UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

May 22, 2017

Mr. Richard L. Anderson, Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - INSPECTION OF THE IMPLEMENTATION OF MITIGATION STRATEGIES AND SPENT FUEL POOL INSTRUMENTATION ORDERS, AND EMERGENCY PREPAREDNESS COMMUNICATION/STAFFING/MULTI-UNIT DOSE ASSESSMENT PLANS – INSPECTION REPORT (05000313/2017008 AND 05000368/2017008)

Dear Mr. Anderson:

On May 1, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One, Units 1 and 2. On May 1, 2017, the NRC inspectors discussed the results of this inspection with Mr. T. Evans, General Manager of Plant Operations, and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

The inspection examined activities conducted under your license as they relate to the "Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051), and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," your compliance with the Commission's rules and regulations, and with the conditions of your operating license. Within these areas, the inspection involved examination of selected procedures and records, observation of activities, and interviews with station personnel.

The NRC inspectors documented two findings of very low significance (Green) in this report.

If you disagree with a cross-cutting aspect assignment or a finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555 0001; with copies to the Regional Administrator, Region IV; and the NRC resident inspector at the Arkansas Nuclear One.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public

Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Neil O'Keefe, Chief,
Project Branch E
Division of Reactor Projects

Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6

Enclosure:
Inspection Report 05000313/2017008 and
5000368/2017008
w/ Attachment: Supplemental Information

cc w/encl: Electronic Distribution

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	50-313 and 50-368
License:	DPR-51 and NPF-6
Report:	05000313/2017008 and 05000368/2017008
Licensee:	Entergy Operations, Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Highway 64 West and Highway 333 South Russellville, Arkansas
Dates:	January 23 through May 1, 2017
Inspectors:	J. Mateychick, Senior Reactor Inspector (Team Leader) T. Sullivan, Project Engineer M. Tobin, Resident Inspector E. Uribe, Project Engineer
Approved By:	Neil O'Keefe Chief, Project Branch E Division of Reactor Projects

Enclosure

SUMMARY

IR 05000313/2017008,05000368/2017008; 01/23/2017 – 05/01/2017; Arkansas Nuclear One, Units 1 and 2; Temporary Instruction 2515/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders, and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans," issued December 23, 2015.

The inspection covered a one week inspection by three inspectors from the Region IV office and one of the assigned resident inspectors. Two findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

A. NRC-Identified and Self-Revealing Findings

- Green. The team identified a finding for the failure to assure that FLEX power supply connections would be reliable following all required postulated beyond design basis external events. Specifically, the team identified that one installed cable configuration could potentially be damaged during high wind events preventing operation of the portable diesel generator required to operate plant equipment. This issue was entered into the licensee's corrective action program as Condition Report CR-ANO-C-2017-00316.

  The failure to adequately install the electrical modification for connecting the portable diesel generator was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012. A bounding evaluation was performed using the exposure time, tornado frequency, and frequency of a random failure of both emergency diesel generators. The licensee's compliance date with the order was January 12, 2016, so an exposure time of one year was used. The tornado frequency selected was for an F2 or greater tornado striking the site (5.31E-5/year). The random failure frequency of both unit's emergency diesel generators (3.15E-3/year) was selected since the emergency diesel generators are protected from damage during high wind events. This is a conservative bounding analysis because it assumes that any tornado would result in damage causing a loss of offsite power and damage the cables in terminal panel 2TB1011 on the roof. The change in core damage frequency for the finding was determined to be 1.67E-7/year. Therefore, the finding was determined to a very low risk significance.

  The finding had a cross-cutting aspect in the challenge to the unknown component of Human Performance because the licensee failed to adequately address all potential damage scenarios when developing the modification design requirements for beyond design basis external events [H.11]. (Section 4OA5.1.c(1))

- Green. The team identified a finding with three examples for the licensee failing to assure that FLEX procedures were adequate for implementation of the strategies credited in the licensee's Final Implementation Plan. This issue was entered into the licensee's corrective action program as Condition Reports CR-ANO-C-2017-00341, CR-ANO-C 2017-00344, CR-ANO-1-2017-00250, and CR-ANO-C-2017 00295.

