



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

May 6, 2015

Mr. Dennis L. Koehl  
President and CEO/CNO  
STP Nuclear Operating Company  
South Texas Project  
P.O. Box 289  
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 - REPORT FOR THE ONSITE  
AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES  
AND RELIABLE SPENT FUEL INSTRUMENTATION RELATED TO ORDERS  
EA-12-049 AND EA-12-051 (TAC NOS. MF0825, MF0826, MF0827, AND  
MF0828)

Dear Mr. Koehl:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A011), STP Nuclear Operating Company (STP, the licensee) submitted its OIP for South Texas Project, Units 1 and 2 (STP) in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 27, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13249A060, ML14073A458, ML14251A029, and ML15075A019, respectively), STP submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the STP interim staff evaluation (ISE) on January 29, 2014 (ADAMS Accession No. ML13339A736), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A006), the licensee submitted its OIP for STP in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13149A092), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated June 25, 2013, August 27, 2013, February 27, 2014, August 27, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13190A466,

ML13249A078, ML14066A388, ML14251A028, and ML15069A220, respectively), the licensee submitted its RAI responses and first three six-month updates to the OIP.

The NRC staff's review led to the issuance of the STP ISE and RAI dated September 19, 2013 (ADAMS Accession No. ML13254A210). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at STP from February 9-13, 2015, per the audit plan dated December 31, 2014 (ADAMS Accession No. ML14363A103). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

D. Koehl

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If you have any questions, please contact me at 301-415-1924 or by e-mail at [tony.brown@nrc.gov](mailto:tony.brown@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Tony Brown', with a stylized flourish at the end.

Tony Brown, Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket Nos.: 50-498 and 50-499

Enclosure:  
Audit Report

cc w/encl: Distribution via Listserv



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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES  
WITH REGARD TO REQUIREMENTS FOR  
MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS  
AND RELIABLE SPENT FUEL POOL INSTRUMENTATION  
STP NUCLEAR OPERATING COMPANY  
SOUTH TEXAS PROJECT, UNITS 1 AND 2  
DOCKET NOS. 50-498 and 50-499

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A011), STP Nuclear Operating Company (STP, the licensee) submitted its OIP for South Texas Project, Units 1 and 2 (STP) in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 27, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13249A060, ML14073A458, ML14251A029, and ML15075A019, respectively), STP submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is

Enclosure

conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the STP interim staff evaluation (ISE) on January 29, 2014 (ADAMS Accession No. ML13339A736), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13070A006), the licensee submitted its OIP for STP in response to Order EA-12-051. By letter dated June 7, 2013 (ADAMS Accession No. ML13149A092), the NRC staff sent a request for additional information (RAI) to the licensee. By letters dated June 25, 2013, August 27, 2013, February 27, 2014, August 27, 2014, and February 26, 2015 (ADAMS Accession Nos. ML13190A466, ML13249A078, ML14066A388, ML14251A028, and ML15069A220, respectively), the licensee submitted its RAI responses and first three six-month updates to the OIP. The NRC staff's review led to the issuance of the STP ISE and RAI dated September 19, 2013 (ADAMS Accession No. ML13254A210). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audit process, to include the in-office and onsite portions, allows the staff to assess whether it has enough information to make a safety evaluation of the Integrated Plans. The audit allows the staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at STP from February 9-13, 2015, per the audit plan dated December 31, 2014 (ADAMS Accession No. ML14363A103). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies (MS) and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, review of staging and deployment of offsite equipment, and review of installation details for SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed, by NRC Japan Lessons-Learned Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174).

For Order EA-12-051, the staff will make a safety determination using the NEI developed guidance document 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'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional staff review will be required to evaluate the alternative strategy in reference to the applicable order.

