Ameren MISSOURI

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ULNRC-06311

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

10 CFR 2.202

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
RENEWED FACILITY OPERATING LICENSE NPF-30
FINAL NOTIFICATION OF FULL COMPLIANCE
WITH MARCH 12, 2012 COMMISSION ORDER
MODIFYING LICENSES WITH REGARD TO RELIABLE SPENT
FUEL POOL INSTRUMENTATION (ORDER NUMBER EA-12-051)

References:
1. Letter dated March 12, 2012 from E. J. Leeds and M. R. Johnson, USNRC, to Adam C. Heflin, Callaway Plant, Union Electric Company, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (ADAMS Accession No. ML12056A044)
2. NRC Interim Staff Guidance JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, August 29, 2012 (ADAMS Accession No. ML12221A339)
3. ULNRC-05925, "Initial Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated October 29, 2012
4. ULNRC-05960, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated February 28, 2013
5. ULNRC-06026, "First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated August 29, 2013

6. ULNRC-06088, “Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” dated February 26, 2014
7. ULNRC-06136, "Third 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)," dated August 28, 2014
8. ULNRC-06185, "Fourth-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)," dated February 26, 2015
9. ULNRC-06241, "Fifth 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)," dated August 27, 2015
10. ULNRC-06283, "Sixth 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)," dated August 27, 2015

On March 12, 2012, the U. S. Nuclear Regulatory Commission (NRC) issued an order identified above as Reference 1 to Union Electric Company (dba Ameren Missouri) for Callaway Plant. Reference 1 was immediately effective and directs Ameren Missouri to have a reliable indication of 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 final interim staff guidance from the NRC (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 3 provided Ameren Missouri’s initial status report regarding reliable spent fuel pool instrumentation. Reference 4 provided Ameren Missouri’s Overall Integrated Plan.

Section IV, Condition C.2 of Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. NEI 12-02, “Industry Guidance for Compliance with NRC Order EA-12-051, Reliable Spent Fuel Pool Instrumentation,” provides direction regarding the content of the status reports. References 5, 6, 7, 8, 9, and 10 provided Ameren Missouri’s six-month status reports.

This letter along with its enclosures provides the notification required by Section IV, Condition C.3 of Reference 1 that full compliance with the requirements described in Attachment 2 of the Order has been achieved for Callaway Plant.

This letter does not contain new commitments. If you have any questions concerning the content of this letter, please contact Roger Wink, Regulatory Affairs Manager, at 573-310-7025.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 7/6/2016

Sincerely,

Timothy E. Herrmann
Site Vice President

Enclosures:

1. NRC Order EA-12-051 Compliance Requirements Summary
2. Response to Request for Additional Information
3. SFPIS Design Bridge Document

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INTRODUCTION

Ameren developed an Overall Integrated Plan (Reference 1) for Callaway Plant Unit 1, to achieve compliance with the requirements described in Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," (Reference 2). The OIP for Callaway Plant Unit 1 was submitted to the NRC on February 28, 2013 and was supplemented by Six-Month Status Reports (References 3, 4, 5, 6, 7, and 8), in accordance with Order EA-12-051.

By letter ULNRC-06036 (Reference 10), Ameren Missouri requested schedular relaxation of FLEX implementation for Order EA-12-049 such that the order implementation date would be extended to completion of Refuel 21 (Spring 2016). The request was approved by NRC letter (ML13319A668) dated December 11, 2013 (Reference 11). FLEX implementation is required to comply with the power supply requirement described in NRC Order EA-12-051, Attachment 2, Section 1.6. Based on the approval of the relaxation request, Ameren Missouri submitted ULNRC-06113 (Reference 12) and ULNRC-06119 (Reference 13) to request relaxation of the power supply requirement described in NRC Order EA-12-051, Attachment 2, Section 1.6. This relaxation was approved by the NRC per ML14154A400 (Reference 9).

Full Compliance with Order EA-12-051 was completed on May 9, 2016. This date corresponds to the relaxation date granted by the NRC under Reference 9 (spring 2016 refueling outage). The information provided herein documents full compliance with NRC Order EA-12-051 for Callaway Plant, Unit 1.

REQUEST FOR ADDITIONAL INFORMATION (RAI) RESOLUTION

The Nuclear Regulatory Commission (NRC) issued an initial set of Requests for Additional Information (RAIs) in Reference 14. Callaway provided responses to the RAIs in Reference 15. Subsequently, the NRC issued an Interim Staff Evaluation (ISE) and RAIs (Reference 16) regarding the OIP (Reference 1), on August 29, 2012. Reference 17 announced the transition to an audit based review process, and notified each licensee participating in the audit not to formally submit their RAI response on the docket but, instead, put their response and any other supporting information on their ePortals by the date identified in their ISE to support the staffs review process. Enclosure 2 to this letter provides the responses to the RAIs (Reference 16).

MILESTONE SCHEDULE – ITEMS COMPLETE

Activity	Completion Date
Submit 60 Day Status Report	Oct 2012
Submit Overall Integrated Plan	Feb 2013
Submit 6 Month Updates:	
Update 1	Aug 2013
Update 2	Feb 2014
Update 3	Aug 2014
Update 4	Feb 2015
Update 5	Aug 2015
Update 6	Feb 2016
Modifications:	
Modifications Evaluation	Feb 2013
Commence Engineering and Design	Mar 2013
Complete Design	Dec 2013
Receipt of SFP Instruments	Apr 2014
Procedures:	
Create Procedures	Sep 2014
Training:	
Develop Training Plan	Aug 2014
Complete SFP Instrumentation Procedures & Training	Sep 2014
RAI Response:	
RAI Response (Note 1)	Jun 2013
ISE RAI Response (Note 2)	Mar 2014
SFP Instruments Operational (Note 3)	Nov 2014
Submit Completion Report	Jul 2016

Note 1: The RAI referred to here is the NRC's RAI concerning the Overall Integrated Plan in response to Order EA-12-051 (Reference 14). Reference 15 provided Ameren Missouri's response to the RAI.

Note 2: The RAI's referred to here are the NRC Interim Staff Evaluation (ISE) and RAI concerning Overall Integrated Plan in response to Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (Reference 16).

Note 3: Prior to the completion of Refuel 20, the SFPIS was installed and in operation with a battery supply that can last 72 hours if site power is lost. Callaway requested relaxation (References 12 and 13) for the requirement described in NRC Order EA-12-051, Appendix 2, Section 1.6. The relaxation request was approved as documented in ML14154A400 (Reference 9). Upon implementation of Callaway's FLEX Strategies per NRC Order EA-12-049, full compliance with NRC Order EA-12-051 was achieved.

IDENTIFICATION OF LEVELS OF REQUIRED MONITORING - COMPLETE

Callaway Plant, Unit 1 has identified the three required levels for monitoring SFP level in compliance with Order EA-12-051.

INSTRUMENT DESIGNED FEATURES - COMPLETE

The design of the instruments installed at Callaway Plant, Unit 1 comply with the requirements specified in the order and described in NEI 12-02 "Industry Guidance for Compliance with NRC Order EA-12-051". The instruments have been installed in accordance with the station design control process.

The instruments have been arranged to provide reasonable protection against missiles. The instruments have been mounted to retain design configuration during and following the maximum expected ground motion. The instruments will be reliable for environmental and radiological conditions when the SFP is at saturation for extended periods. The instruments are independent of each other and have separate and diverse power supplies. The instruments will maintain their designed accuracy following a power interruption and are designed to allow for routine testing and calibration.

The instrument display is readily accessible during postulated events and allows for SFP level information to be promptly available to decision makers.

PROGRAM FEATURES - COMPLETE

Training for Callaway Plant, Unit 1 has been completed in accordance with an accepted training process as recommended in NEI 12-02, Section 4.1.

Operating and maintenance procedures, for Callaway Plant, Unit 1 have been developed, and integrated with existing procedures. Procedures are available for use in accordance with the site procedure control program.

Site processes have been established to ensure the instruments are maintained at their design accuracy.

