FENOC
First Energy Nuclear Operating Company

76 South Main Street
Akron. Ohio 44308

Samuel L. Belcher
Senior Vice President and Chief Operating Officer

February 27, 2014
L-14-024

10 CFR 2.202

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-001

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
Davis-Besse Nuclear Power Station
Docket No. 50-346, License No. NPF-3
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
FirstEnergy Nuclear Operating Company's (FENOC's) Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)
(TAC Nos. MF0799, MF0800, MF0960, and MF0802)

On March 12, 2012, the Nuclear Regulatory Commission (NRC or Commission) issued an order (Reference 1) to FENOC. Reference 1 was immediately effective and directs FENOC to have a reliable indication of the water level in associated spent fuel storage pools. Specific requirements are outlined in Attachment 2 of Reference 1.

Reference 1 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document Nuclear Energy Institute (NEI) 12-02, Revision 1 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the FENOC initial status report regarding requirements for reliable spent fuel pool instrumentation. Reference 5 provided the FENOC overall integrated plan for Beaver Valley Power Station, Unit Nos. 1 and 2 (BVPS), Davis-Besse Nuclear Power Station (DBNPS), and Perry Nuclear Power Plant (PNPP).

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides direction regarding the content of the status reports. The purpose of this letter is to provide the second

six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attached reports for BVPS, DBNPS, and PNPP (Attachments 1, 2, and 3, respectively) provide an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

The NRC staff also issued interim staff evaluations (References 6, 7, and 8) that included requests for additional information (RAIs). The FENOC response to the RAIs for which information is currently available is attached for BVPS, DBNPS, and PNPP (Attachments 4, 5, and 6, respectively).

This letter contains no new regulatory commitments. If you have any questions regarding this report, 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 February 21, 2014.

Respectfully submitted,

Samuel L. Belcher

Attachments:
1. Beaver Valley Power Station Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
2. Davis-Besse Nuclear Power Station Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
3. Perry Nuclear Power Plant Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation
4. Response to Request for Additional Information for Beaver Valley Power Station
5. Response to Request for Additional Information for Davis-Besse Nuclear Power Station
6. Response to Request for Additional Information for Perry Nuclear Power Plant

References:

1. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012
2. NRC Interim Staff Guidance JLD-ISG-2012-03, Compliance with Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, Revision 0, dated August 29, 2012
3. 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
4. FirstEnergy Nuclear Operating Company's (FENOC's) Initial Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051), dated October 26, 2012
5. 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), dated February 27, 2013
6. Beaver Valley Power Station, Units 1 and 2 - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated November 19, 2013
7. Davis-Besse Nuclear Power Plant Unit No. 1 - Interim Staff Evaluation and Request for Additional Informtion Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated December 11, 2013
8. Perry Nuclear Power Plant, Unit 1, - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated December 11, 2013

cc: Director, Office of Nuclear Reactor Regulation (NRR)
NRC Region I Administrator
NRC Region III Administrator
NRC Resident Inspector (BVPS)
NRC Resident Inspector (DBNPS)
NRC Resident Inspector (PNPP)
NRC Project Manager (BVPS)
NRC Project Manager (DBNPS)
NRC Project Manager (PNPP)
Ms. Lisa M. Regner, NRR/JLD/PMB, NRC
Mr. Blake A. Purnell, NRR/JLD/PMB, NRC
Director BRP/DEP (without Attachments)
Site BRP/DEP Representative (without Attachments)
Utility Radiological Safety Board (without Attachments)

1 Introduction

FirstEnergy Nuclear Operating Company (FENOC) developed an Overall Integrated Plan (OIP) for Beaver Valley Power Station (BVPS), Unit Nos. 1 and 2 (Reference 1 in Section 8), documenting the requirements to install reliable spent fuel pool (SFP) level instrumentation (LI), in response to Reference 2. This attachment provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since July 29, 2013 and are current as of January 31, 2014.

- None

3 Milestone Schedule Status

The following provides an update to the milestone schedule to support the OIP. This section provides the activity status of each item and the expected completion date, noting any change. The dates are planning dates subject to change as design and implementation details are developed.

The following milestones are being modified as part of this update to reflect the number assigned in the interim staff evaluation (ISE) (Reference 3) to each request for additional information (RAI) and to update the scheduled submittal time for the RAIs.

Submit Six-Month Status Updates

- Update 2, including response to ISE RAI-1, RAI-2, RAI-3, RAI-4 (except 4b schematic), RAI-6, RAI-9, and RAI-10a: February 2014
- Update 3, including response to ISE RAI-4b schematic, RAI-5, RAI-7, RAI-8, RAI-10b, RAI-11, RAI-12, RAI-13, RAI-14, and RAI-15: August 2014

The revised milestone target completion dates do not impact the order implementation date.

Milestone	Target Completion Date	Activity Status (as of 1/31/14)	Revised Target Completion Date
Submit Six-Month Status Updates (Unit Nos. 1 and 2)			
Update 1	August 2013	Complete	
Update 2, including response to ISE RAI-1, RAI-2, RAI-3, RAI-4 (except 4b schematic), RAI-6, RAI-9, and RAI-10a	February 2014	Started	
Update 3, including response to ISE RAI-4b schematic, RAI-5, RAI-7, RAI-8, RAI-10b, RAI-11, RAI-12, RAI-13, RAI-14, and RAI-15	August 2014	Not Started	
Update 4	February 2015	Not Started	
Update 5	August 2015	Not Started	
BVPS Unit No. 1			
Commence SFP Instrumentation Design	4Q12	Complete	
Commence SFP Instrumentation Procurement	2Q13	Complete	
Complete SFP Instrumentation Design	4Q13	Started	3Q14
SFP Instrumentation Delivery	2Q14	Not Started	
Begin SFP Instrumentation Installation	3Q14	Not Started	4Q14
Commissioning of SFP Instrumentation	2Q15	Not Started	
NRC Order Implementation Date (based on the scheduled end of the second refueling outage after implementation plan submittal)	Spring 2015	Not Started	
BVPS Unit No. 2			
Commence SFP Instrumentation Design	4Q12	Complete	
Commence SFP Instrumentation Procurement	2Q13	Complete	
Complete SFP Instrumentation Design	4Q13	Started	1Q15
SFP Instrumentation Delivery	3Q14	Not Started	
Begin SFP Instrumentation Installation	4Q14	Not Started	2Q15
Commissioning of SFP Instrumentation	4Q15	Not Started	
NRC Order Implementation Date (based on the scheduled end of the second refueling outage after implementation plan submittal)	Fall 2015	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the OIP (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

FENOC expects to comply with the order implementation date. Relief/relaxation is not required at this time.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following tables provide a summary of the open items documented in the OIP or the ISE and the status of each item.

Overall Integrated Plan Open Item	Status
None	Not Applicable

Interim Staff Evaluation Open Item	Status
RAI-1: Please specify for Level 1 how the identified location represents the higher of the two points described in the NEI 12-02 guidance for this level.	RAI response provided in Attachment 4.
RAI-2: Please provide 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). 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.	RAI response provided in Attachment 4.
RAI-3: 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 these sensors toward the location of the read-out/display device.	RAI response provided in Attachment 4.
RAI-4: 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	RAI response provided in Attachment 4 (except 4b schematic).

Interim Staff Evaluation Open Item	Status
support the level sensor assembly.	
RAI-5: For RAI 4(a) above, please provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.	Not started.
RAI-6: For each of the mounting attachments required to attach SFP level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.	RAI response provided in Attachment 4.
RAI-7: Please provide the following: (a) A description of the specific method or combination of methods that will be applied to demonstrate the reliability of the permanently installed equipment under 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.	Not started.
RAI-8: For RAI 7 above, please provide the results from the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.	Not started.
RAI-9: 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 pacticable. (b) Further information describing the design and installation of each level measurement system, consisting of level sensor electronics, cabling, and read-out 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 read-out devices, and the independence of the displays.	RAI response provided in Attachment 4.
RAI-10: Please provide the following: (a) A description of the electrical ac power sources and capabilities for the primary and backup channels. (b) Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is	RAI-10a response provided in Attachment 4. (RAI-10b to be provided in August 2014 update)

Interim Staff Evaluation Open Item	Status
sufficient to maintain the level indication function until offsite resource availability is reasonably assured.	
RAI-11: Please provide the following: (a) An estimate of the expected instrument channel accuracy performance (e.g., in percent of 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.	Not started.
RAI-12: Please provide the following: (a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ. (b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation. (c) A description of how calibration tests and functional checks will be performed, and the frequency at which they will be conducted. Discuss how these surveillances will be incorporated into the plant surveillance program. (d) A description of what preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.	Not started.
RAI-13: Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Not started.
RAI-14: 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	Not started.

Interim Staff Evaluation Open Item	Status
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.	
RAI-15: Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.	Not started.

7 Potential Interim Staff Evaluation Impacts

BVPS Unit No. 1:

By FENOC letter dated July 18, 2013, FENOC established Level 3 as the highest point of the SFP rack at Elevation (El.) 742' 0.5" for BVPS Unit No. 1. It has since been determined that the probe will have a 3" dead zone at the rack end, and the probe is designed to end 1" above the SFP rack. Therefore, Level 3 for BVPS Unit No. 1 has been changed to 6" above the rack, or El. 742' 6.5", which takes into account the probe's 4" non-readable zone plus the calculated equipment inaccuracy of less than 2". This position is conservative and is in compliance with NEI 12-02, Revision 1, Section 2.3.3, which states that Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the fuel pool.

BVPS Unit No. 2:

FENOC has revised Level 2 for BVPS Unit No. 2 as a result of a correction in the highest point of the SFP rack. The highest point of the SFP rack for BVPS Unit No. 2 was determined to be El. 742' 6.4" rather than El. 742' 0". Therefore, Level 2 has been changed from El. 752' to El. 752' 6.4".

By FENOC letter dated July 18, 2013, FENOC established Level 3 as the highest point of the SFP rack at El. 742' 0" for BVPS Unit No. 2. It has since been determined that the probe will have a 3" dead zone at the rack end, and the probe is designed to end 1" above the SFP rack. As a result of this determination and the correction made in the highest point of the SFP rack, Level 3 for BVPS Unit No. 2 has been changed to 6" above the rack, or El. 743' 0.4", which takes into account the probe's 4" non-readable zone plus the calculated equipment inaccuracy of less than 2". This position is conservative and is in compliance with NEI 12-02, Revision 1, Section 2.3.3, which states that Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the fuel pool.

8 References

The following references support the updates to the OIP described in this attachment.

1. 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), dated February 27, 2013.

2. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012.

3. Beaver Valley Power Station, Units 1 and 2 – Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated November 19, 2013.

1 Introduction

FirstEnergy Nuclear Operating Company (FENOC) developed an Overall Integrated Plan (OIP) for Davis-Besse Nuclear Power Station (Reference 1 in Section 8), documenting the requirements to install reliable spent fuel pool (SFP) level instrumentation (LI), in response to Reference 2. This attachment provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since July 29, 2013 and are current as of January 31, 2014.

- None

3 Milestone Schedule Status

The following provides an update to the milestone schedule to support the OIP. This section provides the activity status of each item and the expected completion date, noting any change. The dates are planning dates subject to change as design and implementation details are developed.

The following milestones are being modified as part of this update to reflect the number assigned in the interim staff evaluation (ISE) (Reference 3) to each request for additional information (RAI) and to update the scheduled submittal time for the RAIs.

Submit Six-Month Status Updates

- Update 2, including response to ISE RAI-1, RAI-2, RAI-3, RAI-4 (except 4b schematic), RAI-6, RAI-9, and RAI-10a: February 2014
- Update 3, including response to ISE RAI-4b schematic, RAI-5, RAI-7, RAI-8, RAI-10b, RAI-11, RAI-12, RAI-13, RAI-14, and RAI-15: August 2014

The revised milestone target completion dates do not impact the order implementation date.

Milestone	Target Completion Date	Activity Status (as of 1/31/14)	Revised Target Completion Date
Submit Six-Month Status Updates			
Update 1	August 2013	Complete	
Update 2, including response to ISE RAI-1, RAI-2, RAI-3, RAI-4 (except 4b schematic), RAI-6, RAI-9, and RAI-10a	February 2014	Started	
Update 3, including response to ISE RAI-4b schematic, RAI-5, RAI-7, RAI-8, RAI-10b, RAI-11, RAI-12, RAI-13, RAI-14, and RAI-15	August 2014	Not Started	
Update 4	February 2015	Not Started	
Update 5	August 2015	Not Started	
Update 6	February 2016	Not Started	
Commence SFP Instrumentation Design	4Q12	Complete	
Commence SFP Instrumentation Procurement	2Q13	Complete	
Complete SFP Instrumentation Design	4Q13	Started	2Q15
SFP Instrumentation Delivery	4Q14	Not Started	
Begin SFP Instrumentation Installation	1Q15	Not Started	3Q15
Commissioning of SFP Instrumentation	2Q16	Not Started	
NRC Order Implementation Date (based on the scheduled end of the second refueling outage after implementation plan submittal)	Spring 2016	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the OIP (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

FENOC expects to comply with the order implementation date. Relief/relaxation is not required at this time.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following tables provide a summary of the open items documented in the OIP or the ISE and the status of each item.

Overall Integrated Plan Open Item	Status
None	Not Applicable

Interim Staff Evaluation Open Item	Status
RAI-1: Please specify for Level 1 how the identified location represents the higher of the two points described in the NEI 12-02 guidance for this level.	RAI response provided in Attachment 5.

Interim Staff Evaluation Open Item	Status
RAI-2: Please provide 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). 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.	RAI response provided in Attachment 5.
RAI-3: 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 these sensors toward the location of the read-out/display device.	RAI response provided in Attachment 5.
RAI-4: 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.	RAI response provided in Attachment 5 (except 4b schematic).
RAI-5: For RAI 4(a) above, please provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.	Not started.
RAI-6: For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.	RAI response provided in Attachment 5.
RAI-7: Please provide the following: (a) A description of the specific method or combination of methods that will be applied to demonstrate the reliability of the permanently installed equipment under 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	Not started.

