



Order No. EA-12-049

RS-13-026
TMI-13-004

February 28, 2013

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

Three Mile Island Nuclear Station, Unit 1
Renewed Facility Operating License No. DPR-50
NRC Docket No. 50-289

Subject: 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)

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

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 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012 which endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of this Overall Integrated Plan.

Reference 4 provided the EGC initial status report regarding mitigation strategies, as required by Reference 1.

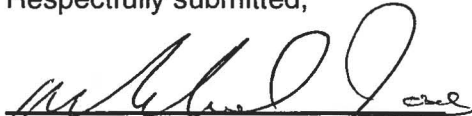
The purpose of this letter is to provide the Overall Integrated Plan pursuant to Section IV, Condition C.1, of Reference 1. This letter confirms EGC has received Reference 2 and has an Overall Integrated Plan developed in accordance with the guidance for defining and deploying strategies that will enhance the ability to cope with conditions resulting from beyond-design-basis external events.

The information in the enclosure provides the Three Mile Island Nuclear Station, Unit 1 Overall Integrated Plan for mitigation strategies pursuant to Reference 3. The enclosed Integrated Plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the Enclosure, will be provided in the 6-month Integrated Plan updates required by Reference 1.

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 February 2013.

Respectfully submitted,



Michael D. Jesse
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosure:

1. Three Mile Island Nuclear Station, Unit 1 Mitigation Strategies (MS) Overall Integrated Plan

cc: Director, Office of Nuclear Reactor Regulation
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NRC Senior Resident Inspector – Three Mile Island Nuclear Station, Unit 1
NRC Project Manager, NRR – Three Mile Island Nuclear Station, Unit 1
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Enclosure 1

Three Mile Island Nuclear Station, Unit 1

Mitigation Strategies (MS)

Overall Integrated Plan

(55 pages)

General Integrated Plan Elements PWR	
Site: TMI	
<p>Determine Applicable Extreme External Hazard</p> <p>Ref: NEI 12-06 section 4.0 -9.0 JLD-ISG-2012-01 section 1.0</p>	<p><i>Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps.</i></p> <p><i>Describe how NEI 12-06 sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards</i></p> <p>Seismic events; external flooding; severe storms with high winds; snow, ice and extreme cold; and high temperatures were determined to be applicable Extreme External Hazards for TMI per the guidance of NEI 12-06 and are as follows:</p> <p><u>Seismic Hazard Assessment:</u></p> <p>The event is a design basis earthquake i.e., Safe Shutdown Earthquake (SSE). The peak ground acceleration is 0.12g in the horizontal plane and 0.08g in the vertical plane. The SSE is twice the Operating Basis Earthquake (OBE), and the OBE spectra curves are shown in UFSAR Figure 2.7-1. (Reference # 1)</p> <p><u>External Flood Assessment:</u></p> <p>At TMI-1 this event is a precipitation driven event with a minimum of 24 hours warning prior to exceeding the protection of the dike and a peak water level of 313.3 ft elevation (measured at the TMI-1 (Intake Pump and Screen House (IPSH)). To have some causal relationship with the flood, the Extended Loss of All AC Power (ELAP) and Loss of Ultimate Heat sink (LUHS) are assumed to occur when the river level exceeds the protection provided by the dike. (Reference # 2)</p> <p><u>High Wind Hazard Assessment:</u></p> <p>NEI 12-06, Figure 7.1 locates TMI between the 130 MPH and 140 MPH curves. NEI 12-06, Figure 7.2, Recommended Tornado Design Wind Speeds, locates TMI in region 2, 170 MPH. The TMI design basis tornado generates 300 mph tangential wind velocity with gust of 130%. (Reference # 3)</p>

	<p><u>Extreme Cold Hazard Assessment:</u></p> <p>NEI 12-06 locates TMI in an area where the record 3-day snowfall is 18" - 25". Figure 8.2 places TMI in a level 4 region for Ice Storm Severity (Level 4 - Severe damage to power lines and/or existence of large amount of ice). A design temperature of 0°F is applied for the FLEX equipment. In addition, the plan addresses maintaining the availability of the credited water sources with ambient temperature of 0°F (including the river) and deployment of FLEX equipment with severe snow or ice conditions. (Reference # 4)</p> <p><u>Extreme Heat Hazard Analysis:</u></p> <p>All FLEX equipment is designed for an ambient temperature of at least 120°F. The highest temperature recorded in the area of TMI is 107°F. (Reference #5 & #6)</p> <p>References:</p> <ol style="list-style-type: none"> 1. TMI1 UFSAR, Figure 2.7-1, and 5.1.2.1.1 2. TMI1 UFSAR, 2.6.4 3. NEI 12-06, Figures 7.1 and 7.2, UFSAR 5.2.1.2.6 4. NEI 12-06, Figure 8.2 5. TMI1 UFSAR 2.5.2 6. NOAA website for Harrisburg, Pa
<p>Key Site assumptions to implement NEI 12-06 strategies.</p> <p>Ref: NEI 12-06 section 3.2.1</p>	<p><i>Provide key assumptions associated with implementation of FLEX Strategies:</i></p> <p>This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and Spent Fuel Pool (SFP) cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are</p>

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	<p>available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). (Reference Task Interface Agreement (TIA) 2004-04, "Acceptability of Proceduralized Departures from Technical Specifications (TSs) Requirements at the Surry Power Station," (TAC Nos. MC4331 and MC4332)," dated September 12, 2006. (Accession No. ML060590273))</p> <p>Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.</p> <p>The TMI Flex plan meets the "N+1" capability requirement described in NEI 12-06 section 3.2.2. No additional failures of any Structures, Systems or Components (SSC) are assumed.</p> <p>SSCs which are designed for operation and protected from the external event hazard are assumed to be available. No additional unavailability is assumed.</p> <p>Routes from the storage locations have not yet been assessed for hazard impact. This will be completed and communicated in a future 6-month update following evaluation.</p> <p>Additional staff resources are expected to arrive beginning at 6 hours. Ref: NEI 12-01 Rev 0, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities.</p>
<p>Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06.</p> <p>Ref: JLD-ISG-2012-01 NEI 12-06 13.1</p>	<p>Full conformance with JLD-ISG-2012-01 and NEI 12-06 is expected with no deviations.</p>

