

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/89020(DRF)

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: December 1, 1989 through January 31, 1990

Inspectors: B. H. Little

C. H. Brown

Approved By:  R. A. Hague, Chief,
Reactor Projects Section 3C

2/13/90
Date

Inspection Summary

Inspection from December 1, 1989 through January 31, 1989 (Report No. 50-483/89020(DRSPP))

Areas Inspected: A routine unannounced safety inspection of non-routine events, plant operations, maintenance and surveillance, and fitness for duty training was performed.

Results: Three examples of licensee identified technical specifications violations which involved the licensee's failure to perform action or surveillance activities as required were identified, however, in accordance with 10 CFR 2 Appendix V.G.1; No Notice of Violation was issued (Paragraph 2). Other results included observations of continuing improvement in operating crews' performance and control room communications, the plant exceeded its previous record for continuous days on line (Paragraph 3); observations of effective work planning and scheduling associated with maintenance and surveillance activities (Paragraph 4); and the implementation of Callaway's Fitness for Duty (FFD) training program (Paragraph 5).

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, Operations and Maintenance
*W. R. Campbell, Manager, Nuclear Engineering
M. E. Taylor, Assistant Manager, Work Control
D. E. Young, Superintendent, Operations
R. R. Roselius, Superintendent, Health Physics
*T. P. Sharkey, Supervising Engineer, Site Licensing
G. J. Czeschin, Superintendent, Planning and Scheduling
W. H. Sheppard, Superintendent, Maintenance
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
*C. S. Petzel, Quality Assurance Engineer
J. A. McGraw, Superintendent, Design Control

*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. Inspection of Licensee Event Reports (LERs) (92700)

Through direct observations, discussions with licensee personnel, and a review of records, the following licensee event reports were reviewed to determine that reportability requirements were fulfilled, that immediate corrective action was accomplished, and that corrective action to prevent recurrence was accomplished in accordance with Technical Specifications (T/Ss). The LERs listed below are considered closed.

- a. (Closed) LER 89009: Plant shutdown required by the plant's T/S, an engineered safety feature actuation, and the late completion of a T/S action.

At 8:40 a.m. on June 23, 1989, in preparation for DSP-SF-00002, Control Rod Partial Movement Test, an attempt was made to move control rod bank "B". The bank failed to move and was declared inoperable.

Troubleshooting efforts proved unsuccessful and at 11:02 a.m. a reactor shutdown was commenced. The NRC was notified that a shutdown required by T/Ss had been initiated. At 2:18 a.m., with reactor power approximately two to three percent, the turbine was tripped off line and the generator output breakers, V53 and V55, opened as expected. Immediately after V55 opened, the 345 KV switchyard bus "B" was cleared by protective relaying that indicated a flashover on breaker V55. Since "A" D/G was still tagged out following maintenance, the loss of switchyard bus "B" gave a complete loss of NB01. At this point the reactor operator manually tripped the reactor in accordance with off normal Procedure OTO-SP-00006, Failure of Control Bank to Move. The control room personnel then entered emergency Procedure E-0, Reactor Trip or Safety Injection, and subsequently ES-0.1, Reactor Trip Response, to ensure stable plant conditions. All engineered safety features functioned as expected upon the manual reactor trip and loss of NB01.

The loss of NB01 also caused a loss of the RM23 for radiation monitors GK-RE-05 and GG-RE-27, which rendered those instruments inoperable. T/S 3.3.3.1 Action b (27) requires that with GK-RE-05 inoperable, "within one hour isolate the control room emergency ventilation system (CREVS) and initiate operation of the CREVS in the recirculation mode". T/S 3.3.3.1 Action b (30) requires that with GG-RE-27 inoperable, "within one hour isolate the fuel building ventilation system (FBVS) and initiate operation of the emergency exhaust system". The licensee determined that the above specified actions were not completed until 3:39 a.m., exceeding the allowable time by approximately 20 minutes.