Interim Staff Evaluation Open Item	Status
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.	
RAI-8: For RAI 7 above, please provide the results from the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.	Not started.
RAI-9: Please provide the following: (a) A description of the manner the two channels of the proposed level measurement system meet the independence requirement to minimize, to the extent pacticable, the potential for a common cause event to adversely affect both channels. (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.	RAI response provided in Attachment 5.
RAI-10: Please provide the following: (a) A description of the electrical ac power sources and capabilities for the primary and backup channels. (b) Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.	RAI-10a response provided in Attachment 5. (RAI-10b to be provided in August 2014 update)
RAI-11: 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.	Not started.
RAI-12: 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	Not started.

Interim Staff Evaluation Open Item	Status
tested in-situ. (b) A description of the testing and calibration necessary to 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 the calibration tests and functional checks processes to be performed, and their frequency. Discuss the steps to be taken to ensure these surveillances will be incorporated into the plant surveillance program. (d) A description of the preventive maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.	
RAI-13: Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection procedures that will be developed for use of the SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Not started.
RAI-14: 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 the approach and process to be used by the licensee to follow guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels. (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.	Not started.
RAI-15: Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.	Not started.

7 Potential Interim Staff Evaluation Impacts

By FENOC letter dated August 12, 2013, FENOC established Level 3 as the highest point of the SFP rack at Elevation (El.) 577' 8" for DBNPS. It has since been determined that the probe will have a 3" dead zone at the bottom of the probe and the probe is designed to end 1" above the SFP rack. It has also been determined that DBNPS fuel bundles sit slightly higher than the fuel rack. Therefore, the top of the highest point of the rack (including fuel) has been changed to 577' 11 1/8". Level 3 for DBNPS has been changed to 6" above the updated rack elevation, or El. 578' 5 1/8", which takes into account the probe's 4" non-readable zone plus the calculated

equipment inaccuracy of less than 2". This position is conservative and is in compliance with NEI 12-02, Revision 1, Section 2.3.3, which states that Level 3 corresponds nominally (i.e., +/- 1 foot) to the highest point of any fuel rack seated in the fuel pool.

8 References

The following references support the updates to the OIP described in this attachment.

1. 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), dated February 27, 2013.

2. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012.

3. Davis-Besse Nuclear Power Plant Unit No. 1 – Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated December 11, 2013.

Perry Nuclear Power Plant Second Six-Month Status Report for the Implementation of Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation

1 Introduction

FirstEnergy Nuclear Operating Company (FENOC) developed an Overall Integrated Plan (OIP) for Perry Nuclear Power Plant (Reference 1 in Section 8), documenting the requirements to install reliable spent fuel pool (SFP) level instrumentation (LI), in response to Reference 2. This attachment provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any.

2 Milestone Accomplishments

The following milestone(s) have been completed since July 29, 2013 and are current as of January 31, 2014.

- None

3 Milestone Schedule Status

The following provides an update to the milestone schedule to support the OIP. This section provides the activity status of each item and the expected completion date, noting any change. The dates are planning dates subject to change as design and implementation details are developed.

The following milestones are being modified as part of this update to reflect the number assigned in the interim staff evaluation (ISE) (Reference 3) to each request for additional information (RAI) and to update the scheduled submittal time for the RAIs.

Submit Six-Month Status Updates

- Update 2, including response to ISE RAI-1, RAI-2, RAI-3 (except 3b schematic), RAI-5, RAI-8, and RAI-9a: February 2014
- Update 3, including response to ISE RAI-3b schematic, RAI-4, RAI-6, RAI-7, RAI-9b, RAI-10, RAI-11, RAI-12, RAI-13, and RAI-14: August 2014

The revised milestone target completion dates do not impact the order implementation date.

Milestone	Target Completion Date	Activity Status (as of 1/31/14)	Revised Target Completion Date
Submit Six-Month Status Updates			
Update 1	August 2013	Complete	
Update 2, including response to ISE RAI-1, RAI-2, RAI-3 (except 3b schematic), RAI-5, RAI-8, and RAI-9a	February 2014	Started	
Update 3, including response to ISE RAI-3b schematic, RAI-4, RAI-6, RAI-7, RAI-9b, RAI-10, RAI-11, RAI-12, RAI-13, and RAI-14	August 2014	Not Started	
Update 4	February 2015	Not Started	
Commence SFP Instrumentation Design	4Q12	Complete	
Commence SFP Instrumentation Procurement	2Q13	Complete	
Complete SFP Instrumentation Design	4Q13	Started	2Q14
SFP Instrumentation Delivery	2Q14	Not Started	
Begin SFP Instrumentation Installation	3Q14	Not Started	
Commissioning of SFP Instrumentation	1Q15	Not Started	
NRC Order Implementation Date (based on the scheduled end of the second refueling outage after implementation plan submittal)	Spring 2015	Not Started	

4 Changes to Compliance Method

There are no changes to the compliance method as documented in the OIP (Reference 1).

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

FENOC expects to comply with the order implementation date. Relief/relaxation is not required at this time.

6 Open Items from Overall Integrated Plan and Interim Staff Evaluation

The following tables provide a summary of the open items documented in the OIP or the ISE and the status of each item.

Overall Integrated Plan Open Item	Status
None	Not Applicable

Interim Staff Evaluation Open Item	Status
RAI-1: Please provide 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). Indicate on this sketch the	RAI response provided in Attachment 6.

Interim Staff Evaluation Open Item	Status
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.	
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 these sensors toward the location of the read-out/display device.	RAI response provided in Attachment 6.
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.	RAI response provided in Attachment 6 (except 3b schematic).
RAI-4: For RAI 3(a) above, please provide the results of the analyses used to verify the design criteria and methodology for seismic testing of the SFP instrumentation and the electronics units, including, design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.	Not started.
RAI-5: For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that will be used to qualify the structural integrity of the affected structures/equipment.	RAI response provided in Attachment 6.
RAI-6: Please provide the following: (a) A description of the specific method or combination of methods that will be applied to demonstrate the reliability of the permanently installed equipment under BDB ambient temperature, humidity, shock, vibration, and radiation conditions. (b) A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to (a) the level sensor mounted in the SFP area, and (b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the	Not started.

Interim Staff Evaluation Open Item	Status
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.	
RAI-7: For RAI 6 above, please provide the results from the selected methods, tests and analyses used to demonstrate the qualification and reliability of the installed equipment in accordance with the Order requirements.	Not started.
RAI-8: 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 pacticable. (b) Further information describing the design and installation of each level measurement system, consisting of level sensor electronics, cabling, and read-out 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.	RAI response provided in Attachment 6.
RAI-9: Please provide the following: (a) A description of the electrical ac power sources and capabilities for the primary and backup channels. (b) Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that its capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.	RAI-9a response provided in Attachment 6. (RAI-9b to be provided in August 2014 update)
RAI-10: 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.	Not started.
RAI-11: 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.	Not started.

Interim Staff Evaluation Open Item	Status
(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 preventive maintenance tasks 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.	
RAI-12: Please provide a list of the procedures addressing operation (both normal and abnormal response), calibration, test, maintenance, and inspection that will be developed for use of the spent SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.	Not started.
RAI-13: 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 plans to ensure 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 FENOC's procedure/process to implement the guidance in NEI 12-02 Section 4.3 on compensatory actions for one or both non-functioning channels. (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.	Not started.
RAI-14: Please provide a description of the in-situ calibration process at the SFP location that will result in the channel calibration being maintained at its design accuracy.	Not started.

7 Potential Interim Staff Evaluation Impacts

There are no potential impacts to the interim staff evaluation identified at this time. Level 3 at PNPP is not affected by the determination that the probe will have a 3" dead zone at the bottom of the probe and that the probe is designed to end 1" above the SFP rack. Level 3 at PNPP was established at 3' 2" above the SFP rack.

8 References

The following references support the updates to the OIP described in this attachment.

1. 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), dated February 27, 2013.

2. NRC Order Number EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, dated March 12, 2012.

3. Perry Nuclear Power Plant, Unit 1, - Interim Staff Evaluation and Request for Additional Information Regarding the Overall Integrated Plan for Implementation of Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, dated December 11, 2013.

Introduction:

By letter dated February 27, 2013, FirstEnergy Nuclear Operating Company (FENOC) provided to the Nuclear Regulatory Commission (NRC) the Beaver Valley Power Station (BVPS) reliable spent fuel pool (SFP) instrumentation overall integrated plan. By letter dated November 19, 2013, the NRC staff issued an interim staff evaluation (ISE) for BVPS that included requests for additional information (RAIs). This report provides the FENOC response to the RAIs for which information is currently available. The NRC request is presented in bold type, followed by the FENOC response.

Requests for Additional Information:

RAI-1:

Please specify for Level 1 how the identified location represents the higher of the two points described in the NEI 12-02 guidance for this level.

Response:

Level 1, the level that is adequate to support operation of the normal fuel pool cooling system, is defined in NEI 12-02 as the higher of the following two points:

(1) The level at which reliable suction loss occurs due to uncovering of the coolant inlet pipe, weir or vacuum breaker (depending on the design), or

(2) The level at which the water height, assuming saturated conditions, above the centerline of the cooling pump suction provides the required net positive suction head (NPSH) specified by the pump manufacturer or engineering analysis.

The coolant inlet pipes for both Unit 1 and Unit 2 are located at elevation (El.) 751'3". Analysis has shown that an elevation of 755' for both units is sufficient to prevent vortexing and loss of suction. Analysis has demonstrated that for Unit 1, an elevation of 758' is required to assure adequate NPSH. For Unit 2, analysis has shown that there is adequate NPSH at an elevation of 755'.

For Unit 1, the higher of the above points is (2). Therefore, Level 1 is at El. 758' for Unit 1.

For Unit 2, the higher of the above points is (1). Therefore, Level 1 is at El. 755' for Unit 2.

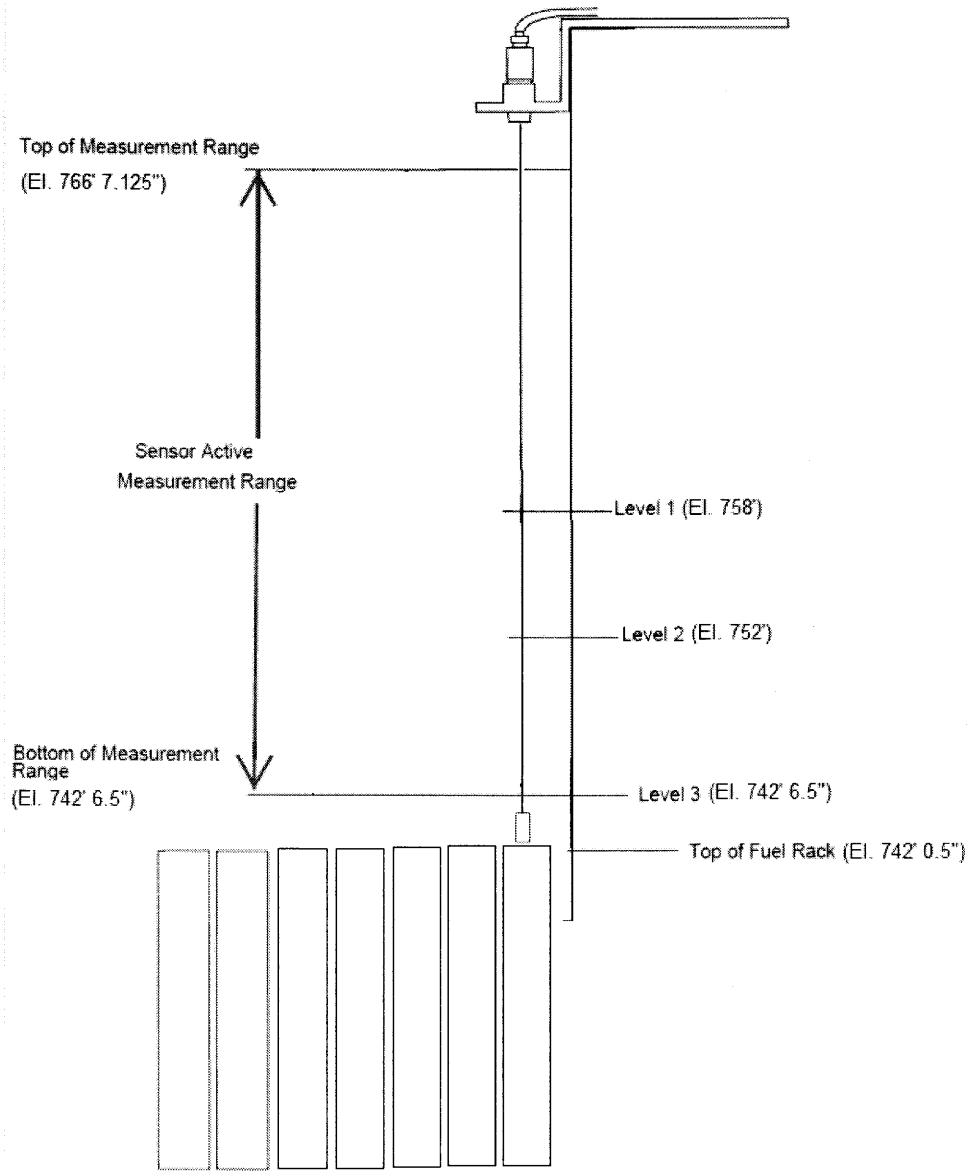
RAI-2:

Please provide 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). 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.