  The failure to provide adequate procedures for responding to an extended loss of all AC power due to a flooding or high wind event was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012. A bounding evaluation was performed using the exposure time, frequency of random failure of both emergency diesel generators, and tornado frequency or flood frequency. The licensee's compliance date with the order was January 12, 2016, so an exposure time of one year was used. The random failure frequency of both unit's emergency diesel generators (3.15E-3/year) was selected since the emergency diesel generators are protected from damage during high wind and flood events. For the two examples impacted by flood events, the flood frequency selected was for a flood exceeding the site grade elevation (8.47E-5/year). The change in core damage frequency for these examples was determined to be 2.67E-7/year. For the example which would only impact the licensee's response to a high wind event, the tornado frequency selected was for an F2 or greater tornado striking the site (5.31E-5/year). The change in core damage frequency for this example was determined to be 1.67E-7/year. Therefore, the three examples of the finding were determined to of very low risk significance.

  The finding had a cross-cutting aspect in the Procedure Adherence component of Human Performance because the licensee failed to adequately perform reviews required by the licensee's procedure control program to confirm that: (1) instructions for implementing the strategies in the licensee's Final Implementation Plan were complete and appropriate; and (2) reviews for affected procedures related to other procedure revisions identified impacts on the implementing strategies and revised them appropriately [H.8]. (Section 4OA5.1.c(2))

B. Licensee-Identified Violations

None

REPORT DETAILS

4. Other Activities

4OA5 Other Activities (TI 2515/191)

The objective of Temporary Instruction (TI) 2015/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders, and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans" is to verify that licensees have adequately implemented the mitigation strategies as described in the licensee's Final Integrated Plan (ADAMS Accession No. ML16014A396), and the NRC's plant safety evaluation (ADAMS Accession No. ML16224A106), and to verify that the licensee installed reliable water-level measurement instrumentation in their spent fuel pools. The purpose of this TI is to verify the licensees have implemented Emergency Preparedness (EP) enhancements as described in their site-specific submittals and NRC safety assessments, including multi-unit dose assessment capability and enhancements to ensure that staffing is sufficient and communications can be maintained during such an event.

The inspection verifies that plans for complying with NRC Orders EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (ADAMS Accession No. ML12229A174)," and EA-12-051, "Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation (ADAMS Accession No. ML12056A044)," are in place and are being implemented by the licensee. Additionally, the inspection verifies implementation of staffing and communications information provided in response to the March 12, 2012, "Request for Information Letter and Multi-Unit Dose Assessment Information," provided per COMSECY-13-0010, "Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned," dated March 27, 2013 (ADAMS Accession No. ML12339A262).

The team discussed the plans and strategies with plant staff, reviewed documentation, and where appropriate, performed plant walkdowns to verify that the strategies could be implemented as stated in the licensee's submittals and the NRC staff-prepared safety evaluation. For most strategies, this included verification that the strategy was feasible, procedures and/or guidance had been developed, training had been provided to plant staff, and required equipment had been identified and staged. Specific details of the team's inspection activities are described in the following sections.

1. Mitigation Strategies for Beyond-Design-Basis External Events

   a. Inspection Scope

The team examined the licensee's established guidelines and implementing procedures for the Mitigation Strategies for Beyond-Design-Basis. The team assessed how the licensee coordinated and documented the interface/transition between existing off-normal and Emergency Operating Procedures with the newly developed mitigation strategies. The team selected a number of mitigation strategies, conducted plant walkdowns with licensed operators and responsible plant staff, to assess the adequacy and completeness of the procedures; familiarity of operators with the procedure objectives and specific guidance; staging and compatibility of equipment,

and the practicality of the operator actions prescribed by the procedures, consistent with the postulated scenarios.

The team verified that a preventive maintenance program had been established for the FLEX portable equipment and that periodic equipment inventories were in place and being conducted. Additionally, the team examined the introductory and planned periodic/refresher training provided to the Operations and Fire Protection staffs most likely to be tasked with implementation of the FLEX mitigation strategies. The team also reviewed the introductory and planned periodic training provided to the Emergency Response Organization personnel. Documents reviewed are listed in the attachment.

b. Assessment

Based on samples selected for review, the inspectors verified that the licensee satisfactorily implemented appropriate elements of the FLEX strategy as described in the plant specific submittals and the associated safety evaluation and determined that the licensee is generally in compliance with NRC Order EA-12-049. The inspectors verified that the licensee satisfactorily:

