

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/88008(DRSS)

Docket No. 50-483

License No. NPF-30

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

Facility Name: Callaway Plant, Unit 1

Inspection At: Callaway Site, Steedman, Missouri

Inspection Conducted: May 2-6, 1988

Inspector: *A. Januska*  
A. Januska

5-29-88  
Date

Accompanied By: *R. Bocanegra*  
R. Bocanegra

5/31/88  
Date

Approved By: *M. Schumacher*  
M. Schumacher, Chief  
Radiological Effluents  
and Chemistry Section

5/26/88  
Date

Inspection Summary

Inspection on May 2-6, 1988 (Report No. 50-483/88008(DRSS))

Areas Inspected: Routine, announced inspection of confirmatory measurements, and Radiological Environmental Monitoring programs including: plant chemistry organization, management controls, training and qualifications (IP 83722, 83723); quality assurance and confirmatory measurements for in-plant radiochemical analysis (IP 84725); and radiological environmental monitoring (IP 80721). Collection of collocated thermoluminescent dosimeter (TLD) measurement results (TI 2500/22, IP 80721) was performed and the licensee's action on an open item was reviewed.

Results: Management attention to detail in radiological measurements has resulted in an overall strong program; however, timeliness in completing calibration confirmation tests and inspector-observed poor laboratory practices need to be addressed. No violations or deviations were identified during this inspection.

## DETAILS

### 1. Persons Contacted

- \*W. R. Robinson, Assistant Plant Manager
- \*D. R. Bromwell, QA Engineer
- \*J. C. Gearhart, Superintendent, QA Operations Support
- \*C. Graham, Supervisor, Health Physics Technical Support
- \*F. J. Forck, QA Scientist
- \*J. R. Peevy, Assistant Manager, Technical Services
- \*C. A. Riggs, Supervisor, Chemistry
- \*R. R. Roselius, Superintendent, Health Physics
- \*E. M. Thornton, QA Engineering Evaluator
- \*M. A. Trusty, Acting Counting Room Foreman
- J. D. Nurrenbern, Health Physicist
- G. Clark, Senior Rad/Chem Technician
- R. Seitz, Rad/Chem Technician
- L. Godley, Rad/Chem Technician
- P. Bell, Chemist

\*B. H. Little, NRC Senior Resident Inspector

\*Denotes those present at the exit meeting.

### 2. Licensee Action on Previous Inspection Findings

(Closed) Open Item (483/87016-01): Licensee to complete changes in the QA/QC program. QC chart limits to be modified, boron QC charts and control sample results tabulated by July 25, 1987. The licensee has revised procedures to address the concerns in this open item. The licensee now determines the standard deviation (s.d.) and the upper and lower warning and control levels every six months using a minimum of 15 current data points for key parameters defined in CDP-ZZ-00700. Performance check data for each key parameter is recorded on a "Control Chart Data Sheet." The boron control chart data indicated that the six months update of the s.d. and control and warning levels had been performed. The licensee now uses independent sources to check stability of standards by assuring that, as a minimum, different lot numbers for calibration standards and control standards are used. There has been no change in the status of obtaining a computer for tabulation and analysis of data.

### 3. Management Controls and Organization (IP 83722, 83723)

The inspectors reviewed the management controls and organization of the Health Physics Technical Support (HPTS) Group. The group is headed by a HPTS Supervisor who reports to the Health Physics Superintendent who in turn reports to the Assistant Manager Technical Services. The HPTS

Supervisor supervises a Rad/Chem Foreman who in turn supervises 11 Rad/Chem Technicians (RCT) and their activities in the laboratory and counting room. During this inspection an RCT was appointed Acting Rad/Chem Foreman during the absence of the Rad/Chem Foreman. Since the inspection in May 1986 (Report No. 86014) one RCT has left Union Electric Company, one has transferred, and two have been promoted to another group. Three experienced RCTs have transferred into the group leaving the group with a net loss of one RCT. The licensee has eliminated this vacant RCT position.

No violations or deviations were identified.

