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OCAN081403

August 28, 2014

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
11555 Rockville Pike  
Rockville, MD 20852

SUBJECT: Third Six-Month Status Report in Response to March 12, 2012,  
Commission Order Modifying Licenses with Regard to Reliable Spent  
Fuel Pool (SFP) Instrumentation (Order Number EA-12-051)  
Arkansas Nuclear One – Units 1 and 2  
Docket Nos. 50-313 and 50-368  
License Nos. DPR-51 and NPF-6

- REFERENCES:
1. NRC Order Number EA-12-051, *Order to Modify Licenses with Regard to Reliable SFP Instrumentation*, dated March 12, 2012 (OCNA031207) (ML12054A679)
  2. Entergy letter to NRC, *Overall Integrated Plan (OIP) in Response to March 12, 2012, Commission Order Modifying License with Regard to Reliable SFP Instrumentation (Order Number EA-12-051)*, dated February 28, 2013 (OCAN021303) (ML13063A015)
  3. Entergy letter to NRC, *First Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable SFP Instrumentation (Order Number EA-12-051)*, dated August 28, 2013 (OCAN081303) (ML13241A415)
  4. Entergy letter to NRC, *Second Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable SFP Instrumentation (Order Number EA-12-051)*, dated February 27, 2014 (OCAN021406) (ML14059A230)

Dear Sir or Madam:

On March 12, 2012, the NRC issued an order (Reference 1) to Entergy Operations, Inc. (Entergy) which required submission of an OIP pursuant to Section IV, Condition C which was provided by Reference 2.


ADD  
NRR

Reference 1 also requires submission of a status report at six-month intervals following submittal of the OIP. References 3 and 4 provided the first and second six-month status reports, respectively. The purpose of this letter is to provide the third six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attached report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

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

I declare under penalty of perjury that the foregoing is true and correct; executed on August 28, 2014.

Sincerely,

A handwritten signature in black ink, appearing to read 'JGB/nbm', with a large, stylized 'B' in the middle.

JGB/nbm

Attachment: Arkansas Nuclear One Units 1 and 2 Third Six-Month Status Report for the Implementation of Order EA-12-051, Order to Modify Licenses with Regard to Reliable SFP Instrumentation

cc: Mr. Marc L. Dapas  
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**Attachment to**

**OCAN081403**

**Arkansas Nuclear One (ANO) Units 1 and 2 (ANO-1 and ANO-2) Third Six Month  
Status Report for the Implementation of Order EA-12-051, Order to Modify  
Licenses with Regard to Reliable Spent Fuel Pool (SFP) Instrumentation**

**ANO-1 and ANO-2 Third Six Month Status Report for the Implementation of Order EA-12-051, Order to Modify Licenses with Regard to Reliable SFP Instrumentation**

**1. Introduction**

Entergy Operations, Inc. (Entergy) developed an overall integrated plan (OIP) provided via Reference 1 for ANO-1 and ANO-2, documenting the requirements to install reliable SFP instrumentation (SFPI), in response to Reference 2. This attachment provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

**2. Milestone Accomplishments**

The following milestone(s) have been completed since January 31, 2014, and are current as of July 31, 2014.

ANO-1 Modification Package (EC-44046) issued. ANO-1 major parts (sensing probe, display/processor panel, and battery panel) received.

**3. Milestone Schedule Status**

The following provides an update to the milestone schedule to support the OIP. This section provides the activity status of each item and the expected completion date noting any change. The dates are planning dates subject to change as design and implementation details are developed.

<b>Milestone</b>	<b>Target Completion Date<sup>†</sup></b>	<b>Activity Status</b>	<b>Revised Target Completion Date</b>
ANO-1 Reliable SFPI Design Modification Package Developed/Issued	March 2014	EC-44046 Issued	
ANO-1 Reliable SFPI Installed	1R25 Early 2015 Refueling Outage	Pending	
ANO-2 Reliable SFPI Design Modification Package Developed/Issued	September 2014	EC-48348 In Progress	
ANO-2 Reliable SFPI Installed	2R24 Fall 2015 Refueling Outage	Pending	
NRC RAIs (Received June 26, 2013, Reference 5)	July 25, 2013	Submitted	
NRC RAIs (Responded July 25, 2013, Reference 6)	July 25, 2013	Submitted	
NRC ISE RAIs (Received October 29, 2013, Reference 3)	September 30, 2014	Answered per this Submittal (see Sect. 6 status)	

<sup>†</sup>Target Completion Date is the last submitted date from either the OIP or previous six-month update

**4. Changes to Compliance Method**

There are no additional changes to the compliance method.