REFERENCES

The following references support the Callaway Plant, Unit 1 SFPI Compliance Summary:

1. ULNRC-05960, “Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” dated February 28, 2013
2. NRC Order Number EA-12-051, “Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,”, March 12,2012.
3. ULNRC-06026, “First Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” dated August 29, 2013
4. ULNRC-06088, “Second Six-Month Status Report in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” dated February 26, 2014
5. ULNRC-06136, "Third 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)," dated August 28, 2014
6. ULNRC-06185, "Fourth-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)," dated February 26, 2015
7. ULNRC-06241, "Fifth 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)," dated August 27, 2015
8. ULNRC-06283, "Sixth 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)," dated February 23, 2016
9. NRC letter to Ameren "Callaway Plant, Unit 1 - Relaxation of the Schedule Requirements for Order EA-12-051, 'Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,'" dated June 26, 2014 (ML14154A400)
10. ULNRC-06036, "Request for Relaxation From NRC Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,'"dated October 09, 2013
11. NRC Letter to Ameren, "Callaway Plant, Unit 1- Relaxation of The Schedular Requirements for Order EA-12-049 'Issuance of Order to Modify Licenses

with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events,'" dated December 11, 2013

12. ULNRC-06113, "Request for Relaxation From NRC Order EA-12-051, 'Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,'" dated April 17, 2014 (ML13319A668)

13. ULNRC-06119, "Supplement to Request for Relaxation From NRC Order EA-12-051, 'Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,'" dated May 8, 2014

14. NRC Letter to Ameren “Callaway Plant, Unit 1 - Request for Additional Information RE: Overall Integrated Plan in Response to Order EA-12-051, ‘Reliable Spent Fuel Pool Instrumentation’ (TAC NO. MF0773),” dated June 7, 2013 (ML13121A187)

15. ULNRC-06008, "Response to Request for Additional Information with Regard to Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-051)," dated July 3, 2013

16. NRC Letter to Ameren, "Callaway Plant, Unit 1 - Interim Staff Evaluation and Request for Additional Information Re: Overall Integrated Plan in Response to Order EA-12-051, Reliable Spent Fuel Pool Instrumentation (TAC NO. MF0773)," dated November 25, 2013 (ML13323A111)

17. NRC letter to Ameren "Nuclear Regulatory Commission Audits of Licensee Responses to Reliable Spent Fuel Pool Instrumentation Order EA-12-051," dated March 26 2014 (ML14083A620)

Enclosure 2
To ULNRC-06311

AMEREN MISSOURI REVISED RESPONSES TO INTERIM STAFF EVALUATION AND REQUEST FOR ADDITIONAL INFORMATION: OVERALL INTEGRATED PLAN IN RESPONSE TO ORDER EA-12-051, RELIABLE SPENT FUEL POOL INTRUMENTATION

Enclosure 2
To ULNRC-06311

LIST OF RAI RESPONSES

RAI 1	Response	No Change
RAI 2	Response	No Change
RAI 3	Response	No Change
RAI 4	Response	Revised - 02-17-2016
RAI 5	Response	No Change
RAI 6	Response	No Change
RAI 7	Response	Revised - 02-17-2016
RAI 8	Response	Revised - 01-27-2016
RAI 9	Response	Revised - 02-17-2016
RAI 10	Response	Revised - 01-11-2016
RAI 11	Response	Revised - 01-11-2016
RAI 12	Response	Revised - 01-27-2016
RAI 13	Response	Revised - 01-11-2016
RAI 14	Response	Revised - 01-27-2016
RAI 15	Response	Revised - 01-28-2016
RAI 16	Response	Revised - 02-17-2016
RAI 17	Response	Revised - 02-17-2016
RAI 18	Response	Revised - 02-17-2016
RAI 19	Response	Revised - 02-17-2016
RAI 20	Response	Revised - 02-17-2016

NRC RAI No.1

Please provide the results of the calculation used to determine the water elevation that is sufficient for the pump's required NPSH so the NRC staff may confirm that Level 1 has been adequately identified.

Callaway Response:

The existing calculation, M-EC-48, concludes that the SFP water elevation that is sufficient for the pump's required NPSH is EL. 2043'-6". Level 1 indication is at the normal SFP water operating level of EL. 2046'-0". This confirms that Level 1 has sufficiently covered the calculated level to maintain the pump's required NPSH.

References:

1. Bechtel Calculation, M-EC-48, Minimum Safety Limit for LSL-57 & 58
2. Bechtel Calculation, M-EC-38, Fuel Pool Cooling Pumps NPSH at 200^0F, 4000 GPM

NRC RAI No. 2

Please clarify whether this wireless communications system will be used as two separate point-to-point wireless communications systems (i.e., one system between the sending unit and receiver for the primary level channel and a second system between the sending unit and receiver for the back-up level channel), or whether there will be shared communications channels over which both the primary and the backup channels can communicate simultaneously. Also, please verify whether there are other wireless communication devices within the plant that will be allowed to share this wireless communications system.

Callaway Response:

Callaway has opted to use hardwired spent fuel pool level measurement systems instead of wireless.

NRC RAI No. 3

Please provide a plant-specific evaluation of the interaction of the proposed wireless technology with other plant systems, in particular, interactions and any malfunctions that could result from potential failure modes of one channel, or due to BOB conditions.

Callaway Response:

Callaway has opted to use hardwired spent fuel pool level measurement systems instead of wireless.

NRC RAI No.4

Please provide additional information describing how the proposed arrangement and routing of the cables meet the Order requirement to arrange the SFP level instrument channels in a manner that provides reasonable protection of the level indication function against missiles that may result from damage to the structure over the SFP.

Callaway Response:

Physical separation of the primary and backup instrument channel signal cables is the primary method used to provide reasonable protection of the level indication function against missiles that may result from the damage to the structure over the SFP. The sensors are located close to the side walls of the SFP and below the floor elevation to utilize the pool walls as inherent protection. The primary instrument channel sensor is mounted near the plant northeast corner of the SFP. From the primary sensor, the primary signal cable, contained in metal conduit, runs plant west approximately 17 feet above the floor along the plant north wall of the Fuel Building. The primary signal cable is then routed along this wall and then around the wall and ceiling of the Fuel Transfer Canal until it penetrates the west wall into the Auxiliary Building. The backup instrument channel sensor is mounted near the plant northwest corner of the SFP. From the backup sensor, the backup signal cable, contained in metal conduit, runs plant north near the floor to the plant east wall of the fuel transfer canal. The backup signal cable is then routed around the walls of the Fuel Transfer Canal until it penetrates the west wall into the Auxiliary Building. This separates the sensors by a distance that is practical and comparable to the shortest length of a side of the pool. The routed signal cables and couplers are contained in metal conduits, within the Fuel Building, and are separated along a shared wall by a distance of approximately 17 feet or more. The SFP walls and corners provide inherent missile protection for the level sensor signal cables.

Physical separation of the primary and backup instrument channel signal cables and power cables is maintained through the Auxiliary Building in accordance with site guidelines for Class 1E and Non-class 1E raceway.

NRC RAI No.5

Please clarify if a stilling well is part of the instrument design and, if so, how its weight is accounted for and how it will be mounted and analyzed.

Callaway Response:

The system to be installed at Callaway does not utilize a stilling well as part of the instrument design.

NRC RAI No.6

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.

Callaway Response:

Level Sensor Bracket: The mounting bracket for the sensing probe was designed according to the plant design basis for a Safe Shutdown Earthquake (SSE) seismic hazard curve at the pool deck elevation. Loads that were considered in the evaluation of the bracket and its mounting are: 1- Static loads including the dead weight of the mounting bracket in addition to the weight of the level sensing instruments, pipe guard and cabling; 2- Dynamic loads including the seismic load due to excitation of the instruments dead weight in addition to the hydrodynamic effects resulting from the excitation of the SFP water. A response spectra analysis was performed for the seismic evaluation of the mounting bracket using structural design & analysis software, GTSTRUDL. Hydrodynamic effects on the mounting bracket were evaluated using TID-7024 (Nuclear Reactors and Earthquakes, dated 1963) and added to the GTSTRUDL model. Plant acceptance criteria and applicable codes were used for the design of the bracket and its anchorage. All members' results were shown to be adequate for the loads and load combinations used in the analysis. Welded and bolted connections were evaluated and were shown to be adequate with significant margin. Base plate of the mounting bracket and anchorage to concrete were evaluated using Plate Wizard in GTSTRUDL and designed to meet the plant criteria for base plates and anchors.

Seismic Testing Results:

Seismic testing results analyses are provided in the response for RAI 13. The seismic testing for the WEC SFPIS demonstrated that the SFPIS operates reliably per the seismic requirements.

References:

1. TID-7024, Nuclear Reactors and Earthquakes, dated 1963
2. GTSTRUDL, Structural Design & Analysis Software

NRC RAI No.7

For each of the mounting attachments required to fasten 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.

Callaway Response:

The SFP level equipment is attached to existing structures, which are reinforced concrete. The locations are Spent Fuel Pool walls, Auxiliary Building exterior walls, Auxiliary Building interior walls, and a Fuel Building slab. Due to the minor weight of SFP level equipment, the structural stability of the existing walls and slabs are not significantly affected and explicit evaluation is not performed. Calculations for the seismic qualification of existing structures are provided in the references.

