# SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

## SURRY POWER STATION

(January 1, 1988 Through June 30, 1988)

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## FORWARD

This report is submitted as required by Appendix A to Operating License No.'s DPR-32 and DPR-37, Technical Specifications for Surry Power Station, Units 1 and 2, Virginia Electric and Power Company, Docket No.'s 50-280, 50-281, Section 6.6.B.3. and as required by Appendix C to Materials License No. SNM-2501, Technical Specifications for Environmental Protection for Surry Independent Spent Fuel Storage, Docket No. 72-2, Section 1.4.1.

# RADIOACTIVE EFFLUENT RELEASE REPORT

# FOR THE

# SURRY POWER STATION

## (January 1, 1988 Through June 30, 1988)

## Index

## 1.0 Purpose and Scope

The Radioactive Effluent Release Report includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", Revision 1, June 1974, with data summarized on a quarterly basis following the format of Tables 1, 2 and 3 of Appendix B thereof. The report submitted within 60 days after January 1 of each year includes an assessment of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the site during the previous calendar year. The report also includes a list of unplanned releases during the reporting period.

As required by Technical Specification 6.8B, changes to the ODCM for the time period covered by this report are included. Information is provided to support the changes along with a package of those pages of the ODCM changed.

This report includes changes to the PCP with information and documentation necessary to support the rationale for the changes as required by Technical Specification 6.8A.

Major changes to the radioactive liquid, gaseous and solid waste treatment systems are reported as required by Technical Specification 6.9. Information to support the reason for the change and a summary of the 10CFR50.59 evaluation are included. In lieu of reporting major changes in this report, major changes to the radioactive waste treatment systems may be submitted as part of the annual FSAR update.

As required by Technical Specification 3.7E.2, a list and explanation for the inoperability of radioactive liquid and/or gaseous effluent monitors are provided in this report.

## 2.0 Discussion

The basis for the calculation of the percent of technical specification for the critical organ in Table 1A of Attachment 1, is Technical Specification 3.11B.1.a (ii). Technical Specification 3.11B.1.a (ii) requires that the dose rate for iodine - 131, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days shall be less than or equal to 1500 mRem/yr to the critical organ at or beyond the site boundary. The critical organ is the child's thyroid, inhalation pathway.

The basis for the calculation of percent of technical specification for the total body and skin in Table 1A of Attachment 1, is Technical Specification 3.11B.1.a (i). This Technical Specification requires that the dose rate for noble gases to areas at or beyond site boundary shall be less than or equal to 500 mRem/yr to the total body and less than or equal to 3000 mRem/yr to the skin.

The basis for the calculation of the percent of technical specification in Table 2A of Attachment 1, is Technical Specification 3.11A.1.a. Technical Specification 3.11A.1.a states that the concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10CFR20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2 \times 10^{-4}$ microcuries/ml.

Percent of technical specification calculations are based on the total gaseous or liquid effluents released for that respective quarter.

The annual and quarterly doses, as reported in Attachment 2, were calculated according to the methodology presented in the ODCM. The beta and gamma air doses due to noble gases released from the site were calculated at site boundary. The maximum exposed member of the public from the release of airborne iodine - 131, tritium and all radionuclides in particulate form with half lives greater than 8 days, is defined as an infant, exposed through the grass-cow-milk pathway, with the critical organ being the thyroid. The maximum exposed member of the public from radioactive materials in liquid effluents in unrestricted areas is defined as an adult, exposed by either the invertebrate or fish pathway, with the critical organ being either the thyroid or GI-LLI. The total body dose was also determined for this individual.

Unplanned releases presented in Attachment 7 are defined in Technical Specification 6.6.B.3 as those gaseous releases exceeding Technical Specification 3.11.B.1.a and those liquid releases exceeding Technical Specification 3.11.A.1.a.

The typical lower level of detection (LLD) capabilities of the radioactive effluent analysis instrumentation are presented in Attachment 8. These LLD values are based upon conservative conditions (i.e., minimum sample volumes and maximum delay time prior to analysis). Actual LLD values may be lower. If an isotope is not detected when analyzing effluent samples, then the activity of that isotope will be reported as Not Detected (N/D) on Attachment 1 of this report. When all isotopes listed on Attachment 1 for a particular quarter and release mode are less than the lower level of detection, then the totals for this period will be designated as Not Applicable (N/A).

