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2CAN081504

August 28, 2015

U.S. Nuclear Regulatory Commission  
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SUBJECT: Fifth 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 – Unit 2  
Docket No. 50-368  
License No. NPF-6

- REFERENCES:
1. NRC Order Number EA-12-051, *Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, dated March 12, 2012 (0CNA031207) (ML12054A679)
  2. Entergy letter to NRC, *Overall Integrated Plan (OIP) in Response to March 12, 2012, Commission Order Modifying License with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 28, 2013 (0CAN021303) (ML13063A015)
  3. Entergy letter to NRC, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 24, 2015 (0CAN021503) (ML15056A153)
  4. Entergy letter to NRC, *Completion of Required Action by NRC Order EA-12-051 Reliable SFP Instrumentation Arkansas Nuclear One – Unit 1*, dated April 14, 2015 (1CAN041501) (ML15105A248)

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. The subject OIP was provided by Reference 2 for Arkansas Nuclear One (ANO).

Reference 1 also requires submission of a status report at six-month intervals following submittal of the OIP. Reference 3 provided the fourth six-month status report. The purpose of this letter is to provide the fifth 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 report applies to ANO-2, because ANO-1 compliance with NRC Order EA-12-051 was documented in Reference 4.

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, 2015.

Sincerely,

**ORIGINAL SIGNED BY JEREMY G. BROWNING**

JGB/nbm

Attachment: ANO-2 Fifth Six-Month Status Report for the Implementation of NRC Order EA-12-051, *Order to Modify Licenses with Regard to Reliable SFP Instrumentation*

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**Attachment to**

**2CAN081504**

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

**ANO-2 Fifth Six Month Status Report for the Implementation of  
NRC 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-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. This update pertains to ANO-2 because ANO-1 compliance with NRC Order EA-12-051 was documented in Reference 9. However, there are several Interim Staff Evaluation (ISE) Request for Additional Information (RAI) responses which are updated in Section 9 based on the results of the on-site NRC audit that apply to both units.

**2. Milestone Accomplishments**

The following milestone(s) have been completed since January 31, 2015, and are current as of July 31, 2015.

It is noted that ANO-1 compliance with NRC Order EA-12-051 was documented in Reference 9.

### 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. The milestone listing includes only ANO-2 dates.

<b>Milestone</b>	<b>Target Completion Date<sup>†</sup></b>	<b>Activity Status</b>	<b>Revised Target Completion Date</b>
ANO-2 Reliable SFPI – Design Modification Package Developed/Issued	September 2014	EC-48348 Issued	NA
ANO-2 Reliable SFPI Installed	2R24 (Fall 2015 Refueling Outage)	Pending	NA
#1 NRC RAI (Received June 26, 2013)	June 26, 2013	Received	NA
#1 NRC RAI (Responded July 25, 2013)	July 25, 2013	Submitted	NA
#2 NRC ISE RAI (Received October 29, 2013)	October 29, 2013	Received	NA
#2 NRC ISE RAI (Responded September 30, 2014, via “Bridging Document” upload to ePortal)	September 30, 2014	Submitted*	NA

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

\* Updates per References 3 and 8. Updated/Revised per this submittal. See Section 6 status.

#### 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 ISE

Entergy has received an ISE that includes 17 RAIs. This listing includes coverage primarily for ANO-2 because ANO-1 compliance with NRC Order EA-12-051 was documented in Reference 9. However, there are several ISE RAI responses which are updated in Section 9 based on the results of the on-site NRC audit that apply to both units. Generically the responses are applicable to both units. The following table provides ISE RAI status.

<b>RAI</b>	<b>ANO Response Status</b>
1	Submitted in Reference 8
2	Uploaded to e-portal September 30, 2014
3	Uploaded to e-portal September 30, 2014
4	Submitted in Reference 3
5	Uploaded to e-portal September 30, 2014
6	Uploaded to e-portal September 30, 2014
7	Uploaded to e-portal September 30, 2014
8	Uploaded to e-portal September 30, 2014
9	Uploaded to e-portal September 30, 2014
10	Uploaded to e-portal September 30, 2014
11	Reference 3 response updated, see Section 9
12	Uploaded to e-portal September 30, 2014
13	Uploaded to e-portal September 30, 2014
14	Reference 8 combined (14-17) response updated, see Section 9
15	Reference 8 combined (14-17) response updated, see Section 9
16	Reference 8 combined (14-17) response updated, see Section 9
17	Reference 8 combined (14-17) response updated, see Section 9

## 7. Potential ISE Impacts

There are no potential impacts to the ISE identified at this time except for those identified in Section 6.