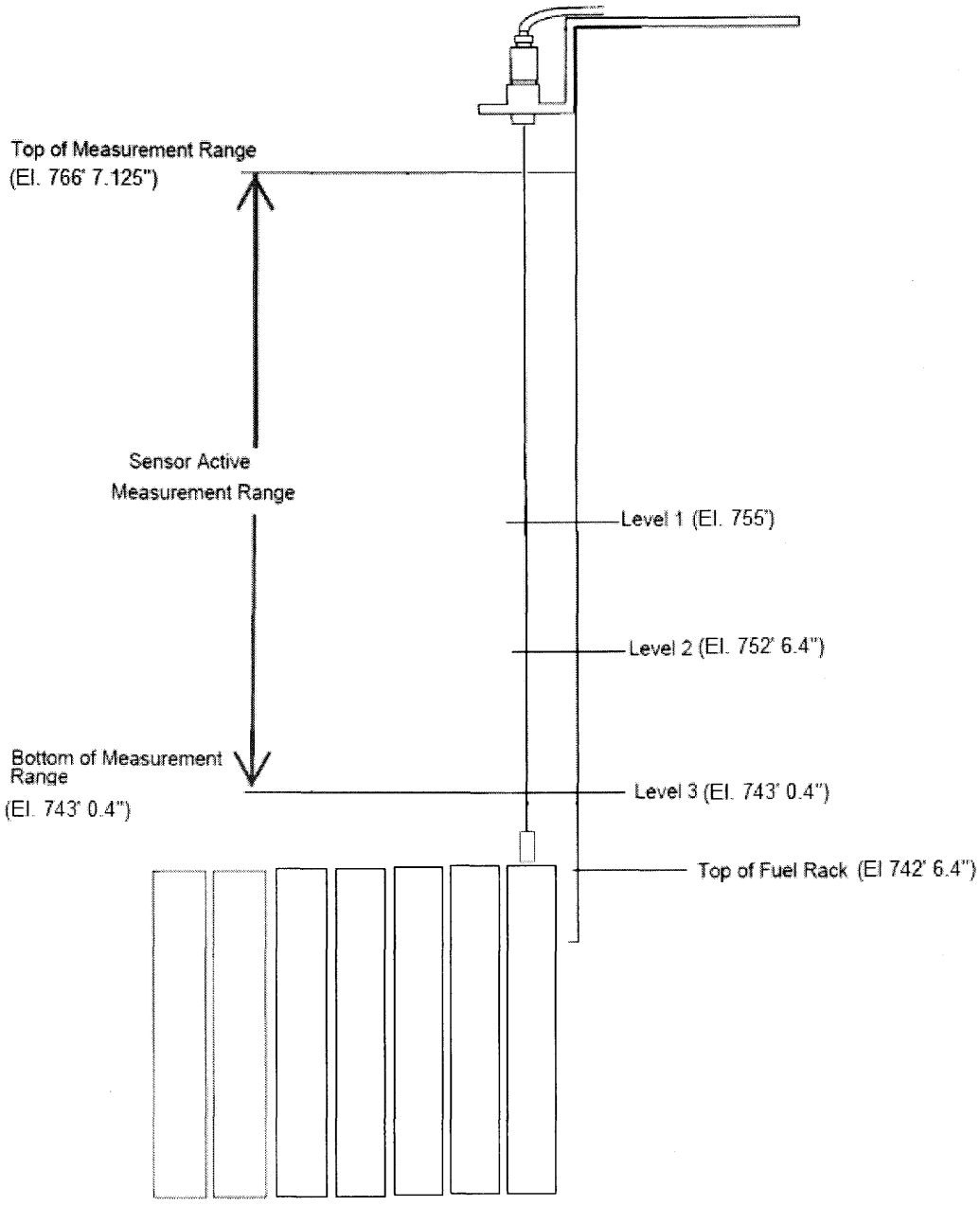
Response:

The following two sketches are provided. The first sketch depicts the elevation view for Unit 1. The second sketch depicts the elevation view for Unit 2.

Unit 1


Top of Measurement Range
(El. 766' 7.125")
Sensor Active
Measurement Range
Level 1 (El. 758')
Level 2 (El. 752')
Bottom of Measurement
Range
(El. 742' 6.5")
Level 3 (El. 742' 6.5")
Top of Fuel Rack (El. 742' 0.5")

Unit 2


Top of Measurement Range
(El. 766' 7.125")
Sensor Active
Measurement Range
Level 1 (El. 755')
Level 2 (El. 752' 6.4")
Bottom of Measurement
Range
(El. 743' 0.4")
Level 3 (El. 743' 0.4")
Top of Fuel Rack (El 742' 6.4")

RAI-3:

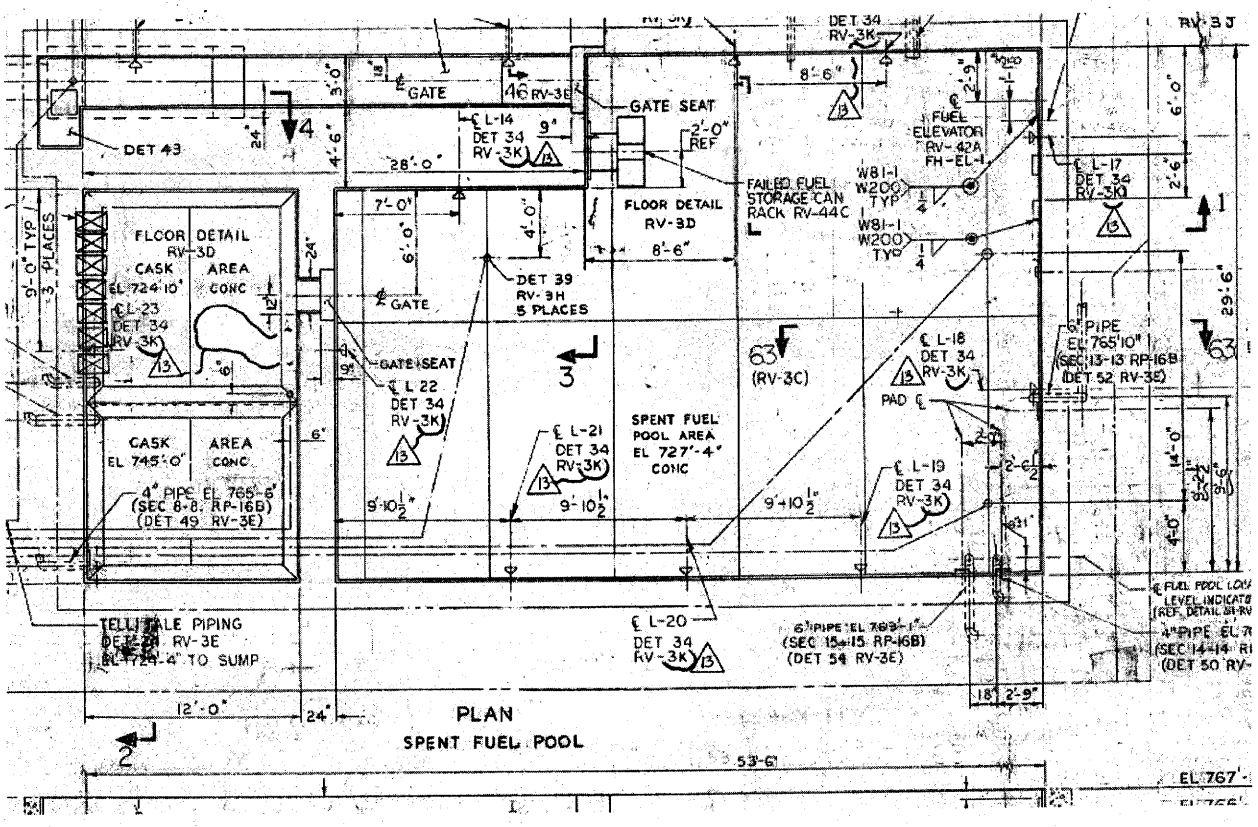
Please provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and backup SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

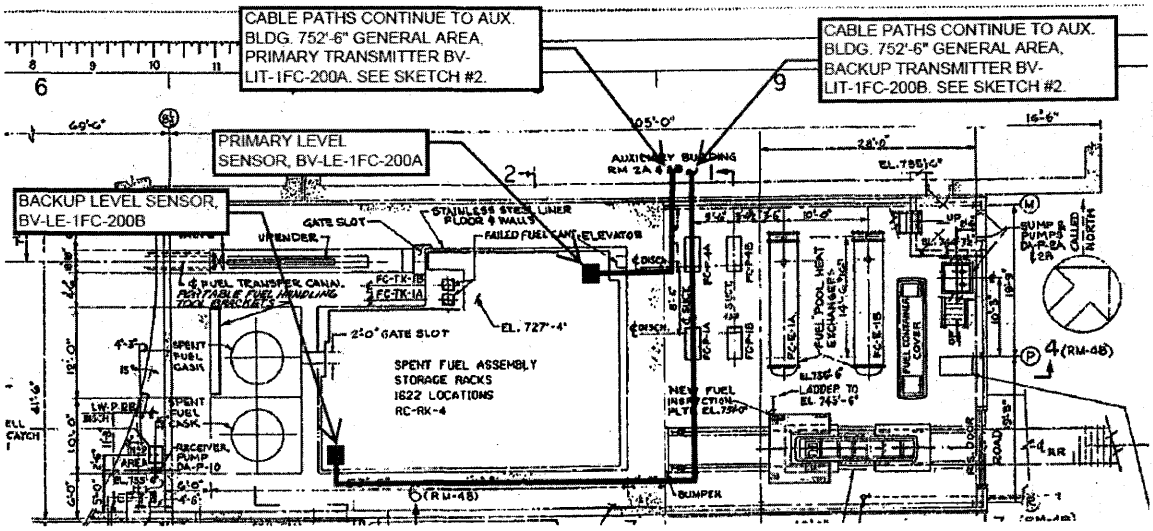
Response:

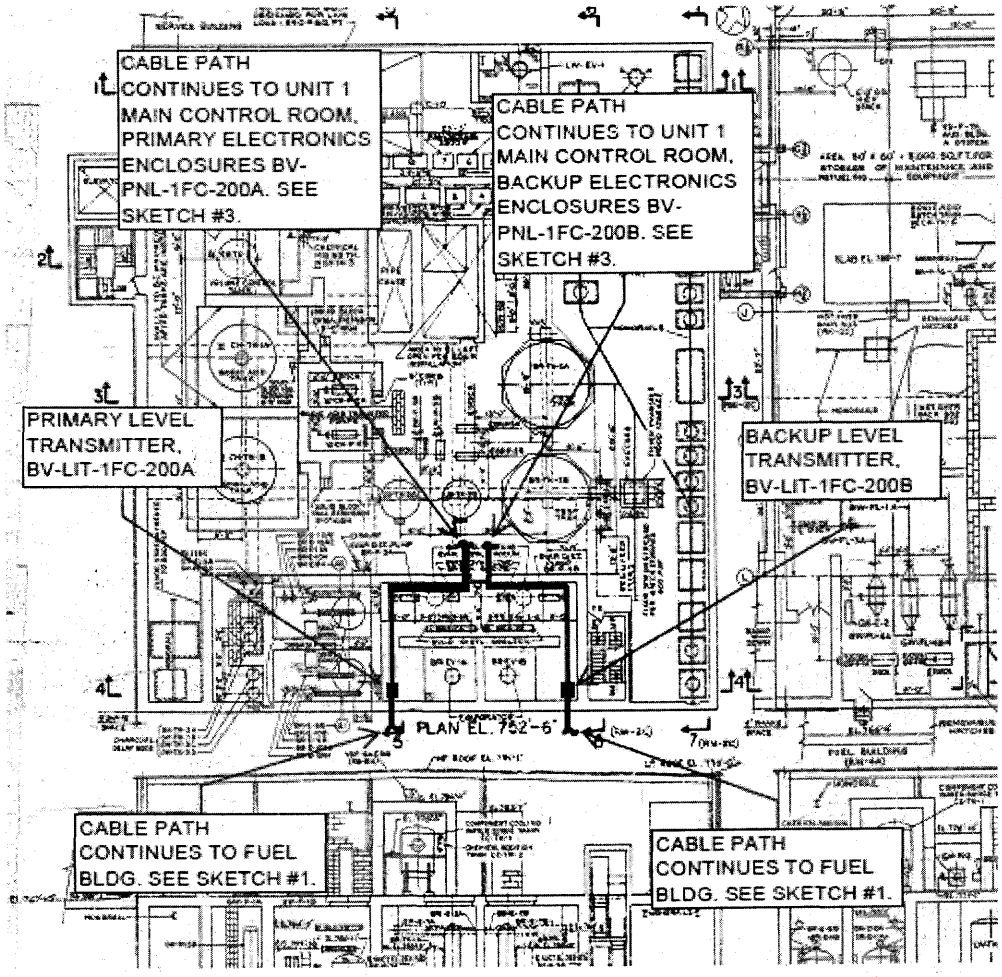
Below are excerpts from plant drawings, being used as sketches, that depict the preliminary design and locations of the two permanently mounted level probes within the SFP area and the cable routing to locate the electronics to a non-harsh environment outside the SFP area. These sketches are excerpts from the 30 percent design change package and include references to other sketches that are not included for this response.

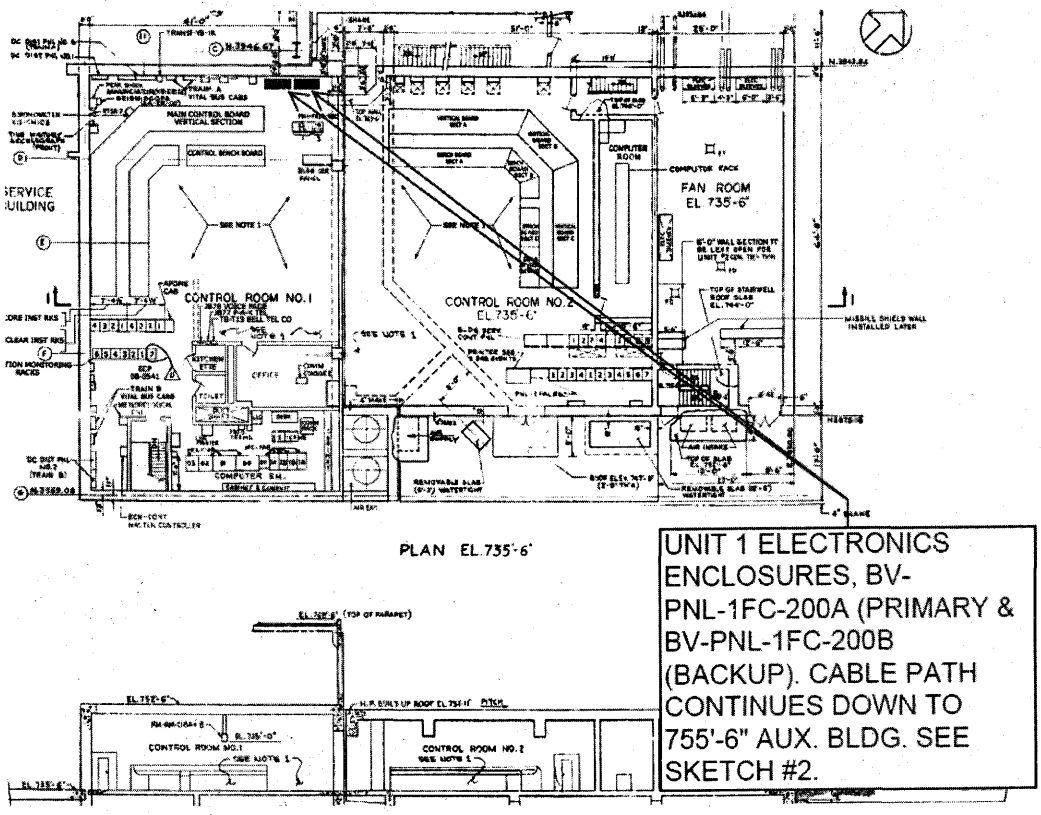
The level transmitter electronics for Unit 1 will be located in the auxiliary building El. 755' 6", which is separated from the SFP area by one floor. The level transmitters located in the auxiliary building have a local display, although the credited display units will be located in the main control room.

