Exelon Generation.

Order No. EA-12-049

RS-14-209

August 28, 2014

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

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: 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)

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-13-021)
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-13-121)
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-14-011)

8. NRC letter to Exelon Generation Company, LLC, LaSalle County Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies) (TAC Nos. MF1121 and MF1122), dated February 21, 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 LaSalle County Station, Units 1 and 2 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 and 7 provided the first and second six-month status reports, respectively, pursuant to Section IV, Condition C.2, of Reference 1 for LaSalle County Station. The purpose of this letter is to provide the third 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 8.

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 28th day of August 2014.

Respectfully submitted,

Glen T. Kaegi
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:
1. LaSalle County Station, Units 1 and 2 Third 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 III
NRC Senior Resident Inspector – LaSalle County Station, Units 1 and 2
NRC Project Manager, NRR – LaSalle County Station, Units 1 and 2
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Illinois Emergency Management Agency - Division of Nuclear Safety

Enclosure

LaSalle County Station, Units 1 and 2

Third 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

(43 pages)

Enclosure

LaSalle County Station, Units 1 and 2 Third 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

LaSalle County Station, Units 1 and 2 developed an Overall Integrated Plan (Reference 1), documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the 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 second 6 Month Update was submitted in February 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.

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	Oct 2012	Complete	
Submit Overall Integrated Plan	Feb 2013	Complete	
Contract with National SAFER Response Center		Complete	
Submit 6 Month Updates:			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete with this submittal.	
Update 4	Feb 2015	Not Started	
Update 5	Aug 2015	Not Started	
Update 6	Feb 2016	Not Started	
Update 7	Aug 2016	Not Started	
Submit Completion Report	Sep 2017	Not Started	May 2018 See Section 5 of this enclosure

Activity	Target Completion Date	Activity Status	Revised Target Completion Date
Modification Development & Implementation:			
Unit 1 Modification Development (All FLEX Phases)	Jan 2015	Started	
Unit 1 Modification Implementation (All FLEX Phases)	Mar 2016	Not Started	
Unit 2 Modification Development (All FLEX Phases)	Jan 2014	Started	Oct 2014
Unit 2 Modification Implementation (All FLEX Phases)	Feb 2015	Not Started	
Procedures:			
Create Site-Specific Procedures	Feb 2015	Started	
Validate Procedures (NEI 12-06, Sect. 11.4.3)	Feb 2015	Not Started	
Create Maintenance Procedures	Feb 2015	Started	
Perform Staffing Analysis	Oct 2014	Started	
Storage Plan and Construction	Feb 2015	Started	
FLEX Equipment Acquisition	Feb 2015	Started	
Training Completion	Feb 2015	Started	
National SAFER Response Center Operational	Dec 2014	Started	
Unit 1 FLEX Implementation	Mar 2016	Started	Mar 2018 See Section 5 of this enclosure
Unit 2 FLEX Implementation	Feb 2015	Started	Feb 2017 See Section 5 of this enclosure
Full Site FLEX Implementation	Mar 2016	Started	Mar 2018 See Section 5 of this enclosure

4 Changes to Compliance Method

Several changes to the compliance method have been made since the February 2014 update (Ref. 7). An update call was held with members of the Nuclear Regulatory Commission on April 4, 2014, to review the current design concepts. During detailed design activities occurring since the FLEX February 2014 6-Month Update Report, several changes were made to the compliance method. The changes were discussed during the April 4, 2014 update call. Attachments 1 and 2 to this update report depict the current water and electrical supply strategies.

The change to the water supply strategy involves the elimination of the pre-staged 480 VAC FLEX pumps in the Division 2 core standby cooling system (CSCS) pump room on each unit. The revised strategy consists of an appropriately sized portable diesel-driven pump (PDDP) located at the ultimate heat sink (UHS) that provides water for both units. Two (2) FLEX PDDP's will be procured to meet the 'N+1' equipment requirements of NEI 12-06. This PDDP will either be connected to the Division 2 Fuel Pool Cooling Emergency Makeup (FC EMU) piping (Primary connection point) or to the Division 1 FC EMU piping (Alternate connection point) on each unit. The available flow paths for both connection points are depicted on Attachment 1 and include the capability to provide flow to the reactor pressure vessel, spent fuel pool and the suppression pool. This strategy change was made as a result of the detailed design work related to pre-staging the 480 VAC FLEX pumps.

The change to the electrical supply strategy involves the elimination of the power supply need for the pre-staged 480 VAC FLEX pumps. Additionally, receptacles are shown on Attachment 2 for the spare 125VDC chargers. These receptacles are being installed to provide the capability of directly powering these chargers via the Alternate electrical supply connection strategy.

Note that Attachments 1 and 2 depict the water and electrical supply strategies for Unit 1. The strategies are the same for Unit 2.

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

By letter dated February 27, 2014 (Ref. 3), LaSalle County Station requested relaxation from certain schedule requirements of Order EA-12-049 (Ref. 2) related to installation of the severe accident capable containment vent required by Order EA-13-109 (Ref. 6). The NRC granted that schedule relief via letter dated April 15, 2014 (Ref. 4).

No additional need for relief/relaxation relative to Order EA-12-049 has been identified at this time.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following tables provide a summary of the open items documented in the Overall Integrated Plan or the Interim Staff Evaluation (ISE) (Ref. 5) and the status of each item.

Section Reference	Overall Integrated Plan Open Item	Status
Sequence of Events (p.5)	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	NOT STARTED

Section Reference	Overall Integrated Plan Open Item	Status
	procedures developed.	
Sequence of Events (p.10)	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.	COMPLETED. Determined that the initial evaluations that were performed are sufficient.
Sequence of Events (p.10)	Analysis of deviations between Exelon's engineering analyses and the analyses contained in BWROG Document NEDC-33771P, "GEH Evaluation of FLEX Implementation Guidelines and documentation of results on Att. 1B, "NSSS Significant Reference Analysis Deviation Table." Planned to be completed and submitted with August 2013 Six Month Update.	COMPLETED Reference 8 contains the analysis.
Strategy Deployment (p.11)	Transportation routes will be developed from the equipment storage area to the FLEX staging areas. 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. Identification of storage areas and creation of the administrative program are open items.	STARTED
Programmatic Controls (p.12)	An administrative program for FLEX to establish responsibilities, and testing & maintenance requirements will be implemented.	STARTED
Core Cooling Phase 1 (p.17)	Additional work will be performed during detailed design development to ensure Suppression Pool temperature will support RCIC operation, in accordance with approved BWROG analysis, throughout the event.	STARTED
Fuel Pool Cooling Phase 1 (p.35)	Complete an evaluation of the spent fuel pool area for steam and condensation.	STARTED
Safety Functions Support Phase 1	Evaluate the habitability conditions for the Main Control Room and develop a	STARTED. LaSalle will be applying the "toolbox"

