

June 23, 2005

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Washington, DC 20555-0001

Ladies and Gentlemen:

ULNRC-05164

**DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
2004 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
Reference: ULNRC-05140, dated April 29, 2005**



Please find enclosed a revision of the referenced 2004 Annual Radioactive Effluent Release Report for the Callaway Plant. Revised are Tables 1A and 1B for the first and second Quarters of 2004. Tables 5, 6, 7, and section 6 were also revised. The revisions were made following discovery of a discrepancy with Auxiliary Boiler Release Permit UR03-2004-G0036;2. The revisions are provided as attachments to this letter. These documents are submitted in accordance with Sections 5.6.3 and 5.5.1 of the Technical Specifications.

Very truly yours,

A handwritten signature in cursive script that reads "Keith D. Young".

Keith D. Young
Manager, Regulatory Affairs

DJW/jdg

- Attachments:
1. Table 1A, Semiannual Summation of Gaseous Releases, All Airborne Effluents 1st and 2nd Quarter 2004
 2. Table 1B, Semiannual Airborne Continuous and Batch Releases, Ground Level Releases 1st and 2nd Quarter 2004
 3. Table 5, Dose at the Site Boundary and to the Nearest Resident from Gaseous Effluents
 4. Table 6, Dose to the Member of the Public from Activities within the Site Boundary
 5. Table 7, Total Dose Due to the Uranium Fuel Cycle (Member of the Public)
 6. Section 6, Related Information – Unplanned Releases

IE48

ULNRC-05164

June 23, 2005

Page 2

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Semiannual Summation of Gaseous Releases

All Airborne Effluents

TABLE 1A

SEMIANNUAL SUMMATION OF GASEOUS RELEASES
ALL AIRBORNE EFFLUENTS

QUARTERS 1 AND 2, 2004

| TYPE OF EFFLUENT | UNITS | FIRST QUARTER | SECOND QUARTER | EST TOTAL ERROR % (a) |
|--|---------|---------------|----------------|-----------------------|
| A. FISSION AND ACTIVATION GASES | | | | |
| 1. TOTAL RELEASE | CURIES | 3.01E+02 | 4.72E+02 | 20 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | uCi/SEC | 3.83E+01 | 6.01E+01 | |
| 3. PERCENT OF TECH SPEC LIMIT | % | N/A | N/A | |
| B. RADIOIODINES | | | | |
| 1. TOTAL IODINE-131 | CURIES | 6.40E-05 | 2.30E-03 | 23 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | uCi/SEC | 8.14E-06 | 2.93E-04 | |
| 3. PERCENT OF TECH SPEC LIMIT | % | N/A | N/A | |
| C. PARTICULATES | | | | |
| 1. PARTICULATE (HALF-LIVES > 8 DAYS) | CURIES | 1.29E-04 | 6.32E-05 | 30 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | uCi/SEC | 1.64E-05 | 8.03E-06 | |
| 3. PERCENT OF TECH SPEC LIMIT | % | N/A | N/A | |
| 4. GROSS ALPHA RADIOACTIVITY | CURIES | 4.71E-07 | 4.11E-07 | |
| D. TRITIUM | | | | |
| 1. TOTAL RELEASE | CURIES | 6.09E+00 | 1.31E+01 | 14 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | uCi/SEC | 7.75E-01 | 1.66E+00 | |
| 3. PERCENT OF TECH SPEC LIMIT | % | N/A | N/A | |