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<p>Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint.</p> <p>Ref: NEI 12-06 section 3.2.1.7 JLD-ISG-2012-01 section 2.1</p>	<p>Sequence of events timeline is provided in Attachment 1 A.</p> <p>Timeline walk through will be completed when detailed design and site strategy is finalized.</p> <p>During this ELAP and LUHS beyond design basis external event, TMI has identified the following short time constraints:</p> <p>The times to complete actions in the Events Timeline are based on operating judgment, the conceptual designs, and the current supporting analyses. The final timeline will be validated once detailed designs are completed and procedures are developed. The results will be provided in a future 6-month update.</p> <p>The items below provide a technical basis for time constraints listed in Attachment 1A, Sequence of Events Timeline.</p> <p>Load shedding (described below) is required to ensure the station batteries can provide vital instrument power for at least six hours. Preliminary calculation C-1101-734-E420-009 shows the following actions within the specified times achieve that objective:</p> <ul style="list-style-type: none"> • Shutdown LO-P-9A & B within 35 minutes • Vent Main Generator Hydrogen and shutdown GN-P-2 within 35 minutes • Strip instrument systems to reduce vital instrument bus load within one hour • Break vacuum and shutdown LO-P-6 within one hour. <p>Establish FLEX Reactor Coolant System (RCS) Makeup capability within approximately 4 hours to maintain sufficient RCS inventory to support core heat removal. This judgment is based on expected leakage reduction from the installation of low-leakage RC-P seals. Conceptual design for low leakage RCP seal design and analysis to confirm this time requirement are not yet complete.</p> <p>Energize 480VAC MCC 1A & 1B using FLEX diesel generator within 6 hours to ensure vital instrument power is maintained.</p> <p>Set up a portable diesel driven pump to deliver river water to the FLEX condensate source. A makeup source to replenish the condensate supply may be required within 24 hours after a tornado. This capability is expected to take 4</p>
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	<p>people approximately 6 hours to accomplish. This action is performed early to provide margin.</p> <p>Preliminary analysis indicates there are no actions required to maintain containment.</p> <p>Action to maintain Spent Fuel Pool (SFP) cooling is not time critical. The spent fuel pool would not reach boiling in the first 24 hours; therefore, no makeup is required. (Reference 1).</p> <p>The TMI mitigation strategy is not based upon the PWROG WCAP 17601-P ELAP mitigation strategy. Attachment 1B was not included. TMI will complete analysis to demonstrate the viability of the planned core cooling strategy.</p> <p>References:</p> <p>1. ER-TM-TSC-0016, <i>RCS AND SFP HEATUP AND INVENTORY BOILOFF FOLLOWING LOSS OF ACTIVE DECAY HEAT REMOVAL</i></p>
<p>Identify how strategies will be deployed in all modes.</p> <p>Ref: NEI 12-06 section 13.1.6</p>	<p>Deployment of FLEX is expected for all modes of operation. Transportation routes will be developed from the equipment storage area to the FLEX staging areas. Administrative programs will ensure pathways remain clear, and compensatory actions will be implemented when necessary.</p> <p>Identification of storage and creation of the administrative program are open items. An AT Item has been created to track both open items. Closure of these items will be documented in the 6-month update.</p>
<p>Provide a milestone schedule. This schedule should include:</p> <ul style="list-style-type: none"> • Modifications timeline <ul style="list-style-type: none"> ○ Phase 1 Modifications ○ Phase 2 Modifications ○ Phase 3 Modifications • Procedure guidance development complete <ul style="list-style-type: none"> ○ Strategies 	<p>See Milestone Schedule (Attachment 2).</p> <p>Exelon Generation Company, LLC (Exelon) fully expects to meet the site compliance dates provided in Order EA-12-049 with no exceptions. Any changes or additions to the planned interim milestone dates will be provided in a future 6-month update.</p>

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<ul style="list-style-type: none"> ○ Maintenance • Storage plan (reasonable protection) • Staffing analysis completion • FLEX equipment acquisition timeline • Training completion for the strategies • Regional Response Centers operational <p>Ref: NEI 12-06 section 13.1</p>	
<p>Identify how the programmatic controls will be met.</p> <p>Ref: NEI 12-06 section 11 JLD-ISG-2012-01 section 6.0</p>	<p>TMI will apply administrative programs to establish responsibilities, and testing & maintenance requirements. The FLEX mitigation strategy will be treated as an independent system which requires configuration controls associated with systems. Unique identification numbers will be assigned to all FLEX components.</p> <p>Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control as outlined in JLD-ISG-2012-01 section 6 and NEI 12-06 section 11.</p> <p>Installed structures, systems and components pursuant to 10CFR50.63(a) will continue to meet the augmented quality guidelines of Regulatory Guide 1.155, Station Blackout. Standard industry PMs will be developed to establish maintenance and testing frequencies based on type of equipment and will be within EPRI guidelines. Testing procedures will be developed based on the industry PM templates and Exelon standards.</p>
<p>Describe training plan</p>	<p>Training materials for FLEX will be developed for all station staff involved in implementing FLEX strategies. For accredited training programs, the Systematic Approach to Training (SAT) will be used to determine training needs. For other station staff, a training overview will be developed and communicated.</p>
<p>Describe Regional Response Center plan</p>	<p>TMI has contractual agreements in place with the Strategic Alliance for FLEX Emergency Response (SAFER). The industry will establish two (2) Regional Response Centers (RRC) to support utilities during beyond design basis events. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested. The fifth set will have equipment</p>

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	<p>in a maintenance cycle. Equipment will be moved from an RRC to a local Assembly Area, established by the SAFER team and the utility. Communications will be established between the affected nuclear site and the SAFER team. Required equipment will be moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, will be delivered to the site within 24 hours from the initial request.</p>
<p>Notes:</p> <p>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.</p>	

Maintain Core Cooling & Heat Removal

Determine Baseline coping capability with installed coping¹ modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- AFW/EFW
- Depressurize SG for Makeup with Portable Injection Source
- Sustained Source of Water

Ref: JLD-ISG-2012-01 section 2 and 3

PWR Installed Equipment Phase 1

Provide a general description of coping strategies using installed equipment including station modifications that are proposed to maintain core cooling. Identify methods (AFW/EFW) and strategy(ies) utilized to achieve this coping time.

Emergency Procedures will describe the FLEX Phase 1 coping strategy. The RCS will be cooled via Natural Circulation using the Once Through Steam Generators (OTSG). OTSG level will be maintained using the Steam-driven Emergency Feedwater pump. OTSG pressure will be controlled using the Atmospheric Dump Valves. This process is controlled from the Control Room for at least two (2) hours and then local control is required. Instrumentation required to control this process will be available as described in the Safety Functions Support section.

The RCS temperature will be reduced to approximately 400°F to reduce RCS leakage and to reduce OTSG pressure to enable the backup feedwater capability.

A condensate source of at least 200,000 gallons will be available for any Beyond Design Basis External Event (BDBEE).

RCS inventory will be maintained to support sub-cooled Natural Circulation as described in the RCS Inventory section of this plan.

In the event of an external flood, the RCS is cooled down and depressurized (~300°F, 250 psig) prior to the ELAP. The OTSG will be used for RCS heat removal in a manner similar to that above.

If the OTSG is not available for core heat removal, core cooling is maintained using BWST or core flood tank gravity drain for RCS makeup for boil-off during the coping period.

Details:

Provide a brief description of Procedures / Strategies / Guidelines

TMI will use industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom

¹ Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

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	based command and control strategies in the current EOPs.
Identify modifications	Reactor Coolant Pump Low Leakage Seals
Key Reactor Parameters	<p>The following instruments will be available for Phase 1:</p> <p>RCS Press (RC-PT-949) PZR Level (RC-LT-777) RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961) RCS Incore Temperatures (RC-TI-952) OTSG Pressure (MS-PT-950, MS-PT-951) OTSG Level (FW-LT-755, FW-LT-788) CST Levels (CO-LI-1061, -1063)</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>
<p>Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.</p>	

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 2

Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time.

The RCS will continue to be cooled via Natural Circulation using the Steam-driven Emergency Feedwater pump and the Atmospheric Dump Valves. Control of this process is maintained by operators locally at the Steam-driven Emergency Feedwater pump and the Atmospheric Dump Valves. Instrumentation to control this process is provided to the Control Room by the FLEX Diesel Generators described in the Safety Functions Support section.

The backup feedwater supply will be provided by the FLEX feedwater pumps submerged in the FLEX Emergency Condensate Storage Tank. These provide a suction boost for the diesel driven portable pump in tornado or earthquake events, or are used exclusively in an external flood event. These pumps are connected to use water from the Main Condenser Hotwell, the Condensate Storage Tanks or DW-T-2 (the "Million Gallon Tank")

The FLEX feedwater supply to the OTSG is established via manual connections through the EFW Nozzles. (See Attachment 3C)

When the OTSG is not available for RCS heat removal, the feedwater sources described above will be re-directed to the RCS via the FLEX primary header and the HPI lines. Condensate will be used to make up for RCS boil off. RCS water level will be maintained constant to control cooling and RCS boron concentration.

Details:

Provide a brief description of Procedures / Strategies / Guidelines

TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.

Identify modifications

FLEX Feedwater System (see Attachment 3C).
FLEX Storage Building
These are conceptual designs. Changes will be provided in a 6-month update.

