

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/91012(DRSS)

Docket No. 50-483

License No. NPF-30

Licensee: Union Electric Company  
Post Office Box 149  
St. Louis, MO 63166

Facility Name: Callaway County Nuclear Station

Inspection At: Callaway Site, Callaway County, Missouri

Inspection Conducted: May 6 - 10, 1991

Inspectors: *A. W. Markley*  
A. W. Markley

5/23/91  
Date

*W. B. Grant*  
W. B. Grant

5/23/91  
Date

Approved By: *W. B. Grant for*  
R. J. Caniano, Chief,  
Radiological Controls and  
Emergency Preparedness Section

5/23/91  
Date

Inspection Summary

Inspection on May 6 - 10, 1991 (Report No. 50-483/91012(DRSS))

Areas Inspected: Routine, unannounced inspection of the radiation protection program, including: organization, management controls and training, audits and appraisals, external exposure control, internal exposure control, control of radioactive materials, contamination, and surveys, and maintaining occupational exposures ALARA (IP 83750).

Results: The licensee's radiation protection program appears to be generally effective in controlling radiological work and in protecting the public health and safety. No violations or deviations were identified.

Areas identified where improvement appeared warranted were: updating of the gamma spectroscopy system (Section 8); improvement of the resin/evaporator bottom sluicing flow path (Section 10); methods used to assess dose due to hot particles (Section 6.b) and availability of qualification records (Section 4.a).

Strengths were identified in the areas of management support of the radiation protection program (Section 4.a) and housekeeping, with some exceptions noted (Section 10).

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## DETAILS

### 1. Persons Contacted

- J. Blosser, Manager, Callaway Plant
- \* D. Brownawell, Quality Assurance Engineer
- \* W. Campbell, Manager, Nuclear Engineering
- \* J. Gearhart, Superintendent, Quality Assurance
- \* C. Graham, Health Physics Technical Services
- \* J. Laux, Manager, Quality Assurance
- \* C. Naslund, Manager, Operations Support
- \* J. Neudecker, Supervisor, Health Physics Operations
- \* J. Polchow, Superintendent, Chemistry/Radwaste
- J. Peevy, Assistant Manager, Operations and Maintenance
- \* R. Roselius, Superintendent Health Physics
- \* M. Taylor, Assistant Manager - Work Control
  
- \* B. Bartlett, Senior Resident Inspector

The inspectors also interviewed other licensee personnel during the course of the inspection.

\* Denotes those present at the exit meeting on May 10, 1991.

### 2. General

This inspection was conducted to review aspects of the licensee's radiation protection program. The inspection included tours of radiation controlled areas, fuel building, auxiliary building, radwaste facilities, observations of licensee activities, review of representative records and discussions with licensee personnel.

### 3. Organizational, Management Controls and Training (IP 83750)

The inspectors reviewed the licensee's organization and management controls for the radiation protection program, including: organizational structure, staffing, delineation of authority and management techniques used to implement the program and experience concerning self identification and correction of program implementation weaknesses.

#### a. Organization and Management Controls

The licensee's radiation protection organization consists of a superintendent of health physics, a technical group and an operations group. The technical group comprises a group supervisor, two health physicists, three rad/chem supervisors and eleven rad/chem technicians. This group is responsible for technical evaluations, computer systems, internal and external dosimetry, environmental reporting and counting room functions. The operations group is comprised of a group supervisor, eight rad/chem supervisors, 21 rad/chem technicians, and 18 rad/chem helpers. This group is

responsible for operational radiological support, ALARA planning, instrumentation and respiratory protection. In addition, the rad/chem helpers provide laundry, trash pickup, decontamination services and labor to support movement of portable ventilation and construction of radiological containments.

The inspectors reviewed the qualifications of licensee management personnel. All individuals reviewed were found to have the requisite levels of training and experience to meet the requirements of ANS 3.1-1978. During this review, it was noted that the licensee could not readily provide information regarding the experience and qualification of personnel. Some information was obtained from the Final Safety Analysis Report (FSAR), deleted information from earlier revisions of the FSAR, and the remaining information was obtained from personnel interviews by the inspector.

