Omaha Public Power District
444 South 16th Street Mall
Omaha, NE 68102-2247

LIC-13-0011
February 28, 2013

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

References:
1. Docket No. 50-285
2. NRC Order Number EA-12-051, "Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ML12056A044) (NRC-12-0023)
3. NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated August 2012 (ML12240A307)
4. NRC Interim Staff Guidance, JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012 (ML12221A339)
5. Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk), "OPPD Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated October 27, 2012 (ML12305A311) (LIC-12-0155)

SUBJECT: Fort Calhoun Station Spent Fuel Pool Instrumentation Overall Integrated Plan

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an Order (Reference 2) to all power reactor licensees and holders of construction permits in active or deferred status. The Order was immediately effective and requires the Omaha Public Power District (OPPD) to have a reliable indication of the water level in Fort Calhoun Station's spent fuel storage pool. Specific requirements for such indication are described in Attachment 2 of the Order. The Order also requires that an overall integrated plan for achieving compliance with these requirements be submitted by February 28, 2013. OPPD's overall integrated plan is attached.

The Nuclear Energy Institute (NEI) has provided guidance (Reference 3) to the industry for compliance with the Order. The NEI guidance was endorsed by the NRC (with exceptions and clarifications) in the Interim Staff Guidance (ISG) (Reference 4), which describes methods acceptable to the NRC for complying with the Order.

OPPD has received the ISG and has developed its overall integrated plan in accordance with the Order's guidance for reliable indication of water level in the spent fuel storage pool.

Reference 5 provided OPPD's initial status report regarding mitigation strategies. The attached plan is based on conceptual design information. Final design details and associated procedure guidance, as well as any revisions to the information contained in the attachment, will be provided in the 6-month updates required by the Order.

If you should have any questions regarding this submittal, please contact Mr. Bill R. Hansher at (402) 533-6894.

No regulatory commitments are contained in this submittal.

I declare under penalty of perjury that the foregoing is true and correct. Executed on February 28, 2013.

Sincerely,

Louis P. Cortopassi
Site Vice President - CNO

LPC/JKG/mle

Attachment: Fort Calhoun Station Overall Integrated Plan with Regard to Reliable Spent Fuel Pool Instrumentation

c: E. J. Leeds, Director of Office of Nuclear Reactor Regulation
E. E. Collins, Jr., NRC Regional Administrator, Region IV
L. E. Wilkins, NRC Project Manager
J. M. Sebrosky, NRC Project Manager
J. C. Kirkland, NRC Senior Resident Inspector

Fort Calhoun Station Overall Integrated Plan with Regard to Reliable Spent Fuel Pool Instrumentation

I. Introduction

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) on March 12, 2012. The Order requires licensees to have a reliable indication of the water level in associated spent fuel storage pools capable of supporting identification of the following pool water level conditions by trained personnel: (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 addition should no longer be deferred. The Order also requires the submittal of an overall integrated plan that provides a description of 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 3) provides an approach for complying with Order EA-12-051. The NRC Interim Staff Guidance (ISG), JLD-ISG-2012-03, *Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation*, (Reference 2) considers that the methodologies and guidance in conformance with the guidelines provided in NEI 12-02, Revision 1, subject to the clarifications and exceptions specific to Section 3.4, Qualification, are an acceptable means of meeting the requirements of Order EA-12-051.

This overall integrated plan provides the Fort Calhoun Station (FCS) approach for complying with Order EA-12-051 using the methods described in NRC JLD-ISG-2012-03. The current revision of the Fort Calhoun Station Overall Integrated Plan is based on our conceptual design information and will be revised as we proceed with detailed design engineering. Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, our 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 the bases.

II. Schedule

Installation of reliable spent fuel pool level instrumentation is scheduled to be completed two refueling outages after FCS starts up from its current shutdown, which would be prior to startup from Refueling Outage (28) scheduled to begin in the spring of 2016. This is an update of the schedule provided in Reference 4 based on the anticipated startup date from the current shutdown.

