



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

October 3, 2017

Mr. Fadi Diya, Senior Vice President
and Chief Nuclear Officer
Ameren Missouri
Callaway Plant
P.O. Box 620
Fulton, MO 65251

**SUBJECT: CALLAWAY PLANT – INSPECTION OF THE IMPLEMENTATION OF
MITIGATION STRATEGIES AND SPENT FUEL POOL INSTRUMENTATION
ORDERS AND EMERGENCY PREPAREDNESS COMMUNICATION/
STAFFING/MULTI-UNIT DOSE ASSESSMENT PLANS – INSPECTION
REPORT 05000483/2017008**

Dear Mr. Diya:

On September 1, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed the onsite portion of an inspection at the Callaway Plant. On September 26, 2017, the NRC inspectors discussed the results of this inspection with Ms. S. Banker, Senior Director, Engineering, and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

The inspection examined activities conducted under your license as they relate to the implementation of mitigation strategies and spent fuel pool instrumentation orders (EA-12-049 and EA-12-051) and emergency preparedness communications, staffing, and multi-unit/source dose assessment plans; your compliance with the Commission's rules and regulations; and with the conditions of your operating license. Within these areas, the inspection involved examination of selected procedures and records, observation of activities, and interviews with station personnel.

The NRC inspectors did not identify any findings or violations of more than minor significance associated with this inspection.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public

F. Diya

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Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA David Proulx Acting for/

Nicholas H. Taylor, Chief
Project Branch B
Division of Reactor Projects

Docket No. 50-483
License No. NPF-30

Enclosure:
Inspection Report 05000483/2017008
w/ Attachment: Supplemental Information

cc w/ encl: Electronic Distribution

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000483
License: NPF-30
Report: 05000483/2017008
Licensee: Union Electric Company
Facility: Callaway Plant
Location: Junction Highway CC and Highway O
Steedman, Missouri
Dates: August 28 – September 26, 2017
Inspectors: R. Alexander, Sr. Project Engineer (Team Leader)
S. Alferink, Reactor Inspector
D. Bradley, Sr. Resident Inspector – Callaway
M. Stafford, Project Engineer
Approved By: Nicholas H. Taylor
Chief, Project Branch B
Division of Reactor Projects

SUMMARY

IR 05000483/2017008; 08/28/2017 – 09/26/2017; Callaway Plant;
Temporary Instruction 2515/191, Inspection of the Implementation of Mitigation Strategies and
Spent Fuel Pool Instrumentation Orders and Emergency Preparedness
Communication/Staffing/Multi-Unit Dose Assessment Plans, issued December 23, 2015.

The inspection covered a one-week inspection by the resident inspector and three inspectors from the Region IV office. No findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

A. NRC-Identified and Self-Revealing Findings

None

B. Licensee-Identified Violations

None

REPORT DETAILS

4. Other Activities

4OA5 Other Activities (TI 2515/191)

The objective of Temporary Instruction (TI) 2515/191 “Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans,” is to verify that licensees have adequately implemented the mitigation strategies as described in the licensee’s Final Integrated Plan (ADAMS Accession No. ML16189A304) and the NRC’s plant safety evaluation (ADAMS Accession No. ML17010A332) and to verify that the licensees installed reliable water level measurement instrumentation in their spent fuel pools. The purpose of this TI is also to verify the licensees have implemented Emergency Preparedness (EP) enhancements as described in their site-specific submittals and NRC safety assessments, including multi-unit dose assessment capability and enhancements to ensure that staffing is sufficient and communications can be maintained during such an event.

The inspection verified that plans for complying with NRC Orders EA-12-049, “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” (ADAMS Accession No. ML12229A174) and EA-12-051, “Order Modifying Licenses With Regard to Reliable Spent Fuel Pool Instrumentation,” (ADAMS Accession No. ML12056A044) are in place and are being implemented by the licensee. Additionally, the inspection verified implementation of staffing and communications information provided in response to the March 12, 2012, request for information letter and multiunit dose assessment information provided per COMSECY-13-0010, “Schedule and Plans for Tier 2 Order on Emergency Preparedness for Japan Lessons Learned,” dated March 27, 2013 (ADAMS Accession No. ML12339A262).

