# 20.0 REQUIREMENTS RESULTING FROM FUKUSHIMA NEAR-TERM TASK FORCE RECOMMENDATIONS

This chapter addresses the Fukushima Near-Term Task Force (NTTF) recommendations that are applicable to North Anna 3 Combined License (COL). The applicable recommendations address three topics: mitigation strategies for beyond-design-basis external events (related to Recommendation 4.2), spent fuel pool (SFP) instrumentation (related to Recommendation 7.1), and emergency preparedness (EP) staffing and communications (related to Recommendation 9.3).

**Background**

In response to the events at Fukushima resulting from the March 11, 2011, Great Tohoku earthquake and tsunami in Japan, the U.S. Nuclear Regulatory Commission (NRC) established the NTTF to conduct a systematic and methodical review of NRC processes and regulations (1) to determine whether the agency should make additional improvements to its regulatory system, and (2) to make recommendations to the Commission for policy directions. In July 2011, the NTTF issued a 90-day report, SECY-11-0093, "Near Term Report and Recommendations for Agency Actions Following the Events in Japan," (Agencywide Documents Access and Management System (ADAMS) Accession Number ML11186A950) identifying 12 recommendations. On September 9, 2011, in SECY-11-0124, "Recommended Actions To Be Taken Without Delay From The NTTF Report," (ADAMS Accession No. ML11245A127), the staff submitted to the Commission for its consideration NTTF recommendations that can and—in the staff's judgment—should be partially or entirely initiated without delay. In SECY-11-0124, the staff identified and concluded that specific actions to address a subset of the NTTF recommendations would provide the greatest potential for improving safety in the near term:

1. Recommendation 2.1: Seismic and Flood Hazard Reevaluations

2. Recommendation 2.3: Seismic and Flood Walkdowns

3. Recommendation 4.1: Station Blackout Regulatory Actions

4. Recommendation 4.2: Equipment Covered under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54(hh)(2)

5. Recommendation 5.1: Reliable Hardened Vents for Mark I Containments

6. Recommendation 8: Strengthening and Integration of Emergency Operating Procedures, Severe Accidents Management Guidelines, and Extensive Damage Mitigation Guidelines

7. Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications)

On October 3, 2011, in SECY-11-0137, "Prioritization of Recommended Actions to Be Taken in Response to Fukushima Lessons Learned" (ADAMS Accession No. ML11272A203), the staff identified two actions in addition to the actions discussed in SECY-11-0124 that had the greatest potential for improving safety in the near term. The additional actions are as follows:

- Inclusion of Mark II containments in the staff's recommendation for reliable hardened vents associated with NTTF Recommendation 5.1

- The implementation of SFP instrumentation proposed in Recommendation 7.1

The staff also proposed to the Commission three tiers of prioritization for the NTTF recommendations. The first tier consists of those NTTF recommendations that the staff determined should be started without unnecessary delay and for which sufficient resource flexibility, including availability of critical skill sets, exists. The second tier consists of those NTTF recommendations that could not be initiated in the near term due to factors that include the need for further technical assessment and alignment, dependence on Tier 1 issues, or availability of critical skill sets. These actions do not require long-term study and can be initiated when sufficient technical information and applicable resources become available. The third tier consists of those NTTF recommendations that require further staff study to support a regulatory action, have an associated shorter-term action that needs to be completed to inform the longer-term action, are dependent on the availability of critical skill sets, or are dependent on the resolution of NTTF Recommendation 1 (See SECY-11-0093).

On February 17, 2012, in SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami" (ADAMS Accession No. ML12039A111), the staff provided the Commission with proposed orders and requests for information to be issued to all power reactor licensees and holders of construction permits.

On March 9, 2012, the Commission approved issuing the proposed orders with some modifications in the staff requirements memorandum (SRM) to SECY-12-0025. As set forth in SRM-SECY-12-0025, the proposed orders are needed for continued adequate protection or to provide a substantial increase in the protection of public health and safety. In accordance with its statutory authority under Section 161 of the Atomic Energy Act of 1954, as amended (the Act), the Commission may impose these requirements.

On March 12, 2012, the NRC issued Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events."; and Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession Nos. ML12054A735 and ML12054A679, respectively), to the appropriate licensees and permit holders, including the only holder at that time of a COL issued under 10 CFR Part 52, Southern Nuclear Operating Company, the licensee and operator of the Vogtle Electric Generating Plant Units 3 and 4. The staff also issued the requests for information pursuant to 10 CFR 50.54(f) regarding Recommendations 2.1, 2.3, and 9.3 to the appropriate licensees and construction permit holders in March 12, 2012, letters (ADAMS Accession No. ML12053A340).

The following Tier 1 recommendations from SECY-11-0137, as modified in SECY-12-0025, were considered in determining those that are applicable to North Anna 3 COL review:

1. Recommendation 2.1: Seismic and Flood Hazard Reevaluations

2. Recommendation 2.3: Seismic and Flood Walkdowns

3. Recommendation 4.1: Station Blackout Regulatory Actions

4. Recommendation 4.2: Equipment Covered under 10 CFR 50.54(hh)(2)

5. Recommendation 5.1: Reliable Hardened Vents for Mark I and Mark II Containments

6. Recommendation 7.1: Spent Fuel Pool Instrumentation

7. Recommendation 8: Strengthening and Integration of Emergency Operating Procedures, Severe Accidents Management Guidelines, and Extensive Damage Mitigation Guidelines

8. Recommendation 9.3: Emergency Preparedness Regulatory Actions (staffing and communications)

The staff determined that the following three recommendations are applicable and should be addressed by the North Anna 3 COL applicant:

1. Recommendation 4.2: Equipment covered under 10 CFR 50.54(hh)(2) - Order licensees to provide reasonable protection for equipment currently provided pursuant to 10 CFR 50.54(hh)(2) from the effects of design-basis external events, and to add equipment as needed to address multiunit events while other requirements are being revised and implemented.

2. Recommendation 7.1: Spent fuel pool instrumentation - Order licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, and to monitor SFP parameters (i.e., water level, temperature, and area radiation levels) from the control room.

3. Recommendation 9.3: Emergency preparedness regulatory actions (staffing and communications) - Order licensees to do the following until rulemaking is complete:

    - Determine and implement the required staff to fill all necessary positions for responding to a multi-unit event.

    - Provide a means to power communications equipment needed to communicate onsite (e.g., radios for response teams and between facilities) and offsite (e.g., cellular telephones and satellite telephones) during a prolonged station blackout.