## 3.0 Supplemental Information

Technical Specification 3.11.D.1.d requires the identification of the cause for the unavailability of milk or leafy vegetation samples, required by Technical Specification, Table 4.9-3, and identification for obtaining replacement samples. All milk and leafy vegetation samples required by Table 4.9-3 were available for collection during the period of January 1, 1988 through June 30, 1988.

Technical Specification 3.11.D.2.b requires the identification of new sample locations determined with the Land Use Census as yielding a calculated dose or dose commitment greater than the values being calculated in Technical Specification 4.9.C. No new sample location(s) that may yield a greater dose or dose commitment that are currently used in Technical Specification 4.9.C, were identified in the Land Use Census.

Dry Cask Independent Spent Fuel Storage Installation Technical Specification Appendix C, 1.4.1 requires reporting the quantity of each of the principal radionuclides released from the installation to the environment in liquid and gaseous effluents during the previous 6 months of operations. There were no liquid or gaseous effluent releases from the Dry Cask Independent Spent Fuel Storage Installation during the period of January 1, 1988 through June 30, 1988.

Attachment 1

# EFFLUENT RELEASE DATA

(January 1, 1988 Through June 30, 1988)

TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
PERIOD: 1/ 1/88 TO 6/30/88
GASEOUS EFFLUENT-SUMMATION OF ALL RELEASES

| SURRY POWER STATION UNITS 1&2 | UNIT | FIRST QTR. | SECOND QTR. | % EST. ERROR |
|---|---|---|---|---|
| A. FISSION & ACTIVATION GASES | | | | |
| 1. TOTAL RELEASE | CI | 1.10E 02 | 9.55E 01 | 2.50E 01 |
| 2. AVG RELEASE RATE FOR PERIOD | UCI/SEC | 1.42E 01 | 1.21E 01 | |
| B. IODINE | | | | |
| 1. TOTAL I-131 | CI | 3.65E-03 | 1.37E-03 | 2.50E 01 |
| 2. AVG RELEASE RATE FOR PERIOD | UCI/SEC | 4.69E-04 | 1.74E-04 | |
| C. PARTICULATE | | | | |
| 1. HALF-LIVES >8 DAYS | CI | 1.35E-03 | 1.63E-03 | 2.50E 01 |
| 2. AVG RELEASE RATE FOR PERIOD | UCI/SEC | 1.74E-04 | 2.07E-04 | |
| 3. GROSS ALPHA RADIOACTIVITY | CI | 5.91E-07 | 9.87E-07 | |
| D. TRITIUM | | | | |
| 1. TOTAL RELEASE | CI | 7.06E 00 | 7.44E 00 | 2.50E 01 |
| 2. AVG RELEASE RATE FOR PERIOD | UCI/SEC | 9.09E-01 | 9.46E-01 | |
| PERCENTAGE OF T.S. LIMITS | | | | |
| CRITICAL ORGAN DOSE RATE | % | 3.45E-02 | 1.53E-02 | |
| TOTAL BODY DOSE RATE | % | 5.79E-02 | 3.70E-02 | |
| SKIN DOSE RATE | % | 2.22E-02 | 1.26E-02 | |

TABLE 1B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
PERIOD: 1/ 1/88 TO 6/30/88
GASEOUS EFFLUENTS-MIXED-MODE RELEASES