The team discussed the plans and strategies with plant staff, reviewed documentation, and where appropriate, performed plant walk downs to verify that the strategies could be implemented as stated in the licensee’s submittals and the NRC staff-prepared safety evaluation. For most strategies, this included verification that the strategy was feasible, procedures and/or guidance had been developed, training had been provided to plant staff, and required equipment had been identified and staged. Specific details of the team’s inspection activities are described in the following sections.

1. Mitigation Strategies for Beyond-Design-Basis External Events

a. Inspection Scope

The team examined the licensee’s established guidelines and implementing procedures for the beyond-design-basis mitigation strategies. The team assessed how the licensee coordinated and documented the interface/transition between existing off-normal and emergency operating procedures with the newly developed mitigation strategies. The team selected a number of mitigation strategies and conducted plant walk downs with licensed operators and responsible plant staff to assess: the adequacy and completeness of the procedures, familiarity of operators with the procedure objectives

and specific guidance, staging and compatibility of equipment, and the practicality of the operator actions prescribed by the procedures, consistent with the postulated scenarios.

The team verified that a preventive maintenance program had been established for the FLEX portable equipment and that periodic equipment inventories were in place and being conducted. Additionally, the team examined the introductory and planned periodic/refresher training provided to the Operations and Security staffs most likely to be tasked with implementation of the FLEX mitigation strategies. The team also reviewed the introductory and planned periodic training provided to the Emergency Response Organization personnel.

b. Assessment

Based on samples selected for review, the team verified that the licensee satisfactorily implemented appropriate elements of the FLEX strategy as described in the plant specific submittals and the associated safety evaluation and determined that the licensee is generally in compliance with NRC Order EA-12-049. The team verified that the licensee satisfactorily:

- Developed and issued FLEX Support Guidelines (FSGs) to implement the FLEX strategies for postulated external events,
- Integrated their FSGs into their existing plant procedures such that entry into and departure from the FSGs are clear when using existing plant procedures,
- Protected FLEX equipment from site-specific hazards,
- Developed and implemented adequate testing and maintenance of FLEX equipment to ensure their availability and capability,
- Trained their staff to assure personnel proficiency in the mitigation of beyond-design-basis events, and
- Developed means to ensure that the necessary off-site FLEX equipment will be available from off-site locations.

The team verified that any non-compliances with current licensing requirements, and other issues identified during the inspection were entered into the licensee's corrective action program.

c. Findings

No findings identified.

2. Spent Fuel Pool (SFP) Instrumentation

a. Inspection Scope

The team examined the licensee's newly installed spent fuel pool instrumentation. Specifically, the team verified the sensors were installed as described in the plant specific submittals and the associated safety evaluation and that the cabling for the power supplies and the indications for each channel are physically and electrically separated. Additionally, environmental conditions and accessibility of the instruments were evaluated. Documents reviewed are listed in the attachment.

b. Assessment

Based on samples selected for review, the team determined that the licensee satisfactorily installed and established control of the SFP instrumentation as described in the plant specific submittals and the associated safety evaluation and determined that the licensee is generally in compliance with NRC Order EA-12-051. The team verified that the licensee satisfactorily:

- Installed the SFP instrumentation sensors, cabling and power supplies to provide physical and electrical separation as described in the plant specific submittal and safety evaluation;
- Installed the SFP instrumentation display in the location, environmental conditions and accessibility as described in the plant specific submittals; and
- Trained their staff to assure personnel proficiency with the maintenance, testing, and use of the SFP instrumentation.

The team verified that any non-compliances with current licensing requirements, and other issues identified during the inspection were entered into the licensee's corrective action program.

c. Findings

No findings identified.