The staff determined that the remaining Tier 1 recommendations did not need to be considered further in North Anna 3 COL review. The applicant evaluated the seismic and flood hazards using current guidance and methodologies. For the seismic hazard, the applicant performed an evaluation consistent with guidance in Regulatory Guide (RG) 1.208, "A Performance-Based Approach to Define the Site Specific Earthquake Ground Motion." Regarding the need to consider the latest information in the evaluation of seismic hazard, the applicant's evaluation included consideration of the NUREG–2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities," (CEUSSSC) model as described in this safety evaluation report (SER) for North Anna 3, Chapter 2, Section 2.5.2. For flood hazards, as evaluated in this SER Chapter 2, Sections 2.4.5 and 2.4.6, the applicant used RG 1.59, "Design Basis Floods for Nuclear Power Plants," supplemented by best current practices, as it relates to providing assurance that natural flooding phenomena that could potentially affect the site have been appropriately identified and characterized. Thus, the staff determined that the applicant has already addressed the seismic and flood hazard reevaluation portion of Recommendation 2.1. Therefore, there are no additional matters left to be addressed in Recommendation 2.1 for seismic and flooding reevaluations related to

North Anna 3 COL application. Additionally, the staff determined that Recommendation 2.3 was not applicable to the North Anna 3 COL because the plant is not yet constructed. The staff also determined that Recommendation 5.1 is not applicable because it applies to boiling-water reactor plant designs with Mark I and Mark II containments, which the Economic Simplified Boiling Water Reactor (ESBWR) does not have.

Recommendations 4.1 and 8 did not need to be considered further because SECY-11-0137 and the associated SRM direct that regulatory actions associated with these recommendations should be initiated through rulemaking.

In SECY-12-0025, the staff stated that all COL applicants would be asked to provide the information addressed in the orders and the requests for information through the review process. Accordingly, for the North Anna 3 COL application, the staff issued several requests for additional information (RAIs) related to the implementation of Fukushima NTTF recommendations pertaining to mitigation strategies for beyond-design-basis external events; SFP instrumentation; and EP staffing and communications based on Recommendations 4.2, 7.1, and 9.3, as modified by SRM-SECY-12-0025. The following sections of this chapter present the staff's safety evaluation related to these areas.

## 20.1 Recommendation 4.2, Mitigation Strategies for Beyond-Design-Basis External Events

In a December 18, 2013, letter (ADAMS Accession No. ML14013A113), the North Anna 3 COL applicant provided the results of its review of RAIs, including RAIs related to the mitigating strategies for beyond-design-basis external events, submitted by the Fermi 3 reference COL (RCOLA) applicant. The North Anna 3 COL applicant indicated that the Fermi 3 responses to RAIs applicable to mitigating strategies were incorporated into the North Anna 3 COL application (COLA), or the North Anna 3 COLA meets the intent of those Fermi 3 RAI responses.

In a January 23, 2015, letter (ADAMS Accession No. ML15028A185) North Anna 3 submitted COLA markups to align with the Fermi 3 October 2014 COLA submissions, (ADAMS Accession No. ML14295A354 and ML14308A337). These COLA markups for North Anna 3 in FSAR Section 1.5.1.1.1 are consistent with the standard COL information contained in the FERMI 3 RCOLA.

The staff completed the review and finds the evaluation of the Fermi 3 COL standard content directly applicable to the North Anna 3 COL application. This report identifies the standard content material with italicized, double-indented formatting.

The staff reviewed the information in the North Anna 3 COL FSAR as follows:

### 20.1.1 Introduction

#### *20.2.1 Introduction*

*SECY-12-0025 states that the staff will request all COL applicants to provide the information addressed in the orders (EA-12-049, EA-12-050, and EA-12-051) through the review process. For mitigation strategies for beyond-design-basis external events, SECY-12-0025 outlines a three-phase approach. The initial phase involves the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool cooling (SFPC) without*

*alternating current power. The transition phase involves providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involves obtaining sufficient offsite resources to sustain those functions indefinitely.*

*The Japan Lesson-Learned Project Directorate (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," (ADAMS Accession No. ML12229A174) endorses with clarification the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 12–06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ADAMS Accession No. ML12242A378) and provides an acceptable approach for satisfying the applicable requirements.*

*Application of JLD-ISG-2012-01 to new reactors, such as Fermi 3, requires appropriate consideration of the approaches to nuclear safety inherent in the specific designs. The Fermi 3 nuclear power plant references the Economic Simplified Boiling-Water Reactor (ESBWR) standard design that utilizes passive design features that provide core cooling, containment, and SFPC capabilities for 72 hours without relying on alternating current (ac) power. The ESBWR design also includes additional installed ancillary equipment that could extend the time period from 72 hours to 7 days to maintain safety functions using available onsite resources.*

## 20.1.2 Summary of Application

### *20.2.2 Summary of Application*

*The applicant addresses mitigation strategies in Section 1.5.1.1.1, "Recommendation 4.2, Mitigating Strategies for Beyond-Design-Basis External Events" of the application. The NRC issued RAI Letter Number 78 (RAI 01.05-3 and RAI 01.05-4) dated July 3, 2012 (ADAMS Accession No. ML121850099); and RAI Letter Number 84 (RAI 01.05-5 and RAI 01.05-6) dated March 19, 2013 (ADAMS Accession No. ML13078A436). The NRC requested the applicant to address the three-phase approach for mitigating beyond-design-basis external events and the mitigating strategies for ensuring that core cooling, containment, and SFPC capabilities function indefinitely. In letters responding to RAI Letter 84 dated April 18, 2013 (ADAMS Accession No. ML13109A426); July 9, 2013 (ADAMS Accession No. ML13192A301); and February 28, 2014 (ADAMS Accession No. ML14064A284), the applicant described the three-phase mitigation strategies for beyond-design-basis external events. The applicant responded to RAI Letter Number 78 in a letter dated August 24, 2012 (ADAMS Accession No. ML12240A184); and in subsequent supplemental response letters dated January 25, 2013 (ADAMS Accession No. ML13028A402); and February 19, 2013 (ADAMS Accession No. ML13051A657). In the response to the RAIs, the applicant proposed adding the following license condition related to mitigation strategies for beyond-design-basis external events:*

> *At least 180 days before the date scheduled for initial fuel load as set forth in the notification submitted in accordance with 10 CFR § 52.103(a), DTE Electric Company shall use the guidance*

*contained in 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 and the information presented in Fermi FSAR Section 01.05 to complete the development of strategies and guidance for maintaining and, if necessary restoring core cooling, containment, and SFPC capabilities beginning 72 hours after loss of all normal and emergency ac power sources, including any alternate ac source under 10 CFR 50.63. These strategies must be capable of:*

- *Mitigating a simultaneous loss of all ac power sources, both from the onsite and offsite power systems, and loss of normal access to normal heat sink,*

- *Maintaining core cooling, containment, and SFPC capabilities for Fermi Unit 3 during and after such an event affecting both Fermi Unit 2 and 3, and*

- *Being implemented in all plant modes.*

*Before initial fuel load, DTE Electric Company shall fully implement the strategies and guidance required in this license condition, including procedures, training, and acquisition, staging or installation of equipment and consumables relied upon in the strategies.*

*The RAI response also included a proposed revision to the COL application Part 10, Section 3.8.2, "Mitigation Strategies for Beyond-Design-Basis External Events."*

