



FirstEnergy Nuclear Operating Company

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10 CFR 2.202

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

SUBJECT:  
Perry Nuclear Power Plant  
Docket No. 50-440, License No. NPF-58  
Response to Request for Additional Information Regarding FirstEnergy Nuclear Operating Company's (FENOC's) Overall Integrated Plan in Response to March 12, 2012 Commission Order Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051) (TAC No. MF0802)

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued an order (Reference 1) to FENOC. Reference 1 was immediately effective and imposes additional requirements to increase the capability of FENOC to mitigate beyond-design-basis external events. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an overall integrated plan by February 28, 2013. The NRC Interim Staff Guidance (Reference 2) was issued August 29, 2012 and endorsed industry guidance document NEI 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of the overall integrated plan.

By letter dated February 27, 2013 [Agencywide Documents Access and Management System (ADAMS) Accession No. ML13059A495], FENOC submitted overall integrated plans for reliable spent fuel pool instrumentation, which included an overall integrated plan for Perry Nuclear Power Plant, Unit No. 1. By letter dated June 10, 2013 (ADAMS Accession No. ML13155A539), the NRC staff requested additional information to complete its review. The NRC also indicated in the letter that if information is unavailable by July 5, 2013, dates as to when the additional information will be submitted are to be provided. As discussed in the public meeting held on June 20, 2013, providing the responses in the six-month update reports is acceptable. By electronic mail dated June 25, 2013, the NRC staff requested additional information regarding power supplies. The response to the request for additional information is

attached. The applicable six-month update in which FENOC intends to provide currently unavailable information is indicated in the attachment.

There are no new regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at 330-315-6810.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 2, 2013.

Respectfully,



Vito A. Kaminskis

Attachment:

Response to Request for Information

References:

1. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (ADAMS Accession No. ML12054A679)
2. 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 (ADAMS Accession No. ML12221A339)
3. 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 24, 2012

cc: Director, Office of Nuclear Reactor Regulation (NRR)  
NRC Region III Administrator  
NRC Resident Inspector  
NRR Project Manager

Response to Request for Information  
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By letter dated February 27, 2013 [Agencywide Documents Access and Management System (ADAMS) Accession No. ML13059A495], FirstEnergy Nuclear Operating Company (FENOC) submitted an overall integrated plan (OIP) in response to the March 12, 2012, Nuclear Regulatory Commission (NRC) Order EA-12-051 modifying licenses with regard to reliable spent fuel pool (SFP) instrumentation (ADAMS Accession No. ML12054A679) for Perry Nuclear Power Plant (PNPP), Unit No. 1. By letter dated June 10, 2013 (ADAMS Accession No. ML13155A539), the NRC staff requested additional information to complete its review. By electronic mail dated June 25, 2013, the NRC staff requested additional information regarding power supplies. The response to the request for additional information (RAI) is provided below. The NRC staff question is presented in bold type, followed by the FENOC response.

### **LEVELS OF REQUIRED MONITORING**

The OIP states, in part, that:

**PNPP discharges irradiated fuel to a single spent fuel storage pool. With the exception of limited time periods for maintenance or non-refueling operations, administrative controls maintain gates in the open position between the following pools: fuel storage & preparation pool, fuel transfer pool, spent fuel storage pool, and cask pit. Thus, these pools are normally inter-connected and at the same water level when the water level in the spent fuel pool is greater than 3.5 feet above the top of stored fuel seated in the storage racks.**

**Level 1 – Level adequate to support operation of the normal fuel pool cooling system**

**Indicated level on either the primary or backup instrument channel of greater than elevation 619'-6" plus the accuracy of the SFP level instrument channel, which is to be determined. The highest point on the spent fuel pool racks is at elevation 591'-4".**

**Level 2 – Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck.**

**Indicated level on either primary or backup instrument channel of greater than 601'-4" plus the accuracy of the SFP level instrument channel, which is to be determined. This monitoring level ensures there is an adequate water level to provide substantial radiation shielding for a person standing on the SFP operating deck.**

**Level 3 – Level where fuel remains covered and actions to implement make-up water addition should no longer be deferred.**

**Indicated level on either the primary or backup instrument channel of greater than 594'-6" plus the accuracy of the SFP level instrumentation, which is to be determined. This monitoring level assures that there is adequate water level above the stored fuel seated in the rack.**