Section Reference	Overall Integrated Plan Open Item	Status
(p.44)	strategy to maintain habitability.	approach for habitability.
Safety Functions Support Phase 1 (p.44)	Evaluate the habitability conditions for the Auxiliary Electric Equipment Room (AEER) and develop a strategy to maintain habitability.	STARTED
Safety Functions Support Phase 2 (p.48)	Develop a procedure to prop open battery room doors upon energizing the battery chargers to prevent a buildup of hydrogen in the battery rooms.	STARTED

Interim Staff Evaluation Open and Confirmatory Items		
	Open Items	
Item Number	**Description**	**Status**
3.2.3.A	Verify the modifications associated with Order EA 13-109 on a Hardened Containment Vent System support the sequence of events and actions associated with the LSCS mitigating strategies.	The modifications associated with Order EA 13-109 are scheduled to complete installation at LSCS in 2017 (Unit 2) and 2018 (Unit 1). The modifications will be designed to support the LSCS mitigating strategies. STARTED
	Confirmatory Items	
Item Number	**Description**	**Status**
3.1.1.2.A	Confirm that soil liquefaction will not prevent movement of equipment along transportation paths.	STARTED
3.1.1.2.B	Confirm that the egress path for personnel to reach the FLEX storage building is seismically robust, or multiple egress paths that are not seismically robust are identified.	STARTED
3.1.1.4.A	Confirm that the logistics for equipment transportation, area set up, and other needs for ensuring the equipment and commodities to sustain the site's coping strategies are available from offsite resources.	STARTED
3.1.3.1.A	If the licensee credits separation of storage sites to address tornado threats, confirm that the axis of separation and distance between storage locations will provide assurance that a single tornado would not impact all locations if the licensee relies on NEI 12-06, Section 7.3.1, configurations 1.b or 1.c for protection of the portable equipment from the high winds hazard.	LaSalle Station is NOT crediting separation of storage sites to address tornado threats.
3.2.1.1.A	Confirm that benchmarks are identified and discussed that demonstrate that the Modular Accident Analysis Program (MAAP) is an appropriate code for the simulation of an ELAP event at LSCS.	COMPLETE. See Attachment 5.
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 specification limits for MAAP analyses.	COMPLETE. See Attachment 5.

Interim Staff Evaluation Open and Confirmatory Items		
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 (ADAMS Accession No. ML13190A201).	COMPLETE. See Attachment 5.
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.	COMPLETE. See Attachment 5.
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 is appropriate for LSCS. Alternately, a comparable level of information may be included in the supplemental response.	COMPLETE. See Attachment 5.
3.2.1.2.A	Confirm adequacy of the technical basis for the assumptions made regarding the leakage rate through the recirculation pump seals and other sources. The analysis should include the assumed pressure-dependence of the leakage rate, and whether the leakage was determined or assumed to be single-phase liquid, two-phase mixture, or steam at the donor cell, and how mixing the leakage flow with the drywell atmosphere is modeled.	COMPLETE. See Attachment 5.
3.2.1.3.A	Confirm that taking readings from a standpipe which is not safety related or seismic does not make the CST level instrumentation inadequate for the automatic swap or informing the operators of CST loss so that they may respond with manual action using the control switches located in the main control room.	COMPLETE. With a potential loss of the CST Standpipe, which is located inside of the Turbine Building, the water would no longer be present to indicate high level; therefore, because the level instruments are seismically qualified, they will remain adequate to support the automatic suction source swap.
3.2.1.4.A	Confirm that pump sizing results consider required water flow rates, the portable/FLEX pump complete	STARTED

Interim Staff Evaluation Open and Confirmatory Items		
	head/flow characteristics, suction and discharge losses, system backpressure, elevation differences and piping losses to allow verification that this will be a successful strategy.	
3.2.1.4.B	Confirm the generator sizing results consider appropriate electrical loads and adequate capacity of portable/FLEX electrical generators planned for use during Phase 2 and Phase 3.	STARTED
3.2.2.A	Confirm completion of the evaluation of the SFP area for steam and condensation and implementation of a vent path strategy, if needed.	STARTED
3.2.4.1.A	Confirm that operation of RCIC with suction temperatures above 200°F is acceptable.	STARTED
3.2.4.2.A	Confirm that the licensee provides acceptable hydrogen gas ventilation.	STARTED
3.2.4.4.A	Confirm that the upgrades to the plant communication systems discussed in 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 Limerick (sic) and, as documented in the staff analysis (ADAMS Accession No. ML13114A067) have been completed.	STARTED
3.2.4.6.A	Confirm that the proceduralized "toolbox" approach can ensure vital area habitability and confirm the proper staging and protection of any equipment to implement this approach.	STARTED
3.2.4.7.A	Confirm that the design of the FLEX pump suctions will prevent introducing excessive amounts of entrained debris as a result of extreme external hazards (e.g., suspended solids especially from high wind debris) in the cooling water from the Lake Screen House/Lake.	STARTED
3.2.4.10.A	Confirm that the high/low temperature analysis (i.e., temperatures above/below those currently assumed in the sizing calculations) shows no adverse effects on expected battery life.	STARTED
3.4.A	Confirm conformance to considerations 2 through 10 of NEI 12-06, Section 12.2 for the use of offsite resources or that an acceptable alternate is developed.	STARTED

7 Potential Draft Safety Evaluation Impacts

The FLEX strategy changes described in this update have the potential to impact the DRAFT Safety Evaluation.