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

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

**6. Open Items from OIP and Interim Staff Evaluation**

Entergy has received an Interim Staff Evaluation that includes 17 RAIs. Responses to the RAIs are due September 30, 2014, and are provided in Section 9 of this six-month status report. The following table provides a status of the RAIs.

RAI #	ANO-1 Response Status	ANO-2 Response Status
1	See Section 9 – Complete	See Section 9 – Complete
2	See Section 9 – Preliminary	See Section 9 – Preliminary
3	See Section 9 – Preliminary	See Section 9 – Preliminary
4	Response Updated See Section 9 – Complete	See Section 9 – Complete
5	See Section 9 – Preliminary	See Section 9 – Preliminary
6	See Section 9 – Preliminary	See Section 9 – Preliminary
7	See Section 9 – Preliminary	See Section 9 – Preliminary
8	See Section 9 – Preliminary	See Section 9 – Preliminary
9	See Section 9 – Preliminary	See Section 9 – Preliminary
10	See Section 9 – Preliminary	See Section 9 – Preliminary
11	Response Updated See Section 9 – Complete	See Section 9 – Complete
12	See Section 9 – Preliminary	See Section 9 – Preliminary
13	See Section 9 – Preliminary	See Section 9 – Preliminary
14	See Section 9 – Preliminary	See Section 9 – Preliminary
15	See Section 9 – Preliminary	See Section 9 – Preliminary
16	See Section 9 – Preliminary	See Section 9 – Preliminary
17	See Section 9 – Preliminary	See Section 9 – Preliminary

## 7. Potential Interim Staff Evaluation Impacts

OIP (Reference 1) Attachment 2 (ANO Unit 2 – SFPI, Approximate Sensor Location and Approximate Cable Routing) is updated relative to Channel A cable routing. See Figure 1 and Figure 2. Original showed sensors located in opposite corners of the SFP's short side (which is not changed) with the cable routing from the sensors proceeding due south and maintaining the same relative sensor spatial separation out to the floor penetrations (which is changed). Channel A floor penetration location (and related cable routing) is revised due to interference on the elevation below. The change brings the Channel A cable routing closer to the opposite channel (i.e., spatial separation is less than the SFP's short side). However, substantial and adequate spatial separation is maintained ( $\approx 3/4$  of that original planned). Also, unchanged is the reasonable protection provided by seismically mounted protective metal raceway and additional protection afforded by objects in the vicinity which rise above the floor grade (e.g. SFP curbs and/or SFP bridge tracks/rails). Information associated with the NRC RAI #4.a (Reference 6) response and information preceding NRC ISE RAI #11 (Reference 3) discusses cable routing maintaining the same relative sensor spatial separation and, as such, is impacted and also updated.

Attachment 2  
ANO Unit 2 – SFPI Simplified Spent Fuel Pool Instrument  
Approximate Locations and Approximate Cable Routing