Key Reactor Parameters

The following instruments will be available for Phase 2:

- RCS Press (RC-PT-949)
- PZR Level (RC-LT-777)
- RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961)
- RCS Incore Temperatures (RC-TI-952)
- OTSG Pressure (MS-PT-950, MS-PT-951)
- OTSG Level (FW-LT-755, FW-LT-788)
- CST Levels (CO-LI-1061, -1063)

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 2

TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.

Storage / Protection of Equipment :

Describe storage / protection plan or schedule to determine storage requirements

Seismic

The Steam-Driven Emergency Feedwater Pump (EF-P-1) is located in the Intermediate Building, a seismic Class 1 building. FLEX Emergency Feedwater Pumps and FLEX Emergency Condensate Storage Tank design will conform to NEI 12-06 requirements.

FLEX Emergency Feedwater Pumps connections are manual. The piping will conform to NEI 12-06 requirements and the connection is to the seismic class 1 EFW system.

Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.

Flooding

Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.

The Steam-Driven Emergency Feedwater Pump (EF-P-1) is located in the flood protected Intermediate Building.

The Condensate Storage Tanks will maintain their structural integrity during the design flood event.

FLEX Emergency Feedwater Pumps are submersible pumps, and are located inside the FLEX Emergency Condensate Storage Tank, located on the 292' elevation of the Turbine Building. The pumps and tanks will be designed for the flood condition.

Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion.

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 2

	Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.
Severe Storms with High Winds	<p>The Steam-Driven Emergency Feedwater Pump (EF-P-1) is located in the Intermediate Building, a tornado protected structure. Due to their location below grade inside the Turbine Building, FLEX Emergency Feedwater Pumps are protected from missile hazards.</p> <p>There are three condensate sources with at least 200,000 gallons available for EFW (CO-T-1A, CO-T-1B and DW-T-2). Due to the spatial distribution of these tanks and intervening tornado hardened structures, there is a high probability at least one of these three sources would be available after a tornado.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>
Snow, Ice, and Extreme Cold	<p>All of the active FLEX components (EF-P-1, FLEX Feedwater Pumps, Portable diesel driven feedwater pump) used for RCS heat removal are located within temperature controlled buildings.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>
High Temperatures	<p>All of the active FLEX components (EF-P-1, FLEX Feedwater Pumps, Portable diesel driven feedwater pump) are designed for operation with ambient temperature of at least 120F.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion.</p>

Three Mile Island Nuclear Station, Unit 1 Mitigation Strategies Integrated Plan

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 2

Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
<p>The Steam Driven Emergency Feedwater Pump is located in the Intermediate Building. The backup feedwater source uses the FLEX Emergency Feedwater Pumps (submersible pumps located inside the FLEX Emergency Condensate Storage Tank) and a portable diesel-driven pump (which will be stored in a protected storage location and positioned in the Turbine Building when needed).</p> <p>A Ford F-750 has been procured to position portable FLEX equipment from the storage location to the required locations. Routes have not been finalized.</p>	<p>FLEX Emergency Feedwater Pumps will be installed in a tank (FLEX Emergency Condensate Storage Tank) located under the North end of the Main Condenser. These pumps will take suction from either the main condenser or the Condensate Storage Tanks. Connections are also provided to the FLEX Emergency Charging Pumps discharge header for makeup to the Spent Fuel Pool or the RCS.</p> <p>Connections for a portable diesel-driven pump will be provided on the FLEX EFW piping.</p>	<p>FLEX Emergency Condensate Storage Tank is located in the Condenser Pit of the Turbine Building. It is therefore protected from tornado/missile hazards. FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev. 0 protection requirements. As the pumps it contains (FLEX Emergency Feedwater Pumps) are submersible, flooding is not an issue. All connections to pre-existing systems will be protected from hazards described above. The designs have not been finalized.</p> <p>The storage location for the portable equipment has not been selected at this time.</p>

Notes:

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Three Mile Island Nuclear Station, Unit 1 Mitigation Strategies Integrated Plan

Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 3

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time.

Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.

A portable refueling vehicle with a large diesel oil bladder will be available on site to support refilling the portable equipment diesel tanks. An additional means (river makeup is available) of delivering condensate may also be developed, details to be provided in a future 6-month update.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.
Identify modifications	No Phase 3 mods are required at this time.
Key Reactor Parameters	<p>The following instruments will be available for Phase 3:</p> <p>RCS Press (RC-PT-949) PZR Level (RC-LT-777) RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961) RCS Incore Temperatures (RC-TI-952) OTSG Pressure (MS-PT-950, MS-PT-951) OTSG Level (FW-LT-755, FW-LT-788) CST Levels (CO-LI-1061, -1063)</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
None	None	None

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Maintain Core Cooling & Heat Removal

PWR Portable Equipment Phase 3

Notes:

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain RCS Inventory Control

Determine Baseline coping capability with installed coping² modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- **Low Leak RCP Seals or RCS makeup required**
- **All Plants Provide Means to Provide Borated RCS Makeup**

PWR Installed Equipment Phase 1:

Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

RCS Inventory will be maintained to prevent loss of OTSG heat removal capability. Letdown is automatically isolated after letdown cooling is lost. An RCS cooldown will be employed to maximize the length of time before hot leg voiding occurs.

An RCS makeup source greater than the loss rate through RCP seals and controlled bleed off flow will be established before that leakage interrupts natural circulation and OTSG heat removal. The 1A and 1B ES MCC will be energized using the FLEX diesel generator as described in Safety Functions Support section and the FLEX RCS makeup pump will be started within 4 hours.

The analysis to confirm the timeline is not yet complete.

When the OTSG is not available for RCS heat removal, makeup sources capable of matching the core boil-off rate will be used. If the Fuel Transfer Canal is not flooded, then makeup will be via BWST gravity drain. Gravity drain from a CF Tank will be used if the BWST is not available.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	<p>Reactor Coolant Pumps seals will be replaced with low-leakage seals in T1R21 (Fall 2015).</p>

² Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain RCS Inventory Control

Key Reactor Parameters

The following instruments will be available for Phase 1:

RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961)

RCS Incore Temperatures (RC-TI-952)

RCS Pressure (RC-PT-949)

RB Pressure (BS-PT-982B)

PZR Level (RC-LT-777)

CF-T Level (CF2-LT1, CF2-LT3)

CF-T Pressure (CF1-PT1, CF1-PT2)

BWST Level (DH-LT-808, DH-LT-809)

TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification..

Notes: Core cooling and RCS inventory analysis is not complete at this time. Completion of this analysis is an open item. Closure of this item will be documented in a future 6-month update.

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

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Maintain RCS Inventory Control

PWR Portable Equipment Phase 2:

Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

Two (2) FLEX Emergency RCS Charging Pumps will be installed in the Patio area of 322' elevation or the Control Tower. These pumps will provide makeup to the RCS via manual connections downstream of the "C" and "D" HPI makeup valves. These pumps will take suction from either the BWST (preferred) or the Spent Fuel Pool.

Reactivity analysis demonstrates that makeup for shrinkage from a 2500 ppm Boron source will provided the necessary boron concentration to maintain the reactor shutdown at 70°F without credit for Xenon reactivity. Therefore, recovering RCS inventory to greater than 100 inches in the pressurizer within 24 hours will ensure the reactor remains shutdown. (Reference #1)

In the event that the Unit is in a refueling shutdown, the FLEX Emergency Feedwater pumps will also be able to supply the RCS for boil-off makeup. This will be accomplished by additional piping between FLEX Emergency Feedwater Pumps and FLEX Emergency RCS Charging Pumps.