| | | CONTINUOUS MODE | | BATCH MODE | |
|---|---|---|---|---|---|
| SURRY POWER STATION UNITS 1&2 | UNIT | FIRST QUARTER | SECOND QUARTER | FIRST QUARTER | SECOND QUARTER |
| 1. FISSION & ACTIVATION GASES | | | | | |
| KR-85 | CI | N/D | 3.52E-01 | 3.70E-01 | 3.07E 00 |
| KR-85M | CI | N/D | N/D | N/D | N/D |
| KR-87 | CI | N/D | N/D | N/D | N/D |
| KR-88 | CI | N/D | N/D | N/D | N/D |
| XE-133 | CI | 3.62E 00 | 1.47E 01 | 1.28E 00 | 2.57E 01 |
| XE-135 | CI | 1.32E-01 | N/D | 2.42E-04 | 3.57E-03 |
| XE-135M | CI | N/D | N/D | N/D | N/D |
| XE-138 | CI | N/D | N/D | N/D | N/D |
| XE-131M | CI | N/D | 1.10E-01 | 6.53E-02 | 8.69E-01 |
| XE-133M | CI | N/D | 1.14E-01 | 1.91E-03 | 1.45E-01 |
| AR-41 | CI | N/D | N/D | N/D | N/D |
| TOTAL FOR PERIOD | CI | 3.76E 00 | 1.52E 01 | 1.71E 00 | 2.98E 01 |
| 2. IODINES | | | | | |
| I-131 | CI | 4.49E-07 | 2.26E-07 | 1.07E-05 | 2.96E-05 |
| I-133 | CI | N/D | N/D | 1.42E-08 | 1.72E-07 |
| I-135 | CI | N/D | N/D | N/D | N/D |
| I-132 | CI | N/D | N/D | N/D | N/D |
| I-134 | CI | N/D | N/D | N/D | N/D |
| TOTAL FOR PERIOD | CI | 4.49E-07 | 2.26E-07 | 1.08E-05 | 2.98E-05 |
| 3. PARTICULATES | | | | | |
| SR-89 | CI | N/D | N/D | N/D | N/D |
| SR-90 | CI | N/D | N/D | N/D | N/D |
| CS-134 | CI | 9.13E-08 | 1.97E-08 | N/D | N/D |
| CS-137 | CI | 9.78E-07 | 2.96E-07 | N/D | 3.10E-08 |
| BA-140 | CI | N/D | N/D | N/D | N/D |
| LA-140 | CI | N/D | N/D | N/D | N/D |
| CO-60 | CI | 2.65E-06 | 7.19E-07 | N/D | 2.50E-08 |
| SE-75 | CI | 2.53E-08 | 1.15E-08 | N/D | N/D |
| CO-58 | CI | 2.58E-09 | 2.93E-09 | N/D | 3.34E-08 |
| MN-54 | CI | N/D | N/D | N/D | N/D |
| CS-138 | CI | N/D | N/D | N/D | N/D |
| RB-88 | CI | N/D | N/D | N/D | N/D |
| TE-132 | CI | N/D | N/D | N/D | N/D |
| CO-57 | CI | N/D | N/D | N/D | N/D |

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
PERIOD: 1/ 1/88 TO 6/30/88
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