8 References

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

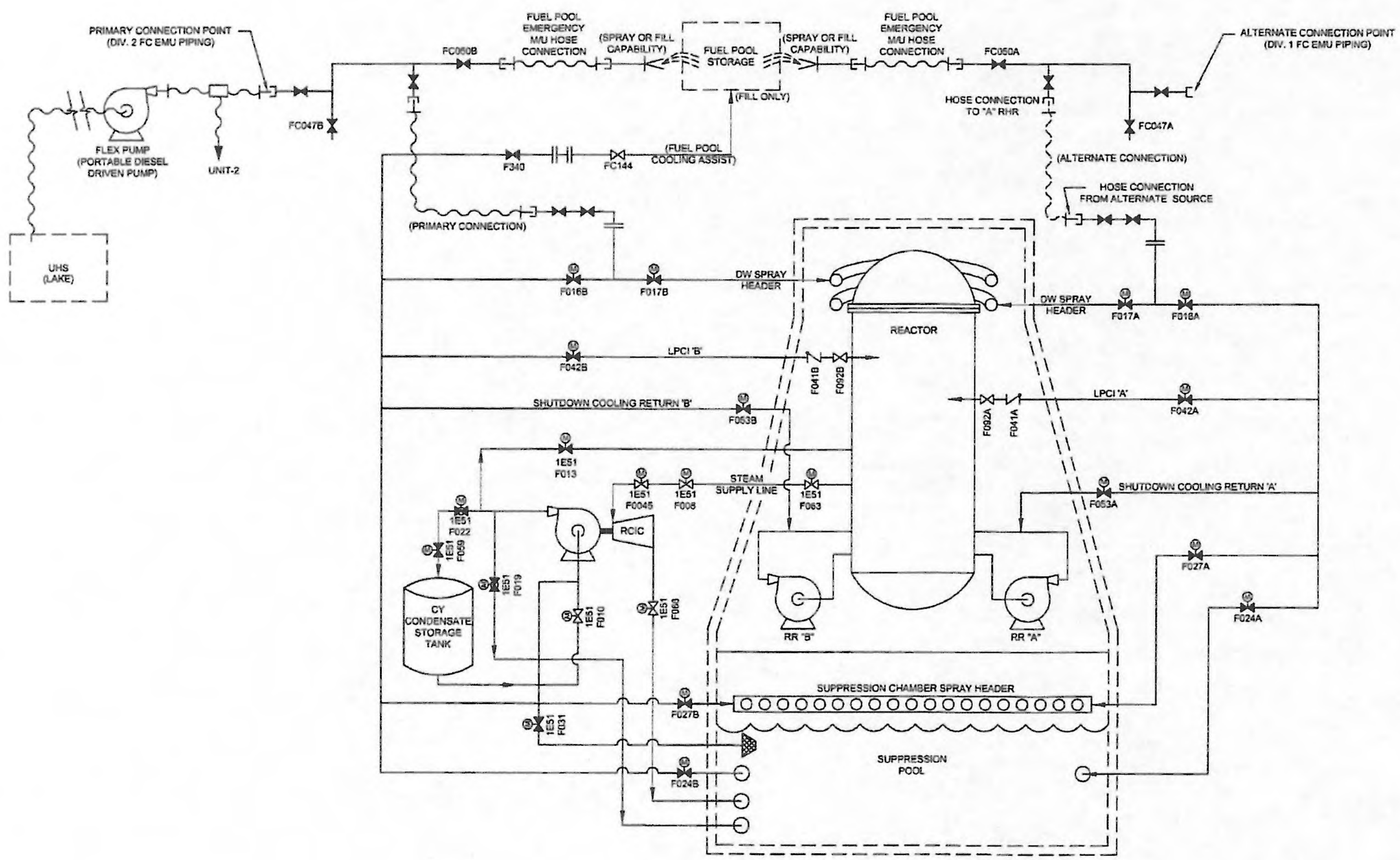
1. LaSalle County Station's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013 (ADAMS Accession No. ML13060A421).
2. 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.
3. Exelon/LaSalle Request for Relaxation from NRC Order EA-12-049, dated February 27, 2014 (ADAMS Accession No. ML14059A076).
4. NRC Approval of Exelon/LaSalle Request for Relaxation from NRC Order EA-12-049, dated April 15, 2014 (ADAMS Accession No. ML14071A455).
5. LaSalle County Station, Units 1 and 2 – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies), dated February 21, 2014 (ADAMS Accession No. ML14030A220(package)).
6. 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
7. LaSalle County Station, Units 1 and 2 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 (ADAMS Accession No. ML14059A431)
8. LaSalle County Station, Units 1 and 2, 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 (ADAMS Accession No. ML13241A283)

9 Attachments

1. FLEX Water Supply Diagram
2. FLEX Electrical Supply Diagram
3. Portable Equipment Phase 2
4. Portable Equipment Phase 3
5. LaSalle Evaluation LS-MISC-025, Rev. 1, "Use of MAAP in Support of FLEX Implementation"

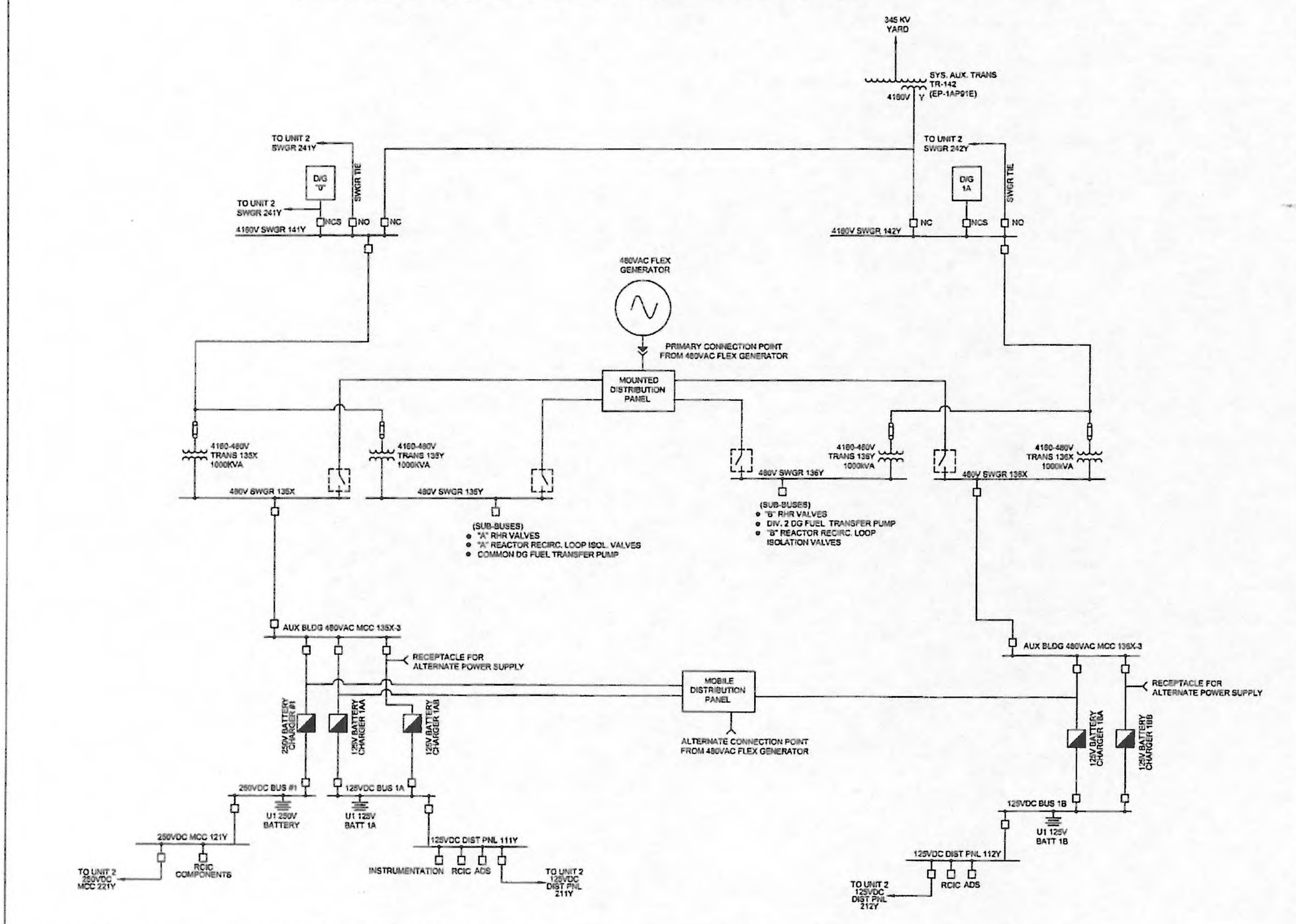
Attachment 1

LA SALLE WATER SUPPLY STRATEGY (AUGUST 2014)