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.

The current milestones are:

Commence Engineering and Design	3Q 2013
Complete Design	2Q 2015
Receipt of Spent Fuel Pool (SFP) Instruments	3Q 2015
Complete Functional Test of SFP Instruments	1Q 2016
SFP Instrument Operational and Training complete	2Q 2016

III. Identification of Spent Fuel Pool Water Levels

Key spent fuel pool water levels:

1. **Level adequate to support operation of the normal fuel pool cooling system** – Indicated level on either the primary or backup instrument channel will be approximately elevation 1034.6' (existing low level alarm LIA-2846, 39.1 feet above pool floor) plus the accuracy of the SFP level instrument channel and the current LIA-2846 low water level alarm. The Level 1 elevation is approximately 23 feet above the lowest spent fuel pool cooling suction line, and is a conservative elevation that has been established above the lowest spent fuel pool cooling suction line. The exact elevation for Level 1 will be determined during the detailed design and engineering phase, but will be approximately the same as the low-level alarm elevation of the current LIA-2846 instrument.

2. **Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck** - Indicated level on either the primary or backup instrument channel will be approximately elevation 1020' plus the accuracy of the SFP level instrument channel, which is to be determined. This elevation is approximately 10' above the top of the spent fuel storage racks (Reference 7). The top of the spent fuel storage racks is approximately at elevation 1009'-7" (per Reference 7). The top of the active fuel area is approximately elevation 1007'-5" and as such approximately an additional 2.5' of water shielding is available through setting the Level 2 elevation at 1020'. The Level 2 elevation of 1020' is approximately 12'-7" above the top of the active fuel. This water level should provide substantial radiation shielding for personnel to respond to Beyond-Design-Basis external events and initiate any SFP makeup strategies.

3. **Level where fuel remains covered** - Indicated level on either the primary or backup instrument channel will be approximately elevation 1011' (approximately one foot above the top of the highest spent fuel rack) plus the accuracy of the SFP level instrument channel, which is to be determined. This elevation is approximately 1' above the top of the spent fuel rack. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack. Setting Level 3 elevation at 1011' provides a water level of approximately 3.5' over the top of the active fuel region.

IV. Instruments

Design of the instruments will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 as discussed below.

Primary and backup instrument channels will consist of fixed components. The plan is for both channels to utilize guided wave radar, which functions according to the principle of time domain reflectometry (TDR). A generated pulse of electromagnetic energy travels down the probe. Upon reaching the liquid surface, the pulse is reflected and based upon reflection times level is inferred. Guided wave radar attributes:

- The guided wave radar assembly is a fixture located close to the operating level floor that suspends the probe into the pool. The guided wave radar assembly is small and as such is easier to protect from event-generated missiles or falling objects.
- Guided wave radar is effectively immune to interference as the signal stays in the immediate vicinity. Details regarding probe signal and transmission of signal will be included in the design and engineering phase of the project. It is unknown at this point in time if any wireless components will be utilized to transmit signals. This information will be provided in the six-month updates.
- The technology is immune to the changes in temperature or the specific gravity of the SFP water.
- The technology is capable of high resolution over the length of the probe.

Measured range will be continuous over the range of the length of the probe starting at normal operating level.

Primary instrument channel level sensing components will be located in the northeast corner of the SFP. Backup instrument channel level sensing components will be located in the southwest corner of the SFP. See *Plan View of SFP Showing New SFP Level Instrumentation* in Section XVIII, Drawings.

V. Reliability

Reliability of the primary and backup instrument channels will be assured by conformance with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, as discussed in Section IX, Qualification. Reliable level indication will be provided whenever water and fuel are in the pool consistent with Section XIII, Testing.

VI. Instrument Channel Design Criteria

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

The guided wave radar probes will be designed and installed to be consistent with guidelines of NRC JLD-ISG-2012-03 and NEI 12-02. Specifics about the design of the probes will be

provided in the 6-month update. FCS continues to work with the Utility Services Alliance for procurement of this technology.