In the response to the Fermi COL RAIs as reflected in the Fermi RCOL, the applicant added the following license condition related to mitigation strategies for beyond-design-basis external events in Revision 7 of the North Anna COLA Part 10, Section 3.8.2, Mitigation Strategies for Beyond-Design-Basis External Events:

At least 180 days before the date scheduled for initial fuel load as set forth in the notification submitted in accordance with 10 CFR 52.103(a), the licensee shall use the guidance contained in JLD-Interim Staff Guidance (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 and the information presented in FSAR Section 1.5 to complete the development of strategies and guidance to maintain and, if necessary, restore core cooling, containment, and spent fuel pool cooling capabilities beginning 72 hours after loss of all normal and emergency AC power sources, including any alternate AC source under 10 CFR 50.63. These strategies must be capable of:

- Mitigating a simultaneous loss of all AC power sources, both from the on-site and off-site power systems, and loss of normal access to the normal heat sink,

- Maintaining core cooling, containment, and spent fuel pool cooling capabilities for NA3 during and after such an event affecting all units on site, and

- Being implemented in all plant Modes.

Before initial fuel load, the licensee shall fully implement the strategies and guidance required in this license condition, including procedures, training, and acquisition, staging or installing of equipment and consumables relied upon in the strategies.

### 20.1.3 Regulatory Basis

#### *20.2.3 Regulatory Basis*

*The requirements and guidance for mitigation strategies for beyond-design-basis external events are established or described in the following:*

- *Atomic Energy Act of 1954, as amended (the Act), Section 161, authorizes the Commission to regulate the possession and utilization of special nuclear material in a manner that is protective of public health and in accordance with the common defense and security.*

- *10 CFR 52.97(a)(1) which authorizes the Commission to issue a COL if it finds, among other things, that issuance of the license will not be inimical to the health and safety of the public. This regulation applies here because the Commission found in Order EA-12-049 that it is necessary for power reactor licensees to develop, implement and maintain guidance and strategies to restore or maintain core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event in order to ensure adequate protection of the public health and safety.*

- *SRM-SECY-12-0025, "Staff Requirements – SECY-12-0025 – Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," dated March 9, 2012, approves the issuance of orders for beyond-design-basis external events, as necessary, for ensuring the continued adequate protection under the 10 CFR 50.109(a)(4)(ii) exception to the Backfit Rule.*

- *Order 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. Although Order EA-12-049 does not apply to Fermi 3, the staff has followed the current NRC and industry guidance for mitigation strategies in evaluating the equipment used as part of the FLEX mitigation strategy for Fermi 3.*

- *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," issued August 29, 2012, endorses NEI 12–06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (issued August 21, 2012), with exceptions/clarifications.*

## 20.1.4 Technical Evaluation

### *20.2.4 Technical Evaluation*

*The NRC issued Order EA-12-049 on March 12, 2012, which required operating reactor licensees and construction permit holders to deploy strategies that will enhance their ability to cope with conditions resulting from beyond-design-basis external events. Attachment 2 to Order EA-12-049 specifies the use of a three-phase approach for mitigating these events. The initial phase involves the use of installed equipment and resources to maintain or restore core cooling, containment and SFPC capabilities. The transition phase involves providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involves obtaining sufficient offsite resources to sustain those functions indefinitely. Application of the three-phase approach to new reactors, such as Fermi 3, requires appropriate consideration of the approaches to nuclear safety inherent in the specific designs.*

*In RAI 01.05-5, the staff requested the applicant to address how the initial and transition phase mitigation will be accomplished in the event of an extended loss of ac power (ELAP) event at Fermi 3. RAI 01.05-3 requested the applicant to address the final phase mitigation describing the strategies for maintaining and restoring core cooling, containment and SFPC capabilities with use of offsite resources. The staff also requested the applicant to address the ability to implement the strategies in all modes.*

*<u>Initial and Transition Phase Mitigation – Core Cooling and Containment Function</u>*

*In the response to RAI 01.05-5 dated April 18, 2013 (ADAMS Accession No. ML13109A426), the applicant provided information on the mitigating strategies that would be used to cope with an ELAP resulting from a beyond-design-basis external event. For this evaluation, the applicant assumed that the plant would be in a station blackout (SBO), which assumes a loss of all offsite power sources with a concurrent loss of the onsite standby diesel generators.*

*The applicant's response indicated that, for the ESBWR, the underlying strategies for coping with an extended loss of ac power events involve a three-phase approach; and that the passive safety features of the ESBWR and the installed ancillary equipment provide a significant coping period.*

*In regard to the initial phase mitigation, the applicant's response to RAI 1.05-5 states the following:*

> *Section 15.5.5 and Section 19A.2.2 of the ESBWR Design Control Document (DCD), which are incorporated by reference into the Fermi 3 FSAR, provide a performance evaluation for station blackout and show conformance to the requirements of 10 CFR 50.63 as it relates to maintaining core cooling, inventory control, and containment heat removal.*

> *The analysis in DCD Tier 2, Section 15.5.5 demonstrates that reactor water level is maintained above the top of the active fuel by operation of the ICS [isolation condenser system], a safety-related system. Because the ICS removes the reactor decay heat to the IC/PCCS [passive containment cooling system] pools that are outside the containment, the containment and suppression pool pressures and temperatures are maintained within the design limits. Therefore the integrity of the containment is maintained. As described in DCD, Section 15.2.2.9, during refueling mode, GDCS [gravity-driven cooling system] is available to ensure extended core cooling and inventory control for at least 72 hours.*

*The applicant indicated that the design basis for the ESBWR standard plant includes passive features that provide core, containment, and SFPC capabilities for 72 hours, with no reliance on ac power. Section 19A.2.2 of the ESBWR DCD states that "the ESBWR is designed such that no operator actions or AC power are required for a station blackout event, for 72 hours," and the ESBWR is designed to successfully mitigate an SBO event to meet the requirements of 10 CFR 50.63, "Loss of all alternating current," using safety-related SSCs. This 72-hour mitigation capability addresses the initial phase mitigation for ESBWR plants such as Fermi 3, and this mitigation capability provides adequate time to transition to final phase mitigation, without necessarily relying upon a transition phase. This is because the transition phase is defined as the time necessary for resources to be brought from offsite and 72 hours is a sufficiently long time period. Nevertheless, the ESBWR design includes installed ancillary equipment that could potentially extend the time period for transition from the initial phase mitigation to final phase mitigation to 7 days.*

*10 CFR 50.63(a)(2) includes a provision that is the premise for the acceptance of an SBO for core cooling and the containment function. The provision requires the following:*

> *The reactor core and associated coolant, control, and protection systems, including station batteries and any other necessary support systems, must provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity is maintained in the event of an SBO for the specified duration. The capability for coping with an SBO of specified duration shall be determined by an appropriate coping analysis.*