The design input and qualification methodology are consistent with the current seismic design for existing plant structures/equipment. As stated within the Callaway Final Safety Analysis Report (FSAR) Rev. OL-18 (12/10), Industry standards, such as those published by the ASTM, are used whenever possible to specify material properties, testing procedures, fabrication, and construction methods. The applicable standards used within the Auxiliary and Fuel Building are discussed in FSAR Section 3.8.3.6. For example, embedded anchor bolt materials conform to the applicable requirements of ASTM A540 for Alloy Steel Bolting Materials for Special Applications.

The mounting attachments are qualified by analysis. With the exception of the level sensor probe mounting bracket, all of the system equipment is seismically qualified by testing. The outputs of the seismic test for all equipment were used as the design input for the qualification of the mounting for that specific equipment.

The mounting bracket for the sensing probe was designed according to the plant design basis for SSE seismic hazard curve at the appropriate plant elevation. Loads that were considered in the evaluation of the bracket and its mounting are: 1- Static loads including the dead weight of the mounting bracket in addition to the weight of the level sensing instruments, pipe guard 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 was performed for the seismic evaluation of the mounting bracket using Finite Element Analysis (FEA) software and the floor response spectrum at the operating deck elevation. Hydrodynamic effects on the mounting bracket were evaluated using TID-7024 (Nuclear Reactors and Earthquakes, dated 1963). Plant acceptance criteria and applicable codes were used for the design of the bracket and its anchorage.

References:

1. Spent Fuel Pool Walls Calculation – C-05-80-F
2. Auxiliary Building Exterior Walls Calculation – C-03-06.1-F
3. Auxiliary Building Interior Walls Calculation – C-03-92-F
4. Fuel Building Slab at EL 2047’ Calculation – C-05-76-F
5. Callaway Final Safety Analysis Report (FSAR) Rev. OL-18 (12/10)
6. TID-7024, Nuclear Reactors and Earthquakes, dated 1963

NRC RAI No. 8

Please describe the quality assurance process to be used to meet the augmented quality requirements identified in the Order.

Callaway Response:

Westinghouse followed their Quality Management System (Reference 1) to meet the augmented quality requirements identified in the Order as applicable to the non-safety augmented quality classification of the SFPIS. SFPIS specific requirements are identified by the Spent Fuel Pool Instrumentation Systems Project Plan (Reference 2) and the Spent Fuel Pool Instrumentation System Design Specification (Reference 3).

APA-ZZ-00391 Appendix 1 Revision 000 (Reference 4) documents the SFPIS Augmented QA Program. The program includes the following activities:

- Design Control and Procurement Document Control
- Instructions, Procedures and Drawings
- Control of Purchased Material, Equipment and Services
- Inspection
- Testing and Test Control
- Inspection, Test, and Operating Status
- Nonconforming Items
- Corrective Action
- Records
- Audits

References:

1. Westinghouse Quality Management System, Revision 7
2. Westinghouse proprietary document, WNA-PD-00319-W5PP, Spent Fuel Pool Instrumentation System Project Plan
3. Westinghouse proprietary document, WNA-DS-02957-GEN, Spent Fuel Pool Instrumentation System Design Specification (J-2048-00000)
4. APA-ZZ-00391 Appendix 1 Revision 000

The Westinghouse proprietary documents described above can be made available upon request.

NRC RAI No. 9

Please provide an analysis of the maximum expected radiological conditions (dose rate and total integrated dose) to which the transmitter electronics will be exposed. Provide documentation indicating the cumulative (total integrated) radiological dose the electronics for this equipment are capable of withstanding. Discuss the time period over which the analyzed total integrated dose was applied.

Callaway Response:

A summary of the radiological conditions to which the equipment is to be qualified is provided below. Current results of vendor tests and analysis demonstrating the qualification of the equipment to be installed are detailed in Westinghouse proprietary documents WNA-TR-03149-GEN (J-2048-00034) and EQ-QR-269 (J-2048-00040).

Radiological conditions for the SFPIS components in the Spent Fuel Pool Area

The coaxial cable, the coupler, the pool-side bracket, and the probe in the spent fuel pool area are required to operate reliably in the service environmental conditions specified in the table below.

Parameter	**Normal**	**Beyond Design Basis**
Radiation TID (above pool)	1E03 Rads γ	1E07 Rads γ
Radiation TID (12" above top of fuel rack)	1E07 Rads γ (probe & weight only)	1E09 Rads γ

The spent fuel pool area radiological conditions are detailed in WNA-TR-03149-GEN.

Radiological conditions Outside of the Spent Fuel Pool Area

The level sensor electronics, sensor electronics bracket, indicators, and the electronics enclosures outside of the spent fuel pool area are required to operate reliably in the service environmental conditions specified in the table below.

Parameter	**Normal**	**Beyond Design Basis**
Radiation TID	≤ 1E03 Rads γ	≤ 1E03 Rads γ

There are no active electronics in the Fuel Building. The transmitter electronics will be physically located within the Auxiliary & Control Buildings and therefore are not subjected to the same post-event (Beyond-Design-Basis) radiological conditions as identified in Section 3.4, "Qualifications" of NEI 12-02, Revision 1.

During a Beyond Design Basis event, the expected radiological conditions (dose rate and total integrated dose) in the Auxiliary Building and Control Building are consistent with normal operating conditions identified in Callaway FSAR Table 3.11(b)-1 based on the following:

- During a Beyond Design Basis event, the Reactor Coolant System remains intact and the Mitigating Strategies per EA-12-049 maintain core cooling.
- Spent Fuel Pool makeup capabilities (>250gpm) exceeds calculated full core offload boil off of ~136gpm.

References:

1. Westinghouse proprietary document WNA-TR-03149-GEN (J-2048-00034)
2. Westinghouse proprietary document, EQ-QR-269 (J-2048-00040)
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), Section 3.4, "Qualifications"
4. Callaway FSAR Table 3.11(B)-1

The Westinghouse proprietary documents described above can be made available upon request.

NRC RAI No. 10

Please provide information indicating:

a) The temperature ratings for all system electronics (including sensor electronics, system electronics, transmitter, receiver and display) and whether the ratings are continuous duty ratings; and,

Callaway Response:

Components in the Fuel Building (Level sensors and their respective cables) are qualified for BDB conditions of 212°F at atmospheric pressure.

For components in the Auxiliary Building, the Sensor Electronics are rated for 140°F at atmospheric pressure. Other components located in the Auxiliary and Control Buildings are rated for 140°F at atmospheric pressure.

b) The maximum expected temperature in the room(s) in which the sensor electronics will be located under BDB conditions, with no ac power available to run Heating, Ventilation, and Air Conditioning (HVAC) systems.

Callaway Response:

Two GOTHIC thermo-hydraulic models were created for the rooms within the Auxiliary Building where the sensor electronics will be located. The details of the models are documented in Ameren Calculation EC-39, "GOTHIC ELAP Analysis of Electrical Penetration Room #1409 and MG Set Room #1403".

The results of these models show that the rooms see a temperature rise of less than 5°F during the course of the 3-day ELAP event. The maximum expected temperature for the Electrical Penetration Room (#1409) is 109.8°F. No formal analysis was performed for Auxiliary Building Hallway (Room 1408) temperature. Due to lack of safety related heat loads and large volume, it is assumed to remain near the initial temperature of 60 to 104°F and not to exceed 120°F. The equipment in the Room 1409 and 1408 location is qualified for 140°F. Therefore, the equipment qualifications delineated in WNA-DS-02957-GEN (J-2048-00000), Rev. 4 are not exceeded for the sensor electronics.

References:

1. Callaway calculation EC-39, "GOTHIC ELAP Analysis of Electrical Penetration Room #1409 and MG Set Room #1403"
2. Westinghouse proprietary document WNA-DS-02957-GEN, Rev. 4 (J-2048-00000)

The Westinghouse proprietary document described above can be made available upon request.

NRC RAI No. 11

Please provide information indicating the maximum expected relative humidity in the room in which the sensor electronics will be located under BDB conditions, with no ac power available to run HVAC systems, and whether the sensor electronics are capable of continuously performing required functions under this expected humidity condition.

Callaway Response:

Qualitatively, due to the lack of water sources in the rooms, the increasing temperatures in the rooms will cause the relative humidity of the rooms to decrease relative to their starting humidity.

