and entered into EDMS as OC-MISC-012. (See Attachment 1)
3.2.1.3.A	The SOE final timeline will be time validated once detailed designs are completed and procedures are developed. The licensee should provide the results for NRC staff review.	Not Started
3.2.4.2.A	The licensee stated that battery room ventilation to address high/low temperatures and prevention of hydrogen buildup will be addressed through procedure changes and that the proposed methods of ventilation, open doors and fans, will be confirmed during the detailed design process.	Not Started
3.2.4.4.A	The NRC staff has reviewed the licensee communications assessment (ADAMS Accession Nos. ML12306A199 and ML13056A135) in response to the March 12, 2012 50.54(f) request for information letter for OCNGS and, as documented in the staff analysis (ADAMS Accession No. ML13114A067) has determined that the assessment for communications is reasonable, and the analyzed existing systems, proposed enhancements, and interim measures will help to ensure that communications are maintained. Verification of required upgrades has been identified as a confirmatory item.	Started
3.2.4.8.A	Confirm the procedures to isolate the vital USS's from the generator.	Not Started
3.2.4.8.A	Ensure that the diesel generator is equipped with overload protection in the generator skid.	Started
3.2.4.8.B	Confirm/review technical basis and/or calculations provided as basis for the generator sizing.	Started

3.2.4.10.A	Confirm completion of analysis to determine battery coping time with no actions and with battery load shed.	Started
3.4.A	NEI 12-06, Section 12.2 lists minimum capabilities for offsite resources for which each Licensee should establish the availability. Confirm implementation of Guidelines 2 through 10 in NEI 12-06, Section 12.2.	Not Started

7. Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8. References

The following references support the updates to the Overall Integrated Plan described in this enclosure.

1. Oyster Creek Nuclear Generating Station's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013.
2. NRC Order Number EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012.

9. Attachment

Attachment 1 OC-MISC-012, Rev 000, 20140408, Use of MAAP In Support of Flex Implementation (12 pages)

RM DOCUMENTATION NO. OC-MISC-012 **REV:** 0 **PAGE NO.** 1

STATION: Oyster Creek

UNIT(S) AFFECTED: Unit 1

TITLE: Use of MAAP in Support of FLEX Implementation

SUMMARY (Include UREs incorporated):

MAAP 4.0.5 calculations (OC-MISC-010-R1) were performed to estimate the containment pressure and temperature response to a variety of extended Station Blackout (SBO) events. The NRC has requested that some additional information be provided relating to the use of MAAP for FLEX analysis as part of the periodic update to the plants response to EA-12-049. The attached information is being provided to include in the next update to EA-12-049.

[ ] Review required after periodic Update

[X] **Internal RM Documentation** [ ] **External RM Documentation**

Electronic Calculation Data Files: N/A

Method of Review: [X] Detailed [ ] Alternate [ ] Review of External Document

This RM documentation supersedes: N/A *in its entirety.*

Prepared by:	Alex H. Duvall (Print)	Alex Duvall (Sign)	4/7/14 (Date)
Reviewed by:	Gary W. Hayner (Print)	(Sign)	4/7/14 (Date)
Approved by:	Edward T. Burns (Print)	E T Burns (Sign)	4/8/14 (Date)

TABLE OF CONTENTS

Section Page

1.0 PURPOSE & SCOPE

The purpose of the included information is to respond to NRC questions relating to the use of MAAP in support of the plant's response to EA-12-049. The MAAP analysis is documented separately in OC-MISC-010-R1.

2.0 REQUESTED INFORMATION ON THE USE OF MAAP

In response to the letter of October 3, 2013 from Jack Davis (NRR) to Joe Pollock (NEI), the following responses have been developed regarding the use of the Modular Accident Analysis Program (MAAP) for estimating accident progression timing in support of the Overall Integrated Plan for Oyster Creek.