Reference: C-1101-202-E620-471

Details:

Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	<p>FLEX RCS Make-up System</p> <p>Closure of this item will be documented in a future 6-month update.</p>
Key Reactor Parameters	<p>The following instruments will be available for Phase 2:</p> <p>RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961)</p> <p>RCS Incore Temperatures (RC-TI-952)</p> <p>RCS Pressure (RC-PT-949)</p> <p>RB Pressure (BS-PT-982B)</p> <p>PZR Level (RC-LT-777)</p> <p>CF-T Level (CF2-LT1, CF2-LT3)</p> <p>CF-T Pressure (CF1-PT1, CF1-PT2)</p> <p>BWST Level (DH-LT-808, DH-LT-809)</p> <p>TMI's evaluation of the FLEX strategy may identify additional</p>

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Maintain RCS Inventory Control

PWR Portable Equipment Phase 2:

parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.

Storage / Protection of Equipment:

Describe storage / protection plan or schedule to determine storage requirements

Seismic

FLEX Emergency RCS Charging Pumps will also be mounted in the Patio area of 322' elevation of the Control Tower, which is a seismic class 1 building. FLEX Emergency RCS Charging Pumps connections are into the seismic class 1 HPI system.

The BWST and Spent Fuel Pool are seismic class 1.

Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.

Flooding

Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.

FLEX Emergency RCS Charging Pumps are located in the patio area of 322' elevation of the Control Tower, which is also above the projected max river water level. The BWST structural integrity in a design flood condition will be maintained.

Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.

Severe Storms with High Winds

FLEX Emergency RCS Charging Pumps will be mounted in the Patio area of 322' elevation of the Control Tower, which is a tornado protected structure.
The BWST may not be available after a tornado. In this event, the Spent Fuel Pool will be used to provide RCS Makeup.

Structures to provide protection of FLEX equipment will be

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Maintain RCS Inventory Control		
PWR Portable Equipment Phase 2:		
	constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.	
Snow, Ice, and Extreme Cold	<p>FLEX Emergency RCS Charging Pumps are located in the Control Tower Patio area, which is temperature controlled.</p> <p>The BWST is maintained above a minimum temperature of 45°F. After an ELAP, the tank's mass and insulation will maintain this source for a significant period of time. The Spent Fuel Pool is located within a temperature controlled building and provides a backup source for RCS inventory.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>	
High Temperatures	<p>FLEX Emergency RCS Charging Pumps will be designed for operation with ambient temperature of at least 120°F.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>	
Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
FLEX RCS Makeup Pumps will be used to provide RCS Makeup.	FLEX Emergency RCS Charging Pumps will be installed in the Patio area of 322' elev.,	The Patio area of the Control Tower is a seismic class 1 tornado protected building.

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Maintain RCS Inventory Control

PWR Portable Equipment Phase 2:

	<p>Control Tower. These pumps will be powered from 1A/1B ES MCC. They will take suction from either the BWST or the Spent Fuel Pool via a new connection. They will discharge to the "C" and "D" HPI lines via a new connection downstream of the HPI makeup system valves.</p> <p>All connections will be by manual operation.</p>	<p>The 322' elevation places the pumps above the maximum flood level.</p> <p>FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements.</p>
Flex Emergency Feedwater Pumps can be used to make-up to the RCS or Spent Fuel Pool for Boil-off additions.	(see FLEX Feedwater equipment in RCS heat removal section)	(see FLEX Feedwater equipment in RCS heat removal section)

Notes:

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

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Maintain RCS Inventory Control

PWR Portable Equipment Phase 3:

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.

A plan will be developed to re-supply borated water to the BWST or SF pool.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	None required
Key Reactor Parameters	<p>The following instruments will be available for Phase 3:</p> <p>RCS Thot and Tcold (RC-TE-958, -TE-959, -TE-960, -TE-961) RCS Incore Temperatures (RC-TI-952) RCS Pressure (RC-PT-949) RB Pressure (BS-PT-982B) PZR Level (RC-LT-777) CF-T Level (CF2-LT1, CF2-LT3) CF-T Pressure (CF1-PT1, CF1-PT2) BWST Level (DH-LT-808, DH-LT-809)</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>

Deployment Conceptual Modification

(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
None	None	None

Maintain RCS Inventory Control

PWR Portable Equipment Phase 3:

Notes:

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Containment	
Determine Baseline coping capability with installed coping³ modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: <ul style="list-style-type: none"> • Containment Spray • Hydrogen igniters (ice condenser containments only) 	
PWR Installed Equipment Phase 1:	
<p><i>Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/Hydrogen igniter) and strategy(ies) utilized to achieve this coping time.</i></p> <p>TMI-FLEX-002, MAAP Containment Pressure Analysis, preliminary results show that Reactor Building pressure will remain below design pressure without any active means of RB cooling for any event where the OTSG is used to remove core heat.</p> <p>Emergency procedures will ensure containment isolation valves are closed.</p>	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	There are no modifications required at this time.
Key Containment Parameters	<p>RB Pressure (BS-PT-982B)</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>
Notes: <p>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the</p>	

³ Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Containment

integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

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Maintain Containment

PWR Portable Equipment Phase 2:

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

TMI-FLEX-002, *MAAP Containment Pressure Analysis*, preliminary results show that Reactor Building pressure will remain below design pressure without any active means of RB cooling for any event where the OTSG is used to remove core heat.

Emergency procedures will ensure containment isolation valves are closed.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	<p>Completion of TMI-FLEX-002, <i>MAAP Containment Pressure Analysis</i>, is an open item. Any required modifications will be documented in a future 6-month update.</p>
Key Containment Parameters	<p>RB Pressure (BS-PT-982B)</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>

Storage / Protection of Equipment:

Describe storage / protection plan or schedule to determine storage requirements

Seismic	NA. No equipment required.
Flooding	NA. No equipment required.
Severe Storms with High Winds	NA. No equipment required.
Snow, Ice, and Extreme Cold	NA. No equipment required.
High Temperatures	NA. No equipment required.

Deployment Conceptual Modification

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Maintain Containment		
(Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
None	None	None
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

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Maintain Containment

PWR Portable Equipment Phase 3:

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

No Phase 3 equipment is required to maintain the containment function.
Active means of RB cooling in Phase 3 may be developed.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	NA
Identify modifications	None.
Key Containment Parameters	RB Pressure (BS-PT-982B) TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
None	None	None

Notes:

Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Maintain Spent Fuel Pool Cooling	
Determine Baseline coping capability with installed coping⁴ modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: <ul style="list-style-type: none"> • Makeup with Portable Injection Source 	
PWR Installed Equipment Phase 1:	
<p>When the core is fully loaded with fuel, Spent Fuel Pool (SFP) makeup is not a time constraint since the maximum SFP heat load is 2.7 MWth. Without any active means of cooling and an initial pool temperature of 100 degrees there would be at least 41 hours before boiling would occur and any inventory would be lost. The time until the water level reached the top of the active fuel is greater than 400 hours (Reference #1). The TMI plan provides a means to supply SFP makeup at 12 hours using the FLEX Feedwater capability as described previously and shown in Attachment 3C and 3D.</p> <p>If the core is partially or fully offloaded, the maximum SFP heat load is 8.9 MWth (Reference #2). Without any active means of cooling and an initial pool temperature of 100 degrees F, the pool would reach boiling in 12.6 hours. It would take 131.7 hours before the water level dropped to the top of the active fuel. With the additional resources available during outage conditions, SFP make-up can be established within 8 hours. (Reference #1)</p> <p>Initial calculations were used to determine the fuel pool timelines. Formal calculations will be performed to validate this information during development of the detailed design.</p> <p>These strategies utilize a vent path for steam. The effects of this steam on other systems and equipment will be evaluated, and the results will be provided in a future 6-month update.</p> <p>References</p> <ol style="list-style-type: none"> 1. ER-TM-TSC-0016, <i>RCS AND SFP HEATUP AND INVENTORY BOILOFF FOLLOWING LOSS OF ACTIVE DECAY HEAT REMOVAL</i> 2. CC-TM-AOP-0202, Rev 0g, <i>Beyond Design Basis External Event – Basis Document</i>. 	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>

