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February 27, 2013

AEP-NRC-2013-14
10 CFR 50.54(f)
10 CFR 50.4

Docket Nos.: 50-315
50-316

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-001

Subject: Donald C. Cook Nuclear Plant Unit 1 and Unit 2
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)

References:

1. Nuclear Regulatory Commission Order Number EA-12-051, Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012.
2. NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, dated August 2012.
3. Nuclear Regulatory Commission JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0, dated August 29, 2012.

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-051 (Reference 1) to Donald C. Cook Nuclear Plant (CNP) Units 1 and 2. Order EA-12-051 was immediately effective and directed CNP to establish reliable indication of the water level in associated spent fuel pool storage pools that is capable of supporting identification by trained personnel of the following pool water level conditions: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and (3) level where fuel remains covered and actions to implement make-up water additions should no longer be deferred.

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Order EA-12-051 also requires that an overall integrated plan be provided no later than February 28, 2013, stating how the requirements of the Order will be achieved.

NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (Reference 2) provides an approach for complying with order EA-12-051. NRC Interim Staff Guidance JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Instrumentation, (Reference 3) endorses the methodologies and guidance provided by Reference 2, subject to the clarifications and exceptions specified in Reference 3.

Enclosure 1 provides an Affirmation. Enclosure 2 provides the Integrated Plan for CNP's approach for complying with Order EA-12-051 using the methods described in Reference 2 and 3. Six month progress reports will be provided consistent with the requirements of Order EA-12-051.

This letter contains no new regulatory commitments. If there are any questions regarding this plan, please contact Mr. Michael K. Scarpello, Manager, Nuclear Regulatory Affairs, at (269) 466-2649.

Sincerely,

Joel P. Gebbie
Site Vice President

DMB/ssl

Enclosures: 1. Affirmation
2. Overall Integrated Plan For Donald C. Cook Nuclear Power Plant Units 1 & 2 Spent Fuel Pool Instrumentation

c: C. A. Casto, NRC Region III
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Enclosure 1 to AEP-NRC-2013-14

**AFFIRMATION**

I, Joel P. Gebbie, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

Indiana Michigan Power Company

Joel P. Gebbie
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 27 DAY OF February, 2013

Notary Public

My Commission Expires 04-04-2018

DANIELLE BURGOYNE
Notary Public, State of Michigan
County of Berrien
My Commission Expires 04-04-2018
Acting In the County of Berrien

ENCLOSURE 2 TO AEP-NRC-2013-14

# Overall Integrated Plan For Donald C. Cook Nuclear Power Plant Units 1 & 2 Spent Fuel Pool Instrumentation

# Overall Integrated Plan
# For Donald C. Cook Nuclear Plant Units 1 & 2
# Spent Fuel Pool Level Instrumentation

**American Electric Power**
**Donald C. Cook Nuclear Plant**
**One Cook Place**
**Bridgman, MI 49106**

# I. Introduction and Applicability

## 1) Applicability

This integrated plan applies to Indiana-Michigan Power (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2.

## 2) Introduction

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Order EA-12-051, *Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation*, (Reference 1) to I&M. The Order was immediately effective and directed CNP to establish reliable indication of the water level in associated spent fuel storage pools that is capable of supporting identification by trained personnel of the following pool water level conditions: (1) level that is adequate to support operation of the normal fuel pool cooling system, (2) level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool (SFP) operating deck, and (3) level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.

Order EA-12-051 also requires that an overall integrated plan be provided no later than February 28, 2013, stating how the requirements of the Order will be achieved.

NEI 12-02, *Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,"* (Reference 4) provides an approach for complying with order EA-12-051. NRC Interim Staff Guidance JLD-ISG-2012-03, *Compliance with Order* EA-12-051, *Reliable Spent Fuel Pool Instrumentation, (*Reference 3) endorses the methodologies and guidance provided by NEI 12-02, Revision 1, subject to the clarifications and exceptions specified in Reference 3.

This integrated plan provides the CNP approach for complying with Order EA-12-051 using the methods described in NEI 12-02 and the guidance within NRC JLD-ISG-2012-03. Six month progress reports will be provided consistent with the requirements of Order EA-12-051.

# II. Schedule

Installation of reliable SFP level instrumentation will be completed prior to startup from the second refueling outage following submittal of this SFP Instrumentation Integrated Plan for CNP Unit 1, currently scheduled for Fall 2014.

