Entergy

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Vice President, Operations
Arkansas Nuclear One

0CAN081302

August 28, 2013

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Rockville, MD 20852

SUBJECT: First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)
Arkansas Nuclear One – Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

REFERENCES:

1. NRC Order Number EA-12-049, *Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (0CNA031206) (ML12056A045)

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 (ML12229A174)

3. Nuclear Energy Institute (NEI) 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012 (ML12221A205)

4. Entergy letter to NRC, *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 26, 2012 (0CAN101203) (ML12305A372)

5. Entergy letter to NRC, *Overall Integrated Plan (OIP) in Response to March 12, 2012, Commission Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2013 (0CAN021302) (ML13063A151)

Dear Sir or Madam:

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

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an OIP pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3). Reference 4 provided the initial status report regarding mitigation strategies, and Reference 5 provided the OIP.

Reference 1 requires submission of a status report at six-month intervals following submittal of the OIP. Reference 3 provides direction regarding the content of the status reports. The purpose of this letter is to provide the first six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The Enclosure 1 report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any. In addition, Enclosure 2 provides a revised OIP that was previously submitted by Reference 5.

This letter contains no new regulatory commitments. Should you have any questions regarding this submittal, please contact Stephenie Pyle at 479.858.4704.

I declare under penalty of perjury that the foregoing is true and correct; executed on August 28, 2013.

Sincerely,

***Original signed by Jeremy G. Browning***

JGB/nbm

Enclosures:
1. Arkansas Nuclear One (ANO) Units 1 and 2 First Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

2. Revised ANO FLEX OIP

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**Enclosure 1 to**

**0CAN081302**

**Arkansas Nuclear One (ANO) Units 1 and 2 (ANO-1 and ANO-2) First Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events**

**ANO-1 and ANO-2 First Six Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events**

## Introduction

Entergy Operations, Inc. (Entergy) developed an Overall Integrated Plan (OIP) for ANO-1 and ANO-2 (Reference 1), documenting the diverse and flexible strategies (FLEX) in response to Reference 2. This enclosure provides an update of milestone accomplishments since submittal of the OIP, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

## Milestone Accomplishments

None

## Milestone Schedule Status

The following provides an update to the milestone schedule to support the OIP. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

- ANO-1 Implementation Outage

  The target completion date for the ANO-1 implementation outage was revised to February 2015. This change does not impact the completion of implementation by the date required by the Order.

Validation Walk-throughs or Demonstration(s):

- Target completion dates have been added to the milestone schedule for completion of the validation walk-throughs for ANO-1 and ANO-2. These new milestone target dates do not impact the Order implementation date.

| Milestone | Target Completion Date | Activity Status | Revised Target Completion Date |
|---|---|---|---|
| **Submit OIP** | **February 2013** | **Complete** | |
| Update 1 | August 2013 | Complete | |
| Update 2 | February 2014 | | |
| Update 3 | August 2014 | | |
| Update 4 | February 2015 | | |
| Update 5 | August-2015 | | |
| **Perform Staffing Analysis** | **December 2013** | **Not Started** | |
| **Modifications** | | | |

| Milestone | Target Completion Date | Activity Status | Revised Target Completion Date |
|---|---|---|---|
| Modifications Evaluation | June 2013 | Started | |
| Engineering and Implementation | June 2013 - October 2015 | Not Started | |
| ANO-1 Implementation Outage | November 2014 | Not Started | February 2015 (See Note) |
| ANO-2 Implementation Outage | October 2015 | Not Started | |
| **On-site FLEX Equipment** | | | |
| Purchase | June 2014 | Not Started | |
| Procure | November 2014 | Not Started | |
| **Off-site FLEX Equipment** | | | |
| Develop Strategies with Regional Response Center | November 2013 | Not Started | |
| Install Off-site Delivery Station (if necessary) | October 2014 | Not Started | |
| **Procedures** | | | |
| Pressurized Water Reactor Owners Group issues Nuclear System Steam Supply (NSSS)-specific guidelines | June 2013 | Issued May 2013 | |
| Create ANO FLEX Strategy Guide | November 2014 | Not Started | |
| Create Maintenance Procedures | November 2014 | Not Started | |
| **Training** | | | |
| Develop Training Plan | June 2014 | Not Started | |
| Implement Training | November 2014 | Not Started | |
| **Validation** | | | |
| ANO-1 walk-throughs or demonstration(s) – including all FLEX equipment points of connect/tie-in for Phase 2 and 3 | November 2014 | Not Started | |
| ANO-2 walk-throughs or demonstration(s) – including all FLEX equipment points of connect/tie-in for Phase 2 and 3 | October 2015 | Not Started | |
| **Submit Completion Report** | **February 2016** | | |

Note: The ANO-1 Refueling Outage 1R25 (second refueling outage after submittal of the OIP) original schedule date of Fall 2014 has slipped to early 2015 due to the 1R24 (Spring 2013) stator drop event recovery and outage extension.

**Changes to Compliance Method**

In preparation for the design phase of the FLEX project at ANO, changes have been identified to the compliance strategies as described in the original OIP. A revised OIP is provided in Enclosure 2. The significant changes include:

- Additional missile shielding is not being added to the qualified condensate storage tank. Instead the turbine-driven emergency feedwater (EFW) pump supply is planned to be supplied from the emergency cooling pond (ECP) water utilizing a diesel-driven fire pump to address Phase 1 for a wind/missile event.

- The ANO-1 borated water storage tank and ANO-2 refueling water tank are not being missile protected. Instead a new borated water tank is planned to be installed at a location that will provide sufficient separation for missile protection; however, several other alternatives are still being evaluated.

- ANO-1 RCS inventory control is planned to be provided by re-energizing an ANO-2 charging pump from the portable diesel generator and cross-connection of the charging pump to ANO-1 high pressure injection.

- The turbine-driven EFW pump supply for Phase 2 and Phase 3 is planned to be provided by the ECP.

The coping strategy identified in Enclosure 2 remains consistent with the guidance provided in WCAP-17601-P, RCS Response to the Extended Loss of Alternating Current (AC) Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs (Reference 3), and satisfies the requirements of NEI 12-06, FLEX Implementation Guide (Reference 4).

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

Entergy expects to comply with the order implementation date and no relief/relaxation is required at this time.

**Open Items from Overall Integrated Plan and Draft Safety Evaluation**

None

**Potential Draft Safety Evaluation Impacts**

The NRC has not yet issued draft safety evaluations for ANO-1 and ANO-2; therefore, there are no potential impacts to the draft safety evaluation identified at this time.

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

1. *Overall Integrated Plan in Response to March 12, 2012, Commission Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated February 28, 2013 (0CAN021302) (ML13063A151)

2. NRC Order Number EA-12-049, *Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (0CNA031206) (ML12056A045)

3. WCAP-17601-P, R*CS Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs*, Revision 0, August 2012

4. NEI 12-06, *FLEX Implementation Guide*, Revision B1, May 2012 (ML12144A419)

**Enclosure 2 to**

**0CAN081302**

**Revised Arkansas Nuclear One (ANO) Diverse and Flexible Coping Strategies (FLEX) Overall Integrated Implementation Plan (OIP)**

Revised ANO FLEX OIP

Revisions are denoted in **BOLD** text.

| General Integrated Plan Elements | |
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| Determine Applicable Extreme External Hazard<br><br>Ref: Nuclear Energy Institute (NEI) 12-06 Section 4.0 -9.0<br>JLD-ISG-2012-01 Section 1.0 | In accordance with Reference 1, the Arkansas Nuclear One (ANO) site has been evaluated, and the following applicable hazards have been identified:<br><br>• Seismic events<br>• External flooding<br>• Severe storms with high winds<br>• Snow, ice, and extreme cold<br>• Extreme heat<br><br>Entergy Operations, Inc. (Entergy) has reviewed the NEI Diverse and Flexible Coping Mitigation Strategies (FLEX) guidance and determined the hazards that FLEX equipment should be protected from include seismic; flooding; severe storms with high winds; snow, ice and extreme cold; and extreme high temperatures. Entergy has determined the functional threats from each of these hazards and identified FLEX equipment that may be affected. The FLEX storage locations will provide the protection required from these hazards. Entergy is also developing procedures and processes to further address plant strategies for responding to these various hazards.<br><br><u>Seismic</u>:<br><br>Per Safety Analysis Report (SAR) seismic input (Reference 4), the seismic criteria for ANO includes two design basis earthquake spectra: operating basis earthquake (OBE) and design basis earthquake (DBE).<br><br>The site-specific design response spectra define the vibratory ground motion of the OBE and DBE. The maximum horizontal acceleration for the DBE is 0.20g and the OBE has a maximum horizontal acceleration of 0.10g.<br><br>The seismic hazard applies to ANO. As a result, the credited FLEX equipment will be assessed based on the current ANO seismic licensing basis to ensure that the equipment remains accessible and available after a beyond-design-basis external event (BDBEE) and that the FLEX equipment does not become a target or source of a seismic interaction from other systems, structures, or components. The FLEX strategies developed for ANO will |