(1) ***From the June 2013 position paper, benchmarks must be identified and discussed which demonstrate that MAAP4 is an appropriate code for the simulation of an ELAP event at your facility.***

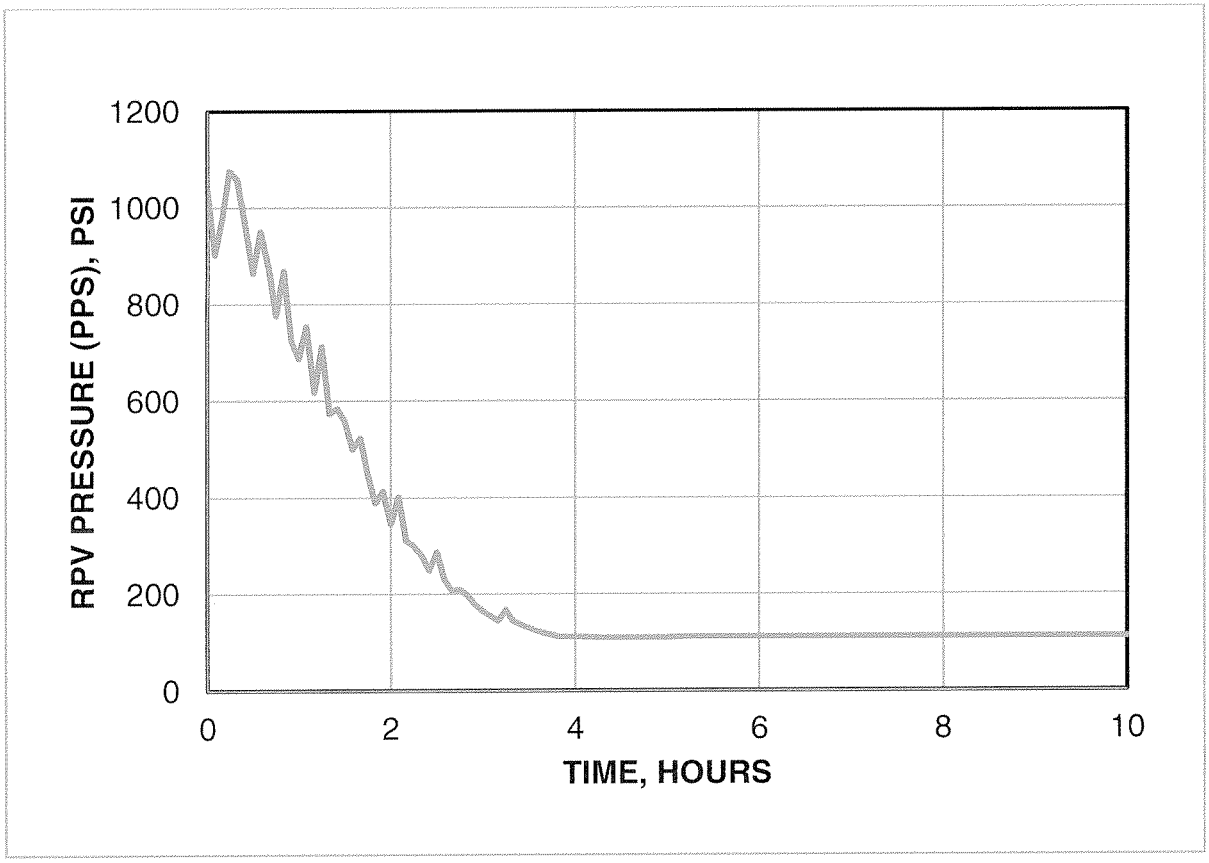
Response to item 1:

Generic response provided by EPRI Technical Report 3002002749, "Technical Basis for Establishing Success Timelines in Extended Loss of AC Power Scenarios in Boiling Water Reactors Using MAAP4," A Guide to MAAP Thermal-Hydraulic Models".

