U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/89009(DRP)

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

Licensee: Union Electric Company
Post Office Box 149 - Mail Code 400
St. Louis, MO 63166

Facility Name: Callaway Plant, Unit 1

Inspection at: Callaway Site, Steedman, Missouri

Inspection Conducted: April 1 through May 31, 1989

Inspectors: B. H. Little

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6/22/89
Date

Inspection Summary

Inspection from April 1 through May 31, 1989 (Report No. 50-483/89009(DRP))
Areas Inspected: A routine unannounced safety inspection of plant operations, maintenance/surveillance, and onsite follow-up of non-routine events was performed.
Results: No violations were identified. Five non-routine events that occurred at other sites were reviewed and evaluated for applicability at Callaway. This evaluation also closed Temporary Instruction 2515/100 (Paragraph 4b). The refueling Cycle 3 outage was covered by this inspection period. The core alterations, stuck vessel head stud removal, various maintenance and surveillance items, and initial criticality were observed (Paragraph 2). The outage planning and scheduling was found to be generally effective and with a management team on site around the clock, the outage work went smoothly (Paragraphs 21 and 3). The operator requalification training was observed (Paragraph 2d). This included simulator training for plant operations with a positive moderator temperature coefficient, and training on modifications that had been made to the the plant.

DETAILS

1. Persons Contacted

*D. F. Schnell, Senior Vice President, Nuclear
*G. L. Randolph, General Manager, Nuclear Operations
*J. D. Blosser, Manager, Callaway Plant
C. D. Naslund, Manager, Operations Support
*J. V. Laux, Manager, Quality Assurance
J. R. Peevy, Assistant Manager, Technical Services
*W. R. Campbell, Manager, Nuclear Engineering
M. E. Taylor, Superintendent, Operations
D. E. Young, Superintendent, Maintenance
*W. R. Robinson, Assistant Manager, Operations and Maintenance
*R. R. Roselius, Superintendent, Health Physics
T. P. Sharkey, Supervising Engineer, Site Licensing
G. J. Czeschin, Superintendent, Planning and Scheduling
W. H. Sheppard, Superintendent, Outages
*G. R. Pendegraff, Superintendent, Security
L. H. Kanuckel, Supervisor, Quality Assurance Program
G. A. Hughes, Supervisor, Independent Safety Engineer Group
J. C. Gearhart, Superintendent, Operations Support, Quality Assurance
J. J. Cassmeyer, Quality Assurance Engineer
*C. S. Petzel, Quality Assurance Engineer

*Denotes those present at one or more exit interviews.

In addition, a number of equipment operators, reactor operators, senior reactor operators, and other members of the quality control, operations, maintenance, health physics, and engineering staffs were contacted.

2. Plant Operations (71707)

a. Operational Safety Verification

Inspections were routinely performed to ensure that the licensee conducts activities at the facility safely and in conformance with regulatory requirements. The inspections focused on the implementation and overall effectiveness of the licensee's control of refueling and maintenance activities and on the performance of licensed and non-licensed operators and shift technical advisors. The inspections included direct observation of activities, tours of the facility, interviews and discussions with licensee personnel, independent verification of safety system status and limiting conditions of operation (LCO), and reviews of facility procedures, records, and reports. The following items were considered during these inspections:

- Adequacy of plant staffing and supervision.
- Control room professionalism, including procedure adherence, operator attentiveness, and response to alarms, events, and off-normal conditions.

- Operability of selected safety-related systems, including attendant alarms, instrumentation, and controls.
- Maintenance of quality records and reports.

The inspectors observed that control room supervisors, shift technical advisors, and operators were attentive to plant conditions, performed frequent panel walkdowns and were responsive to off-normal alarms and conditions.

b. Off-shift Inspection of Control Room

The inspectors performed routine inspections of the control room during off-shift and weekend periods; these included inspections between the hours of 10:00 p.m. and 5:00 a.m. The inspections were conducted to assess overall crew performance and, specifically, control room operator attentiveness during night shifts.