#### **RAI-1**

**Please provide the following:**

- a) For Level 1, specify how the identified location represents the higher of the two points described in the NEI [Nuclear Energy Institute] 12-02 guidance for this level.**
- b) The OIP states, "the Perry SFP contains other materials capable of providing sufficient dose such that the pool deck would not be inhabitable should the materials be uncovered." Given the potential for varied dose rates from other materials stored in the SFP, describe how Level 2 will be adjusted to other than the elevation provided in Section 2 [Levels of Required Monitoring] above.**
- c) 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. 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.**

**Response:**

- a) No other means of removing water from the SFP exist above the skimmers. Therefore, the identified location is the highest point of the two options described in the NEI 12-02 guidance for Level 1 and is the level that is adequate to support operation of the normal fuel pool cooling system.**
- b) NEI 12-02 allows the licensee to use 10 feet (+/-1 foot) above the highest point of any fuel rack seated in the spent fuel pools as Level 2. FENOC has chosen this option for PNPP. NEI 12-02, Section 2.3.2 states that "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." Level 2 is associated with dose rates from the fuel; therefore, it is not adjusted based on varied dose rates from other items in the pool. FENOC has selected guided wave radar as its technology, which provides continuous level indication from Level 1 through Level 3. Data will be available for**

mitigation strategies to be initiated, when deemed appropriate, based on water levels between Level 1 and Level 3. FENOC recognizes additional materials stored in the SFP may cause the area to become uninhabitable prior to the monitored Level 2. FENOC also recognizes that the location of these additional materials is subject to change during each refueling outage. Therefore, FENOC does not plan to adjust Level 2, but instead address the potential dose rates associated with other material through alternate means. FENOC plans to evaluate the other materials in the SFP for relocation or removal in support of mitigation strategies. Based on fuel pool material configuration and projected dose levels, FENOC plans to develop an early method to keep those materials adequately covered using mitigation strategies or a manual makeup capability from a location not impacted by the dose rate. Mitigation strategies for addressing increased doses to personnel in the SFP area associated with other materials in the pool in a beyond-design-basis accident is to be addressed via PNPP Diverse and Flexible Coping Strategies (FLEX) procedures, as needed.

- c) As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

## **INSTRUMENTATION DESIGN FEATURES**

### **Arrangement**

The OIP states, in part, that:

The planned design of this system will consist of two measurement channels, one primary and one backup. Each channel will consist of a level sensor, an electronics unit and an indicator. The primary and backup instrument channel sensors will be protected against missiles that may result from damage to the structure over the SFP. The sensors will be mounted at the western end of the fuel pool (the fuel preparation and storage pool), but as close to the adjacent corners as possible to minimize the possibility of a single event or missile damaging both channels. The sensor arrangement has been proposed in a manner limiting any interference with existing equipment in or around the SFP. This planned design is conservative and is in compliance with Order EA-12-051 however, it does represent a minor deviation from the NEI Guidance. The NEI Guidance recommends putting instrumentation in opposite (diagonal) ends of the spent fuel pool. Due to the limited available locations (caused by interference) for installation, the instrumentation cannot be installed on opposite (diagonal) ends of the pool. This planned design will also not pose any potential hazard to

**personnel working around the pool or on the level instrumentation itself.**

**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 back-up 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.**
- b) **Address how other material stored in the SFP will not create adverse interaction with the fixed instrument location(s).**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

**Mounting**

The OIP states, in part, that:

**Installed primary and back up SFP level instrument channel equipment within the spent fuel pool shall be mounted to retain its design configuration during and following the maximum seismic ground motion considered in the design of the spent fuel pool structure in accordance with NRC JLD-ISG-2012-03 and NEI 12-02 Rev. 1 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.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

#### **Qualification**

The OIP states, in part, that:

**The vendor supplied sensors and associated electronics will be required to be tested and qualified for shock and vibration as a result of a beyond design basis external event. Seismic qualification of equipment will be equivalent to the maximum ground motion spectrum for the area in which it is to be installed.**

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 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.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

### Independence

The OIP states, in part, that:

**The primary instrument channel will be independent of the backup instrument channel. The primary and backup instrument channels will be physically and electrically separated to maintain channel independence. The sensors will be separated as far apart as practical within the constraints of existing pool geometry and equipment. Electronics enclosures will be separated by a suitable distance or may utilize structural features of the room in which they are located as a barrier to provide protection against a single event (missile, explosion, etc.) from damaging the electronics of both instrument channels. Power will be supplied from two separate power buses at a minimum, with a preference of different power divisions or channels as available. Cabling will be run in separate conduit and/or cable tray. The same technology will be used for both the primary and backup instrument channels.**

