

ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Inspection Report: 50-483/96-001

License: NPF-30

Licensee: Union Electric Company  
P.O. Box 149  
St. Louis, Missouri

Facility Name: Callaway Nuclear Plant

Inspection At: Callaway Nuclear Plant, Steedman, Missouri

Inspection Conducted: January 8-12, 1996

Inspectors: Thomas H. Andrews, Radiation Specialist  
Plant Support Branch

Michael P. Shannon, Radiation Specialist  
Plant Support Branch

Approved:

Blaine Murray  
Blaine Murray, Chief, Plant Support Branch  
Division of Reactor Safety

2/1/96  
Date

Inspection Summary

Areas Inspected: Routine, announced inspection of the radiation protection program with emphasis on changes resulting from the revision of 10 CFR Part 20. The inspection module used for this inspection was TI 2515/123. Specific areas inspected included changes associated with: high and very high radiation areas, declared pregnant women and embryo/fetus doses, total effective dose equivalent/as-low-as-is-reasonably-achievable (ALARA) and respiratory protection, and planned special exposures.

Results:

- The licensee implemented a good training program regarding work activities in high and very high radiation areas. Workers and technicians demonstrated good working knowledge of requirements and precautions to be taken while working in these areas (Section 2.1.1).
- The licensee's procedures provided proper guidance for technicians and workers regarding posting and access controls for high and very high radiation areas (Section 2.1.2).

- A violation of Technical Specification 6.12.2 was identified involving failure to prevent potential unauthorized entries into a room where radiation levels exceeded 1000 mR/h at 18 inches. The licensee installed a chain and padlock on the door 18 hours after the condition was identified (Section 2.1.2.1).
- An inspection followup item was identified involving prejob surveys (Section 2.1.2.2).
- An inspection followup item was identified involving posting of contamination areas (Section 2.1.2.3).
- An issue involving unsecured compressed gas cylinders was identified to the licensee (Section 2.1.2.4).
- Quality assurance audits, surveillances, and corrective action trending program associated with the self-assessment of the radiation program were thorough, and very useful tools for management oversight of the radiation program (Section 2.1.3).
- The licensee's declared pregnant woman program was well implemented. The dose assessment process was thorough (Section 2.2).
- The licensee implemented a good respiratory protection evaluation process. Worker doses were maintained as-low-as-is-reasonably-achievable (ALARA) along with reducing the number of respirators issued (Section 2.3).
- The licensee's procedures state that planned special exposures shall not be utilized at the Callaway plant.

Summary of Inspection Findings:

- Violation 483/96001-01 was opened (Section 2.1.2.1).
- A noncited violation was identified (2.1.2.2)
- Inspection Followup Item 483/96001-02 was opened (2.1.2.2).
- A noncited violation was identified (2.1.2.3)
- Inspection Followup Item 483/96001-03 was opened (2.1.2.3).

Attachment:

- Attachment - Persons Contacted and Exit Meeting

## DETAILS

### 1 PLANT STATUS

During the inspection period, the plant operated at 100 percent power.

### 2 IMPLEMENTATION OF REVISED 10 CFR PART 20 (TI 2515/123)

This inspection was conducted to evaluate the licensee's radiological controls for implementing the revised 10 CFR Part 20 to ensure that programmatic controls were established which were effective with respect to high radiation areas, very high radiation areas, dose to the embryo/fetus, maintaining total effective dose equivalent ALARA while working in airborne radioactivity areas, and planned special exposures.

The revised 10 CFR Part 20 became mandatory for all licensees on January 1, 1994. The revised regulation differed in many ways from the "old" 10 CFR Part 20. This included changes in 10 CFR Part 20 philosophy and requirements, which emphasized the importance of controlling access to high and very high radiation areas and recognized the importance that some licensees have placed on the use of respiratory protection equipment.

#### 2.1 High and Very High Radiation Areas

##### 2.1.1 Training of Radiation Workers and Health Physics Technicians

The inspectors reviewed the licensee's general employee training program to determine if it covered high radiation area and very high radiation area hazards, access procedures, postings, proper work practices, and radiation workers' responsibilities with respect to such areas. Definitions of high radiation area and very high radiation area were consistent with those provided in the revised 10 CFR Part 20.