The inspectors determined that both licensed and non-licensed operators were attentive to their duties, and that the administrative controls relating to the conduct of operation were being adhered to.

c. Plant Material Conditions/Housekeeping

The inspectors performed routine plant tours to assess material conditions within the plant, ongoing quality activities and plantwide housekeeping. The inspectors also accompanied the licensee's management on monthly plant tours.

d. Requalification Training

The inspector monitored one of the training sessions, for the operating crew, on positive moderator temperature coefficient (PMTC). The training session included a lecture on PMTC and simulator training on routine plant operations. The lecture on PMTC was informative and also included requalification training on 10 Callaway modification packages (CMPs) that had been completed in the plant. Previous training sessions had been completed on the other CMPs that were installed during this outage. During the plant startup and putting the main turbine on line the operators appeared to have a "good feel" for the plant response with the PMTC.

The following CMPs were included in the training.

CMP 84-0523 - Added check valves, drains, and a vent valve on the centrifugal charging pump discharge line. This will enable this section of line to be drained.

CMP 84-0794 - Provided a keyed trip switch for each channel of the emergency bus loading system. Temporary jumpers were previously used to trip a channel.

CMP 85-0299 - Provided tripping of the main generator output breakers, under certain conditions, to prevent motoring of the generator.

CMP 86-1033 - Added an annunciator to signal that a Main Steam Isolation Valve or a Main Feed Isolation Valve has drifted off the full open position.

CMP 87-1103 - Provided channel trip function switches for several inputs to the Engineered Safety Features Actuation System replacing the use of jumpers to provide the means for tripping a channel.

CMP 88-1004 - Implemented changes to the diesel generators' fuel oil systems.

CMP 88-1020 - Rewired the Limitorque limit switches so the valve position indication switches can be adjusted independently of the torque bypass switches. This CMP was performed on 74 Limitorque valve operators.

CMP 88-1062 - Removed the throttle pressure limiter from the EHC circuit. This circuit caused a reactor trip last cycle when a circuit component failed.

CMP 88-2014 - Provided nitrogen injection into the condenser hotwells to reduce the oxygen level in the condensate.

EMP 87-3039 - Installed run time meters on the intake pump breakers to provide run time data for scheduling maintenance on the pumps.

The requalification training on the above CMPs included training on the revision to procedure EDP-ZZ-04024. This procedure states how CMPs are handled on "Class II" drawings. The training pointed out that in some cases the CMP may need to be used with the drawing for the most accurate representation of the "as-built" status.

e. Core Alterations

The inspectors observed selected portions of the core unload and reload from the spend fuel pool area, from the control room, from the refueling machine, and other stations in containment. The routine surveillances were performed, verifying that the necessary equipment was operable. Containment integrity was verified during fuel movement. The audible source range instrumentation was functional. The personnel involved in core alterations were noted to be attentive to their duties and conducted themselves in a professional manner.

f. Core Loading Change

The licensee issued a field change notice (FCN) to CMP-88-1070 to document a change to the core reload that occurred when two fuel assemblies could not be reconstituted. This resulted in four new

assemblies (slightly different than the other 88 new assemblies) being loaded around the center fuel assembly. The core is calculated to have fuel for 440 full-power days.

g. Core Loading Revision

During the core reload verification, nine fuel assemblies were found to be out of position. The nine assemblies were all new, essentially identical, and did not contain control rods. The vendor was contacted by the licensee for an evaluation. The vendor stated that these nine assemblies were manufactured to the same specifications and could remain loaded "as is". The licensee decided to let the core remain as loaded and issued a FCN to CMP-88-1070 (cycle IV core documentation).

The licensee's root cause evaluation showed that the nine new assemblies had originally been mis-located when they were loaded into the spent fuel pool because the receipt engineer, in making out the fuel movement schedule, did not follow the loading plan. Since the core loading sequence is generated from the location of fuel assemblies in the spent fuel pool, this resulted in misplacement of the assemblies in the core. The procedure for loading assemblies into the spent fuel pool had not provided for independent verification of assembly locations. Such a step has been added to the procedure for receipt of new fuel. All other assemblies in the core were verified to be correct.

h. Initial Criticality

The inspectors observed the rod withdrawal to the calculated critical rod height and the chemical shim dilution to the new core initial criticality. Initial criticality was achieved at 10:00 a.m. on May 21, 1989. The all-rods-out boron concentration criticality point was 1702 ppm which was within 10 ppm of the calculated boron concentration.