⁴ Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

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Identify modifications	Spent Fuel Pool Instrumentation. Closure of this item will be documented in a future 6-month update.
Key SFP Parameter	<p>Per NRC Order Number EA 12-051, "Order Modifying Licenses with regard to Reliable Spent Fuel Pool Instrumentation" and NEI 12-02, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation".</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>
<p>Notes:</p> <p>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.</p>	

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Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment Phase 2:	
<p><i>Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time.</i></p> <p>The strategy described for Phase 1 applies in Phase 2 & 3.</p>	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	<p>Spent Fuel Pool Instrumentation FLEX Feedwater System FLEX RCS Make-up System Closure of these items will be documented in a future 6-month update.</p>
Key SFP Parameter	<p>Per NRC Order Number EA 12-051, "Order Modifying Licenses with regard to Reliable Spent Fuel Pool Instrumentation" and NEI 12-02, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation."</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>
Storage / Protection of Equipment:	
Describe storage / protection plan or schedule to determine storage requirements	
Seismic	Flex Feedwater and RCS makeup equipment protection was described previously. Refer to RCS heat removal & RCS Inventory sections. There is no additional equipment for SF makeup.
Flooding	Flex Feedwater and RCS makeup equipment protection was described previously. Refer to RCS heat removal & RCS Inventory sections. There is no additional equipment for SF makeup.
Severe Storms with High Winds	Flex Feedwater and RCS makeup equipment protection was described previously. Refer to RCS heat removal & RCS Inventory sections. There

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Maintain Spent Fuel Pool Cooling		
	is no additional equipment for SF makeup.	
Snow, Ice, and Extreme Cold	Flex Feedwater and RCS makeup equipment protection was described previously. Refer to RCS heat removal & RCS Inventory sections. There is no additional equipment for SF makeup.	
High Temperatures	Flex Feedwater and RCS makeup equipment protection was described previously. Refer to RCS heat removal & RCS Inventory sections. There is no additional equipment for SF makeup.	
Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
Flex Feedwater and RCS makeup equipment deployment was described previously. Refer to RCS heat removal & RCS Inventory sections. There is no additional equipment for SF makeup.		
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

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Maintain Spent Fuel Pool Cooling		
PWR Portable Equipment Phase 3:		
<p><i>Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time.</i></p> <p>The strategy described for Phase 1 applies in Phases 2 & 3.</p>		
Details:		
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>	
Identify modifications	None required for Phase 3.	
Key SFP Parameter	<p>Per NRC Order Number EA 12-051, "Order Modifying Licenses with regard to Reliable Spent Fuel Pool Instrumentation" and NEI 12-02, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation."</p> <p>TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.</p>	
Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
None	None	None
Notes:		
<p>Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and</p>		

Maintain Spent Fuel Pool Cooling

mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.

Safety Functions Support	
Determine Baseline coping capability with installed coping⁵ modifications not including FLEX modifications.	
PWR Installed Equipment Phase 1	
<p><i>Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.</i></p> <p>The electrical power supply to maintain vital instruments is provided in Phase 1 by the Station batteries and vital instrument bus inverters. With timely load-shedding of large DC motors and stripping loads from non vital instrument systems, vital instrument power can be ensured for at least 6 hours (Reference #1).</p> <p>Inverter and battery room area doors are opened to provide ventilation of critical SSC during Phase 1 (Reference #2)</p> <p>Instrument air for remote operation of EFW Feed Valves and Atmospheric Dump Valves is available at least 2 hours. After that local control is available.</p> <p>Exelon Generation Company, LLC (Exelon) intends on maintaining the Command and Control function within the Main Control Room. Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability. The strategy and associated support analyses will be provided in a future 6-month update.</p> <p>References:</p> <ol style="list-style-type: none"> 1. C1101-734-E420-009, R0 2. OP-TM-AOP-034, <i>Loss of Control Building Cooling</i> 	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	None required for Phase 1
Key Parameters	TMI's evaluation of the FLEX strategy may identify additional

⁵ Coping modifications consist of modifications installed to increase initial coping time, i.e., generators to preserve vital instruments or increase operating time on battery powered equipment.

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	parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.	

Safety Functions Support	
PWR Portable Equipment Phase 2	
<p><i>Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.</i></p> <p>Two (2) Diesel Generators along with Fuel Tanks, will be pre-staged in a protected enclosure on the 322' elevation of the Turbine Building. These generators will be available to supply power to the 1A and 1B ES MCCs via a manual connections through the 1P and 1S 480V ES Buses. This equipment will be configured such that the 1A and 1B ES MCC can be energized within four hours of an ELAP event (or sooner based on potential RCS inventory requirements). Each diesel will be capable of providing power for all FLEX needs (i.e., the FLEX equipment, Vital Instrument Buses, and Emergency lighting).</p> <p>Exelon Generation Company, LLC (Exelon) intends on maintaining the Command and Control function within the Main Control Room. Habitability conditions will be evaluated and a strategy will be developed to maintain Main Control Room habitability. The strategy and associated support analyses will be provided in a future 6-month update.</p>	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	<p><i>Confirm that procedure/guidance exists or will be developed to support implementation</i></p> <p>TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs.</p>
Identify modifications	FLEX Electrical Power Supply. Closure of this item will be documented in a future 6-month update.
Key Parameters	TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.
Storage / Protection of Equipment :	
Describe storage / protection plan or schedule to determine storage requirements	
Seismic	Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date.

Safety Functions Support	
PWR Portable Equipment Phase 2	
	Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	<p>The FLEX diesel generators and fuel oil tanks will be located above 322 ft elevation of the Turbine Building .</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>
Severe Storms with High Winds	<p>The FLEX diesel generators and fuel oil tanks will be protected from tornado winds and missile hazards.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>
Snow, Ice, and Extreme Cold	<p>The FLEX diesel generators and fuel oil tanks will be located with a temperature controlled building (Turbine Bldg).</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>

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Safety Functions Support		
PWR Portable Equipment Phase 2		
High Temperatures	<p>The FLEX diesel generators will be designed for operation with an ambient temperature of at least 120°F.</p> <p>Structures to provide protection of FLEX equipment will be constructed to meet the requirements of NEI 12-06 Section 11. The schedule to construct a permanent building is contained in Attachment 2 and will satisfy the site compliance date. Temporary locations will be used until building construction completion. Procedures and programs will be developed to address storage structure requirements, haul path requirements, and FLEX equipment requirements relative to the external hazards applicable to TMI.</p>	
Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
Establish FLEX AC Power Source.	The Flex Diesel Generators will be manually started and loaded. All connections to existing systems will be manual.	FLEX piping, valves, and connections (electrical & fluid) will meet NEI 12-06 Rev.0 protection requirements.
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for TMI during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

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Safety Functions Support		
PWR Portable Equipment Phase 3		
<i>Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.</i>		
Phases 1 and 2 strategy will provide sufficient capability such that no additional Phase 3 strategies are required.		
The FLEX diesel generator fuel supply provides a minimum of 7 days of fuel, and a connection is provided for fuel oil makeup from a portable source.		
The FLEX diesel generator design will include provisions for connection with a portable 480 VAC generator.		
Details:		
Provide a brief description of Procedures / Strategies / Guidelines	TMI will use the industry developed guidance from the Owners Groups, EPRI and NEI Task team to develop site specific procedures or guidelines to address the criteria in NEI 12-06. These procedures and/or guidelines will support the existing symptom based command and control strategies in the current EOPs	
Identify modifications	None required.	
Key Parameters	TMI's evaluation of the FLEX strategy may identify additional parameters that are needed to support key actions identified in the plant procedures/guidance or to indicate imminent or actual core damage. NEI 12-06 Rev. 0 Section 3.2.1.10 and any differences will be provided in a future 6-month update following identification.	
Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	Modifications	Protection of connections
None	None	None
Notes: Exelon Generation Company, LLC (Exelon) has not finalized the engineering designs for compliance with NRC Order EA-12-049. Detailed designs based on the current conceptual designs will be developed to determine the final plan and associated mitigating strategies. Analysis will be performed to validate that the plant modifications, selected equipment, and identified mitigating strategy can satisfy the safety function requirements of NEI 12-06. Once these designs and mitigating strategies have been fully developed, Exelon will update the integrated plan for (Plant Name) during a scheduled 6-month update. This update will include any changes to the initial designs as submitted in the February 28, 2013 Integrated Plan.		