The inspectors reviewed the support provided to the radiation protection program by management. Support was evident from the improvements made in the dosimetry program, provision of resources during the outage, and in the planned improvements for the gamma spectroscopy computer system. Support was also noted in the task forces initiated to evaluate the causes and corrective actions for high levels of exposure and personnel contaminations experienced during the refueling outage in 1990.

b. Training

Selected training records were reviewed which indicated that Health Physics personnel were being trained in accordance with established training program requirements. The training program for Health Physics technicians is a 3 year apprenticeship which includes formal general employee training (GET), classroom courses such as orientation, administrative controls, advanced radiation worker training and plant systems. This is followed by training in health physics fundamentals and a period of on-the-job training (OJT). Candidates are then given a job performance examination to measure competency and mastery of required knowledge and skills. Successful completion of this part of the apprenticeship program takes about two years and gives the candidate the title of Assistant Technician. After approximately one additional year of experience and similar multi-phase training is completed the candidate is certified as a Health Physics Technician. There are four candidates in an apprenticeship class which started February 4, 1991.

Lesson plans for annual requalification training for health physics technicians were reviewed and verified to be in accordance with training requirements. Annual requalification training consists of two sessions of about forty hours each and include topics such as reactor coolant system or another specific plant system, whole body counting, internal dosimetry, the proposed

changes to 10 CFR 20, plant experiences and recent operational events at the site or in the industry.

The student handout for the specific plant systems training course on the reactor coolant system (RCS) was reviewed. The course syllabus included a course description and a discussion of the RCS, its functions, major components, flowpaths, operation, interconnecting systems and the system technical specifications. The course objectives appeared to be comprehensive and detailed enough to provide the student with a good understanding of the system and its radiological significance.

No violations or deviations were identified.

5. Audits, Surveillances and Self Assessments (IP 83750, 84750)

The inspectors reviewed the results of Quality Assurance audits and surveillances conducted by the licensee since the last inspection. Also reviewed were the extent and thoroughness of the audits and surveillances.

a. Audits and Surveillances

The inspectors reviewed the preliminary results of one audit and the results of two surveillances. The surveillances included tool and equipment decontamination activities and an assessment of actions taken as result of contamination found in the auxiliary boiler. Recurrent problems were noted with the use of decontamination request tags and that corrective actions taken to ensure proper use have been ineffective. Problems were also noted with inconsistent marking of dose rates on bags of contaminated tools and equipment. Good performance was noted in the response to the Request for Review (RFR) 8547A and the 10 CFR 50.59 evaluation to address the contamination found in the auxiliary boiler system. Good performance was also noted in the performance of decontamination of tools and equipment at the 1974' level tool decon table.

The audit of the radiation protection program which had just been completed resulted in two findings and one recommendation for improvement. The findings included recurrent problems in control of radioactive sources and problems with procedures. The procedure problems were characterized as an instance in which the biennial review of a procedure had not been performed and out of date terminology, references, and position titles. Good performance was noted with implementation of radiation work permit (RWP) requirements and posting controls. Since the audit report had not received complete quality assurance management approvals, the inspectors could not evaluate the implementation of corrective actions for these findings.

b. Event Identification and Corrective Action

The inspectors selectively reviewed Suggestion Occurrence Solution (SOS) System reports for event identification, analysis and

implementation of corrective actions. Also reviewed records of tracking and closeout of identified concerns. In general, event identification was consistent with regulatory and procedural requirements. The determination of corrective actions and their implementation was usually good.

No violations or deviations were identified.

6. External Exposure Control (IP 83750)

The inspector reviewed the licensee's external exposure control and personal dosimetry program, including: changes in the program, use of dosimetry to determine whether requirements were met, planning and preparation for maintenance and refueling outage tasks including ALARA considerations and required records, reports and notifications.

a. Personnel Dosimetry Program

Personnel exposure records were reviewed for current and past licensee and contractor employees were selectively reviewed for completeness, accuracy and inconsistencies. In addition, the reporting of exposure information was reviewed for timeliness. No problems were noted.

The licensee has completed a changeout of their thermoluminescent (TLD) chips. Reportedly, the new chips are much improved with a higher level of quality control applied to their manufacture and testing. This appears to have resulted in a reduction of the bias of exposure data. The licensee indicated that a beam port facility was being set up to facilitate National Voluntary Laboratory Accreditation Program (NVLAP) testing. Plans call for testing of two NVLAP categories per quarter. The licensee is currently accredited in all NVLAP categories except Category 1 (accident range low energy x-ray or gamma radiation). The licensee indicated that since there is no real potential for this type of exposure at Callaway accreditation in Category 1 was not pursued. The inspector indicated to the licensee that should significant fuel failures or an accident occur high levels of fission product contamination would be experienced. This would result in high levels of bremsstrahlung as well as degraded gamma radiation. Concern was also expressed for having a single energy data point for validation of dosimetry response for accident range exposures.

b. Overexposure of the Skin of the Whole Body

On October 18, 1990, a contract health physics (HP) technician received an exposure in excess of the 10 CFR 20.101(a) limits of 7.5 Rem to the skin of the whole body which was reportable under 10 CFR 20.405(a)(1)(i). The dose assessment assigned an exposure of 8.5 Rem with an exposure duration of 216 minutes, a particle activity of 0.574 uCi cobalt-60 and a skin density thickness of 0.007 gm/centimeter squared. The hot particle was located on the left lower abdomen.

