

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-483
License No.: NPF-30
Report No.: 50-483/98-19
Licensee: Union Electric Company
Facility: Callaway Plant
Location: Junction Hwy. CC and Hwy. O
Fulton, Missouri
Dates: September 14-18, 1998
Inspector: Michael P. Shannon, Senior Radiation Specialist
Approved By: Blaine Murray, Chief, Plant Support Branch, Division of Reactor Safety
Attachment : Supplemental Information

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EXECUTIVE SUMMARY

Callaway Plant NRC Inspection Report 50-483/98-19

This announced routine inspection reviewed radiation protection program activities. Areas reviewed included: exposure controls, controls of radioactive material and contamination, surveying and monitoring, the program to maintain occupational exposure as low as is reasonably achievable (ALARA), and quality assurance in radiation protection activities.

Plant Support

- In general, the external exposure control program was effectively implemented. Normally, all radiological conditions were reflected on radiation work permits; however, one radiation work permit used for work in a posted airborne activity area did not reflect the airborne conditions. All radiation areas were properly posted. Proper thermoluminescent dosimeters were used for measuring neutron doses. Housekeeping throughout the radiological controlled area was very good (Section R1.1).
- An effective internal exposure program was in place. Respiratory equipment was properly issued to qualified personnel. Whole-body counters were properly calibrated using National Institute of Standards and Technology standards. Internal dose assessment methodologies were proper to determine internal dose (Section R1.2).
- Radioactive material, laundry, and trash containers were properly labeled, posted, and controlled. A good radioactive source inventory and leak test program was in place; however, source inventory results were not consistently recorded. An effective portable radiation protection instrument calibration program was maintained. Radiological surveys properly assessed personnel exposures (Section R1.3).
- In general, an effective ALARA program was implemented. The 1998 exposure goal of 15 person-rem was aggressive and on target. The station's 3-year exposure average of 149 person-rem for 1997 was a little above the industry average; however, it has continued to trend downward. The hot spot reduction program was effectively monitored; however, the involvement of departments other than radiation protection could enhance the program. The ALARA coordinator had not followed the procedural requirements for the review of 120 of the 147 ALARA suggestions submitted in 1998 (Section R1.4).
- The new superintendent of radiation protection and chemistry satisfied the requirements to fill the Radiation Protection Manager position. The two individuals assigned as health physics technical support instructor and chemistry instructor had extensive technical and practical experience in their assigned training areas (Section R5.1).
- Overall, an adequate quality assurance audit program was maintained. Two operational radiation protection quality assurance surveillances were completed since May 1998, which provided management with a good assessment of the areas reviewed. The radiation protection quality assurance audit and surveillance activities had not reviewed 18 of 59 radiation protection program elements in more than 25 months, with the

average time interval between reviews of approximately 41 months. The department self-assessment provided management with an effective critical assessment of the program areas reviewed. No negative trends were identified during the review of radiological suggestion occurrence solution reports written since May 1998 (Section R7.1).

Report Details

Summary of Plant Status

The plant operated at full power during the inspection.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 External Exposure Controls

a. Inspection Scope (83750)

Selected radiation workers and radiation protection personnel involved in the external exposure control program were interviewed. A number of tours of the radiological controlled area were performed. The following items were reviewed:

- Radiological controlled area access controls
- Control of high radiation areas
- Radiation Work Permits
- Dosimetry use
- Housekeeping within the radiological controlled area

b. Observations and Findings

The inspector observed activities at the radiological controlled area access/egress control point and noted that station workers used the personnel contamination monitoring and computerized log-in/out equipment properly. Radiation protection personnel in attendance in this area provided timely response and direction to station workers who alarmed the personnel contamination monitors or needed assistance using the computerized sign-in/out equipment. The inspector noted that a department self-assessment, which was performed during April 1998, identified that, due to the layout of the personnel contamination monitors at the exit point from the radiological controlled area, there was a possibility of cross contamination of personnel and/or radioactive material being released from the radiological controlled area without being monitored. When this item was discussed with station management, the inspector was informed that an assessment team was reviewing the layout of the radiological controlled area access/egress area to improve the traffic flow path, eliminate the possibility of cross contamination, and the unmonitored release of radioactive material.