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| | include documentation ensuring that any storage locations and deployment routes meet the FLEX seismic criteria.<br><br>External Flooding:<br><br>The types of events evaluated to determine the worst potential flood included (1) probable maximum flood (PMF) due to flood flow at Dardanelle Dam yielding a water level at 358 feet (ft) mean sea level (MSL), (2) catastrophic failure of the closest dam upstream of Dardanelle Dam yielding a water level of 361 ft MSL, and (3) the effect of wind induced waves.<br><br>The maximum plant site flood level from any cause is Elevation 361 ft MSL. A flood of the magnitude of the maximum probable flood will be forecast about five days prior to its arrival at the plant site. The plant will be shut down by the time the flood level reaches 354 ft, which is the elevation where flooding of the turbine building would commence. The plant will be shut down using normal shutdown procedures and, during the flood, the operators will maintain the plant in a safe shutdown condition.<br><br>In summary, the ANO site is not considered a “dry” site and the flooding hazard is screened in.<br><br>High Wind:<br><br>Figures 7-1 and 7-2 from NEI 12-06 (Reference 2) were used for this assessment.<br><br>The ANO site is located at 35° - 18’ N (References 4a and 4b, Sections 2.2.1 and 2.1.1, respectively); therefore, ANO is not susceptible to hurricanes based on its location in Arkansas. The plant site is north of the final contour line shown in Figure 7-1 of NEI 12-06 (Reference 2).<br><br>It was determined that the ANO site has the potential to experience damaging winds caused by a tornado exceeding 130 mph. Figure 7-2 of NEI 12-06 (Reference 2) indicates a maximum wind speed of 200 miles per hour (mph) for Region 1 plants, including ANO, which is located at 35°-18' N, 93°-13' W (References 4a and 4b, Sections 2.2.1 and 2.1.1, respectively). Therefore, high-wind hazards are applicable to the ANO site.<br><br>In summary, (1) based on Figure 7-1 of NEI 12-06 (Reference 2), ANO is not susceptible to hurricanes so the hazard is screened out and (2) based on local data and Figure 7-2 of NEI 12-06 (Reference 2), ANO has the |

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| | potential to experience damaging winds so the hazard is screened in.<br><br>Snow, Ice, and Extreme Cold:<br><br>Per the FLEX guidance, all sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment. That is, the equipment procured should be suitable for use in the anticipated range of conditions for the site, consistent with normal design practices.<br><br>Applicability of snow and extreme cold:<br><br>NEI 12-06 (Reference 2) states that plants above the 35th parallel should provide the capability to address the impedances caused by extreme snow and cold. The ANO site is located marginally above the 35th parallel at 35°-18' N (References 4a and 4b, Sections 2.2.1 and 2.1.1, respectively); therefore, the FLEX strategies must consider the impedances caused by extreme snowfall with snow removal equipment, as well as the challenges that extreme cold temperature may present.<br><br>Applicability of ice storms:<br><br>The ANO site, located at 35°-18' N, 93°-13' W (References 4a and 4b, Sections 2.2.1 and 2.1.1, respectively), is not a Level 1 or 2 region as defined by Figure 8-2 of NEI 12-06 (Reference 2); therefore, the FLEX strategies must consider the hindrances caused by ice storms.<br><br>In summary, based on the available local data and Figures 8-1 and 8-2 of NEI 12-06 (Reference 2), the hazards of snow, ice, and extreme cold temperatures are screened in for the ANO site.<br><br>Extreme Heat:<br><br>Per NEI 12-06 (Reference 2), all sites must address high temperatures. Virtually every state in the lower 48 contiguous United States has experienced temperatures in excess of 110˚F. Many states have experienced temperatures in excess of 120˚F. All sites will consider the impacts of these conditions on the FLEX equipment and its deployment.<br><br>The event considered herein is a loss of all alternating current (AC) power as a result of short extreme high |

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| | temperatures coincident with high electrical grid demands, resulting in regional blackout. During this type of event, with the equipment and water inventories in the units operating within the technical specification (TS) limits, no additional limitations on initial conditions/failures/abnormalities are expected.<br><br>In summary, per NEI 12-06, all sites will address high temperatures. Therefore, the extreme heat hazard is screened in for ANO. |
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| Key Site assumptions to implement NEI 12-06 strategies.<br><br>Ref: NEI 12-06 Section 3.2.1 | Assumptions are consistent with those detailed in NEI 12-06 (Reference 2, Section 3.2.1) and the Executive Summary of the Pressurized Water Reactor Owners Group (PWROG) Core Cooling Position Paper (OG-12-482).<br><br><u>ANO Site-Specific Assumptions</u>:<br><br>The following assumptions are specific to the ANO site:<br><br>A1. Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 (Reference 1), 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.<br><br>A2. Exceptions for the site security plan or other (license/site-specific) requirements will be addressed in the Flex Support Guidelines (FSGs).<br><br>A3. Deployment resources are assumed to begin arriving at hour 6 after the event and the site is assumed to be fully staffed by 24 hours.<br><br>A4. Hardened connections are assumed to be protected and diverse with respect to the applicable hazards.<br><br>A5. A flood of the magnitude of the PMF will be forecast about five days prior to the flood's arrival at the plant site. It is assumed that at least 24 hours are available for the deployment of FLEX equipment for the preparation for a flooding scenario, and that power is available during this time.<br><br>A6. Entergy will declare an extended loss of AC power (ELAP) within sufficient time to take actions to stage equipment and initiate coping strategies. |

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| | A7. No events or single failures of systems, structures, and components in addition to those presented in NEI 12-06 (Reference 2), are assumed to occur immediately prior to or during the event, including security events.<br><br>A8. This plan defines strategies capable of mitigating a simultaneous loss of all AC power and loss of normal access to the ultimate heat sink (UHS) resulting from a BDBEE 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 guidance. The plant TSs contain the limiting conditions for normal unit operations to ensure that design safety features are 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 BDBEE may place the plant in a condition where it cannot comply with certain TSs and/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). See Reference 9. |
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| 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.<br><br>Ref: JLD-ISG-2012-01<br>Ref: NEI 12-06 Section 13.1 | Entergy expects to comply with the guidance in JLD-ISG-2012-01 (Reference 3) and NEI 12-06 (Reference 2) in implementing FLEX strategies for the ANO site. See Attachment 1B. |
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| Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint.<br><br>Ref: NEI 12-06<br>Section 3.2.1.7<br>JLD-ISG-2012-01 Section 2.1 | The sequence of events and any associated time constraints are identified for ANO-1 and ANO-2 for Modes 1 through 4. See the attached sequence of events timeline (Attachment 1A) for a summary of this information. |

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| Identify how strategies will be deployed in all modes.<br><br>Ref: NEI 12-06 section 13.1.6 | Deployment of FLEX equipment is described for each FLEX function in the subsequent sections below and covers all modes. |
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| Provide a milestone schedule. This schedule should include:<br>• Modifications timeline<br>  o Phase 1<br>  o Phase 2<br>  o Phase 3<br>• Procedure guidance development complete<br>  o Strategies<br>  o Maintenance<br>• Storage plan (reasonable protection)<br>• Staffing analysis completion<br>• FLEX equipment acquisition timeline<br>• Training completion for the strategies<br>• Regional Response Centers operational<br><br>Ref: NEI 12-06 Section 13.1 | See attached milestone schedule in Attachment 2. |
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| Identify how the programmatic controls will be met<br><br>Ref: NEI 12-06 Section 11<br>JLD-ISG-2012-01 Section 6.0 | Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control in accordance with NEI 12-06, (Reference 2, Section 11).<br><br>The unavailability of equipment and applicable connections that directly perform a FLEX mitigation strategy will be managed using plant equipment control guidelines developed in accordance with NEI 12-06, (Reference 2, Section 11.5).<br><br>Programs and controls will be established to assure personnel proficiency in the mitigation of |

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| | beyond-design-basis events is developed and maintained in accordance with NEI 12-06, (Reference 2, Section 11.6).<br><br>Existing plant configuration control procedures will be modified to ensure that changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies in accordance with NEI 12-06, (Reference 2, Section 11.8).<br><br>Procedure Guidance:<br><br>Procedures and guidance to support deployment and FLEX coping strategy implementation, including interfaces with emergency operating procedures (EOPs), special events procedures, abnormal operating procedures (AOPs), and system operating procedures, will be coordinated within the site procedural framework. The procedural documentation will be auditable, consistent with generally accepted engineering principles and practices, and controlled within the Entergy document control system.<br><br>Entergy is participating with the PWROG to develop and implement the FSGs at ANO in a timeline to support the implementation of FLEX by Fall of 2014 for ANO-1 and by Fall of 2015 for ANO-2. The PWROG has generated these guidelines in order to assist utilities with the development of site-specific procedures to cope with an ELAP in compliance with the requirements of NEI 12-06 (Reference 2).<br><br>Actions that maneuver the plant will remain contained within the typical controlling procedures, and the FSGs will be implemented as necessary to maintain the key safety functions of core cooling, containment, and SFP cooling in parallel with the controlling procedure actions.<br><br>Maintenance and Testing:<br><br>The FLEX mitigation equipment will be initially tested (or other reasonable means used) to verify performance conforms to the limiting FLEX requirements. It is expected that the testing will include the equipment and the assembled sub-system to meet the planned FLEX performance. Additionally, Entergy plans to use the guidance in the maintenance and testing template upon issuance by the Electric Power Research Institute (EPRI). The template will be developed to meet the FLEX guidelines established in Section 11.5 of NEI 12-06 (Reference 2). |