- Developed and issued FLEX Support Guidelines (FSGs) to implement the FLEX strategies for postulated external events;
- Integrated their FSGs into their existing plant procedures such that entry into and departure from the FSGs are clear when using existing plant procedures;
- Protected FLEX equipment from site-specific hazards;
- Developed and implemented adequate testing and maintenance of FLEX equipment to ensure their availability and capability;
- Trained their staff to assure personnel proficiency in the mitigation of beyond-design-basis events; and
- Developed means to ensure that the necessary off-site FLEX equipment will be available from off-site locations.

c. Findings

(1) Inadequate FLEX Power Supply Connections

Introduction. The team identified a Green finding for the failure to assure that FLEX power supply connections would be reliable following all postulated beyond design basis external events. Specifically, the installed cable configuration could potentially be damaged during high wind events preventing operation of the portable diesel generator required to operate plant equipment.

Description. The team reviewed the licensee's method of reestablishing power to select components in both units during an extended loss of all AC power. The licensee's Final Integrated Plan for responding to an extended loss of all AC power includes deploying and connecting a portable diesel generator within six hours of the initiation of the event.

Cables from the portable diesel generator would be connected to one of two terminal panels installed for that purpose. Terminal panel 2TB1010 was installed inside of a building. The cables from the portable diesel generator would be routed through an open door. This connection point would be used for all beyond design bases external events except flooding. Terminal panel 2TB1011 was installed on the roof of the building to allow connecting the portable diesel generator cables during a potential flooding event so that the water tight door to remain closed. Cables from both terminal panels 2TB1010 and 2TB1011 connect to terminal panel 2TB1009 from which power is supplied to select components in both units.

Terminal panel 2TB1011 located on the roof is not protected from damage during high wind events. The modification addressed this potential damage by requiring that the cables routed between terminal panels 2TB1009 and 2TB1011 be disconnected in terminal panel 2TB1011 (i.e., outside of the tornado-protected building). The cables would only be connected in preparation for expected site flooding. The disconnected cables would prevent damage to terminal panel 2TB1011 from physically impacting operation of the electrical system.

During plant walkdowns, the team identified that in the installed configuration, the cables in terminal panel 2TB1011 would be energized when the portable diesel generator was connected to terminal panel 2TB1010 inside the building. Damage to the twelve cables in terminal panel 2TB1011 on the roof during a high wind event could potentially create shorts preventing the portable diesel generator from providing power to the required plant components. The licensee confirmed that potential damage to the cables in terminal panel 2TB1011 was not considered in the modification design requirements.

Procedure EN-DC-141, “Design Inputs”, Attachment 9.3 provided guidance for identifying design requirements for protecting structures, systems, and components against environmental impacts, including tornado missiles. Based on that guidance, modification package Base EC 44044, “ANO FLEX Electrical,” Revision 0, Section 3.1.22, specifically required the cables from termination panel 2TB1011 be installed but not connected. However, the team identified that the licensee failed to protect structures, systems, and components against environmental impacts of tornado missiles. Specifically, with the cables from termination panel 2TB1011 connected in termination panel 2TB1009, the installed configuration failed to protect the circuits from damage during high wind events. The licensee disconnected the cables of concern in terminal panel 2TB1009 resolving the concern while the team was onsite. This issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-C-2017-00316.

Analysis. The failure to install the electrical circuit modification to allow connecting the portable diesel generator such that the circuits were protected from tornado missile damage was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not ensure that the strategy model work order providing installation instructions implemented the design requirement that the electrical circuits for providing power to required plant components would be capable of fulfilling their function in the case of an extended loss of all AC power (ELAP) occurring due to a high wind event.

The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012. An initial bounding evaluation was performed using exposure time, tornado frequency, and frequency of random failure of both emergency diesel generators. The licensee's order compliance date was January 12, 2016, so an exposure time of one year was used. The tornado frequency selected was for an F2 or greater tornado striking the site (5.31E-5/year). The random failure frequency of both unit's emergency diesel generators (3.15E-3/year) was selected since the emergency diesel generators are protected from damage during high wind events. This is a conservative bounding analysis in that it assumes that any tornado would result in damage causing a loss of offsite power and damage the cables in terminal panel 2TB1011 on the roof. The change in core damage frequency for the finding was determined to be 1.67E-7/year. Therefore, the finding was determined to of very low risk significance (Green).