| | | CONTINUOUS MODE | | BATCH MODE | |
|---|---|---|---|---|---|
| SURRY POWER STATION UNITS 1&2 | UNIT | FIRST QUARTER | SECOND QUARTER | FIRST QUARTER | SECOND QUARTER |
| 1. FISSION & ACTIVATION GASES | | | | | |
| KR-85 | CI | 4.91E-02 | N/D | 3.68E-02 | N/D |
| KR-85M | CI | 1.70E-01 | N/D | 1.22E-06 | 6.75E-03 |
| KR-87 | CI | N/D | N/D | N/D | 9.31E-03 |
| KR-88 | CI | 2.17E-04 | N/D | N/D | 1.48E-02 |
| XE-133 | CI | 9.38E 01 | 2.01E 01 | 7.44E 00 | 2.88E 01 |
| XE-135 | CI | 3.08E 00 | N/D | 3.10E-05 | 2.95E-01 |
| XE-135M | CI | N/D | N/D | N/D | 6.11E-03 |
| XE-138 | CI | N/D | N/D | N/D | N/D |
| XE-131M | CI | 7.80E-02 | 1.02E-04 | 8.72E-03 | 4.10E-03 |
| XE-133M | CI | 6.31E-03 | N/D | 1.13E-03 | 1.75E-01 |
| AR-41 | CI | 2.22E-01 | N/D | N/D | 9.98E-01 |
| TOTAL FOR PERIOD | CI | 9.74E 01 | 2.01E 01 | 7.48E 00 | 3.03E 01 |
| 2. IODINES | | | | | |
| I-131 | CI | 3.56E-03 | 1.01E-03 | 7.27E-05 | 3.31E-04 |
| I-133 | CI | 1.33E-03 | 4.99E-04 | 5.64E-05 | 3.89E-05 |
| I-135 | CI | 2.95E-04 | N/D | 2.73E-05 | N/D |
| I-132 | CI | 1.71E-06 | 1.07E-03 | 6.41E-06 | 1.22E-05 |
| I-134 | CI | 9.19E-06 | N/D | N/D | N/D |
| TOTAL FOR PERIOD | CI | 5.20E-03 | 2.58E-03 | 1.63E-04 | 3.82E-04 |
| 3. PARTICULATES | | | | | |
| SR-89 | CI | 4.79E-07 | N/D | N/D | N/D |
| SR-90 | CI | N/D | N/D | N/D | N/D |
| CS-134 | CI | 1.37E-04 | 6.75E-05 | 1.22E-06 | 4.89E-06 |
| CS-137 | CI | 4.41E-04 | 3.30E-04 | 1.43E-05 | 1.96E-05 |
| BA-140 | CI | N/D | N/D | N/D | N/D |
| LA-140 | CI | N/D | N/D | N/D | N/D |
| CO-60 | CI | 1.62E-04 | 2.62E-04 | 3.00E-06 | 7.14E-06 |
| SE-75 | CI | N/D | N/D | N/D | N/D |
| CO-58 | CI | 5.77E-04 | 8.80E-04 | 3.38E-06 | 4.54E-05 |
| MN-54 | CI | 7.18E-06 | 5.36E-06 | N/D | N/D |
| CS-138 | CI | 6.15E-04 | N/D | 7.31E-06 | N/D |
| RB-88 | CI | 2.04E-03 | N/D | 1.09E-07 | N/D |
| TE-132 | CI | 2.38E-06 | N/D | N/D | N/D |
| CO-57 | CI | 7.95E-07 | 2.04E-06 | N/D | N/D |

*TABLE 2A*

*EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT*
*PERIOD: 1/ 1/88 TO 6/30/88*
*LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES*

| *SURRY POWER STATION UNITS 1&2* | *UNIT* | *FIRST QTR.* | *SECOND QTR.* | *% EST. ERROR* |
|---|---|---|---|---|
| *A. FISSION AND ACTIVATION PRODUCTS* | | | | |
| *1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)* | *CI* | *3.62E-01* | *8.75E-01* | *2.50E 01* |
| *2. AVG DIL. CONC. DURING PERIOD* | *UCI/ML* | *6.43E-10* | *2.70E-09* | |
| *3. PERCENT OF APPLICABLE LIMIT* | *%* | *2.71E-02* | *1.48E-02* | |
| *B. TRITIUM* | | | | |
| *1. TOTAL RELEASE* | *CI* | *1.94E 02* | *9.34E 01* | *2.50E 01* |
| *2. AVG DIL. CONC. DURING PERIOD* | *UCI/ML* | *3.44E-07* | *2.88E-07* | |
| *3. PERCENT OF APPLICABLE LIMIT* | *%* | *1.15E-02* | *9.61E-03* | |
| *C. DISSOLVED AND ENTRAINED GASES* | | | | |
| *1. TOTAL RELEASE* | *CI* | *4.02E 00* | *3.17E-01* | *2.50E 01* |
| *2. AVG DIL. CONC. DURING PERIOD* | *UCI/ML* | *7.13E-09* | *9.78E-10* | |
| *3. PERCENT OF APPLICABLE LIMIT* | *%* | *3.56E-03* | *4.89E-04* | |
| *D. GROSS ALPHA RADIOACTIVITY* | | | | |
| *1. TOTAL RELEASE* | *CI* | *0.00E-01* | *0.00E-01* | *2.50E 01* |
| *E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)* | *LITERS* | *7.12E 07* | *7.63E 07* | *3.50E 00* |
| *F. VOLUME OF DILUTION WATER USED DURING PERIOD* | *LITERS* | *5.64E 11* | *3.24E 11* | *3.50E 00* |