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6 month status reports.

| Original Target Date | Activity | Status<br><br>*{Include date changes in this column}* |
|---|---|---|
| October 2012 | Submit 60 Day Status Report | Complete |
| February 28, 2013 | Submit Overall Integrated Implementation Plan | Complete with this submittal |
| March 27, 2013 | Unit 1 refueling outage (1st RFO) start | |
| April 2013 | Commence Engineering Modification Design, order electronics | |
| August 28, 2013 | Submit 6 Month Status Report | |
| December 2013 | Complete design, Receive electronics | |
| February 2014 | Submit 6 Month Status Report | |
| June 2014 | Commence Installation | |
| August 2014 | Submit 6 Month Status Report | |
| August 2014 | Issue Maintenance Procedures | |
| September 2014 | Implement Training | |
| November 2014 | Unit 1 refueling Outage (2nd RFO) complete | |
| November 2014 | Complete functional test | |
| February 2015 | Submit Completion Report | |

## III. Identification of Spent Fuel Pool Water Levels

CNP Units 1 and 2 share a common SFP. The SFP is located within the Auxiliary Building with the Spent Fuel deck at the 650' elevation. The pool is constructed of reinforced concrete, and lined with 1/4-inch thick stainless steel plate from approximately the 646'

elevation to the bottom of the pool at approximately the 606' elevation (Reference 8). All movement of fuel for spent fuel transfer operations is completed underwater, and the water is of sufficient depth to maintain a nominal 10 feet of shielding water above the active fuel.

## Spent Fuel Pool Levels 1, 2 and 3

1) **Level adequate to support operation of the normal fuel pool cooling system - Level 1:** Normal spent fuel pool level is 645'-1-1/2" (Reference 9). The CNP Spent Fuel Pool Instrumentation (SFPI) system will meet or exceed the Level 1 monitoring requirements (a resolution of 1 foot) provided in NEI 12-02, Section 2.3, Figure 1.

2) **Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck - Level 2:** 630'-3-1/2" is approximately 10'-0" above the highest point of the fuel racks (References 10 and 11). The CNP SFPI system will meet or exceed the Level 2 monitoring requirements (a resolution of 3.5 foot) provided in NEI 12-02, Section 2.3, Figure 1.

3) **Level where fuel remains covered – Level 3:** 620'-3-1/2" is the nominal level of the highest fuel rack. (References 10 and 11).

# IV. Instruments

Design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4) with exceptions and clarifications as detailed below.

The primary and backup SFPI channels will consist of fixed components. The plan is for both channels to utilize electric field perturbation guided radar technology which is an ultra-wideband guided radar technique utilizing time domain reflectometry electronics and specialized signal processing software. The primary and backup instrument channels are comprised of a fully immersible liquid level probe suspended in the SFP, a signal processor, and a coaxial cable. The probe is suspended at or just below the SFP deck to the top of the spent fuel racks. The coax cable is connected to the top of the probe and the signal processor. The signal processor is a panel mount instrument housed in a stainless steel enclosure with a display screen showing SFP level numerical read out with continuous indication.

The measured range provides continuous indication from normal water level to the top of the fuel racks (645'-1 ½" to 620'-3-1/2") and encompass NEI 12-02 monitoring Level 1 to Level 3 (Reference 9 and 10).

# V. Reliability

Reliability of the primary and backup instrument channels will be in conformance with the guidelines of NRC JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4), as discussed in Section 3.4, Qualification and 3.8, Testing. Reliable level indication will be

functional during all modes of operation consistent with NEI 12-02 (Reference 4) Section 4.3, Testing and Calibration.

# VI. Instrument Channel Design Criteria

Instrument channel design criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4).

## A. Arrangement

SFP level sensors will be installed near the Northwest and Northeast corners of the SFP to maintain separation within the SFP area. These locations will provide reasonable protection against missiles. The primary and backup channels signal processors will be located in the Auxiliary Building in independent locations and installed with seismic supports. I&M has not determined the exact location for the level sensors at this time.

The design of the sensor and sensor support will allow the fuel handling machine to pass over it without interference. Cabling for the primary and backup channel instruments will be routed in separate raceways and seismically mounted. Cables from the sensors in the SFP area will be routed in dedicated rigid steel conduits and routed to minimize interference with fuel handling activities.

## B. Mounting

Mounting of the primary and backup channel instruments will be Seismic Class I. Installed equipment will be seismically qualified to withstand the maximum seismic ground motion considered in the design of the plant area in which it is installed.

## C. Qualification

The primary and backup instrument channels will be reliable at the temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for 7 days.

Instrument channel reliability will be demonstrated via an appropriate combination of design, analysis, operating experience, and/or testing of channel components for the following set of parameters:

- Conditions in the area of the instrument channel component use for all instruments;
- Effects of shock and vibration on instrument channel components used during and following any applicable event for installed components; and
- Seismic effects on instrument channel components used during and following a potential seismic event for installed components.

Augmented quality requirements, similar to those applied to fire protection, will be applied for this project.

The temperature, humidity, and radiation levels consistent with conditions in the vicinity of the SFP and the area of use considering normal operational, event, and post-event conditions for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies resulting from Order EA-12-049 (Reference 2) will be addressed in the engineering design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

a. radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with the SFP water level at Level 3 as described in Order 12-EA-051 (Reference 1);
b. temperature of 212 degrees F and 100% relative humidity environment;
c. boiling water and/or steam environment;
d. a concentrated borated water environment; and
e. the impact of FLEX mitigating strategies.