### AUDIT ACTIVITIES

The onsite audit was conducted at the STP facility from February 9, 2015, through February 13, 2015. The NRC audit team staff was as follows:

<b>Title</b>	<b>Team Member</b>	<b>Organization</b>
Team Lead/Project Manager	Tony Brown	NRR/JLD
Technical Support – Balance of Plant	Garry Armstrong	NRR/JLD
Technical Support – Reactor Systems	Joshua Miller	NRR/JLD
Technical Support – Electrical	Matthew McConnell	NRR/JLD
Technical Support – SFPI	Khoi Nguyen	NRR/JLD

The NRC staff executed the onsite portion of the audit per the three part approach discussed in the December 31, 2014, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

### AUDIT SUMMARY

#### 1.0 Entrance Meeting (February 9, 2015)

At the audit entrance meeting, the NRC staff audit team introduced itself followed by introductions from the licensee's staff. The NRC audit team provided a brief overview of the audit's objectives and anticipated schedule.

#### 2.0 Integrated Mitigating Strategies Compliance Program Overview

Per the audit plan and as an introduction to the site's program, the licensee provided a presentation to the NRC audit team describing the site's strategies to meet the NRC orders. The licensee reviewed its strategy to maintain core cooling, containment, and SFP cooling in the event of a BDBEE, and the plant modifications being done in order to implement the strategies. Also reviewed was the design and location of the storage facilities for the FLEX equipment, the interface with the National Strategic Alliance for FLEX Emergency Response (SAFER) Response Center including staging areas, the

SFP level indication modification, the emergency communications equipment and capabilities, preventative maintenance plans for the FLEX equipment, procedural enhancements such as development of FLEX support guidelines (FSGs), and operator training.

### 3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with licensee technical staff, site walk-downs, and detailed document review for the items identified in the plan. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

#### 3.1 Reactor Systems Technical Discussions and Walk-Downs

NRC staff met with licensee staff to discuss the amount of leakage from the reactor coolant pump (RCP) seals, the timing of the injection of borated water into the reactor coolant system (RCS), and the availability of borated water sources. NRC staff reviewed the boration calculations and flow calculations, along with applicable procedures.

#### 3.2 Electrical Technical Discussions and Walk-Downs

NRC staff reviewed the calculations on extending battery life based on load shedding, and walked down the battery rooms to evaluate strategies for hydrogen and temperature control. NRC staff also walked down panels used for load shedding to evaluate feasibility and timing.

NRC staff walked down connection points and locations for FLEX electrical generators. The staff reviewed the licensee's load and sizing calculations for the FLEX generators and reviewed the procedures for connecting the Phase 2 and Phase 3 electrical generators. The NRC staff noted that the licensee is pre-staging the FLEX diesel generators in protected structures and this strategy is an alternative to NEI 12-06.

#### 3.3 SFPI Technical Discussions and Walk-Downs

NRC staff walked down instrument, transmitter, electronics, and display locations for the SFP level instrumentation, along with the associated cable runs. NRC staff also reviewed the associated calibration, maintenance and test procedures for the SFP level instrumentation.

#### 3.4 Other Technical Discussion Areas and Walk-Downs

a. NRC staff met with licensee staff to discuss the required robust sources of water for the turbine-driven auxiliary feedwater pump. The staff conducted a walkdown of the locations of the water sources to be used as well as the connection points inside the

protected plant buildings. The staff also reviewed the procedures for providing makeup to the steam generators (SGs), as well as alternate methods as needed.

b. NRC staff toured the buildings designated for storage of FLEX equipment and reviewed the building plans. The staff walked down equipment haul routes from the storage building to the designated deployment sites, and walked down haul routes from designated staging areas for equipment that will be delivered from the National SAFER Response Center.

c. NRC staff walked down the FLEX strategies for core cooling, RCS inventory, and SFP inventory functions. This included the locations of the FLEX pumps, hose routing and deployment connection points. NRC staff noted that the licensee's strategy involves pre-installed pumps, due to the design-basis flooding event, and is an alternative to the guidance in NEI 12-06. The staff also noted that the licensee strategy does not include primary and alternate connection points and relies on separate pumps and injection pathways. This is also an alternative to NEI 12-06. To ensure diversity and flexibility, the licensee stated it will reduce the allowed out of service time to 30 days for both the installed positive displacement pump and installed FLEX RCS makeup pump, and associated connections and flow paths, for Modes 1-4. Additionally, the licensee identified additional connection points and procedures for SG makeup and SFP makeup to ensure diversity and flexibility.