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| | Staffing:<br><br>The FLEX strategies documented in the event sequence analysis assume:<br><br>On-site staff are at minimum shift staffing levels<br>No independent, concurrent events<br>All personnel on-site are available to support site response<br><br>Entergy plans to address staffing considerations in accordance with NEI 12-06 (Reference 2) to fully implement FLEX at the site.<br><br>Configuration Control:<br><br>Per NEI 12-06 (Reference 2) and the Interim Staff Guidance (Reference 3), the FLEX strategies must be maintained to ensure that future plant changes do not adversely impact the FLEX strategies. Therefore, Entergy plans to maintain the FLEX strategies and modify existing plant configuration control procedures to ensure changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies. |
| | |
| Describe training plan | Training plans will be developed for plant groups such as the emergency response organization (ERO), fire, security, emergency planning (EP), operations, engineering, mechanical maintenance, and electrical maintenance. The training plan development will be done in accordance with ANO site procedures using the Systematic Approach to Training and will be implemented to ensure that the required Entergy ANO site staff is trained prior to implementation of FLEX. The training program will comply with the requirements outlined in Section 11.6 of NEI 12-06 (Reference 2). |
| Describe Regional Response Center plan | The industry is expected to establish two Regional Response Centers (RRCs) to support utilities during beyond design basis events. Each RRC is expected to hold five sets of equipment; four of which should be able to be fully deployed when requested; the fifth set would have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local assembly area, established by the Strategic Alliance for FLEX Emergency Response |

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| | (SAFER) team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, is expected to be delivered to the site within 24 hours from the initial request.<br><br>Entergy will negotiate and execute a contract with the SAFER for the ANO site which will meet the requirements of NEI 12-06 (Reference 2, Section 12). |
| Notes: N/A | |

| Maintain Core Cooling and Heat Removal |
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| Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:<br>• Emergency Feedwater (EFW)<br>• Depressurize Steam Generator (SG) for Makeup with Portable Injection Source<br>• Sustained Source of Water<br><br>Ref: JLD-ISG-2012-01 Sections 2 and 3 |
| PWR-Installed Equipment Phase 1 |
| During a station blackout (SBO), operator actions are currently governed by the applicable SBO procedures. Heat is removed from the core through the SG using the atmospheric dump valves (ADVs)/main steam safety valves, with the SG being fed by the turbine-driven EFW pumps at both units. Following loss of remote control of the ADV and the turbine-driven EFW pump, local manual action is possible and will be used to continue plant control consistent with procedures. The "Q" condensate storage tank (QCST) will supply **the initial feedwater** inventory for both units. **An additional feedwater water supply is** required **during Phase 1** to assure wind-generated missile protection.<br><br>Cooldown for ANO-1 is deferred until the reactor coolant system (RCS) inventory control is assured. **ANO-1 and ANO-2 cooldown is deferred until the Phase 2 turbine-driven EFW backup feedwater supply is staged and available.**<br><br>The turbine-driven EFW pumps will be utilized by both units to provide **feedwater** flow from an event-qualified source to supply the SGs. The turbine-driven EFW pumps are located in the auxiliary building (AB). The **AB** is designed to withstand the effects of earthquakes, tornadoes, floods, external missiles, and other appropriate natural phenomena. **The Phase 1 water source for seismic and flood events is the QCST. The Phase 1 water source for wind/missile events is initially the QCST supplemented by the emergency cooling pond (ECP) supplied by the diesel-driven fire pump.**<br><br>Power supplied to the turbine-driven EFW pump, valve operators, and other necessary support systems is independent of AC power sources. **The diesel-driven fire pump starts automatically on loss of AC power and will require manual valve operation to align the pump's discharge to the service water header.**<br><br>The ADVs **will** be opened in order to remove the steam generated from the SGs and support the natural circulation cooling **of the core**. For ANO-1, each main steam line, between the reactor building penetration and the corresponding main steam isolation valve (MSIV), is provided with spring-loaded safety valves and air-operated dump valves which discharge to **the** atmosphere. This arrangement permits controlled release of steam for RCS **cooldown** when the MSIVs are |

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.

<table>
<tr><td colspan="2">closed. This will be accomplished by manual operation either from the control room or by using local operation. For ANO-2, each main steam line, between the reactor building penetration and the corresponding MSIV, is provided with spring-loaded safety valves and two sets of steam dump bypass system ADVs and isolation valves. This arrangement permits controlled release of steam for RCS cooling when the MSIVs are closed. This can be accomplished by local operation.<br><br>Phase 1 core heat removal during Modes 5 and 6 will be accomplished by maintaining RCS inventory. Refer to the Phase 1 RCS Inventory Control strategy.</td></tr>
<tr><td colspan="2">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>Existing procedures/strategies/guidelines will be revised to consider FSGs.</td></tr>
<tr><td>Identify modifications</td><td>Modification to the diesel-driven fire pump discharge to allow the fire pump to discharge to the turbine-driven EFW suction through the service water piping during a wind/missile event.</td></tr>
<tr><td>Key Reactor Parameters</td><td>1. SG Level<br>2. SG Pressure<br>3. QCST Level<br>4. RCS Pressure<br>5. Core Exit Thermocouples (CETs)<br>6. RCS Temperature</td></tr>
<tr><td colspan="2">Notes: The key parameters will either be monitored from the control room or taken locally.</td></tr>
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| Maintain Core Cooling and Heat Removal | |
|---|---|
| PWR Portable Equipment Phase 2 | |
| The transition into Phase 2 for core heat removal will **occur as portable resources are utilized to support the Phase I strategies. The turbine-driven EFW pump will remain available as long as steam is available for powering the pump and a source of supply water is maintained.** In preparation of **turbine-driven EFW unavailability, the diesel-driven SG** FLEX pump **will be staged** to deliver **feedwater** to both SGs **if the turbine-driven EFW pump becomes unavailable.**<br><br>As the QCST depletes, portable diesel-driven pumps will be staged to transfer inventory to the QCST **or directly to the SG feedwater (turbine-driven EFW or SG FLEX) pump suction. The qualified backup in the event the QCST is depleted is provided** from the ECP via **a portable FLEX** inventory transfer pump.<br><br>**Phase 1 core heat removal during Modes 5 and 6 will be accomplished by maintaining RCS inventory. Refer to the Phase 1 RCS Inventory Control strategy.**<br><br>Diesel fuel required for FLEX equipment will be sourced from available onsite diesel fuel storage tanks for both ANO-1 and ANO-2.<br><br>Conceptual routings for reactor core cooling and heat removal strategies with SGs available (Modes 1 through 4) are contained in Attachment 3.<br><br>Conceptual routings for transfer of inventory to the QCST are contained in Attachment 3. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | Procedures and guidance to support deployment and implementation including interfaces to existing site procedures/ strategies/guidelines will be developed in accordance with NEI 12-06 (Reference 2, Section 11.4). Further, the PWROG is developing generic and NSSS-specific FSGs. The FSGs developed for ANO will align with the PWROG guidance. |
| Identify modifications | 1. The ANO-1 and ANO-2 primary and secondary connection points for the SG **FLEX** feed pump discharge during Modes 1 through 4 would be accessible locations on the EFW system.<br><br>2. The ANO-1 and ANO-2 primary and secondary SG **FLEX** feed pump suction for Modes 1 through 4 would require connections from the QCST piping to the pump.<br><br>3. Hose and/or piping connection(s) between the **ECP** and the QCST or QCST piping. |
| Key Reactor Parameters | 1. SG Level<br>2. SG Pressure |

| Maintain Core Cooling and Heat Removal | |
|---|---|
| PWR Portable Equipment Phase 2 | |
| | 3. QCST Level<br>4. RCS Pressure<br>5. CETs<br>6. RCS Temperature |
| Notes: The key parameters will either be powered from batteries and monitored from the control room or taken locally. | |