The inner dimensions of the Unit 1 Fuel Pool are 39' 6" x 29' 6".



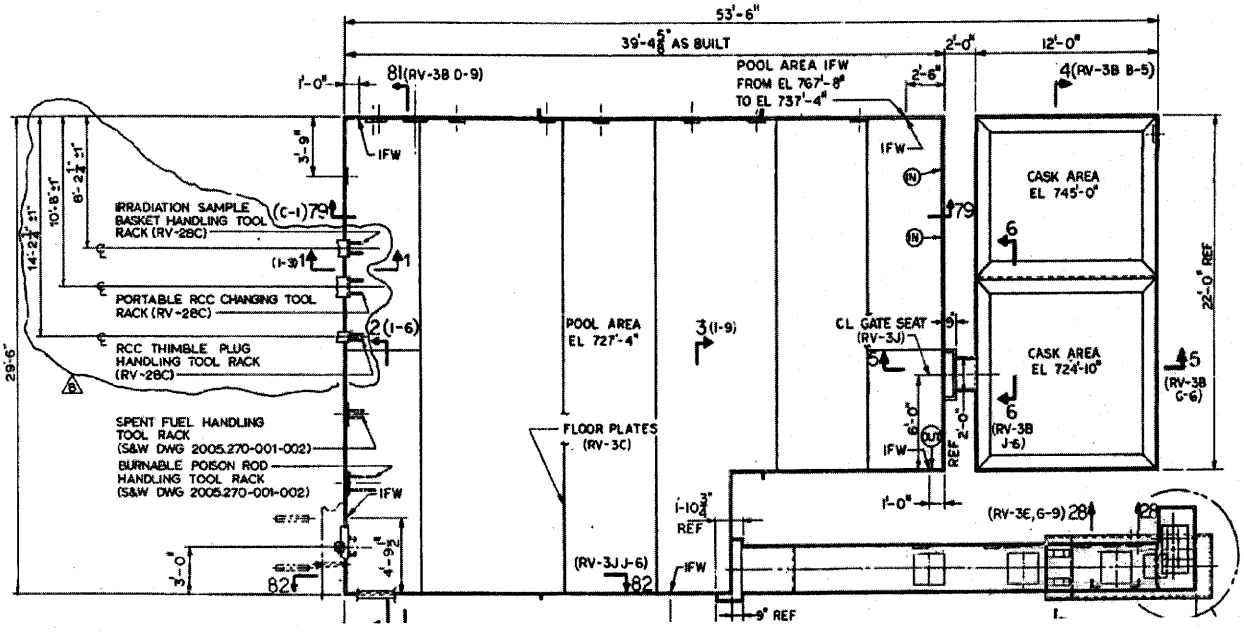

CABLE PATHS CONTINUE TO AUX. BLDG. 752'-6" GENERAL AREA, PRIMARY TRANSMITTER BV-LIT-1FC-200A. SEE SKETCH #2.
CABLE PATHS CONTINUE TO AUX. BLDG. 752'-6" GENERAL AREA, BACKUP TRANSMITTER BV-LIT-1FC-200B. SEE SKETCH #2.
PRIMARY LEVEL SENSOR, BV-LE-1FC-200A
BACKUP LEVEL SENSOR, BV-LE-1FC-200B
SPENT FUEL ASSEMBLY STORAGE RACKS 1622 LOCATIONS RC-RK-4
EL. 727'-4"
2'-0" GATE SLOT

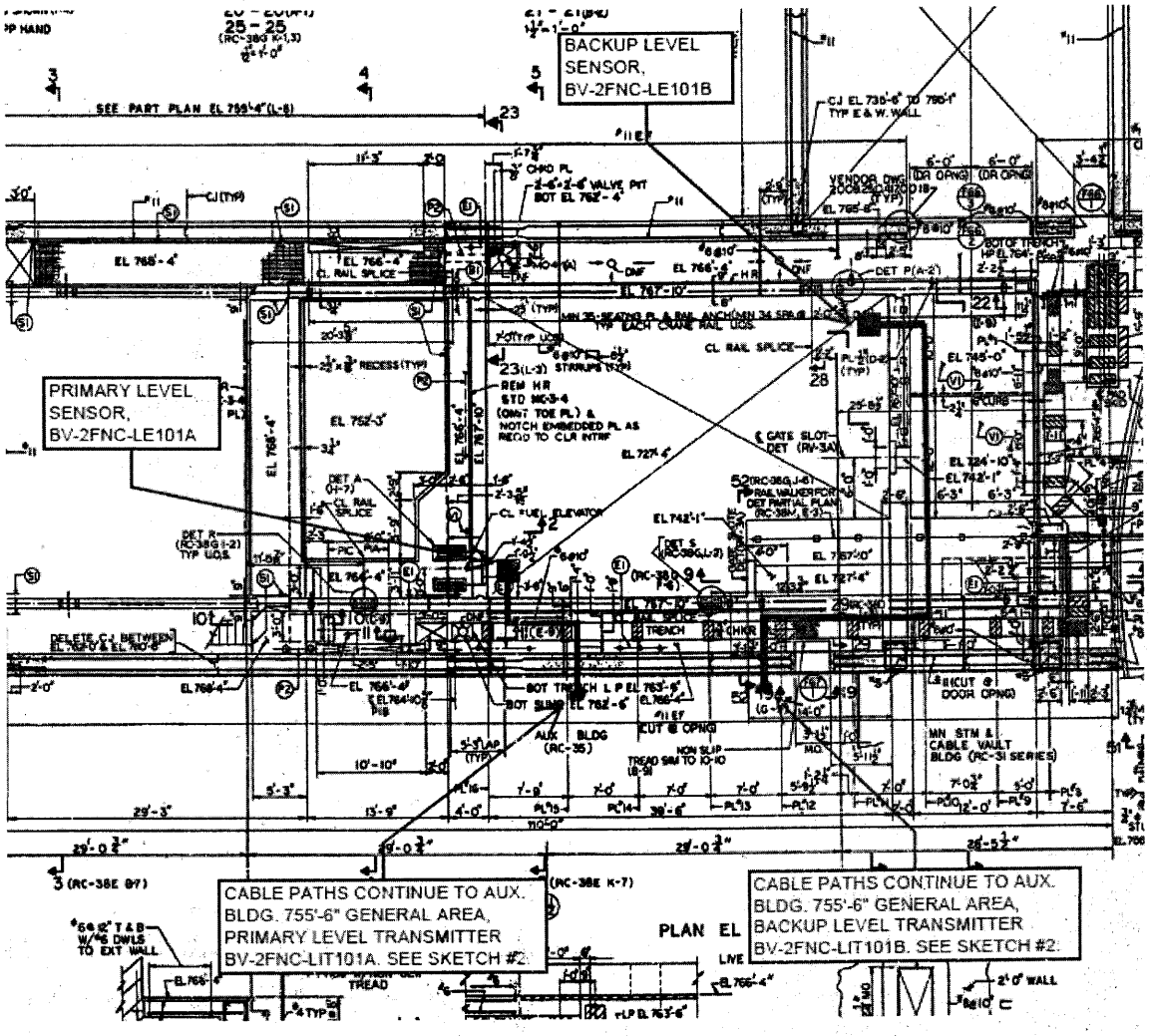

CABLE PATH CONTINUES TO UNIT 1 MAIN CONTROL ROOM, PRIMARY ELECTRONICS ENCLOSURES BV-PNL-1FC-200A. SEE SKETCH #3.
CABLE PATH CONTINUES TO UNIT 1 MAIN CONTROL ROOM, BACKUP ELECTRONICS ENCLOSURES BV-PNL-1FC-200B. SEE SKETCH #3.
PRIMARY LEVEL TRANSMITTER, BV-LIT-1FC-200A
BACKUP LEVEL TRANSMITTER, BV-LIT-1FC-200B
PLAN EL. 752'-6"
CABLE PATH CONTINUES TO FUEL BLDG. SEE SKETCH #1.
CABLE PATH CONTINUES TO FUEL BLDG. SEE SKETCH #1.