The licensee defined the following areas as sub-categories of high radiation areas:

##### Caution High Radiation Area

An accessible area where an individual could receive in excess of 100 millirem but no more than 1000 millirem in one hour at a distance of 12 inches from the radiation source.

##### Danger High Radiation Area

An accessible area where an individual could receive greater than 1000 millirem in one hour at a distance of 12 inches from the radiation source.

Danger High Radiation Exclusion Area

An accessible area where radiation levels vary as a result of plant operations, entry is infrequent, and radiation levels can be reduced by control of plant operations.

Danger high radiation areas and danger high radiation exclusion areas were used to ensure compliance with Technical Specification 6.12.

Industry events were used to emphasize the importance of identifying and complying with postings associated with these areas. Information related to ALARA concepts was presented to aid the worker in minimizing doses in high and very high radiation areas.

The new requirements brought about by the revisions to 10 CFR Part 20 were incorporated into the licensee's general employee training program and health physics technician training program. All workers and health physics technicians interviewed were familiar with high radiation area and very high radiation area hazards, access controls and procedures, postings, proper work practices, and individual responsibilities with respect to such areas.

The inspectors reviewed the licensee's training and continuing training programs for health physics technicians, focusing on lesson plans and lectures covering those areas of the plant that exhibit high or very high radiation dose rates during normal operations and/or outages, and those areas of the plant where radiological conditions may change rapidly.

The licensee employed contractor health physics technicians for outage support. Technicians were required to have passed the Northeast Utilities written examination which contained questions regarding the changes to 10 CFR Part 20. A minimum score of 70 percent was required to be considered for employment. Once satisfying this screening requirement as well as meeting experience requirements, contractors were trained on site-specific procedures and must demonstrate their skills at identifying, posting, and documenting surveys. They were required to demonstrate proficiency with the use of equipment. This was documented on qualification cards.

Licensee procedures discussed job coverage requirements and responsibilities. This included job coverage responsibilities for work to be performed in high radiation areas and very high radiation areas. Discussions with technicians demonstrated that they held a good working knowledge of these requirements.

The inspectors discussed stop-work responsibilities with respect to departures from the radiological conditions or the work scope described in prejob briefings, work packages, and radiation work permits with workers.

technicians, management, and training personnel. Training personnel provided information showing where workers and technicians were instructed to follow the directions of health physics personnel while working in the radiological controlled area.

### 2.1.2 Implementing Procedures

The licensee developed implementing procedures concerning the posting and controlling of access to high and very high radiation areas. The inspectors specifically reviewed the following procedures:

- APA-ZZ-01106, "Lock and Key Control," Revision 7
- HTP-ZZ-01201, "Preparation and Maintenance of General and Specific Radiation Work Permits," Revision 26
- HDP-ZZ-01500, "Radiological Posting," Revision 14.
- HDP-ZZ-03000, "Radiological Survey Program," Revision 17
- HTP-ZZ-06001, "High Radiation/Very High Radiation Area Access," Revision 15

Danger high radiation areas and danger high radiation exclusion areas were a subset of high radiation areas. Danger high radiation exclusion areas may not always meet the criteria of being a danger high radiation area, but the licensee treated them as a danger high radiation area because conditions could rapidly change based on plant operations. Danger high radiation areas were specified to comply with Technical Specifications.

Keys were controlled at the access point to the radiological controlled area. Inventories of keys were performed as part of plant security shift turnover. The inspectors verified that the inventory was documented as being performed. At the time the inspectors visited the access points, all keys were present and accounted for. Keys were color-coded to designate the type of area.

The level of management required to approve access increased with corresponding increases in area radiation levels. The approval of a health physics supervisor was required to authorize entry into a danger high radiation area. Entry into a danger high radiation exclusion area required the authorization of the health physics division manager. Entry into a very high radiation area required authorization from the health physics division manager and the plant manager prior to entry.

The inspectors toured the facility to observe postings and access controls. Independent surveys of boundaries indicated that boundaries were properly posted. Boundaries were typically marked using rope and tape. Postings were clearly written/printed and accurate. During the tour the inspectors checked all high radiation doors required to be locked by Technical Specifications.

