

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/83-30

Docket No. 50-483

License No. CPPR-139

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

Facility Name: Callaway Plant, Unit 1

Inspection At: Callaway Site, Reform, MO

Inspection Conducted: December 13-15, 19, and 21, 1983

Inspectors: *M. J. Cestmann*  
M. J. Cestmann

*1/6/84*

Date

*A. G. Januska*  
A. G. Januska

*1/6/84*

Date

Approved By: *M. C. Schumacher*  
M. C. Schumacher, Chief  
Independent Measurements and  
Environmental Protection Section

*1/6/84*

Date

Inspection Summary

Inspection on December 13-15, 19, and 21, 1983 (Report No. 50-483/83-30[DRMSP])

Areas Inspected: Routine, unannounced safety inspection of the preoperational radiological environmental monitoring program (REMP) including management controls; program implementation and results; quality assurance; review of chemistry/radiochemistry program and procedures; a tour of laboratory facilities and counting room; comparison of spiked particulate filter and charcoal adsorber analytical results between licensee and NRC; and review of actions taken regarding previous open items. The inspection involved 36 inspector-hours onsite by two NRC inspectors.

Results: No items of noncompliance or deviations were identified.

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## DETAILS

### 1. Persons Contacted

- \*B. Holderness, Health Physicist, Nuclear Engineering, Corporate Headquarters
- \*J. Peevy, Superintendent, Radiation Protection
- \*V. Shanks, Superintendent, Chemistry
  - R. Gearhart, Supervising Engineer, Quality Assurance - Operations
- \*G. Ronchetto, Engineer, QA - Operations
- \*T. Tharp, Engineer, Compliance
- \*C. Riggs, Supervisor, Primary Chemistry
- \*J. Polchow, Foreman, Health Physics, Radiation Protection
- \*\*E. Mitchell, Foreman, Counting Room, Radiation Protection

The inspector also interviewed several other licensee personnel during the course of the inspection, including health physics and chemistry personnel.

\*Denotes those present during the exit interview on December 15, 1983.

\*\*Also present during telephone conversations on December 19 and 21, 1983.

### 2. Licensee Action on Previous Findings

- a. (Closed) Open Item (50-483/82-07-03): Completion of procedure HTP-ZZ-07001, "Collection and Shipping of Environmental Samples", and selection of the fourth milk sampling location. The licensee has completed procedure HTP-ZZ-07001, Revision 1, dated October 19, 1983, and because of difficulty in finding a fourth milk sampling location within five miles of the plant, the licensee has recommended collection of vegetation as an alternative sampling media to the Office of Nuclear Reactor Regulation. This will be finalized by NRR when the Technical Specifications will be issued with the fuel load license. This item is therefore closed.
- b. (Closed) Open Item (50-483/83-07-01): Provide for direct air path to air sampling heads. During a tour of selected air sampling stations during this inspection, the inspectors observed that the housing of the air sampling equipment had been modified to allow for direct path to the heads. This item is therefore closed.
- c. (Closed) Open Item (50-483/83-07-02): The licensee's REMP annual environmental monitoring report sent to NRC Region III. On October 10, 1983, the licensee submitted the REMP contractor's annual report for 1982. This item is therefore closed.
- d. (Closed) Open Item (50-483/83-07-03): Designate which sample stations are to satisfy NRC REMP requirements. The current program is an augmented program with more sampling locations and more frequent sample collections than the initial program performed in 1973-1974. This was done primarily to satisfy NRC guidance as described

in the NRC Radiological Assessment Branch Technical Position (BTP) (Revision 1, November 1979) and to satisfy the State of Missouri's additional radiological sampling requirements as described in the National Pollution Discharge Elimination System (NPDES) permit. For several media, primarily aqueous samples, the licensee has used the same sampling stations to satisfy both requirements. The environmental monitoring reports (1982 annual and quarterly for 1983) include results of the REMP to meet both the BTP and NPDES requirements. Since the licensee's program meets the NRC's guidance in the BTP, this item is therefore considered closed.