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 on how each level measurement system, consisting of level sensor electronics, cabling, and readout devices, will be designed and installed to address independence through the application and selection of independent power sources, the use of physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the



schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

### **Power Supplies**

The OIP states, in part, that:

**Each channel will normally be powered from independent 120 VAC [volts-alternating current] power sources and will have a dedicated battery backup. A minimum battery life of 24 hours will be provided to allow for power restoration from portable equipment.**

### **RAI-6**

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

**If the level measurement channels are to be powered through a battery system (either directly or through an uninterruptible power supply), 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 beyond-design-basis event for the minimum duration needed, consistent with the plant mitigation strategies for beyond-design-basis external events (Order EA-12-049).**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

### **Accuracy**

The OIP states, in part, that:

**The guided wave radar design provides continuous monitoring of the SFP water level. The accuracy of the SFP level instrument channel, from sensor to main control room indicator, will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, Rev. 1. Instrument channels will be designed to maintain their design accuracy without recalibration following a power interruption or change in power source.**

**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 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.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete. Therefore, FENOC intends to submit the response to this request in the February 2014 six-month update.

**Testing**

**The OIP states, in part, that:**

**Testing will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02, Rev. 1. The instrument channel design will include provisions for routine testing and calibration. The instrumentation will allow for in-situ testing and calibration of the level instrumentation to minimize calibration effort and instrument downtime. Calibration procedures will be developed in accordance with plant procedures and vendor recommendations.**

**RAI-8**

**Please provide the following:**

- a) **A description of the capability and provisions the proposed level sensing equipment will 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 functional checks will be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Provide a discussion as to 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.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete and the FENOC engineering change process has progressed to the point of determining procedure details needed for testing and calibration. Therefore, FENOC intends to submit the response to this request in the August 2014 six-month update.

### **Display**

The OIP states, in part, that:

**The display will be consistent with the guidelines of NRC JLD-ISG-2012-03 and NEI 12-02 Rev. 1. Trained personnel will, at a minimum, be able to monitor the SFP water level from an appropriate and accessible location, and will provide on demand or continuous indication of SFP water level. The SFP level instrumentation will provide for display of fuel pool level using an indicator located in the main control room. The indicator will be powered by the instrument loop and will not require additional power circuits from those described above.**

**RAI-9**

Please provide the following:

- a) **The specific location for the primary and backup instrument channel display.**
- b) **If the primary or backup display location is other than the main control room, then provide 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 enable the information from these instruments to be considered "promptly accessible" to various drain-down scenarios and external events.**

Response:

The SFP level instrumentation, primary and backup instrument channel display, will be located in the main control room. As a result, a response to part (b) of this request is not needed. The main control room is expected to be occupied at all times; therefore, the location is considered promptly accessible.

## **PROGRAM FEATURES**

### **Procedures**

The OIP states, in part, that:

**Procedures will be established and maintained for the testing, calibration, operation and abnormal response issues associated with the primary and backup spent fuel pool instrumentation channels.**

### **RAI-10**

**Please provide a description of the standards, guidelines and/or criteria that will be utilized to develop procedures for inspection, maintenance, repair, operation, abnormal response, and administrative controls associated with the SFP level instrumentation, as well as storage and installation of portable instruments.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete and the FENOC engineering change process has progressed to the point of determining procedure details needed for testing and calibration, including identification of standards, guidelines and/or criteria that will be used to develop the procedures. Therefore, FENOC intends to submit the response to this request in the August 2014 six-month update.

### **Testing and Calibration**

The OIP states, in part, that:

**Per NRC Order EA-12-051, processes will be established and maintained for scheduling and implementing necessary testing and calibration of primary and backup SFP level instrument channels in order to maintain the design accuracy.**

**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) Describe how the guidance in NEI 12-02, Section 4.3, regarding compensatory actions for one or both non-functioning channels will be addressed.**
- c) Describe what compensatory actions are planned in the event that one of the instrument channels cannot be restored to functional status within 90 days.**

Response:

As stated in letter dated February 27, 2013, the OIPs are based on conceptual design information. Progress made, proposed changes in compliance methods, updates to the schedule, and if needed, requests for relief and the bases will be provided in the six-month integrated plan updates. The information to support response to this request would be available after final design is complete and the FENOC engineering change process has progressed to the point of determining procedure details needed for testing and calibration. Therefore, FENOC intends to submit the response to this request in the August 2014 six-month update.