Boron deposits are not expected to adversely impact probe performance. Periodic cleaning of deposits on the probe at the air-water interface will be determined during the engineering and design phase. Discussions with the guided wave technology vendor in regards to boron deposits have been initiated and details for any maintenance will be provided in FCS procedures upon installation of the probes.

The remaining design requirements will be met through the selection of the probes and through the engineering and design phase.

VII. Arrangement

SFP level probes are proposed to be installed in the southwest and northeast corners of the SFP (diagonally opposite corners). Details of the probe locations will be finalized in the design and engineering phase. Details related to location of the transmitters and the cabling have not been finalized at this point in time and will be part of the design and engineering phase of the project.

Supports for the probes will be designed to shield the components from event-generated missiles. In the conceptual design, the SFP probes bolt to a mounting plate for installation at the corner of the SFP, or a plate for mounting near the side of the SFP. This mounting option will allow the probe to be installed within a few inches of the SFP liner, minimizing the chances of interference with other structures, and occupying limited space on the SFP deck. To the greatest extent possible, the supports will allow the fuel-handling machine to pass over them without interference. Details of the supports will be addressed in the design and engineering phase of the project. The location of the probes will not interfere with fuel cask handling transfers.

Cabling for power supplies and indications for each channel will be routed in separate conduits from cabling for the other channels.

Planned locations for SFP level displays will be in a mild environment of the Auxiliary Building providing adequate protection from temperature, humidity, and radiation. Preliminarily, one channel will be located in a remote location in the Ventilation Equipment Room near FLEX strategy equipment, and one SFP level display is to be mounted in the Alternate Shutdown Panel in the Upper Electrical Penetration Room. Both locations have ready access by operators.

VIII. Mounting

Both the primary and backup system will be installed as Seismic Class I to meet the NRC JLD-ISG-2012-03 and NEI 12-02 guidance requirements.

IX. Qualification

Both channels will be reliable at temperature, humidity, and radiation levels consistent with the spent fuel pool water at saturation conditions for an extended period. Post event temperature at probes located above the SFP is assumed to be 212°F. Post event humidity in the Auxiliary Building near and above the SFP is assumed to be 100% with condensing steam. Equipment will be qualified for expected conditions at the installed location assuming that normal power is unavailable and that the SFP has been at saturation for an extended period. Equipment located in the vicinity of the SFP will be qualified to withstand peak and total integrated dose radiation levels for its installed location assuming that post event SFP water level is equal to SFP Level 3 for an extended period.

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

- conditions in the area of instrument channel component use for all instrument components,
- effects of shock and vibration on all instrument channel components, and
- seismic effects on instrument channel components used during and following a potential seismic event for only installed components.

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

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 will be addressed in the engineering and design phase. Examples of post-event (beyond-design-basis) conditions that will be considered are:

- radiological conditions for a normal refueling quantity of fuel in the pool.
- temperatures of 212°F and 100% relative humidity environment,
- boiling water and/or steam environment,
- a concentrated borated water environment.

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

- 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;
- 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
- Components are inherently resistant to shock and vibration loadings, such as cables.

For seismic effects on instrument channel components used after a potential seismic event for only installed components (with the exception of battery chargers and replaceable batteries), the following measures will be used to verify that the design and installation is adequate. Applicable components of the instrument channels are rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the area of instrument channel component use using one or more of the following methods:

- demonstration of seismic motion will be consistent with that of existing design basis loads at the installed location;
- 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 proposed installation;
- adequacy of seismic design and installation is demonstrated based on the guidance in IEEE Standard 344-2004, *IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations*, (Reference 5) or a substantially similar industrial standard;
- 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
- seismic qualification using seismic motion consistent with that of existing design basis loading at the installation location.
- The procurement specification for the probes has specified that the probes are to be evaluated to two times safe shutdown earthquake requirements.

