Burkhardt, Janet

From: Wilkins, Lynnea
Sent: Thursday, September 12, 2013 4:10 PM
To: Van Der Kamp, David (dwvande@nppd.com)
Cc: Kirkpatrick, Brenda M. (bmkirkp@nppd.com); Flaherty, James R. (jrflahe@nppd.com); Burkhardt, Janet
Subject: RAI for Cooper Re: Reliable Spent Fuel Pool Instrumentation Order Response (Overall Integrated Plan) (MF0971)

Dave,

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13070A007), Nebraska Public Power District submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No.ML12054A679) for Cooper Nuclear Station. The U. S. Nuclear Regulatory Commission (NRC) staff endorsed Nuclear Energy Institute (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 (ADAMS Accession No. ML12240A307), with exceptions, as documented in Interim Staff Guidance (ISG) 2012-03 "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed your submittal and has determined that the information specified in the Request for Additional Information (RAI) below is needed for the staff to complete its evaluation. On September 12, 2013, a teleconference was held with Ms. Brenda Kirkpatrick and others of your staff. Ms. Kirkpatrick stated that a response to the RAIs would be provided within 30 days of this email.

Please contact me if you have any questions.

Thanks
Lynnea

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REQUEST FOR ADDITIONAL INFORMATION

OVERALL INTEGRATED PLAN IN RESPONSE TO

ORDER EA-12-051 "RELIABLE SPENT FUEL POOL INSTRUMENTATION"

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13070A007), Nebraska Public Power District submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No.ML12054A679) for Cooper Nuclear Station. The U. S. Nuclear Regulatory Commission (NRC) staff endorsed Nuclear Energy Institute (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 (ADAMS Accession No. ML12240A307), with exceptions, as documented in Interim Staff Guidance (ISG) 2012-03 "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 28, 2013, response by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its Technical Review. If any part of this information is not available within the 30-day response period for this RAI, please provide the date this information will be submitted.

2.0 LEVELS OF REQUIRED MONITORING

The OIP states, in part, that

> Level 1 – Level adequate to support operation of the normal fuel pool cooling system. Level 1 elevation for Cooper Nuclear Station will be at 999' 7" based on the bottom of the weir that leads to the skimmer surge tanks (CNS Dwg. 1330-17 Det. 1 & IA, Ref. 9.8). This equates to a water level of 37' 4" above the bottom of the SFP (CNS Dwg. 4230 sect. 856, Ref. 9.9) or 22' 1-5/8" above the top of the spent fuel racks (CNS Dwg. 80EI 143, Ref. 9.10). This is consistent with the guidance provided in NEI 12-02 sect. 2.3.1. The Cooper SFP instrumentation system Level 1 monitoring will meet or exceed the Level 1 monitoring requirements provided in NEI 12-02.
>
> Level 2 – Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck.

ENCLOSURE

Level 2 elevation for Cooper Nuclear Station will be at 987' 5-3/8". This equates to a water level of 25' 2-3/8"' above the bottom of the SFP (CNS Dwg. 4230 sect. 856, Ref. 9.9). This elevation is based on a water level of 10 feet above the top of the fuel racks in the SFP in accordance with NEI 12-02 sect. 2.3.2. The minimum shielding required is reflected in USAR XII sect. 3.3.2 (Ref. 9.6) which states in part, "For purposes of providing adequate shielding, a minimum of 8-1/2' of water is maintained above irradiated fuel located in the Spent Fuel Pool." The NEI 12-02 guidance of 10 feet of water exceeds the 8-1/2 feet minimum requirement, so it will be used as the basis for Level 2.

Level 3 – Level where fuel remains covered. Level 3 elevation for Cooper Nuclear Station will be at 977' 5-3/8". This equates to a water level of 15' 2-3/8"' above the bottom of the SFP. This elevation is based on a water level that is even with the top of the fuel racks (CNS Dwg. 80EI 143, Ref. 9.10) in the SFP in accordance with NEI 12-02 Section 2.3.3. It should be noted that although approximately 3-5/8" of a fuel assembly's lifting bail will extend above the top of the fuel racks at this water level, all of the irradiated fuel will remain below the top of the fuel racks, and thus submerged.

RAI-1

Please provide a clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values representing Level 1, Level 2, and Level 3 as well as the top of the fuel racks. Indicate on this sketch the portion of the level sensor measurement range that is sensitive to measurement of the fuel pool level, with respect to the Level 1, Level 2, and Level 3 datum points.