During tours of the radiological controlled area, the inspector observed that high radiation areas were properly controlled and posted. All Technical Specifications required that high radiation area doors were locked, and flashing lights were used where appropriate and operating properly.

In general, radiation work permits (RWPs) were properly written; however, the inspector identified that RWP 98-04420, which was used for the reactor cavity cooling fan repair

work, did not reflect the airborne conditions in the reactor building, although the area was posted as an airborne activity area. Technical Specification 6.8.1. requires procedures for the RWP system. Section 5.1.3.7.2 of Procedure HTP-ZZ-01201, "Preparation and Maintenance of General and Specific Radiation Work Permits," Revision 29, requires that prior to issuance of the RWP derived airborne concentrations (DACs) based on current surveys or historical data shall be listed on RWPs. A review of other RWPs used for work in airborne activity areas revealed that airborne conditions were listed. The inspector concluded that the failure to document the DACs on the RWP used for the reactor cavity cooling fan repair work was an isolated incident. Therefore, the inspector determined that this failure constitutes a violation of minor significance and is not subject to formal enforcement action. However, the inspector commented that radiation protection management attention to this area may be required. The licensee acknowledged the inspector's comment and on September 16, 1998, documented this item in Suggestion Occurrence Solution Report 98-3418.

Field interviews with radiation workers revealed that they were knowledgeable of the general radiological conditions in their work area and the proper response to electronic dosimeter alarms.

In 1988, a vendor with the assistance of the licensee conducted a spectral analysis to determine the neutron energies inside the reactor containment building during reactor operations. The analysis determined that the neutron energies ranged from approximately 20 to 230 kilo-electron volts (keV).

The licensee processed its thermoluminescent dosimeters on site and was certified by the National Voluntary Laboratory Accreditation Program for all categories. Neutron doses are based on the use of correction factors that were developed using a tissue equivalent proportional counter to determine the neutron fluence and energy spectra encountered in the reactor containment building during reactor operations. From a review of data supplied by the licensee, the inspector determined that personnel entries into the reactor containment building during reactor operations had remained relatively constant during the past 4 years, ranging from as high as 15 in 1994 to as low as 10 in 1997. The inspector noted that the highest individual neutron dose was 283 millirem in 1997.

The inspector determined that housekeeping throughout the radiological controlled area was very good.

c. Conclusions

In general, the external exposure control program was effectively implemented. Radiation protection personnel at the radiological controlled area access/egress control point provided timely response and direction to station workers who alarmed the personnel contamination monitor or needed assistance using the computerized sign-in/out equipment. Normally, all radiological conditions were reflected on radiation work permits; however, one radiation work permit used for work in a posted airborne activity area did not reflect the airborne conditions. All radiation areas were conspicuously and clearly posted. Proper thermoluminescent dosimeters were used for

establishing personnel neutron doses. Housekeeping throughout the radiological controlled area was very good.

R1.2 Internal Exposure Controls

a. Inspection Scope (83750)

Selected radiation protection personnel involved with the internal exposure control program were interviewed. The following items were reviewed:

- Respiratory protection program
- Whole-body counting program, including the calibration of the counter
- The internal dose assessment program

b. Observations and Findings

There were four full-faced, negative-pressure respirators issued for radiological work during July and August of this year. From a review of the respirator issue log, the inspector determined that respirators were properly issued to qualified individuals, and proper total effective dose equivalent/as low as is reasonably achievable (TEDE/ALARA) evaluations were completed to justify respiratory use. No problems were noted with the respirator issue and control program.

Whole-body counters were verified to be calibrated using standards traceable to the National Institute of Standards and Technology. The inspector noted that an acceptable phantom was used along with radiation sources that covered energy ranges between approximately 88 -1836 keV. The inspector concluded that a proper whole-body calibration program was in place.

Internal dose assessments were reviewed. The inspector noted that the highest internal dose assigned, in 1998 was 51 millirem. No problems were noted by the inspector during the review of the methodologies used to determine internal dose.

c. Conclusions

An effective internal exposure program was in place. Respiratory equipment was properly issued to qualified personnel. Whole-body counters were properly calibrated using National Institute of Standards and Technology standards. Internal dose assessment methodologies were proper to determine internal dose.