#### 2.1.2.1 Area Required To Be Locked To Prevent Unauthorized Access

On January 9, 1996, at approximately 2:00 p.m., the inspectors discovered the door leading to the waste hold-up tank room (room 7122), located on the 1976' elevation of the radioactive waste building, had an opening approximately

5 inches by 5 inches which was large enough to permit reaching through the door to access the knob on the inside of the door. This opening was made in the door to allow the passage of a 1/4 inch tube through the doorway on the non-hinged side of the door. The opening was located approximately 12 inches above the lock. This door was posted as a danger high radiation area in accordance with the licensee's procedures and was required to be locked.

With the approval of a licensee health physics technician, one of the inspectors demonstrated that a person could easily insert their hand through the opening and unlock the door without using a key, thus defeating the lock. This condition was immediately identified to the licensee. The licensee stated that the existing condition was acceptable and that no additional actions were needed. However, approximately 18 hours after the condition was identified, the licensee installed a chain and padlock. Because the licensee considered the existing condition to be in compliance with Technical Specifications, the licensee further stated that the installation of the chain and padlock was to address the inspector's concern and not was intended to prevent unauthorized access.

At the inspectors' request, on January 10, 1996, the licensee performed a radiological survey of the waste hold-up tank room. The general area radiation levels for this room was between 1000 and 1200 millirem per hour. This confirmed that the radiation levels in the waste hold-up tank room required posting as a danger high radiation area. As stated earlier, this door was properly posted.

Through review of inspection reports and licensee corrective action documents, the inspectors determined that there had not been any documented incidents in the past year associated with unauthorized access to danger high radiation areas. At the time of discovery there was no one in the area. According to the licensee, the door was locked and conspicuously posted as a danger high radiation area. Personnel with access to the radiological controlled area were required to demonstrate knowledge of procedures for access to danger high radiation areas. Furthermore, the licensee stated that anyone accessing this area of the plant was required to have vital area access.

The inspectors discussed events where, even with proper training and security access requirements, there have been instances in the nuclear industry where individuals bypassed established controls for various reasons. If an individual, for whatever reason, had entered the waste hold-up tank room, they would be in radiation levels where they could receive a significant dose.

Technical Specification 6.12.2 states, in part, "areas accessible to personnel with radiation levels greater than 1000 mR/h at 45 cm (18 in.) from the radiation source or from any surface which the radiation penetrates shall be provided with locked doors to prevent unauthorized entry, and the keys shall be maintained under the administrative control of the Shift Supervisor/ Operating Supervisor on duty and/or health physics supervision." Based on the

radiological survey results, the waste hold-up tank room was an area that required a locked door to prevent unauthorized entry. An individual standing outside the waste hold-up tank room could gain unauthorized access to the area by simply reaching through the opening in the door, unlock the door without a key and open the door. Therefore, this condition is identified as a violation of Technical Specification 6.12.2 [Violation 483/96001-01].

#### 2.1.2.2 Failure to Perform Radiological Survey

On January 9, 1996, while performing a tour of the auxiliary building to verify postings and access controls for high radiation areas, the inspectors observed a ladder positioned to allow access to the overhead areas in a hallway on the 1976' elevation. The ladder was not marked "Contact Health Physics." The licensee's procedures stated that areas not routinely surveyed will be posted as "Contact Health Physics" areas.

When questioned about the possible use of the ladder to gain access to overhead areas, the licensee responded that areas not routinely accessed required individuals to contact health physics prior to entering the area. Once a survey of the area was performed and the radiological conditions in the area verified, the need to contact health physics was not required.

Procedure HDP-ZZ-03000, Revision 17, "Radiological Survey Program," states, in part, that "Areas above 8' are surveyed on an as-needed basis to establish access." This procedure further states "Surveys to access greater than 8' may be waived in hallway areas for non-radioactive work from ladders." Additionally, Section 4.2 of Procedure HTP-ZZ-01201, Revision 26, "Preparation and Maintenance of General and Specific Radiation Work Permits," states, in part, "when writing a radiation work permit, determine the current or expected radiological conditions by using: (a) prejob radiological survey, (b) radiological survey(s) that reflect conditions in the work area(s) during a previously performed task on the same or similar component."