3. Staffing and Communication Request for Information

a. Inspection Scope

Through discussions with plant staff, review of documentation and plant walk downs, the team verified that the licensee has implemented required changes to staffing, communications equipment, and facilities to support an Extended Loss of All AC Power (ELAP) scenario as described in the licensee's staffing assessment and the NRC safety assessment. The team also verified that the licensee has implemented dose assessment (including releases from spent fuel pools) capability using the licensee's site-specific dose assessment software and approach as described in the licensee's dose assessment submittal. Documents reviewed are listed in the attachment.

b. Assessment

The team reviewed information provided in the licensee's multi-unit dose submittal and in response to the NRC's March 12, 2012, request for information letter and verified that the licensee satisfactorily implemented enhancements pertaining to Near-Term Task Force Recommendation 9.3 response to a large scale natural emergency event that results in an extended loss of all ac power to the site and impedes access to the site.

The team verified the following:

- Licensee satisfactorily implemented required staffing change(s) to support an ELAP scenario,
- Emergency preparedness communications equipment and facilities are sufficient for dealing with an ELAP scenario, and
- Implemented dose assessment capabilities (including releases from spent fuel pools) using the licensee's site-specific dose assessment software and approach.

The team verified that any non-compliances with current licensing requirements, and other issues identified during the inspection were entered into the licensee's corrective action program.

c. Findings

No findings identified.

40A6 Exit

Exit Meeting Summary

On September 1, 2017, the team presented the on-site inspection results in a management debrief to T. Herrmann, Site Vice President, and other members of the site staff. The inspectors confirmed that proprietary information examined during the inspection had been returned to the licensee. The team lead completed an exit meeting conducted with S. Banker, Senior Director, Engineering, and other members of the site staff, via telephone on September 26, 2017, to discuss the final results of the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

S. Abel, Director, Engineering Projects
A. Alley, Engineering Program Supervisor
S. Banker, Senior Director Engineering
F. Bianco, Director, Nuclear Operations
J. Cortez, Director, Training
M. Covey, Manager, Operations
B. Cox, Senior Director Nuclear Operations
D. Farnsworth, Director, Work Management
T. Herrmann, Site Vice President
T. Holland, Shift Manager
B. Huhmann, Regulatory Affairs Supervisor
B. Jungmann, Director, Maintenance
S. Kovaleski, Director, Engineering Design
G. Kremer, Director, Engineering Programs
M. McLachlan, Senior Director Plant Support
K. Mills, Director, Engineering Systems
T. Moser, Director, Nuclear Projects
J. Nurrenbern, FLEX Program Engineer
E. Olson, Director, Engineering Programs
J. Patterson, Director, Nuclear Projects
E. Ptasznik, Licensing Engineer
S. Sandbothe, Director, Plant Support
D. Stepanovic, Manager, Materials

NRC Personnel

S. Janicki, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

2515/191	TI	Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans, issued December 23, 2015
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LIST OF DOCUMENTS REVIEWED

Section 40A5: Other Activities

Corrective Action Documents

201106180	201408448	201601716	201605315
201605701	201605787	201607008	201607646
201607894	201607938	201609168	201609286
201700008	201700079	201701274	201702320
201703278	201703911	201703920	201704462
201704470*	201704490*	201704488*	201704491*
201704499*	201704501*	201704502*	20170503*
201704509*	201704513*	201704514*	201704515*
201704539*	201704551*	201704552*	

* - indicates corrective action document written by the licensee as a result of the NRC inspection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
APA-ZZ-00102	EOP/OTO Writers Manual	13
APA-ZZ-00391	Beyond Design Basis (BDB) Program Document	3
APA-ZZ-00391, Appendix 8	Callaway Plant Final Integrated Plan	1
APA-ZZ-00500	Corrective Action Program	67
APA-ZZ-00500, Appendix 17	CAP, Screening Process Guidelines	31
ECA-0.0	Loss of All AC Power	25
EDP-ZZ-04600	Engineering Change Control	0
EIP-ZZ-01211	Accident Dose Assessment	34
FSG-11	Alternate SFP Makeup and Cooling	3
FSG-12	Alternate Containment Cooling	2
FSG-13	Transition from FLEX Equipment	0
FSG-14	Shutdown RCS Makeup	2
FSG-3	Alternate Low Pressure Feedwater	3
FSG-4	ELAP DC Bus Load Shed/Management	3
FSG-40	FLEX Support Guidelines Flowchart	1