(a) Safety Analysis Calculation 87-063-00, January 6, 1988

Semiannual Airborne Continuous and Batch Releases, Ground Level Releases

TABLE 1B

SEMIANNUAL AIRBORNE CONTINUOUS AND BATCH RELEASES GROUND LEVEL RELEASES FISSION GASES, IODINES, AND PARTICULATES

QUARTERS 1 AND 2, 2004

| NUCLIDE | UNITS | CONTINUOUS RELEASES | | BATCH RELEASES | |
|-------------------------|---------------|---------------------|-----------------|-----------------|-----------------|
| | | FIRST QUARTER | SECOND QUARTER | FIRST QUARTER | SECOND QUARTER |
| 1. FISSION GASES | | | | | |
| AR-41 | CURIES | 0.00E+00 | 0.00E+00 | 6.62E-02 | 1.17E-01 |
| XE-133 | CURIES | 2.77E+02 | 4.42E+02 | 2.09E-01 | 1.53E+01 |
| XE-135 | CURIES | 1.08E+01 | 5.25E+00 | 1.47E-03 | 4.52E-02 |
| KR-85M | CURIES | 2.89E+00 | 4.71E-01 | 0.00E+00 | 2.76E-03 |
| XE-135M | CURIES | 0.00E+00 | 3.76E-01 | 2.63E-06 | 0.00E+00 |
| KR-87 | CURIES | 9.03E-01 | 1.04E-01 | 0.00E+00 | 0.00E+00 |
| XE-131M | CURIES | 1.60E+00 | 1.71E+00 | 1.16E-03 | 1.15E-01 |
| XE-133M | CURIES | 2.54E+00 | 5.25E+00 | 9.20E-04 | 4.54E-02 |
| KR-88 | CURIES | 3.42E+00 | 4.54E-01 | 0.00E+00 | 1.43E-02 |
| KR-85 | CURIES | 0.00E+00 | 0.00E+00 | 2.10E+00 | 3.26E-01 |
| XE-138 | CURIES | 0.00E+00 | 2.06E-01 | 0.00E+00 | 0.00E+00 |
| TOTAL FOR PERIOD | CURIES | 2.99E+02 | 4.56E+02 | 2.38E+00 | 1.59E+01 |
| 2. IODINES | | | | | |
| I-133 | CURIES | 0.00E+00 | 1.86E-05 | 2.17E-05 | 9.16E-06 |
| I-131 | CURIES | 5.30E-06 | 1.15E-03 | 5.87E-05 | 1.15E-03 |
| I-132 | CURIES | 0.00E+00 | 1.04E-05 | 5.71E-06 | 1.21E-04 |
| I-135 | CURIES | 0.00E+00 | 0.00E+00 | 4.66E-06 | 0.00E+00 |
| TOTAL FOR PERIOD | CURIES | 5.30E-06 | 1.18E-03 | 9.08E-05 | 1.28E-03 |
| 3. PARTICULATES | | | | | |
| CS-137 | CURIES | 1.05E-06 | 2.99E-07 | 1.62E-05 | 3.86E-06 |
| SB-125 | CURIES | 2.61E-06 | 5.54E-07 | 0.00E+00 | 0.00E+00 |
| BA-140 | CURIES | 0.00E+00 | 0.00E+00 | 5.13E-07 | 3.57E-07 |
| CS-134 | CURIES | 0.00E+00 | 0.00E+00 | 2.44E-05 | 1.26E-05 |
| CS-136 | CURIES | 0.00E+00 | 0.00E+00 | 2.61E-06 | 5.64E-07 |
| NA-24 | CURIES | 0.00E+00 | 0.00E+00 | 4.30E-08 | 0.00E+00 |
| CO-58 | CURIES | 0.00E+00 | 5.58E-06 | 2.55E-07 | 3.79E-06 |
| CO-60 | CURIES | 4.67E-07 | 0.00E+00 | 8.07E-05 | 3.36E-05 |
| NB-95 | CURIES | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.25E-07 |
| CR-51 | CURIES | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-06 |
| ALPHA | CURIES | 4.71E-07 | 4.11E-07 | 0.00E+00 | 0.00E+00 |
| TOTAL FOR PERIOD | CURIES | 4.60E-06 | 6.84E-06 | 1.25E-04 | 5.67E-05 |

**Semiannual Airborne Continuous and
Batch Releases, Ground Level Releases
Fission Gases, Iodines, and Particulates**

TABLE 1B (continued)

**SEMIANNUAL AIRBORNE CONTINUOUS AND BATCH RELEASES
GROUND LEVEL RELEASES
FISSION GASES, IODINES, AND PARTICULATES**

QUARTERS 1 AND 2, 2004

| NUCLIDE | UNITS | CONTINUOUS RELEASES | | BATCH RELEASES | |
|-------------------|--------|---------------------|----------------|----------------|----------------|
| | | FIRST QUARTER | SECOND QUARTER | FIRST QUARTER | SECOND QUARTER |
| 4. TRITIUM | | | | | |
| H-3 | CURIES | 6.00E+00 | 1.20E+01 | 8.60E-02 | 1.02E+00 |