The Electrical Penetration Room #1409 does have a small 1'x1' transfer grill that leads out into the 2026' Auxiliary Building hallway, which would be the only potential source of potential moisture for the room. There is no forced airflow through this flowpath, as the HVAC system has been disabled by the loss of AC power. The only airflow through the transfer grill would be buoyancy driven natural circulation, which is minor due to the low thermal gradient between the room and the hallway.

The 2026' hallway area is a large open space consisting of Corridors 1402 and 1408, and the open CCW HX & Pump Area 1406. The Fuel Building is connected to Corridor 1408 by Pressure Boundary Door DSK14081. As a Pressure Boundary Door, it is designed to have limited leakage across it, as seen in purchasing specification A-081. Any leakage through the pressure boundary door would be quickly diluted by the large volume of the hallways, which would dampen any potential rise in humidity. If the leakage from the Fuel Building is saturated steam, there would also be the potential for the steam to condense out into liquid water on the hallway surfaces, which would reduce the amount of moisture in the air to contribute to humidity.

These factors combine to show that the impact of increased humidity during an ELAP in Rooms 1408 & 1409 will be negligible for these areas thus ensuring that the equipment qualifications as cited below are not exceeded for the sensor electronics or the main electronics.

Components in the Fuel Building (Level sensors and their respective cables) are qualified for BDB conditions of 100% Humidity (saturated steam).

For components in the Auxiliary Building Room 1409, the Sensor Electronics are rated for humidity of 0-100% (Non-condensing). Other components located in the Auxiliary Building Room 1408, the main electronics are rated for humidity of 0-95% (Non-condensing).

NRC RAI No. 12

Please provide the following:

a) Information describing the evaluation of the sensor electronics design, the shock test method, test results, and forces applied to the sensor electronics applicable to successful tests demonstrating the testing provides an appropriate means to demonstrate reliability of the sensor electronics under the effects of severe shock.

b) Information describing the evaluation of the sensor electronics design, the vibration test method, test results, forces and their frequency ranges, and directions applied to the sensor applicable to successful tests demonstrating the testing provides an appropriate means to demonstrate reliability of the sensor electronics under the effects of high vibration.

Callaway Response:

In regards to both (a) and (b), no portable hand-held devices are used in the SFPI system. Components of both the primary and backup SFP measurement channels are permanently installed and fixed to rigid, structural walls or floors of Seismic Category 1 structures, and will not be subject to anticipated shock or vibration inputs. Furthermore shock and vibration are not postulated for design basis event conditions in the area of instrument channel components. The level sensor electronics are enclosed in a NEMA-4X housing. The electronics enclosure utilizes a NEMA-4X rated stainless steel housing. These housings mounted to a seismically qualified wall and contain the active electronics and aid in protecting the internal components from vibration induced damage. Vibration forces applied in testing were those intrinsic to seismic testing at sinusoidal frequencies from 1-100Hz and accelerations reaching nearly 10G. No additional shock tests or vibration tests were performed. Refer to Section 5.4 of J-2048-00040 Design Verification Testing Summary Report for Seismic testing and results.

The probe, the coaxial cable, and the mounting brackets are inherently resistant to shock and vibration loadings.

References:

1. J-2048-00040 Design Verification Testing Summary Report

NRC RAI No. 13

Please provide analysis of the seismic testing results and show that the instrument performance reliability, following exposure to simulated seismic conditions representative of the environment anticipated for the SFP structures at Callaway, has been adequately demonstrated. Include information describing the design inputs and methodology used in any analyses of the mounting of electronic equipment onto plant structures, as requested in RAI No. 7 above.

Callaway Response:

The Westinghouse SFPIS, including the pool-side bracket, is qualified as Seismic Category I per IEEE Std. 344-2004. The objective of the testing and analysis was to demonstrate that the SFPIS meets the seismic performance requirements of Westinghouse proprietary design specification WNA-DS-02957-GEN (J-2048-00000). The Required Response Spectra (RRS) for this program includes the 10% margin recommended by IEEE Std 323-2003. The seismic test and analysis results are documented in the proprietary Westinghouse test reports, EQ-QR-269 (J-2048-00040) and WNA-TR-03149-GEN (J-2048-00034).

These documents as well as plant-specific seismic spectra can be made available for review upon request.

References:

1. IEEE Standard 344-2004, "IEEE Recommended Practice for Seismic Qualification of
2. Class 1E Equipment for Nuclear Power Generating Stations"
3. Westinghouse proprietary document, WNA-DS-02957-GEN (J-2048-00000)
4. IEEE Standard 323-2003, "IEEE Standard for Qualifying Class 1E Equipment for
5. Nuclear Power Generating Stations"
3. Westinghouse proprietary document, EQ-QR-269 (J-2048-00040)
4. Westinghouse proprietary document, WNA-TR-03149-GEN (J-2048-00034)

The Westinghouse proprietary documents described above can be made available upon request.

RAI No. 14

Please provide the NRC staff with the final configuration of the power supply source for each channel so the staff may conclude the two channels are independent from a power supply assignment perspective.

Callaway Response:

The primary and backup SFPIS channels are powered by independent non-Class 1E electrical AC buses: PA01 and PA02. The buses are never cross tied. They are fed from the same transformer source but from separate windings (X or Y winding on the 13.8kV side).

The primary level indication loop ECL-0059 is powered FROM Separation Group 5 power:

- PA01 13.8KV bus TO
- PG25 480VAC Load Center TO
- PG25H 480VAC MCC TO
- PG25HBR102 120VAC Dist Panel TO
- EC350 SFPI Main Electronics Enclosure TO
- EC349 SFPI Transmitter Electronics Enclosure TO
- ECLE0059 Primary Level Sensor Probe

The backup level indication loop ECL-0060 is powered FROM Separation Group 6 power:

- PA02 13.8KV bus TO
- PG20 480VAC Load Center TO
- PG20G 480VAC MCC TO
- PG20GBR224 120VAC Dist Panel TO
- EC352 SFPI Main Electronics Enclosure TO
- EC351 SFPI Transmitter Electronics Enclosure TO
- ECLE0060 Backup Level Sensor Probe

Each SFPIS channel of equipment has an independent UPS with 24V battery backup that ensures at least 72 hours of battery power without AC. Additionally, an interface is provided for an alternate power supply such as a FLEX generator. The SFP level can be continuously monitored for at least 3 days under station blackout conditions with battery power only and for the required 7 days with an alternate power supply.

NRC RAI No. 15

Please provide the results of the calculation depicting the battery backup duty cycle requirements demonstrating that battery capacity is sufficient to maintain the level indication function until offsite resource availability is reasonably assured.

Callaway Response:

The power consumption calculation J-2048-00051 demonstrates that the SFPIS will last > 3 days from a fully charged battery after AC power loss. The calculations include design and aging margin.
The strategy of providing power to the SFPI equipment during an ELAP prior to depletion of the batteries is in FSG45, Temporary Ventilation, Lighting and Power.
The J-2048-00051, Power Consumption Calculation, Page 18 Section 5.4.1 estimates total hours under max current draw, 101.21 hours (4.22days).
Test Log results in the J-2048-00042 Integrated Functional Test Report page 239 of 468 shows a battery life time estimate of 219.59hrs (9.15 days).

References:

1. FSG-45 Temporary Ventilation, Lighting and Power
2. J-2048-00051 Power Consumption Calculation
3. J-2048-00042 Integrated Functional Test Report

NRC RAI No.16

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.

Callaway Response:

The channel accuracy for each SFPIS instrument channel is ± 3 inches for the full level measurement range. This covers the normal SFP surface level or higher to within six inches of the top of the fuel rack under both normal and BDB conditions. Additional details regarding the requirements on measurement accuracy are defined in the Westinghouse proprietary design specification document WNA-DS-02957-GEN (J-2048-00000), the proprietary channel accuracy calculation and correction documents, WNA-CN-00301-GEN (J-2048-00052) and LTR-SFPIS-14-136 (J-2048-00047).

b) A description of the methodology used for determining the maximum allowed deviation from the instrument channel design accuracy under normal operating conditions, which would be used as an acceptance criterion for a calibration procedure to alert operators and technicians that the channel requires adjustment to within normal design accuracy.

Callaway Response:

The channel accuracy requirements are identified in WNA-DS-02957-GEN (J-2048-00000) (proprietary) and demonstrated by the channel accuracy calculation, WNA-CN-00301-GEN (J-2048-00052) and LTR-SFPIS-14-136 (J-2048-00047). Both SFP primary and backup redundant sensor electronics require periodic calibration verification to check that the channel's measurement performance is within the specified tolerance (± 3 inches). The verification process based on acceptance criteria is provided in plant procedures ITL-EC-00L59 and ITL-EC-00L60. If the difference is larger than the allowable tolerance during the verification process, an electronic output verification/calibration will be required. If the electronic output verification/calibration does not restore the performance, a calibration adjustment will be required.