*ESBWR DCD, Tier 2, Section 15.5.5 contains the results of the DCD applicant's performance evaluation for an SBO showing conformance to the requirements of 10 CFR 50.63.*

*NRC staff reviewed ESBWR DCD, Tier 2, Section 15.5.5, as part of the ESBWR DCD review. In Subsection 15.5.5.4 of the ESBWR Final Safety Evaluation Report SER (FSER) in NUREG–1966, "Final Safety Evaluation Report Related to the Certification of the Economic Simplified Boiling-Water Reactor," the staff concluded that*

> *The ESBWR reactor core and associated coolant, control, and protection systems, including station batteries and other*

*necessary support systems, provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity in the event of an SBO for 72 hours. The applicant conducted an appropriate coping analysis to demonstrate the capability for coping with an SBO with a 72-hour duration, and hence, the acceptance criteria are satisfied.*

*Fulfilling the requirements for an SBO, per 10 CFR 50.63, but without reliance on an alternate ac source, assures adequate core and containment cooling of the plant for operating modes ranging from normal power operation (Mode 1) to safe shutdown (Mode 4). Adequate cooling must also be provided when the plant is in cold shutdown (Mode 5) and refueling (Mode 6).*

*In Mode 5, when insufficient steam is available to drive the ICS, the GDCS can be used to perform the core cooling function. In Mode 6, the only core cooling systems available during the ELAP event are the GDCS and the suppression pool. In ESBWR FSER Section 16.2.8, the staff's discussion of RAI 16.2-37 states that General Electric-Hitachi performed an analysis to show that the water above the core will be sufficient to keep the core covered and to maintain an adequate level of shielding. Based on the results of this analysis, the staff concludes that in Mode 6 with the reactor cavity flooded up, a sufficient water inventory would exist for 72 hours to passively provide decay heat removal and to protect the fuel. DCD Tier 2, Subsection 19A.3.1.1 states that during shutdown conditions, either the GDCS or the flooded-up refueling volume is sufficient to ensure core cooling. Once activated, neither power nor controls are necessary to maintain these functions for 72 hours. The staff therefore concludes that the strategies adequately address that for an ELAP in Modes 5 and 6, core cooling, has been adequately addressed because sufficient water either from the GDCS pools and the suppression pool or from the flooded-up refueling volume will be available, and is sufficient to ensure core cooling for 72-hours.*

*For the transition phase, NRC order EA-12-049 allows use of portable, onsite equipment and consumables to maintain or restore core cooling, containment, and SFPC functions until they can be accomplished with resources brought from offsite (e.g., on Page 4 of the order). As discussed above, the initial phase mitigation of 72 hours provides sufficient time for resources to be brought from offsite. As such, reliance on a transition phase is not necessary for Fermi 3.*

*In the response to RAI 01.05-5 the applicant also discusses a coping strategy to extend the cooling capability beyond 72 hours and for up to 7 days. In particular, the applicant states that following the 72-hour passive system coping time, support is required to continue passive system cooling and makeup to the IC/PCCS pools and spent fuel storage pools. This support could be provided by installed plant ancillary equipment as discussed in ESBWR DCD Tier 2, Section 19A.3.1, "Actions Required Beyond 72 Hours." Section 19A.3.1 describes the post 72- hour actions and the use of installed regulatory treatment of non-safety systems (RTNSS) equipment for core, containment, and spent fuel cooling safety functions. NRC's evaluation of the ESBWR RTNSS program is provided in Chapter 22, "Regulatory Treatment of Nonsafety Systems," of the ESBWR FSER, and includes an evaluation of the augmented design standards*

*for RTNSS equipment to withstand external events such as earthquakes, hurricanes, tornadoes, and floods.*

*Initial and Transition Phase Mitigation – Spent Fuel Pool Cooling*

*The applicant addressed mitigation strategies for SFPC in the response to the first question in RAI 01.05-5. That response addressed the initial phase mitigation with the following statement:*

> *As described in the ESBWR DCD, Section 9.1.3.2, which is incorporated by reference into the Fermi 3 FSAR, during a loss of spent fuel pool and buffer pool cooling, cooling of the spent fuel pool and buffer pool is accomplished by allowing the water in the pools to heat and boil. There is sufficient water in each pool to ensure adequate fuel cooling for 72 hours.*

*The applicant addressed the transition phase mitigation by stating the following:*

> *DCD Section 19A.3.1, which is incorporated by reference into the Fermi 3 FSAR, describes the post 72-hr actions and credits use of installed regulatory treatment of non-safety systems (RTNSS) equipment.*
>
> *After 72 hours, nonsafety-related systems are used to replenish the passive systems to perform these safety functions directly. As described in Section 9.1.3, and 19A.3.1, after 72 hours, makeup water can be provided through installed safety-related connection to the Fire Protection System (FPS) or spent fuel storage pool. Between 72 hours and seven days, the resources for performing theses safety functions are available onsite.*

*The staff reviewed the information regarding the ESBWR SFPC as part of the review of the ESBWR DCD, which is documented in Section 9.1.3 of the ESBWR DCD FSER. The staff concludes that for both the buffer pool and the SFP, the water levels and free volumes are sufficient to ensure that for 72 hours following a loss of forced cooling without active cooling water makeup, the water levels in the pools will remain above the top of active fuel (TAF) which provides sufficient time for initial phase mitigation and for resources to be bought from offsite.*

*Similar to that for the core cooling and containment functions discussed above, installed plant ancillary equipment could potentially extend this time period to 7 days.*

*Final Phase Mitigation*

*To support core cooling, containment, and spent fuel pool cooling post 72-hours, the ESBWR design has installed ancillary equipment with sufficient capacity. This equipment is designed to augmented design standards for external events, such as earthquakes, hurricanes, tornadoes, and floods, as documented in the ESBWR DCD Section 19A.3.1 and the NRC's ESBWR FSER Section 22.5.6. The ancillary equipment is capable of delivering at least minimum water quantities, at the minimum makeup rates, needed to support heat removal from*

*the core and spent fuel pool. In its response to RAI 01.05-5 the applicant describes the use of this equipment to allow the extension of the initial mitigation phase from 72 hours up to 7 days.*

*In its response to RAI 01.05-5, the applicant indicated that the ESBWR has safety-related connections through which makeup water can be supplied. These connections allow portable equipment brought in from offsite to be used to support continued operation of the ESBWR passive systems, as an alternative to the plant installed ancillary equipment if it is not available or operable. These connections would be used during the final mitigation phase.*

The staff reviewed the North Anna application, RAI responses from FERMI, and the January 23, 2015, letter regarding alignment with the RCOLA, and determined that the supplemental Information is consistent with the FERMI RCOL information. Therefore, the North Anna 3 supplemental information that addresses mitigating strategies for beyond-design-basis external events is acceptable. The staff provided a license condition with the same provisions as the comparable license condition for Fermi that reflects the same mitigating strategies. This license condition ensures that the applicant will have developed the overall plan of mitigating strategies for North Anna 3 at least 1 year before completion of the final inspections, tests, analyses, and acceptance criteria (ITAAC).