TABLE 2B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
PERIOD: 1/ 1/88 TO 6/30/88
LIQUID EFFLUENTS

| | | CONTINUOUS MODE | | BATCH MODE | |
|---|---|---|---|---|---|
| SURRY POWER STATION UNITS 1&2 | UNIT | FIRST QUARTER | SECOND QUARTER | FIRST QUARTER | SECOND QUARTER |
| SR-89 | CI | N/D | N/D | N/D | N/D |
| SR-90 | CI | N/D | N/D | N/D | N/D |
| CS-134 | CI | 3.35E-03 | 6.41E-03 | 2.86E-02 | 2.62E-02 |
| CS-137 | CI | 3.35E-02 | 5.88E-02 | 4.81E-02 | 7.71E-02 |
| I-131 | CI | N/D | N/D | 4.23E-02 | 8.56E-03 |
| CO-58 | CI | N/D | N/D | 1.23E-01 | 8.52E-02 |
| CO-60 | CI | 7.21E-03 | 1.82E-03 | 4.09E-02 | 1.49E-01 |
| FE-59 | CI | N/D | N/D | 8.27E-04 | 4.80E-03 |
| ZN-65 | CI | N/D | N/D | N/D | 5.82E-05 |
| MN-54 | CI | N/D | N/D | 1.34E-03 | 3.38E-03 |
| CR-51 | CI | N/D | N/D | 9.64E-04 | 1.18E-01 |
| ZR-95 | CI | N/D | N/D | N/D | 3.94E-03 |
| NB-95 | CI | N/D | N/D | 2.94E-05 | 6.44E-03 |
| MO-99 | CI | N/D | N/D | 8.10E-05 | N/D |
| TC-99M | CI | N/D | N/D | N/D | 7.97E-05 |
| BA-140 | CI | N/D | N/D | 1.11E-05 | 3.06E-05 |
| LA-140 | CI | N/D | N/D | 2.96E-03 | 1.45E-04 |
| CE-141 | CI | N/D | N/D | 2.40E-06 | 4.39E-05 |
| SB-124 | CI | N/D | N/D | 5.37E-03 | 1.66E-02 |
| SB-125 | CI | N/D | N/D | 1.54E-02 | 1.33E-01 |
| AG-110M | CI | N/D | N/D | 5.45E-05 | 2.90E-03 |
| CO-57 | CI | 1.03E-05 | N/D | 5.02E-05 | 1.70E-04 |
| I-133 | CI | N/D | N/D | 5.68E-04 | 1.37E-04 |
| NA-24 | CI | N/D | N/D | 8.12E-05 | 3.33E-04 |
| I-135 | CI | N/D | N/D | 2.96E-05 | N/D |
| CS-136 | CI | N/D | N/D | 5.42E-04 | N/D |
| FE-55 | CI | N/D | N/D | 6.68E-03 | 1.67E-01 |
| CE-144 | CI | N/D | N/D | 1.69E-05 | 9.62E-05 |
| ND-147 | CI | N/D | N/D | 1.09E-05 | 1.47E-05 |
| RU-103 | CI | N/D | N/D | 1.12E-06 | 3.00E-03 |
| TE-132 | CI | N/D | N/D | N/D | 7.08E-04 |
| I-132 | CI | N/D | N/D | N/D | 5.33E-04 |
| NP-239 | CI | N/D | N/D | N/D | 3.80E-05 |
| CS-138 | CI | N/D | N/D | N/D | 1.80E-05 |
| NA-22 | CI | N/D | N/D | N/D | 2.18E-06 |
| I-134 | CI | N/D | N/D | N/D | 2.63E-05 |
| TOTAL FOR PERIOD | CI | 4.41E-02 | 6.70E-02 | 3.18E-01 | 8.08E-01 |
| XE-133 | CI | 1.45E-03 | N/D | 3.91E 00 | 3.10E-01 |
| XE-135 | CI | N/D | N/D | 2.05E-02 | 1.31E-03 |
| XE-131M | CI | N/D | N/D | 7.24E-02 | 3.69E-03 |
| AR-41 | CI | N/D | N/D | 2.64E-05 | 1.57E-04 |
| XE-135M | CI | N/D | N/D | 4.63E-05 | N/D |
| XE-133M | CI | N/D | N/D | 1.66E-02 | 1.92E-03 |
| KR-88 | CI | N/D | N/D | 1.40E-04 | N/D |
| KR-85M | CI | N/D | N/D | 8.40E-05 | N/D |