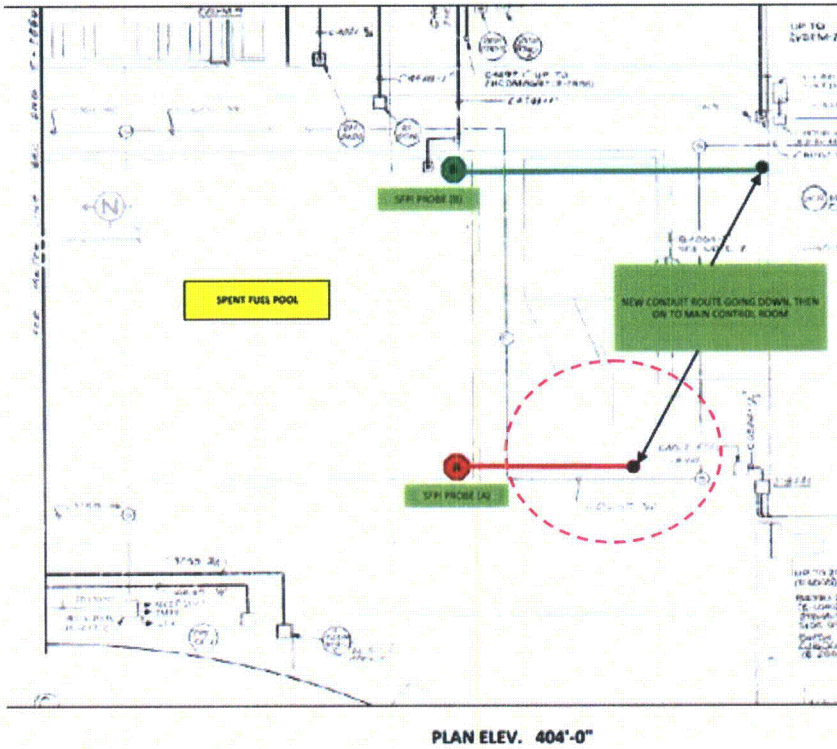


Figure 1: Original Cable Routing (Reference 1, Attachment 2)

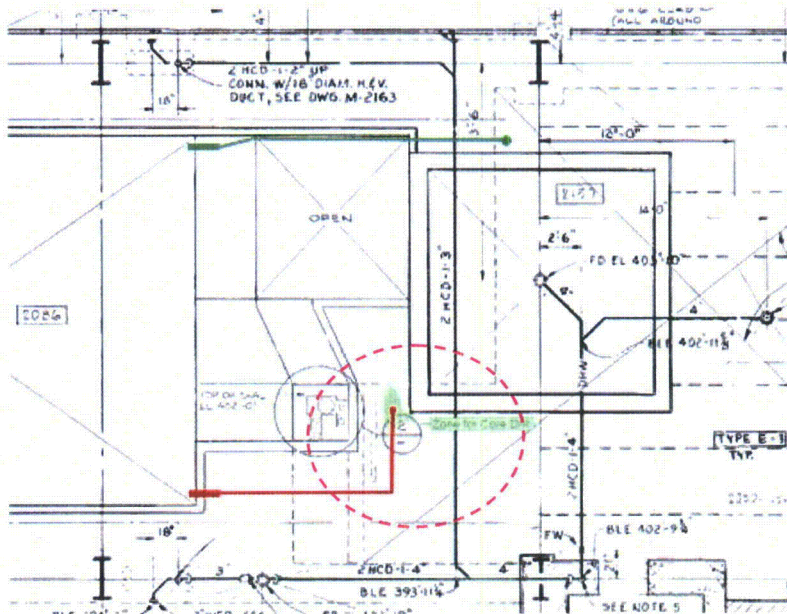


Figure 2: Updated Cable Routing

## 8. References

1. *OIP in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable SFP Instrumentation (Order Number EA-12-051)*, dated February 28, 2013 (OCAN021303) (ML13063A015)
2. NRC Order Number EA-12-051, *Order Modifying Licenses with Regard to Reliable SFP Instrumentation*, dated March 12, 2012 (OCNA031207) (ML12054A679)
3. *Arkansas Nuclear One, Units 1 and 2 – ISE and RAI Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable SFP Instrumentation (TAC NOs. MF0944 and MF0945)*, dated October 29, 2013 (OCNA101307) (ML13281A502)
4. *November 26, 2013, Public Meeting Summary for the Discussion Between the NRC Staff and Industry Concerning Responses to ISEs for SFP Instrumentation*, dated December 26, 2013 (ML13347B030)
5. *RAI for the OIP in Response to the Commission Order Modifying Licenses with Regard to Requirements for Reliable SFP Instrumentation (Order Number EA-12-051)*, dated June 26, 2013 (OCNA061308) (ML13156A313)
6. *Response to RAI dated July 25, 2013* (OCAN071301) (ML13207A2693)