This 1700 ppm boron concentration results in a positive moderator temperature coefficient (PMTC). The measured PMTC was within 0.1 pcm of the calculated value. The technical specification limits the PMTC to positive 5 pcm per degree Fahrenheit up to 70 percent power. The PMTC becomes zero and starts to go negative at approximately 20 percent power for zero burnup on the core. The calculated maximum PMTC is 4.5 pcm per degree Fahrenheit with two to three months burnup at zero power and goes to zero between 60 and 70 percent power on the core. The PMTC then starts to decrease in magnitude until the coefficient is negative for all power levels within four to five months of full power operation.

i. Control Rod and Core Surveillance

The inspectors observed or reviewed the surveillance tests for the control rod drives and the control rod withdrawal and drop time tests, the surveillance tests on the nuclear instrumentation, the

heat balance data as power was being increased, the rescaling of delta temperature, and the control rod worth measurements. The delta flux measurements (difference in power level between the top and bottom halves of the core) were followed. It was noted that the neutral (or natural) line for delta flux has a positive slope for this time in core life, from zero at zero percent power to about positive 6.4 percent delta flux at 100 percent power.

j. Emergency Diesel Generator and Sequencer, Vessel Hydro, and Power Operated Relief Valve Tests

The inspector observed portions of ISP-SA-2413A (Train A, Diesel Generator and Sequencer Test). This is an Instrumentation and Control (I&C) response time test procedure. The section of the test that was observed checked the sequencer timing with "blackout with a safety injection signal". The initial performance of the test revealed a failed card. After the card was replaced the subsequent test was satisfactory.

The inspector, while accompanying quality control and health physics personnel, monitored the reactor coolant system post maintenance hydro test, number 89-BB-001, while in containment and verified no leakage in several areas.

The inspector monitored the testing of steam generator power operated relief valves (PORV) from the control room. The tests verified the PORVs to be operable.

k. Containment Close Up

The inspectors observed containment housekeeping conditions at the conclusion of the outage. The area was found to be clean with no loose gear except tools being used for several small tasks that were being worked at the time. No leaks were noted on the tours and a spot check of valve lineups appeared satisfactory.

The inspectors considered the performance of the operating personnel, during the refueling outage and the start-up to power, to have been generally effective and professional in all phases.

l. Management Involvement During the Refueling Outage

The inspectors observed or reviewed portions of the licensee and contractor activities associated with the plant outage and routinely attended the status and "Plan of the Day" (POD) meetings. Management involvement was noted in all phases. Upper level management was on site around the clock for the duration of the outage. These "outage managers" along with the various area coordinators maintained an overview of the outage schedule and work progress status. Management personnel had the authority to make

changes to the POD work schedule "on the spot". This was helpful, allowing job interferences to be resolved in minutes rather than hours on the phone. The management involvement helped the outage to flow smoothly. More work was performed this outage than in previous outages and with less trouble.

m. Radiological Controls

The licensee's radiological controls and practices were routinely observed by the inspectors during plant tours and during the inspection of selected work activities. The inspection included direct observations of health physics (HP) activities relating to radiological surveys and monitoring, maintenance of radiological control signs and barriers, contamination, and radioactive waste controls. The inspection also included a routine review of the licensee's radiological and water chemistry control records and reports.

The inspectors performed frequent plant tours during the refueling outage to assess the effectiveness of the licensee's HP program implementation relating to occupational radiation safety. The inspectors observed that additional HP staffing was provided for the increase in work activities. HP supervision attended work planning meetings and provided ALARA review and special training. The licensee closely monitored personnel contamination incidents.

Radiological control barriers, signs, and zones were maintained. HP staff coverage was provided for special work activities and at hot particle buffer zones. Good HP housekeeping practices were observed. The inspectors observed that personnel entering, working in, and exiting radiological control areas generally displayed good radiological work practices.

The licensee's "Hot Particle Action Plan" was implemented during the outage. All of the hot particles were identified as corrosion/wear products. For the past six months, the licensee has implemented a program of cleaning the primary water with a succession of finer filters. This appears to have removed a considerable amount of activated corrosion products from the reactor coolant. One person was contaminated with a hot particle and received a calculated dose of 14 rem (limit is 18 3/4 rem/quarter) to the extremities.

The inspectors determined that the licensee implemented effective radiological controls during the Cycle 3 refueling outage.

n. Security

The licensee's security activities were observed by the inspectors during routine facility tours and during the inspectors' site arrivals and departures. Observations included the security personnel's performance associated with access control, security checks, and surveillance activities, and focused on the adequacy of security staffing, the security response (compensatory measures), and the security staff's attentiveness and thoroughness.