**Confirmation that the changes described in the January 23, 2015, letter regarding RCOLA alignment, as listed in** the North Anna 3 **FSAR Section 1.5.1.1, are incorporated in the next FSAR revision for North Anna 3 is being tracked as [Confirmatory Item 20.1-1].**

### 20.1.5 Post Combined License Activities

The ESBWR design, incorporated by reference into the North Anna 3 COL, includes passive design features that provide core cooling, containment, and SFPC for 72 hours without reliance on ac power. These features do not rely on access to any external water sources. The ESBWR design also includes onsite equipment to replenish water sources and charge batteries.

Connections are provided for using generators and pumping equipment that can be brought from offsite.

For the reasons discussed in Section 20.1.4 of this report, (Fermi Section 20.2.4), Technical Evaluation, the staff will include a license condition related to the mitigating strategies program:

**License Condition (20.1-1)**: Mitigation Strategies for Beyond-Design-Basis External Events

a. The Licensee shall complete development of an overall integrated plan of strategies to mitigate a beyond-design-basis external event at least 1 year before the completion of the last ITAAC on the schedule required by 10 CFR 52.99(a).

b. The overall integrated plan required by this condition must include guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities. The overall integrated plan must include provisions to address all accident mitigation procedures and guidelines (including the guidance and strategies required by this section, emergency operating procedures, abnormal operating procedures, and extensive damage management guidelines).

c. The guidance strategies required by this condition must be capable of (i) mitigating a simultaneous loss of all ac power and loss of normal access to the normal heat sink and (ii) providing for adequate capacity to perform the functions upon which the guidance and strategies rely for all units on the North Anna site and in all modes at each unit on the site.

d. Before initial fuel load, Dominion shall fully implement the guidance and strategies required by this condition, including:

1. Procedures;

2. Training;

3. Acquisition, staging, or installation of equipment and consumables relied upon in the strategies; and

4. Configuration controls and provisions for maintenance and testing (including testing procedures and frequencies for preventative maintenance) of the equipment upon which the strategies and guidance required by this condition rely.

e The training required by condition d.2 must use a Systematic Approach to Training (SAT) to evaluate training for station personnel, and must be based upon plant equipment and procedures upon which the guidance and strategies required by this condition rely.

f The Licensee shall maintain the guidance and strategies described in the application upon issuance of the license, and the integrated plan of strategies upon its completion as required by condition a. The Licensee may change the strategies and guidelines required by this condition provided that the Licensee evaluates each such change to ensure that the provisions of conditions b and c continue to be satisfied and the Licensee documents the evaluation in an auditable form.

### 20.1.6 Conclusion

The staff reviewed the applicant's proposed mitigating strategies discussed in FSAR Section 1.5.1.1.1 of the application for ensuring that core cooling, containment, and SFPC capabilities function indefinitely without ac power, in the event of a beyond-design-basis external event resulting in an extended loss of ac power. The staff finds that the approach for mitigating beyond-design-basis external events to be used at North Anna 3 is consistent with NRC Order EA-12-049. The staff also finds that the ESBWR passive design features provide for initial phase mitigation because core cooling, containment function and SFPC are achieved without ac power or operator action for the first 72 hours. In addition, through the implementation of the final phase mitigation using offsite FLEX equipment, core cooling, containment function and SFPC can be extended indefinitely.

## 20.2 Recommendation 7.1, Reliable Spent Fuel Pool Instrumentation

In North Anna 3 FSAR Revision 7, the applicant incorporated Supplemental Information Consistent with RCOLA (CWR Sup) 1.5-1, which addresses Recommendation 7.1, Reliable Spent Fuel Pool Instrumentation.

Dominion, the North Anna 3 applicant, included in their application the same supplemental information submitted by Fermi 3 as the reference COLA or RCOLA.

The CWR Sup 1.5-1 includes FSAR Tier 2, Subsection 1.5.1.1.2, Recommendation 7.1, "Reliable Spent Fuel Pool Instrumentation," which describes the design features for spent fuel pool instrumentation as incorporated by reference in Revision 10 of the ESBWR Design Control Document (DCD).

The staff completed the review and finds the evaluation of the Fermi 3 COL standard content directly applicable to the North Anna 3 COL application. This SER identifies the standard content material with italicized, double-indented formatting.

The staff reviewed the information in the North Anna 3 COL FSAR as follows:

## 20.2.1 Introduction

***20.3.1 Introduction***

*During the events in Fukushima, responders were without reliable instrumentation to determine the water level in the SFP. This raised concerns that the pool may have boiled dry, resulting in fuel damage, which highlighted the need for reliable SFP instrumentation. The current SFP water level instrumentation at U.S. nuclear power plants is typically a narrow range and, therefore, it is only capable of monitoring normal and slightly off-normal conditions. Although the likelihood of a catastrophic event affecting nuclear power plants and the associated SFPs in the United States remains very low, beyond-design-basis external events could challenge the ability of existing SFP instrumentation to provide emergency responders with reliable information on the condition of the SFPs. Reliable and available indicators are essential to ensure that plant personnel can effectively prioritize emergency actions.*

*SECY-12-0025 (ADAMS Accession No. ML12039A103) states that for DC and COL applications submitted under 10 CFR Part 52 and in active staff review, the staff plans to assure that the Commission-approved Fukushima actions are addressed before certification or licensing. The staff will request all COL applicants to provide the information addressed in the orders (EA-12-049, EA-12-050, and EA-12-051) and the request for information letters described in this SECY paper, as applicable, through the review process.*

*JLD-ISG-2012-03, Revision 0, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," (ADAMS Accession No. ML12221A339) endorses with exceptions and clarifications the methodologies described in the industry guidance document NEI 12–02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (ADAMS Accession No. ML122400399) and provides an acceptable approach for satisfying the applicable requirements.*

## 20.2.2 Summary of Application

***20.3.2 Summary of Application***

*The applicant addresses reliable spent fuel pool instrumentation in Section 1.5.1.1.2, "Recommendation 7.1, Reliable Spent Fuel Pool Instrumentation" of the application. The NRC issued RAI Letter Number 78 (RAI 01.05-4) dated July 3, 2012 (ADAMS Accession No. ML121850099), and RAI Letter 84 (RAI 01.05-6) dated March 19, 2013 (ADAMS Accession No. ML13078A436). In these RAI letters, the staff requested the applicant to address the provisions for monitoring key SFP parameters as described in Order EA-12-051 dated March 12, 2012 (ADAMS Accession No. ML12054A679), which are not part of the ESBWR DCD, and to include any proposals for changes to the current application. The applicant responded to these RAIs in letters dated August 24, 2012 (ADAMS Accession No. ML12240A184); January 25, February 19, April 18, July 9 and October 15, 2013 (ADAMS Accession Nos. ML13028A402, ML13051A057, ML13109A426, ML13192A301, and ML13311A101 respectively). As part of the RAI responses, the applicant described the SFP and the buffer pool level instrument design features that ensure a reliable indication of the water level in the SFP and buffer pools. The applicant proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2, "Recommendation 7.1, Reliable Spent Fuel Pool Instrumentation"; and a license condition in Part 10, Revision 4, Section 3.8.3, "Reliable Spent Fuel Pool/Buffer Pool Level Instrumentation," which verifies that the programmatic aspects of the order are completed and implemented prior to initial fuel loading.*