R1.3 Control of Radioactive Materials and Contamination; Surveying and Monitoring

a. Inspection Scope (83750)

Areas reviewed included:

- Control of radioactive material
- Source inventory and control programs
- Portable instrumentation calibration and performance checking programs
- Adequacy of the surveys necessary to assess personnel exposure

b. Observations and Findings

During tours of the radiological controlled area, the inspector noted that all radioactive material containers were properly labeled, posted, and controlled. All laundry and trash containers were properly maintained. The use of holding areas with local radiation monitor alarms for laundry and trash containers waiting radiological surveys was a good licensee initiative. Contaminated areas were appropriately posted and clearly identified.

The inspector randomly selected six radioactive sources from an inventory list provided by the licensee. All six of these sources were found in their designated location and properly labeled. From a review of the last four inventory lists, the inspector noted that the inventory and source leak testing programs were performed in accordance with station procedures. However, during the review, the inspector noted that source inventory results were not recorded consistently. For example, one time a check mark was used to reflect the source had been accounted for; while another time, an individual's initials were used; and another time, the word SAT was used. The inspector commented that not documenting the inventory consistently could cause confusion when reviewing the inventory. The licensee acknowledged the inspector's comment and on September 17, 1998, documented this item in Suggestion Occurrence Report 98-3429.

The inspector reviewed the portable radiation survey instrument program, including the calibration and repair of instrumentation. All instrumentation observed in use in the radiological controlled area was properly calibrated and source response checked in accordance with station procedures. Instrumentation calibration and maintenance records were reviewed. The inspector determined that the records were well maintained, and maintenance history was properly recorded for trend purposes. Proper National Institute of Standards and Technology traceable sources were used for calibration.

The licensee used a vendor to calibrate the portable neutron instrumentation. Calibration certificates documented that the neutron survey meters were calibrated using a moderated californium-252 source, which was traceable to National Institute of Standards and Technology. The meters were calibrated to exposure rates that adequately covered the normal exposure rates encountered in the reactor containment building at power. Prior to use, portable neutron instrumentation was source response checked using a plutonium-beryllium (PuBe) source.

Independent radiological measurements performed by the inspector confirmed that area radiological postings reflected general radiological conditions within the room. All radiological postings were conspicuous and clearly posted.

c. Conclusions

Radioactive material, laundry, and trash containers were properly labeled, posted, and controlled. The use of holding areas with local radiation monitor alarms for laundry and trash containers waiting radiological surveys was a program strength. A good radioactive source inventory and leak test program was in place; however, source inventory results were not consistently recorded. An effective portable radiation survey instrument program, including the calibration and repair of instrumentation was maintained. Radiological surveys properly assessed personnel exposures.

R1.4 Maintaining Occupational Exposure As Low As is Reasonably Achievable (ALARA)

a. Inspection Scope (83750)

Radiation protection personnel involved with the ALARA program were interviewed. The following areas were reviewed:

- Exposure goal establishment and status
- Hot spot reduction program
- ALARA suggestion program

b. Observations and Findings

The inspector determined that the non-outage exposure goal of 15 person-rem was aggressive and established using the station's best past performance. Additionally, the exposure goal was being properly tracked and trended monthly by the ALARA group. Exposure status was distributed to, and monitored by, station departments. The inspector's interviews with the Superintendents of Maintenance and Operations confirmed that the station management was aware of both the station's yearly exposure goal and its department's approximate yearly exposure status. The inspector noted that although the station's 3-year exposure average of 149 person-rem for 1997 was slightly above the industry average, it had continued to trend downward. Interviews with chemistry management revealed that the addition of ammonia in the reactor coolant system appeared to be effective in the removal of cobalt-58.

No problems were identified during the review of the hot spot reduction program. Hot spots were properly updated, tracked, and trended by the ALARA group. However, the inspector observed that the program was driven solely by the radiation protection department. The inspector commented that involving other departments, such as operations, in the removal of hot spots had proven to be successful in reducing hot spots at other nuclear power facilities. The licensee acknowledged the inspector's comment.