The finding had a cross-cutting aspect in the challenge to the unknown component of the Human Performance area because the licensee failed to adequately address all potential damage scenarios when developing the modification design requirements for beyond design basis external events [H.11].

Enforcement. This finding does not involve enforcement action because no violation of regulatory requirements was identified. Specifically, the performance deficiency was determined to involve the failure to meet a self-imposed standard. Because the finding does not involve a violation of regulatory requirements and has very low safety significance, it is identified as: FIN 05000313/2017008-01 and 05000368/2017008-01, "Inadequate FLEX Power Supply Connections."

(2) Inadequate FLEX Procedures

Introduction. The team identified a Green finding for the failure to provide procedures that were adequate for implementation of the FLEX strategies credited in the licensee's Final Implementation Plan.

Description. The team reviewed the licensee's procedures for implementing the Final Implementation Plan. The team reviewed the licensee's FLEX Developed Strategies, FLEX Strategy Guidelines, and an associated work order. The team identified three examples of inadequate procedures.

Example 1

The team reviewed Model Work Order 402438 in which the licensee established instructions for staging Phase II FLEX equipment prior to an impending flood event. Task 9 of the work order provided instructions for connecting the FLEX portable diesel generator to the plant electrical systems. The portable generator was intended to provide power to the required components in both units if an extended loss of AC power occurred during a flood event. The task provided detailed instructions for installing the temporary cables from the portable generator to terminal panel 2TB1011. The team identified that there were no instructions or labels to ensure that the twelve cables left

disconnected in terminal panel 2TB1011 would be correctly connected to the three terminal blocks. The correct four cables must be connected to the corresponding terminal block in terminal panel 2TB1011 for each of the three electrical phases. Any errors in terminating the twelve cables would create a phase to phase fault preventing operation of the portable generator. This example was entered into the corrective action program as Condition Report CR-ANO-C-2017-00341.

Example 2

The team reviewed FLEX Developed Strategies FDS-007, "Unit 1 Flood ELAP Guideline," Revision 1, and FDS-008," Unit 2 Flood ELAP Guideline," Revision 1, which were intended to be used to respond to an extended loss of all AC power occurred during a flood event. Preparations for an impending flood specified by the licensee's Procedure OP-1203.025, "Natural Emergencies," Revision 60, required the units to be shut down, cooled down, and the decay heat removal system placed in service. The procedure also required Model Work Order 402438 to stage and install the FLEX Phase II equipment in specific configurations required for flood conditions.

The team determined that FLEX Developed Strategies FDS-007 and FDS-008 were inadequate because these procedures were developed for initial plant conditions that did not reflect the conditions which were expected to exist at the time the procedures would be implemented. Also, these procedures did not provide adequate operating instructions for utilizing the FLEX equipment in the configurations required for a flood event. Specifically, FLEX Developed Strategies FDS-007 and FDS-008 contained instructions which would be appropriate if an extended loss of all AC power occurred with the unit in modes 1-4, but not in the shutdown conditions that were required by implementing Procedure OP-1203.025. This example was entered into the corrective action program as Condition Report CR-ANO-C 2017-00344.

Example 3

The team reviewed FLEX Developed Strategies FDS-001, "Unit 1 Extended Loss of AC Power," Revision 3, and FDS-002, "Unit 2 Extended Loss of AC Power," Revision 3, which were intended to be used to respond to an extended loss of all AC power occurred with the units starting in modes 1-4. The team identified that the licensee had failed to ensure that air-binding of the emergency feedwater pumps, which were required for decay heat removal, would be prevented. Specifically, the licensee failed to revise FLEX Developed Strategies FDS-001 and FDS-002, when they revised emergency operating procedures that contained the same instructions to correct the same potential failure mechanism. At the time FLEX Developed Strategies FDS-001 and FDS-002 would be implemented, each unit would only have one turbine driven emergency feedwater pump available to perform decay heat removal. The team determined that the licensee had no procedure for recovering from air-binding the turbine driven emergency feedwater pump in this condition. Specifically, following FDS-001 and FDS-002 could result in draining the qualified condensate storage tank and failing to isolate the suction, ingesting air and air-binding the pumps. This example was entered into the corrective action program as Condition Reports CR-ANO-1-2017-00250 and CR-ANO-C-2017 00295.

NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, Section 11.4.3 requires that Functional Support Guidelines be controlled under the site procedure control program. Licensee Procedure 1000.006, "Procedure

Control," Revision 69, requires validation of the original issue (Revision 0) of a procedure and any procedure changes that alters the sequence of steps or actions. The validation is to confirm that the proposed procedure is usable, accurate, contains the appropriate level of detail. The procedure also requires that all related procedures affected by a change are identified and revised. The team identified that Example 3 described above did not meet these requirements.

Analysis. The failure to provide procedures that were adequate for implementation of FLEX strategies for responding to an extended loss of all AC power due to a flooding or high wind events was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to ensure that Model Work Order 402438 and FLEX developed strategies FDS-001, FDS-002, FDS-007, and FDS-008 used to implement the program provided adequate instructions.

The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012.

For Example 1 and Example 2, the procedure deficiencies would only impact the licensee's response to a flood event. A bounding evaluation was performed using exposure time, flood frequency, and frequency of random failure of both emergency diesel generators. The licensee's compliance date for the order was January 12, 2016, so an exposure time of one year was used. The flood frequency selected was for a flood first exceeding the site grade elevation (8.47E-5/year). The random failure frequency of both unit's emergency diesel generators (3.15E-3/year) was selected since the emergency diesel generators are protected from damage during flood events. This is a conservative bounding analysis in that a source of off-site power is protected against higher flood levels. The bounding change in core damage frequency for the finding was determined to be 2.67E-7/year. Therefore, these examples of the finding were determined to of very low risk significance (Green).

For Example 3, the procedure deficiency would only impact the licensee's response to a high wind event. A bounding evaluation was performed using exposure time, tornado frequency, and frequency of random failure of both emergency diesel generators. The licensee's compliance date for the order was January 12, 2016, so an exposure time of one year was used. The tornado frequency selected was for an F2 or greater tornado striking the site (5.31E-5/year). The random failure frequency for both emergency diesel generators in one unit (3.15E-3/year) was selected since the emergency diesel generators are protected from damage during high wind events. This is a conservative assumption because it assumes that any tornado would result in damage causing a loss of offsite power and damage to the condensate storage tank credited in the Final Implementation Plan. The bounding change in core damage frequency for the finding was determined to be 1.67E-7/year. Therefore, this example of the finding was determined to of very low risk significance (Green).

The finding had a cross-cutting aspect in the Procedure Adherence component of Human Performance because the licensee failed to adequately perform reviews required by the licensee's procedure control program to confirm that: (1) instructions for implementing the strategies in the licensee's Final Implementation Plan were complete and appropriate; and (2) reviews for affected procedures related to other procedure revisions identified impacts on the implementing strategies and revised them appropriately [H.8].

Enforcement. This finding does not involve enforcement action because no violation of regulatory requirements was identified. Specifically, the performance deficiency was determined to involve the failure to meet a self-imposed standard. Because the finding does not involve a violation of regulatory requirements and has very low safety significance, it is identified as: FIN 05000313/2017008-02 and 05000368/2017008-02, "Inadequate FLEX Procedures."

2. Spent Fuel Pool (SFP) Instrumentation

a. Inspection Scope

The team examined the licensee's newly installed spent fuel pool instrumentation. Specifically, the inspectors verified the sensors were installed as described in the plant specific submittals to the NRC and the associated safety evaluation and that the cabling for the power supplies and the indications for each channel are physically and electrically separated. Additionally, environmental conditions and accessibility of the instruments were evaluated. Documents reviewed are listed in the attachment.

b. Assessment

Based on samples selected for review, the inspectors determined that the licensee satisfactorily installed and established control of the spent fuel pool instrumentation as described in the plant specific submittals and the associated safety evaluation, and determined that the licensee is generally in compliance with NRC Order EA-12-051. The inspectors verified that the licensee satisfactorily:

- Installed the SFP instrumentation sensors, cabling, and power supplies to provide physical and electrical separation as described in the plant specific submittal and safety evaluation;

- Installed the SFP instrumentation display consistent with the locations, environmental conditions, and accessibility described in the plant specific submittals; and

- Trained their staff to assure personnel proficiency with the maintenance, testing, and use of the SFP instrumentation.

c. Findings

No findings identified.