Licensee's Evaluation of Cause and Corrective Actions

Root Cause

1. The root cause of the rod control problem was determined to be the component failures of two circuit boards in the rod control logic cabinet.
2. The root cause of the loss of NB01 was also determined to be a component failure. The flashover relay, 50FO-V44, for V55 failed to reset due to a loose calibration set screw.
3. The root cause of the late completion of T/S 3.3.3.1, Actions 27 and 30, was attributable to cognitive personnel errors. These events occurred in conjunction with a manual reactor trip. Licensed operators were very busy taking appropriate actions in accordance with Procedures, E-0, Reactor Trip or Safety Injection and ES-0.1, Reactor Trip Response. Upon completing ES-0.1, they reviewed the T/S and identified the need to isolate the CREVS and FBVS within one hour. These were all identified within the required time frame. However, the identification was not in time to complete the isolation of the CREVS and FBVS until one hour and twenty minutes had elapsed.

Corrective Actions

1. The defective rod control circuit boards were replaced. The components found defective on the boards will be included in the existing component failure trending program.
2. Flashover relay 50FO-V55 was recalibrated and returned to service. Breaker V55 was power factored to ensure the absence of an actual fault in the breaker.
3. A T/S action statement completion procedure (00A-TS-00001) has been implemented. The procedure provides for quick identification and implementation of short time (less than four hour) T/S action statements.

Inspector's Review

The inspector determined that the event was promptly identified, corrected and reported, and that appropriate corrective action has been completed. The event posed minimal safety significance because the control rods were capable of responding to automatic or manual reactor trip signals. The redundant power supply to the "B" train safety related loads (NB02) was available. Redundant radiation monitors were operable and would initiate CREVS and FBVS in the event of high gaseous radioactivity.

The inspector observed that the operating crew's response to the rod control system failure included trouble shooting efforts, subsequent plant shutdown, and also response to the loss of NB01. The crew received prompt technical and management support, and demonstrated effective control of the plant during plant shutdown and restoration activities. However, the licensee's failure to establish CREVS and FBVS conditions within one hour as specified by T/S 3.3.3.1 is an example of a violation of T/S requirements. (483/89020-01A(DRP))

- b. (Closed) LER 89011: T/S violation when the steam generator lo-lo trip delta temperature (DT) signals were put into service without a current T/S surveillance (due to personnel error).

On September 6, 1989 during a power reduction to Mode 2, surveillances on the steam generator (S/G) trip time delays (TTDs) were missed due to a performance error by the shift technical advisor (STA). The shutdown was performed to correct the S/G chemistry problem which resulted from an inadvertent injection of essential service water (ESW) into the "A" and "D" S/Gs. (This event is described in LER-89010.)

At approximately 12:40 a.m., the plant power had been reduced to 30 percent. The reactor operator (RO) asked the STA to verify operability of TTD circuitry. The STA reviewed the surveillance tracking manual and incorrectly noted that the last surveillance "performed date" was current (within 30 days) and incorrectly

reported that the TTDs were operable. Based on the STA's report the TTDs were reinstated (taken out of bypass). Reinstating the TTDs resulted in an exit of T/S 3.3.2 Action C.27(c), an action requirement due to the TTDs' surveillance having lapsed. Subsequently, during a pre mode change review, the STA identified the error, and at 6:25 a.m., the TTDs were again "bypassed" (tripped condition).

Licensee's Evaluation of Cause and Corrective Action

Root Cause

The root cause of this event was the lack of attention to detail during the STA's review of surveillance tracking documents.

Corrective Actions

- Procedure OTG-ZZ-00004, Power Operations, has been revised to remind the operators that the TTD surveillances are not kept current during normal power operations above 20 percent power.
- A night order has been issued to remind control room personnel that this surveillance is not kept current.
- This event has been included in licensed operator and STA retraining.

Inspector's Review

The inspector determined that the event received prompt management attention and involvement in both cause determination and corrective action, and that action to prevent recurrence has been completed. The event posed minimal safety significance as the surveillance performed on September 6, 1989 demonstrated that the TTD circuit was in proper adjustment and would have operated as required during the period from 12:40 a.m. to 6:25 a.m. on September 6, 1989.

The licensee's exit from the limiting condition for operation (LCO) action requirement without first meeting the LCO operability requirements is a violation of T/S 3.3.2, and is another example of a violation of the plant's T/Ss. (483/8920-01B(DRP))

- c. (Closed) LER 89012: Leakage past liquid radwaste discharge monitor tank inlet isolation valve invalidated the batch sampling performed prior to discharge.

