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July 18, 2013
L-13-234

10 CFR 2.202

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

SUBJECT:

Beaver Valley Power Station, Unit Nos. 1 and 2

Docket No. 50-334, License No. DPR-66

Docket No. 50-412, License No. NPF-73

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 Nos. MF0799 and MF0800)

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 Beaver Valley Power Station, Unit Nos. 1 and 2. By letter dated June 25, 2013 (ADAMS Accession No. ML13172A179), the NRC staff requested additional information to complete its review. As discussed in the NRC public meeting held on June 20, 2013, providing the responses in the six-month update reports is acceptable. 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 18, 2013.

Respectfully,



Eric A. Larson

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 I Administrator
NRC Resident Inspector
NRR Project Manager
Director BRP/DEP
Site BRP/DEP Representative

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 Beaver Valley Power Station (BVPS), Unit Nos. 1 and 2. By letter dated June 25, 2013 (ADAMS Accession No. ML13172A179), the NRC staff requested additional information to complete its review. 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, Section 3, states, in part, that:

BVPS discharges irradiated fuel to a single spent fuel storage pool for each unit. 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: spent fuel pool, fuel transfer canal, and cask loading 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 1 foot above the top of stored fuel seated in the storage racks.

Level 1:

Indicated level on either the primary or backup instrument channel for Unit 1 of greater than a to-be-determined elevation plus the accuracy of the SFP level instrument channel, which is to be determined.

Indicated level on either the primary or backup instrument channel for Unit 2 of greater than a to-be-determined elevation plus the accuracy of the SFP level instrument channel, which is to be determined.

Level 2:

Indicated level on either primary or backup instrument channel of Unit 1 greater than 752'-0" 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.

Indicated level on either primary or backup instrument channel of Unit 2 greater than 752'-0" 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:

Indicated level on either the primary or backup instrument channel of Unit 1 greater than 742'-0" (which is the top of the highest point on the spent fuel pool racks) 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.

Indicated level on either the primary or backup instrument channel of Unit 2 greater than 742'-0" (which is the top of the highest point on the spent fuel pool racks) 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 the elevation for this level and 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) 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.**
- c) A description of the conditions under which the SFP, fuel transfer canal, and cask loading pit would be isolated by a gate or other means such that the separated pools would not have independent measurements of wide range SFP level for the respective areas. Provide the justification for not installing independent level indications in each area for conditions in which the SFPs are isolated.**

Response:

- a) 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. As indicated in the BVPS OIP, spent fuel pool water levels that are to be determined will be established as part of the final design and by the Complete SFP Instrumentation Design milestone in Section 2. 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.
- b) 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.
- c) For each unit, spent fuel storage is confined to the SFP. The fuel transfer canal is a transitory spent fuel pathway used during refueling operation. The cask loading pit is a transitory pathway used to support dry cask storage operation. During these transitory periods of operation, the fuel transfer canal and the cask loading pit communicate with the SFP and are, therefore, not isolated pools. Installation of the new wide range SFP Level Instrumentation System within the SFP will monitor stored spent fuel assemblies.

INSTRUMENTATION DESIGN FEATURES

Arrangement

The OIP, Section 7, states that:

The planned design of this system will consist of two measurement channels, one primary and one backup. Each channel consists of a level sensor, an electronics unit and an indicator. The primary and backup instrument channel sensors would be protected against missiles that may result from damage to the structure over the SFP. The sensors will be mounted as close to the different SFP 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 proposed design would not pose any potential hazard to personnel working around the pool or on the level instrumentation itself.

The proposed design locates the electronics enclosures in an area removed from the SFP environment, which would be accessible in the event of a beyond-design basis external event that would restrict access to the SFP. The enclosures for the two instrument channels will be separated to minimize the possibility of a single event damaging both channels. Cabling for each channel will be run in separate conduit and/or cable tray to the control room indicators.

RAI-2

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.

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, Section 8, states 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 roof and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a drawing, the portions of the level sensor that will serve as points of attachment for mechanical/mounting and 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, Section 9, states, in part, that:

The primary and backup instrumentation for the proposed design will be suitable and reliable at temperature, humidity, and radiation levels consistent with the SFP water at saturated conditions for an extended period of time. This reliability will be established through use of an augmented quality assurance process. Using the guidance of NEI 12-02, Rev. 1 and NRC JLD-ISG-2012-03 the equipment design will include reliability against effects of shock and vibration and seismic motion.

The design will consider the environmental conditions as discussed by NEI 12-02, Rev. 1, which recommends considering temperature, humidity, and radiation levels during normal operation and after an external beyond design basis event for no fewer than seven days post-event or until off-site resources can be deployed by the mitigating strategies. Conditions considered are the radiological conditions for a normal refueling quantity of freshly discharged (100 hours) fuel with SFP water level at Level 3 as defined by NRC Order EA-12-051, temperature of 212°F and 100% relative humidity, boiling water and/or steam, and concentrated borated water.

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 (i) the level sensor mounted in the SFP area, and (ii) 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, Section 10, states 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 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.**

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, Section 11, states 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

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), 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 FLEX [Diverse and Flexible Coping Strategies] plans.

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, Section 12, states 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 % span) under both (i) normal SFP level conditions (approximately Level 1 or higher) and (ii) 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.**

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, Section 13, states 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 recommendation.

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 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 the 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, Section 14, states 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 will enable the information from these instruments to be considered "promptly accessible" from a timing perspective. Include consideration of various drain-down scenarios.

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 and is not a concern for drain-down scenarios.

PROGRAM FEATURES

Procedures

The OIP, Section 15.2, states 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 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 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.**

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.

Testing and Calibration

The OIP, Section 15.3, states 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) 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.**

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.