3.0 INSTRUMENTATION DESIGN FEATURES

3.2 Arrangement

The OIP states, in part, that

Probes:
The primary and backup level sensing probes will be located in the SFP separated by a distance that is comparable to the shortest side of the pool. These locations will provide the needed separation of the channels to provide reasonable protection against a single missile damaging both the primary and backup SFP indication. This is in accordance with the guidance provided in NEI 12-02 Section 3.2 which provides as one of the example arrangements, "separated by a distance comparable to the shortest length of side of the pool."

Signal Processors and Indication:
The primary and backup channel's signal processors will be located within the control building. As a result, SFP level indication will be accessible without requiring entry into the reactor building. The signal processors will be separated by a sufficient distance and/or barrier(s) in order to prevent physical damage due to a common cause. Also, the control building is designed to protect equipment within it from external missiles.

Cable Routing:
The power and signal cable required for each channel will be routed separately from the other channel. Conduit supports that are qualified for seismic class I applications will be used for routing all conduit in both the reactor and the control buildings. The conduit in the reactor building will be installed to ensure that it will not interfere with fuel handling activities or other activities in the SFP.

RAI-2

Please provide the following:

a) A clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensors, and the proposed routing of the cables that will extend from the sensors toward the location of the local electronics cabinets and read-out/display devices in the main control room or alternate accessible location.

b) In Figure 1 of your submittal, it appears that the sensors will be separated by a distance comparable to the longest side of the pool, however your text states that they will be "separated by a distance that is comparable to the shortest side of the pool." Please clarify this discrepancy.

3.3 Mounting

The OIP states, in part, that

> Mounting of the primary and secondary channel signal processors and probes will be seismic class I. The equipment will be installed in its designated plant area to be seismically qualified to withstand the maximum seismic ground motion considered in the design of that area. This will ensure that the mounting of the equipment will meet the NRC JLD-ISG-2012-03 and NEI 12-02 guidance requirements.

RAI-3

Please provide the following:

a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.

b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections.

c) A description of the manner by which the mechanical connections will attach the level instrument to permanent SFP structures so as to support the level sensor assembly.

3.4 Qualification

The OIP states, in part, that

> Verification that the design and installation of instrument channel components (with the exception of battery chargers and replaceable batteries) is adequate to withstand a potential seismic event will be required. Applicable components of the instrument channels will be 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 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 will be inclusive of the effects of seismic motion imparted to the components at the proposed installation location in the plant.

- Adequacy of seismic design and installation will be demonstrated based on the guidance in Sections 7, 8, 9, and 10 of IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of Class 1 E Equipment for Nuclear Power Generating Stations," (Ref. 9.7) 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.

RAI-4

Please provide the following:

a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under Beyond-Design-Basis (BDB) ambient temperature, humidity, shock, vibration, and radiation conditions.

b) A description of the testing and/or analyses that will be conducted 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 mounted. Include a discussion of this seismic reliability demonstration as it applies to: (a) the level sensor mounted in the SFP area, and (b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders.

c) A description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment such that following a seismic event the instrument will maintain its required accuracy.

3.5 Independence

The OIP states, in part, that

> The primary instrument channel will be independent of the backup instrument channel. The probes for the two channels will be located near the edge of the SFP and separated by a distance that is comparable to the length of the shortest side of the pool.
>
> The signal processors for both the primary and backup instrument channels will be located in the control building. These signal processors will be separated by a distance of at least 20 feet in order to prevent simultaneous physical damage due to a common cause.

Conduit and cable for the primary channel will be routed separately from the conduit and cable for the backup channel. The normal power for the primary and backup channels will be from different divisions of non-essential AC power.

RAI-5

Please provide the following:

a) A description of how the two channels of the proposed level measurement system in each pool meet this requirement so that the potential for a common cause event to adversely affect both channels is minimized to the extent practicable.

b) Further information describing the design and installation of each level measurement system, consisting of level sensor electronics, cabling, and readout devices. Please address how independence of these components of the primary and back-up channels is achieved through the application of independent power sources, physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.

3.6 Power Supplies

The OIP states, in part, that

The power supplies for the instrument channels will be arranged as follows:

- The primary instrument channel will normally receive power from a non-essential, Division I, 120 VAC circuit. In the event of a failure of this circuit, an internal battery for the signal processor will supply the instrument for between 4 and 24 hours. This time can be extended by utilizing an on-demand measurement feature of the processor where indication will be provided only when requested by the operator. An external battery will also be provided which can provide power for up to seven (7) days of continuous use.