Table 5

Dose at the Site Boundary and to the

Nearest Resident From Gaseous Effluents

Table 5

DOSE AT THE SITE BOUNDARY AND TO THE NEAREST RESIDENT FROM GASEOUS EFFLUENTS

| ORGAN | UNITS | SITE BOUNDARY | | NEAREST RESIDENT | |
|------------------|-------|---------------|-------------|------------------|-------------|
| | | DOSE | % LIMIT (a) | DOSE | % LIMIT (b) |
| GAMMA AIR DOSE * | MRAD | 1.29E-02 | 0.13 | 8.50E-03 | N/A |
| BETA AIR DOSE * | MRAD | 3.03E-02 | 0.15 | 1.99E-02 | N/A |
| WHOLE BODY *** | MREM | 1.17E-02 | N/A | 7.69E-03 | N/A |
| SKIN *** | MREM | 2.50E-02 | N/A | 1.65E-02 | N/A |
| BONE ** | MREM | 4.86E-04 | N/A | 1.73E-03 | 0.01 |
| LIVER ** | MREM | 1.75E-03 | N/A | 9.33E-03 | 0.06 |
| TOTAL BODY ** | MREM | 1.75E-03 | N/A | 8.25E-03 | 0.05 |
| THYROID ** | MREM | 2.90E-03 | N/A | 2.23E-01 | 1.49 |
| KIDNEY ** | MREM | 1.75E-03 | N/A | 9.06E-03 | 0.06 |
| LUNG ** | MREM | 1.78E-03 | N/A | 7.81E-03 | 0.05 |
| GI-LLI ** | MREM | 1.75E-03 | N/A | 7.77E-03 | 0.05 |

* Dose from Noble Gases only.

** Dose from Tritium, Radioiodines, and Particulates only.

*** Dose from Noble Gases plus Ground Plane dose.

(a) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003) of 10 mrad gamma air dose and 20 mrad beta air dose.

(b) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003) of 15 mrem to any organ from I-131, I-133, H-3, and particulate radionuclides with half-lives greater than 8 days.

From Activities within the Site Boundary

Table 6

DOSE TO THE MEMBER OF THE PUBLIC FROM ACTIVITIES
WITHIN THE SITE BOUNDARY

(MEMBER OF THE PUBLIC)

| ORGAN | UNITS | EFFLUENT DOSE WITHIN THE SITE BOUNDARY | DIRECT RADIATION FROM THE UNIT | DIRECT RADIATION FROM OUTSIDE TANKS | DIRECT RADIATION FROM RAM STORAGE | EFFLUENT DOSE FROM CLG. TWR | TOTAL DOSE FOR THE YEAR |
|------------|-------|---|---|--|--|--------------------------------------|----------------------------------|
| SKIN | MREM | 5.80E-03 | N/A | N/A | N/A | N/A | 5.80E-03 |
| BONE | MREM | 1.41E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | N/A | 1.21E-02 |
| LIVER | MREM | 5.05E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.25E-02 |
| TOTAL BODY | MREM | 3.15E-03 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.51E-02 |
| THYROID | MREM | 7.19E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.27E-02 |
| KIDNEY | MREM | 5.05E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.25E-02 |
| LUNG | MREM | 5.10E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.25E-02 |
| GI-LLI | MREM | 5.04E-04 | 8.79E-03 | 1.36E-03 | 1.82E-03 | 2.08E-05 | 1.25E-02 |

Total Dose Due to the Uranium Fuel Cycle

(Member of the Public)

Table 7

TOTAL DOSE DUE TO THE URANIUM FUEL CYCLE

(MEMBER OF THE PUBLIC)

| ORGAN | UNITS | EFFLUENT DOSE AT THE RESIDENCE LOCATION | DOSE FROM ACTIVITIES WITHIN SITE BOUNDARY | DOSE FROM CLG TWR H-3 AT NEAREST RESIDENCE | TOTAL DOSE TO THE MEMBER OF THE PUBLIC | % LIMITS* |
|------------|-------|---|---|--|--|-----------|
| SKIN | MREM | 1.62E-02 | 5.80E-03 | N/A | 2.20E-02 | 0.09 |
| BONE | MREM | 6.61E-04 | 1.21E-02 | N/A | 1.28E-02 | 0.05 |
| LIVER | MREM | 5.38E-03 | 1.25E-02 | 1.42E-05 | 1.79E-02 | 0.07 |
| TOTAL BODY | MREM | 1.26E-02 | 1.51E-02 | 1.42E-05 | 2.77E-02 | 0.11 |
| THYROID | MREM | 7.98E-02 | 1.27E-02 | 1.42E-05 | 9.25E-02 | 0.12 |
| KIDNEY | MREM | 5.30E-03 | 1.25E-02 | 1.42E-05 | 1.78E-02 | 0.07 |
| LUNG | MREM | 4.85E-03 | 1.25E-02 | 1.42E-05 | 1.73E-02 | 0.07 |
| GI-LLI | MREM | 4.92E-03 | 1.25E-02 | 1.42E-05 | 1.74E-02 | 0.07 |

* Annual dose limits from 40CFR190.10(a) of 25 mrem whole body, 75 mrem to the thyroid, and 25 mrem to any other organ.