- e. (Closed) Open Item (50-483/83-07-04): Conduct QA audit of REMP contractor and approve QA manual and analytical procedures. The licensee performed an adequate QA audit of the new REMP contractor, Controls for Environmental Pollution (CEP), on July 7, 1983. The audit included a review and approval of CEP's QA manual, and procedures. This item is considered closed.
- f. (Open) Open Item (50-483/83-07-05): Finalize procedure QS-22 defining REMP management responsibilities. This procedure is under review by the licensee's management and has not been approved as yet. This item will remain open, pending licensee approval of this procedure.
- g. (Closed) Open Item (50-483/83-07-06): Finish construction of and establish hot laboratory and counting rooms. The inspectors toured the hot laboratory and counting room during the inspection and found the laboratory instrumentation and counting equipment in place and operational. The ventilation system is temporarily completed to meet the immediate needs of establishing the hot laboratory and counting room. The ventilation system will be permanently installed prior to fuel load date. Since the laboratory and counting room are functional, this item is considered closed.

### 3. Preoperational Radiological Environmental Monitoring Program (REMP)

#### a. Implementation of REMP

The inspectors toured four continuous air sampling stations, one water well, a water compositor at the intake structure, and several TLD stations, including two NRC TLD stations. The air samplers were found operable, each having calibration stickers affixed showing the calibration dates. Calibrations are performed semi-annually. No problems were noted with these different sampling stations.

The current REMP in existence was initiated on April 1, 1982, using the licensee contractor, Radiation Management Company, to perform the analysis of samples collected by the licensee. The contractor was changed to Controls for Environmental Pollution (CEP) on May 1, 1983. A preliminary one year preoperational program was conducted from the summer of 1973 and continued through December 1974. The

current program has been augmented to include more sampling locations and more frequent and additional types of analyses, done primarily because the State of Missouri imposed the additional radiological sampling requirements on the licensee in the NPDLS permit. Results of the entire program as presented in the 1982 annual environmental monitoring report and the 1983 quarterly reports through June 1983 were reviewed by the inspectors during this inspection. No problems were noted except that no meat or poultry was analyzed and quarterly, not monthly, air particulate composites were analyzed in contrast to the commitments made in Table 6.1-5 of the licensee's Environmental Report - Operating License Stage (ER-OL). The licensee's program, however, is consistent with the Branch Technical Position (BTP) (Revision 1, November 1979) which does not include meat and poultry and also recommends quarterly composites for air particulates to be analyzed. A licensee representative stated that these items were being negotiated with NRR in determining the REMP for the Technical Specifications to be issued with the fuel load license. These items will be resolved by NRR in these negotiations.

The inspectors also reviewed procedure HTP-ZZ-07002, "Evaluation of Operational Radiological Environmental Monitoring Data", approved on August 26, 1983 and found no problems. This procedure will be implemented once the plant is operational.

b. Quality Assurance

The licensee in its audit of CEP in July 1983 approved the contractor's quality assurance/control program. This program includes utilizing standard operating procedures, known and unknown spike analysis, blank analysis, and participation in the U.S. EPA Interlaboratory cross check program. No problems were noted in the review of the contractor's participation in the EPA cross check program.

c. Management Controls

The inspectors reviewed the management controls for administering the REMP. Overall responsibility for the REMP rests with the Supervising Engineer, Nuclear Engineering in the licensee's corporate headquarters. Sample collection, however, is primarily under Nuclear Operations through the Radiation Protection Department. As stated in Section 2.f, the licensee has yet to finalize Procedure QS-22 which defines program responsibility. The inspectors discussed with the licensee the need for finalizing the management responsibility for the REMP. This item will be reviewed in a subsequent inspection. (Open Item 50-483/83-07-05).

No items of noncompliance or deviations were identified.