<table>
<tr><td colspan="3">Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements</td></tr>
<tr><td>Seismic</td><td colspan="2" rowspan="5">The FLEX equipment storage location(s) will withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO.</td></tr>
<tr><td>Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.</td></tr>
<tr><td>Severe Storms with High Winds</td></tr>
<tr><td>Snow, Ice, and Extreme Cold</td></tr>
<tr><td>High Temperatures</td></tr>
<tr><td colspan="3">Deployment Conceptual Design<br><br>In all external events, a deployment strategy is planned that will deliver FLEX equipment to the appropriate staging area.<br><br>In the specific case of a flooding event, it is expected that several days' notice will be given before a flood level will approach either plant grade and/or the magnitude of the PMF. Therefore, it is assumed that at least 24 hours is available for the deployment of the FLEX equipment for the flooding scenario (i.e., primary connection). It is also assumed that power is available during this time. Deployment of portable FLEX equipment for the flooding scenario consists of transporting all required equipment from the storage location(s) to the FLEX equipment flood platform. All paths and roads on-site are assumed to be maintained as unobstructed in this scenario, so the easiest path will used.<br><br>Any portable FLEX equipment will be trailer-mounted or on wheels for ease of deployment. This will give the current vehicles at ANO the capability to move any portable FLEX equipment. Available forklifts or pickup trucks will be utilized for deploying any portable FLEX equipment. Most of this equipment will be utilized for both the movement of any portable FLEX equipment and debris removal.<br><br>A strategy to clear debris for FLEX coping strategies will be implemented.</td></tr>
<tr><td>Strategy</td><td>Modifications</td><td>Protection of connections</td></tr>
<tr><td>The ANO-1 and ANO-2 event strategies are to rely upon the installed turbine-driven EFW pumps with inventory from the QCST. Either remote or local manual control of the turbine-driven EFW pump and flow control valves will be utilized;</td><td>ANO-1 and ANO-2 primary and secondary connections are required to the EFW system and the QCST piping.</td><td>The primary and secondary piping connections are located to be protected from the event specific conditions.</td></tr>
</table>

| | | |
|---|---|---|
| The plant will steam through the ADV**s** with either remote or local manual control of the valves;<br><br>Transition to FLEX SG feed pump is possible;<br><br>The FLEX SG feed pumps will feed the SG through connection into normal EFW piping;<br><br>Primary and secondary **connection** locations address all external event possibilities;<br><br>The strategy, previously described, is used for Modes 1 through **4; The strategy for** Modes 5 and 6 (SGs not available) **is addressed in the RCS Inventory Control strategy below.** | Potential use of the FLEX SG feed pump for Modes 5 and 6 would require discharge connections to ANO-1 high pressure injection (HPI) and ANO-2 high pressure safety injection (HPSI)/charging piping. | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| **The backup water source is from the ECP. If** any other alternate water source survives the event (such as the ANO-1 and ANO-2 CSTs, the ANO-2 RMWT, and the ANO-1 RWHT), it can provide additional inventory to the QCST. | Hose and/or piping connection(s) will be made between **the ECP and** the QCST or QCST piping. | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to the specific water source. |
| Notes: N/A | | |

<table>
<tr><td colspan="3">Maintain Core Cooling and Heat Removal</td></tr>
<tr><td colspan="3">PWR Portable Equipment Phase 3</td></tr>
<tr><td colspan="3">It is calculated that the decay heat is able to maintain the required steam pressure to the turbine-driven EFW pump for 72 hours if provided acceptable sources of SG feed. Because condensate-grade water sources, diesel fuel supplies, and other large equipment cannot be assured to be on site, strategies for delivery of off-site equipment from the RRC must be developed. This strategy credits that back-ups to the Phase 2 equipment will be delivered from the RRC to be on-site during Phase 3 should any Phase 2 equipment fail during the indefinite coping period.<br><br>Alternate water sources were evaluated for their capability to extend SG feed time after plant trip. The primary water source is the QCST. The site alternate water source is the ECP.<br><br>The Phase 3 recovery strategy and equipment necessary is independent of operational mode at the start of the event. The strategy involves accessing the ultimate heat sink (UHS) with inventory through the service water system (SWS) to one of the decay heat removal (DHR)/shutdown cooling (SDC) system heat exchangers, combined with re-powering one of the DHR/SDC system pumps.</td></tr>
<tr><td colspan="3">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td colspan="2">FSGs will be developed to support the Phase 3 core cooling and heat removal strategies.</td></tr>
<tr><td>Identify modifications</td><td colspan="2">A hose connection for an RRC pump will be installed in order to supply water from the UHS through the installed SWS piping, and discharging back into the UHS.</td></tr>
<tr><td>Key Reactor Parameters</td><td colspan="2">1. SG Level<br>2. SG Pressure<br>3. QCST Level<br>4. RCS Pressure<br>5. CETs<br>6. RCS Temperature</td></tr>
<tr><td colspan="3">Notes: N/A</td></tr>
<tr><td colspan="3">Deployment Conceptual Design<br><br>Deployment strategies for Phase 3 equipment will be determined during detailed design.</td></tr>
<tr><td>Strategy</td><td>Modifications</td><td>Protection of connections</td></tr>
<tr><td>A hose connection for an RRC pump will be used to supply water from the UHS through the installed SWS piping and discharge back into the UHS.</td><td>A hose connection to the UHS for an RRC pump will be installed.</td><td>The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO.</td></tr>
</table>

| Maintain Core Cooling and Heat Removal | | |
|---|---|---|
| PWR Portable Equipment Phase 3 | | |
| **Any** further level of design of this equipment will not be completed during the conceptual design phase, and will need to be completed during detailed design. | None | N/A |
| Notes: N/A | | |

| Maintain RCS Inventory Control | |
|---|---|
| Determine Baseline coping capability with installed coping[2] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:<br>• Low-leak reactor coolant pump (RCP) Seals or RCS makeup required<br>• All Plants Provide Means to Provide Borated RCS Makeup | |
| PWR-Installed Equipment Phase 1: | |
| Based on the current conditions and performance of the RCP seals, RCP seal leakage is not anticipated to be an immediate concern. Under scenario conditions, it is not currently possible to add RCS inventory for either unit **during Phase 1**. RCS makeup remains a Phase 2 action **and is discussed below**.<br><br>On loss of DHR/**SDC** for Modes 5 and 6 (no SGs available), ANO will **close** containment and let the RCS heat up and eventually start boiling. A strategy for RCS makeup will be specified in Phase 2.<br><br><u>RCS Inventory Control</u>:<br><br>For ANO-1 **and ANO-2,** RCS inventory control is not required until Phase 2.<br><br><u>RCS Shutdown Margin</u>:<br><br>For ANO-1 **and ANO-2 adequate shutdown margin is achieved by control rod insertion and Xenon buildup** during Phase 1. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | Existing procedures/strategies/guidelines will be revised to consider FSGs. |
| Identify modifications | ANO-2 SIT level power supply will need to be added to the batteries. |

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 | 1. RCS Pressure<br>2. ANO-2 SIT Level<br>3. Pressurizer Level (Modes 1 – 4)<br>4. Reactor Vessel Level (Modes 5 and 6) |
| Notes: The key parameters will either be powered from batteries and monitored from the control room or taken locally. | |

| Maintain RCS Inventory Control |
|---|
| PWR Portable Equipment Phase 2: |
| RCS inventory control and boration in Modes 1 through 4 will be provided by inject**ing** borated water. **For ANO-1, one of the ANO-2 charging pumps will be repowered using the portable diesel generator (PDG). The charging pumps' discharge will be cross-tied to either a primary or an alternate location in the ANO-1** HPI system. **This allows injection of RCS inventory for ANO-1 prior to plant cool down and depressurization. The initial suction source for the charging pumps will be the ANO-2 boric acid makeup tank (BAMT) and subsequently inventory will be provided by the ANO-2 Refueling Water Tank (RWT). Maintaining RCS inventory is required to maintain natural circulation cooling (NCC) during the ANO-1 cooldown and depressurization.**<br><br>**For ANO-2, initial makeup inventory is provided by the safety injection tanks (SITs) during RCS cool down and depressurization. Following RCS cool down and depressurization, RCS inventory will be added as needed by utilizing a portable FLEX RCS makeup pump. The FLEX RCS makeup pump will be provided by either** the ANO-1 Borated Water Storage Tank (BWST) **or** ANO-2 Refueling Water Tank (RWT). **If the BWST or RWT are not available due to a tornado, an additional borated water source will be identified and utilized. Maintaining RCS inventory is required to maintain NCC long term.**<br><br>During Modes 5 and 6 with SGs not available, the FLEX SG feed pumps will be utilized for RCS makeup due to their higher volume capacity with like connections. **The BWST and RWT provide for Modes 5 and 6 RCS inventory during non-wind/missile events. Several alternatives are being evaluated to address Modes 5 and 6 RCS inventory needs during a wind/missile event.**<br><br>Conceptual routings for RCS inventory control are contained in Attachment 3.<br><br>Conceptual routings for RCS inventory control with SGs not available (Modes 5 and 6) are contained in Attachment 3.<br><br><u>RCS Shutdown Margin</u>:<br><br>For ANO-1, **injection of the concentrated boron inventory maintained in the ANO-2 BAMT** is sufficient to borate **the RCS** from hot full power critical boron concentration to cold shutdown (200°F). The intended FLEX makeup capability supports the inventory makeup capability in existing analyses. **Several alternatives are being evaluated to address RCS inventory needs during a wind/missile event.**<br><br>For ANO-2 **the SITs will inject borated water during the plant cool down and depressurization. Subsequent RCS makeup will be provided by the FLEX RCS makeup pump supplied with borated water from the ANO-1 BWST or ANO-2 RWT. Several alternatives are being evaluated to address RCS inventory needs during a wind/missile event.**<br><br><u>RCS Mode 5 and Mode 6 Boric Acid Precipitation Control</u>: |