The inspectors reviewed the results of the licensee's dose assessment, investigation and reporting. The Licensee Event Report was submitted in a timely manner and the licensee's investigation appeared to be thorough and comprehensive. The licensee's dose assessment accounted for the beta component of the exposure; however, it did not account for the gamma component of the exposure. This was discussed with the licensee. Included in this discussion was the referral of information sources and calculation methods for determining the gamma component of exposure. The licensee indicated that the method for evaluating hot particle dose would be reevaluated.

No violations or deviations were identified.

7. Internal Exposure Control (IP 83700)

The inspectors reviewed the licensee's internal exposure control and assessment programs, including: changes to facilities, equipment, and procedures affecting internal exposure control and personal exposure assessment; determination whether respiratory equipment, and assessment of individual intakes meet regulatory requirements; required records, reports, and notifications; effectiveness of management techniques used to implement these programs; and experience concerning self identification and correction of program implementation weaknesses.

The licensee's program for internal exposure control includes the use of engineering controls, surface and airborne survey data, respiratory protection equipment, and direct surveillance of selected work activities. A selected review of air sample data and smear survey results was made; no problems were noted.

A review of the licensee's whole body count records (WBC) indicated that no exposures in excess of the 40 MPC-hour control measure occurred during 1991 to date. Dose assessments are performed for any positive WBC or any other bioassay result. Approximately 45 assessments were made in 1990 and 1991 to date. The licensee uses REMEDY, a computer program based on ICRP-30, to estimate uptake, percent of Annual Limit of Intake (ALI) and dose. MPC-hour determinations are tracked and a known test case is run for a quality control check of accuracy. Procedure HPT-7-1320, Internal Dose Assessment, was reviewed; no problems were noted. The procedure is currently being reviewed for upgrade.

No violations or deviations were identified.

8. Control of Radioactive Material (IP 83750)

The inspector reviewed the licensee's program for control of radioactive materials and contamination, including: adequacy of supply, maintenance and calibration of contamination survey and monitoring equipment; effectiveness of survey methods, practices, equipment and procedures; adequacy of review and dissemination of survey data; effectiveness of radioactive and contaminated material controls.

The licensee controls movement of the transverse incore probes (TIP) by procedure and informational posting. The procedure cautions against movement of the probes without prior notification of the health physics department. The TIP control panels are posted with signs stating "Notify Health Physics Prior to Moving Incore Probes". According to the licensee, there have been no problems with movement of the probes prior to notification of health physics.

The licensee has recently installed and is currently testing an automatic trash frisker. The licensee is currently planning to frisk all the trash collected from the Radiologically Controlled Area (RCA) green trash cans, segregate contaminated from noncontaminated, dispose of the contaminated trash as Dry Active Waste (DAW), and dispose of the noncontaminated trash after an additional frisk with a scintillation detector in a low background area. The inspector reviewed the licensee's plan and did not identify concerns with this methodology.

The inspectors reviewed the gamma spectroscopy system in use. This system utilizes a Nuclear Data 6685 computer system. The licensee reported that problems with reliability and procurement of spare parts have been experienced. This system is no longer manufactured. The licensee indicated that efforts were currently in progress to present specifications to management for a new computer system for gamma spectroscopy.

No violations or deviations were identified.

9. Maintaining Occupational Exposures ALARA (IP 83750)

The inspector reviewed the licensee's program for maintaining occupational exposures ALARA, including: ALARA group staffing and qualification; changes in ALARA policy and procedures, and their implementation; ALARA considerations for planned, maintenance and refueling outages; worker awareness and involvement in the ALARA program; establishment of goals and objectives, and effectiveness in meeting them. Also reviewed management techniques, program experience and correction of self identified program weaknesses.

The licensee's ALARA (as low as reasonably achievable) organization is comprised of a rad/chem supervisor and a full time technician. The technician, due to union considerations, rotates into other positions every three months. The licensee utilizes a calculation called the apparent reduction potential to determine whether an ALARA review is deemed appropriate for a given task in the RCA. Reportedly, this calculation takes into account cost benefit considerations, estimated exposure, and the whole body exposure rate. ALARA job history files consist of some job histories and notes and data recorded in the Master Equipment List. This list has a noteboard capability in which ALARA notes can be recorded which are then available for use whenever work is planned that involves that particular component. Workers are briefed prior to job performance by craft supervision and by health physics personnel. Reportedly, these briefs frequently take the form of combined briefings.