## 8. References

1. Entergy letter to NRC, *Overall Integrated Plan in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 28, 2013 (0CAN021303) (ML13063A015)
2. NRC Order Number EA-12-051, *Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012 (0CNA031207) (ML12054A679)*
3. Entergy letter to NRC, *Third Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated August 28, 2014 (0CAN081403) (ML14246A209)
4. Entergy letter to NRC, *Response to Request for Additional Information (RAI) for the Overall Integrated Plan (OIP) in Response to the Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool (SFP) Instrumentation*, dated July 25, 2014 (0CAN071301) (ML13207A269)
5. ANO Engineering Changes: ANO-1 (EC)-44046, ANO-2 (EC)-48348, *NRC Order EA-12-051 SFP Instrumentation Implementation*
6. NRC Order Number EA-12-049, *Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (0CNA031206) (ML12056A045)
7. NRC letter to Entergy, *Arkansas Nuclear One, Unit 1 - Relaxation Of The Schedule Requirements For Order EA-12-049 "Issuance Of Order To Modify Licenses With Regard To Requirements For Mitigation Strategies For Beyond-Design-Basis External Events,"* dated May 20, 2014 (1CNA051402) (ML14114A697)
8. Entergy letter to NRC, *Fourth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)*, dated February 24, 2015 (0CAN021503) (ML15056A153)
9. Entergy letter to NRC, *Completion of Required Action by NRC Order EA-12-051 Reliable Spent Fuel Pool Level (SFP) Instrumentation Arkansas Nuclear One – Unit 1*, dated April 14, 2015 (1CAN041501) (ML15105A248)

## 9. Updates to Responses to ANO ISE RAIs

Note: This six-month update applies only to ANO-2; however, the ISE RAI responses updated in this section apply to both units and are based on follow-up actions resulting from the on-site NRC audit.

**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.**

Update to Reference 3:

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

For ANO-2, the primary channel (Instrument Channel 1) 120 VAC power is being supplied from Panel 2RS1, which is a Class 1E inverter-backed panel supplied from 125V 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 instruments are “channelized” and are 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 instruments are “channelized” and are being powered from opposing power division safety-related vital 120 VAC power sources.

The following is added to that provided in the Third Six-Month Status Report (Reference 3):

Installation of permanently installed, physically independent, and physically separated channels (with channel separation in accordance with existing plant design basis requirements) that are supplied from opposing power division safety-related vital power sources (e.g., separate independent power sources with each inverter-backed, or emergency diesel generator and battery-backed) that are designed and installed to Seismic Category I requirements assures that channels are independent from a power supply assignment perspective.

The primary independent AC power source design provides rapid restoration (e.g., within hours) per FLEX strategies during a beyond-design-bases external event from sources independent of plant sources (e.g. FLEX portable diesel generators); although FLEX strategy rapid restoration need not be credited by virtue of the permanently installed battery capacity, which is analyzed to cover full event duration (e.g., seven days). Installed rechargeable battery capacity for a full seven days coupled with FLEX power restoration strategies also precludes the need for crediting battery replacements, stocking of battery spare stock, and the alternate external DC power source capability. As such, the SFP instrument channels have highly reliable power sources, originating from separate power sources, with power capability independent from plant sources, and with on-board battery capacity analyzed for full event duration (e.g., seven days) or



maximum offsite resource availability time frames which is well beyond FLEX strategy restoration time frames. An installed alternate power source is provided for instrument channel power with sufficient capacity to maintain the level indication function for full event duration including until offsite resource availability is reasonably assured.

The following FLEX Support Guides (FSGs) have been drafted in association with pending implementation of NRC Order EA-12-049 FLEX strategies to repower the normal AC power supply to the SFPI with portable equipment following an Extended Loss of AC Power (ELAP) event.

- 1FSG-004 – ANO-1 ELAP DC Load Management (draft)
- 2FSG-004 – ANO-2 ELAP DC Load Management (draft)

Attachment 2 of the above FSGs ensures that 120 VAC Vital Panel Breakers which feed SFPI are not shed as part of the DC Load Shed strategy to preserve Station Vital Batteries. For ANO-1, the breakers are RS3 Bkr #7 and RS4 Bkr #7. For ANO-2, the breakers are 2RS1 Bkr #1 and 2RS2 Bkr #1.

Attachment 3 of the above FSGs restores power to 480 VAC Vital Load Centers. For ANO-1, the load centers are B5 and B6. For ANO-2, the load centers are 2B5 and 2B6.