4. Confirmatory Measurements (IP 84725)

a. Quality Assurance

The inspectors reviewed the radioactivity measurements laboratory quality assurance program including the physical facilities, laboratory operations, and procedures. Pertinent laboratory and counting room operating procedures found in Health Physics Department Procedures (HDP) and Health Physics Technical Procedures (HTP) were reviewed for technical content by the inspectors. Procedures reviewed included Count Room Quality Control Program (HDP-ZZ-04700), Calibration of Intrinsic Germanium Detectors (HTP-ZZ-04538), Count Room Analytic and Quality Control Calculations and Methods (HTP-ZZ-06020), and Operation of the Gamma Spectroscopy Counting System (HTP-ZZ-04537). The inspectors also reviewed Quality Control records and related supporting documentation. Documents inspected included results for germanium detector calibration and efficiency tables. The inspectors also verified that calibrations for release geometries had been confirmed semiannually per HTP-ZZ-04538 4.8. However, the inspectors expressed concern to the licensee that the latest confirmation tests of detector calibrations performed in January 1988 had not been closed out. Charcoal and planchette geometry confirmation tests showed some inconsistencies that had not been resolved by the licensee. The licensee will give priority to completing the last confirmation tests and will initiate a change in procedure to require completion of future confirmation tests within a reasonable length of time.

The licensee participates in a quarterly intercomparison crosscheck program with an outside vendor. Some of these samples are forwarded to the licensee's contract laboratory for Sr-89, Sr-90, and Fe-55 analyses. A review of the fourth quarter 1986 results for these specific analyses showed the contract laboratory achieved one out of three agreements. A licensee assessment (UOTH-87-154) of the contract laboratory's past performance resulted in a new laboratory being selected for future analyses. The 1987 intercomparison results showed a marked improvement. Crosscheck program results for in-house gamma-ray analysis for third quarter 1986, first quarter 1987, and first quarter 1988, were reviewed. The results were generally good with some minor disagreements.

Daily QC charts for the germanium detectors were inspected. The Health Physicist responsible for interpreting and evaluating the charts was interviewed by an inspector and appeared to be competent and knowledgeable in this area. Rad/Chem Technicians were observed and evaluated on sample acquisition and preparation, and general laboratory practices. One technician was observed pouring low level radioactive liquid into a container without wearing gloves. The licensee acknowledged the inspectors' concern and agreed to discuss the laboratory practices with Rad Chem personnel.

b. Sample Split

Six samples (air particulate, charcoal absorber, charcoal spike, reactor coolant, liquid waste and gas) were analyzed for gamma emitting isotopes by the licensee and in the Region III mobile laboratory on site. Comparisons were made on combinations of the licensee's four normally used count room detectors and on a back up system in the EOF. Results of the sample comparisons are given in Table 1; comparison criteria are given in Attachment 1. The licensee achieved 87 agreements out of 89 comparisons.

A containment air particulate, a liquid waste monitor tank, a reactor coolant and a gas sample yielded all agreements. The licensee agreed to analyze or have a portion of the liquid sample analyzed for gross alpha, gross beta, H-3, Sr-89, Sr-90 and Fe-55 and report the results to Region III (Open Item 50-483/88008-01).

A containment charcoal absorber yielded a disagreement on Detector 2 and on the EOF detector for Br-82. In addition to the disagreement, the iodine comparisons, although agreements, were biased low. A spiked charcoal absorber was analyzed as an unknown on Detector 2 and by the inspectors resulting in all agreements. The inspectors then demonstrated to the licensee that activity distribution on the sample and the calibration standard were not the same which caused the low bias in the analyses. The licensee was cautioned of the potential for under reporting halogen fission products in samples collected under abnormal conditions. The licensee acknowledged the inspectors comments.

c. Audits

The inspectors reviewed several surveillance reports and audit reports related to radiochemistry. There were no findings made relating to confirmatory measurements. The inspector also noted the high quality of the surveillance reports and, in particular, the technical quality of "Surveillance of EBAR" performed in January 1988.

No violations or deviations were noted.

5. Environmental Protection (IP 80721)

The inspectors reviewed the radiological portion of the licensee's "Annual Environmental Operating Report" for 1986 and 1987. The levels of radioactivity in the samples collected around the plant were generally consistent with previous data. There appears to be no evidence that the plant operation has had any significant environmental impact.

No violations or deviations were identified.

6. Collocated TLD Verification (TI 25000/22, IP 80721)

The inspectors examined ten locations where licensee and NRC dosimeters were thought to be collocated. Eight of the locations appeared close enough in distance and azimuth to be so regarded. NRC TLD Stations Nos. 8 and 27 were not collocated with Licensee's Stations Nos. 47 and 15, respectively.

No violations or deviations were identified.

7. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. An open item disclosed during the inspection is discussed in Section 4b.

8. Exit Meeting

The inspectors met with licensee representatives denoted in Section 1 at the conclusion of the inspection on May 6, 1988. The scope of the inspection and findings were discussed.

During the inspection 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 procedures as proprietary.