3. Staffing and Communication Request for Information

a. Inspection Scope

Through discussions with plant staff, review of documentation, and plant walkdowns the team verified that the licensee implemented required changes to staffing, communications equipment, and facilities to support an ELAP scenario as described in the licensee's staffing assessment and the NRC safety assessment. The team also verified that the licensee implemented dose assessment capability (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach as described in the licensee's dose assessment submittal. Documents reviewed are listed in the attachment.

b. Assessment

The inspectors reviewed information provided in the licensee's multi-unit dose submittal and in response to the NRC's March 12, 2012, request for information letter and verified that the licensee satisfactorily implemented enhancements pertaining to Near-Term Task Force Recommendation 9.3 response to a large scale natural emergency event that results in an extended loss of all ac power to the site and impedes access to the site.

The inspectors verified the following:

- The licensee satisfactorily implemented required staffing change(s) to support an ELAP scenario;
- Emergency preparedness communications equipment and facilities are sufficient for dealing with an ELAP scenario; and
- The licensee implemented dose assessment capabilities (including releases from spent fuel pools) using the site-specific dose assessment software and approach.

c. Findings

No findings identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On January 27, 2017, the inspectors presented the on-site inspection results in a management debrief to Mr. T. Evans, General Manager of Plant Operations, and other members of the site staff.

The inspectors completed an exit meeting with Mr. T. Evans, General Manager of Plant Operations and other members of the site staff, via telephone on May 1, 2017, who acknowledged the final results of the inspection. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

B. Adkison, Senior Engineer, Design Engineering
T. Arnold, Training Manager
L. Blocker, Nuclear Independent Oversight Manager
R. Buser, Supervisor, Design Engineering
P. Butler, Design and Program Engineering Manager
R. Carey, Manager, Emergency Preparedness
T. Chernnec, Outage Manager
L. Cowyer, FLEX Marshal, Operations
B. Davis, Engineering Director
T. Evans, General Manager of Plant Operations
M. Fields, Assistant Operations Manager
R. Freeman, Planner, Emergency Preparedness
M. Hall, Licensing Specialist, Regulatory Assurance
J. Hathcote, Support Manager, Operations
G. Hudnall, Manager, Nuclear Oversite
D. James, Director, Regulatory Affairs and Recovery
L. Jordan, Procedure Writer, Operations
D. Kilpatrick, Training Manager
B. Lynch, Manager, Radiation Protection
P. McCray, Senior Manager, Projects
B. Miller, Senior Engineer, Design Engineering Electrical
N. Mosher, Licensing Specialist, Regulatory Assurance
R. Pace, Production Manager
B. Patrick, Maintenance Manager
D. Perkins, Senior Manager, Operations
P. Perkins, Senior Operations Managers
N. Pope, Planner, Emergency Preparedness
M. Preston, Trainer, Emergency Preparedness
S. Pyle, Manager, Regulatory Assurance
T. Shearill, Assistant Operations Manager
F. Shewmake, Unit 2 Assistant Operations Manager
M. Skartvedt, Systems and Components Engineering Manager
J. Toben, Nuclear Safety Culture Manager
D. Vogt, Senior Manager, Operations
C. Warren, Acting Vice President, Entergy

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000313/2017008-01 05000368/2017008-01	FIN	Inadequate FLEX Power Supply Connections (Section 1.c(1))
05000313/2017008-02 05000368/2017008-02	FIN	Inadequate FLEX Procedures (Section 1.c(2))

LIST OF DOCUMENTS REVIEWED

Calculations

Number	Title	Revision/Date
ANOC-CS-13-00012	ANO FLEC Tank Tornado Missile Impact Evaluation	0
B&A 14-015	FLEX Equipment Buildings (ANO) Mechanical – Load Calculations	August 22, 2014
13-E-0005-19	Sliding and Rocking Evaluation of FLEX Storage Building	1
13-E-0005-51	ANO FLEX Drain Time of Tanks due to Missile Puncture	0
82-2086-60	Design Calculation for T41B	4
82-D-2086-01	Volume of CST T-41B Requiring Tornado Missile Protection	4
88-E-0034-14	Seismic Qualification of Equipment – T3 BWST	5
88-E-0035	Seismic Qualification of Equipment Refueling Water Storage Tank 2T3	0
91-E-009-19	ECP Spillway Reinforced Concrete Spillway Design	0
93-SQ-0002-53	Seismic Qualification Package	0
93-SQ-0002-262	Seismic Qualification Package	0
97-R-0010-15	Results of Bechtel's Evaluation of the Dardanelle Lock and Dam for a Safe Shutdown Earthquake	0