Attachment 2

LA SALLE ELECTRICAL STRATEGY (AUGUST 2014)



Attachment 3

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Two (2) Hale IP4000DIM-TCL portable diesel driven pumps with two (2) hydraulic submersible booster pumps	X	X	X			Nominal 4,000 gpm main pump at 150 psig. Hydraulic booster pumps nominal 2,000 gpm.	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Three (3) 480 VAC Portable Diesel Driven Generators	X	X	X	X	X	500kW	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Two (2) tandem axle cable trailers with cable reels	X	X	X	X	X	'2N' sets of cable located on one trailer in protected FLEX building. '+1' set of cable located on one trailer in commercial FLEX building.	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) Tandem Axle Hose Trailers	X	X	X			Capable of hauling hoses, fittings, and tools	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Ford F750 Truck w/snow plow and two (2) 118 gal diesel fuel tanks with pump and dispensing equpment	X	X	X		X	Tow vehicle, portable equipment refueling vehicle, and debris removal vehicle	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Six (6) 5.5 kW portable diesel generators					X	5.5 kW, 120/240VAC	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Ten (10) portable fans with ducting (Support RCIC and other room cooling)	X				X	115 VAC, 5,000 SCFM	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Two (2) Oscillating Spray Fire Monitors (Support SFP Spray)			X			250 gpm	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Miscellaneous fire hose and fittings	X	X	X			Various	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Miscellaneous Electrical Cable and Connectors	X	X	X	X	X	Various	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
12 "spider" boxes to distribute electrical power	X	X	X	X	X	Provide AC power for portable fans, lighting, etc.	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Portable Inflatable Tower Lighting (Ten 10' units, Four 14' units)					X	AC powered	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
6 large area fans					X	AC. 13,300 cfm.	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Portable battery operated fans (5)					X	AC/DC, variable speed, 5,000 to 15,000 cfm	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Hydraulic "rescue" cutters (1)						Max 236,250 psf lbf, 6 hp diesel engine	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Hydraulic circular saw						14 inch, 10 hp diesel engine	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Miscellaneous cold weather gear					X	Coveralls, gloves, hoods	N/A
Sleeping bags and cots					X		N/A
Cooling vests and spare cooling packs					X	To support "toolbox" approach for area habitability	N/A
Porta-potties (4)					X		N/A
Portable (AC) fuel transfer pump and hoses	X	X	X	X	X		Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.

LaSalle Portable Equipment Phase 2							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) battery-powered trailer movers	X	X	X	X	X	Move large trailers in/out of FLEX storage buildings	Equipment maintenance and testing will be performed in accordance with the industry templates, as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.
Sound-powered phone equipment	X	X	X	X	X	Headsets, extra cable sections	N/A
Handheld radios	X	X	X	X	X	Additional radios for use in talk-around mode, batteries, chargers	N/A

Attachment 4

BWR Portable Equipment Phase 3 (Generic Equipment)

Note: The equipment listed is the generic equipment list provided by the National SAFER Response Center and even though LaSalle does not require this equipment in our FLEX strategies, this equipment will be available from the National SAFER Response Center and could be utilized in the Phase 3 time period. {Based on AREVA "Regional Response Center Equipment Technical Requirements" document 51-9199717-007.}

Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Medium Voltage Diesel Generator	X	X	X	X	X	1 MW output at 4160 Vac, three phase Note 1	
Low Voltage Diesel Generator	X	X	X	X	X	1100 kW output at 480 Vac, three phase Note 2	
High Pressure Injection Pump	X					2000 psi shutoff head, 60 gpm capacity	
SG/RPV Makeup Pump	X					500 psi / 500 gpm	
Low Pressure / Medium Flow Pump	X	X	X			300 psi shutoff head, 2500 gpm max flow	
Low Pressure / High Flow Pump	X	X	X			150 psi shutoff head, 5000 gpm max flow	
Cable / Electrical	X	X	X	X		Various as determined by AREVA document # 51 -	

BWR Portable Equipment Phase 3 (Generic Equipment)							
Note: The equipment listed is the generic equipment list provided by the National SAFER Response Center and even though LaSalle does not require this equipment in our FLEX strategies, this equipment will be available from the National SAFER Response Center and could be utilized in the Phase 3 time period. {Based on AREVA "Regional Response Center Equipment Technical Requirements" document 51-9199717-007.}							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
						9199717 - 007	
Hose / Mechanical Connections	X	X	X			Various as determined by AREVA document # 51 - 9199717 - 007	
Lighting Towers (3/unit)					X	40,000 lumens	
Diesel Fuel Transfer						500 gallon air-lift container	
Diesel Fuel Transfer Tank						264 gallon tank, with mounted AC/DC pumps	
Portable Fuel Transfer Pump						60 gpm after filtration	
Electrical Distribution System						4160 V, 250 MVA, 1200 A	
Note 1: 1 MW is the individual generator output, and 2 MW is the total standard output to be supplied by the Phase 3 MV generators to satisfy identified load demands. The total output is created by connection of several smaller generators in parallel. Loads in excess of 2 MW are planned to be addressed as additional generators classified as non-generic equipment (see Section 8.4). Note 2: The 1100 kW unit is derated to 1000 kW.							

LaSalle Portable Equipment Phase 3 (Non-Generic Equipment)							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
2500/5000 GPM Suction Booster Lift Pumps	X	X	X			The Suction Booster Lift Pump will assist in providing 26 feet of suction lift to the Low Pressure Medium Flow Pumps and the Low Pressure High Flow Pumps.	Exelon/LaSalle is currently pursuing participation in this equipment group .

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling	These types of equipment will be requested from site to site and utility to utility on an as required basis.
Commodities • Food • Potable water	These types of commodities will be requested from site to site and utility to utility on an as required basis.

Attachment 5

Copy of LS-MISC-025 Rev. 1 (20 pages including cover page)

RM DOCUMENTATION NO. LS-MISC-025	**REV:** 1	**PAGE NO.** 1

STATION: LaSalle

UNIT(S) AFFECTED: Units 1 and 2

TITLE: Use of MAAP in Support of FLEX Implementation

SUMMARY (Include UREs incorporated):

MAAP 4.0.5 calculations (LS-MISC-017-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. Revision 1 includes discussion to provide additional details regarding the NRC's information request.