Attachments:

1. Attachment 1, Criteria for Comparing Analytical Measurements
2. Table 1, Confirmatory Measurements Program Results, 1st Quarter 1988

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'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.

RESOLUTION

RATIO = LICENSEE VALUE/NRC REFERENCE VALUE

Agreement

<3	No Comparison
<u>≥</u> 3 and <4	0.4 - 2.5
<u>≥</u> 4 and <8	0.5 - 2.0
<u>≥</u> 8 and <16	0.6 - 1.67
<u>≥</u> 16 and <51	0.75 - 1.33
<u>≥</u> 51 and <200	0.80 - 1.25
<u>≥</u> 200	0.85 - 1.18

Some discrepancies may result from the use of different equipment, techniques, and for some specific nuclides. These may be factored into the acceptance criteria and identified on the data sheet.

TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: CALLAWAY  
 FOR THE 2 QUARTER OF 1988

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC----		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
PRIMARY	NA-24	1.2E-03	4.6E-05	1.2E-03	5.0E-05	9.7E-01	2.6E 01	A
<i>DET 1</i>	CR-51	4.0E-03	3.5E-04	3.4E-03	2.9E-04	8.7E-01	1.1E 01	A
	MN-54	5.1E-04	4.0E-05	6.0E-04	3.8E-05	1.2E 00	1.3E 01	A
	CO-58	4.0E-03	6.2E-05	3.5E-03	6.1E-05	8.7E-01	6.5E 01	A
	CO-60	3.4E-04	2.9E-05	3.2E-04	2.8E-05	9.3E-01	1.2E 01	A
	I-131	5.7E-03	6.6E-05	5.8E-03	6.4E-05	1.0E 00	8.6E 01	A
	I-132	4.5E-03	7.4E-05	4.4E-03	7.3E-05	9.8E-01	6.0E 01	A
	I-133	1.1E-02	7.9E-05	1.1E-02	8.3E-05	9.9E-01	1.4E 02	A
	I-135	4.9E-03	1.6E-04	4.8E-03	1.7E-04	9.8E-01	3.1E 01	A
	CS-137	5.3E-04	3.8E-05	4.7E-04	3.4E-05	8.7E-01	1.4E 01	A
P FILTER	CR-51	6.8E-12	6.8E-13	6.8E-12	3.5E-13	1.0E 00	1.0E 01	A
<i>DET 4</i>	MN-54	5.7E-13	6.8E-14	5.4E-13	4.5E-14	9.5E-01	8.4E 00	A
	CO-58	6.0E-12	1.9E-13	6.3E-12	1.3E-13	1.1E 00	3.2E 01	A
	CO-60	6.2E-13	6.8E-14	5.9E-13	5.3E-14	9.6E-01	9.1E 00	A
	I-131	6.4E-13	6.9E-14	4.7E-13	0.0E-01	7.3E-01	9.2E 00	A
	ZR-95	7.0E-13	1.2E-13	5.3E-13	6.6E-14	7.5E-01	5.9E 00	A
	NB-95	6.1E-13	8.4E-14	6.0E-13	4.7E-14	9.9E-01	7.3E 00	A
	MO-99	1.7E-12	4.7E-13	1.5E-12	3.1E-14	9.3E-01	3.5E 00	A
	CS-134	4.6E-13	1.2E-13	2.7E-13	4.3E-14	5.9E-01	3.9E 00	A
	CS-137	1.2E-12	1.2E-13	9.2E-13	6.0E-14	8.0E-01	9.9E 00	A
	CE-144	6.8E-13	6.7E-14	7.2E-13	1.3E-13	1.0E 00	1.0E 01	A
	HF-181	3.3E-13	9.5E-14	2.4E-13	0.0E-01	7.3E-01	3.5E 00	A
PRIMARY	NA-24	1.2E-03	4.4E-05	1.2E-03	3.4E-05	9.8E-01	2.7E 01	A
<i>DET 3</i>	CR-51	3.1E-03	3.3E-04	3.8E-03	2.0E-04	1.2E 00	9.4E 00	A
	MN-54	8.3E-04	4.8E-05	6.5E-04	3.9E-05	7.9E-01	1.7E 01	A
	CO-58	3.9E-03	6.0E-05	4.0E-03	5.0E-05	1.0E 00	6.5E 01	A
	CO-60	3.9E-04	2.8E-05	3.0E-04	2.3E-05	7.7E-01	1.4E 01	A
	I-131	5.8E-03	6.8E-05	5.9E-03	5.5E-05	1.0E 00	8.5E 01	A
	I-132	4.4E-03	6.3E-05	4.6E-03	5.6E-05	1.0E 00	6.9E 01	A
	I-133	1.1E-02	7.8E-05	1.2E-02	7.0E-05	1.0E 00	1.4E 02	A

