NRR-PMDAPEm Resource

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Sent: Thursday, July 11, 2013 3:04 PM
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Subject: Prairie Island Units 1 and 2 - Draft RAI RE: OIP for Reliable SFP Instrumentation (TAC Nos. MF0832 and MF0833)
Attachments: PINGP - Draft RAI Concerning OIP for Reliable SFP Instrumentation.pdf

Lynne,

Attached is a draft request for additional information (RAI) concerning the February 26, 2013, submittal (ADAMS Accession No. ML13060A363) regarding the Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation for Prairie Island Nuclear Generating Plant, in response to Order EA-12-051.

Please review this draft RAI and let me know if you would like to have a conference call with the NRC staff to clarify this request. The NRC staff is requesting a 30 day response to this RAI. Please consider this and let's discuss.

Regards,

Tom Wengert
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REQUEST FOR ADDITIONAL INFORMATION

OVERALL INTEGRATED PLAN IN RESPONSE TO

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

NORTHERN STATES POWER COMPANY - MINNESOTA

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

DOCKET NO. 50-282 AND 50-306

1.0 INTRODUCTION

By letter dated February 26, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13060A363), Northern States Power Company, a Minnesota corporation (the licensee), doing business as Xcel Energy submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, U.S. Nuclear Regulatory Commission (NRC), Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2. The 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 26, 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- Support Operation of the Normal Fuel Pool Cooling System
>
> Level 1 is the level that is adequate to support operation of the normal fuel pool cooling system. This level will be based on the top of the cooling system suction pipe location, which is about four feet below the normal pool water level. The minimum level is 21 feet and 1 3/4 inches above the top of the racks (36 feet and 3 3/4 inches from the bottom of the pool). This level will be adequate to assure the normal fuel pool cooling system is available for cooling the spent fuel pool (See Figure 2) and will be used for Level 1. Allowance for instrumentation accuracy will be applied to the setpoint for this level.

Level 2 - Provide Substantial Radiation Shielding for a Person Standing on the Spent Fuel Pool Operating Deck

Level 2 represents the range of water level where any necessary operations in the vicinity of the spent fuel pool can be completed without significant dose consequences from direct gamma radiation from the stored spent fuel. Based on the guidance in Section 2.3 of NEI 12-02, Level 2 is 10 feet (+/- 1 foot) above the top of the spent fuel rack, which corresponds to 25 feet and 8 inches from the bottom of the PINGP spent fuel pool. Therefore, Level 2 will be 25 feet and 8 inches from the bottom of the spent fuel storage pool. Allowance for instrumentation accuracy will be applied to the setpoint for this level.

Level 3 - Fuel Remains Covered and Actions to Implement Make-up Water Addition Should No Longer be Deferred

Level 3 is the level where the fuel remains covered and actions to implement make-up water addition should no longer be deferred. Level 3 will be greater than six inches above the top of the racks or 15 feet and 8 inches above the pool bottom. This level will be adequate to ensure the fuel remains covered (see Figure 2). This level is based on the guidance provided by NEI 12-02 (i.e., +/- one foot of the highest point of the fuel racks in the spent fuel pool). The final setpoint will be established upon installation and will be within one foot of the top of the racks as recommended by NEI 12-02. Allowance for instrumentation accuracy will be applied to the setpoint for this level.

RAI-1

Please provide the following:

a) For level 1, specify how the identified elevation represents the HIGHER of the two points described in the NEI 12-02 guidance for this level.

b) For Figure 2, indicate 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.

c) The OIP states, in section 3.3, Mounting, “An evaluation of other hardware stored in the SFP will be conducted as part of the detailed design to ensure it will not create adverse interaction with the fixed instrument locations.” Please provide a discussion regarding dose rates for stored spent fuel versus that of other material that may be stored in the pool.

3.0 INSTRUMENTATION DESIGN FEATURES

3.2 Arrangement

The OIP states, in part, that

> The two level instruments will be installed in separate pools as shown in Figure 1. The probes will be located approximately 45 feet apart. This distance meets the minimum separation requirement from NEI 12-02, as the shortest length of one pool side is 18 feet and 3 inches. These locations will assure that damage due to missiles is minimized since each instrument is located in a separate pool and is also protected in a pool corner by two walls. In addition, the entire spent fuel pool at PINGP is enclosed in a Class 1 structure designed to protect the pool from tornado generated missiles.
>
> All cabling routing for the primary and backup instrument channels will be protected from external events to meet the requirements of NRC JLD-ISG-2012-03 and NEI 12-02. No cabling will be installed outside structures or in areas subject to external event submergence. The conduit and cable routing will be determined during the design process.

RAI-2

Please modify the sketch in Figure 1 or provide a marked-up plant drawing of the plan view of the spent fuel pool area, depicting the spent fuel pool inside dimensions, the planned locations/ placement of the primary and back-up spent fuel pool 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.

3.3 Mounting

The OIP states, in part, that

> Both the primary and backup system mounting will be installed as Seismic Category I to meet the NRC JLD-ISG-2012-03 and NEI 12-02 guidance requirements. An evaluation of other hardware stored in the SFP will be conducted as part of the detailed design to ensure it will not create adverse interaction with the fixed instrument locations.

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 spent fuel pool structures so as to support the level sensor assembly.

d) A description of how other material stored in the SFP will not create adverse interaction with the fixed instrument location(s).

