



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

July 17, 2013

Mr. Matthew W. Sunseri  
President and Chief Executive Officer  
Wolf Creek Nuclear Operating Corporation  
Post Office Box 411  
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION – REQUEST FOR ADDITIONAL  
INFORMATION RE: OVERALL INTEGRATED PLAN IN RESPONSE TO  
ORDER EA-12-051, “RELIABLE SPENT FUEL POOL INSTRUMENTATION”  
(TAC NO. MF0781)

Dear Mr. Sunseri:

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML130630581), Union Electric Company (dba Ameren Missouri, the licensee) 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 (SFP) Instrumentation (Order Number EA-12-051) for Callaway Plant, Unit 1. The NRC staff endorsed Nuclear Energy Institute (NEI) 12-02, “Industry Guidance for Compliance with U.S. Nuclear Regulatory Commission (NRC) Order EA-12-051, To Modify Licenses with Regard to Reliable SFP Instrumentation,” Revision 1, dated August 2012, with exceptions as documented in Interim Staff Guidance (ISG) 2012-03, “Compliance with Order EA-12-051, Reliable SFP Instrumentation,” Revision 0, dated August 29, 2012.

The NRC staff has determined that the additional information, as requested in the enclosure, is needed to complete its review. Please provide a response to the questions within 30 days of the date of this letter. If any part of this information is not available within 30 days of this request, please provide the date that this information will be provided.

M. Sunseri

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If you have any questions, please contact me at 301-415-2296 or via e-mail at [fred.lyon@nrc.gov](mailto:fred.lyon@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "CFLyon".

Carl F. Lyon, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure  
As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION  
OVERALL INTEGRATED PLAN IN RESPONSE TO  
ORDER EA-12-051, "RELIABLE SPENT FUEL POOL INSTRUMENTATION"  
WOLF CREEK NUCLEAR OPERATING CORPORATION  
WOLF CREEK GENERATING STATION  
DOCKET NO. 50-482

**1.0 INTRODUCTION**

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13071A419), Wolf Creek Nuclear Operating Corporation (WCNOC) submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, U.S. Nuclear Regulatory Commission (Commission, NRC) Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for Wolf Creek Generating Station (WCGS). 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 28, 2013, submittal by the licensee and determined that the following information is needed to complete its Technical Review. If any part of this information is not available within the 30-day response period for this request for additional information (RAI), please provide the date this information will be submitted.

**2.0 LEVELS OF REQUIRED MONITORING**

The OIP states that

Key spent fuel pool water levels:

1. **Level adequate to support operation of the normal SFP cooling system** - Indicated level on either the primary or backup instrument channel of 24 feet 10.75 inches above the top of the fuel storage racks plus the accuracy of the SFP level instrument channel, which is to be determined. This aligns with the normal SFP level as shown in the Wolf Creek Updated Safety Analysis Report (USAR) (Reference 5) Figure 1.2-21 and provides adequate margin to maintain fuel pool cooling pump suction.

Enclosure

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 of greater than 10 feet (+/- 1 foot) above the top of the fuel storage racks based on Reference 2 and Reference 3. This monitoring level ensures there is an adequate water level to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck.
3. **Level where fuel remains covered -** Indicated level on either the primary or backup instrument channel of greater than 1 foot above the top of the fuel storage racks plus the accuracy of the SFP level instrument channel. This monitoring level assures that there is adequate water level to cover the stored fuel seated in the rack.

#### **RAI-1**

Please provide the following:

- a) The specific elevations within the plant SFP corresponding to the three levels described in the guidance provided in NEI 12-02, Revision 1. For level 1, specify how the identified location represents the HIGHER of the two points described in the NEI 12-02 guidance for this level.
- b) A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of the instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Please 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**

**(Section numbers in 3.0 and 4.0 below correspond to sections in NEI 12-02)**

#### **3.2 Arrangement**

The OIP states, in part, that

The primary and backup instrument sensing components will be separated consistent with the guidelines of Reference 2 and Reference 3. Design of the mounting bracket will allow the fuel handling machine to pass over the bracket without interference.