Since January 1, 1998, 147 ALARA suggestions were submitted. All ALARA suggestions were captured in the station's suggestion occurrence solution reporting

system, as of September 17, 1998, 106 have been closed; and 41 remained open in various stages of evaluation and closure. The inspector noted that of the 147 suggestions, the ALARA coordinator had only evaluated 27 suggestions. The remaining ALARA suggestions were evaluated and implemented, if seen fit, by the department who originated them.

Technical Specification 6.8.1 requires procedures for the ALARA program. Section 5.5.6 of Procedure APA-ZZ-01001, "Callaway Plant ALARA Program," Revision 6, states, in part, that the ALARA coordinator evaluates ALARA suggestions. The failure of the ALARA coordinator to evaluate the 120 ALARA suggestions is a violation of Technical Specification requirements; however, because of the continued downward exposure trend, the inspector determined that this failure constitutes a violation of minor significance and is not being subject to formal enforcement action. On September 16, 1998, the licensee documented this item in Suggestion Occurrence Solution Report 98-3419.

c. Conclusions

In general, an effective ALARA program was implemented. The 1998 exposure goal of 15 person-rem was aggressive. The station's 3-year exposure average of 149 person-rem for 1997 was slightly above the industry average; however, it continued to trend downward. The hot spot reduction program was effectively monitored; however, involving departments other than radiation protection could enhance the program. The ALARA coordinator had not followed the procedural requirements for the review of 120 of the 147 ALARA suggestions submitted in 1998.

R5.1 Radiation Protection Staff Qualifications

a. Inspection Scope (83750)

The inspector reviewed the qualifications of the superintendent of radiation protection and chemistry, health physics technical support instructor, and the chemistry instructor.

b. Observations and Findings

Due to a recent organizational change, the chemistry/radwaste and radiation protection departments were combined. As part of this reorganization a new individual was designated to fill the Radiation Protection Manager position. Technical Specification 6.3.1.2 requires that the individual filling the position of radiation protection manager (RPM) meet or exceed the qualifications of USNRC Regulatory Guide 1.8, September 1975. From a review of the superintendent of radiation protection and chemistry resume, the inspector determined that this individual satisfied the requirements of USNRC Regulatory Guide 1.8, September 1975.

During the week of the inspection, the licensee's training department announced the selections of a new health physics technical support instructor and a chemistry instructor. From a review of the above individuals' resumes, the inspector determined that both individuals had extensive technical and practical experience in their assigned training areas.

c. Conclusions

The superintendent of radiation protection and chemistry satisfied the requirements of USNRC Regulatory Guide 1.8, September 1975. The two individuals assigned as health physics technical support instructor and chemistry instructor had extensive technical and practical experience in their assigned training areas.

R7 Quality Assurance in Radiological Protection and Chemistry Activities

R7.1 Quality Assurance Audits and Surveillances, and Radiation Department Self-Assessments and Radiological Suggestion Occurrence Solution Reports

a. Inspection Scope (83750)

Selected personnel involved with the performance of quality assurance audits and surveillances and radiation department self-assessments were interviewed. The following items were reviewed:

- Quality assurance audits performed since April 1, 1998
- Quality assurance surveillances performed since April 1, 1998
- Radiation protection department self-assessments performed since April 1, 1998
- Radiological Suggestion Occurrence Solution reports written since April 1, 1998

b. Observations and Findings

Quality Assurance Audits, and Surveillances Reports

No audits were performed since the last inspection of this area in May 1998. However, two operational radiation protection quality assurance surveillances were completed. One of these two surveillances was performed at the request of radiation protection management and covered radiological postings, surveys, and radioactive material control programs. The other surveillance pertained to radiological controls during Refueling Outage 9.

Both surveillances provided management with good assessments of the areas reviewed. Eight items were identified for evaluation and properly documented in the station's suggestion occurrence solution reporting system.