- The backup instrument channel will normally receive power from a non-essential Division II, 120 VAC circuit. Since the backup channel is identical to the primary channel, it also has an internal battery for the signal processor which will supply the instrument for between 4 and 24 hours. This time can be extended by utilizing the same on-demand measurement feature as the primary channel. An external battery will also be provided which can provide power for up to seven (7) days of continuous use.

- For both the primary and the backup channels, an external 120 VAC connection will be provided that can be used to supply power to the signal processors. This connection can be used to connect a portable generator or any other 120 VAC source to the signal processors.

RAI-6

Please provide the following:

a) A description of the electrical AC power sources and capacities for the primary and backup channels.

b) If the level measurement channels are to be powered through a battery system (either directly or through an Uninterruptible Power Supply (UPS)), please provide the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the BDB event for the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA-12-049).

3.7 Accuracy

The OIP states, in part, that

> The primary and backup instrument channels will be designed to maintain their design accuracy following a power interruption or change in power source without recalibration. The accuracy of the instrument channels, including display accuracy, will be consistent with the guidelines of NRC JLD-ISG-2012-03 & NEI 12-02.
>
> Both channels will be calibrated with the same range limits. Since the two channels will be identical in design and will be exposed to the same environment, they will provide the same readings within their limits of accuracy at all times. This will prevent the two indications from conflicting with each other.

RAI-7

Please provide the following:

a) An estimate of the expected instrument channel accuracy performance (e.g., in % of span) under both: (a) normal SFP level conditions (approximately Level 1 or higher) and (b) at the BDB conditions (i.e., radiation, temperature humidity, post-seismic and post-shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points.

b) 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.

3.8 Testing

The OIP states, in part, that

> Both the primary and backup instrument channels will be designed to provide for routine in-situ testing and calibration. Details will be determined during the engineering and design phase.

RAI- 8

Please provide the following:

a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.

b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation.

c) A description of how calibration tests and functional checks will be performed and the frequency at which they will be conducted. Discuss how these surveillances will be incorporated into the plant surveillance program.

d) A description of what preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.

3.9 Display

The OIP states, in part, that

> Both the primary and backup instrument channels will have accessible displays available in the control building. Each signal processor has a local display which may be used during normal operations or in the event of a control room evacuation.

RAI-9

Please provide the following:

a) The specific location for the primary and backup instrument channel display.

b) If the primary and backup display locations are not in the main control room, please provide a description of the display location that addresses primary and alternate access route evaluation, continuous habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for verbal communications with decision makers for the various SFP drain down scenarios and external events.

c) The reasons justifying why the locations selected will enable the information from these instruments to be considered "promptly accessible." Include consideration of various drain-down scenarios.

4.0 <u>PROGRAM FEATURES</u>

4.2 Procedures

The OIP states, in part, that

> Procedures will be developed or revised, as necessary, using guidelines and vendor instructions to address the maintenance, operation, and abnormal response issues associated with the new SFP level instrumentation.
>
> Procedures will also address the following situations consistent with the applicable NEI 12-02 guidelines:
>
> - 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, if necessary, it may be replaced with a commercially available component that may or may not meet all of the qualifications in order to maintain the instrument channel functionality.
>
> - Cooper Nuclear Station will have a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with the implementation of NEI 12-06.

RAI-10

Please provide the following:

a) A list of the operating (both normal and abnormal response) procedures, calibration/test procedures, maintenance procedures, and inspection procedures that will be developed for use of the spent fuel pool instrumentation in a manner that addresses the order requirements.

b) A brief description of the specific technical objectives to be achieved within each procedure. If your plan incorporates the use of portable spent fuel level monitoring components, please include a description of the objectives to be achieved with regard to the storage location and provisions for installation of the portable components when needed.

4.3 Testing and Calibration

The OIP states, in part, that

> Processes will be established and maintained consistent with the applicable NEI 12-02 guidelines 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. The testing and calibration of the instrumentation will be consistent with vendor recommendations or other documented basis. Calibration will be specific to the mounted signal processor and display.

RAI-11

Please provide the following:

a) 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 the 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.

b) A description of how the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed.

c) A description of the compensatory actions to be taken in the event that one of the instrument channels cannot be restored to functional status within 90 days.