(2) ***The collapsed level must remain above Top of Active Fuel (TAF) and the cool down rate must be within technical specification limits.***

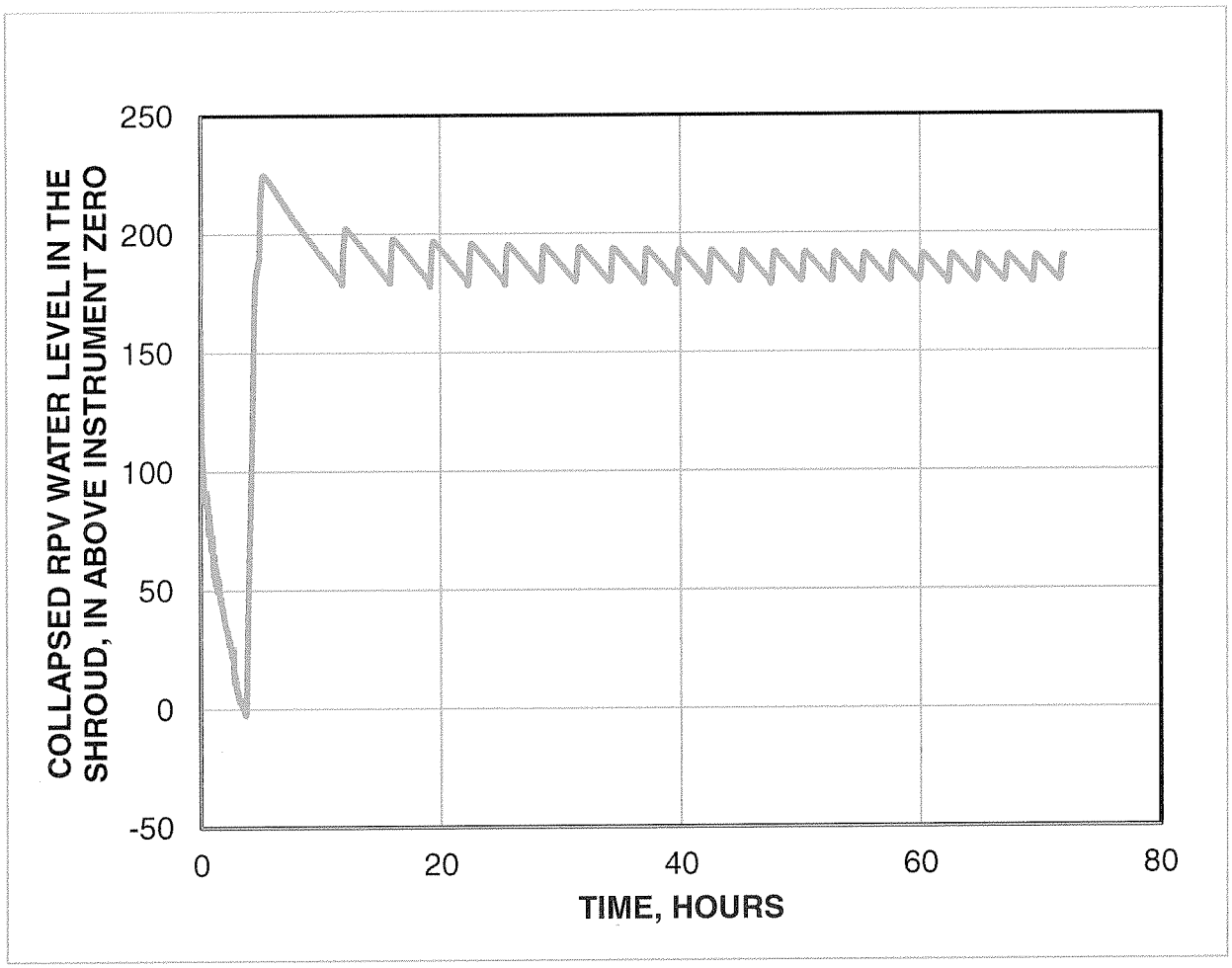
Response to item 2:

Attachment 1A of the Oyster Creek Integrated Plan (Feb. 2013) states that the operators would commence a cooldown of the RPV at 10 min at a rate of 50°F/hr which is within the technical specifications limit of 100 °F/hr. The following plot of the RPV pressure from the MAAP analysis confirms this cooldown rate for the supporting MAAP calculation.