<table>
<tr><td colspan="2">Maintain RCS Inventory Control</td></tr>
<tr><td colspan="2">PWR Portable Equipment Phase 2:</td></tr>
<tr><td colspan="2">The first concern for an ELAP during shutdown conditions is the selection of a makeup pump with sufficient capacity to match the expected steaming rate. The second concern is when to provide flushing flow in order to prevent the precipitation of boric acid. The capacity of the makeup provided during these modes addresses these concerns.</td></tr>
<tr><td colspan="2">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>FSGs will be developed to support the Phase 2 strategies for RCS inventory control.</td></tr>
<tr><td>Identify modifications</td><td>1. One ANO-2 charging pump will be powered from a PDG to supply RCS makeup to ANO-1.<br><br>2. The ANO-2 charging pump requires connection to the ANO-1 HPI system.<br><br>3. The ANO-2 FLEX RCS makeup pump requires suction from the RWT and/or BWST.<br><br>4. The ANO-2 primary and secondary FLEX RCS makeup pump requires primary and secondary connections to the HPSI/charging piping.<br><br>5. For Modes 5 and 6 use of the FLEX SG feed pump would require discharge connections to ANO-1 HPI and ANO-2 HPSI/charging piping.<br><br>6. ANO-2 SIT level power supply will need to be added to the batteries.<br><br>7. Several alternatives are being evaluated to address RCS inventory needs during Modes 5 and 6 for wind-missile events.</td></tr>
<tr><td>Key Reactor Parameters</td><td>1. RCS Pressure<br>2. ANO-2 SIT Level<br>3. Pressurizer Level (Modes 1 – 4)<br>4. Reactor Vessel Level (Modes 5 and 6)</td></tr>
<tr><td colspan="2">Notes: The key parameters will either be powered from batteries and monitored from the control room or taken locally.</td></tr>
<tr><td colspan="2">Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements</td></tr>
</table>

<table>
<tr><td colspan="3">Maintain RCS Inventory Control</td></tr>
<tr><td colspan="3">PWR Portable Equipment Phase 2:</td></tr>
<tr><td>Seismic</td><td colspan="2" rowspan="5">The FLEX equipment storage location(s) will withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO.</td></tr>
<tr><td>Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.</td></tr>
<tr><td>Severe Storms with High Winds</td></tr>
<tr><td>Snow, Ice, and Extreme Cold</td></tr>
<tr><td>High Temperatures</td></tr>
<tr><td colspan="3">Deployment Conceptual Modification<br><br>In all external events, a deployment strategy is planned that will deliver any required FLEX equipment to the appropriate staging area.<br><br>In the specific case of a flooding event, it is expected that several days' notice will be given before a flood level will approach either plant grade and/or the magnitude of the PMF. Therefore, it is assumed that at least 24 hours is available for the deployment of the FLEX equipment for the flooding scenario (i.e., primary connection). It is also assumed that power is available during this time. Deployment of FLEX equipment for the flooding scenario consists of transporting all required equipment from the storage location(s) to the FLEX equipment flood platform. All paths and roads on-site are assumed to be maintained as unobstructed in this scenario, so the easiest path will used.<br><br>Any portable FLEX equipment will be trailer-mounted or on wheels for ease of deployment. This will give the current vehicles at ANO the capability to move any portable FLEX equipment. Available forklifts or pickup trucks will all be utilized for deploying any portable FLEX equipment. Most of this equipment will be utilized for both the movement of any portable FLEX equipment and debris removal.<br><br>A strategy to clear debris for FLEX coping strategies will be implemented.</td></tr>
<tr><td>Strategy</td><td>Modifications</td><td>Protection of connections</td></tr>
<tr><td>For ANO-1, the ANO-2 charging</td><td>For ANO-1, the ANO-2</td><td>The FLEX connections will be</td></tr>
</table>

| Maintain RCS Inventory Control | | |
|---|---|---|
| PWR Portable Equipment Phase 2: | | |
| **pump will be used to** inject borated water into the HPI system with suction from the **BAMT and then RWT. The discharge connection is** to be hard-piped as much as practical to minimize the required length of high pressure hose.<br><br>For ANO-2, a FLEX RCS makeup pump would inject borated water into the HPSI/charging system with suction from the RWT **or BWST**.<br><br>Modes 5 and 6 (with SGs not available) may require a higher capacity pump, e.g., the FLEX SG feed pump. | **charging pumps require connection to the ANO-1** HPI piping.<br><br>ANO-2 **FLEX RCS makeup pump requires** primary and secondary connections to the HPSI/charging piping and the RWT **or BWST**.<br><br>Potential use of the FLEX SG feed pump for Modes 5 and 6 would require discharge connections to ANO-1 HPI and ANO-2 HPSI/charging piping.<br><br>ANO-2 SIT level power supply will need to be added to the batteries.<br><br>**Several alternatives are being evaluated to address RCS inventory needs during Modes 5 and 6 for wind-missile events.** | constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| Notes: N/A | | |

| Maintain RCS Inventory Control | | |
|---|---|---|
| PWR Portable Equipment Phase 3: | | |
| For Phase 3, Entergy intends to continue with the Phase 2 strategies with additional support and equipment provided by offsite resources. Phase 3 design will be completed during the detailed design phase. If it is determined in the detailed design phase that a mobile boration unit or a mobile water purification system is required these items will be obtained from the RRC. | | |
| Details: | | |
| Provide a brief description of Procedures / Strategies / Guidelines | FSGs will be developed to support the Phase 3 RCS inventory control strategies. | |
| Identify modifications | No modifications are currently identified for Phase 3. | |
| Key Reactor Parameters | 1. RCS Pressure<br>2. ANO-2 SIT Level<br>3. Pressurizer Level (Modes 1 – 4)<br>4. Reactor Vessel Level (Modes 5 and 6) | |
| Notes: N/A | | |
| Deployment Conceptual Modification<br><br>Deployment strategies for Phase 3 equipment will be determined during detailed design. | | |
| Strategy | Modifications | Protection of connections |
| N/A | N/A | N/A |
| Notes: N/A | | |

| Maintain Containment | |
|---|---|
| Determine Baseline coping capability with installed coping[3] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:<br>• Containment Spray<br>• Hydrogen igniters (ice condenser containments only) | |
| PWR-Installed Equipment Phase 1: | |
| Containment function is not challenged early in the event; therefore, no actions are required in Phase 1 in support of containment function.<br><br>For Modes 5 and 6, containment function will be addressed using current procedural actions of References 8a, 8b, and 8c. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | N/A |
| Identify modifications | N/A |
| Key Containment Parameters | Containment Pressure |
| Notes: N/A | |

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 | | | |
|---|---|---|---|
| PWR Portable Equipment Phase 2: | | | |
| Containment function is not challenged early in the event; therefore, no actions are required in Phase 2 in support of containment function.<br><br>Per the analysis supporting Reference 5, containment is not expected to be challenged for the duration of Phase 2.<br><br>For Modes 5 and 6, containment closure will be addressed using current procedural actions of References 8a, 8b, and 8c. | | | |
| Details: | | | |
| Provide a brief description of Procedures / Strategies / Guidelines | N/A | | |
| Identify modifications | N/A | | |
| Key Containment Parameters | Containment Pressure | | |
| Notes: N/A | | | |
| Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements | | | |
| Seismic | N/A | | |
| Flooding | | | |
| Severe Storms with High Winds | | | |
| Snow, Ice, and Extreme Cold | | | |
| High Temperatures | | | |
| Deployment Conceptual Modification<br><br>N/A | | | |
| Strategy | Modifications | Protection of connections | |
| N/A | N/A | N/A | |
| Notes: N/A | | | |

| Maintain Containment | | |
|---|---|---|
| PWR Portable Equipment Phase 3: | | |
| Using RRC equipment for restoration of SW to containment cooling, containment function will not be challenged even later in the event; therefore, no further actions are required in Phase 3 in support of containment function.<br><br>For Modes 5 and 6, containment closure will be addressed using current procedural actions of References 8a, 8b, and 8c. | | |
| Details: | | |
| Provide a brief description of Procedures / Strategies / Guidelines | FSGs will be developed to support the Phase 3 containment strategies as needed. | |
| Identify modifications | N/A | |
| Key Containment Parameters | Containment Pressure | |
| | | |
| Deployment Conceptual Modification | | |
| Strategy | Modifications | Protection of connections |
| The large UHS pump delivered from the RRC will **be** utilized to **recover** the SWS. **Containment coolers are supplied from the SWS per normal operation**. The large generator will support loads of the containment cooler fans. | No additional modification. | N/A |
| **Any** further level of design of this equipment will not be completed during the conceptual design phase, and will need to be completed during detailed design. | None | N/A |
| Notes: N/A | | |

| Maintain SFP Cooling | |
|---|---|
| Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:<br>• Makeup with Portable Injection Source | |
| PWR-Installed Equipment Phase 1: | |
| SFP cooling is not challenged early in the event for either unit.<br><br>During phase 1, SFP cooling will be by boil-off of inventory in the pool. SFP makeup will be addressed in **Phase** 2, but during **Phase** 1 a makeup hose will be staged to ensure that makeup capability is available for **Phase** 2.<br><br>For ANO-1, for the maximum credible heat load, the time to boil is 3.87 hours. The boil-off rates of 28.10 gpm and 66.50 gpm were determined for normal and maximum decay heat in the SFP, respectively. These values correspond to a required volumetric flow rate of 27.32 gpm and 64.66 gpm, respectively, to replace any boil-off losses in the SFP using water with coolant properties at 130°F.<br><br>For ANO-2, for the maximum credible heat load, the time to boil is 2.19 hours. ANO-2 SFP has a smaller volume and a higher decay heat load than the ANO-1 SFP. The boil-off rates of 42.92 gpm and 81.73 gpm were determined for normal and maximum decay heat in the SFP, respectively. These values correspond to a required volumetric flow rate of 41.73 gpm and 79.46 gpm, respectively, to replace any boil-off losses in the SFP using water with coolant properties at 130°F. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | Procedures/strategies/guidelines will be revised, as necessary, to consider timing of requirements for access to the SFP. |
| Identify modifications | No modifications are required for Phase 1. |
| Key SFP Parameter | SFP Level |
| Notes: The key parameters will either be monitored from the control room or taken locally. | |

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.