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
FSG-41	FLEX Emergency Communications	1
FSG-43	Nitrogen and Instrument Air Strategy	3
FSG-44	FLEX Diesel Fuel Strategy	2
FSG-45	Temporary Ventilation, Lighting, and Power	2
FSG-46	Mobile Water Purification Unit	0
FSG-48	FLEX ESW Pump	1
FSG-5	Initial Assessment and FLEX Equipment Staging	3
FSG-50	Freeze Protection for ELAP Response	2
FSG-51	Temporary Sump Pump Operation	1
FSG-6	Alternate HCST Makeup	2
FSG-7	Loss of Vital Instrumentation or Control Power	1
FSG-9	Low Decay Heat Temperature Control	2
IP-ENG-001	Standard Design Process	0
ITL-EC-00L39	LOOP-LVL; Spent Fuel Pool Lvl	13
ITL-EC-00L59	LOOP-LVL; Spent Fuel Pool Primary Level	2
ITL-ED-00L60	LOOP-LVL; Spent Fuel Pool Backup Level	2
ODP-ZZ-00002	Equipment Status Control	88
ODP-ZZ-00025	EOP/OTO User's Guide	29
ODP-ZZ-00030	EOP Implementation Guide	12
OTO-NB-00005	Loss of All AC Power While on RHR	1

Parent/Model Work Orders

<u>Number</u>	<u>Title</u>	<u>Revision / Date</u>
1008428	FLEXP-HALE-1 (Flex Hale Pump) – 6 month maintenance	April 25, 2017
1008430	FLEXP-HALE-1-FLEX P Hale Pump #1 – 12 month maintenance	April 25, 2017
1008432	FLEXP-HALE-1-FLEX P Hale Pump #1 – 36 month maintenance plan	0
1008589	FLEXG-480-1-480 Volt FLEX Generator # 1 – 12 month	June 21, 2017
1008591	FLEXG-480-1-480 Volt FLEX Generator # 1 – 9 year maintenance plan	0

Parent/Model Work Orders

<u>Number</u>	<u>Title</u>	<u>Revision / Date</u>
1008643	FLEXP-SFP-1-fLEX P SFP Pump # 1 – 36 month maintenance plan	0
1008645	FLEXP-SFP-2-FLEX P SF? Pump # 2 – 6 month maintenance	June 19, 2017
1008656	FLEXP-SFP-1-FLEX P SFP Pump # 1 – 12 month maintenance	June 20, 2017
1008678	FLEXH-WATER-1-FLEX H Water #1 – 36 month electrical inspection plan	0
1008692	FLEXP-AFW-1-FLEX AFW Pump #1 – 6 month battery inspection	June 22, 2017
1008693	FLEXP-AFW-1-FLEX AFW Pump #1 – 12 month functional test	June 21, 2017
1008694	FLEXP-AFW-1-FLEX AFW Pump #1 – 36 month functional test plan	0
1008712	Inventory FLEX Emergency Food and Water Supplies – 12 month inspection	August 18, 2017
1008807	FLEXG-240-1-Kubota G1-11000 240 volt generator 1 – 6 month maintenance	June 27, 2017
1008808	FLEXG-240-1-Kubota G1-11000 240 volt generator 1 – 36 month maintenance plan	0
1008878	FLEXT-COMMS-01-FLEX T Communications trailer # 1 – 6 month maintenance	June 2, 2017
1008879	FLEXT-COMMS-01-FLEX T Communications trailer # 1 – 36 month maintenance plan	0
1008967	FLEXT-FUEL-0 1-FLEX I Fueling Trailer # 1 – 6 month maintenance	June 2, 2017
1008968	FLEXT-FUEL-0 1-FLEX I Fueling Trailer # 1 – 36 month maintenance plan	0
14000593.915	Functional Test Passive Antenna Connection to Aux Building	2

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision / Date</u>
81402-C-001	Development of Enveloped Ground Motion Response Spectra for HCSTF Design	0
81402-C-013	Hardened Condensate Storage Tank Design	0