Condition Reports

CR-ANO-C-2017-00316*	CR-ANO-C-2017-00344*	CR-ANO-C-2017-00341*
CR-ANO-C-2017-00295*	CR-ANO-C-2017-00250*	CR-ANO-2016-00788
CR-ANO-2016-01752	CR-ANO-2015-03121	CR-ANO-2015-03280
CR-ANO-2015-03669	CR-ANO-2015-04419	CR-ANO-2016-00355
CR-ANO-2016-00609	CR-ANO-2016-01705	CR-ANO-2016-03946
LR-LAR-2012-00089		

*Issued as a result of inspection activities.

Drawings

Number	Title	Revision
C-667, Sheet 1	Grading and Drainage Plan for FLEX Storage Buildings	New
C-667, Sheet 3	FLEX Storage Buildings Primary Deployment Path	New
C-667, Sheet 4	FLEX Storage Buildings Alternate Deployment Path	New
C-667, Sheet 9	NSRC Phase 3 FLEX Equipment Primary Deployment Path	New
C-667, Sheet 10	NSRC Phase 3 FLEX Equipment Alternate Deployment Path	New
C-2002, Sheet 1	Site Plan	22
E-8, Sh. 1	Single Line Meter & Relay Diagram 480V Load Centers Engineered Safety Features & Main Supply	30
E-16, Sh. 1	Single Line Diagram 480V Motor Control Centers B55-B56	70
E-17, Sh. 1	Red Train Vital AC and 125VDC Single Line and Distribution	51
E-17, Sh. 1A	Green Train Vital AC and 125VDC Single Line and Distribution	17
E-18, Sh. 1	Single Line Diagram 480V Motor Control Centers B61 & B62	80
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E-2017, Sh. 1A	Green Train Vital AC and 125VDC Single Line and Distribution	10
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E-2022, Sh. 1	120 VAC Engineered Safety Features and 125 VDC Power Distribution Panels	35
E-2028, Sh. 1	125VDC Distribution Panels 480VAC Pressurizer Heater Distribution Panes	25
E-2941, Sh. 10	MRECENC-480-108305	I
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Drawings

Number	Title	Revision
E-2941, Sh. 3	MRECENC-480-108304	F
E-2941, Sh. 4	MRECENC-480-108304	F
E-2941, Sh. 5	MRECENC-480-108304	F
E-2941, Sh. 7	MRECENC-480-108305	I
M-204, Sheet 3	Piping and Instrument Diagram Emergency Feedwater	34
M-209, Sheet 1	Piping and Instrument Diagram Circulating Water, Service Water and Fire Water Intake Structure Equipment	115
M-201, Sheet 1	Piping and Instrument Diagram Service Water	150
M-219, Sheet 1	Piping and Instrument Diagram Fire Water	90
M-2204, Sheet 4	Piping and Instrument Diagram Emergency Feedwater	70
M-2210, Sheet 1	Piping and Instrument Diagram Service Water	90
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M-2210, Sheet 3	Piping and Instrument Diagram Service Water	91

Miscellaneous

Number	Title	Revision/Date
ANO-2015-0078	ANO FLEX Validation	September 16, 2015
ASPCS-FLEX-PROG	Diverse and Flexible (FLEX) Program Course Summary	2
ASRR-FLEX-FLEXCTTOPICS	FLEX Continuing Training Topics	0
EN-OP-201	Diverse and Flexible Coping Strategies (FLEX) Fleet Program Document	2
EN-OP-201-01	Arkansas Nuclear One FLEX Program Document	2
EN-OP-202	Diverse and Flexible Coping Strategies (FLEX) Program Document Bases	0
ENERCON Project No. ENTGANO088	Report of Geotechnical Exploration, FLEX Equipment Storage Buildings, Arkansas Nuclear One (ANO) Generating Station	December 10, 2013