**9. Responses to 17 of the ISE RAIs for ANO-1 and ANO-2**

**RAI #1: Please provide information regarding the projected dose rate impact of any irradiated hardware stored in the SFP on the Level 2 value. Please provide any changes in the elevation identified as Level 2, if applicable.**

Interim Staff Guidance (ISG) JLD-ISG-2012-03 'Compliance with Order EA-12-051, Reliable SFP Instrumentation' states "The NRC staff considers that the methodologies and guidance in conformance with the guidelines provided in Nuclear Energy Institute (NEI) 12-02, Revision 1, subject to the clarifications and exceptions in Attachment 1 to this ISG, are an acceptable means of meeting the requirements of Order EA-12-051."

NEI 12-02, Revision 1, Section 2.3.2, entitled 'Level 2 - level that is adequate to provide substantial radiation shielding for a person standing on the SFP operating deck' defines Level 2. Level 2 represents the range of water level where any necessary operations in the vicinity of the SFP can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel. Level 2 is based on either of the following:

- Ten feet (+/- 1 foot) above the highest point of any fuel rack seated in the SFPs, or
- a designated level that provides adequate radiation shielding to maintain personnel radiological dose levels within acceptable limits while performing local operations in the vicinity of the pool. This level shall be based on either plant-specific or appropriate generic shielding calculations, considering the emergency conditions that may apply at the time and the scope of necessary local operations, including installation of portable SFP instrument channel components. Additional guidance can be found in EPA-400 (Reference 4), USNRC Regulatory Guide 1.13 (Reference 5) and ANSI/ANS-57.2-1983 (Reference 6).

Entergy has selected the ten-foot option which has been determined by the NRC to meet the requirements of the order with no further evaluation or review required.

**RAI #2: Please provide the analyses verifying that the SFP instrument design configuration will be maintained during and following the maximum seismic ground motion considered in the design of the SFP structure.**

See bridging document Topics #8, 9, and 12 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #3: or each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.**

See bridging document Topics #8, 9, 12, and 13 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #4: Please provide the results of the evaluation performed to ensure that other hardware stored in the SFP cannot adversely interact with the SFP level instrumentation.**

The following response replaces the response that was provided in the Second Six Month Status Report.

An exclusion zone of two square feet around the probe is the minimum clearance required to prevent any tools or devices from disturbing the function of the probe. Additionally, a Civil walkdown follow-up is planned to ensure other hardware does not adversely interact with the SFPI.

Note for ANO-2, an existing level switch (2LS-5414) was identified within the two square feet exclusion zone of the Channel 2 or B SFPI probe mounting location. This level switch hangs approximately three feet down into the SFP. The item is not designed per seismic category 1; however, the mounting details show it threaded into a ¼" stainless steel angle iron mount that is welded to the liner plate such that it does not adversely interact with the SFPI probe.

**RAI #5: Please provide information indicating what will be the maximum expected ambient temperature in the room in which the signal processor (electronics) will be located under Beyond Design Basis External Event (BDBEE) conditions in which there is no ac power available to run heating, ventilation, and air conditioning (HVAC) systems.**

See bridging document Topic #3 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #6: Please provide information indicating the maximum expected relative humidity in the room in which the signal processor (electronics) will be located under BDBEE conditions, in which there is no ac power available to run HVAC systems, and whether the sensor electronics is capable of continuously performing its required functions under this expected humidity condition.**

See bridging document Topic #3 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #7: Please provide information describing the evaluation of the comparative sensor design, the shock test method, test results, and forces applied to the sensor applicable to its successful tests demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of severe shock.**

See bridging document Topic #14 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #8: Please provide information describing the evaluation of the comparative sensor design, the vibration test method, test results, and the forces and their frequency ranges and directions applied to the sensor applicable to its successful tests, demonstrating that the referenced previous testing provides an appropriate means to demonstrate reliability of the sensor under the effects of high vibration.**

See bridging document Topic #14 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #9: Please provide the results of the seismic testing performed per IEEE 344-2004 to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be located.**

See bridging document Topic # 8 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #10: lease provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at ANO, has been adequately demonstrated.**

See bridging document Topic # 8 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #11: Please provide the NRC staff with the final configuration of the power supply source for each channel so that the staff may conclude that the two channels are independent from a power supply assignment perspective.**

The immediately following response was previously provided in the Second Six Month Status Report.