[ ] 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: **Rev. 0** ***in its entirety.***

	Print		Sign		Date
Prepared by:	Alex H. Duvall	/	*[signature]*	/	7/22/14
Reviewed by:	Gary W. Hayner	/	*[signature]*	/	7/22/14
Approved by:	Edward T. Burns	/	*[signature]*	/	7/22/14

RM DOCUMENTATION NO. LS-MISC-025 **REV:** 1 **PAGE NO.** 1

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[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: **Rev. 0** ***in its entirety.***

	Print	Sign	Date
Prepared by:	Alex H. Duvall		
Reviewed by:	Gary W. Hayner		
Approved by:	Edward T. Burns		

TABLE OF CONTENTS

1.0 PURPOSE & SCOPE

The purpose of the included information is to respond to NRC questions relating to the use of the Modular Accident Analysis Program (MAAP) Version 4 in support of the plant's response to NRC Order EA-12-049 [1]. The MAAP analysis is documented separately in LS-MISC-017-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) [2], the following responses have been developed regarding the use of MAAP4 for estimating accident progression timing in support of the Overall Integrated Plan (OIP) for LaSalle.

2.1 NRC ITEM 1

Question 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:

The 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" [6] concludes that MAAP4 is an appropriate code for the simulation of an ELAP at this facility.

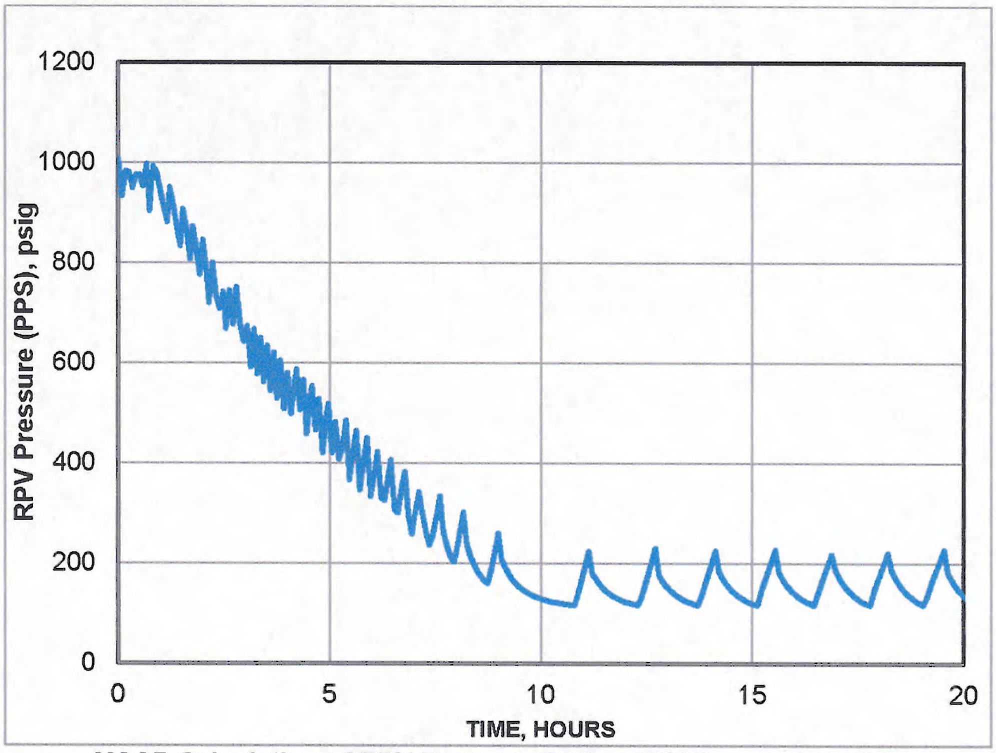
2.2 NRC ITEM 2

Question 2

The collapsed level must remain above Top of Active Fuel (TAF) and the cool down rate must be within Technical Specification limits.

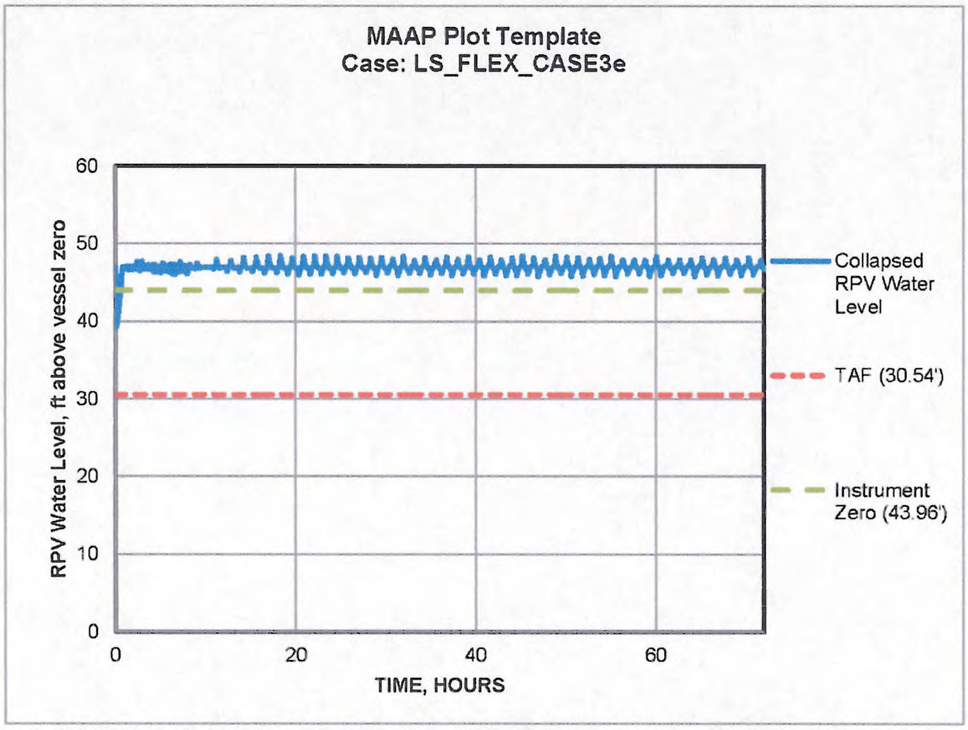
Response to Item 2:

Attachment 1A of the LaSalle Integrated Plan (Feb. 2013) states that the operators would commence a cooldown of the RPV at 20 min at a rate of 20°F/hr which is within the Technical Specifications limit of 100°F/hr. The following plot of the RPV pressure from the MAAP4 analysis confirms this cooldown rate for the supporting MAAP4 calculation was modeled correctly.