Leakage past liquid radwaste (LRW) discharge monitor tank (DMT) "A" inlet isolation (HB-FV-0886) allowed LRW to be discharged to the environment without prior sampling. Leakage of HB-FV-0886 was first discovered on July 20, 1989 during the owl shift by a radwaste (RW)

technician. The RW technician initiated work request (WR) condition tag 126332, hung it on the valve, and left the detached portion in the RW basket for the RW foreman to take it to the control room for the shift supervisor/operating supervisor (SS/OS) approval signature. When the condition tag was delivered to the SS/OS by the RW person, the condition tag received priority three and was marked "no significant effect" on the plant.

On September 26, 1989, it was discovered by another RW technician that the level in DMT "A" was increasing and the level in DMT "B" was decreasing without any addition to or discharge from either tank. The RW technician who discovered the problem with HB-FV-0886 on July 20, 1989 recalled the WR on the valve and verified the condition tag was still hanging. The upstream manual isolation valve HB-V-0884 was shut and the tank level was monitored for five hours. No further leakage was observed. Therefore, HB-FV-0886 was determined to have been leaking past its valve seat on this occasion. The condition was identified as a potential T/S 4.11.1.1.1 concern. On September 27, 1989, a corrective document was initiated to determine reportability.

A review was initiated to determine if any volume of unsampled LRW discharged to the environment. Discharge documents and operating logs (from date of initial discovery, July 20, 1989, to the date the valve was replaced, September 29, 1989) were reviewed. This review concluded that leakage occurred on four out of 27 DMT "A" discharges. The total unsampled volume of LRW discharged to the environment was found to be approximately 1665 gallons.

DMT "B" sample analysis was representative of the leakage past HB-FV-0886 into DMT "A". DMT "B" had been discharged within the T/S radioactive effluent limits. Radiation monitor HB-RE-0018 was operable during this time and would have alarmed and isolated any release of radioactive effluent to the environment.

The licensee's review determined that the event was reportable as a condition prohibited by T/S 4.11.1.1.1 Table 4.11-1 Notation (2) which states: "A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed by a method described in the Off-Site Dose Calculation Manual (ODCM) to assure representative sampling."

Licensee Evaluation of Cause and Corrective Action

Root Cause

The inlet isolation valve, HB-FV-0886, to DMT "A" was intermittently leaking. The valve failure was due to corrosion caused by the wide pH ranges of the feedwater coming into the DMT.

Contributing factors

- 1) The manual isolation valve HB-V-0884 upstream of HB-FV-0886 was not used or required to be used by plant procedures which would have provided double inlet valve isolation.
- 2) The utility non-licensed RW foreman or licensed shift supervisor (SS) did not realize the potential T/S compliance concern. Therefore, the WR was not assigned a higher priority.

Corrective Actions

HB-FV-0866 was replaced on September 29, 1989. A WR was initiated to evaluate the similar inlet isolation valve to DMT "B", HB-FV-0887.

On September 27, 1989, a change to Procedure RTN-HB-01000, Operation of the Liquid Radwaste Discharge Monitor Tanks, was written which added the operation of manual isolation valves HB-V-0879, HB-V-0880, and HB-V-0884 to isolate DMT "A" for recirculation, sample, and discharge.

The Radwaste Department has revised Procedures HTP-ZZ-02006, Liquid Radwaste Release Permit (Batch); RTN-HB-01000, Operation of the Liquid Radwaste Discharge Monitor Tanks; RTN-HB-00500, Waste Monitor Tank Operation; and RTN-HP-00300, Operation of Secondary Liquid Waste Monitor Tanks, to provide double isolation where possible to ensure DMT isolation for discharge.

This event was discussed with all RW personnel stressing the need to properly document and follow up on problems of this nature to ensure timely repairs.

The failure to identify this event as a T/S compliance concern by the SS and the RW foreman was determined to be an isolated occurrence. The SS and RW foreman have received a copy of the event report for their information.

Inspector' Review

The inspector determined that, once identified, the event received thorough management attention, and that corrective action to prevent recurrence has been completed. A more disciplined review by the SS/OS and RW foreman could have prevented or minimized the duration of the violation. Although T/S radioactive effluent limits were not exceeded, valve leakage invalidated the required sample performed prior to discharge, in that each batch was not "isolated". The licensee's failure to isolate each batch prior to sampling is a violation of T/S 4.11.1.1.1 and is another example of a violation of the plant's T/S. (483/89020-01C(DRP))

The events described above posed no significant threat to the public or plant safety based on satisfactory surveillance results, the short duration of occurrence and/or the operability of redundant equipment. However, the events resulted in T/S violations and are considered avoidable through greater performance discipline. The violations are "licensee identified items" and meet the tests of 10 CFR 2, Appendix C, Section V.G; consequently, no Notice of Violation will be issued and these matters are considered closed.