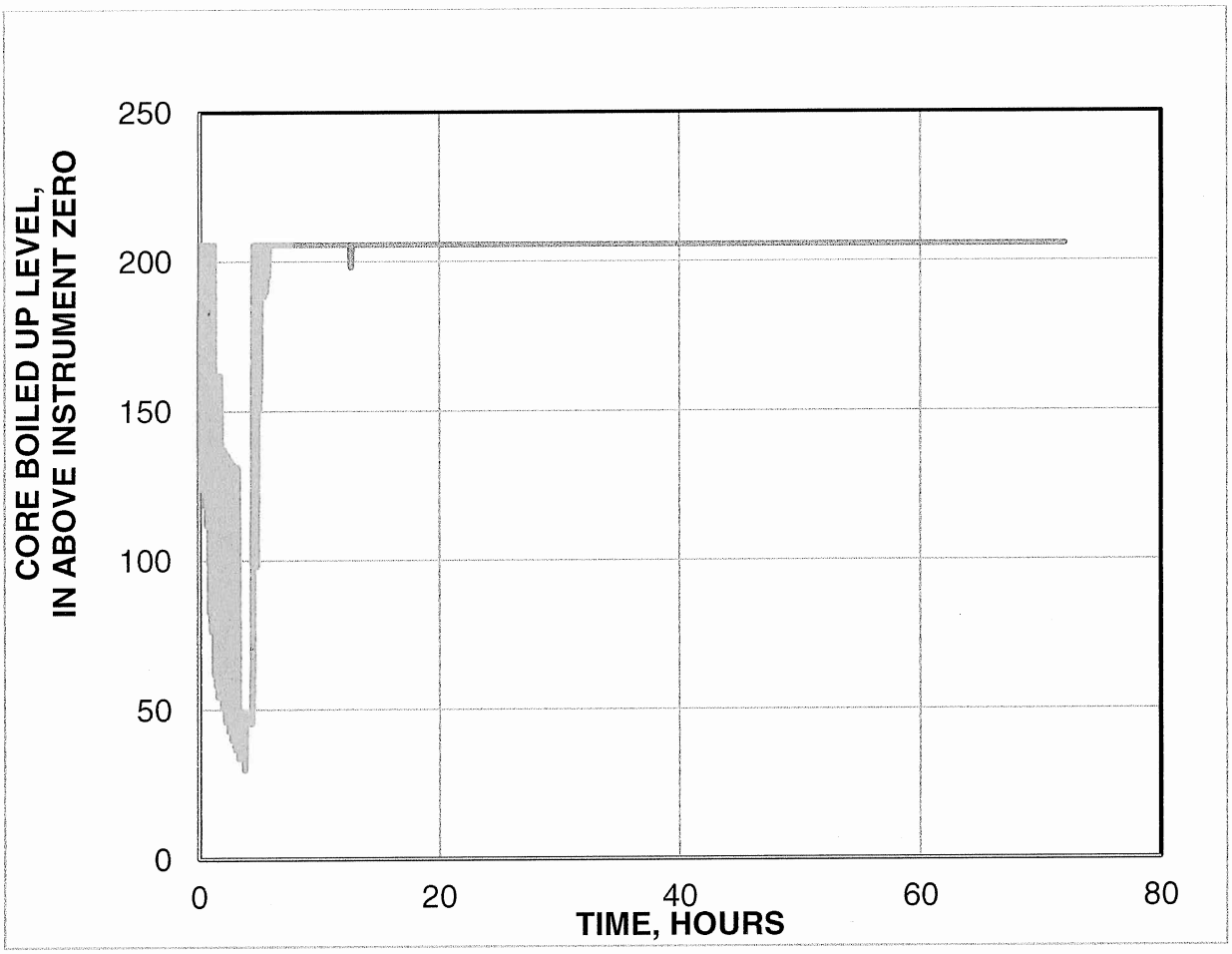
MAAP Calculation of RPV Pressure During RPV Depressurization