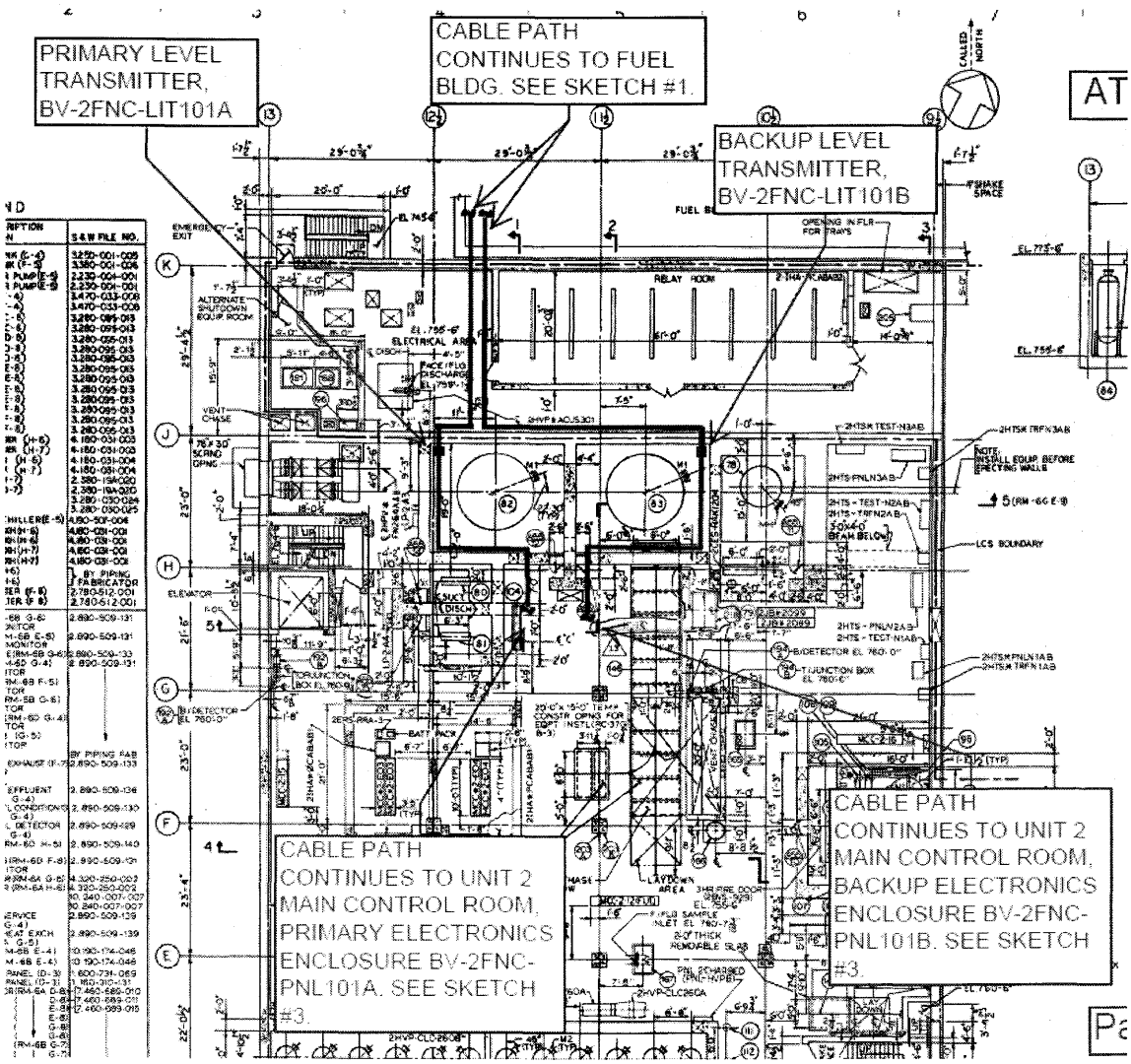


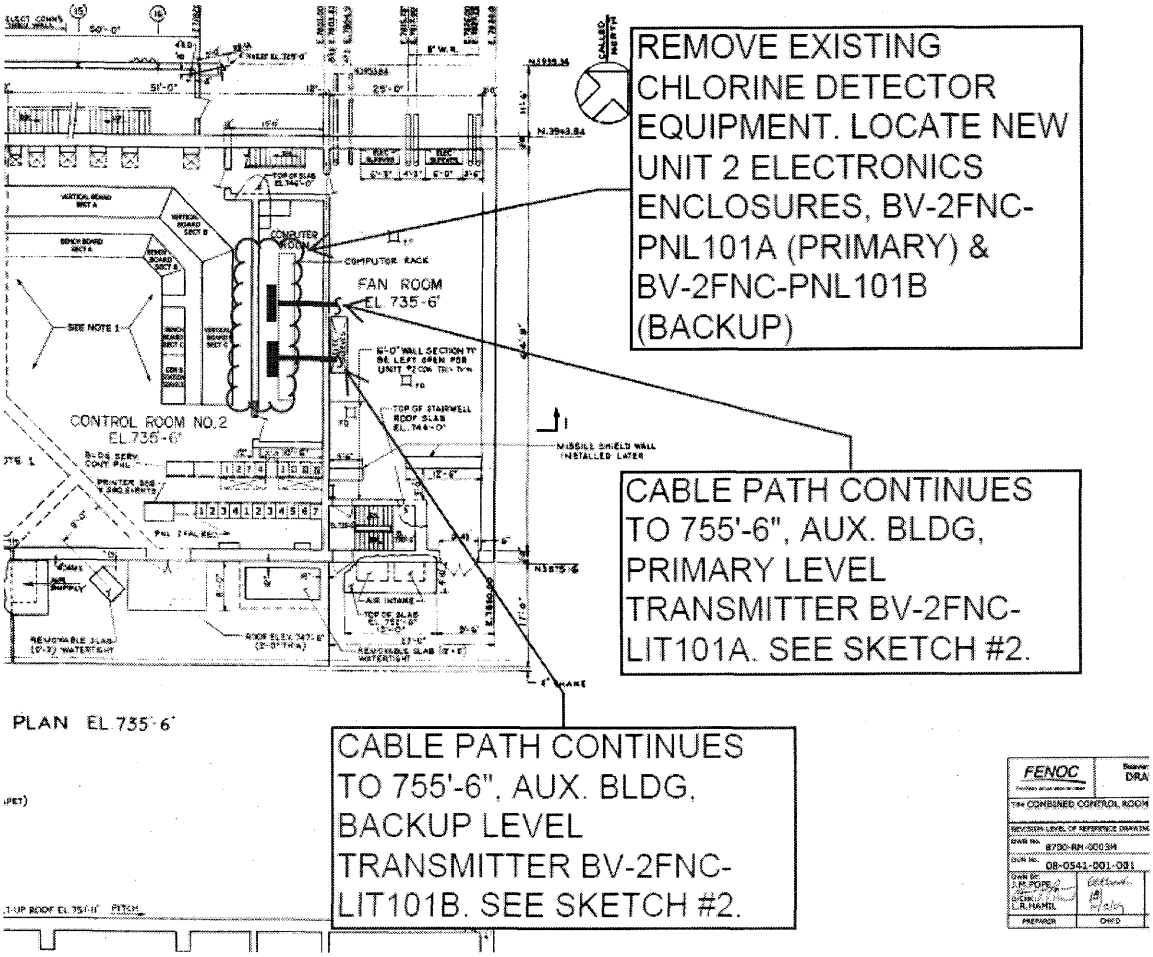
The level transmitter electronics for Unit 2 will be located in the auxiliary building El. 755' 6", which is separated from the SFP area by one floor. The level transmitters located in the auxiliary building have a local display, although the credited display units will be located in the main control room.

The inner dimensions of the Unit 2 Fuel Pool are 39' 4 5/8" x 29' 6".


53'-6"
39'-4 5/8" AS BUILT
2'-0"
12'-0"
POOL AREA IFW FROM EL 767'-8" TO EL 737'-4"
IRRADIATION SAMPLE BASKET HANDLING TOOL RACK (RV-28C)
PORTABLE RCC CHANGING TOOL RACK (RV-28C)
RCC THIMBLE PLUG HANDLING TOOL RACK (RV-28C)
SPENT FUEL HANDLING TOOL RACK (S&W DWG 2005.270-001-002)
BURNABLE POISON ROD HANDLING TOOL RACK (S&W DWG 2005.270-001-002)
POOL AREA EL 727'-4"
FLOOR PLATES (RV-3C)
CASK AREA EL 745'-0"
CASK AREA EL 724'-10"
CL GATE SEAT (RV-3J)
IFW
22'-0" REF
9" REF


BACKUP LEVEL SENSOR, BV-2FNC-LE101B
PRIMARY LEVEL SENSOR, BV-2FNC-LE101A
CABLE PATHS CONTINUE TO AUX. BLDG. 755'-6" GENERAL AREA, PRIMARY LEVEL TRANSMITTER BV-2FNC-LIT101A. SEE SKETCH #2.
CABLE PATHS CONTINUE TO AUX. BLDG. 755'-6" GENERAL AREA, BACKUP LEVEL TRANSMITTER BV-2FNC-LIT101B. SEE SKETCH #2.
PLAN EL


PRIMARY LEVEL TRANSMITTER, BV-2FNC-LIT101A
CABLE PATH CONTINUES TO FUEL BLDG. SEE SKETCH #1.
BACKUP LEVEL TRANSMITTER, BV-2FNC-LIT101B
CABLE PATH CONTINUES TO UNIT 2 MAIN CONTROL ROOM, PRIMARY ELECTRONICS ENCLOSURE BV-2FNC-PNL101A. SEE SKETCH #3.
CABLE PATH CONTINUES TO UNIT 2 MAIN CONTROL ROOM, BACKUP ELECTRONICS ENCLOSURE BV-2FNC-PNL101B. SEE SKETCH #3.
RELAY ROOM
ELECTRICAL AREA
ALTERNATE SHUTDOWN EQUIP ROOM
LAYDOWN AREA
LCS BOUNDARY



RAI-4:

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:

(a) The mounting bracket for the sensing probe will be designed according to the plant design basis, inclusive of loads from a Safe Shutdown Earthquake (SSE). Loads that will be considered in the evaluation of the bracket and its mounting are: 1) Static loads, inclusive of the dead weight of the mounting bracket in addition to the weight of the level sensing instruments, and cabling; and 2) Dynamic loads, including the seismic load due to excitation of the dead weight of the system in addition to the hydrodynamic effects resulting from the excitation of the SFP water. A response spectra analysis will be performed for the seismic evaluation of the mounting bracket using a Finite Element Analysis (FEA) software and using floor response spectrum at the operating deck elevation (that is, mounting floor elevation). Damping values will be according to SSE and consistent with the design basis of the station. The material properties that will be used for the bracket and its mounting will take into consideration the environmental conditions in the SFP area following an event. Hydrodynamic effects on the mounting bracket will be evaluated using TID-7024 (Nuclear Reactors and Earthquakes, dated 1963). Plant acceptance criteria and applicable codes will be used for the design of the bracket and its anchorage.

(b) The bracket will be attached to the pool deck using installed anchors that will be designed according to the plant existing specification for design of concrete anchors. This is the only support for this instrument. The probe attaches to the bracket's support plate via a 1 1/2" NPT (National Pipe Thread Taper) threaded connection. Non-movable connections of parts will be welded. The specifics of the bracket design have yet to be finalized; therefore, FENOC intends to provide a schematic in the August 2014 six-month update.

(c) The attachment of the seismically qualified bracket to the pool deck will be through permanently installed anchors. With the permanently installed anchors, the bracket pedestal will be secured to the poolside deck with adequate washers and bolts.

RAI- 6:

For each of the mounting attachments required to attach SFP level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

Response:

Westinghouse has conducted seismic testing of the level sensor electronics bracket and electronics enclosure, which includes the mounting details, according to Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard 344 (2004), against the

seismic spectra defined in the product design specification. All steel plates will conform to American Society for Testing and Materials (ASTM) Standard A240 Type 304 steel. All bolts will conform to ASTM Standard F593C. All weld material will be the same as base metal or compatible. Loads applied consist of self-weight, dead load of the instrumentation (the probe assembly including the launch plate), seismic load, and hydrodynamic load due to the seismic effect. The seismic loads are obtained from plant response spectra curves. Convective pressure associated with hydrodynamic loads will be considered for sloshing analysis by conservatively using the longest span of the pool and the height of the water between the top of the fuel racks and the high water level since the bracket cantilevers over the SFP water. The calculation of the convective pressure is based on TID-7024. Load combinations will be used in accordance with plant seismic criteria. Seismic forces in all three directions are combined using GT STRUDL, Version 32, analysis. Dead weight, seismic and convective pressure results are combined in absolute values. The FENOC engineering change process will be used to address the effect of this added instrumentation to plant structures, and it will be analyzed per the plant design basis for equipment loads.

RAI-9:

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 read-out 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 read-out devices, and the independence of the displays.

Response:

(a) Within the Unit 1 SFP area, the brackets will be mounted as close to the northeast (primary sensor) and southwest (back-up sensor) corners of the SFP, as permanent plant structures allow. Within the Unit 2 SFP area, the brackets will be mounted as close to the southwest (primary sensor) and northeast (back-up sensor) corners of the SFP, as permanent plant structures allow. Placing the brackets and probes in the corners allows for natural protection from a single event or missile from disabling both systems. The cabling within the SFP area will be routed in separate hard-pipe conduit. All conduit routing and location of system components will be selected such that there will not be any seismic 2-over-1 hazard. Site safety related separation requirements will be followed.

(b) Each system will be installed using completely independent cabling structures, including routing of the interconnecting cable within the SFP area in separate hard-pipe

conduits. Power sources will be routed to the electronics enclosures from electrically separated sources ensuring the loss of one train or bus will not disable both channels. The system displays will be installed in separate qualified National Electrical Manufacturers Association (NEMA) Type 4X or better enclosures in the Unit 1 Auxiliary Building El. 752' 6" and the Unit 2 Auxiliary Building El. 755' 6", with the primary and back-up display in the main control room. Primary and backup systems will be completely independent of each other, having no shared components.

RAI-10:

Please provide the following:

(a) A description of the electrical ac power sources and capabilities for the primary and backup channels.

Response:

Each instrument channel is normally powered by non-class 1E 120 volts alternating current (VAC) distribution panels to support continuous monitoring of the SFP level. The 120VAC distribution panels for the primary and backup channels at each unit are powered by different 480V buses. Therefore the loss of any one 480V bus will not result in the failure of both instrument channels.

On loss of normal 120VAC power, each channel's uninterruptible power supply (UPS) automatically transfers to a dedicated backup battery. If normal power is restored, then the channel will automatically transfer back to the normal alternating current (AC) power.

The 72-hour backup batteries are maintained in a charged state by UPSs.

Introduction:

By letter dated February 27, 2013, FirstEnergy Nuclear Operating Company (FENOC) provided to the Nuclear Regulatory Commission (NRC) the Davis-Besse Nuclear Power Station (DBNPS) reliable spent fuel pool (SFP) instrumentation overall integrated plan. By letter dated December 11, 2013, the NRC staff issued an interim staff evaluation (ISE) for DBNPS that included requests for additional information (RAIs). This report provides the FENOC response to the RAIs for which information is currently available. The NRC request is presented in bold type, followed by the FENOC response.

Requests for Additional Information:

RAI-1:

Please specify for Level 1 how the identified location represents the higher of the two points described in the NEI 12-02 guidance for this level.

Response:

Level 1, the level that is adequate to support operation of the normal fuel pool cooling system, is defined in NEI 12-02 as the higher of the following two points:

(1) The level at which reliable suction loss occurs due to uncovering of the coolant inlet pipe, weir or vacuum breaker (depending on the design), or

(2) The level at which the water height, assuming saturated conditions, above the centerline of the cooling pump suction provides the required net positive suction head (NPSH) specified by the pump manufacturer or engineering analysis.

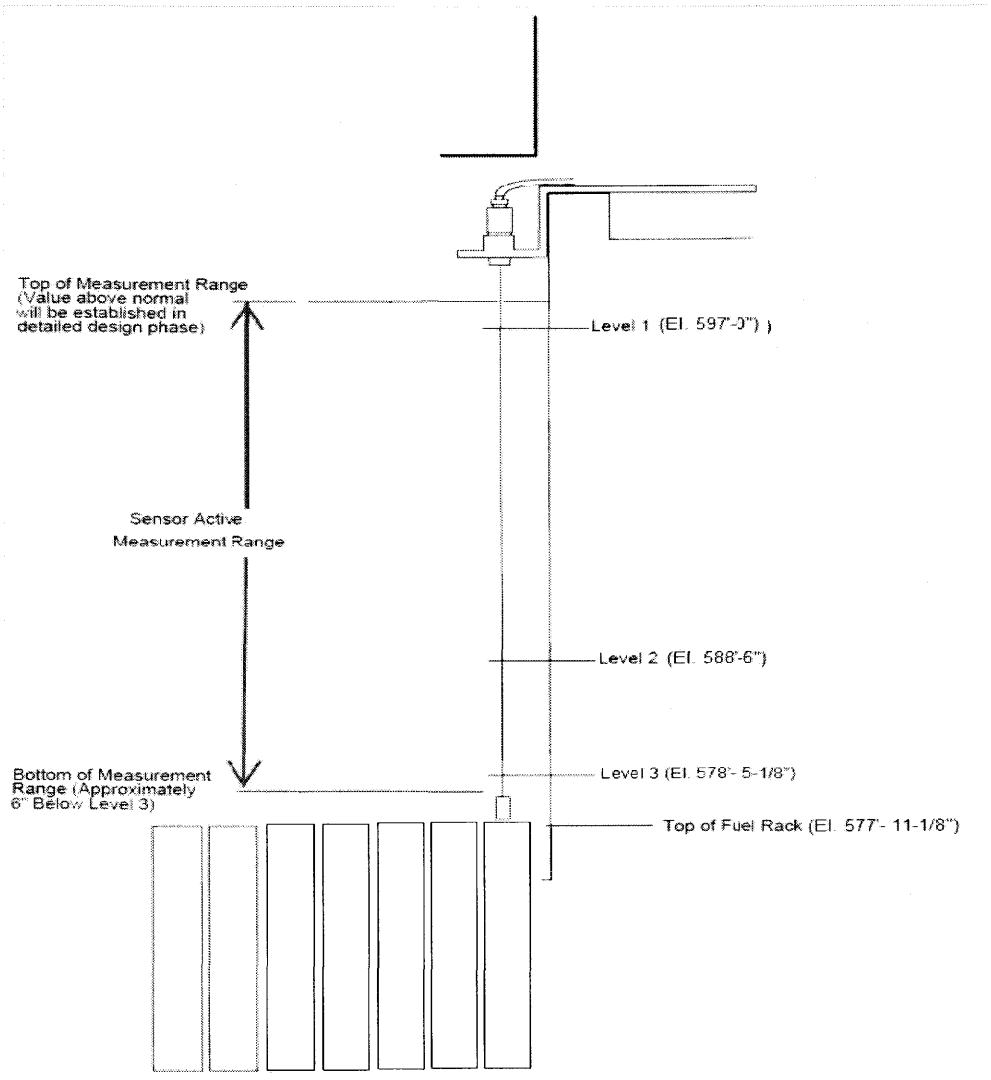
Level 1 for DBNPS is designated to be elevation (El.) 597' (19' 2" above the top of the fuel racks). Once the water level drops below El. 597', water will no longer be extracted from the pool to be sent to the SFP cooling equipment to provide heat removal from the SFP. At this level, the coolant inlet pipe is uncovered. This level is also above the level required to provide NPSH to SFP pumps at El. 585'.