Work had been allowed to be performed in the overhead in this hallway under Radiation Work Permit 96-01201 issued on December 27, 1995. When asked, the licensee was not able to provide documentation showing that a prejob survey had been performed for this work, nor could they identify that the survey had been waived. At the inspectors' request, the licensee performed a survey of the area in the overhead where work was performed and determined that work in this area did not involve significant radiation dose rates or contamination levels.

The radiation work permit required workers to review survey maps for the area for the radiological conditions as part of the review of the radiation work permit. Given that there were no surveys for the overhead area, it was obvious that this review was not performed by workers. This was considered as a missed opportunity to identify the condition.

Failure to perform a survey to determine the radiological conditions and content of radioactive materials in the area where work was to be performed was a violation of the licensee's radiation work permit and procedures. In this particular instance, given the low safety significance regarding radiological conditions in the area, the consequences associated with work without a survey was minor. Under different radiological conditions, the significance could have been substantially different.

This failure constitutes a violation of minor significance and is being treated as a noncited violation consistent with Section IV of the NRC Enforcement Policy. However, the licensee's radiation work permit program will be reviewed in a future inspection. This review will focus on worker knowledge of information contained within the radiation work permits, and on prejob survey results. This matter is considered an Inspection Followup Item (IFI 483/96001-02)

### 2.1.2.3 Improperly Posted Contamination Areas

On January 9, 1996, while performing a tour of the auxiliary building to verify postings and access controls for high radiation areas, the inspectors observed two contamination areas where the boundaries were not clearly marked. The licensee's procedures required that areas where radiological controls were established were to have perimeters that were clearly identified with barricading materials.

The alpha centrifugal charging pump skid located on the 1976' elevation of the auxiliary building was identified on area surveys as being contaminated. The contamination area was not marked to clearly establish the perimeter of the area. A short strip of contamination area tape were placed on each side of the pump, but this would not serve to identify which areas within the pump skid envelope were contaminated.

A curbed area around the containment access hatch/airlock located on the 2047' elevation of the auxiliary building was partially posted as a contaminated area. On each side of the airlock drum, there was a short piece of contamination area tape indicating that the area inside the curbing and underneath the airlock drum was contaminated. Across the end of the airlock drum where the access door was located, there were no markings identifying the area inside the curbing and underneath the airlock drum as being a contaminated area.

The inspectors discussed the above items with the licensee and the licensee corrected the postings. Based on a review of licensee contamination reports, there had not been any recent documented contamination incidents associated with work in these two areas. Contamination levels in these areas were low enough not to pose a radiation dose concern.



This failure constitutes a violation of minor significance and is being treated as a noncited violation consistent with Section IV of the NRC Enforcement Policy. The licensee's posting practices will be reviewed in a future inspection to ensure that contamination area postings are consistent with the licensee's procedures. This matter is considered as an Inspection Followup Item (IFI 483/96001-03).

#### 2.1.2.4 Unsecured Compressed Gas Cylinders

On January 9, 1996, while performing a tour of the auxiliary building to verify postings and access controls for high radiation areas, the inspectors observed two unsecured compressed gas cylinders on the 2047' elevation between the control room habitability monitor cabinets. Between these cabinets were three bottle locations for compressed gas supply to these monitors. These locations had a base in which to stand each cylinder, and a metal strap that could be secured around the middle of each bottle.

Two of the bottles were properly secured, but the third bottle was not secured by the metal strap. All three of these bottles were connected to the system. A fourth bottle, a spare, was standing adjacent to the unsecured bottle that was in use. A wire was wrapped around the neck of the spare bottle and this was fastened to the bottle that was not secured.

This condition was identified to the licensee. The licensee stated that this condition had been identified by their staff on the previous day (January 8, 1996) and had not yet been corrected. The condition was corrected on January 9, 1996, by securing the inservice bottle and removing the spare bottle from the area. The inspectors informed the resident inspector of this observation.