The electronic output verification/calibration will verify electronics are working properly using simulated probe signals.

The calibration adjustment is performed to restore level measurement accuracy within the acceptance criteria at 0%, 25%, 50%, 75%, and 100% points of the full span.

The calibration acceptance criteria and procedures are defined in Westinghouse procedure WNA-TP-04709-GEN (J-2048-00030) (proprietary).

References:

1. Westinghouse proprietary document, WNA-DS-02957-GEN (J-2048-00000)
2. Westinghouse proprietary document, WNA-CN-00301-GEN (J-2048-00052)
3. Westinghouse proprietary document, LTR-SFPIS-14-136 (J-2048-00047)
4. Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030)
5. Procedure ITL-EC-00L59; LOOP-LVL SPENT FUEL POOL PRIMARY LEVEL
6. Procedure ITL-EC-00L60; LOOP-LVL SPENT FUEL POOL BACKUP LEVEL

The Westinghouse proprietary documents described above can be made available upon request.

NRC RAI No.17

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.

Callaway Response:

The calibration verification is performed by utilizing the sliding pool-side bracket design to raise the sensor probe for calibration verification. This is performed by loosening the hold down bolts and raising the sensor assembly until it hits the top stop (at a pre-defined distance above the normal bracket level) and verifying that the indicator responds with a corresponding change in reading. Upon completion of measurement, the technician will lower the mounting bracket and re-torque the slide assembly hold down bolts.

If the calibration verification indicates that the channel being checked is operating out of specification or an anomaly is observed, an electronic output verification/calibration is performed on the level sensor electronics outside of the SFP area. If the electronic output verification/calibration does not restore performance, a calibration adjustment will need to be performed. The calibration adjustment uses a portable test kit that attaches at the sensor electronics mounting, allowing the full calibration to be performed outside of the spent fuel pool area without removing installed SFPIS components from the SFP area. The test kit will consist of equipment specifically paired with the installed equipment in order to properly verify calibration of the sensor electronics.

The calibration verification, electronic output verification/calibration, and the calibration adjustments are performed per procedures ITL-EC-00L59 Loop-Lvl Spent Fuel Pool Primary Level, ITL-EC-00L60 Loop-Lvl; Spent Fuel Pool Backup Level and detailed maintenance instructions. The procedures and instructions are based on the proprietary Westinghouse procedure WNA-TP-04709-GEN (J-2048-00030).

b) A description of the way 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.

Callaway Response:

The SFP level measurement instrumentation system is not safety related therefore not subject to the channel check requirements defined in IEEE 338-1987 for class 1E system. Additionally, channel checks are not identified under 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) Section 3.8, Testing or Section 4.3, Testing and Calibration. No exceptions were taken to these sections within JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation.

However, a verification of channels is performed each shift as part of Primary Operator Rounds. OOA-EC-00002-"Operator Aid For Spent Fuel Pool Level Indications" is used for the guide for verifying the values of each independent channel (EC-LI-59A and EC-LI-60A) against the other and against EC LI-39A, which is the other permanently-installed SFP level instrumentation.

c) A description of the functional checks to be performed, and the frequency at which they will be conducted. Describe how calibration tests will be performed, and the frequency at which they will be conducted. Discuss how these surveillances will be incorporated into the plant surveillance program.

Callaway Response:

The SFPIS calibration verification process is described briefly by part a) above and in more detail in the Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030). Plant personnel will perform these periodic calibration verification checks on each SFPIS channel using ITL-EC-00L59 and ITL-EC-00L60. PM1007976 and PM1007977 will track completion of these calibrations. These tasks are tracked as surveillance task types. The periodic calibration verification will be performed within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g., 25%). This calibration check is not required to be performed more than once per 12 months.

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.

Callaway Response:

The periodic calibration verification check will be performed within 60 days of a planned refueling outage considering normal testing scheduling allowances (e.g., 25%). This calibration check is not required to be performed more than once per 12 months. Additionally, at the time of the calibration verification check, the probe will be inspected to ensure no frays or nicks have occurred since the last verification check and to remove any significant accumulation of boron.

These calibration requirements are consistent with the guidance provided in NEI 12-02 section 4.3. In addition, the following time-based replacement PM tasks were created:

- PM1007972 – W36 - ECLQY0059 - UPS battery replacement
- PM1007973 – W36 - ECLQY0060 - UPS battery replacement
- PM1007978 – Y07 - EQLIT0059 - Time based replacement of level indicating transmitter
- PM1007979 – Y07 - EQLIT0060 -Time based replacement of level indicating transmitter
- PM1007976 – M18 - Perform Loop Calibration of Loop ECL-0059
- PM1007977 – M18 - Perform Loop Calibration of Loop ECL-0060

References:

1. Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030)
2. IEEE Std 338-1987, "IEEE Standard Criteria for Periodic Testing of Nuclear Power Generating Stations."
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) Section 3.8, Testing or Section 4.3, Testing and Calibration
4. JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool
5. ITL-EC-00L59 LOOP-LVL; SPENT FUEL POOL PRIMARY LEVEL
6. ITL-EC-00L60 LOOP-LVL; SPENT FUEL POOL BACKUP LEVEL

The Westinghouse proprietary document described above can be made available upon request.

NRC RAI No. 18

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 SFP instrumentation. The licensee is requested to include a brief description of the specific technical objectives to be achieved within each procedure.

Callaway Response:

Below is a list of instructions provided to support the utility's procedures:

1. WNA-OG-00127-GEN (J-2048-00025), *Spent Fuel Pool Instrumentation System Technical Manual* (proprietary), contains instructions for installation, normal operation, abnormal response/troubleshooting, cleaning, calibration, maintenance, spare parts, and special tools for the SPFIS as well as the major components of the system.
2. WEC WNA-TP-04709-GEN (J-2048-00030), *Spent Fuel Pool Instrumentation System Calibration Procedure* (proprietary), contains the calibration and test procedures, the periodic calibration verification checks, and periodic maintenance checks for the probe. This procedure ensures that the SFPIS will retain its accuracy as defined by the design specification document WNA-DS-02957-GEN (J-2048-00000) (proprietary), the NRC order and NEI guidance as clarified by the interim staff guidance (JLD-ISG-2012-03).

3. A customer specific installation instruction will be provided to communicate the SFPIS installation requirements.
4. A customer specific power-up and site acceptance test will be provided to be used for the plant's AE to develop the applicable procedures.

Below is a list of Callaway procedures and instructions:

Normal/Emergency procedures:

- OTA-RK-00022 Add 76D – Spent Fuel Pool Level High/Low Annunciator response procedure which utilizes ECLI0059A/60A
- DFC – Provides a method to the TSC to diagnose plant conditions during severe accidents.
- EC Supplemental Guideline – Provides additional options to restore plant equipment.
- SACRG – 2 – Provides actions to respond to a severe accident where the core may be damaged.
- SAEG -1 – Provides info to the TSC to monitor for long-term concerns with implementation of SAG/SACRG.
- SAG – 9 – Provides guidance to respond to a severe accident in the FB.
- SCG – 5 – Recover spent fuel pool level
- SCST - Provides a method to diagnose severe challenges to containment fission product boundaries.
- Primary Operator Rounds - A verification of channels is performed each shift as part of Primary Operator Rounds.
- OOA-EC-00002-"Operator Aid For Spent Fuel Pool Level Indications" is used for the guide for verifying the values of each independent channel (EC-LI-59A and EC-LI60A) against the other and against EC LI-39A, which is the other permanently-installed SFP level instrumentation.
- KDP-ZZ-00013 Appendix 1, Equipment Important to Emergency Response Matrix - Compensatory measures. See the page 3 and 22 of the procedure in the RAI folder.

Calibration/Functional Procedures:

- ITL-EC-00L59 Primary Loop Calibration/two-point check functional verification and boron build-up removal.
- ITL-EC-00L60 Backup Loop Calibration/two-point check functional verification and boron build-up removal.