For the representative MAAP run (Case 6), the collapsed RPV water level inside the shroud remains above or near Top of Active Fuel (TAF) for the duration of the analysis. The plot below shows that the lowest RPV level, calculated by MAAP, was at approximately 0" relative to instrument zero which is 353" above vessel zero. TAF is located at instrument zero. As shown in the following plot, the collapsed RPV water level in the shroud briefly drops below TAF. The collapsed water level remains near TAF before rapidly increasing to more than 170" above TAF for the remainder of the scenario.



MAAP Calculation of Collapsed RPV Water Level Inside the Shroud
(TAF = 0")

As shown in the following plot, the collapsed RPV water level inside the shroud remains at least 25" above TAF for the duration of the analysis. While the collapsed water level in the shroud may briefly drop below TAF, the boiled-up water level in the core remains adequately above TAF during the scenario. Since the core remains covered by the boiled-up water level and >95% covered by the collapsed level, core damage does not occur. Additionally, since the collapsed water level is calculated as dropping to and hovering near TAF for only a few minutes, conditions do not exist for the fuel to rapidly heat up to harmful temperatures.



MAAP Calculation of Boiled-UP RPV Water Level Inside the Shroud

(3) *MAAP4 must be used in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper.*

Response to item 3:

MAAP analysis performed for Oyster Creek was carried out in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper, EPRI Technical Report 3002001785, "Use of Modular Accident Analysis Program (MAAP) in Support of Post-Fukushima Applications". Preparation and Review of the MAAP analysis is conducted under engineering training certification guide ENANRM08.

(4) ***In using MAAP4, the licensee must identify and justify the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP4 Application Guidance, Desktop Reference for Using MAAP4 Software, Revision 2" (Electric Power Research Institute Report 1020236). This should include response at a plant-specific level regarding specific coding options and parameter choices for key models that would be expected to substantially affect the ELAP analysis performed for that licensee's plant. Although some suggested key phenomena are identified below, other parameters considered important in the simulation of the ELAP event by the vendor / licensee should also be included.***