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PWR Portable Equipment Phase 2							
<i>Use and (potential / flexibility) diverse uses</i>						<i>Performance Criteria</i>	<i>Maintenance</i>
<i>List portable equipment</i>	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Diesel driven pump (1)	X		X			240 gpm, 250 psid	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.
Diesel driven pump (2)	X		X			600 gpm, 245 psid	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) Portable Fans				X	X	2-speed, high volume, 120V	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.

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PWR Portable Equipment Phase 2							
<i>Use and (potential / flexibility) diverse uses</i>						<i>Performance Criteria</i>	<i>Maintenance</i>
<i>List portable equipment</i>	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Three (3) Portable Generators				X	X	480VAC 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.
Ten (10) Portable lights with tripods					X	240-watt LED per unit	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) Satellite Phones					X	Iridium 9555	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.

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PWR Portable Equipment Phase 2							
<i>Use and (potential / flexibility) diverse uses</i>						<i>Performance Criteria</i>	<i>Maintenance</i>
<i>List portable equipment</i>	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Ford F-750	X	X	X		X	Transportation, debris removal, fuel oil delivery	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.

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PWR/BWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						Performance Criteria	Notes
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Note: The RRC equipment has not been procured at the time of this submittal. Once the SAFER committee determines the equipment specifications for bid, updates will be made as necessary to this table. The Phase 3 portable equipment table will be updated once all of the equipment has been procured and placed in inventory.							
Medium Voltage Diesel Generator	X	X	X	X	X	2 MW output at 4160 Vac, three phase	<ul style="list-style-type: none"> Generator must be common commercially available. Must run on diesel fuel.
Low Voltage Diesel Generator	X	X	X	X	X	500 kW output at 480 Vac, three phase	<ul style="list-style-type: none"> Generator must be common commercially available. Must run on diesel fuel.
Positive displacement High Pressure Pumps (PWR only)	X					1000-3000 psi shutoff head, 60 gpm capacity	Must run on diesel fuel
Low Pressure Pump	X	X	X			300 psi shutoff head, 2500 gpm max flow	
Low Pressure Pump	X		X			500 psi shutoff head, 500 gpm max flow	

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PWR/BWR Portable Equipment Phase 3							
<i>Use and (potential / flexibility) diverse uses</i>						<i>Performance Criteria</i>	<i>Notes</i>
<i>List portable equipment</i>	Core	Containment	SFP	Instrumentation	Accessibility		
Low Pressure Pump					X	110 psi shutoff head, 400 gpm max flow submersible	
Low Pressure Pump	X	X				150 psi shutoff head, 5000 gpm max flow	
Air Compressor		X				120 psi minimum pressure, 2000 scfm	

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Phase 3 Response Equipment/Commodities	
Item	Notes
Radiation Protection Equipment <ul style="list-style-type: none"> • Survey instruments • Dosimetry • Off-site monitoring/sampling 	The RRC will not stock this type of equipment but this equipment will be requested from site-to-site and utility-to-utility on an as required basis.
Commodities <ul style="list-style-type: none"> • Food • Potable water 	The RRC will not stock these commodities but they will be requested from site-to-site and utility-to-utility on an as required basis.
Fuel Requirements <ul style="list-style-type: none"> • Diesel fuel 	300 – 500 gallon bladders that can be delivered by air
Heavy Equipment <ul style="list-style-type: none"> • Transportation equipment • Debris clearing equipment 	TBD during site specific playbook development Redundant Phase 2 equipment to be located at RRC

Attachment 1A Sequence of Events Timeline

Action item	Elapsed Time	Action	Time Constraint Y/N ⁶	Remarks / Applicability
1	0	Earthquake or Tornado Event Causes LOOP and damages unprotected equipment	NA	Plant @100% power
2	0	All control rods inserted and reactor is shutdown. Emergency Diesel Generators fail to energize ES buses.	N/A	Failures per JLD-ISG-2012-01 and NEI 12-06
3	0	EFW actuated. Steam driven pump, EF-P-1, supplies feedwater. MSSV & ADV control OTSG pressure	N	Automatic plant response
4	< 1 min	EOP initiated	N	
5	< 2 min	Letdown isolates (MU-V-3) automatically on high temperature.	N	This is a pre-condition for item
6	3 min	Operators ensure each of the following are closed: Letdown isolation (MU-V-3) RCP Controlled Bleed Off Isolation Valve (MU-V-26)	N	
7	< 5 min	Operators attempt to start and load SBO Diesel Generator, and identify SBO DG is inoperable.	N	Failures per JLD-ISG-2012-01 and NEI 12-06. This signals an ELAP condition.
8	< 10 min	Operators verify core cooling via OTSG with RCS natural circulation, and throttle ADV to stabilize OTSG pressure	N	
9	15 min	Operators locally open Main Condenser vent to atmosphere (Break Vacuum) and line up valves to vent Main Generator H2 to atmosphere	N	This is a pre-condition to reduce DC loads, LO-P-6 and GN-P-2.
10	15 min	Operator secures FW Pump lube oil pumps LO-P-9A and LO-P-9B	Y	DC load shedding required to maintain instrument buses. (C-1101-734-E420-009).
11	30 min	Operator throttle open ADV to initiate a cooldown to 400F at approximately 30°F/HR	N	Pre-condition for item 26.
12	30 min	Operator locally opens doors to inverter and	Y	This condition is part of the

⁶ Instructions: Provide justification if No or NA is selected in the remarks column
If yes, include technical basis discussion as requires by NEI 12-06 section 3.2.1.7

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		battery rooms for ventilation.		basis for acceptable FLEX equipment cooling.
13	30 min	Operator opens breakers on vital instrument buses to shutdown instrument systems not required for ELAP mitigation.	Y	Load shedding required to maintain instrument buses. (C-1101-734-E420-009).
14	35 min	Main Generator pressure is less than 15 psig, operator secures Main Generator Seal Oil Pump (GN-P-2).	Y	DC load shedding required to maintain instrument buses. (C-1101-734-E420-009).
15	1 hour	When Main Turbine speed is reduced or within one hour of the event, Main Turbine Lube Oil Pump LO-P-6 is shutdown.	Y	DC load shedding required to maintain instrument buses for 6 hours (C-1101-734-E420-009).
16	1:30	Operators locally lineup FLEX Emergency Diesel Generator for operation.	N	Pre-condition to item 18
17	2:00	Operators locally lineup FLEX RCS Charging Pump from BWST or Spent Fuel Pool to RCS	N	Pre-condition to item 22
18	2:15	Operators locally strip loads from 1P/1S 480V Buses & 1A & 1B ES MCC to prepare to load FLEX diesel generator	N	Pre-condition to Item 19
19	2:30	Operator locally starts FLEX Emergency Diesel Generator and locally closes breakers to energize 1P or 1S 480V bus	N	Pre-condition to Item 20
20	2:35	Cross tie 1P & 1S 480V Buses Energize 1A/1B ES MCC from 1P/1S 480V Bus	N	Pre-condition to Item 21
21	2:45	Energize selected loads on 1A and 1B ES MCC Battery Chargers AC Sources to Inverters FLEX Emergency RCS Charging Pumps FLEX Emergency Feedwater Pumps Emergency Lighting	Y	Must be accomplished prior to 6-hour to ensure vital instrument power is maintained (C-1101-734-E420-009).
22	3:00	Start FLEX Emergency RCS Charging Pumps to restore RCS inventory and initiate boration.	N	Precondition to items 25 and 30
23	3:00	Dispatch personnel to move diesel-driven feedwater pump into the turbine building.	N	Provide B/U for Steam Driven Emergency Feedwater Pump
24	4:00	Complete backup feedwater pump connections to condensate supply and feedwater header. Backup feedwater capability is now available.	N	Provide B/U for Steam Driven Emergency Feedwater Pump
25	5:30	Initial RCS cooldown complete. Approximate conditions are as follows: <ul style="list-style-type: none"> Incore temperature 400F (RCS heat removal via OTSG using natural circulation) 	Y	Analysis to confirm RCS conditions support natural circulation throughout this coping period is not yet complete. Results will be