The inspector reviewed the 1998 quality assurance radiation protection audit and surveillance activities which were described in the licensee's coverage plan. The inspector noted that the quality assurance department developed coverage plans annually to identify which program elements (referred to as critical attributes) would be reviewed during the year. During this review, the inspector noted that 59 radiation protection program elements were listed. However, during discussions with the lead quality assurance radiation protection auditor, the inspector was informed that only 25 of the 59 program elements had been assessed as of September 15, 1998. A further review of the program elements revealed that 18 of the 59 radiation protection elements

had not been reviewed in more than 25 months with the average time interval between reviews of 41 months. One area (counting room systems) had not been reviewed in 72 months. None of the 18 program elements had a frequency requirement associated with them; however, the inspector commented that management attention to coverage plan development and adherence could help ensure a timely, comprehensive radiation protection program review. The licensee acknowledged the inspector's comment and on September 17, 1998, documented this item in Suggestion Occurrence Solution Report 98-3434.

Department Self-Assessments

One radiation protection department self-assessment was performed since April 1998. The self-assessment was performed by three technical specialists from other nuclear power facilities. The inspector determined that the self-assessment was an effective critical assessment, which provided management with a good overview of the radiation protection program areas reviewed. Thirteen areas were assessed and 11 recommendations were provided. All recommendations have been captured in the station's suggestion occurrence solution reporting system, 5 of the 11 recommendations had been closed as of September 16, 1998, and the remaining 6 are in various stages of evaluation.

Radiological Suggestion Occurrence Solution Reports

The inspector reviewed selected radiological suggestion occurrence solution reports written since May 1, 1998, and noted that the station identified items at the proper threshold to provide management with a good overview of radiological program areas. Corrective actions to prevent a reoccurrence appeared to be effective to resolve the original problem and, in general, suggestion occurrence solution reports were closed in a timely manner. The inspector identified no negative trends during this review.

c. Conclusions

Overall, an adequate quality assurance audit program was maintained. Two operational radiation protection quality assurance surveillances were completed since May 1998, which provided management with a good assessment of the areas reviewed. The radiation protection audit and surveillance activities had not reviewed 18 of 59 radiation protection program elements in more than 25 months with the average being approximately 41 months. The department self-assessment provided management with an effective critical assessment of the program areas reviewed. No negative trends were identified during the review of radiological suggestion occurrence solution reports written since May 1998.

R8 Miscellaneous Radiological Protection and Chemistry Issues

R8.1 (Discussed) Inspection Follow-up Items 9807-06

This item was identified in NRC Inspection Report 50-483/9807 and involved problems with radiological controlled area access control. The inspector reviewed the actions

taken by the licensee's assessment team and determined that the problem was being properly evaluated. From a review of the assessment team's implementation schedule, the inspector concluded that proposed corrective actions will be presented to management by December 31, 1998, and corrective actions completed by June 1, 1999, approximately 4 months prior to Refueling Outage 10. This item remains open pending a reviewed during the next inspection of this area.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at an exit meeting on September 18, 1998. The licensee acknowledged the findings presented. No proprietary information was identified.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

G. Randolph, Vice President and Chief Nuclear Officer
R. Affolter, Plant Manager
D. Brownwell, Engineer, Quality Assurance
R. Farnam, Supervisor, Health Physics Operations
F. Forck, Quality Assurance Specialist
J. Gloe, Superintendent, Maintenance
C. Graham, Supervisor, Health Physics Technical Support
G. Hamilton, Supervisor Engineer, Quality Assurance
J. Laux, Manager, Quality Assurance
B. Miller, Supervisor, Radwaste
A. Passwater, Manager, Corporate Nuclear Services
M. Reidmeyer, Engineer/NRC Interface, Quality Assurance
R. Roselius, Superintendent, Radiation Protection and Chemistry
M. Taylor, Manager, Nuclear Engineering

NRC

B. Murray, Chief Plant Support Branch
D. Passehl, Senior Resident Inspector

INSPECTION PROCEDURE USED

83750 Occupational Radiation Exposure

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Discussed IFI 9807-06 Electronic radiation work permit/access control problem
evaluation.

LIST OF DOCUMENTS REVIEWED

List of radiological Suggestion Occurrence Solution reports (05/01/98 - 09/11/98)

Quality Assurance Department Surveillance Report SP98-061

Quality Assurance Department Surveillance Report SP98-083

Radiation Protection Self-Assessment performed April 13 - 17, 1998

Procedures