X. Independence

The primary and backup instrument channels are of the same technology, are permanently installed, separated by distance and utilize independent power supplies.

XI. Power Supplies

The two instrumentation channels will each be powered normally by a separate power supply and will have dedicated batteries and local battery chargers. Minimum battery life of 72 hours will be provided. The battery systems will include provision for battery replacement should the battery charger be unavailable following the event. Spare batteries will be available. In the event of a loss of normal power, the battery chargers could be connected to another suitable power source.

XII. Accuracy

Instrument channels will be designed such that they will maintain their design accuracy following a power interruption or change in power source without recalibration.

Accuracy will consider SFP conditions, e.g., saturated water, steam environment, or concentrated borated water. Additionally, instrument accuracy will be sufficient to allow trained personnel using plant procedures to determine when the actual level exceeds the specified lower level of each indicating range (levels 1, 2, and 3) without conflicting or ambiguous indication. The accuracy will be within the resolution requirements of Figure 1 of NEI 12-02.

XIII. Testing

Instrument channel design will provide for routine testing and calibration consistent with Order EA-12-051 and the guidance in NEI 12-02.

XIV. Display

Remote indication will be provided in the alternate safe shutdown panel in the Auxiliary Building Upper Electrical Penetration Room. The other remote indication will be provided with portable equipment located near FLEX equipment along the north wall of the Ventilation Equipment Room. It has not been determined at this point in time if a readout will be provided in the control room or with the plant computer display system. That determination will be made during the design and engineering phase.

The display in the alternate shutdown panel Upper Electrical Penetration Room will be:

- promptly accessible to the appropriate plant staff giving appropriate consideration to various drain down scenarios,
- outside of the area surrounding the SFP floor, e.g., an appropriate distance from the radiological sources resulting from an event impacting the SFP,
- inside a structure providing protection against adverse weather, and
- outside of any very high radiation areas or LOCKED HIGH RAD AREA during normal operation.

Each instrument channel (Primary and Backup) will have the capability to drive an external remote 4 – 20 milliamp (ma) loop that can be used to provide level indication at a second display location or be used as an input to the plant computer. Failure of the external remote 4 – 20 ma signal will not adversely impact the primary display located in the transmitter (electronics) enclosure.

XV. Instrument Channel Program Criteria

Instrument channel program criteria will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02.

A. Training

FCS training programs and processes will be used to identify the population to be trained and to determine both the initial and continuing elements of the required training. Training will be completed prior to placing the instrumentation in service.

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 instrumentation consistent with NEI 12-02.

Procedures will address 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 6). The details of the procedure implementation will be linked to NRC Order 12-049, *Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events* (Reference 8). Procedures will address the following situations:

- 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.
- If, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel component must be replaced, we may use commercially available components that may or may not meet all of the qualifications (Section IX) to maintain the instrument channel functionality.

C. Testing and Calibration

Processes will be established and maintained for scheduling and implementing necessary testing and calibration of the primary and backup spent fuel pool level instrument channels to maintain the instrument channels at the design accuracy. Testing and calibration of the instrumentation will be consistent with vendor recommendations and any other documented basis. Calibration will be specific to the mounted instrument and the monitor.

XVI. Need for Relief and Basis

FCS is not requesting relief from the requirements of Order EA-12-051 or the guidance in NRC JLD-ISG-2012-03 at this time.