a. Nodalization

b. General two-phase flow modeling

c. Modeling of heat transfer and losses

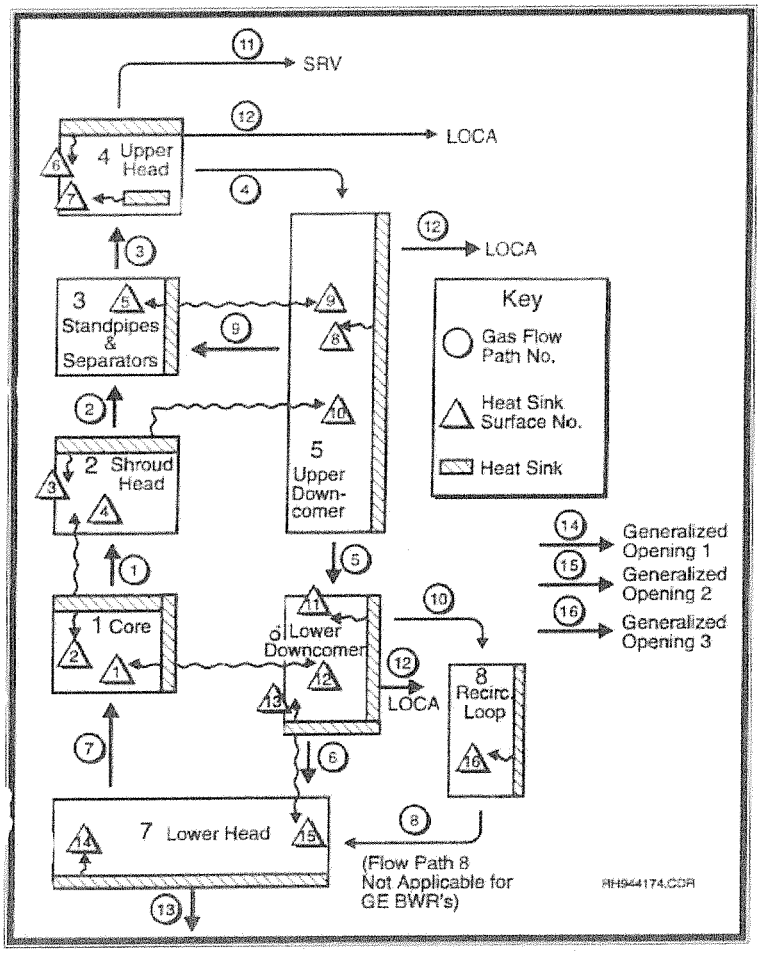
d. Choked flow

e. Vent line pressure losses

f. Decay heat (fission products / actinides / etc.)

Response to item 4:

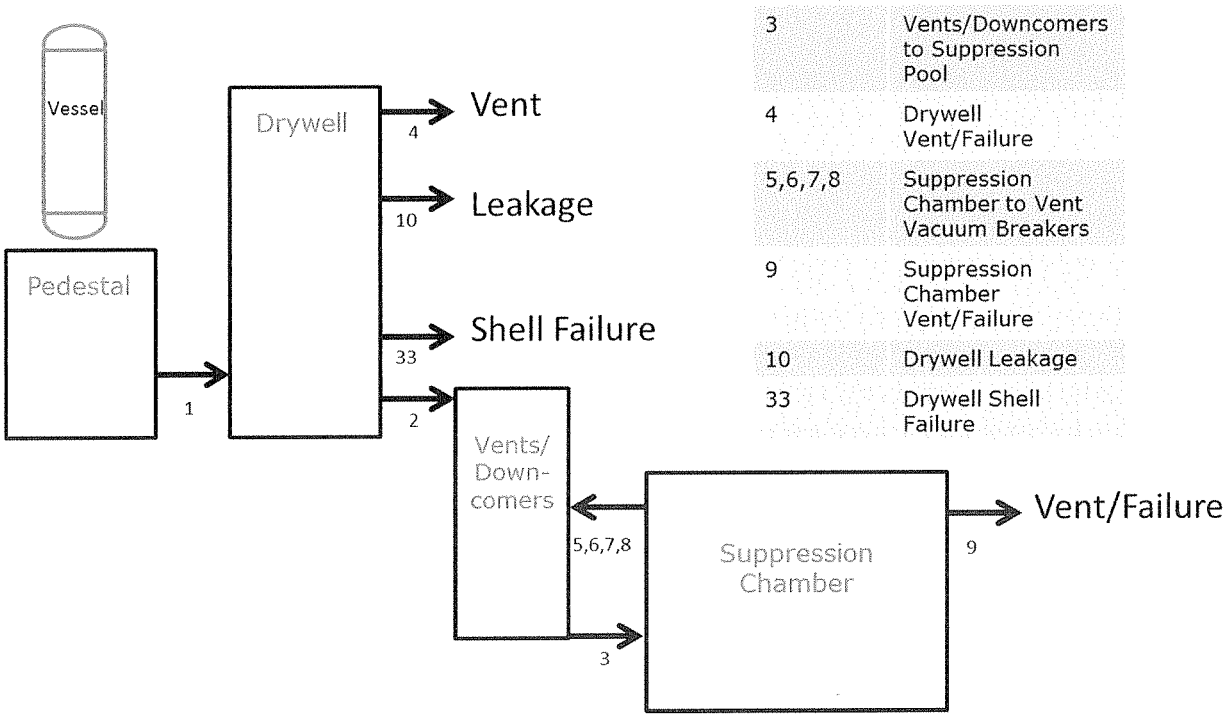
a. The reactor vessel nodalization is fixed by the MAAP code and cannot be altered by the user, with the exception of the detailed core nodalization. The Oyster Creek MAAP 4.0.5 parameter file divides the core region into 5 equal volume radial regions (See NCHAN) and 13 axial regions (See NAXNOD). The axial nodalization represents 8 equal-sized fueled nodes (see NROWS), 1 unfueled node at the top (see NNFT), and 2 unfueled nodes at the bottom (see NNFB). The figure below, taken from the MAAP Users Manual, illustrates the vessel nodalization scheme.