d. NRC staff reviewed the strategy that will be implemented by the licensee to refuel the diesel-powered FLEX equipment. The NRC staff reviewed the instructions for refueling the equipment as well as the equipment needed to perform the refueling.

e. The staff reviewed the licensee's plans to ensure adequate communications, lighting, personnel access, and equipment access, to successfully implement the strategies. The staff interviewed plant personnel responsible for these areas, and observed lighting and communication needs during plant walkdowns.

f. The licensee's cooldown strategy relies on operation of the SG power operated relief valves (PORVs). The licensee indicated accumulators will provide initial motive force for the PORVs and no electrical power will be required to operate the valves locally. Additionally, the licensee indicated that procedural guidance is available for operators to control the valves locally as necessary. The staff observed these mechanisms during the plant walkdown and also reviewed the site procedures for operation of the PORVs. Following questions by the staff regarding room habitability, the licensee initiated corrective actions to develop contingencies to ensure operators can access and operate the PORVs in potentially adverse conditions.

#### 4.0 Exit Meeting (February 13, 2015)

The NRC staff audit team conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that the results of the onsite audit trip will be documented in this report. The NRC staff also discussed the remaining open items with the licensee and information needed for closure. The open items are listed in Attachment 3 of this report.



## CONCLUSION

The NRC staff completed all three parts of the December 31, 2014, onsite audit plan. The audit items identified in Part 2 of the plan were reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process as the licensee proceeds towards orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the MS and SFP Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

- a. Interim Staff Evaluation (ISE) Open Items (OIs) and Confirmatory Items (CIs)
- b. Audit Questions (AQs)
- c. Licensee-identified Overall Integrated Plan (OIP) Open Items (OIs)
- d. Spent Fuel Pool Level Instrumentation (SFPLI) Requests for Additional Information (RAIs)
- e. Additional Safety Evaluation (SE) needed information

The attachments provide audit information as follows:

- a. Attachment 1: List of NRC staff and licensee staff audit participants
- b. Attachment 2: List of documents reviewed during the onsite audit
- c. Attachment 3: MS/SFPI SE Audit Items currently under NRC staff review (licensee input needed as noted)

While this report notes the completion of the onsite portion of the audit per the audit plan dated December 31, 2014, the ongoing audit process continues as per the letters dated August 28, 2013, and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:

1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

## Onsite Audit Participants

### NRC Staff:

Tony Brown	NRR/JLD/JOMB
Garry Armstrong	NRR/JLD/JCBB
Joshua Miller	NRR/JLD/JERB

Matthew McConnell	NRR/JLD/JERB
Khoi Nguyen	NRR/JLD/JERB

### South Texas Project Staff:

Charlie Albury	Supervising Engineer, Reactor Analysis
Philip Alier	Engineer IV, Systems Engineering
David Amador	Head Plant Operator
Ron Bradford	Engineer Consult SE, Testing & Programs
Wendy Brost	Engineer IV, Licensing
Jeff Coney	Spec Engineering Staff, Communications
Nathan Corrick	Spec Ops Support Staff Sr
Mark Coughlin	Unit Supervisor, Procedure Projects
Ken Cross	Safety Review Team Staff
Dave Dujka	Safety Review Team Supervisor
Matt Dunlap	Head Plant Operator
Rob Engen	Manager, Engineering Projects
Fermin Estraca	Plant Operator
Mitch Gandt	Engineer II, Systems Engineering
Roger Harris	Engineer Consult Sr, Equipment Reliability
Gary Jones	Engineer Consult Sr, I&C Design
Raihan Khondker	Engineer Sr, Equipment Reliability
Gary Lamberth	Spec Ops Support, Procedure Projects
Jim Ledgerwood	Manager, Safety Review Team
Rodrigo Lozano	Engineer Consult SE, Electrical Systems
Marco Ruvalcaba	Manager Strategic Projects
Robyn Savage	Spec Licensing Eng Consult SE, Licensing
Dan Sicking	Spec Engineering Consult SR
Steve Sieben	Safety Review Team Staff, FLEX Lead
Eric Stephens	Engineer SR, Electrical Systems
James Svetlik	Plant Operator
Todd Van Meter	Engineer Staff, I&C Design
Dave Wiegand	Spec Engineer Consult SR, Plant Generation
Gary Williams	Engineer Consult Sr, Electrical Engineering