Power distribution related SAR Figures for ANO-1 (Figure 8-1) and ANO-2 (Figures 8.3-1 and 8.3-6) illustrate the power distribution which feeds SFPI showing connections between the 480 VAC Vital Load Centers (ANO-1: B5, B6; ANO-2: 2B5, 2B6) and 120 VAC Vital Panels (ANO-1: RS3, RS4; ANO-2: 2RS1, 2RS2) including those associated with the Vital DC Buses and Inverters.

**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.**

**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.**

**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.**

**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.**

Update to Reference 8:

RAIs #14, #15, #16, and #17 are combined due to their commonalities.

The ANO SFP instrument channels automatically monitor the integrity of the measurement system using in-situ capability or on-board diagnostics. Deviation of measured test parameters from manufactured or as-installed configuration beyond a configurable threshold prompts operator intervention. The probe itself is a perforated tubular coaxial waveguide with defined geometry and is not calibrated. Channel design provides capability for calibration or validation against known/actual SFP level.

The ANO SFP instrument channels have a reasonably high certified design accuracy of equal to or better than +/- three inches (excluding boric acid deposition effects that cause a conservative decrease in indicated level).

A new ANO-1 procedure, OP-1304.223, *Unit 1 Spent Fuel Pool Level Instrumentation Channel Functional Test*, has been implemented. The ANO-1 Technical Requirements Manual (TRM) has been revised to include actions to be taken for the primary and back-up SFP level instruments with respect to functionality (new TRM 3.10.1). In addition, ANO-1 procedure OP-1015.003A, *Unit 1 Operations Logs*, has been revised to add SFP level instruments LIT-2020-3 and LIT-2020-4. An Operations procedure was not required based on the simple indication function and use.

An ANO-1 Preventative Maintenance task has been established for scheduling and implementing necessary functional testing in accordance with ANO-1 TRM requirements. The testing per ANO-1 OP-1304.223 provides for calibration or validation of the primary and backup ANO-1 SFP level instrument channels against known/actual SFP level to maintain design accuracy within limits established. The testing also provides for ANO-1 SFP level instrument cross channel comparison. This is augmented by routine monitoring per ANO-1 procedure OP-1015.003A, *Unit 1 Operations Logs*.

For ANO-2, comparable procedures and testing program implementation are planned.

The following is added to that provided in the Fourth Six-Month Status Report (Reference 8):

The following table includes all SFPI related preventive maintenance (PM) tasks and Procedures for ANO-1 and ANO-2:

<b>ANO-1 SFPI Related PMs and Procedures</b>	<b>ANO-2 SFPI Related PMs and Procedures**</b>
MWO-405634 CFT/Calib. Procedure performed IAW ANO-1 TRM 3.10.1	MWO-422989 CFT/Calib. Procedure performed IAW ANO-2 TRM 3.10.1
OP-1304.223 ANO-1 SFPLI Chan-3 &-4 CFT or Calibration Check	OP-2304.271 ANO-2 SFPLI Chan-1 &-2 CFT or Calibration Check
OP-1015.003A ANO-1 Ops Log SFPLI routine rounds/checks	OP-1015.003B ANO-2 Ops Log SFPLI routine rounds/checks
MWO-405171 ANO-1 SFPLI Boric Acid Mitigation Chan-3	MWO-413616 ANO-2 SFPLI Boric Acid Mitigation Chan-1
MWO-405173 ANO-1 SFPLI Boric Acid Mitigation Chan-4	MWO-413619 ANO-2 SFPLI Boric Acid Mitigation Chan-2
MWO-403237 ANO-1 1-Year PM SFPLI Chan-3	MWO-413612 ANO-2 1-Year PM SFPLI Chan-1
MWO-403239 ANO-1 1-Year PM SFPLI Chan-4	MWO-413617 ANO-2 1-Year PM SFPLI Chan-2
MWO-403238 ANO-1 10-Year PM SFPLI Chan-3 for Clock Battery Replacement	MWO-413614 ANO-2 10-Year PM SFPLI Chan-1 for Clock Battery Replacement
MWO-403240 ANO-1 10-Year PM SFPLI Chan-4 for Clock Battery Replacement	MWO-413618 ANO-2 10-Year PM SFPLI Chan-2 for Clock Battery Replacement
1FSG-004 – ANO-1 ELAP DC Load Management (draft)*	2FSG-004 – ANO-2 ELAP DC Load Management (draft)*

\* NRC Order EA-12-049 FLEX strategies implementation is pending for both ANO units. Reference 1CNA051402, ML14114A697, relative to ANO-1 schedule relaxation.

\*\* ANO-2 SFPI installation is pending or in-progress.