LERs 89008, 89011, and 89012 are considered closed.

d. (Closed) LER's 89010-01 and 89013: Engineered Safety Features Actuations

On September 5, 1989 (LER 89010-01) and again on November 9, 1989 (LER 89013), engineered safety features (ESF) containment purge isolation signal (CPIS), control room ventilation isolation signal (CRVIS) and fuel building ventilation isolation signal (FBVIS) actuations were received when a 15 volt DC power supply failed in the ESF cabinet for the "B" train. The associated ESF equipment functioned as designed to the loss of power incident. However, during restoration activities, following the replacement of the defective power supply on September 5, 1989, an incorrect action by the RO resulted in an unplanned auxiliary feedwater actuation signal (AFAS).

The AFAS started the "B" motor driven auxiliary feedwater pump with a suction valve swapover to the essential service water (ESW) system. Injection of ESW water into the "A" and "D" S/G's resulted in exceeding S/G chemistry specification for conductivity and sodium. The plant, at 100 percent power at the time of the event, was shutdown to Mode 2, on September 6, to restore S/G chemistry conditions. Proper chemistry conditions were reestablished and the plant returned to power operations on September 9.

Licensee's Evaluation of Cause and Corrective Action

Root Cause

The initial CPIS, CRVIS and FBIS actuations occurred as the result of a failed 15 volt DC power supply in the "B" train ESF cabinet SA036E. This is an encapsulated power supply and therefore the cause of failure cannot be determined.

The AFAS and suction valve swapover to ESW occurred when the RO mistakenly energized the relay power supply prior to resetting the tripped logic. The improper operator action was attributed to the lack of specific procedural guidance and insufficient communication within the crew.

Corrective Action

The failed power supply was replaced and tested for proper operation per plant procedures. The failed power supply type was evaluated for possible generic concerns which would justify possible replacement on a routine basis or replacement with a different type of power supply. A request for resolution (RFR 4276 Revision C) was initiated to replace the existing power supply with a more reliable model. The expected completion date is June 1, 1990.

The RO, SS, and instrument and control (I&C) engineer involved have demonstrated their understanding of the judgement errors that were made, as well as their failure to speak up and insist on a full understanding of the problem before proceeding.

The Procedure OTS-SA-00001 was revised to incorporate more specific guidance on resetting various trip actuations.

The importance of crew communications and conservative judgement was included in operator, engineer, and I&C retraining.

Inspector's Review

The inspector determined that the safety equipment associated with the ESF system functioned as designed. The power supply failures received prompt engineering evaluation and action. To enhance communication the operating crew involved in the performance error reenacted, on video, the activities leading up to the AFAS event including a post event critique. The reenactment clearly conveyed communication deficiencies, and appeared to be an effective communications training aid.

Other than the performance error described above all activities were conducted in a safe and adequate manner. LERs 89010-01 and 89013 are considered closed.

- e. (Closed) LER 89014: Two engineered safety features actuations due to spurious signals on a fuel building radiation monitor.

At 9:00 a.m. on Saturday, December 9, 1989, an unplanned ESF actuation occurred which resulted in a FBIS and a CRVIS. The ESF actuation was determined to be caused by a spurious signal from the fuel building radiation monitor GG-RE-27. The licensee's event review team responded to the site and was at the monitor, evaluating the first event when a second FBIS and CRVIS occurred. The ESF equipment performed as designed.

During troubleshooting, a loose terminal connection was identified and tightened, but was not considered the cause of the spurious actuations. In addition to the troubleshooting done via G465638, the monitor was left out of service until December 12, 1989 for observation. No additional spiking was recorded. On December 12,

1987 the monitor was powered down for a previously scheduled modification via Callaway Modification Package (CMP) 88-1011. This modification involved extensive determination and retermination plus power supply checks. Additional visual inspections were also made. These checks and inspections yielded no additional insight to the cause of the spiking.

On December 12, 1989, after successful testing following the completion of CMP 88-1011, the monitor was returned to service.