Maintenance Instructions:

- EC-LIT-0059 Replacement, Calibration and Setup of Unit
- EC-LY-0059 Calibration E/I Loop Isolator Module
- EC-LI-0059A Replacement, Calibration and Setup of Unit
- EC-LQ-0059A Power Supply Replacement and Setup
- EC-LQY-0059 Replacement, Calibration and Setup of Unit

- EC-LQ-0059B Battery Check and Replacement
- EC-LIT-0060 Replacement, Calibration and Setup of Unit
- EC-LY-0060 Calibration E/I Loop Isolator Module
- EC-LI-0060A Replacement, Calibration and Setup of Unit
- EC-LQ-0060A Power Supply Replacement and Setup
- EC-LQY-0060 Replacement, Calibration and Setup of Unit
- EC-LQ-0060B Battery Check and Replacement

References:

1. Westinghouse proprietary document, WNA-OG-00127-GEN (J-2048-00025)
2. Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030)
3. Westinghouse proprietary document, WNA-DS-02957-GEN (J-2048-00000)
4. JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation

The Westinghouse proprietary documents described above can be made available upon request.

NRC RAI No.19

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 that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.

Callaway Response:

The maintenance and testing program will ensure that regular testing and calibration is performed and verified. Calibration and testing for the instruments will be based on Westinghouse "Spent Fuel Pool Instrumentation System Calibration Procedure", WNA-TP-04709-GEN (J-2048-00030) as adapted to specific site procedures.
The periodic testing recommended to validate the functionality of the installed instrument channel will be performed within 60 days of a planned refueling outage with a normal testing allowance of 25% but not more than once per 12 month period.

b) A description of the compensatory actions to be taken in the event that one or both channels are non-functioning, as described in the guidance in NEI 12-02 section 4.3

Callaway Response:

Non-functioning SFP level instrumentation will be tracked by Operations department procedure ODP-ZZ-00002, Equipment Status Control. Emergency Response Matrix KDP-ZZ-00013

Appendix 1 identifies compensatory actions. Operator Aid OOA-EC-00002 defines the values to identify expected spent fuel pool water levels. The Primary Operator Rounds Log describes required actions if unsatisfactory conditions are discovered, which generates a corrective action request. I&C procedures ITL-EC-00L59 and ITL-EC-00L60 provide methods for returning equipment to service. The primary or back-up instrument channel can be out of service for testing, maintenance and/or calibration for up to 90 days provided the other channel is functional. The non-functioning instrument shall be returned to service within the 90 day period. In the event that one instrument channel is not functional and is not expected to be restored within 90 days, compensatory actions will be taken. If both instrument channels are determined to be non-functioning, actions will be initiated within 24 hours to restore one of the instrument channels to full functionality within 72 hours prior to implementing compensatory actions. If one of the instrument channels cannot be restored within this period, then enhanced monitoring of the existing SFP level instrumentation will be performed on a shiftly basis.

c) A description of the planned compensatory actions to be taken when one of the instrument channels cannot be restored to functional status within 90 days.

Callaway Response:

If the non-functioning instrument channel cannot be returned to service within the 90 day period, enhanced monitoring through operator rounds will be performed on a shiftly basis.

References:
1. Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030)
2. Callaway procedure ODP-ZZ-00002, Equipment Status Control

The Westinghouse proprietary document described above can be made available upon request.

NRC RAI No. 20

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.

Callaway Response:

The calibration verification is performed by simulating a change in SFP level through the use of a two-point check with the sliding poolside mounting bracket. If the difference is larger than the allowable tolerance during this verification, an electronic output verification/calibration is required. This electronic output verification/calibration verifies that the electronics are working properly using simulated probe signals.

If the electronic output verification/calibration does not restore the performance, a calibration adjustment will be required to restore and verify level measurement accuracy at 0%, 25%, 50%, 75%, and 100% points along the full span. This adjustment is performed outside of the SFP area using a calibration kit and does not require removal of components from the SFP pool or area.

The calibration verification, electronic output verification/calibration, and the calibration adjustment are defined in the proprietary Westinghouse procedure WNA-TP-04709-GEN (J-

2048-00030). WNA-TP-04709-GEN was used to develop the plant procedures for functional/calibration verification and boron build-up removal, ITL-EC-00L59 and ITL-EC-00L60. WNA-TP-04709-GEN was also used to develop several Callaway maintenance instructions including:

- EC-LIT-0059 Replacement, Calibration and Setup of Unit [Transmitter]
- EC-LIT-0060 Replacement, Calibration and Setup of Unit [Transmitter]
- EC-LI-0059A Replacement, Calibration and Setup of Unit [Display]
- EC-LI-0060A Replacement, Calibration and Setup of Unit [Display]

References

1. Westinghouse proprietary document, WNA-TP-04709-GEN (J-2048-00030)

The Westinghouse proprietary document can be made available for review upon request.

Callaway Plant, Unit 1 - SFPI Design Bridge Document						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document #**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
1	Design Specification	SFPIS Requirements derived from References 1, 2, and 3.	WNA-DS-02957-GEN	Contains technical SFPIS requirements based on NRC order, NEI guidance, and the ISG listed above.	N/A	Callaway Plant has determined that WNA-DS-02957-GEN bounds the Callaway Plant requirements from References 1, 2, and 3.
2	Test Strategy	Per Requirements.	WNA-PT-00188-GEN	Strategy for performing the testing and verification of the SFPIS and pool-side bracket.	N/A	Callaway Plant has determined WNA-PT-00188-GEN to be acceptable for the design.
3	Environmental qualification for electronics enclosure with Display	50° F to 140° F, 0 to 95% Relative Humidity (RH)	EQ-QR-269 and WNA-TR-03149-GEN for all conditions.	Results are summarized in EQ-QR-269 (Section 5.5) and WNA-TR-03149-GEN (Section 5.5).	Test passed conditions described.	Temperature is ≤ 140°F and humidity is ≤ 95% RH for abnormal conditions in Room 1408 and Room 1409 of the Auxiliary Building (Reference 22). The values are bounded by the values in section 5.3 of WNA-TR-03149-GEN.
		TID ≤ 1E03 R γ normal (outside SFP area) TID ≤ 1E03 R γ abnormal (outside SFP area)	EQ-QR-269 and WNA-TR-03149-GEN for all conditions.	Radiation Aging verification summarized in Section 4 of WNA-TR-03149-GEN.	Test passed conditions described.	Aging Tests - Westinghouse completed its aging qualification of SFPIS to 10 years. Westinghouse has provided a final position regarding the aging qualification which closes the previous open item from Steris; Rev 5 of EQ-QR-269 has been issued. Callaway Plant has received the report.

Callaway Plant, Unit 1 - SFPI Design Bridge Document						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document #**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
4	Environmental Testing for Level Sensor components in SFP area – Saturated Steam & Radiation	50 ° F to 212° F and 100% humidity	EQ-QR-269	Testing summarized in EQ-QR-269 (Section 5.7), with additional clarifications/explanation in WNA-TR-03149-GEN (Section 5.2), and LTR-SFPIS-15-34.	Passed	The Temperature and Humidity values of 212°F and 100% RH from Reference 2 are bounded by Section 5.2 of WNA-TR-03149-GEN.
		1E03 R γ normal (SFP area)	WNA-TR-03149-GEN	Thermal Aging & radiation aging verification summarized in Sections 3 and 4 (entire system) of WNA-TR-03149-GEN.	Passed	The generic radiation analysis documented in WNA-TR-03149-GEN, Section 4.0, contains significant conservatism with the intent to bound sites installing the system. The normal operating dose in the SFP area determined in Section 4.1.2 of WNA-TR-03149-GEN is 1E03 R γ. Justification that the system components are inherently resistant to radiation effects is provided in Section 4.1.3 of WNA-TR-03149-GEN.
		1E07 R γ BDB (SFP area)	EQ-TP-354 (procedure) EQ-QR-269 (10 year thermal/radiation testing completed).	Additional thermal & radiation aging programs were completed under test procedure EQ-TP-354. The results are captured in EQ-QR-269 (section 5.2, 5.3) with additional clarification/explanation in	Additional aging program was completed to achieve longer life – 10 years at maximum normal operating temperature of 140°F.	The Beyond Design Basis (BDB) radiation value to which the Westinghouse equipment is qualified to is 1E09 R γ for the probe, stainless steel cable and weight and 1E07R γ for the equipment above the pool,

Callaway Plant, Unit 1 - SFPI Design Bridge Document						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document #**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
				WNA-TR-03149-GEN, (Section 3 and 4) and LTR-SFPIS-15-34.		per Section 4.1.2 of WNA-TR-03149-GEN. This generic analysis contains significant conservatism with the intention of bounding plants installing this system. With SFP water level at Level 3, the only components of the SFPIS that are exposed to high radiation are the stainless steel probe and the stainless steel anchor. The materials with which the probe and the anchor are manufactured are resistant to radiation effects. The justification that the system components are inherently resistant to radiation effects is provided in Section 4.1.1 of WNA-TR-03149-GEN. Reference 21 states that the TID basis for all electrical equipment and instrumentation outside of containment is 1E07 R (DBA). Section 5.3 of EQ-QR-269 demonstrates that the test specimens were subjected to a minimum