For ANO-1, the primary channel (Instrument Channel 3) 120 volt alternating current (VAC) power is being supplied from Panel RS3, which is a Class 1E inverter-backed panel supplied from 125V direct current (VDC) Bus D01. The backup channel (Instrument Channel 4) 120 VAC power is being supplied from Panel RS4, which is a Class 1E inverter-backed panel supplied from 125 VDC Bus D02.

The following has been added to the previously provided response in the Second Six Month Status Report.

For ANO-2, the primary channel (Instrument Channel 1) 120 volt alternating current (VAC) power is being supplied from Panel 2RS1, which is a Class 1E inverter-backed panel supplied from 125V direct current (VDC) Bus 2D01. The backup channel (Instrument Channel 2) 120 VAC power is being supplied from Panel 2RS2 which is a Class 1E inverter-backed panel supplied from 125 VDC Bus 2D02.

For ANO-1, the two SFPI channels are “channelized” and are being powered from opposing power division (e.g., red train and green train) safety-related vital 120 VAC power sources. For ANO-2, the two SFPI channels are “channelized” and are being powered from opposing power division safety-related vital 120 VAC power sources.

**RAI #12: Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.**

See bridging document Topic # 18 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #13: Please provide analysis verifying that the proposed instrument performance is consistent with these estimated accuracy normal and BDBEE values. Please demonstrate that the channels will retain these accuracy performance values following a loss of power and subsequent restoration of power.**

See bridging document Topics # 16, 17, and 18 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #14: Please provide a description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.**

In general relative to normal operating conditions, any applicable calibration procedure tolerances (or acceptance criterion) are expected to be established based on the vendor manuals stated/recommended reference accuracy (or design accuracy). The methodology used is expected to be based on the vendor manuals and captured in plant procedures and/or programs. See bridging document Topic # 20 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #15: Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.**

The process is expected to be captured in Entergy procedures established based on manufacturer's recommendations and Entergy processes and procedures. The instrument automatically monitors the integrity of its level measurement system using in-situ capability. Deviation of measured test parameters from manufactured or as-installed configuration beyond a configurable threshold prompts operator intervention. See bridging document Topic #20 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]

**RAI #16: Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.**

The calibration and test procedure developed by MOHR are provided in the technical manuals developed by MOHR. See bridging document Topics #10, 19, and 20 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]. The objectives are to measure system performance, determine if there is a deviation from normal tolerances, and if deviation(s) are found return the system to normal tolerances.

Diagnostic procedures developed by MOHR are provided as automated and semi-automated routines in system software alerting the operator to abnormal deviation in selected system parameters such as battery voltage, loop continuity, and time domain reflectometry waveform of the transmission cable. The technical objective of the diagnostic procedures is to identify system conditions that require operator attention to ensure continued reliable liquid level measurement. Manual diagnostic procedures are also provided in the event that further workup is determined to be necessary.

Maintenance procedures developed by MOHR are provided in the technical manual. These allow a technician trained in Model EFP-IL system maintenance to ensure that system functionality is maintained. An operation procedure is expected to provide sufficient instructions for operation and use of the system. Entergy procedures are being developed in accordance with the vendor manuals provided by MOHR and Entergy procedures and processes. FLEX Support Guidelines are also expected to provide sufficient instructions for use of the SFPI during a BDBEE.

**RAI #17: Please provide further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Include a description of your plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.**

SFPI channel/equipment maintenance/preventative maintenance and testing program requirements to ensure design and system readiness are expected to be established in accordance with Entergy's processes and procedures and in consideration of vendor recommendations to ensure that appropriate regular testing, channel checks, functional tests, periodic calibration, and maintenance is performed (and available for inspection and audit). See RAI#16 response and bridging document Topics #10 and 20 located on the ePortal. [Note: Preliminary responses are available in the draft bridging document which is awaiting issuance of NRC Audit Report for the SFPI vendor (MOHR).]