<table>
<tr><td colspan="2">Maintain SFP Cooling</td></tr>
<tr><td colspan="2">PWR Portable Equipment Phase 2:</td></tr>
<tr><td colspan="2">SFP cooling in the ELAP condition is accomplished by local pool boiling and evaporation supported by coolant makeup. SFP cooling is not challenged early in the event (Phase 1) for either unit due to the limited inventory loss due to boiling. However, access to the SFP area as a part of Phase 2 response could be challenged due to environmental conditions local to the pool. Thus, actions that require access to the SFP deck will be completed prior to Phase 2.<br><br>Makeup will be provided using a separate FLEX SFP makeup pump.<br><br>The strategies for the discharge connection to the SFP are to:<br><br>• install branch connection to the SFP deck to accommodate a hose connection or oscillating spray fire nozzle<br><br>• provide makeup via connection into existing SFP Cooling system (ANO-1) piping or service water (ANO-2) piping.<br><br>Both SFPs are located in a structure that does not require additional ventilation.<br><br>Conceptual routings for makeup to the SFP are contained in Attachment 3.</td></tr>
<tr><td colspan="2">Details:</td></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>FSGs will be developed to support the Phase 2 SFP cooling strategies.</td></tr>
<tr><td>Identify modifications</td><td>1. Install stand pipe in ANO-2 AB stairwell for supplying make-up via the FLEX SFP pump to the ANO-1 and ANO-2 spent fuel pools.<br><br>2. A connection into the existing ANO-1 SFP cooling system and ANO-2 service water piping would be required.</td></tr>
<tr><td>Key SFP Parameter</td><td>SFP Level</td></tr>
<tr><td colspan="2">Notes: The key parameters will be monitored from the control room or taken locally.</td></tr>
</table>

<table>
<tr><td colspan="2">Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements</td></tr>
<tr><td>Seismic</td><td rowspan="6">The FLEX equipment storage location(s) will withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO.</td></tr>
<tr><td>Flooding</td></tr>
<tr><td>Severe Storms with High Winds</td></tr>
<tr><td>Snow, Ice, and Extreme Cold</td></tr>
<tr><td>High Temperatures</td></tr>
<tr><td colspan="2">Deployment Conceptual Design<br><br>In all external events, a deployment strategy is planned that will deliver any required FLEX equipment to the appropriate staging area.<br><br>In the specific case of a flooding event, it is expected that several days' notice will be given before a flood level will approach either plant grade and/or the magnitude of the PMF. Therefore, it is assumed that at least 24 hours is available for the deployment of the FLEX equipment for the flooding scenario (i.e., primary connection). It is also assumed that power is available during this time. Deployment of FLEX equipment for the flooding scenario consists of transporting all required equipment from the storage location(s) to the FLEX equipment flood platform. All paths and roads on-site are assumed to be maintained as unobstructed in this scenario, so the easiest path will used.<br><br>Any portable FLEX equipment will be trailer-mounted or on wheels for ease of deployment. This will give the current vehicles at ANO the capability to move any portable FLEX equipment. Available forklifts or pickup trucks will all be utilized for deploying any portable FLEX equipment. Most of this equipment will be utilized for both the movement of any portable FLEX equipment and debris removal.<br><br>A strategy to clear debris for FLEX coping strategies will be implemented.</td></tr>
</table>

| Strategy | Modifications | Protection of connections |
|---|---|---|
| The FLEX **SFP pump will be used to supply water via a** hose or oscillating fire monitor nozzle.<br><br>If the connection into existing SFP cooling system piping **or service water** is used, a hose will be connected. | **Install a stand pipe in ANO-2 Auxiliary Building stairwell for supplying make-up via the FLEX SFP pump to the ANO-1 and ANO-2 spent fuel pools by hose or oscillating fire monitor nozzle.**<br><br>A connection into existing SFP cooling system piping **(ANO-1) and service water (ANO-2) is** required. | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| Notes: N/A | | |

| Maintain SFP Cooling | | |
|---|---|---|
| PWR Portable Equipment Phase 3: | | |
| For Phase 3, Entergy intends to continue with the Phase 2 strategies (boil-off) with additional support and equipment provided by off-site resources. RRC equipment can be installed into the existing SWS piping to provide makeup indefinitely.<br><br>This strategy credits that back-ups to the Phase 2 equipment will be delivered from the RRC to be on-site during Phase 3 should any Phase 2 equipment fail during the indefinite coping period. | | |
| Details: | | |
| Provide a brief description of Procedures / Strategies / Guidelines | FSGs will be developed to support the Phase 3 SFP cooling strategies. | |
| Identify modifications | A hose connection for an RRC pump will be installed in order to supply water from the UHS through the installed SWS piping. | |
| Key SFP Parameter | SFP Level | |
| Notes: The key parameters will either be monitored from the control room or taken locally. | | |
| Deployment Conceptual Design<br><br>Deployment strategies for Phase 3 equipment will be determined during detailed design. | | |
| Strategy | Modifications | Protection of connections |
| A hose connection for an RRC pump will be used to supply water from the UHS through the installed SWS piping. | **A pre-engineered, temporary modification to connect the RRC pump to an existing SW valve will be required to be developed.** | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| **Any** further level of design of this equipment will not be completed during the conceptual design phase, and will need to be completed during detailed design. | None | N/A |
| Notes: N/A | | |

| Safety Functions Support | |
|---|---|
| Determine baseline coping capability with installed coping[5] modifications not including FLEX modifications | |
| PWR-Installed Equipment Phase 1 | |
| Support for the safety functions is provided by continued observation of plant conditions by site personnel in the control room or taken locally. During Phase 1, the installed vital batteries are used to maintain the critical instrumentation, and some control systems (ANO-1 only), available to the site personnel.<br><br>The time which vital power will be available can be extended by performing a load shed of all loads which are not considered to be critical for monitoring the conditions of the plant during an ELAP.<br><br>DC load shed will be required in order to extend battery life until installed battery chargers can be re-powered via the FLEX PDGs. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | Procedures/strategies/guidelines will be revised to consider the FSGs. |
| Identify modifications | No modifications are required for Phase 1. |
| Key Parameters | DC Bus Voltage |
| Notes: N/A | |

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.

| Safety Functions Support |
|---|
| PWR Portable Equipment Phase 2 |
| The electrical portion of the ANO-1 and ANO-2 Phase 2 coping strategy consists of two main goals:<br>• Maintain power to essential instrumentation by powering the battery charger.<br>• Provide power to one **ANO-2 charging** pump and other equipment.<br>Maintaining power to essential instrumentation will be achieved by re-powering an installed battery charger via the FLEX PDG. Powering the one **ANO-2 charging** pump will be achieved by **re-energizing portions of the electrical distribution or by routing cables directly to the pump motor.**<br>Additional installed equipment may be required to be powered by the FLEX generators. This will include fuel oil transfer pumps. Additional equipment that may be required to be powered include portable fans/lighting, pressurizer heaters, and other essential equipment.<br>**Modes 5 and 6** strategies will be evaluated as part of the detailed design phase.<br>Conceptual routings for safety function support are contained in Attachment 3. The portable equipment is listed in the following table. |

| Details: | |
|---|---|
| Provide a brief description of Procedures / Strategies / Guidelines | FSGs will be developed to support the Phase 2 safety functions strategies. |
| Identify modifications | Installation of spare breaker in applicable existing switchgear and raceway from PDG staging location to tie-in points |
| Key Parameters | DC Bus Voltage |
| Notes: N/A | |