The inspection showed that this matter received the licensee's prompt and thorough evaluation. All activities were conducted in a safe and adequate manner. LER 89014 is considered closed.

3. 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 operating 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, 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.

Inspector observations during plant walkdowns indicate that the licensee's programs relating to plant material conditions and housekeeping are being effectively carried out. With only infrequent and minor exceptions, deficiencies observed were appropriately tagged. Shift activities and associated communications showed improved attentiveness and communication discipline.

At the close of this inspection period, Callaway had accumulated a continuous "on-line" run of 145 days 23 hours and 46 minutes, exceeding its previous record of approximately 142.5 days, set in 1987.

The inspectors attended a human performance evaluation system (HPES) training session provided for licensee supervisory personnel. The purpose of HPES training is to improve the supervisor's skill in the identification and evaluation of causal factors to establish root cause, and thereby enhance corrective action effectiveness.

The training included classroom instruction in the HPES process and role playing by class attendees. The training was well organized and presented in a manner which held the attendees' interest. Overall it appeared that the training objective was met. The HPES process training should be beneficial in the licensee's evaluation and resolution of complicated problems or events.

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.

All activities were conducted in a safe and adequate manner.

4. 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 observed ongoing maintenance and surveillance activities were found to be properly authorized and were being performed using approved procedures. The activities were noted to be scheduled and required isolations and tagging were found to be correctly carried out. The limiting conditions for operation were adhered to during the performance of these activities. In general, the workmanship was found to be satisfactory, and housekeeping was adequately maintained at the job site.

a. Maintenance

The reviewed maintenance activities included:

<u>Work Request No.</u>	<u>Activity</u>
W-467411	Install and remove freeze seal on essential service water (ESW) piping for repair of valve AL-HV-0030 (ESW supply to motor driven auxiliary feedwater pump).
W-129845	Replace "T-ring" seal and "O-ring" in valve AL-HV-0030.
W-129845B	Motor operated valve actuation testing system of valve AL-HV-0030.
W-130033	Emergency diesel generator "B" air start strainer leak repair.
Various Numbers	Replace inflatable seals on spent fuel pool gates - driving operations included.

b. Surveillance

The reviewed surveillances included:

<u>Procedure No.</u>	<u>Activity</u>
ISF-EF-00P43	Functional - pressure, essential service water flow to air compressor "B".
ISL-GS-00A2A	Loop - analysis, containment hydrogen analyzer train "A".
ISL-BB-OT421	Loop - temperature, loop 2 delta temperature/temperature average.
OSP-SF-00002	Control rod movement test.
ODP-ZZ-00016	Watchstation equipment logs and practices.
OSP-ZZ-00001	Control room shift and daily log readings and channel checks.
ODP-ZZ-00008	Night order/standing order log.

All activities were conducted in an adequate and safe manner.

5. Regional Requests (92701)

Licensee's Fitness-For-Duty (FFD) Initial Training Program (255104)

An inspection in this area was performed to assess the adequacy of the licensee's training related to FFD program implementation requirements.

The inspectors attended a FFD training session for general employees (which included escort training) and a training session for supervisory personnel. The inspection included a review of the licensee's administrative Procedure APA-ZZ-00908 (FFD Program), FFD update study package, continued employee observation training and the associated exam. The licensee's quality assurance assessment of the FFD program (Audit Report Number AP89-024) was also reviewed.

The inspectors determined that the licensee had developed and implemented a comprehensive FFD training program for both general employees and supervisory personnel. The FFD training instructor was knowledgeable of the program requirements and presented the subject in a thorough and appropriate manner.

Temporary Instruction (TI 2515/104) is considered closed.

6. Violations for Which a "Notice of Violation" Will Not be Issued

The NRC uses the Notice of Violation as a standard method for formalizing the existence of a violation of a legally binding requirement. However, because the NRC wants to encourage and support licensee initiatives for self-identification and correction of problems, the NRC will not generally issue a Notice of Violation for a violation that meets the tests of 10 CFR 2, Appendix C, Section V.A. These tests are: (1) the violation was identified by the licensee; (2) the violation would be categorized as Severity Level IV or V; (3) the violation was reported to the NRC, if required; (4) the violation will be corrected, including measures to prevent recurrence, within a reasonable time period; and (5) it was not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation.

Violations for which a Notice of Violation will not be issued are identified in Paragraphs 2.a, 2.b, and 2.c.

7. 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.