## Documents Reviewed

- 0PCP01-ZA-0014, "Chemistry Scheduling and Data Management," Rev. 7
- 0PGP03-ZA-0090, "Work Process Program," Rev. 39
- 0PGP03-ZM-0002, "Preventive Maintenance Program," Rev. 38
- 0PGP03-ZO-0043, "Fuel Oil Monitoring Program," Rev. 9
- 0PGP03-ZO-0056, "FLEX Equipment Functionality Program," Rev. 0, Draft
- 0PGP03-ZO-FLEX "FLEX Support Guideline Program" Rev. 0
- 0PGP03-ZV-0002, "Hurricane Plan," Rev. 7
- 0PGP04-ZE-0309, "Design Change Package," Rev. 33
- 0PMP08-FC-1401, "FLEX SFP Level Loop Calibration," Rev. 0, Draft
- 0POP01-ZA-0017 "Emergency Operating Procedure Revision and Implementation" Rev. 11
- 0POP01-ZQ-0022, "Plant Operations Shift Routines," Rev. 74
- 0POP04-FC-0001, "Loss of Spent Fuel Pool Level or Cooling," Rev. 30
- 0POP04-ZO-0002, "Natural or Destructive Phenomena Guidelines," Rev. 47
- 0POP05-EO-EC00, "Loss of all AC Power", Rev. 23
- 0POP12-ZO-FSG01, "Long Term RCS Inventory Control," Rev. 0, Draft
- 0POP12-ZO-FSG03, "Alternate Low Pressure Feedwater," Rev. 0, Draft
- 0POP12-ZO-FSG04, "ELAP DC Bus Load Shed/Management," Rev. 0, Draft
- 0POP12-ZO-FSG05, "Initial Assessment and FLEX Equipment Staging," Rev. 0, Draft
- 0POP12-ZO-FSG06, "Alternate AFWST Makeup," Rev. 0, Draft
- 0POP12-ZO-FSG07, "Loss of Vital Instrumentats or Control Power," Rev. 0, Draft
- 0POP12-ZO-FSG08, "Alternate RCS Boration," Rev. 0, Draft
- 0POP12-ZO-FSG09, "Low Decay Heat Temperature Control," Rev. 0, Draft
- 0POP12-ZO-FSG10, "RCS Accumulator Isolation," Rev. 0, Draft
- 0POP12-ZO-FSG11, "Alternate SFP Makeup and Cooling," Rev. 0, Draft
- 0POP12-ZO-FSG12, "Alternate Containment Cooling," Rev. 0, Draft
- 0POP12-ZO-FSG13, "Transition from FLEX Equipment," Rev. 0, Draft
- 0POP12-ZO-FSG14, "Shutdown RCS Makeup," Rev. 0, Draft
- 0POP12-ZO-FSG17, "Portable Pump Fill of RWST," Rev. 0, Draft
- 0POP12-ZO-FSG19, "480V FLEX Diesel Generator Operation," Rev. 0, Draft
- 0POP12-ZO-FSG20, "Alternate QDPS Parameter Monitoring," Rev. 0, Draft
- 0POP12-ZO-FSG21, "NSRC Turbine Generator," Rev. 0, Draft
- 00009E0PFAX#2, "Single Line Diagram 480V Motor Control Center 2L3 (MAB)," Rev. 15
- 00009E0PFBA#2, "Single Line Diagram 480V Motor Control Center 2S1 (MAB)," Rev. 16
- 02-9212321D, "South Texas Project Units 1 & 2 Vega Power Control Panel Schematic Diagram," Rev. 1