T TEST RESULTS:  
 A=AGREEMENT  
 D=DISAGREEMENT  
 \*=CRITERIA RELAXED  
 N=NO COMPARISON

TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: CALLAWAY  
 FOR THE 2 QUARTER OF 1980

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC----		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
PRIMARY	I-135	5.3E-03	1.7E-04	5.1E-03	1.4E-04	9.5E-01	3.1E 01	A
DGT 3 CONT.	CS-134	1.4E-04	3.0E-05	1.3E-04	2.5E-05	9.3E-01	4.6E 00	A
	CS-137	5.4E-04	3.8E-05	5.3E-04	2.7E-05	9.9E-01	1.4E 01	A
P FILTER	CR-51	6.8E-12	6.8E-13	6.4E-12	3.5E-13	9.5E-01	1.0E 01	A
DGT 1	CO-58	6.0E-12	1.9E-13	5.7E-12	1.2E-13	9.5E-01	3.2E 01	A
	MN-54	5.7E-13	6.8E-14	6.0E-13	5.2E-14	1.0E 00	8.4E 00	A
	CO-60	6.2E-13	6.8E-14	5.7E-13	5.3E-14	9.3E-01	9.1E 00	A
	I-131	6.4E-13	6.9E-14	6.0E-13	0.0E-01	9.4E-01	9.2E 00	A
	ZR-95	7.0E-13	1.2E-13	6.5E-13	7.5E-14	9.3E-01	5.9E 00	A
	NB-95	6.1E-13	8.4E-14	5.8E-13	5.0E-14	9.5E-01	7.3E 00	A
	MO-99	1.7E-12	4.7E-13	1.5E-12	3.2E-14	9.3E-01	3.5E 00	A
	CS-134	4.6E-13	1.2E-13	2.8E-13	4.4E-14	6.2E-01	3.9E 00	A
	CS-137	1.2E-12	1.2E-13	9.4E-13	6.3E-14	8.1E-01	9.9E 00	A
	CE-144	6.8E-13	6.7E-14	6.2E-13	1.3E-13	9.0E-01	1.0E 01	A
	HF-181	3.3E-13	9.5E-14	1.5E-13	0.0E-01	4.4E-01	3.5E 00	A
C FILTER	BR-82	1.3E-11	4.8E-13	8.5E-12	2.1E-13	6.8E-01	2.6E 01	D
DGT 2	I-131	5.5E-11	6.8E-13	4.9E-11	3.3E-13	9.0E-01	8.1E 01	A
	I-133	3.4E-12	3.1E-13	2.9E-12	1.1E-13	8.7E-01	1.1E 01	A
L WASTE	CR-51	2.2E-05	2.1E-06	2.7E-05	1.3E-06	1.2E 00	1.1E 01	A
EOP	MN-54	5.9E-06	3.1E-07	5.5E-06	1.2E-07	9.3E-01	1.9E 01	A
	FE-59	1.2E-06	2.7E-07	1.4E-06	1.7E-07	1.2E 00	4.3E 00	A
	CO-58	3.1E-05	3.8E-07	2.8E-05	2.0E-07	9.2E-01	8.1E 01	A
	CO-60	2.1E-06	1.5E-07	2.2E-06	9.5E-08	1.0E 00	1.4E 01	A
	W-187	1.6E-06	7.7E-07	2.3E-06	3.0E-07	1.4E 00	2.1E 00	A
	I-131	1.0E-04	6.0E-07	9.8E-05	3.2E-07	9.5E-01	1.7E 02	A
	I-132	1.3E-05	8.2E-07	1.2E-05	3.4E-07	9.2E-01	1.6E 01	A
	I-133	1.3E-04	6.9E-07	1.2E-04	3.5E-07	9.3E-01	1.9E 02	A
	I-135	4.1E-05	1.3E-06	3.9E-05	7.3E-07	9.4E-01	3.1E 01	A
	CS-134	4.1E-06	3.2E-07	3.9E-06	1.3E-07	9.4E-01	1.3E 01	A

T TEST RESULTS:  
 A=AGREEMENT  
 D=DISAGREEMENT  
 \*=CRITERIA RELAXED  
 N=NO COMPARISON



TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: CALLAWAY  
 FOR THE 2 QUARTER OF 1988