RAI-2:

Please provide 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). 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.

Response:

The following sketch is provided. The sketch depicts the elevation view for DBNPS. The top of fuel assemblies was used instead of the fuel rack, as the top of fuel assemblies have a higher top elevation than the top of the fuel rack.



RAI-3:

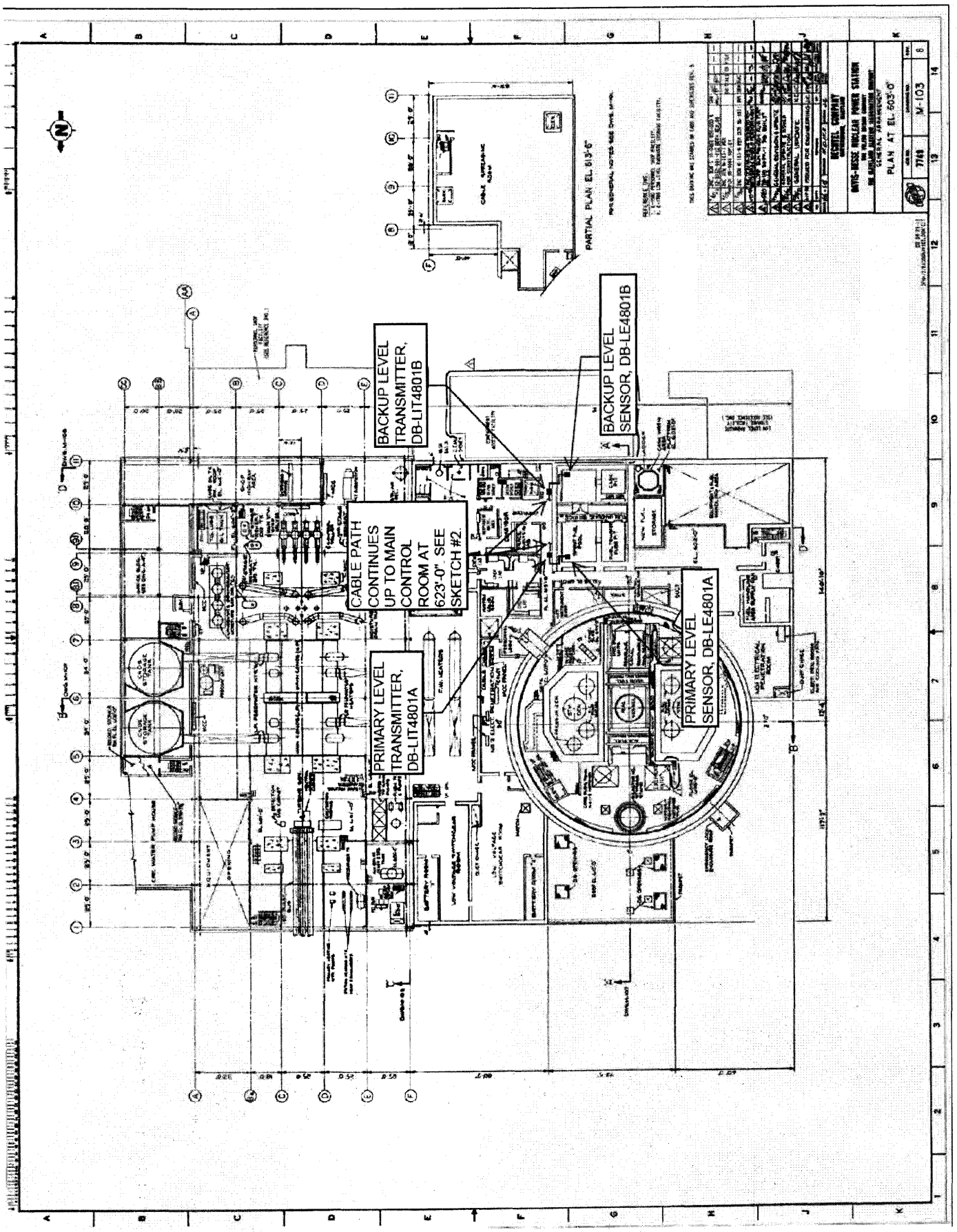
Please provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

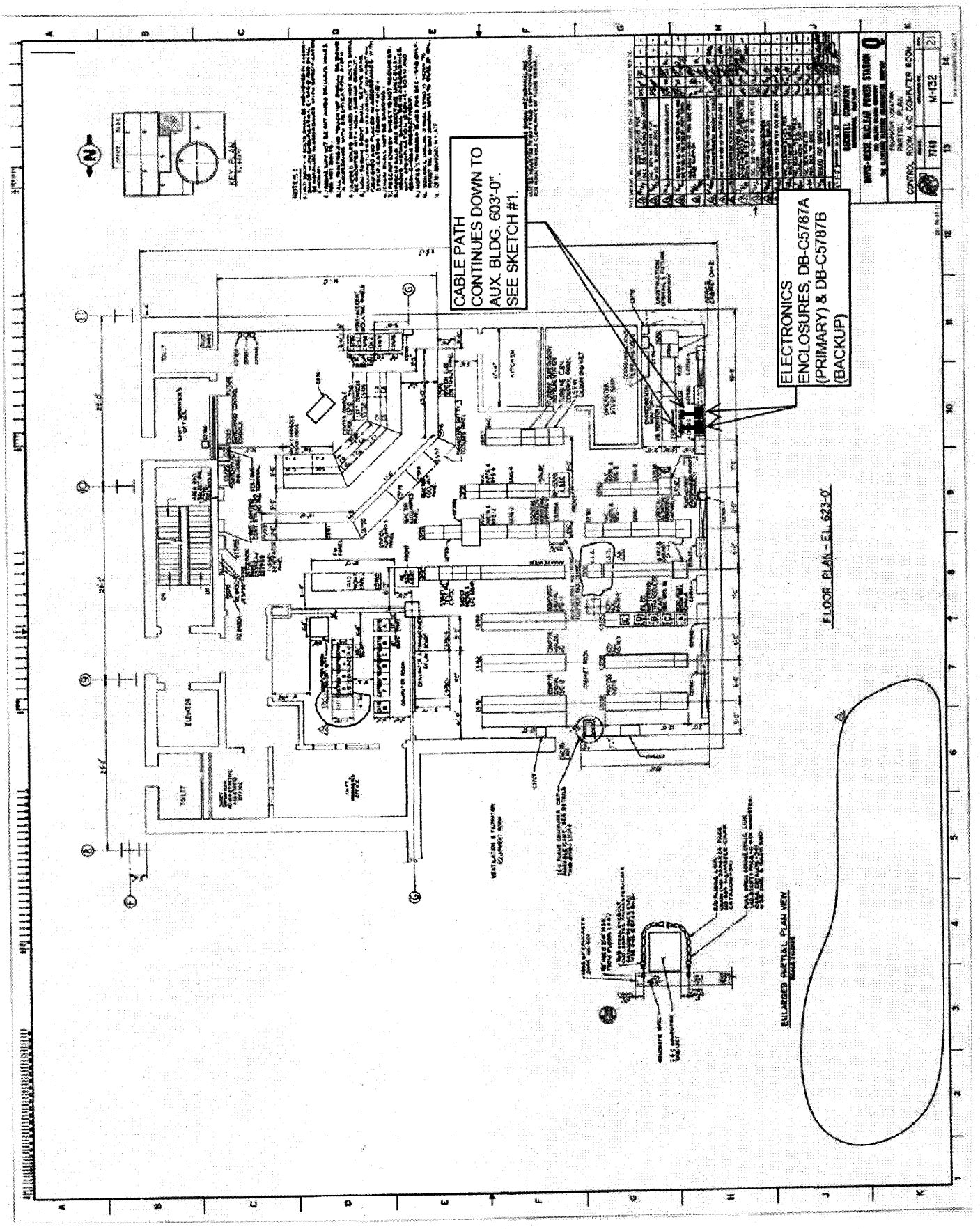
Response:

Below are excerpts from plant drawings, being used as sketches, that depict the preliminary design and locations of the two permanently mounted level probes within the SFP area and the cable routing to locate the electronics to a non-harsh environment outside the SFP area. These sketches are excerpts from the 30 percent design change package and include references to other sketches that are not included for this response.

The level transmitter electronics will be located in the auxiliary building El. 603', on the same level as the SFP but in the building adjacent to the fuel handling building. The level transmitters located in the auxiliary building have a local display, although the credited display units will be located in the main control room.

The inner dimensions of the SFP are 52' 11.5" x 19' 11.5".


BACKUP LEVEL TRANSMITTER, DB-LIT4801B
BACKUP LEVEL SENSOR, DB-LE4801B
CABLE PATH CONTINUES UP TO MAIN CONTROL ROOM AT 623'-0". SEE SKETCH #2.
PRIMARY LEVEL TRANSMITTER, DB-LIT4801A
PRIMARY LEVEL SENSOR, DB-LE4801A
PARTIAL PLAN EL. 613'-6"
PLAN AT EL. 603'-6"


CABLE PATH
CONTINUES DOWN TO
AUX. BLDG. 603'-0"
SEE SKETCH #1.
ELECTRONICS
ENCLOSURES, DB-C5787A
(PRIMARY) & DB-C5787B
(BACKUP)
FLOOR PLAN - EL. 623'-0"
ENLARGED PARTIAL PLAN VIEW

RAI-4:

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:

(a) The mounting bracket for the sensing probe will be designed according to the plant design basis, inclusive of loads from a Safe Shutdown Earthquake (SSE) (referred to as a maximum possible earthquake in the DBNPS Updated Safety Analysis Report). Loads that will be considered in the evaluation of the bracket and its mounting are: 1) Static loads, inclusive of the dead weight of the mounting bracket in addition to the weight of the level sensing instruments, and cabling; 2) Dynamic loads including the seismic load due to excitation of the dead weight of the system in addition to the hydrodynamic effects resulting from the excitation of the SFP water. A response spectra analysis will be performed for the seismic evaluation of the mounting bracket using a Finite Element Analysis (FEA) software and using floor response spectrum at the operating deck elevation (that is, mounting floor elevation). Damping values will be according to SSE and consistent with the design basis of the station. The material properties that will be used for the bracket and its mounting will take into consideration the environmental conditions in the SFP area following an event. Hydrodynamic effects on the mounting bracket will be evaluated using TID-7024 (Nuclear Reactors and Earthquakes, dated 1963). Plant acceptance criteria and applicable codes will be used for the design of the bracket and its anchorage.

(b) The bracket will be attached to the pool deck using installed anchors that will be designed according to the plant existing specification for design of concrete anchors. This is the only support for this instrument. The pedestal will be adjusted to the height of the poolside curb to ensure the SFP bracket extends over the pool horizontally level. The probe attaches to the bracket's support plate via a 1 1/2" NPT (National Pipe Thread Taper) threaded connection. Non-movable connections of parts will be welded.

The specifics of the bracket design have yet to be finalized; therefore, FENOC intends to provide a schematic in the August 2014 six-month update.

(c) The attachment of the seismically qualified bracket to the pool deck will be through permanently installed anchors. With the permanently installed anchors, the bracket pedestal will be secured to the poolside deck with adequate washers and bolts.

RAI- 6:

For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that was used to qualify the structural integrity of the affected structures/equipment.

Response:

Westinghouse has conducted seismic testing of the level sensor electronics bracket and electronics enclosure, which include the mounting details, according to Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard 344 (2004), against the seismic spectra defined in the product design specification. All steel plates will conform to American Society for Testing and Materials (ASTM) Standard A240 Type 304 steel. All bolts will conform to ASTM Standard F593C. All weld material will be the same as base metal or compatible. Loads applied consist of self-weight, dead load of the instrumentation (the probe assembly including the launch plate), seismic load, and hydrodynamic load due to the seismic effect. The seismic loads are obtained from plant response spectra curves. Convective pressure associated with hydrodynamic loads will be considered for sloshing analysis by conservatively using the longest span of the pool and the height of the water between the top of the fuel racks and the high water level since the bracket cantilevers over the SFP water. The calculation of the convective pressure is based on TID-7024. Load combinations will be used in accordance with plant seismic criteria. Seismic forces in all three directions are combined using GT STRUDL, Version 32, analysis. Dead weight, seismic and convective pressure results are combined in absolute values. The FENOC engineering change process will be used to address the effect of this added instrumentation to plant structures, and it will be analyzed per the plant design basis for equipment loads.

RAI-9:

Please provide the following:

(a) A description of the manner the two channels of the proposed level measurement system meet the independence requirement to minimize, to the extent practicable, the potential for a common cause event to adversely affect both channels.

(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:

(a) Within the SFP area, the brackets will be mounted as close to the northeast (primary sensor) and southeast (back-up sensor) corners of the SFP, as permanent plant structures allow. Placing the brackets and probes in the corners allows for natural protection from a single event or missile from disabling both systems. The cabling within the SFP area will be routed in separate hard-pipe conduit. All conduit routing and location of system components will be selected such that there will not be any seismic 2-over-1 hazard. Site safety related separation requirements will be followed.

(b) Each system will be installed using completely independent cabling structures, including routing of the interconnecting cable within the SFP area in separate hard-pipe conduits. Power sources will be routed to the electronics enclosures from electrically separated sources ensuring the loss of one train or bus will not disable both channels. The system displays will be installed in separate qualified National Electrical Manufacturers Association (NEMA) Type 4X or better enclosures in the auxiliary building El. 623', with the primary and back-up display in the main control room. Primary and backup systems will be completely independent of each other, having no shared components.