- 25799-000-M0C-YA-00001, "Miscellaneous Pumps, Tanks and Hose Layouts for STP FLEX Support," Rev. 00B, Draft
- 2-E0FRAA-01, "Single Line Diagram Unit 2 FLEX Onsite Auxiliary Power 480V Distribution Panel DP1000," Rev. 0
- 4E019NQ1009, "Design Criteria for Equipment Qualification Program," Rev. 11
- 9-EOPKAA-01#2, "Single Line Diagram 4.16kV Class 1E Switchgear E2A," Rev. 10
- 9-EOPKAB-01#2, "Single Line Diagram 4.16kV Class 1E Switchgear E2B," Rev. 10
- 9-EOPKAC-01#2, "Single Line Diagram 4.16kV Class 1E Switchgear E2C," Rev. 9
- 9-EOPLAA-01#2, "Single Line Diagram 480V Class 1E Center E2A," Rev. 18
- 9-EOPLAB-01#2, "Single Line Diagram 480V Class 1E Center E2B," Rev. 16
- 9-EOPLAC-01#2, "Single Line Diagram 480V Class 1E Center E2C," Rev. 16
- 9M129A81109, "Radiation Zones Mechanical and Electrical Aux. Building Plan at ELVES. 35'-0" and 41'-0," Rev. 6
- 9M129A81110, "Radiation Zones Mechanical and Electrical Aux. Building Plan at EL. 60'-0," Rev. 4
- 9M129A81124, "Post Accident Radiation Zones Mechanical and Electrical Aux. Building Plan at EL. 35'-0" and 41'-0," Rev. 9
- CC09972, "Qualification of Piping and Piping Supports for Spent Fuel Pool Level Indicator," Rev.0
- CC09973, "Qualification of Horn and Transmitter Supports for Spent Fuel Pool Level Indicator," Rev.0
- CC09974, "Qualification of Power Control Panel Mounting for Spent Fuel Pool Level Indicator," Rev.0
- CC09994, "Qualification of Sensor Supports for Spent Fuel Pool Level Indicator," Rev.0
- Condition Report 12-11658
- Condition Report 15-443
- Condition Report Engineering Evaluation 11-12544-10
- Condition Report Engineering Evaluation 12-11658-485
- Design Change Package 12-11658-27
- Design Change Package (DCP) 12-12320-17, Supplement 0, "Spent Fuel Pool Level Indication Installation," May 12, 2014
- Design Change Package (DCP) 12-12320-17, Supplement 5, "Unit 2 Spent Fuel Pool Level Indication Installation," March 18, 2015
- DG reliability Position Paper, "Survivability of STP FLEX Diesels in Close Proximity to Each Other," February 6, 2015
- Document Change Notice 1500444
- Document Change Notice 1500445
- Document Change Notice 1500446
- Document Change Notice 1500447

- Document Change Notice 1500524
- Document Change Notice 1500525
- EC05101, "STP FLEX Diesel Generator Sizing Calculation," Rev. 0
- MC-5861, "Auxiliary Feedwater (AFW) Pump Design TDH, Flow Rate and Pump Runout," Rev. 6
- MC-6506, "AFW Pump Room D Maximum Temperature During a Station Blackout," Rev. 0
- MC06512, "Spent Fuel Pool Makeup FLEX Pump Sizing," Rev. 6
- NAI-1646-001, "STP Electrical Auxiliary Building GOTHIC Room Heatup Analysis," December 31, 2012
- NAI-1786-001, "South Texas Project Nuclear Plant Extended Loss of AC Power Containment Response Due to RCS Inventory Loss," Rev. 0
- NC-7106, "Spent Fuel Pool Heatup Analysis," Rev. 3
- ST-UB-NOC-13003357, "Bounding Cold Leg Temperature Evaluation During Extended Loss of AC Power (ELAP) for South Texas Project Units 1 & 2," October 14, 2013
- STP-CP-006, "ELAP Analysis with the South Texas Project RETRAN-3D Input Model," Rev. 1
- STPNOC016-CALC-001, "Spent Fuel Pool Instrumentation Radiological Evaluation Per NEI 12-02," Rev. 0
- Test Report 51-9230745-000, "Through Air Radar Spent Fuel Pool Level Instrument (SFPLI) Factory Acceptance Test (FAT) Report for South Texas Project (STP) Unit 2," Rev. 0
- Unit 2 FLEX PM List, 2/11/2015
- Plan of Action, "Development of PM for FLEX/Fukushima Response (FR) Equipment," 1/26/2015
- WCG-0002, "Work Management Scheduling," Rev. 32
- WCG-0005, "Preventive Maintenance Administration Guide," Rev. 6
- White paper demonstrating the applicability of the RETRAN-3D code for analysis of the ELAP
- White paper evaluating Building 44 equivalency to ASCE 7-05
- SAFER Response Plan for South Texas Project Electric Generating Station, Rev. 0, Draft
- 9Q539LFR0001, FLEX-0001, "Diverse and Flexible Coping Strategies (FLEX) Program Document," Rev. 0, Draft
- ZV-0028, "SAFER Response Plan," Rev. 0, Draft
- RC7462, "Non-Design Configuration Change Notice for the Seal Leakoff Lines," Rev. 2
- 2C159RC7462, "Design Change Notice for CV system," Rev. 2

**Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:**

**Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted**

Audit Item Reference	Item Description	Licensee Input Needed
ISE OI 3.2.1.1.B	Provide analysis of the ELAP transient that is applicable to STP and which demonstrates the adequacy of the mitigating strategy proposed for STP. This includes specification of an acceptable definition for the transition to reflux condensation cooling to ensure that the analysis is not credited beyond this juncture. A sufficient number of cases should be included in the analysis to demonstrate the acceptability of different strategies that may be necessary to mitigate an ELAP (e.g., as discussed in Section 3.2.1.6, in some cases "N" and "N+1" pumps have different capabilities, which may substantially affect the sequence of events in the integrated plan).	The staff reviewed STP's calculation during the audit. The staff is developing additional questions and will provide those to the licensee separately as part of the ongoing audit process. No additional information from the licensee is requested at this time.
ISE CI 3.2.1.2.C	In some plant designs, such as those with 1200 to 1300 psia SG design pressures and no accumulator backing of the main steam system PORV actuators, the cold legs could experience temperatures exceeding 580 degrees °F before cooldown commences. This is beyond the qualification temperature (550 degrees °F) of the O-rings used in the RCP seals. For such Westinghouse designs, a discussion of the information (including the applicable analysis and relevant seal leakage testing data) should be provided to justify that (1) the integrity of the associated O-rings will be maintained at the temperature conditions experienced during the ELAP event, and (2) the seal leakage rate of 21 gpm/seal used in the ELAP is adequate and acceptable.	The staff requests the licensee make available for audit documentation that identifies the types of o-rings that are installed, or will be installed in future operating cycles, and justification for their survivability during the ELAP event.

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.2.1.3.A	The licensee should address the following issues associated with decay heat modeling: (1) specify the value of the multiplier applied to the ANS 5.1-1979 decay heat standard for the ELAP event and its basis. (2) Clarify whether the multiplier would be capable of accounting for the residual heat contribution from actinides (e.g., plutonium, neptunium) and neutron absorption in fission products, or whether these residual heat sources were accounted for explicitly. (3) Clarify whether the discussion applies to the RETRAN-3D thermal-hydraulic analysis or whether it applies to auxiliary calculations (e.g., the determination of steam generator makeup required during various phases of the ELAP coping analysis).	The staff requests the licensee make available for audit documentation that demonstrates the thermal/hydraulic analysis assumptions concerning decay heat are bounding, or are well representative of the current licensing basis for long-term decay heat (i.e., Updated Final Safety Analysis Report (UFSAR) Revision 16, Table 6.2.1.3-6a); or justification that UFSAR, Revision 16, Table 6.2.1.3-6, is reasonable to use for ELAP event, even if it is not the STP licensing basis for long-term decay heat.
ISE CI 3.2.1.4.A	Confirm that the key initial plant parameters and assumptions used in the forthcoming RETRAN-3D analysis are consistent with the appropriate values from NEI 12-06, Section 3.2, or justify any deviations.	This item is open pending staff review. No additional information from the licensee is requested at this time.
AQ #25	Provide the manufacturer's name and model number for the reactor coolant pumps and the reactor coolant pump seals. Discuss whether or not the reactor coolant pump and seal combination complies with a seal leakage model described in WCAP-17601.	Some information has been provided by the Pressurized Water Reactor Owners Group (PWROG) to attempt to address similarity of AREVA and Westinghouse seals. The staff has identified questions associated with this information that will require further discussion with PWROG and the licensee as part of the ongoing audit process. No additional information from the licensee is requested at this time.
SE #9	Questions related to Westinghouse Nuclear Safety Advisory Letter 14-1, "Impact of Reactor Coolant Pump No. 1 Seal Leakoff Piping on Reactor Coolant Pump Seal Leakage During a Loss of All Seal Cooling."	This item is open pending staff review. No additional information from the licensee is requested at this time.