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
L WASTE	CS-136	2.0E-06	2.2E-07	2.8E-06	1.2E-07	1.0E 00	1.3E 01	A
EOF CONT	CS-137	1.6E-05	2.9E-07	1.5E-05	1.5E-07	9.4E-01	5.6E 01	A
C FILTER	BR-82	1.3E-11	4.8E-13	8.3E-12	2.1E-13	6.6E-01	2.6E 01	D
EOF	I-131	5.5E-11	6.8E-13	4.6E-11	3.0E-13	8.3E-01	8.1E 01	A
	I-133	3.4E-12	3.1E-13	2.6E-12	1.2E-13	7.8E-01	1.1E 01	A
OFF GAS	XE-133	7.8E-04	1.5E-05	7.7E-04	1.4E-06	1.0E 00	5.3E 01	A
DET 2	XE-135	1.8E-05	2.1E-06	1.7E-05	1.3E-07	9.1E-01	8.7E 00	A
C SPIKED	CO-57	9.2E-03	1.7E-04	9.7E-03	9.4E-05	1.1E 00	5.4E 01	A
DET 2	CO-60	2.0E-02	5.8E-04	1.9E-02	3.3E-04	9.9E-01	3.4E 01	A
	HG-203	6.3E-03	2.5E-04	6.6E-03	1.2E-04	1.0E 00	2.5E 01	A
	Y-88	2.1E-02	6.5E-04	2.1E-02	3.2E-04	1.0E 00	3.2E 01	A
	CD-109	5.2E-01	6.4E-03	5.5E-01	3.5E-03	1.1E 00	8.1E 01	A
	SN-113	1.3E-02	3.9E-04	1.4E-02	2.1E-04	1.1E 00	3.3E 01	A
	CS-137	1.8E-02	5.5E-04	2.0E-02	2.7E-04	1.1E 00	3.3E 01	A
	CE-139	7.3E-03	2.0E-04	7.6E-03	9.8E-05	1.0E 00	3.6E 01	A
OFF GAS	XE-133	7.6E-04	1.4E-05	7.8E-04	1.2E-06	1.0E 00	5.4E 01	A
DET 3	XE-135	1.4E-05	1.7E-06	1.7E-05	1.2E-07	1.2E 00	8.4E 00	A
L WASTE	NA-24	1.0E-05	3.2E-07	1.0E-05	1.9E-07	1.0E 00	3.2E 01	A
DET 4	CR-51	2.7E-05	2.0E-06	2.8E-05	1.6E-06	1.0E 00	1.3E 01	A
	MN-54	5.4E-06	2.6E-07	4.2E-06	1.4E-07	7.8E-01	2.1E 01	A
	CO-58	3.0E-05	4.1E-07	2.9E-05	2.6E-07	9.6E-01	7.4E 01	A
	CO-60	2.0E-06	2.2E-07	2.3E-06	1.1E-07	1.1E 00	9.5E 00	A
	W-187	2.4E-06	6.8E-07	3.1E-06	0.0E-01	1.3E 00	3.5E 00	A
	I-131	1.0E-04	6.3E-07	1.0E-04	3.7E-07	9.9E-01	1.7E 02	A
	I-132	1.3E-05	3.5E-07	1.3E-05	1.9E-07	9.9E-01	3.8E 01	A
	I-133	1.3E-04	6.5E-07	1.3E-04	4.1E-05	9.7E-01	2.0E 02	A
	I-135	3.9E-05	1.2E-06	4.0E-05	7.2E-07	1.0E 00	3.2E 01	A

## T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

\*\*CRITERIA RELAXED

N=NO COMPARISON

TABLE 1

U S NUCLEAR REGULATORY COMMISSION  
 OFFICE OF INSPECTION AND ENFORCEMENT  
 CONFIRMATORY MEASUREMENTS PROGRAM  
 FACILITY: CALLAWAY  
 FOR THE 2 QUARTER OF 1988

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	REG	T
L WASTE	CS-134	4.0E-06	2.5E-07	3.9E-06	1.7E-05	1.0E 00	1.6E 01	A
<i>DET 4 cont</i>	CS-136	3.4E-06	2.4E-07	3.2E-06	1.6E-07	9.3E-01	1.4E 01	A
	CS-137	1.5E-05	3.2E-07	1.6E-05	1.9E-07	1.0E 00	4.7E 01	A

T TEST RESULTS:  
 A=AGREEMENT  
 D=DISAGREEMENT  
 \*=CRITERIA RELAXED  
 N=NO COMPARISON