Callaway Plant, Unit 1 - SFPI Design Bridge Document						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document #**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
						TID of 11.00 Mrad. Section 4.1.1 of WNA-TR-03149-GEN states that "Westinghouse engineering evaluation saw no reasonable way to exceed 10 MR for the beyond design basis TID." Aging Tests - Westinghouse completed its aging qualification of SFPIS to 10 years. Westinghouse has provided a final position regarding the aging qualification which closes the previous open item from Steris; Rev 5 of EQ-QR-269 was issued. Callaway has received the report.
5	Environmental Testing for Level Sensor Electronics Housing – outside SFP	50° F to 140° F, 0 to 95% RH	EQ-QR-269	Testing summarized in Section 5.5 of EQ-QR-269 with additional clarifications/explanation in WNA-TR-03149-GEN (Section 5.3), and LTR-SFPIS-15-34.	Passed	Temperature is < 140°F and humidity is -< 95% RH for abnormal conditions in Auxiliary Building, Room 1408 from References 22 and 23. The above values are bounded by the values in Section 5.3 of WNA-TR-03149-GEN.
		100% RH	WNA-TR-03149-GEN	100% humidity addressed in Section 7.5.	Passed	The humidity is < 100% RH for abnormal conditions

Callaway Plant, Unit 1 - SFPI Design Bridge Document						
#	**Topic**	**Parameter Summary**	**Westinghouse Reference Document #**	**Additional Comment**	**Test or Analysis Results**	**Licensee Evaluation**
						in Auxiliary Building, Room 1408 from Reference 21.
		TID ≤ 1E03 R γ normal (outside SFP area) TID ≤ 1E03 R γ abnormal (outside SFP area)	WNA-TR-03149-GEN	Radiation Aging verification summarized in Section 4.	Passed	The normal and abnormal TID of < 1 E3 R γ in Auxiliary Building, Room 1408 from Reference 21 is bounded by Section 4.1.3 of WNA-TR-03149-GEN.
6	Thermal & Radiation Aging – organic components in SFP area	1E03 R γ normal (SFP area)	EQ-QR-269 and WNA-TR-03149-GEN	Thermal Aging & radiation aging verification summarized in EQ-QR-269 (Sections 5.2 and 5.3) and in Sections 3 and 4 (entire system) of WNA-TR-03149-GEN.	Passed	Callaway Plant has determined EQ-QR-269 and WNA-TR-03149-GEN to be acceptable for the Callaway Plant installation. See response to Item 4 above.
		1E07 R γ BDB (SFP area)	EQ-TP-354 (procedure) EQ-QR-269 (10 year thermal/radiation testing completed).	Additional thermal & radiation aging programs were completed under test procedure EQ-TP-354. The results are captured in EQ-QR-269 (section 5.2, 5.3) with additional clarification/explanation in WNA-TR-03149-GEN, (Section 3 and 4) and LTR-SFPIS-15-34.	Additional aging program has been completed to achieve longer life – 10 years at maximum normal operating temperature of 140°F.	Aging Tests - Westinghouse completed its aging qualification of SFPIS to 10 years. Westinghouse has provided a final position regarding the aging qualification which closes the previous open item from Steris; Rev 5 of EQ-QR-269 was issued. Callaway Plant has received the report.

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7	Basis for Dose Requirement	<u>SFP Normal Conditions:</u> 1E03 R γ TID (above pool) 1E09 R γ TID (1' above fuel rack) <u>SFP BDBE Conditions:</u> 1E07 R γ TID (above pool) < 1E07 R γ TID (1' above fuel rack)	LTR-SFPIS-13-35 and WNA-DS-02957-GEN See also section 4.1.1 of WNA-TR-03149-GEN	LTR-SFPIS-13-35 contains the Explanation of Basis for Radiation Dose Requirement (includes the clarification of production equivalency of electronics enclosure used for Seismic and EMC Testing). The Radiation Dose basis has been incorporated into WNA-TR-03149-GEN (Section 4.1.1).	Passed for all conditions	Callaway Plant has determined the basis documents to be acceptable. The radiation analysis documented in WNA-TR-03149, Section 5.0, contains clarification of significant conservatism with the intention of bounding sites installing the system. With SFP water level at Level 3, the only components of the SFPIS that are exposed to high radiation are the stainless steel probe and the stainless steel anchor. The materials with which the probe and the anchor are manufactured are resistant to radiation effects. The justification that the system components are inherently resistant to radiation effects is provided in Section 5.1.1 of WNA-TR-03149-GEN. 10466-J-830 (Reference 21) states that the TID basis for all electrical equipment and instrumentation inside the

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						SFP area but above the pool is 1E07 R. Section 5.3 of EQ-QR-269 demonstrates that the test specimens were subjected to a minimum TID of 11.00 Mrad. Section 5.1.1 of WNA-TR-03149-GEN states that "Westinghouse engineering evaluation saw no reasonable way to exceed 10 MR for the beyond design basis TID."
8	Seismic Qualification	Per Spectra in WNA-DS-02957-GEN	EQ-QR-269	EQ-QR-269 (section 5.4) summarizes the testing performed by Westinghouse.	Passed	The spectra in CN-PEUS-13-31 (Reference 11) for the pool-side mounting brackets bounds Callaway Plant for meeting the requirements to withstand an SSE. Instrument panel mounting qualified in EQ-QR-269 and WNA-TR-03149-GEN are bounded by this same
			WNA-TR-03149-GEN	WNA-TR-03149-GEN (Section 6) provides high level summary of the pool-side bracket analysis and optional RTD in addition to the overall system and the various options for improved EMC performance.	Passed	

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			EQ-QR-269	Seismic Pull test for new connectors documented in Section 4.4.	Passed	seismic spectra. Seismic analysis of the transmitter enclosure documented by CN-PEUS-14-15 (Reference 24) is bounded by these same seismic spectra. The optional RTD does not apply to the Callaway Plant.
9	Sloshing	N/A	LTR-SEE-II-13-47	Calculation to demonstrate that probe will not be sloshed out of the SFP.	Passed	Callaway Plant has determined WNA-TR-03149-GEN to be acceptable. Adequate sloshing forces (inclusive of vertical and horizontal impact forces, hydrodynamic forces) were accounted to calculate the overall sloshing forces. These forces were added to design the bracket anchorage, to ensure the probe will not be sloshed due to a BDB seismic event.
			WNA-TR-03149-GEN	Sloshing is also addressed in Section 7.2 with further clarification in LTR-SFPIS-14-70.	Passed	
10	Spent Fuel Pool Instrumentation System Functionality Test Procedure	Acceptance Criteria for Performance during EQ testing	WNA-TP-04613-GEN	Test procedure used to demonstrate that SFPIS meet its operational and accuracy requirements during Equipment Qualification Testing programs.	See applicable Environmental Qualification (EQ) test.	Callaway Plant has determined WNA-TP-00189-GEN "Integrated Functional Test Plan" to be acceptable. The Callaway Plant specific test report is

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						WNA-TR-03369-SCP (Reference 20).
11	Boron Build-Up	Per requirement in WNA-DS-02957-GEN	WNA-TR-03149-GEN	Section 7.4 Boron build up is also demonstrated through Integrated Functional Test (IFT).	Passed	Callaway Plant has determined WNA-TP-00189-GEN "Integrated Functional Test Plan" to be acceptable. The Callaway Plant specific test report is WNA-TR-03369-SCP (Reference 20).
12	Pool-side Bracket Seismic Analysis	N/A	Site Specific CN-PEUS-13-31	Also includes hydrodynamic forces, as appropriate.	Passed	Callaway Plant's seismic requirements withstand an SSE are bounded by CN-PEUS-13-31 for the pool-side mounting brackets.
13	Additional Brackets (Sensor Electronics and Electronics Enclosure)	N/A	WNA-DS-02957-GEN	Weights provided to licensees for their own evaluation.	N/A	Callaway Plant's seismic requirements withstand an SSE are bounded by the seismic spectra used in CN-PEUS-14-15.
14	Shock & Vibration	WNA-DS-02957-GEN	WNA-TR-03149-GEN	Section 7 provides rationale and summary of RTD.	N/A	Callaway Plant has determined the Westinghouse evaluation of shock and vibration in WNA-TR-03149-GEN is acceptable.