The licensee indicated that the ALARA coordinator's duties include conceptual design input; prioritization and tracking of decontamination activities and contaminated areas; coordinating shift schedules; health physics training schedules; preparation of quarterly radiological data reports and monthly radiological supervision reports; and serving as the secretary of the ALARA committee.

The inspectors reviewed the radiation work permit packages associated with the RTD bypass modification, the Refueling IV Outage Summary Report, and the report of the Refuel 4 Radiation Exposure Task Team. These were reviewed for causes and corrective actions to be taken to reduce the high levels of exposure experienced during the Refueling IV outage. The licensee appears to have performed a good evaluation of the problems encountered and a significant number of corrective actions were identified. The over budget exposure was attributed to failed efforts to decontaminate the RTD line, performance of inservice inspection while the upper reactor internals were not covered by water, and additional scaffolding and insulation work. Some savings in exposure were also noted with steam generator work, refueling activities, new cavity seal ring, reactor coolant pump preventive maintenance and pressurizer manway work; however, these savings were small compared to the over budget work previously identified.

No violations or deviations were identified.

#### 10. Plant Tours (IP 83750)

The inspectors performed several tours of radiologically controlled areas. These included walk downs of the auxiliary building, radwaste facilities and spent fuel pool facilities. The inspectors observed the following:

- ° Radiation workers access and egress from the RCA; personnel use of frisking stations and portal monitors were acceptable.
- ° Contamination monitoring, portable survey, area radiation monitoring instrumentation in use throughout the plant; with the exception of an oxygen indicator found out of calibration in the chemistry sample area on the 2000' elevation in the auxiliary building, instrumentation observed had been recently source checked and had current calibrations, as appropriate.
- ° Posting and labeling for radiation, high radiation, contaminated and radioactive material storage areas; posting and labeling were in accordance with regulatory requirements and approved station procedures. One incidence of downed postings was noted on the spent fuel pool floor. This appeared to be a partial deposting of an area for previous work activities. One end of the rope barrier was still attached to the wall and the placards were left attached to the rope, face down on the floor.

- ° Housekeeping and material conditions were generally good. Problems were noted in some spent fuel pool area. Accumulations of dirt, debris and tools were found. An accumulation of decontaminated tools was also noted at the decon area on the 1974' elevation of the auxiliary building.

During the tour of the radwaste facilities, the inspectors noted that the method used to sluice resin and evaporator bottoms was poor. This line is hard piped into the area from approximately twenty feet off the floor. The pipe turns and ends approximately three feet off the floor. A fire hose is then attached and routed under a drain grating approximately 75 feet to the liner fill area. The fire hose is then routed out of the drain channel up to a liner or high integrity container, as appropriate. The licensee indicated that this line is hydro tested prior to each use. It was noted that lead blanket shielding had been placed over the floor grating above the fire hose.

However, there have been numerous incidents in the industry in which fire hoses that have been hydro tested have burst and resulted in spills of high activity spent resin. Lines do occasionally clog and frequently are cleared by applying additional pressure to clear the clogged line. Additionally, this flow path is in a high traffic passageway. While operational restrictions are utilized to minimize traffic during resin and evaporator bottom sluicing, it appears that unnecessary exposure is still received by rad/chem and radwaste personnel during these evolutions. The licensee indicated that a modification was being considered that would improve this flow path for evaporator sluicing; however, the licensee indicated that this modification did not address the resin sluicing evolution.

The licensee commenced investigations and implemented corrective actions to resolve most of the identified concerns prior to the completion of the inspection.

No violations or deviations were identified.

#### 11. Exit Interview (IP 30703)

The inspector met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on May 10, 1991, to discuss the scope and findings of the inspection.

During the exit interview, the inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. Licensee representatives did not identify any such documents or processes as proprietary. The following matters were specifically discussed.

- a. Inspector concerns regarding the availability of qualification records. (Section 4.a)
- b. Inspector concerns regarding the reliability of the gamma spectroscopy computer system. (Section 8)

- c. Inspector concerns regarding the flow path utilized to sluice spent resins and evaporator bottoms. (Section 10)
- d. Inspector concerns regarding the methodology utilized to assess skin dose due to hot particles. (Section 6.b)