Containment nodalization is defined by the user. The standard nodalization scheme is used in the Oyster Creek MAAP 4.0.5 parameter file and represents the following individual compartments:

1. Reactor pedestal region
2. Drywell
3. Drywell vents to torus
4. Torus (Wetwell)

The figure below illustrates the Oyster Creek containment nodalization along with an identification of containment flow junctions.



Junction	Description
1	Pedestal Door to Drywell
2	Drywell to Vents/Downcomers
3	Vents/Downcomers to Suppression Pool
4	Drywell Vent/Failure
5,6,7,8	Suppression Chamber to Vent Vacuum Breakers
9	Suppression Chamber Vent/Failure
10	Drywell Leakage
33	Drywell Shell Failure

General two-phase flow from the reactor vessel is described in the EPRI Technical Report 3002002749. In the case of the scenario outlined in the integrated plan, flow can exit the RPV via the open SRV(s) and from the assumed recirculation pump seal leakage. Flow from the SRV(s) will be single-phase steam and flow from the recirc pump seal or other RPV leakage will be single-phase liquid due to the location of the break low in the RPV with RPV level maintained above TAF. Upon exiting the RPV, the seal leakage will flash a portion of the flow to steam based on saturated conditions in the drywell, creating a steam source and a liquid water source to the drywell. As described in the EPRI Technical Report 3002002749, "Technical Basis for Establishing Success Timelines in Extended Loss of AC Power Scenarios in Boiling Water Reactors Using MAAP4 – A Guide to MAAP Thermal-Hydraulic Models", there are two MAAP parameters that can influence the two-phase level in the RPV– FCO (void concentration factor) and

FCHTUR (churn-turbulent critical velocity coefficient). The following table confirms that the parameter values match the recommended values as outlined in the EPRI Technical Report 3002002749.

PARAMETER NAME	VALUE USED IN THE OYSTER CREEK MAAP ANALYSIS	EPRI RECOMMENDED VALUE
FCO	1.5248	1.5248
FCHTUR	1.53	1.53

b. Modeling of heat transfer and losses from the RPV are described in the EPRI Technical Report 3002002749. The MAAP parameters that control these processes, as defined in the EPRI report, are provided below with the values selected to represent Oyster Creek.

PARAMETER NAME	VALUE USED IN THE OYSTER CREEK MAAP ANALYSIS	COMMENT
QC0 – not-thru-insulation heat transfer from RPV during normal operation.	3.4122E6 BTU/hr	Plant specific value based on drywell heat removal to coolers during normal operation. Typical values range between 1-2 MW (3.4E6 to 6.8E6 BTU/hr).
FINPLT – number of plates in reflective insulation	8.0	Plant-specific value
XTINS – average reflective insulation thickness	0.333 ft	Plant-specific value

At the request of the NRC, the following information, as used in the MAAP analysis, is provided.