## 20.2.3 Regulatory Basis

***20.3.3 Regulatory Basis***

*The requirements and guidance for reliable SFP instrumentation are established or described in the following:*

- *Atomic Energy Act of 1954, as amended, (the Act), Section 161, authorizes the Commission to regulate the possession and utilization of special nuclear material in a manner that is protective of public health and in accordance with common defense and security.*

- *10 CFR 52.97(a)(1) which authorizes the Commission to issue a COL if it finds, among other things, that issuance of the license will not be inimical to the health and safety of the public. This regulation applies here because the Commission found in Order EA-12-049 that it is necessary for power reactor licensees to develop, implement and maintain guidance and strategies to restore or maintain core cooling, containment, and SFP cooling capabilities in the event of a beyond-design-basis external event in order to ensure adequate protection of the public health and safety.*

- *SRM-SECY-12-0025, "Staff Requirements – SECY-12-0025 – Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," dated March 9, 2012, approves the issuance of orders for reliable SFP instrumentation under an administrative exemption to the Backfit Rule.*

- *Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012.*

- *JLD-ISG-2012-03, Revision 0, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," issued August 29, 2012, endorses NEI 12–02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," with exceptions and clarifications.*

## 20.2.4 Technical Evaluation

***20.3.4 Technical Evaluation***

*As a result of SECY-12-0025, the staff issued RAI Letter 78 (RAI 01.05-4) requesting additional information in relation to the lessons learned from the Great Tohoku Earthquake and Tsunami. In RAI 01.05-4, the staff requested the applicant to address the provisions for monitoring key SFP parameters as described in the order dated March 12, 2012, which are not part of the ESBWR design—including any proposals for changes to the current application.*

*In Commission Order EA-12-051, the NRC describes the key parameters used to determine that a level instrument is considered reliable. NEI 12–02, Revision 1 provides an acceptable approach for satisfying the applicable requirements. The staff evaluated the applicant's response to RAI 01.05-4 and determined that additional information was needed. The staff issued RAI 01.05-6 requesting the applicant to provide further clarification on the level instrument design criteria and programmatic aspects. In the applicant's responses, they suggested the creation of a new license condition in Section 3.8.3 to Part 10 of the COL application; and FSAR changes to Tier 2, Subsection 1.5.1.1.2 that provided further design information and discussed how the SFP level instrument is designed to be reliable according to the guidance in NEI 12–02. The applicant's response and the proposed FSAR changes take credit for design information already described in several sections of the ESBWR DCD. The staff's evaluation of the DCD sections is discussed in the ESBWR DCD FSER (NUREG-1966) and is not part of this SER.*

*<u>Instruments</u>*

*In Commission Order EA-12-051, Attachment 2, Section 1.1 states that the SFP level instrument channels shall consist of a permanent and fixed primary instrument channel and a backup instrument channel. The backup instrument channel may be fixed or portable. Portable instruments shall have capabilities that enhance the ability of trained personnel to monitor the SFP water level under conditions which restrict direct personnel access to the pool, such as partial structural damage, high radiation levels, or heat and humidity from a boiling pool.*

*The applicant's response to RAI 01.05-6 (ADAMS Accession No. ML13192A301) proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2, which references ESBWR DCD, Tier 2, Section 9.1.3 which states that the SFP and the buffer pool each have two wide-range, safety- related level transmitters that transmit signals to the main control room. These signals are used to indicate a collapsed water level and to initiate high/low-level alarms, both locally and in the main control room. ESBWR DCD, Tier 2, Subsection 7.5.5.3.1 indicates that the safety-related pool monitoring instrumentation design conforms to Institute for Electrical and*

*Electronics Engineers (IEEE) Standard (Std) IEEE Std 603–1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations."*

*The staff noted that the ESBWR DCD credits the SFP pool level instruments as operational in environmental conditions consistent with boiling down to the top of the active fuel. These conditions would result in a high temperature (100 degrees Celsius [212 degrees Fahrenheit]), high humidity, steaming environment, loss of shielding, and high radiation doses. The staff evaluated the instrument description in the RAI response and the proposed changes to the FSAR. The staff determined that crediting two permanently installed, safety-related, seismic Category I instruments is in accordance with the design features identified in Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*<u>Arrangement</u>*

*In Commission Order EA-12-051, Attachment 2, Section 1.2 states that the SFP level instrument channels shall be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the SFP. This protection may be provided by locating the safety-related instruments to maintain instrument channel separation within the SFP area, and to utilize inherent shielding from missiles provided by existing recesses and corners in the SFP structure.*

*The applicant's response to RAI 01.05-6 states that the SFP level instrument channels will be arranged in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the SFP. The applicant's response refers to ESBWR DCD, Tier 2, Subsection 7.5.5.3.2, which indicates that the SFP and the buffer pool instrumentation meets the separation criteria set forth in 10 CFR Part 50, Appendix A, GDC 24, "Separation of protection and control system." Also, ESBWR DCD, Tier 2, Section 7.5.5 indicates that the safety-related pool monitoring instrumentation is designed to satisfy the requirements of IEEE Standard 603–1991, as endorsed by RG 1.153, Revision 1, "Criteria for Safety Systems," which includes requirements for the physical separation of channels to avoid a common mode failure due to a missile. ESBWR DCD, Tier 2, Subsection 3.8.4.1.1 indicates that the reactor building, which houses the buffer pool, is a seismic Category I structure. ESBWR DCD, Tier 2, Subsection 3.8.4.1.3 describes the fuel building, which houses the SFP facilities and their supporting system and heat, ventilation, and air conditioning (HVAC) equipment, as a seismic Category I structure except for the penthouse that houses HVAC equipment. The penthouse is a seismic Category II structure. ESBWR DCD, Tier, 2 Section 3.5 describes the missile assessment for the ESBWR. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 reference the ESBWR DCD sections mentioned above.*

*The staff evaluated the ESBWR DCD and confirmed that the DCD provides design features to protect safety-related components against missiles. The staff evaluated the instrument location description in the applicant's RAI response and the proposed changes to the FSAR. The staff determined that crediting the channel separation is an acceptable approach that provides reasonable protection against missiles. Therefore, the staff concludes that these features are in conformance with Commission Order EA-12-051 and the guidance in JLD- ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*Mounting*