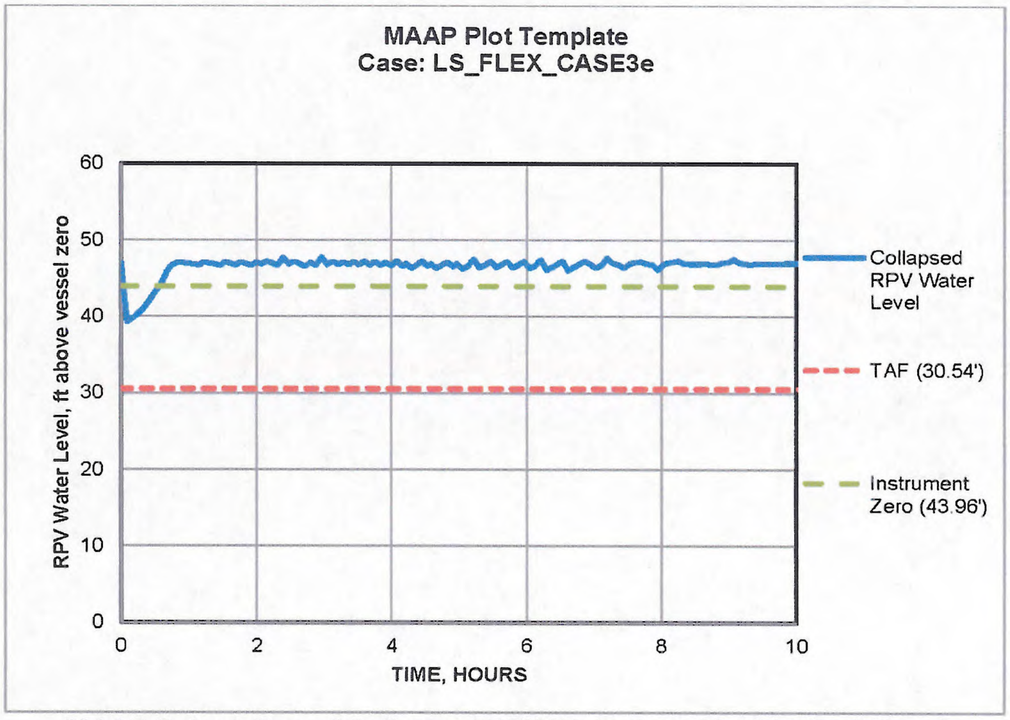
MAAP Calculation of RPV Pressure During RPV Depressurization

For the representative MAAP4 run (Case 3.e), the collapsed RPV water level inside the shroud remains above Top of Active Fuel (TAF) for the duration of the analysis. The plots below shows that the lowest RPV water level, calculated by MAAP4, is approximately 60" (5') below instrument zero[(1)]. TAF is located at -161" (-13.42') relative to instrument zero. As shown in the following plots, the collapsed RPV water level remains at least 8' above TAF for the duration of the analysis.



MAAP Calculation of Collapsed RPV Water Level Inside the Shroud From 0 to 72 Hours

(1) Instrument zero is at +527.5" (43.96') above vessel zero.



MAAP Calculation of Collapsed RPV Water Level Inside the Shroud From 0 to 10 Hours

2.3 NRC ITEM 3

Question 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:

The MAAP4 analysis performed for LaSalle 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" [3]. The requirements of each of these sections of the generic guideline (EPRI Technical Report 3002001785) are dispositioned below.

2.3.1 Compliance with Section 4.1

Section 4.1 of the EPRI report discusses documentation of the verification and validation of the MAAP 4.0.5 installation [3]. The MAAP 4.0.5 BWR output provided by EPRI with the MAAP 4.0.5 installation (run on Windows XP) was compared to the computer running output files generated on the computer system (operating Windows 7) that is used for all MAAP4 calculations in the LaSalle MAAP ELAP analysis. The Peach Bottom sample Parameter File provided with the MAAP 4.0.5 software installation package (PEACH4.par) was used to accomplish this validation.

The Peach Bottom Parameter File was executed using the MAAP 4.0.5 code with the large loss of coolant (LLOCA1.inp) and station blackout (SBO1A1.inp) scenario input files provided with the MAAP 4.0.5 software installation package. The output files generated from these executions as part of local code installation are compared with the output files for the same scenarios that were provided by EPRI with the MAAP 4.0.5 installation (i.e., post-executed files). The input and output files generated during this installation validation process are not included with this report; however, key results of the EPRI files and the validation files are compared below.

The following is the comparison of the EPRI sample outputs with the same cases performed on the computer used for LaSalle calculations. As noted in Section 4.1 of the June 2013 Position Paper, validation of the MAAP installation is adequate for alternate computer and operating systems if the figures-of-merit at the end of the user-generated log file agree with the figures-of-merit from the log file provided with the MAAP installation are within certain tolerances [3].

LLOCA-LARGE LOSS OF COOLANT ACCIDENT

The first EPRI test case is the LLOCA sequence (LLOCA1.inp) initiated with a double-ended recirculation line break (28" break area) at the bottom elevation of the downcomer/reactor pressure vessel penetration. This break drains the reactor coolant into the drywell. All RPV injection sources are assumed to be unavailable. The end time of the sequence is 40 hours. The Table 2-1 provides a comparison of LLOCA

results between the Windows XP MAAP 4.0.5 output files provided with the MAAP 4.0.5 installation (LLOCA1.log) and the output file generated using a Windows 7 computer. A comparison of results shows a valid installation of the software. The output results show slight but acceptable differences (i.e., within code tolerances) between the Windows XP run provided by EPRI and the Windows 7 run performed as part of this installation assessment. This comparison confirms that there are no issues using Windows 7 to perform MAAP 4.0.5 calculations.

Table 2-1

PEACH BOTTOM (PEACH4) LLOCA COMPARISON

Parameter	Calculated Parameter Value	
	PEACH4.par MAAP 4.0.5 with Windows XP	PEACH4.par MAAP 4.0.5 with Windows 7
Time Core Uncovery	41.8 sec	41.8 sec
Time of Core Temp >2499K	1381.4 sec	1382.1 sec
Time of First Relocation to Lower Plenum	5909.6 sec	5984.6 sec
Time of First Vessel Failure	12287.5 sec	11733.3 sec
First Vessel Failure Mode, Node	CRD tube ejection	CRD tube ejection
UO_2 Mass in Pedestal	81514.9 kg	81518.9 kg
UO_2 Mass in Drywell	77057.9 kg	77054.4 kg
CsI Mass in Containment	29.0203 kg	29.0786 kg
SrO Mass in Corium	70.7301 kg	71.2745 kg
Fraction of Zr Clad Reacted in Vessel	0.1988	0.2118

STATION BLACKOUT

The second EPRI test case is the SBO sequence (SBO1A1.inp) modeled as the loss of onsite and offsite AC power. Battery backed injection systems (i.e., HPCI and RCIC) are available for the life of the battery charge. The end time of the sequence is 40 hours. The table below provides a comparison of the SBO results between the Windows XP MAAP 4.0.5 output file provided with the MAAP 4.0.5 installation (SBO1A1.log) and the output file generated using the Windows 7 computer. A comparison of results shows a valid installation of the software. The output results show slight but acceptable differences (i.e., within code tolerances) between the Windows XP run provided by EPRI and the Windows 7 run performed as part of this installation assessment. This comparison confirms that there are no issues using Windows 7 to perform MAAP 4.0.5 calculations.