4. Chemistry Audit

The inspectors reviewed a licensee internal audit report (AD5A8310C) describing the findings of the audit performed on October 17-31, 1983 on

the chemistry program. The audit was comprehensive and thorough and identified 24 findings requesting response for corrective actions by January 16, 1984. Some of the findings such as lack of calibration stickers on laboratory instruments were also identified by the inspectors during a tour of the chemistry laboratory. This is considered an open item until the licensee completes the corrective actions to the findings and a followup audit is performed to assure the audit can be closed out. (Open Item 50-483/83-30-01).

5. Chemistry and Inplant Radiological Measurements

The inspectors toured the licensee's "hot" and "cold" chemistry laboratories and counting room. All areas are complete and functional although the "hot" lab is operating on a temporary nonfiltered ventilation system. Personnel interviewed appeared knowledgeable in appropriate procedures and equipment operation. The inspectors noted that equipment did not have calibration stickers affixed. The licensee stated that calibration stickers are on order and will be put on when received. Equipment on a short calibration frequency will bear tags that require updating on the tag in lieu of changing of the tag.

Equipment in the counting room was operational. The licensee's gamma ray spectrometry system includes three shielded intrinsic Ge detectors linked to a stand alone Multichannel Analyzer (MCA) which is in turn linked, along with other systems, to one of two main computers. The detectors have been calibrated for all geometries except 100 cc gas sample chamber and a one-liter gas Marinelli. The licensee plans to upgrade these geometries where Eu-152 was used, determine self-absorption coefficients for the gel standard used to calibrate gas geometries, and redo all geometries with new mixed nuclide standards, currently on order. These will be examined during a subsequent inspection (Open Item 50-483/83-30-2).

The licensee conducts a Quality Control program for counting room equipment in accordance with approved procedures. Two procedures examined during the inspection are in the process of review prior to being revised. The revisions reflect the switch to the use of quality control charts.

The licensee's results of the analyses of the first set of blind samples contracted for with an outside vendor did not show favorable agreement. These had been samples analyzed with the counting system in a temporary location. Recounts of the samples after the counting system had been relocated to its permanent location were in agreement with the vendor's analyses.

The licensee's method of tracking samples from acceptance into the counting room until a final result is obtained was examined. The method will assure awareness of the status of a sample at any time during its analysis.

6. Confirmatory Measurements

The inspectors supplied the licensee with a spiked air particulate filter and a spiked charcoal adsorber to analyze. Results of sample comparisons are listed in Table 1 and the comparison criteria are given in Attachment 1.

The licensee achieved five agreements and two possible agreements for the air particulate sample. The possible agreements are for those nuclides that had decayed three half lives at the time of the analysis. The licensee had all disagreements for the charcoal adsorber, six of which were conservative. The calibration was examined and the licensee's standard charcoal adsorber was counted by the inspectors on December 17, 1983 in the Region III laboratory. The value of the licensee's standard adsorber was confirmed within 2% of the certificate value of 4627 dps (October 1, 1980) of Eu-152 activity. A hand calculation by the inspector of the amount of activity required to produce the licensee's efficiency was approximately  $3.9E04$  dps. On December 21, 1983, a licensee representative informed the inspectors that a licensee investigation of the cause revealed that a wrong certificate value, which was approximately  $3.5E04$  dps, was used for the calibration. The licensee has since recalibrated this geometry using the proper value of the standard and agreed to re-analyze the NRC charcoal adsorber spectrum. The licensee recalibration of the detector and the reanalysis of the NRC spectrum will be examined in a subsequent inspection (Open Item 50-483/83-30-03).

Arrangements were made to supply the licensee with a liquid sample which is to be analyzed for H-3, Sr-89, Sr-90, gross B, and gamma isotopic. The licensee agreed to supply his results to RIII (Open Items 50-483/83-30-4). The comparisons will be reported as an addendum to this inspection.

No items of noncompliance or deviations were identified.