<b>Audit Item Reference</b>	<b>Item Description</b>	<b>Licensee Input Needed</b>
SE #10	<p>Please provide adequate justification for the seal leakage rates calculated according to the Westinghouse seal leakage model that was revised following the issuance of NSAL-14-1. The justification should include a discussion of the following factors:</p> <ul style="list-style-type: none"><li>a. benchmarking of the seal leakage model against relevant data from tests or operating events,</li><li>b. discussion of the impact on the seal leakage rate due to fluid temperatures greater than 550°F resulting in increased deflection at the seal interface,</li><li>c. clarification whether the second-stage reactor coolant pump seal would remain closed under ELAP conditions predicted by the revised seal leakage model and a technical basis to support the determination, and,</li><li>d. justification that the interpolation scheme used to compute the integrated leakage from the reactor coolant pump seals from a limited number of computer simulations (e.g., three) is realistic or conservative.</li></ul>	<p>The PWROG is developing and validating documentation that leakage rates in PWROG-series reports are valid. The staff is reviewing the preliminary results of this work and will require further discussion with the PWROG and licensee as part of the ongoing audit process. No additional information from the licensee is requested at this time.</p>



Audit Item Reference	Item Description	Licensee Input Needed
SE #11	<p>The NRC staff understands that Westinghouse has recently recalculated seal leakoff line pressures under loss of seal cooling events based on a revised seal leakage model and additional design-specific information for certain plants.</p> <p>a. Please clarify whether the piping and all components (e.g., flow elements, flanges, valves, etc.) in your seal leakoff line are capable of withstanding the pressure predicted during an ELAP event according to the revised seal leakage model.</p> <p>b. Please clarify whether operator actions are credited with isolating low-pressure portions of the seal leakoff line, and if so, please explain how these actions will be executed under ELAP conditions.</p> <p>c. If overpressurization of piping or components could occur under ELAP conditions, please discuss any planned modifications to the seal leakoff piping and component design and the associated completion timeline.</p> <p>d. Alternately, please identify the seal leakoff piping or components that would be susceptible to overpressurization under ELAP conditions, clarify their locations, and provide justification that the seal leakage rate would remain in an acceptable range if the affected piping or components were to rupture.</p>	<p>The staff requests the licensee make available for audit documentation that (1) demonstrates the leakoff line piping and components up to and including the flow orifice are robust to the design pressure of the RCS and (2) that credit is not being taken for calculated leakage rates where the 1/4" flow orifice unchokes (e.g., possible at RCS pressures below about 300 psia), since these flowrates may be underestimated if a rupture occurs in the piping and components downstream of the flow orifice.</p>
SE #17	Load shed validation	<p>The staff requests the licensee make available for audit validation of the battery load shed procedure.</p>

D. Koelh

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If you have any questions, please contact me at 301-415-1924 or by e-mail at tony.brown@nrc.gov.

Sincerely,

***/RA/***

Tony Brown, Project Manager  
Orders Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Docket Nos.: 50-498 and 50-499

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