<table>
<tr><td colspan="2">Storage / Protection of Equipment:<br>Describe storage / protection plan or schedule to determine storage requirements</td></tr>
<tr><td>Seismic</td><td rowspan="5">The FLEX equipment storage location(s) will withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO.</td></tr>
<tr><td>Flooding<br>Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.</td></tr>
<tr><td>Severe Storms with High Winds</td></tr>
<tr><td>Snow, Ice, and Extreme Cold</td></tr>
<tr><td>High Temperatures</td></tr>
<tr><td colspan="2">Deployment Conceptual Design<br><br>In all external events, a deployment strategy is planned that will deliver any required FLEX equipment to the appropriate staging area.<br><br>In the specific case of a flooding event, it is expected that several days' notice will be given before a flood level will approach either plant grade and/or the magnitude of the PMF. Therefore, it is assumed that at least 24 hours is available for the deployment of the FLEX equipment for the flooding scenario (i.e., primary connection). It is also assumed that power is available during this time. Deployment of FLEX equipment for the flooding scenario consists of transporting all required equipment from the storage location(s) to the FLEX equipment flood platform. All paths and roads on-site are assumed to be maintained as unobstructed in this scenario, so the easiest path will used.<br><br>Any portable FLEX equipment will be trailer-mounted or on wheels for ease of deployment. This will give the current vehicles at ANO the capability to move any portable FLEX equipment. Available forklifts or pickup trucks will all be utilized for deploying any portable FLEX equipment. Most of this equipment will be utilized for both the movement of any portable FLEX equipment and debris removal.<br><br>A strategy to clear debris for FLEX coping strategies will be implemented.</td></tr>
</table>

| Strategy | Modifications | Protection of connections |
|---|---|---|
| For ANO-1 and ANO-2, a PDG will be used to maintain power to essential instrumentation by re-powering an existing battery charger that feeds vital DC buses and provide electric power to one **ANO-2 charging** pump for RCS makeup as necessary. | Conduit will be run from the PDG staging **location to the** tie-in point for the battery charger that feeds vital DC buses. | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| Notes: N/A | | |

| Safety Functions Support | |
|---|---|
| PWR Portable Equipment Phase 3 | |
| Similar Phase 3 coping strategies will be employed for both ANO-1 and ANO-2. Off-site equipment from the RRC will arrive on-site to supply Phase 3 coping capabilities.<br><br>Electrically, this includes 4160V **diesel** generators capable of re-powering 4160V buses. In turn, the 4160V buses will feed the 480V Engineered Safeguards buses so the Phase 2 PDGs are no longer required for this **function**.<br><br>**Conceptual** routings for safety function support are contained in Attachment 3. The portable equipment and commodities are listed in the following tables. | |
| Details: | |
| Provide a brief description of Procedures / Strategies / Guidelines | FSGs will be developed to support the Phase 3 safety functions strategies. |
| Identify modifications | **None** |
| Key Parameters | DC Bus Voltage |
| Notes: N/A | |
| Deployment Conceptual Design<br><br>In all external events, a deployment strategy is planned that will deliver any required FLEX equipment to the **appropriate staging** area.<br><br>In the specific case of a flooding event, it is expected that several days' notice will be given before a flood level will approach either plant grade and/or the magnitude of the PMF. Therefore, it is assumed that at least 24 hours is available for the deployment of the FLEX equipment for the flooding scenario (i.e., primary connection). It is also assumed that power is available during this time. Deployment of FLEX equipment for the flooding scenario consists of transporting all required equipment from the storage location(s) to the **FLEX equipment flood platform**. All paths and roads on-site are assumed to be maintained as unobstructed in this scenario, so the easiest path will used.<br><br>Any portable FLEX equipment will be trailer-mounted or on wheels for ease of deployment. This will give the current vehicles at ANO the capability to move any portable FLEX equipment. Available forklifts or pickup trucks will all be utilized for deploying any portable FLEX equipment. Most of this equipment will be utilized for both the movement of any portable FLEX equipment and debris removal.<br><br>A strategy to clear debris for FLEX coping strategies will be implemented. | |

| Safety Functions Support | | |
|---|---|---|
| PWR Portable Equipment Phase 3 | | |
| Strategy | Modifications | Protection of connections |
| The ANO-1 and ANO-2 Phase 3 electrical coping strategy is to re-power 4160V Engineered Safeguards buses. | **None** | The FLEX connections will be constructed to withstand the NEI 12-06 (Reference 2) hazards as applicable to ANO. |
| Notes: N/A | | |

| PWR Portable Equipment Phase 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Use and (potential / flexibility) diverse uses | | | | | | Performance Criteria | Maintenance |
| List portable equipment (Quantity) | Core | Containment | SFP | Instrumentation | Accessibility | Flow Rate and Required Head | Maintenance / PM requirements |
| **Portable SG Feed Pump (3)** | X | | | | | **300 gallons per minute (gpm) @ 900 ft total developed head (TDH) (estimated)** | Will follow EPRI template requirements |
| **Portable RCS Injection Pump(ANO-2) (2)** | X | | | | | **40 gpm @ 1500 ft TDH (estimated)** | Will follow EPRI template requirements |
| **Portable SFP Makeup Pump (2)** | | | **X** | | | **400 gpm @ 400 ft TDH (estimated)** | Will follow EPRI template requirements |
| **Portable Inventory Transfer Pump (2)** | X | | | | | **750 gpm @ 200 ft TDH (estimated)** | Will follow EPRI template requirements |
| **Diesel Generator (2)** | X | | | | | **480 Volt, 800 kiloWatt (estimated)** | Will follow EPRI template requirements |
| **Debris Removal Equipment** | | | | | **X** | **To Be Determined (TBD)** | |

| PWR Portable Equipment Phase 3 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Use and (potential/flexibility) diverse uses | | | | | | Performance Criteria | Notes |
| List portable equipment | Core | Containment | SFP | Instrumentation | Accessibility | Flow Rate and Required Head | |
| ANO-1 SW RRC Pump | X | X | X | | | 2500 gpm<br>52.15 ft | 9.8 gallons per hour (gph) fuel required |
| ANO-1/2 SW RRC Pump (N+1) | X | X | X | | | 2500 gpm<br>52.15 ft | 9.8 gph fuel required |
| ANO-2 SW RRC Pump | X | X | X | | | 2500 gpm<br>52.15 ft | 9.8 gph fuel required |
| Large Fuel Truck | X | X | X | X | | TBD | Fuel Replenish/Transfer |
| SW Suction Hose | X | X | X | | | TBD | |
| SW Discharge Hose | X | X | X | | | TBD | |
| Large 4160V DG | X | X | | X | | TBD | |
| Large 4160V DG (N+1) | X | X | | X | | TBD | |

| Phase 3 Response Equipment/Commodities | |
|---|---|
| Item | Notes |
| Radiation Protection Equipment<br><br>• Survey instruments<br>• Dosimetry<br>• Off-site monitoring/sampling<br>• Radiological counting equipment<br>• Radiation protection supplies<br>• Equipment decontamination supplies<br>• Respiratory protection | N/A |
| Commodities<br><br>• Food<br><br>o Meals ready to eat<br>o Microwavable meals<br><br>• Potable water | N/A |
| Fuel Requirements<br><br>• #2 Diesel Fuel<br><br>• Diesel fuel bladders | N/A |
| Heavy Equipment<br><br>• 4 wheel-drive transportation equipment (tow vehicle)<br><br>• Debris clearing equipment (skid steer type) | N/A |

References:

1. NRC EA-12-049, “Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for BDBEE,” March 12, 2012 [ADAMS Accession Number ML12056A045]

2. NEI 12-06, Revision 0, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” August 2012

3. NRC JLD-ISG-2012-01, Revision 0, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” August 2012

4. ANO SARs
   a. ANO-1 SAR, Amendment 25, Facility Operating License Number DPR-51, Docket Number 50-313
   b. ANO-2 SAR, Amendment 24, Facility Operating License Number NPF-6, Docket Number 50-368

5. Entergy Document, “Arkansas Nuclear One Station Response to INPO IER 11-4, ‘Near-Term Actions to Address the Effects of an Extended Loss of All AC Power in Response to the Fukushima Daiichi Event’,” Attached in EDMS as ‘ANO IER 11-4 Responses.zip’

6. ANO Procedures
   a. ANO-1 Procedure 1202.008, “Blackout”
   b. ANO-2 Procedure 2202.008, “Station Blackout”

7. WCAP-17601-P, Revision 1, “RCS Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs,” January 2013

8. ANO Procedures
   a. ANO-1 Procedure 1203.028, “Loss of Decay Heat Removal”
   b. ANO-2 Procedure 2203.029, “Loss of Shutdown Cooling”
   c. ANO-2 Procedure 2202.011, “Lower Mode Functional Recovery

9. Task Interface Agreement 2004-04, "Acceptability of Proceduralized Departures from TSs Requirements at the Surry Power Station," (TAC Nos. MC4331 and MC4332)," dated September 12, 2006. (Accession No. ML060590273)