5.0

Solid Wastes

The quantities of radioactive material released in shipments of solid waste for burial and irradiated fuel transported from the site during the year are summarized in Table 3. The total quantity and radioactivity reported in Table 3 for each waste type was for waste buried and includes wastes buried by waste reprocesses after volume reduction. The activity and fractional abundance of each nuclide was determined for each waste type based upon radiochemical analysis by an independent laboratory. The curie concentration

of each nuclide listed in Table 3 was determined as the product of the fractional abundance and the total curies shipped. Those nuclides which comprise at least 1% of the total activity for a particular waste type are presented in Table 3.

6.0

Related Information

6.1 Unplanned Releases

Unplanned releases are:

- 1) Inadvertent or accidental releases of radioactive material.
- 2) Releases of radioactive material via normal pathways without a release permit, proper authorization, or proper sampling and analysis.
- 3) Releases which are conducted in such a manner as to result in significant deviation from the requirements of the release permit.

Auxiliary Boiler Contamination

On April 10, 1998, during a refueling outage, radioactivity was detected in the Auxiliary Boiler feed water system. The boiler was flushed and cleaned several times in an attempt to decontaminate the unit. Small amounts of contamination remained in the sludge. During subsequent operation of the boiler small amounts

of contamination leached from the sludge and were detected in the boiler water.

An investigation was performed to locate the source of the contamination. No miss-positioned valves or leaks were identified. The results of sampling different system components were inconclusive, but may indicate a small leak in the SLWE heat exchanger. During refueling operations, the concentration of radioactive nuclides in the SLWE system can be a factor of 1000 times higher than normal operations. The size of the leak may be small enough to only be recognized when these high concentrations are present. Increased monitoring was initiated in an attempt to identify the source of the contamination. No additional contamination was identified.

A 10CFR50.59 evaluation concluded that the resulting dose to a Member of the Public from the release of radioactive material to the environment would be a small fraction of the regulatory dose limits. Therefore, continued operation of the Auxiliary Boiler would not pose any significant safety or environmental concern.

6.0

Related Information

The Auxiliary Boiler was operated intermittently during 2004. The maximum total body dose to a Member of the Public from these releases was $4.85E-05$ mrem during 2004. This is negligible compared to the quarterly and annual effluent control limits. The total activity released from the Auxiliary Boiler in 2004 was $1.04E-01$ Curies.

Containment Equipment Hatch

Air samples taken outside of the Containment Equipment hatch during RF012 indicated reactor produced isotopes (CAR 200207059).

Releases of radioactivity from the Containment Equipment hatch in 2004 (RFO13) were quantified and are included in this report. The total amount of activity released from the Containment Equipment hatch was approximately 13.9 Curies, primarily consisting of Noble gases.

The maximum total body dose to a Member of the Public from these releases was $2.65E-04$ mrem during 2004. This is negligible compared to the quarterly and annual effluent control limits. The activity released from the Containment Equipment hatch during 2004 is included in Tables 1A, 1B, 5, 6, and 7.

Auxiliary Boiler Operated w/o Release Permit

On 1/27/04, the Auxiliary Boiler was started prior to release permit generation (CAR 200400644). Control room procedures require release permit generation prior to operation. Approximately 30 minutes after operation began, the Count Room technicians were notified and a release permit was generated. The total activity released during this release was $1.82E-03$ Curies and the Total Body dose to a Member of the Public was $3.28E-07$ mrem. As expected, the activity and dose from this release was well below regulatory limits.

To prevent reoccurrence, Radiation Protection procedures were revised to provide a continuously open Auxiliary Boiler release permit to allow the Callaway Operations staff increased operating flexibility.

Antimony-122 In Liquid Effluents

Antimony-122 (Sb-122) was discovered in liquid effluent release permits during Health Physicist review (CAR 200409000). Sb-122 was initially discovered in reactor coolant samples and added to the effluent release library based on the comparison. After the radionuclide was added to the release library, an interference with Cs-134 at the 564 keV energy was noticed. All of the liquid release permits from 2004 were evaluated for Sb-122. The evaluation revealed 10 batch liquid release permits where Sb-122 was present. The affected release permits were revised to account for Sb-122.

Sb-122 was also added to Table 2.1, Ingestion Dose Commitment Factor (A_{IT}) for Adult Age Group, of APA-ZZ-01003, Callaway ODCM. The total amount of Sb-122 activity released in liquid effluents was $1.29E-03$ Curies. The dose from Sb-122 was well below 1% of the total dose from liquid effluents in 2004.

'A' Mixed Bed Demineralizer Flush

On 4/6/04, the control room commenced a flush of 'A' Mixed Bed Demineralizer in accordance with plant procedures. Shortly after the flush began, the Auxiliary Building ventilation exhaust particulate monitor GL-RE-60 alarmed in the control room (CAR 200402553). Trends on GL-RE-60 indicated a step increase in activity. As a result of the alarm, the control room decided to secure the flush of 'A' Mixed Bed Demineralizer.