3.4 Qualification

The OIP states, in part, that

> Conditions
>
> The primary and backup instrumentation channel equipment installed in the spent fuel pool enclosure and vicinity will be qualified for reliable operation at conditions expected in the spent fuel pool enclosure as described by Section 3.4 of NEI 12-02. This includes consideration of the spent fuel pool boiling at saturated conditions and the presence of high levels of boric acid in the vicinity of the pool. The equipment installed will also be qualified for reliable operation at radiation levels representative of a normal core offload of freshly discharged fuel as allowed by existing refueling procedures with the spent fuel pool water at Level 3. The sensors and cables located in the vicinity of the SFP will be qualified to withstand these conditions for an extended period consistent with strategies developed in response to NRC Order EA-12-049 and NEI 12-06.
>
> Shock and Vibration
>
> The applicable components of the primary and backup instrumentation channel required after an event will be rated for anticipated shock and vibration per the recommendations of NRC JLD-ISG-2012-03 and NEI 12-02.
>
> Seismic
>
> The primary and backup instrument channel components required after a potential seismic event will be qualified for reliable operation following such an event. The methods used to qualify components will be consistent with the guidance of NEI 12-02, including the clarifications and exceptions to that guidance provided by the NRC Staff in NRC JLD-ISG-2012-03.

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 spent fuel pool 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 channel will be independent of the backup channel. Both channels will have their own probes located in separate corners of the spent fuel pool, separate cable routes, and separate electronics. In the vicinity of the spent fuel pool, existing embedded conduit will be used for entry and exit of cables from the spent fuel pool structure. Once outside the pool structure, the primary and backup channel cabling will be routed in separate conduit or cable trays to achieve independence.

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 instrument channels will each have an independent power supply meeting the recommendations of NRC JLD-ISG-2012-03 and NEI 12-02. Any onsite generators used as an alternate power source and replaceable batteries used for instrument channel function will have sufficient capacity to maintain level indication function until offsite resource availability is reasonably assured. Any portable power supplies used will be stored consistent with the requirements of NRC Order EA-12-049 and NEI 12-06. The design process will determine the normal power source, battery power supply, and any additional power sources required for the instrument channels.
>
> Both the primary and the backup instrument channels will maintain their design accuracy without recalibration following a power interruption or change in the power source, as required by NRC Order EA-12-051.

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 accuracy of both the primary and backup instrument channel will be consistent with the requirements of NRC JLD-ISG-2012-03 and NEI 12-02. The primary and backup instrument channels will maintain their design instrument accuracy without requiring recalibration following power interruptions or changes in power source, as required by NRC Order EA-12-051. The total loop accuracy of both instrument channels will be determined for the entire span (Level 1 to 3) during the design process …

RAI-7

Please provide the following:

a) An estimate of the expected instrument channel accuracy performance (e.g., in percent of span) under both: a) normal spent fuel pool level conditions (approximately Level 1 or higher), and b) at the beyond-design-basis 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

> The instrument channel design will provide for routine testing and calibration. The entire primary and backup instrumentation channel will be capable of in-situ testing and calibration per the requirements of NRC JLD-ISG-2012-03 and NEI 12-02.

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 spent fuel pool 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 the preventative maintenance tasks that 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

> The primary and backup instrumentation displays will be installed per the requirements of NRC JLD-ISG-2012-03 and NEI 12-02. The primary and backup instrument channel will be capable of displaying an on-demand or continuous display of spent fuel pool level from Level 1 to Level 3. The primary and backup display will be located in an area which meets the four characteristics defined in NEI 12-02, Section 3.9. The location will be finalized in the design process.

RAI-9

Please provide the following:

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

b) For primary or backup display locations not located in the main control room, please provide a description of the location for the primary and backup displays, including justification for prompt accessibility to displays including primary and alternate route evaluation, habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for 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 PROGRAM FEATURES

4.2 Procedures

The OIP states, in part, that

> Procedures will be developed for both the primary and backup instrument channels consistent with the requirements of NRC JLD-ISG-2012-03 and NEI 12-02, Section 4.2. This will include procedures for the maintenance, operation, testing, calibration and normal/abnormal response of the primary and backup instrument channels. As described in Section 3.1.4 [of the OIP], the time duration required for both the primary and backup instrument channels to be functional will be coordinated with the strategies developed for NRC Order EA-12-049 and 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

> Testing and calibration of the primary and backup instrument channels will be established and implemented by existing PINGP processes, and will be scheduled in intervals such that the design accuracy of the instruments is maintained. Surveillance or testing intervals will be established per the recommendations of NEI 12-02, Section 4.3.
>
> If instrumentation is out of service for any reason, including testing, maintenance or calibration, the guidance in NEI 12-02, Section 4.3 will be implemented. This includes a 90-day limitation on use of pool divider gates that isolate the common pool into pools 1 and 2. When the pools are isolated by the divider gates and an instrument in one of the pools containing fuel discharged within the past five years is declared out of service, actions will be initiated within 24 hours to either restore the equipment, un-isolate the pools, or take other appropriate compensatory measures within 72 hours. Allowed out of service times, as identified in NEI 12-02, will be incorporated consistent with the programmatic process used for compliance with NRC Order EA-12-49.

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 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.

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.