RAI-10:

Please provide the following:

(a) A description of the electrical ac power sources and capabilities for the primary and backup channels.

Response:

Each instrument channel is normally powered by non-class 1E 120 volts alternating current (VAC) distribution panels to support continuous monitoring of the SFP level. The 120VAC distribution panels for the primary and backup channels at each unit are powered by different 480V buses. Therefore, the loss of any one 480V bus will not result in the failure of both instrument channels.

On loss of normal 120VAC power, each channel's uninterruptible power supply (UPS) automatically transfers to a dedicated backup battery. If normal power is restored, then the channel will automatically transfer back to the normal alternating current (AC) power.

The 72-hour backup batteries are maintained in a charged state by UPSs.

Introduction:

By letter dated February 27, 2013, FirstEnergy Nuclear Operating Company (FENOC) provided to the Nuclear Regulatory Commission (NRC) the Perry Nuclear Power Plant (PNPP) reliable spent fuel pool (SFP) instrumentation overall integrated plan. By letter dated December 11, 2013, the NRC staff issued an interim staff evaluation (ISE) for PNPP that included requests for additional information (RAIs). This report provides the FENOC response to the RAIs for which information is currently available. The NRC request is presented in bold type, followed by the FENOC response.

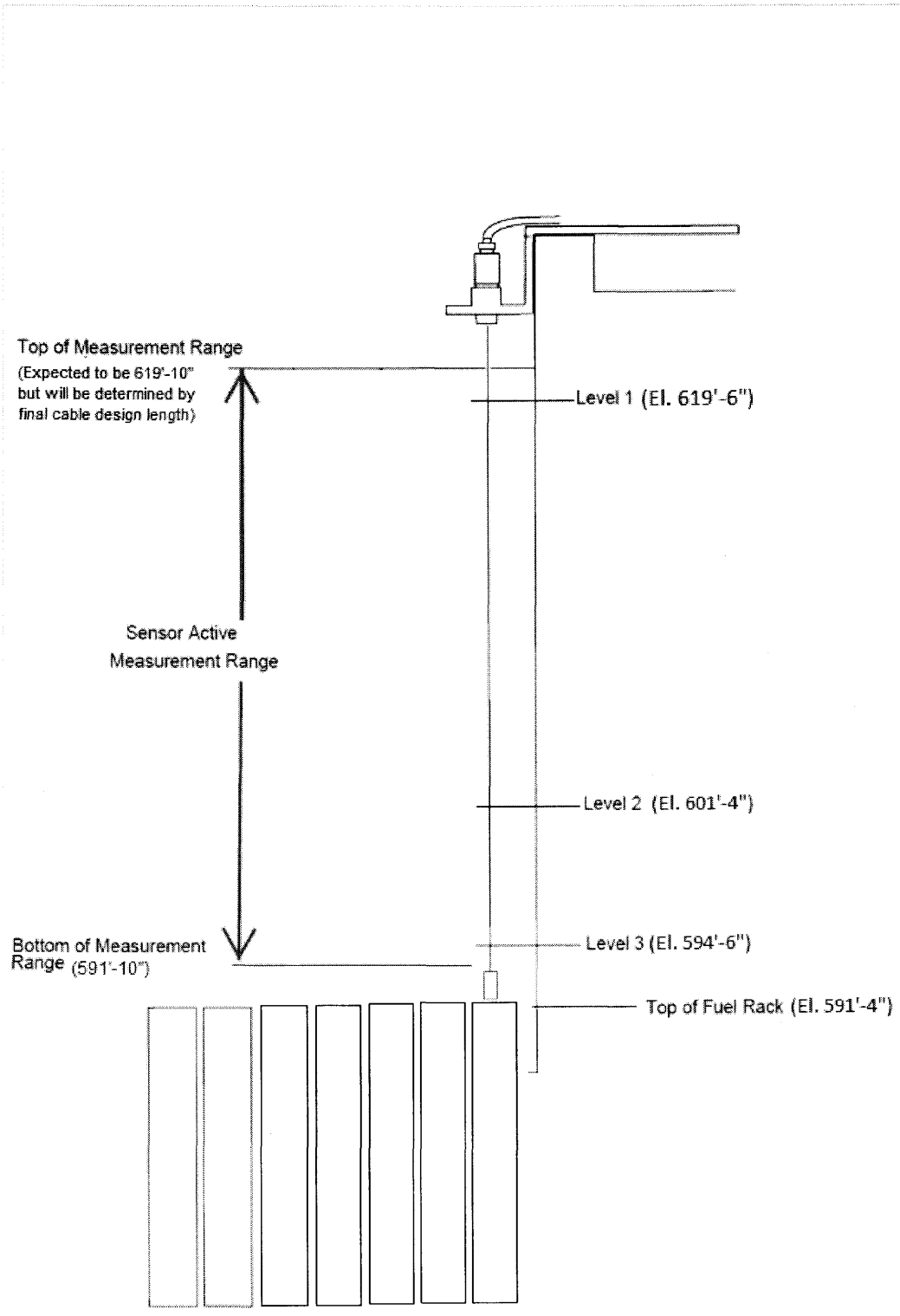
Requests for Additional Information:

RAI-1:

Please provide 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). 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.

Response:

The following sketch is provided. The sketch depicts the elevation view for PNPP.


Top of Measurement Range
(Expected to be 619'-10" but will be determined by final cable design length)
Level 1 (El. 619'-6")
Sensor Active Measurement Range
Level 2 (El. 601'-4")
Bottom of Measurement Range (591'-10")
Level 3 (El. 594'-6")
Top of Fuel Rack (El. 591'-4")

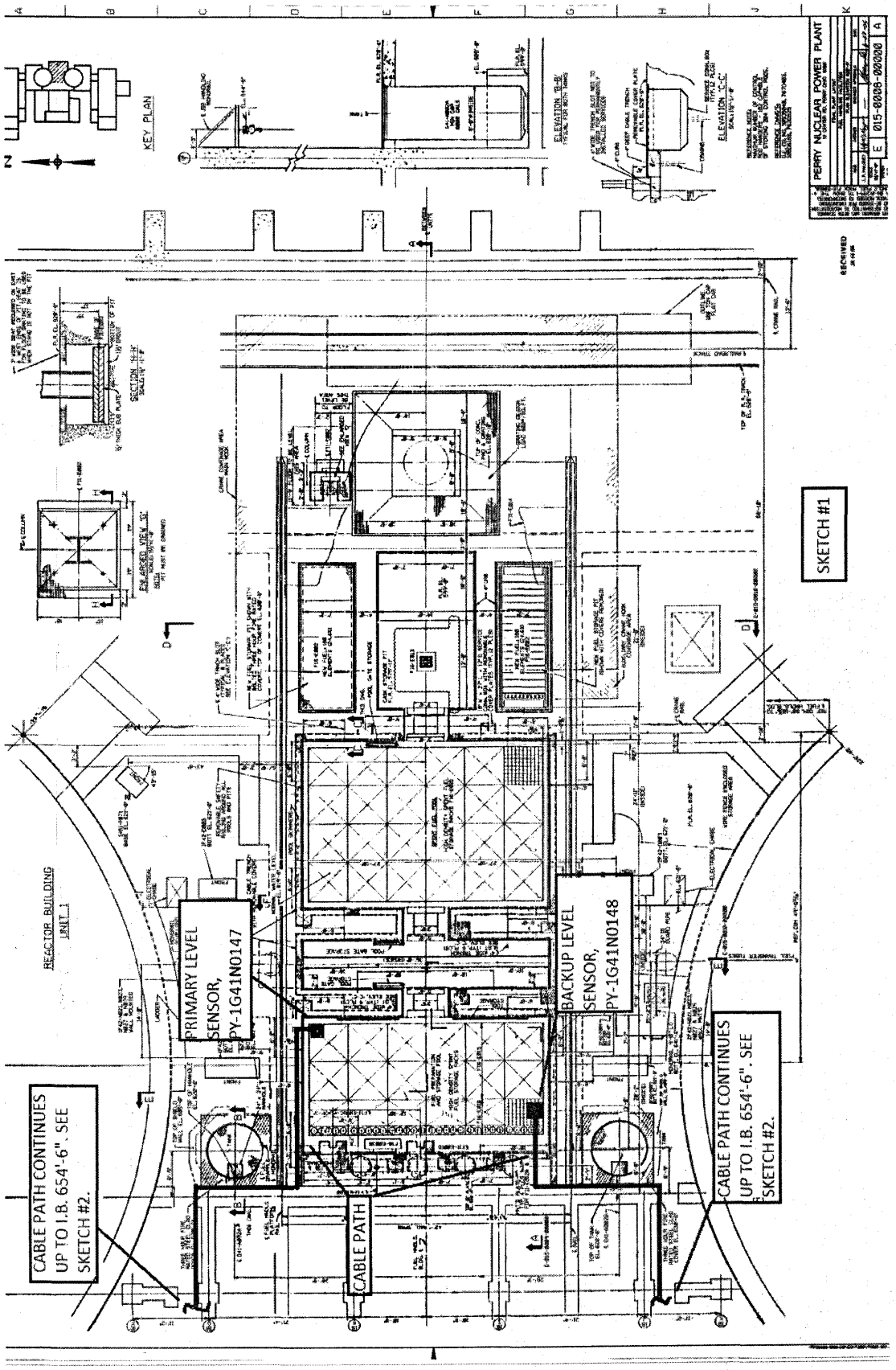
RAI-2:

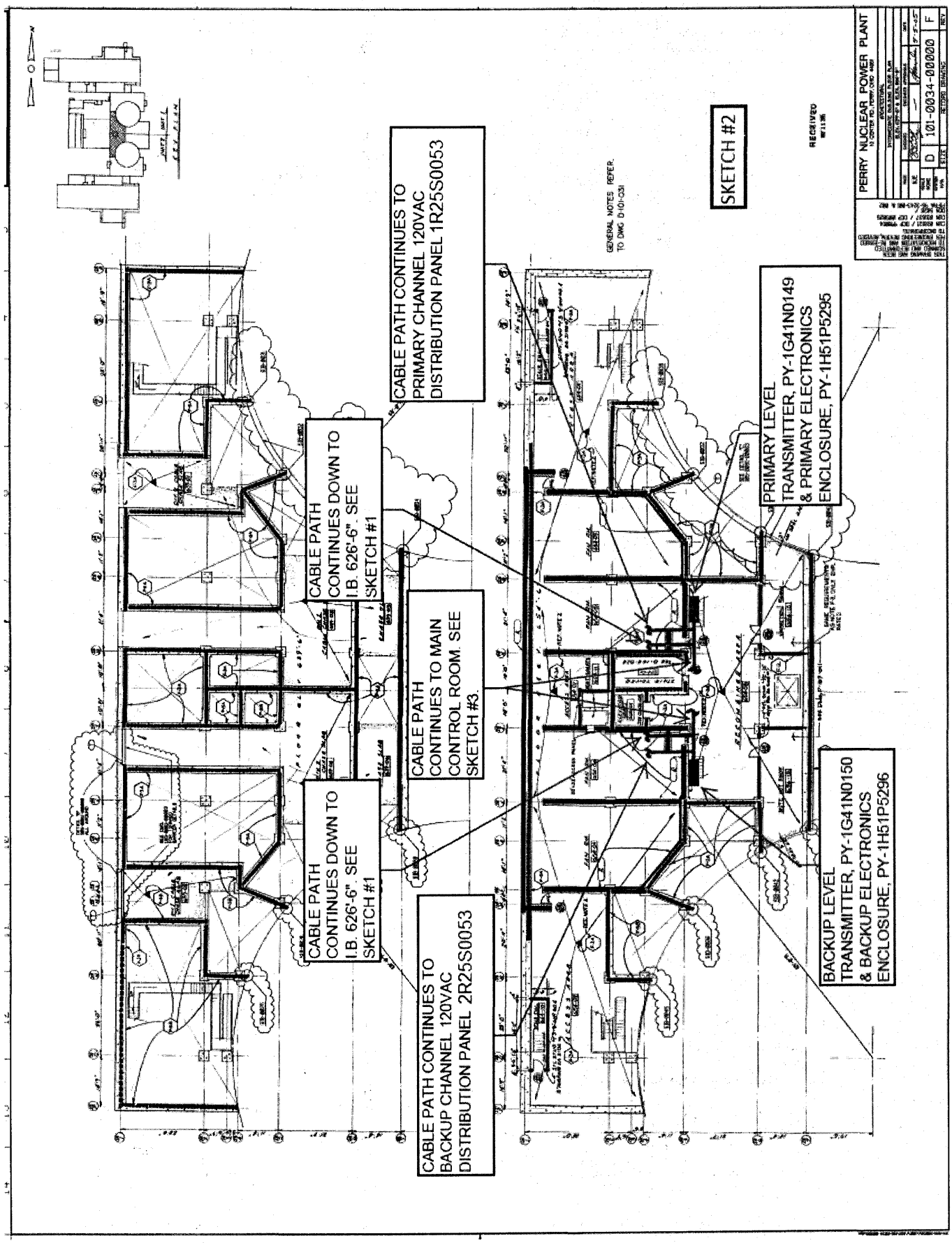
Please provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SFP area, depicting the SFP inside dimensions, the planned locations/placement of the primary and back-up SFP level sensor, and the proposed routing of the cables that will extend from these sensors toward the location of the read-out/display device.