The inspectors noted that the security officers were alert and knowledgeable of security procedures.

No violations or deviations were identified.

3. Maintenance/Surveillance (62703) (61726)

Selected portions of the plant surveillance, test and maintenance activities on safety-related systems and components were observed or reviewed to ascertain that the activities were performed in accordance with approved procedures, regulatory guides, industry codes and standards, and the Technical Specifications. The following items were considered during these inspections: the limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibration was performed prior to returning the components or systems to service; parts and materials that were used were properly certified; and appropriate fire prevention, radiological, and housekeeping conditions were maintained.

The inspector's overview of the licensee's maintenance and surveillance programs found them to be functional and effective. The planning and scheduling of work and manpower was generally good, although on several occasions the schedule required modification. The high level of management involvement and their review of the schedules, at least in part, prevented problems from occurring.

During the observation of work items in the containment and in contaminated areas within the auxiliary building, the radiological controls were also noted. The controls were found to be effective. A more indepth inspection, of these areas, was performed by a region based inspector (see Inspection Report 50-483/89010).

a. Maintenance

The inspectors observed parts of the following work items which were covered by multiple work requests:

- The removal of the stuck reactor vessel head studs.
- Inspected the stud holes after stud removal as to thread condition - noted some damage to several threads. The contractor's evaluation indicated that sufficient thread remained and that all the studs would be fully operable.
- Repair/inspection of one reactor coolant pump motor.
- Replacement of seal package in one reactor coolant pump.
- Diesel generator "B" exhaust gasket repair and reassembly.

- Shaft seal replacement on "B" centrifugal charging pump.

- Toured tendon gallery with management and discussed grease leakage from tendons. No problems were identified that required maintenance on any of the tendons.

Other maintenance observed included the following items:

Work Request No.	Activity
A426588A	Remove encapsulation on EJ-HV-8811A.
A427154A	Remove encapsulation on EJ-HV-8811B.
W119889	Remove snubber for testing, EPOZR013232A.
W119890	Remove snubber for testing, BB13R526261A.
P426231	Inspect and vent steam generator "C" hydraulic snubber "C".
W111992	Remove five stuck studs on reactor vessel flange.
W111174	Hydraulically press stuck studs.
R420717A	Retest on EM-HV-8923A for CMP-88-1020.
R444547	Verify annunciator 49B (RHR suction valves) for CMP-89-1001 retest.

b. Surveillance

The reviewed surveillances included:

Procedure No.	Activity
ESP-ZZ-00004	Detector normalization.
ESP-ZZ-0006	Incore/excore calibration.
ESP-ZZ-0009	Moderator temperature coefficient measurement at zero power.
ESP-ZZ-00012	Target flux difference update and measurement.
ESP-ZZ-00015	Quadrant power tilt ratio.
ESP-ZZ-00016	Rod drop time measurement.
ESP-ZZ-00021	Rod drop time measurement.

ESP-ZZ-00018	Incore versus indicated axial flux difference comparison.
ESP-ZZ-00022	RCS total flow rate.
ESP-SQ-00001	Loose parts monitor background noise calibration.
TP-SR-ST001	Startup flux mapping.
ETP-SE-ST001	Nuclear instrumentation startup testing.
ETP-SE-ST002	Reactimeter checkout and operation.
ETP-ZZ-ST002	Initial criticality.
ETP-ZZ-ST004	Boron endpoint measurement.
ETP-ZZ-ST005	Control rod bank reactivity worth measurements.
ETP-ZZ-ST006	Bank reactivity worth measurement (rod swap method).
ETP-ZZ-08001	Including vendor testing procedure, on 2000 KIP test machine for snubbers, as a plant procedure.
OSP-NE-00002	Standby diesel generator periodic tests.
OSP-ZZ-00001	Control room shift log readings and channel checks.
ITL-AE-0F510	Loop flow; steam generator "A" feedwater flow control.
ITL-AE-0F520	Loop flow; steam generator "B" feedwater flow control.
ITL-AE-0F530	Loop flow; steam generator "C" feedwater flow control.
ITL-AE-0F540	Loop flow; steam generator "D" feedwater flow control.
ETP-BB-03131	Reactor coolant flow measurements and transmitter span adjustment.
ISF-GH-0R10B	Functional - nuclear; radwaste building vent effluent radiation detector.