#### 7. Exit Interview

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on December 15, 1983. The scope and findings of the inspection were summarized. Licensee representatives acknowledged the inspectors' comments and agreed to the action described in Sections 4, 5, and 6, and will respond to the remaining open items prior to issuance of the fuel load license.

The licensee also agreed in telephone conversations on December 19 and 21, 1983, to recalibrate his gamma detector and re-analyze the NRC charcoal adsorber spectrum.

#### Attachments:

1. Table 1, Confirmatory Measurements  
Program Results, 4th Quarter, 1983
2. Attachment 1, Criteria for Comparing  
Analytical Measurements

TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: CAL  
 FOR THE 4 QUARTER OF 1983

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
F SPIKED	CD-109	3.7E-01	1.8E-02	3.5E-01	2.4E-03	9.5E-01	2.1E 01	A
	CO-57	8.8E-03	4.7E-04	7.4E-03	8.5E-05	8.4E-01	1.9E 01	A
	CE-139	1.1E-02	4.8E-04	7.8E-03	1.7E-04	7.2E-01	2.3E 01	P
	SN-113	2.7E-02	1.1E-03	2.0E-02	6.5E-04	7.1E-01	2.4E 01	P
	CS-137	2.0E-02	8.9E-04	1.6E-02	1.4E-04	7.9E-01	2.2E 01	A
	CO-60	2.3E-02	9.8E-04	2.3E-02	2.6E-04	9.9E-01	2.4E 01	A
	Y-88	5.6E-02	2.7E-03	6.2E-02	2.0E-03	1.1E 00	2.0E 01	A
C FILTER	CD-109	1.5E-01	7.4E-03	1.3E 00	1.5E-02	8.2E 00	2.1E 01	D
	CO-57	3.7E-03	2.0E-04	3.5E-02	7.9E-04	9.5E 00	1.9E 01	D
	CE-139	4.6E-03	2.0E-04	4.8E-02	1.9E-03	1.1E 01	2.3E 01	D
	SN-113	1.2E-02	4.7E-04	1.0E-01	6.3E-03	9.1E 00	2.4E 01	D
	CS-137	8.3E-03	3.7E-04	7.0E-02	1.0E-03	8.5E 00	2.2E 01	D
	CO-60	9.7E-03	4.1E-04	8.2E-02	1.4E-03	8.4E 00	2.4E 01	D
	Y-88	2.3E-02	1.2E-03	1.9E-01	9.1E-03	8.2E 00	2.0E 01	D

T TEST RESULTS:  
 A=AGREEMENT  
 D=DISAGREEMENT  
 P=POSSIBLE AGREEMENT  
 N=NO COMPARISON

ATTACHMENT 1

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the NRC Reference Laboratory's value to its associated one sigma uncertainty. As that ratio, referred to in this program as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement should be considered acceptable as the resolution decreases. The values in the ratio criteria may be rounded to fewer significant figures to maintain statistical consistency with the number of significant figures reported by the NRC Reference Laboratory, unless such rounding will result in a narrowed category of acceptance. The acceptance category reported will be the narrowest into which the ratio fits for the resolution being used.

<u>RESOLUTION</u>	<u>RATIO = LICENSEE VALUE/NRC REFERENCE VALUE</u>		
	<u>Agreement</u>	<u>Possible Agreement "A"</u>	<u>Possible Agreeable "B"</u>
<3	No Comparison	No Comparison	No Comparison
>3 and <4	0.4 - 2.5	0.3 - 3.0	No Comparison
>4 and <8	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
>8 and <16	0.6 - 1.67	0.5 - 2.0	0.4 - 2.5
>16 and <51	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
>51 and <200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.67
>200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is greater than 250 keV.

Tritium analyses of liquid samples.

"B" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is less than 250 keV.

Sr-89 and Sr-90 determinations.

Gross beta, where samples are counted on the same date using the same reference nuclide.