Miscellaneous

Number	Title	Revision/Date
ENERCON Report	NRC Audit Question Regarding ASCE 7-10 Seismic Loading vs SSE Loading	February 1, 2016
Entergy Letter 0CAN011601	Notification of Full Compliance with NRC Order EA-12-049 Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (BDBEEs) Arkansas Nuclear One - Units 1 and 2 Docket Nos. 50-313 and 50-368 License Nos. DPR-51 and NPF-6	January 12, 2016
Entergy Letter 0CAN091601	Additional Questions Associated with the Notification of Full Compliance with NRG Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (BDBEEs) Arkansas Nuclear One - Units 1 and 2 Docket Nos. 50-313 and 50-368 License Nos. DPR-51 and NPF-6	September 1, 2016
IDLC800-2M	Industrial Diesel Generator Set	
NRC Letter ML16224A106	Arkansas Nuclear One, Units 1 and 2 - Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF0942, MF0943, MF0944, and MF0945)	September 19, 2016
Regulatory Guide 1.76	Design-Basis Tornado and Tornado Missiles for Nuclear Power Plants	1
NSRC-005	Safer Response Plan for Arkansas Nuclear One	2
STM-1-73	System Training Manual – FLEX (Diverse and Flexible Coping Strategies)	3
TRM 3.10.2	Diverse and Flexible Coping Strategies (FLEX) Equipment	51
TRM 3.10.3	FLEX Fluid/Electrical Connections and Flow Paths	51
	FLEX Compliance Curriculum	2013
	FLEX Validation of Action Items #13 & #18	August, 14, 2016
	Standing Order: FLEX EDG Connections	January 26, 2017

Modifications

Number	Title	Revision
Engineering Change 42529	ANO-2 FLEX Modifications in Support of ANO-1 Strategy	0
Engineering Change 44043	ANO-1 FLEX Modifications	0
Engineering Change 48343	ANO-2 FLEX Piping Modifications	0

Procedures

Number	Title	Revision
1FSG-001	Long Term RCS Inventory Control	1
1FSG-002	Alternative EFW Suction Source	0
1FSG-004	Unit 1 Extended Loss of AC Power DC Load Management	1
1FSG-007	Loss of DC Power	1
1FSG-008	Alternative RCS Boration	0
2FSG-004	Unit 2 Extended Loss of AC Power DC Load Management	1
2FSG-007	Loss of DC Power	0
CFSG-005	Initial Assessment and FLEX Equipment Staging	2
GFSG-006	EFW Storage Tank Makeup	1
CSFG-011	Alternate Spent Fuel Pool Makeup	0
CFSG-100	BDBEE/ELAP Emergency Response	1
CFSG-101	BDBEE/EP Communication	2
CFSG-102	Phase III National Safer Response Center (NSRC) Equipment Staging and Installation Guideline	0
EN-OP-201-01	Arkansas Nuclear One FLEX Program Document	2
FDS-001	Unit 1 Extended Loss of AC Power	3
FDS-002	Unit 2 Extended Loss of AC Power	3
FDS-005	Unit 1 Lower Mode ELAP Guideline	1

Procedures

Number	Title	Revision
FDS-006	Unit 2 Lower Mode ELAP Guideline	2
FDS -007	Unit 1 Flood ELAP Guideline	1
FDS -008	Unit 2 Flood ELAP Guideline	1
1000.006	Procedure Control	69
1015.003A	Unit 1 Operations Logs	93
1015.003B	Unit Two Operations Logs	77
1304.223	Unit 1 Spent Fuel Pool Level Instrumentation Channel Functional Test	2
1202.008	Blackout	16
1203.025	Natural Emergencies	60
1903.053	Logistical Support	8
1903.062	Communications System Operating Procedure	29
1904.002	Offsite Dose Projections	41
2202.008	Station Blackout	13
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2304.271	Unit 2 Spent Fuel Pool Level Instrumentation Channel Functional Test	0

Work Orders

00402438	00466109	52658410	52658411	52673961	399165-01

ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 - INSPECTION OF THE IMPLEMENTATION OF MITIGATION STRATEGIES AND SPENT FUEL POOL INSTRUMENTATION ORDERS, AND EMERGENCY PREPAREDNESS COMMUNICATION/STAFFING/MULTI-UNIT DOSE ASSESSMENT PLANS – INSPECTION REPORT (05000313/2017008 AND 05000368/2017008) – MAY 22, 2017

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