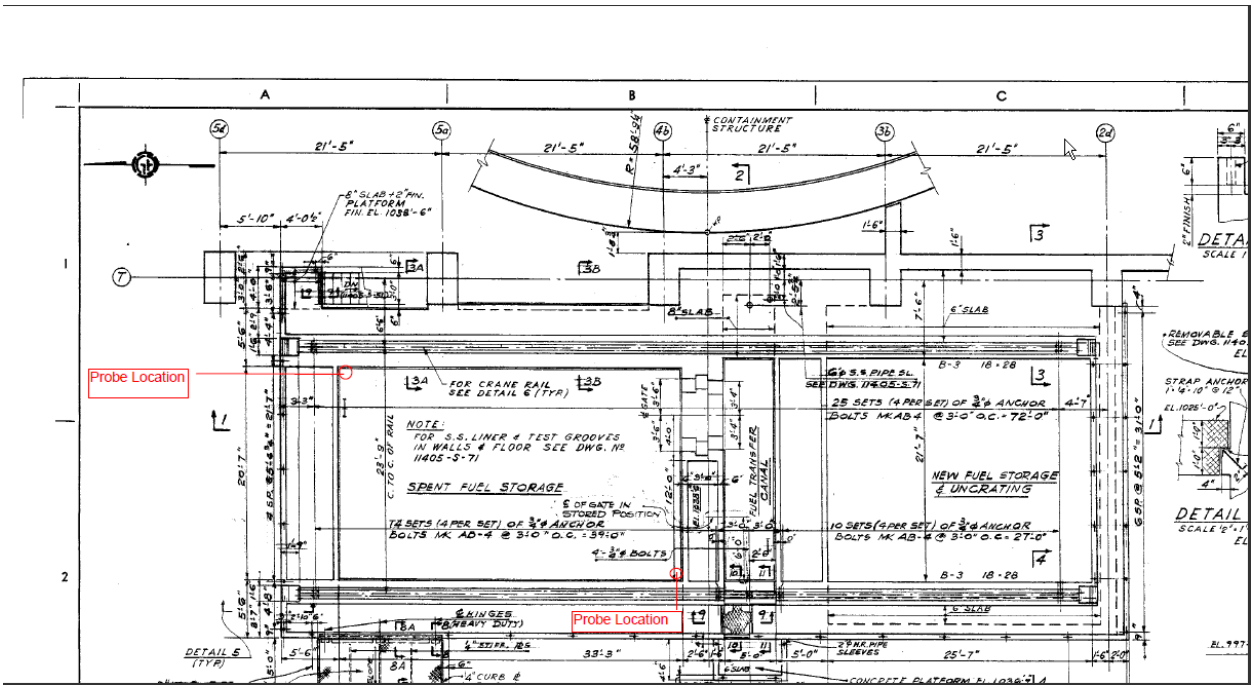
Consistent with the requirements of Order EA-12-051 and the guidance in NEI 12-02, our six-month reports will delineate progress made, any proposed changes in our compliance methods, updates to the schedule, and if needed, requests for relief and their bases.

XVII. References

1) EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," March 12, 2012 (ML12056A044) (NRC-12-0023)
2) NRC ISG JLD-ISG-201 2-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, August 29, 2012 (ML12221A339)
3) NEI 12-02, "Industry Guidance for Compliance with NRC Order EA-1 2-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool I nstrumentation," Revision 1, August 2012 (ML12240A307)
4) Letter from OPP D (L. P. Cortopassi) to NRC (Document Control Desk), "OPPD I nitial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requir ements for Reliable S pent Fuel Pool Instrumentation (Order Number EA-12-051)," October 27, 2012 (ML12305A311) (LIC-12-0155)
5) IEEE Standard 344-2004, IEEE Recommende d Practice f or Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations
6) NEI 12-06, "Diverse a nd Flexible Coping Strategies (FLEX) Implementation Guide," August 2012 (ML12242A378)
7) Letter from NRC (S. Bloom) to OPPD (T. L. Patterson), "Fort Calhoun Station, Unit No. 1 - Amendment No. 155 to Facility Operating License No. DPR-40 (T AC No. M85116)," August 12, 1993 (NRC-93-0293)
8) EA-12-049, "Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis Exte rnal Events," Ma rch 12, 201 2 (ML12056A045) (NRC-12-0020)

XVIII. Drawings

Plan View of SFP Showing New SFP Level Instrumentation



XIX. Open Items

Fort Calhoun Station has identified no open items related to the Spent Fuel Pool Instrumentation Overall Integrated Plan submittal.