Table 2-2

PEACH4 SBO COMPARISON

Parameter	Calculated Parameter Value	
	PEACH4.par MAAP 4.0.5 with Windows XP	PEACH4.par MAAP 4.0.5 with Windows 7
Time Core Uncovery	27783.3 sec	27783.3 sec
Time of Core Temp >2499K	31246.7 sec	31246.7 sec
Time of First Relocation to Lower Plenum	46372.9 sec	46428.1 sec
Time of First Vessel Failure	47832.2 sec	47890.3 sec
First Vessel Failure Mode, Node	CRD tube ejection	CRD tube ejection
UO_2 Mass in Pedestal	76008.7 kg	76331.9 kg
UO_2 Mass in Drywell	82589.3 kg	82265.8 kg
CsI Mass in Containment	20.4359 kg	19.4627 kg
SrO Mass in Corium	69.0067 kg	68.5566 kg
Fraction of Zr Clad Reacted in Vessel	0.5031	0.5031

2.3.2 <u>Compliance with Section 4.2</u>

This section discusses the testing requirements of the MAAP 4.0.5 Parameter File. Testing and review of the LaSalle MAAP 4.0.5 Parameter File is documented in Exelon Risk Management document LS-PSA-009, Rev. 2 [5], which concludes that the Parameter File has been adequately tested and reviewed.

2.3.3 <u>Compliance with Section 4.3</u>

This section discusses the preparation and confirmation requirements of MAAP 4.0.5 input files. The LaSalle MAAP FLEX analysis, LS-MISC-017, Rev. 1 [7], documents the creation of these input files in Section 6 and Attachment 1 and the results of the analysis output in Section 7 and Attachment 1.

2.3.4 Compliance with Section 4.4

This section discusses the requirements for control of the analysis model files, the analysis documentation, and the review of the analysis. LS-MISC-017, Rev. 1, provides documentation of the analysis and was reviewed by Exelon qualified staff. The MAAP scenario input and output files are stored appropriately.

2.3.5 Compliance with Section 4.5

This section discusses the requirements of qualified individuals to perform the analysis. Preparation and review of the MAAP analysis in LS-MISC-017, Rev. 1 was conducted using Exelon engineering training certification guide ENANRM08. All personnel responsible for the analysis are qualified in this certification guide.

2.4 NRC ITEM 4

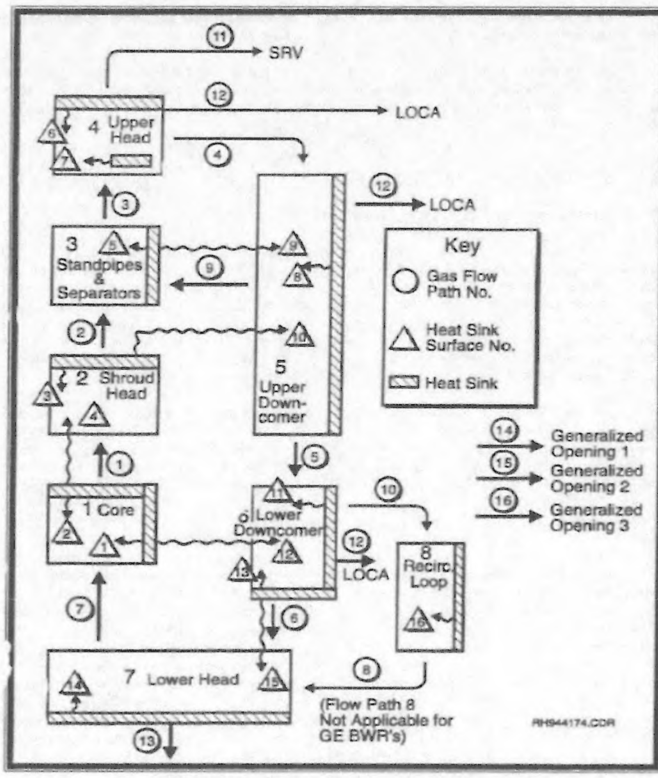
Question 4

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) [4]. 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:

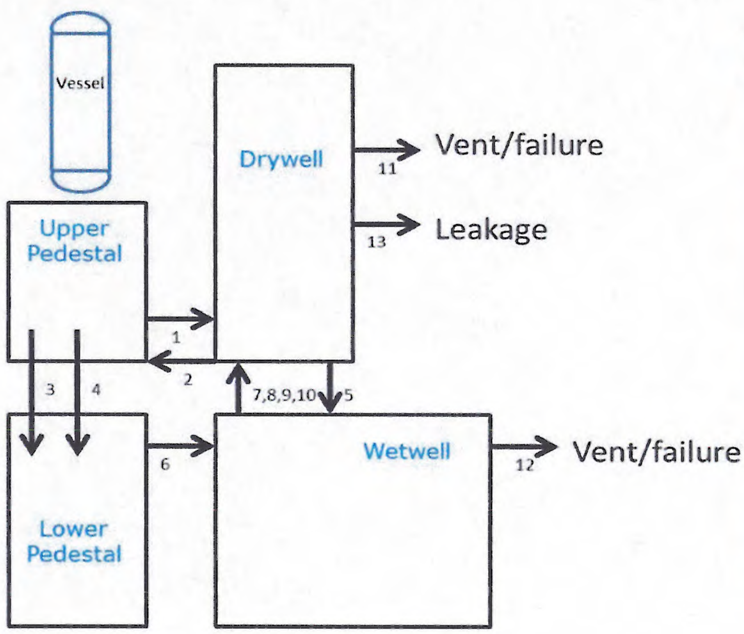
a. The reactor vessel nodalization is fixed by the MAAP code and cannot be altered by the user, with the exception of the detailed core nodalization. The LaSalle MAAP 4.0.5 Parameter File divides the core region into 5 equal volume radial regions and 13 axial regions. The axial nodalization represents 10 equal-sized fueled nodes, 1 unfueled node at the top, and 2 unfueled nodes at the bottom. The LaSalle MAAP 4.0.5 Parameter File is documented in LS-PSA-009, Rev. 2 [5]. 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 LaSalle MAAP 4.0.5 Parameter File and represents the following individual compartments:

1. Upper Pedestal
2. Drywell
3. Suppression chamber (Wetwell)
4. Lower Pedestal

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



Junction	Description
1	Upper Pedestal Door to Drywell
2	Drywell to Upper Pedestal Drains
3	Upper Pedestal Drain line Failure to Lower Pedstal
4	Upper Pedestal to Lower Pedestal Corium Junction
5	Downcomers
6	Lower Pedestal to Wetwell Opening
7,8,9,10	Vacuum Breakers
11	Drywell vent/failure
12	Wetwell vent/failure
13	Drywell leakage

b. General two-phase flow from the reactor vessel is described in the EPRI Technical Report 3002002749, Section 2 [6]. 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", Section 2, [6] 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, Section 3. The LaSalle MAAP 4.0.5 Parameter File is documented in LS-PSA-009, Rev. 2 [5].

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

c. Modeling of heat transfer and losses from the RPV are described in Section 2 of the EPRI Technical Report 3002002749 [6]. The MAAP parameters that control these processes, as defined in the EPRI report, are provided below with the values selected to represent LaSalle. LS-PSA-009, Rev. 2, documents the LaSalle MAAP 4.0.5 Parameter File [5].