#### 2.1.3 Management and Supervisory Oversight

There was a good relationship between the health physics organization and other work groups. Workers expressed confidence and support for the health physics staff. They expressed the opinion that health physics personnel were helpful in getting jobs done and were willing to assist where possible.

According to 10 CFR 20.1101(c), each licensee shall periodically (at least annually) review the health physics program content and implementation documents. The licensee had assigned most of the assessment responsibilities to Quality Assurance. The inspectors reviewed quality assurance audits and surveillances and found them to be very thorough and probing. Routine reports from the trending program established by the licensee were reviewed and were considered to be excellent because of the availability and flexibility provided to management. These were considered to be very useful tools for management oversight of the licensee's radiation protection program.

## 2.2 Declared Pregnant Women and Embryo/Fetus Doses

The licensee had developed procedures and policies for implementing the requirements of 10 CFR 20.1208, "Dose to an Embryo/Fetus." The licensee's procedures described the process for a woman to declare herself pregnant. This process was also discussed in general employee training. Interviews with licensee personnel revealed that workers were familiar with the policy and that declaration was voluntary. According to procedures, when a woman declared herself pregnant, her dose margin was set well below the 10 CFR Part 20 limits for exposure to the embryo/fetus.

The inspectors reviewed records of dose assessments of selected declared pregnant women. These records were consistent with regulatory guidance. As part of the declaration process, the licensee typically required whole-body counting to ensure that there was not a "deposition" dose to the embryo/fetus that needed to be accounted for. If required, procedures stated that dose assessment for the embryo/fetus would be performed using Regulatory Guide 8.36, "Radiation Dose to the Embryo/Fetus."

## 2.3 Total Effective Dose Equivalent/ALARA and Respiratory Protection

The new requirement for justifying the use of respiratory protection devices as part of a program to ensure that each individual's total effective dose equivalent was maintained ALARA represented a major change in the radiation protection philosophy as embodied in the old 10 CFR Part 20. As a result, the licensee had reduced the number of respiratory devices issued for radiological purposes through the use of engineering controls, procedures, and other approved methods. A review of whole-body counting results indicated that no committed dose calculations were necessary, indicating that the evaluation process for the use of respirators was working to keep worker doses ALARA.

The licensee did not differentiate between respirators issued for radiological purposes or for industrial purposes. The trend from 1990 to present (during years with refueling outages), had decreased from issuing thousands, to hundreds, to tens of respirators each year. Based on information provided by the licensee, this was accomplished with no increase in internal dose and no significant change in the number of facial contamination events. Given that the licensee has a trend indicating that total person-rem is trending downward, the licensee's program for evaluating the use of respirators was considered to be good.

## 2.4 Planned Special Exposures

Procedure APA-ZZ-01000, Revision 10, "Callaway Plant Health Physics Program," Section 5.7 stated, in part, that "planned special exposures shall not be utilized at the Callaway plant." No further inspection was performed in this area.

## ATTACHMENT

### 1 PERSONS CONTACTED

#### 1.1 Licensee Personnel

J. Clark, Security, Assistant Superintendent  
M. Evans, Health Physics, Superintendent (RPM)  
R. Farnam, Health Physics Operations, Supervisor  
C. Graham, Health Physics Technical Support, Supervisor  
G. Hamilton, Quality Assurance, Supervisor  
J. Laux, Quality Assurance, Manager  
J. Little, Licensing, Engineer  
R. Miller, Chemistry/Radwaste, Supervisor  
R. Moore, Training, Senior Training Specialist  
G. Randolph, Nuclear Operations, Vice President  
M. Reidmeyer, Licensing, Engineer  
R. Roselins, Chemistry/Radwaste, Superintendent

#### 1.2 NRC Personnel

D. Passehl, Senior Resident Inspector

The above individuals attended the exit meeting on January 12, 1996. In addition to the personnel listed above, the inspectors met and held discussions with other personnel of the licensee's staff during the inspection.

### 2 EXIT MEETING

An exit meeting was conducted on January 12, 1996. During this meeting, the inspector reviewed the scope and findings of the inspection. The licensee stated that they disagreed with the basis for the violation associated with the locked high radiation area door. The licensee did not identify as proprietary, any information provided to, or reviewed by the inspectors.