*In Commission Order EA-12-051, Attachment 2, Section 1.3 states that the installed instrument channel equipment within the SFP shall be mounted to retain its design configuration during and following the maximum seismic ground motion considered in the design of the SFP structure.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Subsection 7.5.5.3.3 indicates that the SFP and the buffer pool instrumentation are seismically qualified and this includes the equipment mounting configuration. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 reference the ESBWR DCD section mentioned above.*

*The staff evaluated the RAI response and the proposed FSAR changes. The staff determined that designing the instrument and its mounting to be seismically qualified will ensure that both will retain their design functionality following a seismic event. The staff concludes that these features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*Qualification*

*In Commission Order EA-12-051, Attachment 2, Section 1.4 states that primary and backup instrument channels shall be reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturation conditions for an extended period.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Section 9.1.3 indicates that both the SFP and the buffer pool each have two wide-range, safety-related level transmitters. ESBWR DCD, Tier 2, Subsection 7.5.5.3.3 indicates that the pool instrumentation is subject to environmental qualification and post-accident monitoring criteria. ESBWR DCD, Tier 2, Subsections 7.5.5.3.1 and 7.5.5.3.2 indicate that the pool instrumentation system conforms to quality standards for safety-related equipment. The ESBWR DCD credits the SFP pool level instruments as operational in environmental*

*conditions consistent with boiling down to the top of the active fuel. These conditions would result in a high temperature (100 degrees Celsius [212 degrees Fahrenheit]), high humidity, steaming environment, loss of shielding, and high radiation doses. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 reference the ESBWR DCD sections mentioned above.*

*The staff reviewed the applicant's response and the proposed FSAR changes. The staff determined that the instrumentation will be designed to quality standards for safety-related equipment and to remain operational while exposed to the environmental conditions following an accident event. The staff finds that these features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1.*

*Independence*

*In Commission Order EA-12-051, Attachment 2, Section 1.5 states that the primary instrument channel shall be independent of the backup instrument channel.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Subsection 7.5.5.3.2 states that the instrument channels are physically and electronically independent, in accordance with GDC 24.*

*The staff reviewed the applicant's response and concludes that this feature is in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved.*

*Power Sources*

*In Commission Order EA-12-051, Attachment 2, Section 1.6 states that the permanently installed instrumentation channels shall each be powered by a separate power supply. Permanently installed and portable instrumentation channels shall provide for power connections from sources independent of the plant ac and direct current (dc) power distribution systems, such as portable generators or replaceable batteries.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Subsection 7.5.5.3.2 states that the instrument channels are physically and electronically independent, in accordance with GDC 24. The safety-related primary and backup instrumentation channels are controlled by the safety-related distributed control and information system (Q-DCIS). ESBWR DCD, Tier 2, Section 7.1.2 describes the divisional Q-DCIS components as powered by redundant, independent, and separated uninterruptible power supplies (UPSs) dedicated to their division with a battery backup (per division) for at least 72 hours. After 72 hours, the Q-DCIS can operate continuously on power from the ancillary diesel generators until offsite power is restored.*

*Commission Order EA-12-051 specifies that all permanently installed instrumentation channels are to be provided with power connections from*

*sources independent of the plant ac and dc power distribution systems. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 state that the instrument channels will be provided with an alternate connection to sources independent of the plant ac and dc power distribution systems, such as portable generators or replaceable batteries, thus allowing for quick and accessible connections of sources. The alternate power source and replaceable batteries used for instrument channel power will have sufficient capacity to maintain the level indication function until offsite resource availability is reasonably assured.*

*The staff reviewed the applicant's response and the proposed changes to FSAR Subsection 1.5.1.1.2. The staff noted that the level instrument channels are powered by separated safety-related sources capable of powering the instruments for up to 72 hours. After 72 hours, the instrument channel can be powered by the ancillary diesel generators. In the event that these power sources are not available, the applicant's proposed changes to FSAR Subsection 1.5.1.1.2 state that these instrument channels will have the capability of being quickly connected to an alternate power source independent from the plant ac and dc power distribution systems. The staff evaluated the applicant's RAI response and the proposed FSAR changes. The staff concludes that these design features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*<u>Accuracy</u>*

*In Commission Order EA-12-051, Attachment 2, Section 1.7 states that the instrument shall maintain its designed accuracy following a power interruption or a change in the power source without recalibration.*

*The applicant's response to RAI 01.05-6 and the proposed changes to FSAR Subsection 1.5.1.1.2 state that the instrument channels will be capable of maintaining the original accuracy following a power interruption or a change in power source without recalibration. The revised FSAR subsection also references ESBWR DCD, Tier 1, Table 2.6.2-2, which verifies that the instruments meet the minimum instrument accuracy of ±300 millimeters (mm) (±1 ft).*

*The staff reviewed the applicant's system description and the proposed FSAR changes. The staff concludes that these design features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*Testing*

*In Commission Order EA-12-05, Attachment 2, Section 1.8 states that the instrument channel design shall provide for routine testing and calibration.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Subsection 9.1.3.4 indicates that the fuel and auxiliary pools cooling system (FAPCS) is designed to permit surveillance testing and in-service inspection of the safety-related components and the components required to perform the post-accident recovery functions in accordance with GDC 45, "Inspection of cooling water system," and American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC) Section XI. In addition, Fermi 3 COL Application Part 4, "Technical Specifications," Section 3.7.5, includes periodic surveillance of the fuel pools water level during the movement of irradiated fuel assemblies in the associated fuel storage pool or when irradiated fuel assemblies are stored in the associated fuel storage pool. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 reference the ESBWR DCD and the technical specifications sections mentioned above.*

*The staff reviewed the applicant's system description, the ESBWR design, and the proposed FSAR changes. The staff concludes that these design features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*Display*

*In Commission Order EA-12-051, Attachment 2, Section 1.9 states that trained personnel shall be able to monitor the SFP water level from the control room, the alternate shutdown panel, or other appropriate and accessible locations. The display shall provide on-demand or continuous indication of the SFP water level.*

*The applicant's response to RAI 01.05-6 noted that ESBWR DCD, Tier 2, Section 9.1.3 states that both the SFP and the buffer pool each have two wide-range, safety-related, level transmitters that transmit signals to the main control room. These signals are used for on demand or continuous collapsed water level indications and to initiate high/low-level alarms, both locally and in the main control room. The proposed changes to FSAR Tier 2, Subsection 1.5.1.1.2 reference the ESBWR DCD section mentioned above.*

*The staff reviewed the applicant's system description and the proposed FSAR changes. The staff concludes that these design features are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the proposed FSAR changes are in the next FSAR revision was being tracked as part of Confirmatory Item 20.3-1. The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

*Programs*

*In Commission Order EA-12-051, Attachment 2, Section 2 states that the SFP instrumentation shall be maintained to be available and reliable through the appropriate development and implementation of a training program. Personnel shall be trained in the use and maintenance (including test and calibration), and in the procedures for providing alternate power to the level instrument channels.*