PARAMETER DEFINITION	PARAMETER NAME IN MAAP	VALUE USED IN THE OYSTER CREEK MAAP ANALYSIS
Power level, MWth	QCR0	1930 MWth
Initial CST water volume, gal	VCSTO (ft^3)	499,963 gal
Initial CST water temperature, F	HCST (enthalpy)	90°F
Initial suppression pool water mass, lbm	Calculated from input	5,435,000
Initial suppression pool water level, ft	XWRB0(i), where i is node number for wetwell	12.4 ft
Initial suppression pool water temperature, F	TWRB0(i), where i is node number for wetwell	90.2°F
Drywell free volume, ft^3	VOLRB(i), where I is node number for drywell	146,844 ft^3
Wetwell free volume, ft^3	VOLRB(i) – volume of suppression pool water from initial pool mass	209,975 ft^3
Containment vent pressure, psia	Refer to MAAP analysis document	49.7 psia
RCIC max flow rate, gpm	WVRCIC	N/A (no RCIC system at OC)
Max FLEX pump flow rate, gpm	Refer to MAAP analysis document	600 gpm (@160 psig in RPV)
Lowest set SRV flow rate, lb/hr	Derived from SRV area, ASRV	602,900 lb/hr
Lowest set SRV pressure, psia	PSETRV	1079.7 psi
Recirc pump seal leakage, gpm	Value that was used to define LOCA area, ALOCA	35 gpm
Total leakage used in the transient, gpm	Value that was used to define LOCA area, ALOCA	35 gpm

c. Choked flow from the SRV and the recirculation pump seal leakage is discussed in the EPRI Technical Report 3002002749. The parameters identified that impact the flow calculation are listed below with input values identified.

PARAMETER NAME	VALUE USED IN THE OYSTER CREEK MAAP ANALYSIS	EPRI RECOMMENDED VALUE
ASRV – effective flow area for relief valve	0.0733 ft^2 (based on rated flow at pressure)	Plant-specific value
ALOCA – seal leakage area	5.75E-4 ft^2 (35 gpm at normal conditions)	Plant-specific value
FCDBRK – discharge coefficient for seal leakage	0.75	0.75

d. Vent line pressure loss can be represented in two ways. The actual piping flow area can be input along with a discharge coefficient (FCDJ). An alternative method would be to calculate the effective flow are given the estimated piping losses, and input a loss coefficient of 1.0. For the Oyster Creek analysis, the vent area is input based on a 8" diameter pipe and a discharge coefficient of 0.75 was selected.

e. The decay heat calculation in MAAP is discussed in the EPRI Technical Report 3002002749. Input parameters used to compute the decay heat are identified in the EPRI report and are listed in the following table along with their values used in the Oyster Creek analysis.

PARAMETER NAME	VALUE USED IN THE OYSTER CREEK MAAP ANALYSIS	EPRI RECOMMENDED VALUE
FENRCH – normal fuel enrichment	0.0338	Plant-specific value
EXPO – average exposure	25,453 MW-day/ton	Plant-specific value
FCR – total capture rate of U-238 / total absorption rate	0.324	Plant-specific value
FFAF – total absorption rate / total fission rate	2.37	Plant-specific value
FQFR1 – fraction of fission power due to U-235 and PU-241	0.476	Plant-specific value
FQFR2 – fraction of fission power due to PU-239	0.437	Plant-specific value
FQFR3 – fraction of fission power due to U-238	0.087	Plant-specific value
TIRRAD – average effective irradiation time for entire core	8,333.3 hours	Plant-specific value

(5) ***The specific MAAP4 analysis case that was used to validate the timing of mitigating strategies in the integrated plan must be identified and should be available on the ePortal for NRC staff to view. Alternately, a comparable level of information may be included in the supplemental response. In either case, the analysis should include a plot of the collapsed vessel level to confirm that TAF is not reached (the elevation of the TAF should be provided) and a plot of the temperature cool down to confirm that the cool down is within tech spec limits.***

Response to item 5:

The MAAP analysis performed in support of the Oyster Creek Integrated Plan is documented in calculation OC-MISC-010 Rev. 1 and is available on the ePortal. Case 6 was the specific MAAP run selected to represent the scenario as described in Attachment 1A of the integrated plan.