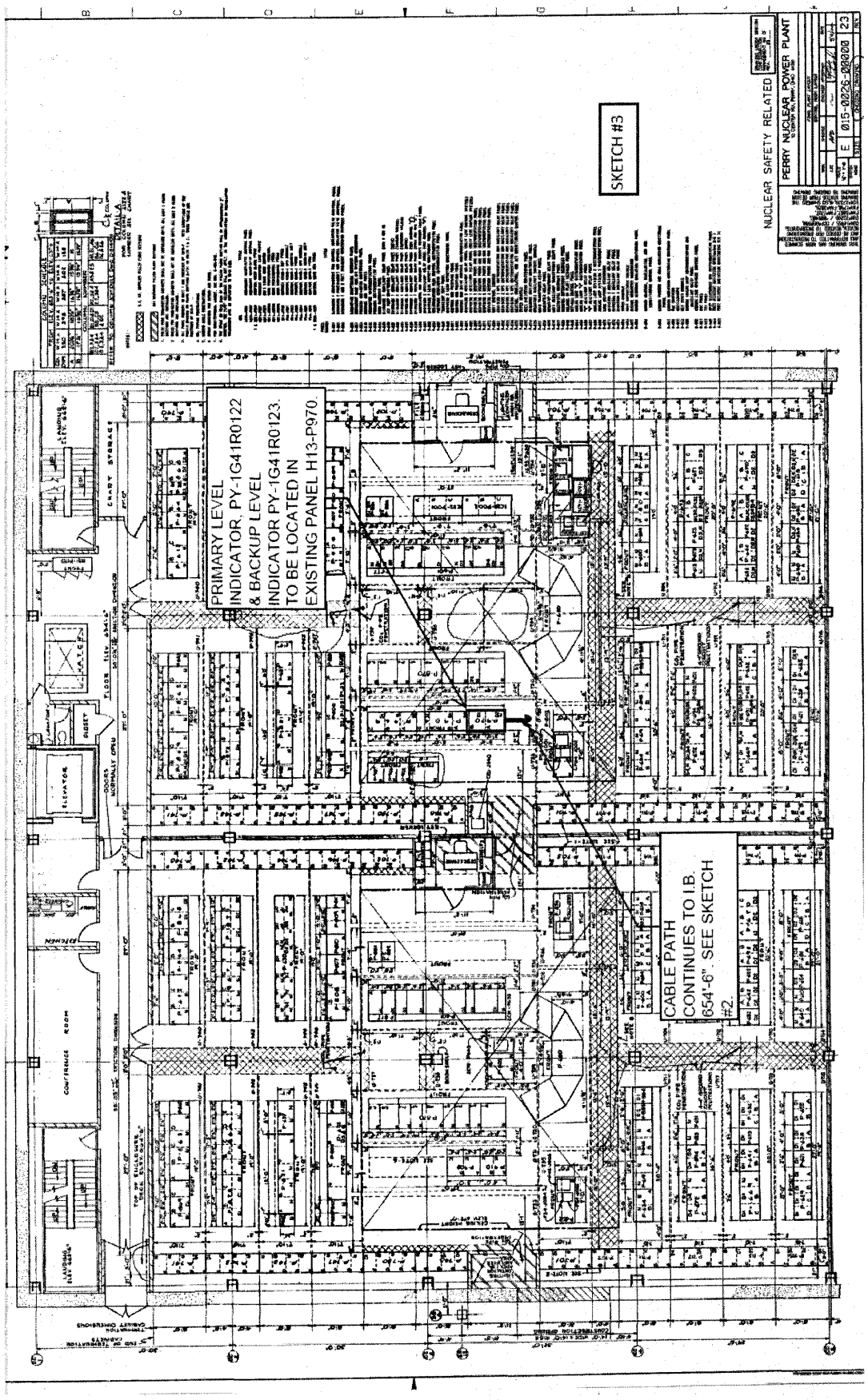
Response:

Below are excerpts from plant drawings, being used as sketches, that depict the preliminary design and locations of the two permanently mounted level probes within the SFP area and the cable routing to locate the electronics to a non-harsh environment outside the SFP area.

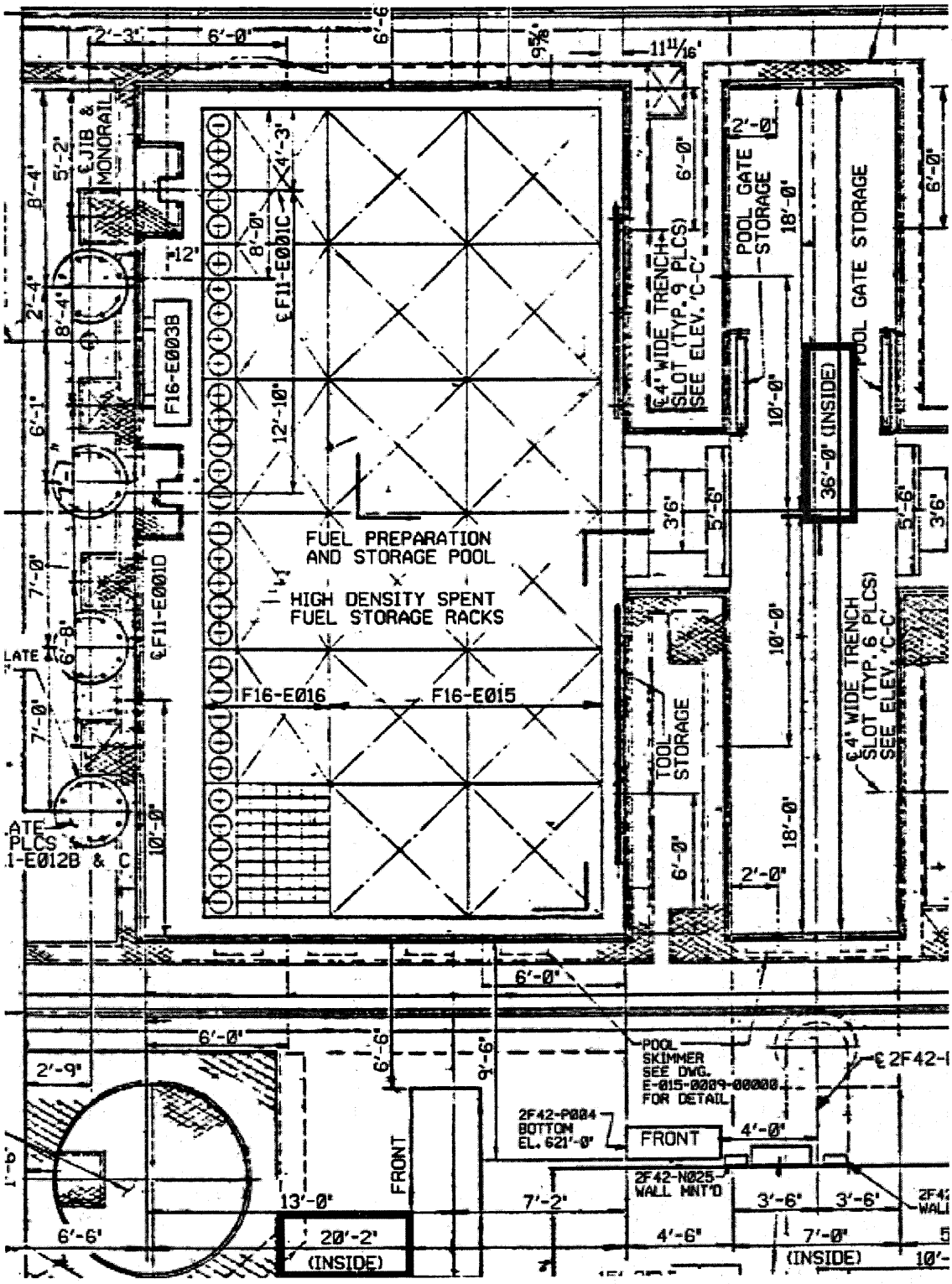
The level transmitter electronics will be located in the intermediate building elevation (El.) 654' 6", which is separated from the SFP area by one floor. The level transmitters located in the intermediate building have a local display, although the credited display units will be located in the main control room on the east wall, in panel 1H13P0970.


KEY PLAN
PERRY NUCLEAR POWER PLANT
SKETCH #1
REACTOR BUILDING
UNIT 1
PRIMARY LEVEL SENSOR, PY-1G41N0147
BACKUP LEVEL SENSOR, PY-1G41N0148
CABLE PATH CONTINUES UP TO I.B. 654'-6". SEE SKETCH #2.
CABLE PATH
CABLE PATH CONTINUES UP TO I.B. 654'-6". SEE SKETCH #2.


SKETCH #2
CABLE PATH CONTINUES TO PRIMARY CHANNEL 120VAC DISTRIBUTION PANEL 1R25S0053
CABLE PATH CONTINUES DOWN TO I.B. 626'-6". SEE SKETCH #1
CABLE PATH CONTINUES TO MAIN CONTROL ROOM. SEE SKETCH #3.
CABLE PATH CONTINUES DOWN TO I.B. 626'-6". SEE SKETCH #1
CABLE PATH CONTINUES TO BACKUP CHANNEL 120VAC DISTRIBUTION PANEL 2R25S0053
PRIMARY LEVEL TRANSMITTER, PY-1G41N0149 & PRIMARY ELECTRONICS ENCLOSURE, PY-1H51P5296
BACKUP LEVEL TRANSMITTER, PY-1G41N0150 & BACKUP ELECTRONICS ENCLOSURE, PY-1H51P5296
GENERAL NOTES REFER TO DWG D-101-031
PERRY NUCLEAR POWER PLANT
D
101-0034-00000
F


SKETCH #3
NUCLEAR SAFETY RELATED
PERRY NUCLEAR POWER PLANT
PRIMARY LEVEL INDICATOR, PY-1G41R0122 & BACKUP LEVEL INDICATOR PY-1G41R0123. TO BE LOCATED IN EXISTING PANEL H13-P970.
CABLE PATH CONTINUES TO I.B. 654'-6". SEE SKETCH #2.
CONFERENCE ROOM
ELEVATOR
KITCHEN

The inside dimensions of the fuel preparation pool, which is where the sensors will be installed, are 20' 2" x 36' 0". Reference the excerpt from a plant drawing below.



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.

(a) The mounting bracket for the sensing probe will be designed according to the plant design basis, inclusive of loads from a Safe Shutdown Earthquake (SSE). Loads that will be considered in the evaluation of the bracket and its mounting are: 1) Static loads, inclusive of the dead weight of the mounting bracket in addition to the weight of the level sensing instruments, and cabling; 2) Dynamic loads including the seismic load due to excitation of the dead weight of the system in addition to the hydrodynamic effects resulting from the excitation of the SFP water. A response spectra analysis will be performed for the seismic evaluation of the mounting bracket using a Finite Element Analysis (FEA) software and using floor response spectrum at the operating deck elevation (that is, mounting floor elevation). Damping values will be according to SSE and consistent with the design basis of the station. The material properties that will be used for the bracket and its mounting will take into consideration the environmental conditions in the SFP area following an event. Hydrodynamic effects on the mounting bracket will be evaluated using TID-7024 (Nuclear Reactors and Earthquakes, dated 1963). Plant acceptance criteria and applicable codes will be used for the design of the bracket and its anchorage.

(b) The bracket will be attached to the pool deck using installed anchors that will be designed according to the plant existing specification for design of concrete anchors. This is the only support for this instrument. The pedestal will be adjusted to the height of the poolside curb to ensure the SFP bracket extends over the pool horizontally level. The probe attaches to the bracket's support plate via a 1 1/2" NPT (National Pipe Thread Taper) threaded connection. Non-movable connections of parts will be welded. The specifics of the bracket design have yet to be finalized; therefore, FENOC intends to provide a schematic in the August 2014 six-month update.

(c) The attachment of the seismically qualified bracket to the pool deck will be through permanently installed anchors. With the permanently installed anchors, the bracket pedestal will be secured to the poolside deck with adequate washers and bolts.

RAI- 5:

For each of the mounting attachments required to attach SFP Level equipment to plant structures, please describe the design inputs, and the methodology that will be used to qualify the structural integrity of the affected structures/equipment.

Response:

Westinghouse has conducted seismic testing of the level sensor electronics bracket and electronics enclosure, which include the mounting details, according to Institute of Electrical and Electronics Engineers, Inc. (IEEE) Standard 344 (2004), against the seismic spectra defined in the product design specification. All steel plates will conform to American Society for Testing and Materials (ASTM) Standard A240 Type 304 steel. All bolts will conform to ASTM Standard F593C. All weld material will be the same as base metal or compatible. Loads applied consist of self-weight, dead load of the instrumentation (the probe assembly including the launch plate), seismic load, and hydrodynamic load due to the seismic effect. The seismic loads are obtained from plant response spectra curves. Convective pressure associated with hydrodynamic loads will be considered for sloshing analysis by conservatively using the longest span of the pool and the height of the water between the top of the fuel racks and the high water level since the bracket cantilevers over the SFP water. The calculation of the convective pressure is based on TID-7024. Load combinations will be used in accordance with plant seismic criteria. Seismic forces in all three directions are combined using GT STRUDL, Version 32, analysis. Dead weight, seismic and convective pressure results are combined in absolute values. The FENOC engineering change process will be used to address the effect of this added instrumentation to plant structures, and it will be analyzed per the plant design basis for equipment loads.

RAI-8:

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:

(a) Within the SFP area, the brackets will be mounted as close to the northeast (primary sensor) and southwest (back-up sensor) corners of the fuel preparation pool, as permanent plant structures allow. Placing the brackets and probes in the corners allows for natural protection from a single event or missile from disabling both systems. The cabling within the SFP area will be routed in separate hard-pipe conduit. All conduit routing and location of system components will be selected such that there will not be any seismic 2-over-1 hazard. Site safety related separation requirements will be followed.

(b) Each system will be installed using completely independent cabling structures, including routing of the interconnecting cable within the SFP area in separate hard-pipe conduits. Power sources will be routed to the electronics enclosures from electrically separated sources ensuring the loss of one train or bus will not disable both channels. The system displays will be installed in separate qualified National Electrical Manufacturers Association (NEMA) Type 4X or better enclosures in the intermediate building El. 654', with the primary and back-up display in the main control room. Primary and backup systems will be completely independent of each other, having no shared components.

RAI-9:

Please provide the following:

(a) A description of the electrical ac power sources and capabilities for the primary and backup channels.

Response:

Each instrument channel is normally powered by non-class 1E 120 volts alternating current (VAC) distribution panels to support continuous monitoring of the SFP level. The 120VAC distribution panels for the primary and backup channels at each unit are powered by different 480V buses. Therefore, the loss of any one 480V bus will not result in the failure of both instrument channels.

On loss of normal 120VAC power, each channel's uninterruptible power supply (UPS) automatically transfers to a dedicated backup battery. If normal power is restored then the channel will automatically transfer back to the normal alternating current (AC) power.

The 72-hour backup batteries are maintained in a charged state by UPSs.