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						The optional RTD is not installed at this site.
15	Requirements Traceability Matrix	Maps Requirements to documentation / evidence that Requirement is met	WNA-VR-00408-GEN and WNA-DC-00251-SCP	The RTM maps the requirements of the NRC order, NEI guidance, ISG to the applicable technical requirements in the SFPIS design specification and maps the design specification requirements to the documentation demonstrating the requirement is met.	Complete	Callaway Plant has reviewed the compliance matrix WNA-DC-00251-SCP, which addresses the details of the NRC order, the NEI guidance, and the ISG.
16	Westinghouse Factory Acceptance Test, including testing of dead-zones	IFT Functional Requirements from WNA-DS-02957-GEN	WNA-TP-04752-GEN	The Integrated Functional Test (IFT) demonstrates functionality of the full system for each customer's FAT, which includes calibration of each channel.	Pilot IFT executed/passed Site specific IFT OR functional checks / channel FAT have been completed and passed for equipment that has been delivered.	Callaway Plant has reviewed the final test reports, including Reference 20, and found them to be acceptable.
		12" dead-zone at top of probe 4" dead-zone at bottom of probe	WNA-TP-04752-GEN	Dead-zone tests are in Section 9.6.2.	N/A	
17	Channel Accuracy	+/- 3 inches per WNA-DS-02957-GEN	WNA-CN-00301-GEN	Channel accuracy from measurement to display. Additional clarification provided in LTR-SFPIS-14-	Passed	Callaway Plant has reviewed WNA-DS-02957-GEN and WNA-CN-00301-GEN found that channel accuracy requirements are

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				136, Rev. 1		met. Callaway Plant's calculated channel accuracy is ± 3 inches.
18	Power Consumption	3 day battery life (minimum) 0.257 Amps power consumption	WNA-CN-00300-GEN	N/A	Passed	Callaway Plant has reviewed WNA-CN-00300-GEN and concluded that battery life of > 72 hours is available for display enclosure and meets the Order requirements. The 0.257 Amps loading does not challenge the Callaway Plant's electrical distribution system.
19	Technical Manual	N/A	WNA-GO-00127-GEN	Information and instructions for Operation, Installation, use, etc. are included here.	N/A	Callaway Plant used WNA-GO-00127-GEN as input for procedure preparation.
20	Calibration	Routine Testing/calibration verification and Calibration method	WNA-TP-04709-GEN	Also, includes preventative maintenance actions such as those for Boron buildup and cable probe inspection.	N/A	Callaway Plant used WNA-TP-04709-GEN as input for procedure preparation.
21	Failure Modes and Effects Analysis (FMEA)	N/A	WNA-AR-00377-GEN	Addresses mitigations for the potential failure modes of the system.	N/A	Callaway Plant used WNA-AR-00377-GEN for procedure preparation.
22	Emissions Testing	RG 1.180 R1 test conditions	EQ-QR-269	Documented in EQ-QR-269 (Section 5.6) and in WNA-TR-03149-GEN (Section 2).	Passed	Callaway Plant has reviewed the test report and found it meets requirements for radiated emissions limits and criterion B testing based on the

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						modifications implemented.
23	Splash Testing / Submersion	Temporary With Option for longer submersion	WNA-TR-03149-GEN	Section 7.5 – Standard configuration withstands the temporary submersion. Option available for longer submersion.	Passed	Callaway Plant has reviewed the final reports and found them to be acceptable.

Table References:

1) ML12056A044, NRC Order EA-12-051, "ORDER MODIFYING LICENSES WITH REGARD TO RELIABLE SPENT FUEL POOL INSTRUMENTATION," Nuclear Regulatory Commission, March 12, 2012.
2) ML12240A307, NEI 12-02 (Revision 1), "Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" August, 2012.
3) ML12221A339, Revision 0, JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation", August 29, 2012, Nuclear Regulatory Commission Japan Lessons-Learned Project Directorate.
4) Westinghouse Proprietary Document, WNA-DS-02957-GEN, "Spent Fuel Pool Instrumentation System (SFPIS) Standard Product System Design Specification," Revision 4 reviewed by NRC in April 2014; current revision is Revision 4.
5) Westinghouse Proprietary Document, WNA-PT-00188-GEN, "Spent Fuel Pool Instrumentation System (SFPIS) Standard Product Test Strategy," Revision 1 reviewed by NRC in February 2014; NRC did not review in April; current revision is Revision 3.
6) Westinghouse Proprietary Document, EQ-QR-269, "Design Verification Testing Summary Report for the Spent Fuel Pool Instrumentation," Revision 1 reviewed by NRC in April 2014; current revision is Revision 5 (completion of the longer aging program; see also, supplement letter LTR-SFPIS-15-34 for additional clarification; also, closure of the Steris Radiation issue).
7) Westinghouse Proprietary Document, WNA-TR-03149-GEN, "SFPIS Standard Product Final Summary Design Verification Report," Revision 1 reviewed by NRC in April 2014; current revision is Revision 02 (completion of the design verification program, including 10 year aging program; see also, supplement letter LTR-SFPIS-15-34 for additional clarification).

8) Westinghouse Proprietary Document, LTR-SFPIS-13-35, "SFPIS: Basis for Dose Requirement and Clarification of Production Equivalency of Electronics Enclosure Used for Seismic Testing," Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 1.

9) Westinghouse Proprietary Document, LTR-SEE-II-13-47, "Determination if the Proposed Spent Fuel Pool Level Instrumentation can be Sloshed out of the Spent Fuel Pool during a Seismic Event," Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 0.

10) Westinghouse Proprietary Document, WNA-TP-04613-GEN, "Spent Fuel Pool Instrumentation System Functionality Test Procedure," Revision 5 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 5.

11) Westinghouse Proprietary Document, CN-PEUS-13-31, "Seismic Analysis of the SFP Mounting Bracket for Callaway Plant Unit 1,"Revision 0.

12) Westinghouse Proprietary Document, WNA-VR-00408-GEN, "Spent Fuel Pool Instrumentation System Requirement Traceability Matrix," Revision 0 reviewed by the NRC in April 2014; current revision is Revision 02.

13) Westinghouse Proprietary Document, WNA-DC-00251-SCP, "Spent Fuel Pool Instrumentation System Compliance Matrix – Callaway," Rev. 0 was not reviewed by the NRC in February or April 2014 although they reviewed the generic RTM, WNA-VR-00408-GEN. Both address the NRC order and NEI guidance.

14) Westinghouse Proprietary Document, WNA-TP-04752-GEN, "Spent Fuel Pool Instrumentation System Standard Product Integrated Functional Test Procedure," Revision 1 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 2.

15) Westinghouse Proprietary Document, WNA-CN-00301-GEN, "Spent Fuel Pool Instrumentation System Channel Accuracy Analysis," Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 2 (see also supplemental letter, LTR-SFPIS-14-136, Rev. 1).

16) Westinghouse Proprietary Document, WNA-CN-00300-GEN, "Spent Fuel Pool Instrumentation System Power Consumption Calculation," Revision 0 reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 1.

17) Westinghouse Proprietary Document, WNA-GO-00127-GEN, "Spent Fuel Pool Instrumentation System Standard Product Technical Manual," Revision 1 reviewed by the NRC in April 2014; current revision is Revision 4.

18) Westinghouse Proprietary Document, WNA-TP-04709-GEN, "Spent Fuel Pool Instrumentation System Calibration Procedure," Revision 3 was reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 5.

19) Westinghouse Proprietary Document, WNA-AR-00377-GEN, "Spent Fuel Pool Instrumentation System Failure Modes and Effect Analysis," Revision 2 was reviewed by the NRC in February 2014; NRC did not review in April; current revision is Revision 4.

20) Westinghouse Proprietary Document, WNA-TR-03369-SCP, "Spent Fuel Pool Instrumentation System Integrated Functional Test Report – Callaway," Revision 0. NRC did not review in February or April 2014 as this is the site specific test report.

21) 10466-J-830(Q), Revision 2, Technical Specification for Environmental Qualification for Safety-Related Control and Instrument Devices. (Site specific, not reviewed during vendor audit).

22) Callaway FSAR TABLE 3.11(B)-1, Plant Environmental Normal Conditions

23) Callaway FSAR TABLE 3.11(B)-2, Environmental Qualification Parameters For SNUPPS NUREG-0588 Review (LOCA, MSLB AND HELB)

24) Westinghouse Proprietary Document, CN-PEUS-14-15, "Seismic Qualification of the SFPIS Transmitter Enclosure for Callaway Nuclear Plant Unit 1", Revision 0