Components of the instrument channels installed in the SFP area will be qualified for shock and vibration using one or more of the following methods:

a. components are supplied by manufacturers using commercial quality programs with shock and vibration requirements included in the purchase specification at levels commensurate with portable hand-held device or transportation applications;
b. components have a substantial history of operational reliability in environments with significant shock and vibration loading , such as portable hand-held device or transportation applications; or
c. components are inherently resistant to shock and vibration loadings, such as cables.

Applicable components of the instrument channels are rated by the manufacturer (or otherwise tested) for seismic impact at levels commensurate with those of postulated design basis event conditions in the area of instrument channel component usage (with the exception of battery chargers and replaceable batteries). The following measures will be used to verify that the design and installation is adequate:

a. Demonstration of seismic motion consistent with that of existing design basis loads at the installed location;
b. Substantial history of operational reliability in environments with significant vibration, such as for portable hand-held devices or transportation applications. Such a vibration design envelope will be inclusive of the effects of seismic motion imparted to the components proposed at the location of the installation;

c. Adequacy of seismic design and installation is demonstrated based on the guidance in Sections 7,8,9, and 10 of IEEE Standard 344-2004 (Reference 6), *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations,* or a substantially similar industrial standard;
d. Demonstration that proposed devices are substantially similar in design to models that have been previously tested for seismic effects in excess of the plant design basis at the location where the instrument is to be installed (g-levels and frequency ranges); or
e. Seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.

## D. Independence

The primary instrument channel will be independent of the backup instrument channel. The primary and backup instrument channel sensors will be located near separate corners of the SFP and the signal processors will be located in separate locations of the Auxiliary Building, placed to optimize access by personnel in normal, event, or post-event conditions. Cabling for the primary and backup instrument channels will be routed separately. The power sources for the primary and backup channels will be from separate 120VAC buses/switchgear.

## E. Power Supplies

The primary and backup instrument channels will each be powered from independent 120V AC power sources and will have a dedicated battery backup. A minimum battery life of 72 hours will be provided to allow for power restoration from portable equipment.

## F. Accuracy

The primary and backup instrument channels will be designed such that they will maintain their design accuracy without recalibration following a power interruption or change in power source.

The accuracy of the primary and backup instrument channels will be consistent with the guidelines of JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4). Accuracy will be within the resolution requirements of Figure 1 of NEI 12-02 (Reference 4).

## G. Testing

Instrument channel design will provide for routine testing and calibration consistent with the guidelines of JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4) and provide for in situ testing.

### H. Display

The primary and backup SFP level displays will be continuously provided at the associated Signal processing units. The signal processing unit will be located to allow personnel access during normal, event, and post-event conditions and to facilitate display observation during normal operation and during implementation of post-event FLEX strategies.

## VII. Instrument Channel Program Criteria

Instrument channel program criteria will be consistent with the guidelines of JLD-ISG-2012-03 (Reference 3) and NEI 12-02 (Reference 4).

### A. Training

A systematic approach to training will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Personnel will complete training prior to being assigned responsibilities associated with the new SFP level instrumentation instruments.

### B. Procedures

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP level instrumentation.

Procedures will address the following situations:

i. if, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel ceases to function, its function will be recovered within a period of time consistent with the emergency conditions that may apply at the time;
ii. if, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel component needs to be replaced, a commercially available component may be used even if it does not meet all of the qualifications to maintain the instrument channel functionality; and
iii. CNP will utilize a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with implementation of NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide* (Reference 5).

### C. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup SFP level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations or

other documented basis. Calibration will be specific to the mounted instrument and the monitor.

## VIII. Need for Relief and Basis

I&M is not requesting relief from the requirements of Order EA-12-051 (Reference 1) or the guidance in NRC JLD-ISG-2012-03 (Reference 3) at this time. Consistent with the requirements of Order EA-12-051 (Reference 1) and the guidance in NEI 12-02 (Reference 4), the six-month reports will delineate progress made, any proposed changes in our compliance methods, updates to the schedule, and, if needed, requests for relief and their bases.

## IX. References

1) EA-12-051, Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool instrumentation, March 12, 2012
2) EA-12-049, Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, March 12, 2012
3) NRC JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, Revision 0, August 29, 2012
4) NEI 12-02, Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, "Revision 1, August 2012
5) NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, August 2012
6) IEEE Standard 344-2004, IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
7) CNP Unit 1 and 2 Final Safety Analysis Reports, Revision 24
8) Drawing 12-3801, Unit 1 & 2 Auxiliary Building Spent Fuel Pit & Fuel Transfer Canal Stainless Steel Liner Sections and Details Sh 2 of 4
9) Drawing OP-12-5136, flow Diagram Spent Fuel Pit Cooling & Clean-up Unit 1 & 2
10) ECP 12-R5-01, Spent Fuel Pit Level Instrumentation
11) Drawing DC-06033, Rack Construction mixed region storage racks