*The applicant's response to RAI 01.05-6 stated that FSAR Section 13.2 includes a description of the training programs for operators and emergency response actions. FSAR Section 13.5 describes the development of procedures under the Plant Operating Procedures Development Plan that will address the procedures, testing, and calibration requirements of the installed instrument channels as identified in the Commission's order. In addition, the applicant has proposed new license condition in Section 3.8.3 to Part 10 of the COL application requiring that prior to fuel loading, the SFP and the buffer pool instrumentation shall be maintained to be available and reliable through the appropriate development and implementation of a training program. Personnel shall be trained in the use and the provision of alternate power to the safety-related level instrument channels.*

*The staff evaluated the applicant's RAI response and the proposed license condition. The staff finds that the program descriptions provided are in conformance with Commission Order EA-12-051 and the guidance in JLD-ISG-2012-03. Therefore, this part of RAI 01.05-6 is resolved. Confirmation that the license condition changes are in the next revision of the COL application, Part 10, Section 3.8.3, was being tracked as part of Confirmatory Item 20.3-1.*

*The staff confirmed that these changes have been incorporated into the Fermi 3 COL FSAR. Therefore, this part of Confirmatory Item 20.3-1 is closed.*

The staff reviewed the North Anna incorporated supplemental Information and finds that it is consistent with the FERMI RCOL information in Section 1.5.1.1.2 of the FERMI RCOL final safety evaluation report (FSER). Therefore, the North Anna 3 supplemental information that addresses reliable spent fuel pool level instrumentation is acceptable.

### 20.2.5 Post Combined License Activities

For the reasons discussed in the "Technical Evaluation" section above, and to be consistent with the RCOLA, the staff proposed to include the following license condition related to the SFP instrumentation in order to verify that the programmatic aspects of the order are completed and implemented prior to initial fuel loading.

**License Condition (20.3-1)**: Reliable Spent Fuel Pool/Buffer Pool Level Instrumentation

Prior to initial fuel load, Dominion shall address the following requirements using the guidance contained in JLD-ISG-2012-03, "Compliance with Order EA-2012-051, Reliable Spent Fuel Pool Instrumentation," Revision 0:

> The spent fuel pool/buffer pool instrumentation shall be maintained available and reliable through the development and implementation of a training program. The training program shall include provisions to ensure trained personnel can route the temporary power lines from the alternate power source to the appropriate connection points, and connect the alternate power source to the safety-related level instrument channels.

### 20.2.6 Conclusion

The staff evaluated the applicant's FSAR sections related to the SFP and Buffer Pool water level instrumentation and concluded that these instruments are designed in accordance with the guidance in JLD-ISG-2012-03. Therefore, these instruments are considered reliable, able to withstand beyond-design-basis natural phenomena, and able to monitor key SFP level parameters as described in Commission Order EA-12-051.

## 20.3 Recommendation 9.3, Emergency Preparedness

### 20.3.1 Introduction

The accident at Fukushima reinforced the need for effective emergency preparedness (EP). The objective of EP is to ensure that the capability exists for a licensee (or will exist for a COL applicant) to implement measures that mitigate the consequences of a radiological emergency and to provide for protective actions of the public. The accident at Fukushima highlighted the need to determine the staffing needed to respond to a multi-unit event. Additionally, there is a need to ensure that the communication equipment relied on has adequate power to coordinate the response to an event during an ELAP.

### 20.3.2 Summary of Application

In the North Anna 3 COLA, Part 10, the applicant proposed License Condition 3.8.1 to address Fukushima NTTF Recommendation 9.3.

### 20.3.3 Regulatory Basis

The requirements for EP for beyond-design-basis external events are established or described in the following:

- 10 CFR 50.47(b)(1) states, in part, that "each principal response organization has staff to respond and to augment its initial response on a continuous basis."
- 10 CFR 50.47(b)(2) states, in part, that "adequate staffing to provide initial facility accident response in key functional areas is maintained at all times" and that "timely augmentation of response capabilities is available."
- 10 CFR 50.47(b)(6) states that "[p]rovisions exist for prompt communications among principal response organizations to emergency personnel and to the public."

- 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," Section IV.E.P, states, in part, that adequate provisions shall be made and described for emergency facilities and equipment, including at least one onsite and one offsite communications system, and that each system shall have a backup power source.

The guidance for EP for beyond-design-basis external events is established or described in the following:

- SECY-12-0025 states, in part, that the staff will also request all COL applicants to provide information required by the orders and request for information letters described in this paper, as applicable, through the review process.

- NEI 12–01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0, May 2012 (ADAMS Accession No. ML12125A412).

- NUREG–0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Section B, "Onsite Emergency Organization," states, in part, the following:

  > Each licensee shall specify the positions or title and major tasks to be performed by the persons to be assigned to the functional areas of emergency activity. . . .These assignments shall cover the emergency functions in Table B-1 entitled, "Minimum Staffing Requirements for Nuclear Power Plant Emergencies." The minimum on-shift staffing levels shall be as indicated in Table B-1. The licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency. This capability shall be as indicated in Table B-1.

- NUREG–0696, "Functional Criteria for Emergency Response Facilities," offers guidance on how to meet the requirements of 10 CFR Part 50, Appendix E, and describes the onsite and offsite communications requirements for the licensee's emergency response facilities.

### 20.3.4 Technical Evaluation

Regarding NTTF Recommendation 9.3 (Emergency Preparedness), the NRC request for information letter of March 12, 2012, requested that all power reactor licensees and holders of construction permits (in active or deferred status) assess their current staffing levels and determine the appropriate staff to fill all necessary positions for responding to a multi-unit event during a beyond-design-basis natural event, and determine if any enhancements are appropriate. Single-unit sites should provide the requested information, as it pertains to an extended loss of all ac power and impeded access to the site.

With regard to communications, NTTF Recommendation 9.3 requests that all power reactor licensees and holders of construction permits (in active or deferred status) assess their current communications systems and equipment used during an emergency event, including consideration of any enhancements that might be appropriate for the emergency plan with respect to the communications requirements of 10 CFR 50.47, 10 CFR Part 50, Appendix E,

and NUREG-0696. In addition, the means necessary to power the new and existing communications equipment during a prolonged station blackout should be considered.

Accordingly, the staff requested that the North Anna 3 COL applicant address staffing and communications provisions to enhance emergency preparedness. The staff reviewed the applicant's submitted information and documented its evaluation and conclusions involving the staffing levels and communications in Chapter 13, Sections 13.3.4.2 and 13.3.4.6, of this North Anna 3 SER respectively.

### 20.3.5 Post Combined License Activities

Post-combined license activities consist of two staff-proposed license conditions to address NTTF Recommendation 9.3, which are provided in this SER in Chapter 13, Section 13.3.4.2.

### 20.3.6 Conclusion

The staff's conclusions regarding how the applicant addressed NTTF Recommendation 9.3 is provided in this SER in Chapter 13, Section 13.3.4.2.