A SFP walkdown identified preliminary locations for the primary and backup level sensing components. The preliminary location of the primary and backup instrument sensing components are at the plant northeast and northwest corners

of the SFP. The design for installation will include physical separation of the two sensors, separate extension cables from the electronics to the sensors, routing all cables in separate conduit / trays, separate UPS [uninterruptible power supply] power supplied from different ac [alternating current] sources, and seismically qualified mounting with physical separation of both the level sensing electronics and indications.

#### **RAI-2**

- a) Please provide 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 backup SFP level sensor, and the proposed routing of the cables that will extend from the sensors toward the location of the read-out/display device.

### **3.3 Mounting**

The OIP states that

The mounting of both the primary and backup system will be installed to maintain its integrity during and following a design basis seismic event. All locations will be reviewed for two-over-one seismic interference.

#### **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. Please 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. Please 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

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

- (1) conditions in the area of instrument channel component used for all instrument components,
- (2) effects of shock and vibration on instrument channel components used during and following any applicable event for installed components, and
- (3) seismic effects on instrument channel components used during and following a potential seismic event for only installed components.

#### **RAI-4**

Please provide the following:

- a) A description of the specific method or combination of methods the licensee intends 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. Please include a discussion of this seismic reliability demonstration as it applies to (1) the level sensor mounted in the SFP area, and (2) 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 that

The backup instrument system will be redundant to and independent of the primary instrument system.

Independence of the two systems includes: location, mounting, power sources, power and signal wiring, and indications, to prevent any failure of one system from affecting the other system.

#### **RAI-5**

Please provide the following:

- a) A description of how the two channels of the proposed level measurement system 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 backup 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 that

An ac source will be selected for each system's 24-Vdc [Volts direct current] UPS, with power cables routed separately through existing or new tray / conduit and penetrations.

Both channels will be powered by independent batteries following a loss-of-ac power. The minimum battery life will be 72 hours. The 72 hour battery life is a sufficient amount of time for an alternate source of power to be provided by the plant-specific procedures to address Reference 6. Each channel will include an externally accessible bulkhead connector and transfer switch for connection of an alternate power source.

#### **RAI-6**

Please provide the following:

- a) A description of the electrical alternating current (AC) power sources and capacities for the primary and backup channels, demonstrating that the loss of one normal AC power supply will not affect both channels of level instrumentation.
- b) Since both channels will be powered by independent batteries following a loss of AC power, 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 <sup>[1]</sup>).

### **3.7 Accuracy**

The OIP states that

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

The accuracy will be within the resolution requirements of Reference 2, Figure 1.

The instrument accuracy will be sufficient to allow personnel using plant procedures to determine when the water level reaches levels 1, 2, and 3 without conflicting or ambiguous indication.

### **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 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 that

Instrument channel design will provide for routine testing and calibration consistent with Reference 2 and Reference 3.

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<sup>1</sup> U.S. Nuclear Regulatory Commission, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," EA-12-049, dated March 12, 2012 (ADAMS Accession No. ML12054A735).



### **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. Please discuss how these surveillances will be incorporated into the plant surveillance program.
- d) A description of what preventative 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 that

The primary system indicator will be located in the vicinity of the control room. The backup system indicator will be located in an accessible location. The locations will allow for reading of the indicators following an event. The display will provide continuous indication of the SFP water level and will be consistent with the guidelines of Reference 2 and Reference 3.

### **RAI-9**

Please provide the following:

- a) The specific location for the primary and backup instrument channel display.
- b) Since the licensee has not committed to place the primary and backup displays in the main control room, please provide a description of the location for the primary and backup display, 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." Please include consideration of various drain-down scenarios.

#### **4.0 PROGRAM FEATURES**

##### **4.2 Procedures**

The OIP states, in part, that

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

##### **RAI-10**

Please provide responses to 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 SFP 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 the licensee's 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 that

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.

##### **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. Please include a description of the licensee's 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.

M. Sunseri

- 2 -

If you have any questions, please contact me at 301-415-2296 or via e-mail at [fred.lyon@nrc.gov](mailto:fred.lyon@nrc.gov).

Sincerely,

Carl F. Lyon, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure  
As stated

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**\*memo dated**

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