Attachment 1A – ANO-1 Sequence of Events Timeline

| Action Item | Elapsed Time (hours) | Action | Time Constraint Y/N | Remarks / Applicability |
|---|---|---|---|---|
| | 0 | Event Starts | N/A | Plant at 100% power |
| | 0 | Perform Actions Consistent with Station Blackout Procedure | N/A | Actions performed per EOP (Reference 6a) |
| 1 | 1 | Declare ELAP | Y | ELAP declared when power sources cannot be restored |
| 2 | 3 | Perform Battery Load Shed | Y | Extended battery load shedding performed to extend life to Phase 2 |
| 3 | 5 | Clear Debris | Y | Debris cleared for deployment paths for equipment |
| 4 | 6 | Perform Damage Assessment | Y | FSG requirement to devise coping strategies |
| 5 | 6 | Deploy and Connect FLEX 480V Generator | Y | Establish connections to provide power to ANO-2 Charging Pumps and ANO-1 Battery Chargers. Diesel Generator is shared between units and is adequately sized to provide power to both ANO-1 and ANO-2. |
| 6 | 6 | **Align ANO-2 Charging pump for ANO-1 RCS injection** | Y | A makeup flow rate of 35 gpm is used assuming a 20°F/hr cooldown. BWST volume should last throughout the 72 hour ELAP event.<br><br>**ANO-2 Charging pumps are capable of supplying 44 gpm each.** |
| 7 | **8** | **Align inventory transfer pump** | **Y** | **Inventory transfer pump staged and aligned to provide makeup from the ECP via service water piping to the QCST prior to exhausting its normal operating volume. Pending analysis of makeup requirements for DHR.** |
| 8 | 8 | Commence Plant Cooldown | Y | **Confirmed by previous analysis** |
| 9 | 12 | Deploy hose for SFP makeup | Y | Prior to onset of boiling |
| 10 | 16 | Refuel Diesel Equipment | Y | Assuming 10 hours of fuel is available in all diesel |

| | | | | |
|---|---|---|---|---|
| | | | | equipment, the RCS makeup pump and 480V generator need to be refueled at ANO-1 starting at 16 hours. The QCST makeup pump needs to be refueled at 18 hours.<br><br>**Requires hose to be staged from Fuel Oil Storage Building to diesel equipment staging areas. Re-power fuel oil transfer pumps using small portable diesel generator.** |
| 11 | 24 | Prepare site for receipt of RRC equipment | Y | RRC equipment expected to be able to arrive 24 hours after the event |
| 12 | 24 | Align **SFP** Feed Pump to SFP | Y | Assuming 15 feet of water is needed above the fuel racks for shielding; makeup to the ANO-1 SFP is not required until 47.67 hours after the event.<br><br>**SFP pump is shared between units and is adequately sized to provide necessary makeup flow for both ANO-1 and ANO-2.** |
| 13 | N/A | Establish any required ventilation | N | The need for ventilation through 72 hours has not been determined.<br><br>**Pending additional analysis.** |
| 14 | N/A | Align FLEX SG Feed Pump | N | Steam pressure is expected to be sufficient to operate the turbine-driven EFW pumps throughout the 72-hour ELAP event. The backup FLEX SG feed pumps should be deployed when time/resources permit. |
| 15 | N/A | Align 4160V Generators | N | The 4160V generator aligned when possible |
| 16 | N/A | Establish Large Fuel Truck Service | N | On-site fuel resources expected to last for over 72 hours |
| 17 | N/A | Establish FLEX SW RRC Pump | N | The final details of this equipment will be finalized in the detailed design phase. |

Attachment 1A – ANO-2 Sequence of Events Timeline

| Action item | Elapsed Time (hours) | Action | Time Constraint Y/N | Remarks / Applicability |
|---|---|---|---|---|
| | 0 | Event Starts | N/A | Plant at 100% power |
| | 0 | Perform Actions Consistent with Station Blackout Procedure | N/A | Actions performed per EOP (Reference 6b) |
| 1 | 1 | Declare ELAP | Y | ELAP declared when power sources cannot be restored |
| 2 | 3 | Perform Battery Load Shed | Y | Extended battery load shedding performed to extend life to Phase 2 |
| **3** | **6** | **Deploy and Connect FLEX 480V Generator** | **Y** | **Provides power to ANO-2 Battery Chargers. Diesel Generator is shared between units and is adequately sized to provide power to both ANO-1 and ANO-2.** |
| **4** | **8** | **Commence Plant Cooldown to a Cold Leg Temperature of 350°F** | **Y** | **Assuming an initial cold leg temperature of 550°F cooled to a temperature of 350°F, this cooldown will take 2.67 hours with a 2-hour hold.** |
| **5** | 5 | Clear Debris | Y | Debris cleared for deployment paths for equipment |
| **6** | 6 | Perform Damage Assessment | Y | FSG requirement to devise coping strategies |
| **7** | 8 | Align **inventory transfer pump** | Y | The required time for QCST makeup is based on the credited TS QCST volume and the assumed cooldown strategy at ANO-1, which starts at 8 hours. The QCST is a shared resource for both units. The exact need time for makeup to this water source is unknown until the cooldown strategy has been finalized.<br><br>**Inventory transfer pump staged and aligned to provide makeup from the ECP via service water piping to the QCST prior to exhausting its normal operating volume. Pending analysis of makeup requirements for DHR.** |
| **8** | 12 | Deploy hose for SFP makeup | Y | Prior to onset of boiling |
| **9** | 16 | Refuel Diesel Equipment | Y | Assuming 10 hours of fuel is |

| | | | | |
|---|---|---|---|---|
| | | | | available in all diesel equipment, the QCST makeup pump needs to be refueled at 18 hours. |
| **10** | 18 | Align FLEX RCS Makeup Pump from suction source | Y | RCS makeup is to be supplied at 17.5 hours at a flow rate of 20 gpm. |
| 11 | 24 | Prepare site for receipt of RRC equipment | Y | RRC equipment expected to be able to arrive 24 hours after the event |
| 12 | 24 | Align SFP Feed to SFP | Y | Assuming 15 feet of water is needed above the fuel racks for shielding, makeup to the ANO-2 SFP is not required until 24.74 hours after the event.<br><br>**SFP Feed Pump is shared between units and is adequately sized to provide necessary makeup flow for both ANO-1 and ANO-2.** |
| 13 | N/A | Establish any required ventilation | N | The need for ventilation through 72 hours has not been determined.<br><br>**Pending additional analysis.** |
| 14 | N/A | Align FLEX SG Feed Pump | N | Steam pressure is expected to be sufficient to operate the turbine-driven EFW pumps throughout the 72-hour ELAP event. The backup FLEX SG feed pumps should be deployed when time/resources permit. |
| 15 | N/A | Align 4160V Generators | N | The 4160V generator aligned when possible |
| 16 | N/A | Establish Large Fuel Truck Service | N | On-site fuel resources expected to last for over 72 hours |
| 17 | N/A | Establish FLEX SW RRC Pump | N | The final details of this equipment will be finalized in the detailed design phase. |

Attachment 1B – NSSS Significant Reference Analysis Deviation Table

| Item | Parameter of interest | WCAP value (WCAP-17601-P, Revision 1) | WCAP page | Plant applied value | Gap and discussion |
|---|---|---|---|---|---|
| ANO-1 | | | | | |
| | All | There are currently no identified deviations in the ANO-1 FLEX conceptual design with respect to the PWROG guidance pending completion of PWROG-sponsored revision to WCAP-17601 (Reference 7) that is in progress for the updated NSSS strategy for B&W NSSS designs. | | | |
| ANO-2 | | | | | |
| | All | Entergy has evaluated WCAP-17601 (Reference 7) considering ANO-2 site-specific parameters and determined that the conclusions of that document are generally applicable to ANO-2. There are currently no identified deviations in the ANO-2 FLEX conceptual design with respect to the PWROG guidance. | | | |

Attachment 2 – Milestone Schedule

The following milestone schedule is provided. The dates are planning dates that are subject to change as the FLEX program design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent six-month status reports.

| ANO Milestone Schedule | | |
|---|---|---|
| Activity | Original Target Completion Date | Status (Will be updated every 6 months) |
| Submit Overall Integrated Implementation Plan | February 2013 | Complete |
| Update 1 | August 2013 | Complete |
| Update 2 | February 2014 | |
| Update 3 | August 2014 | |
| Update 4 | February 2015 | |
| Update 5 | August 2015 | |
| Perform Staffing Analysis | December 2013 | Not Started |
| Modifications | | |
| Modifications Evaluation | June 2013 | Started |
| Engineering and Implementation | June 2013 - October 2015 | Not Started |
| ANO-1 Implementation Outage | November 2014 | February 2015 |
| ANO-2 Implementation Outage | October 2015 | Not Started |
| On-site FLEX Equipment | | |
| Purchase | June 2014 | Not Started |
| Procure | November 2014 | Not Started |
| Off-site FLEX Equipment | | |
| Develop Strategies with RRC | November 2013 | Not Started |
| Install Off-site Delivery Station (if necessary) | October 2014 | Not Started |
| Procedures | | |
| PWROG issues NSSS-specific guidelines | June 2013 | May 2013 |
| Create ANO FSG | November 2014 | Not Started |
| Create Maintenance Procedures | November 2014 | Not Started |
| Training | | |
| Develop Training Plan | June 2014 | Not Started |
| Implement Training | November 2014 | Not Started |
| Submit Completion Report | December 2015 | |

Attachment 3 – Conceptual Drawing Mark-ups

Drawings have not been updated.