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		<ul style="list-style-type: none"> OTSG A & B Pressure 110 psig (being controlled with ADV) RCS Pressure 410 psig (being controlled with RCS makeup) 		available in first 6-month update
26	6:00	Complete backup feedwater pump connections to condensate supply and feedwater header. Backup feedwater capability is now available.	N	Provide B/U for Steam Driven Emergency Feedwater Pump
27	7:30	Dispatch personnel to position a diesel-driven portable pump at the ramp to the river, and route discharge hose to a functional condensate source (B CST or hotwell).	N	Precondition for item 28
28	10:30	Diesel-driven portable pump is set up to draft water from the river and makeup to a Condensate Storage Tank or directly to the hotwell.	Y	After a tornado, condensate may be depleted in 20 hours.
29	12:00	Line-up FLEX condensate feed to the Spent Fuel Pool. Monitor SF pool level and add water as needed to maintain level.	Y	Spent fuel pool would not boil within 40 hours.
30	15:00	RCS boron concentration exceeds cold shutdown concentration requirement	Y	Xenon reactivity worth reduces below initial equilibrium concentration at approx. 24 hours.
31	24:00	RRC (Regional Response Center) resources begin arriving on site.	N	Reference: JLD-ISG-2012-01 and NEI 12-06
32	24 – 72 Hours	Transition from Steam Driven Emergency Feedwater pump to FLEX Emergency Feedwater Pumps	N	Steam supply to the Steam Driven Feedwater pump is diminishing.
33	24 – 72 Hours	Continue to maintain critical functions of Core Cooling, RCS Inventory Control and spent fuel cooling.	N	End of analytical simulation.

Note: This timeline is based on best available information. It is subject to change based on outstanding analysis results and will be updated during a 6-month update.

Attachment 2 Milestone Schedule

Original Target Completion Date	Activity	Status {Include date changes in this column}
	Submit 60 Day Status Report	Complete
	Submit Overall Integrated Implementation Plan	Complete
	Contract with RRC	Complete
Recurring action, Aug and Feb	Submit 6-month updates	Ongoing
	Modification Development	
Oct 2014	• Phase 1 modifications	N/A
Oct 2014	• Phase 2 modifications	Contract Awarded for TMI
Oct 2014	• Phase 3 modifications	N/A
	Modification Implementation	
Nov 2015	• Phase 1 modifications	N/A
Nov 2015	• Phase 2 modifications	Aug 2013 – Nov 2015
Nov 2015	• Phase 3 modifications	N/A
	Procedure development	
Nov 2015	• Strategy procedures	Note 1
Nov 2015	• Maintenance procedures	Note 1
Jul 2015	Staffing analysis	Note 1
Nov 2015	Storage Plan	Note 1
Nov 2015	FLEX equipment acquisition	Note 1
Nov 2015	Training completion	Note 1
Jul 2015	Regional Response Center Operational	(will be a standard date from RRC)
Nov 2015	Unit 1 Implementation date	Note 1

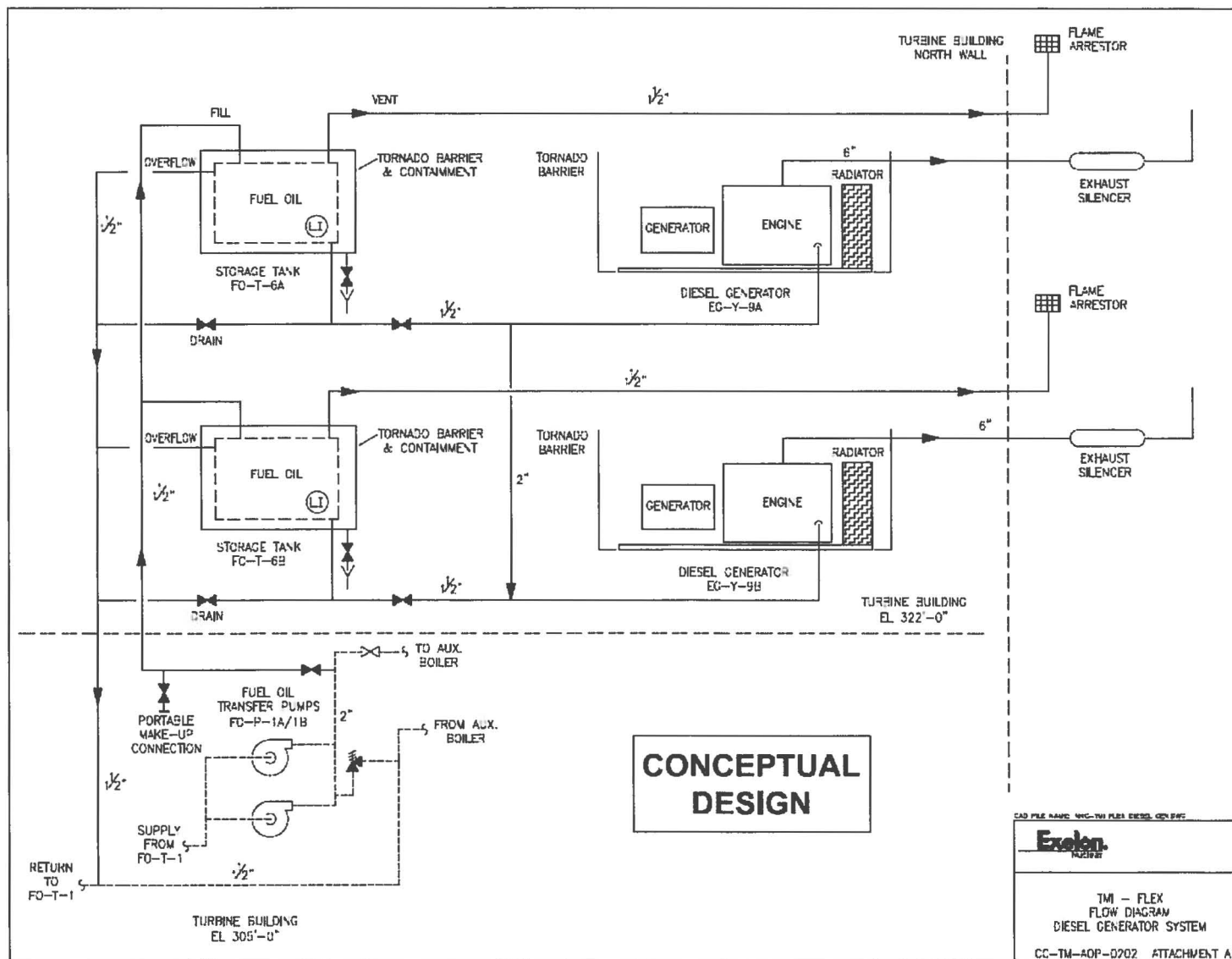
Note(s):

- Exelon will update the status of ongoing and future milestones in the Integrated Plan for TMI during a scheduled 6-month update. This update will include any changes to the milestone schedule as submitted in the February 28, 2013 Integrated Plan.