PARAMETER NAME	VALUE USED IN THE LASALLE MAAP ANALYSIS	COMMENT
QC0 – not-thru-insulation heat transfer from RPV during normal operation.	3.753E6 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	10.0	Plant-specific value
XTINS – average reflective insulation thickness	0.2917 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 LASALLE MAAP ANALYSIS
Power level, MWth	QCR0	3546 MWth
Initial CST water volume, gal	VCSTO (ft^3)	262,482.2 ft^3
Initial CST water temperature, F	HCST (enthalpy)	95°F
Initial suppression pool water mass, lbm	Calculated from input	8,119,000 lbm
Initial suppression pool water level, ft	XWRB0(i), where i is node number for wetwell	26.5 ft
Initial suppression pool water temperature, F	TWRB0(i), where i is node number for wetwell	105.0°F
Drywell free volume, ft^3	VOLRB(i), where I is node number for drywell	220,402.4 ft^3
Wetwell free volume, ft3	VOLRB(i) – volume of suppression pool water from initial pool mass	295757.0 ft3
Containment vent pressure, psia	Refer to MAAP analysis document	26.32 psia
RCIC max flow rate, gpm	WRCIC	625 gpm
Max FLEX pump flow rate, gpm	Refer to MAAP analysis document	300 gpm
Lowest set SRV flow rate, lb/hr	Derived from SRV area, ASRV	862,400
Lowest set SRV pressure, psia	PSETRV	1090.7
Recirc pump seal leakage, gpm	Value that was used to define LOCA area, ALOCA	36 (18 gpm per pump)
Total leakage used in the transient, gpm	Value that was used to define LOCA area, ALOCA	100

d. Choked flow from the SRV and the recirculation pump seal leakage (as break flow) is discussed in the EPRI Technical Report 3002002749 in Section 4 and Section 2, respectively [6]. The parameters identified that impact the flow calculation are listed below with input values identified. LS-PSA-009, Rev. 2, documents the LaSalle MAAP 4.0.5 Parameter File [5].

PARAMETER NAME	VALUE USED IN THE LASALLE MAAP ANALYSIS	EPRI RECOMMENDED VALUE
ASRV – effective flow area for relief valve	0.0927 ft^2 (based on rated flow at pressure)	Plant-specific value
ALOCA – seal leakage area	1.55E-3 ft^2 (100 gpm at normal conditions)	Plant-specific value
FCDBRK – discharge coefficient for seal leakage	0.75	0.75

e. Containment 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 LaSalle analysis, the vent area is input based on a 10" diameter pipe and a discharge coefficient of 0.75 was selected. For this vent flow, MAAP assumes a compressible, adiabatic, critical flow between containment and the environment. This flow is only adjusted for pressure loss using the discharge coefficient (i.e., the physical losses from piping and pipe components are not independently considered, rather the effects are averaged as the discharge coefficient). The vent is assumed to cycle in the open and close states via operator actions to maintain wetwell pressure between 5 and 8 psig.

f. The decay heat calculation in MAAP is discussed in the EPRI Technical Report 3002002749, Section 2 [6]. 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 LaSalle analysis. LS-PSA-009, Rev. 2, documents the LaSalle MAAP 4.0.5 Parameter File [5].

PARAMETER NAME	VALUE USED IN THE LASALLE MAAP ANALYSIS	EPRI RECOMMENDED VALUE
FENRCH – normal fuel enrichment	0.0381	Plant-specific value
EXPO – average exposure	29,549.6 MW-day/ton	Plant-specific value
FCR – total capture rate of U-238 / total absorption rate	0.323	Plant-specific value
FFAF – total absorption rate / total fission rate	2.30	Plant-specific value
FQFR1 – fraction of fission power due to U-235 and PU-241	0.510	Plant-specific value
FQFR2 – fraction of fission power due to PU-239	0.405	Plant-specific value
FQFR3 – fraction of fission power due to U-238	0.085	Plant-specific value
TIRRAD – average effective irradiation time for entire core	26,280 hours	Plant-specific value

2.5 NRC ITEM 5

Question 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 Technical Specification limits.

Response to Item 5:

The MAAP analysis performed in support of the LaSalle OIP is documented in calculation LS-MISC-017 Rev. 1 [7] and is available on the ePortal. Case 3e was the specific MAAP run selected to represent the scenario as described in Attachment 1A of the integrated plan.

2.6 ADDITIONAL ITEMS

Additionally, this document responds to the following question:

Additional Question (Question 6)

Confirm adequacy of the technical basis for the assumptions made regarding the leakage rate through the recirculation pump seals and other sources. The analysis should include the assumed pressure-dependence of the leakage rate, and whether the leakage was determined or assumed to be single-phase liquid, two-phase mixture, or steam at the donor cell, and how mixing the leakage flow with the drywell atmosphere is modeled.

Response to Item 6:

Leakage is estimated for LaSalle to be 18 gpm of recirculation pump seal leakage per pump (36 gpm total) in addition to 25 gpm to account for additional primary system leakage (61 gpm total) per Table 15.9-1 of the LaSalle UFSAR. This estimated leakage rate is conservatively modeled to be 100 gpm and is assumed to initiate at t = 30 minutes relative to accident initiation. This leakage is modeled in MAAP4 using a fixed junction flow area that achieves a total of 100 gpm leakage at full operating pressure and temperature. As the RPV is depressurized, leakage will decrease because the leakage flow rate is dependent on upstream pressure. Although actual recirculation pump seal leakage may initiate much later following transient initiation (e.g., an hour or more), this modeling approach is a reasonable upper bound representation of actual recirculation pump seal leakage.

General two-phase flow from the reactor vessel is described in Section 2 of EPRI Technical Report 3002002749 [6]. The location of the modeled leakage in the MAAP4 analysis is approximately at the elevation of the recirculation pump seals and hence is expected to be a single-phase liquid in the donor cell for the scenarios examined. However, MAAP calculates the conditions in the donor cell each timestep. Based on these conditions, as well as the flow characteristics and downstream node conditions, MAAP4 will determine if the leakage flashes into steam or is released as a single-phase liquid. MAAP4 assumes homogenous mixing in the drywell and adds the discharged mass and energy to the appropriate phases in the downstream node.

3.0 REFERENCES

[1] NRC EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (BDBEE), March 2012.

[2] Jack R. Davis (NRR) to Joseph E. Pollock (NEI), U.S. Nuclear Regulatory Commission, ADAMS Accession No.: ML13275A318, October 3, 2013.

[3] "Use of Modular Accident Analysis Program (MAAP) in Support of Post-Fukushima Applications," EPRI, Palo Alto, CA: 2013. 3002001785.

[4] MAAP4 Application Guidance. EPRI, Palo Alto, CA: 2010. 1020236.

[5] LS-PSA-009, LaSalle MAAP 4.0.5 Parameter File Notebook, Rev. 2.

[6] 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. EPRI, Palo Alto, CA: 2010. 3002002749.

[7] LaSalle MAAP Analysis to Support Initial FLEX Strategy, LS-MISC-017, Rev. 1.