81402-C-014	Hardened Condensate Storage Tank Facility	0
81402-C-017	Qualification of Ring Net and Framing System for Tornado Missile Loads	0
95599-M-001	1974' Auxiliary Building Flooding Elevation	0
AMN-003-CALC-017	AFW Hydraulic Calculation for FLEX Piping Configuration	3
CEC-CS-005-00	Liquefaction Resistance and Post-Earthquake Settlement for ISFSI at Callaway Energy Center	0
CN-PEUS-12-09	Callaway FLEX Battery Coping Analysis	1
DAR-SEE-II-12-17	Evaluation of Alternate Coolant Sources for Responding to a Postulated Extended Loss of All AC Power at the Callaway Energy Center	0
SC-670005-01	Superstructure Design Calculations	0
SC-670005-03	Missile Impact Evaluation	0
Z-1052-S-002	Robust Missile Barrier Calculation	3

Miscellaneous Documents/Reports

<u>Number</u>	<u>Title</u>	<u>Revision / Date</u>
	Callaway Plant, Unit 1 – Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051	February 2, 2017
	Control Room Operator Logs	June 19 – 22, 2017
	NEI 12-02 Phase 2 Extended Loss of Alternating Current Power (ELAP) Emergency Response Organization (ERO) Staffing Analysis Report	
	NANTeL Generic Basic FLEX Training	13
	NANTeL Generic Advanced FLEX Training	1
	LOCT Cycle 13-4, 13-5, 14-2, 15-1, 15-2, 15-5 and 16-2 Training Documents	
	NLOCT Cycle 13-4, 13-5, 15-1, 15-2 and 15-6 Training Documents	
	GET Plant Access Callaway	
	I/C Fukushima Seminar	
51-9242058-002	SAFER Response Plan for Callaway Energy Center	November 5, 2015

Miscellaneous Documents/Reports

<u>Number</u>	<u>Title</u>	<u>Revision / Date</u>
APA-ZZ-00391, Appendix 7	FLEX Validation Documentation	1
MP 13-0026	Spent Fuel Pool Cooling During BDBEE	0.2
MP 13-0027	SFP Instrumentation for NRC Order EA-12-051	1
MP 13-0028	RWST Tie-In to Support FLEX Strategies	0
MP 15-0012	Engineering Disposition: HCST Tank, Protective Barrier System, Valve House, and Electrical Power	007
Self-Assessment 201720030-035	FLEX Program Compliance with NRC Requirements	June 12, 2017
T61.OSLPS	PRI 1 TRRQ Review for Hardened CST and New FLEX Equipment	October 26, 2016
T62.1000.8	Fukushima Event	August 14, 2012
T62.1000.8	Fukushima Modifications	May 1, 2014
T62.P100.6	Introduction to Plant Emergency Conditions – Part 2	October 28, 2013
T63.0630.8	TRRQ 201309537 Westinghouse Guided Wave RADAR Spent Fuel Pool Level Indication System	June 18, 2014
T64.0340.8	RP – Station Blackout	July 18, 2013
T64.0340.8	RP – Fukushima Modifications	July 21, 2015
T64.0340.8	RP – Temp Power to HPAC	May 15, 2017
T64.0340.8	RP – Operating Experience	July 24, 2012
T64.0360.8	Chemistry – FLEX Debris Removal	May 23, 2016
T64.0360.8	Chemistry – FLEX Loss of Power	January 14, 2014
T64.0360.8	Chemistry – Atmospheric Hazards	July 17, 2015
T64.0360.8	Chemistry Continuing Training	January 14, 2014
T67.0200.8	2016-2 Electrical Continuing Training	August 1, 2016
T68.SORI.5	Crisis Leadership	March 5, 2015

CALLAWAY PLANT – INSPECTION OF THE IMPLEMENTATION OF MITIGATION STRATEGIES AND SPENT FUEL POOL INSTRUMENTATION ORDERS AND EMERGENCY PREPAREDNESS COMMUNICATION/ STAFFING/MULTI-UNIT DOSE ASSESSMENT PLANS – INSPECTION REPORT 05000483/2017008 DATED OCTOBER 3, 2017

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