Attachment 3A
FLEX Diesel Generator Conceptual Design

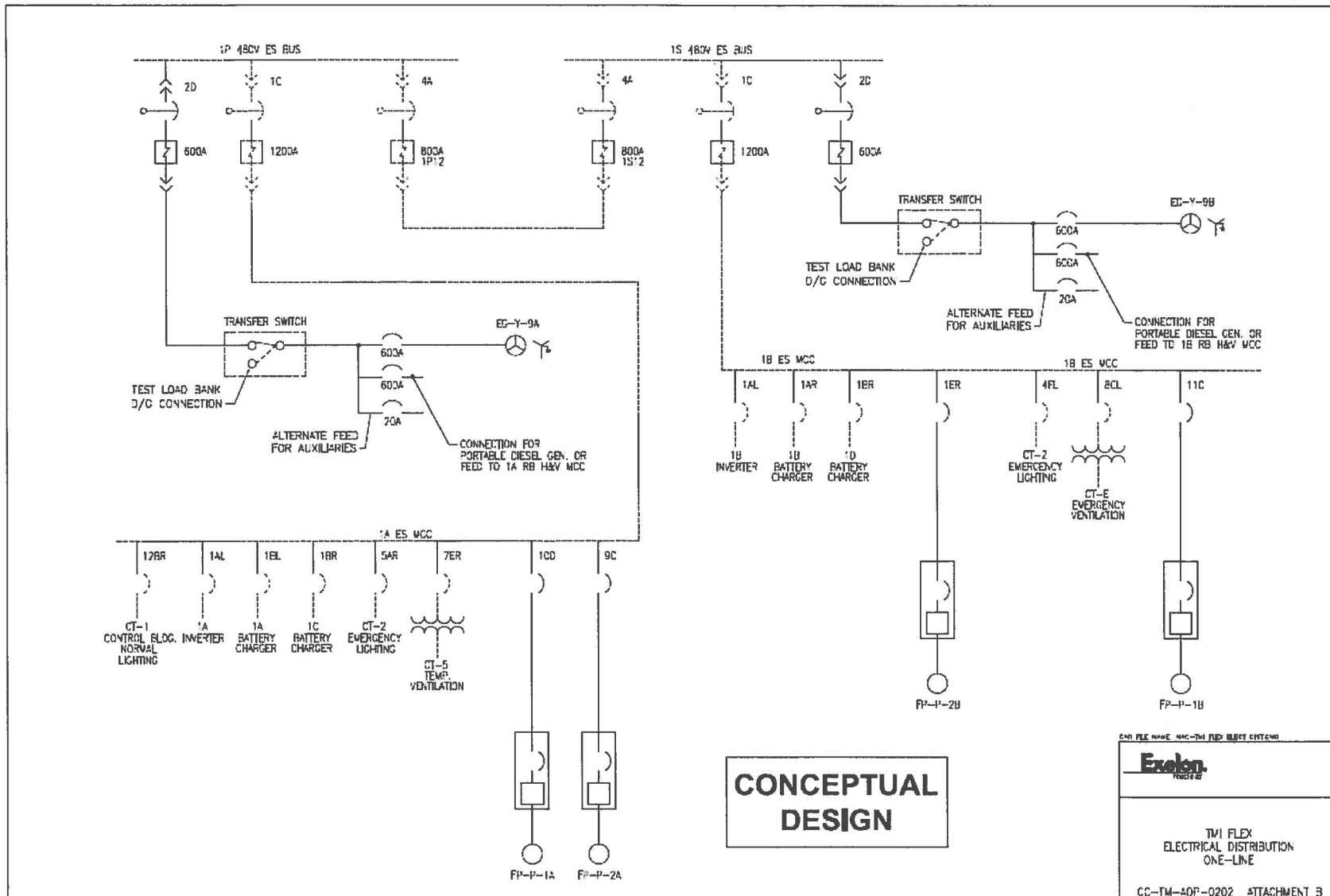
Attachment 3
Conceptual Sketches

Attachment 3A FLEX Diesel Generator Conceptual Design

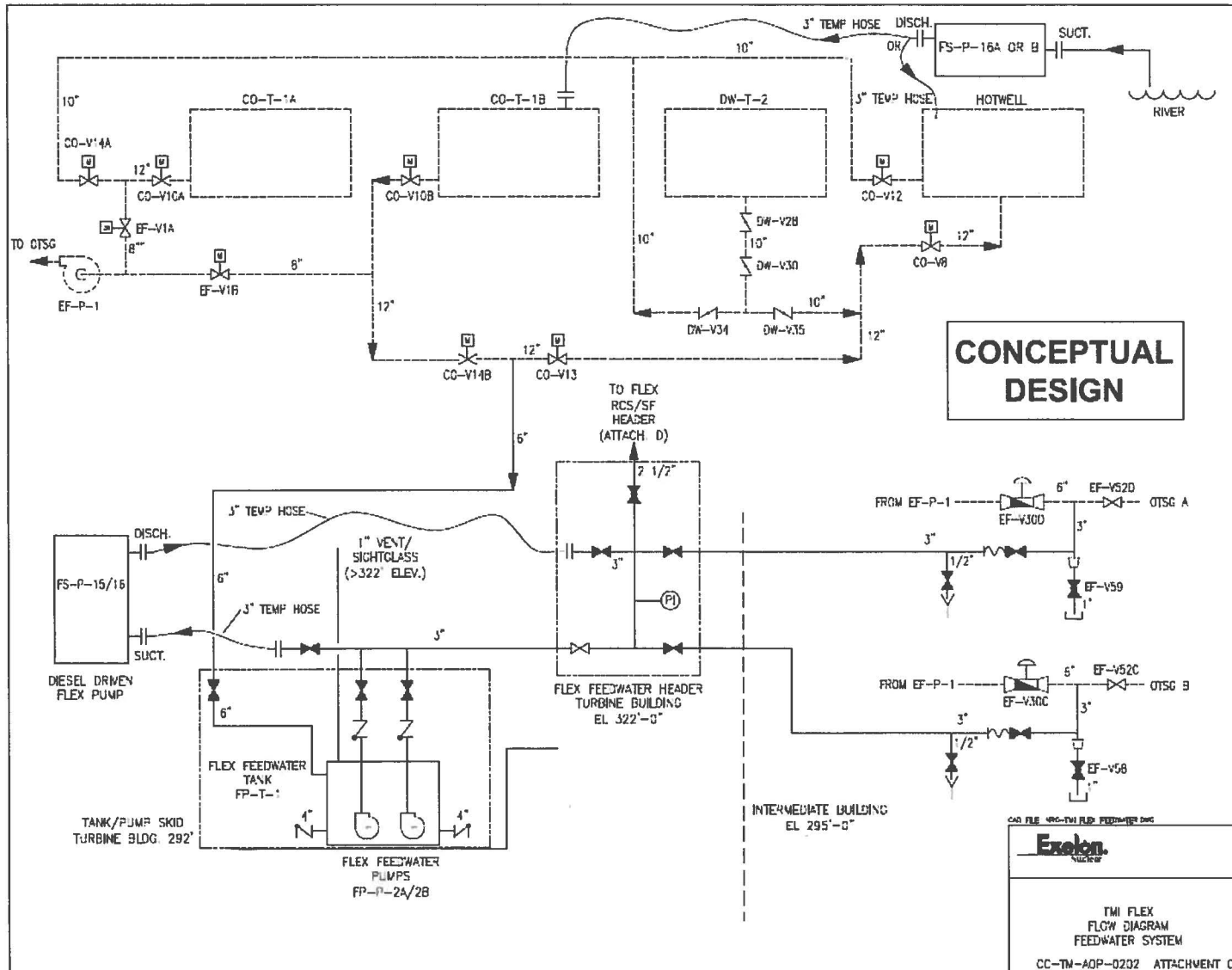


Attachment 3B

FLEX Electrical Distribution Conceptual Design



Attachment 3C FLEX Feedwater Conceptual Design



Attachment 3D FLEX RCS & SFP Makeup Conceptual Design