ISL-BB-OT441	Loop - temperature; loop 4 delta temperature/temperature average.
ITL-AC-OP118	Loop - pressure; throttle steam pressure.
ITL-AC-OP116	Loop - pressure; turbine intermediate pressure.
ITL-AC-OP119	Loop - pressure; first stage pressure.
ISL-SQ-OOY64	Loop - vibration; loose parts monitor.
ISL-AE-OLP53	Loop - level; steam generator "A", "B", "C", "D" narrow range level protection set 3.

c. Callaway Modification Packages (CMP)

The inspectors observed portions of installation and/or testing of the following CMPs:

CMP No.	Activity
CMP 89-1001	Removal of the automatic closure interlocks for the RHR suction valves and revise RHR low flow setpoints. Included is CMP 88-1020 on the two valves.
CMP 88-1020	Revise limit switches on valves to allow adjustments of bypass and close limits.
CMP 88-1063	Connect adjacent instrument cabinets to eliminate effects of seismic interaction.
CMP 88-1059	Allow use of Westinghouse enhanced performance reactor control cluster assemblies.
CMP 87-1032	Lower steam generator lo-lo level setpoint.
CMP 84-0794D	Provide trip switches for load shedding and emergency load sequencing to allow manual tripping on loss of or degraded voltage.
CMP 87-1008	Turbine trip, auxiliary feedwater actuation system on anticipated transient without scram.

No violations or deviations were identified.

4. Onsite Follow-Up of Nonroutine Events (92700)

a. Due to conditions noted at another site, the inspectors were requested to evaluate hydrogen and other condensed gas storage. The storage of hydrogen and other compressed gasses at the site is

outside the protected area approximately 250 feet from the nearest air intake, which is for the radwaste building. The hydrogen (102,857 cu. ft. at STP) is stored in twelve 56 cu. ft. cylinders at a maximum pressure of 2250 psig. An excess flow check-valve protects all but about 10 feet of the three inch supply line to the plant. The liquid nitrogen and carbon dioxide storage is in the same area. The industry accepted safety controls are exercised for the portable gas cylinders used for welding and other tasks.

b. Another site noted a potential problem with the storage capacity of diesel fuel for the emergency diesel generators. The inspectors reviewed the storage and sample frequency of the stored diesel fuel at the Callaway site. The review showed that the fuel was standard number two fuel oil which is sampled routinely. Each load is sampled, before it is pumped into the storage tanks, for water and particulate, and later verified to meet the required MIL standards which include the BTU content. The historical sampling has shown that the fuel begins to have high particulate content within a two year time frame. Due to the possibility of the high particulate level exceeding the limits, the licensee transfers the fuel oil to the plant auxiliary boiler fuel tank or offsite and inspects the diesel fuel tanks each 18 month refuel cycle. The tanks are refilled with relatively fresh fuel oil.

TI 2515/100 is considered completed by this review.

c. The inspectors reviewed the process of placing and maintaining "freeze seals" which are used to isolate sections of water filled piping where valves have not been installed to enable the operators to isolate the section of interest. The facility employs a contractor to perform this service for lines that are two inches or larger. The licensee's quality control personnel do "pre" and "post" checks of the piping at the "freeze seal" location. The "freeze seal" is normally used on an out-of-service piece of equipment or system, however, if the system is to be left in service during the "freeze seal" procedure, an engineering evaluation is required to be performed. The inspectors considered the inplace controls to be satisfactory.

d. The cap screws on the diesel generator fuel injector top plates were inspected. None were found to be broken and the torque values were correct.

e. The inspector surveyed the small fuel oil and lube oil lines on the diesel engines after the 24 hour post overhaul run and several wear points were noted. This was passed on to the licensee who performed a complete review and evaluation of these lines. This resulted in replacement of several sections of line and steps were taken to prevent lines from rubbing on each other. The inspector considered these actions to be satisfactory.

5. Exit Meeting (30703)

The inspectors met with licensee representatives (denoted under Persons Contacted) at intervals during the inspection period. The inspectors summarized the scope and findings of the inspection. The licensee representatives acknowledged the findings as reported herein. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents/processes as proprietary.