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
PERIOD 01/01/88-06/30/88

SURRY POWER STATION

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL(Not irradiated fuel)

| 1. Type of waste | Unit | 6-month Period | Est.Total Error,% |
|---|---|---|---|
| a. Spent resins, filter sludges, evaporator bottoms, etc. | $m^3$ | 2.41E+01 | 5.00E+00 |
| | Ci | 1.58E+02 | 3.00E+01 |
| b. Dry compressible waste, contaminated equip., etc. | $m^3$ | 3.25E+02* | 5.00E+00 |
| | Ci | 8.29E+00 | 3.00E+01 |
| c. Irradiated components, control rods, etc. | $m^3$ | 0.00E+00 | 0.00E+00 |
| | Ci | 0.00E+00 | 0.00E+00 |
| d. Organic waste(i.e. oil and scintillation fluid) | $m^3$ | 0.00E+00 | 0.00E+00 |
| | Ci | 0.00E+00 | 0.00E+00 |

2. Estimate of major nuclide composition(by type of waste)

| | | |
|---|---|---|
| a. Co-60 | % | 4.26E+01 |
| Cs-137 | % | 2.44E+01 |
| Ni-63 | % | 1.35E+01 |
| Cs-134 | % | 6.93E+00 |
| Fe-55 | % | 6.17E+00 |
| Co-58 | % | 3.35E+00 |
| Sb-125 | % | 1.48E+00 |
| b. Co-60 | % | 5.13E+01 |
| Fe-55 | % | 2.82E+01 |
| Ni-63 | % | 8.82E+00 |
| Cs-137 | % | 7.49E+00 |
| Cs-134 | % | 2.16E+00 |
| c. _____ | % | |
| d. _____ | % | |

TABLE 3 (Cont)

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
PERIOD 01/01/88-06/30/88

3. Solid Waste Disposition

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| 9 | Truck | Barnwell, SC |
| 10 | Truck | Oak Ridge, TN* |

B. IRRADIATED FUEL SHIPMENT(Disposition)

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| 0 | | |

* NOTE: 2.94E+02 cubic meters (containing 3.75 curies on 10 shipments) of this represents dry active waste shipped from Surry to a licensed waste processor for volume reduction. Therefore, this portion of the total for this waste type is not representative of the actual volume buried.

## ANNUAL AND QUARTERLY DOSES

An assessment of the Annual and Quarterly Doses to the maximum exposed members of the public due to radioactive liquid and gaseous effluents released from the station during 1988 will be in the Semi Annual Radioactive Release Report submitted within 60 days after January 1, 1989 in accordance with Technical Specification 6.6.B.3.

## REVISIONS TO OFFSITE DOSE CALCULATION MANUAL (ODCM)

Revisions to the Surry Offsite Dose Calculation Manual (ODCM) were approved by the Station Nuclear Safety and Operating Committee on April 26, 1988. The following is a description and discussion of the changes:

a. A review of the dose factor tables revealed a typographical error in the mixed mode dose factor for Kr-87. The Kr-87 beta air dose factor in Table 7.1 was changed to 1.03E+4 mrad/yr/curie/sec.

b. Section 11 of the ODCM was revised to include references to NUREG-0543, February 1980, "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40CFR190)" and Surry Technical Specifications.

c. Section 12 of the ODCM was revised to correct a reference made to Surry Technical Specifications for Semi-Annual Radioactive Effluent Release reporting. The section was also revised to clarify the annual reporting of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the station. Dose from direct radiation will be included in this assessment as required by Surry Technical Specification 3.11.C.2.

A review of Process Vent effluents (mixed mode releases) since 1984 reveal no release of Kr-87, therefore the typographical error in the mixed mode dose factor for Kr-87 did not alter the offsite dose calculations. The above changes to sections 11 and 12 were made to clarify the Technical Specification required to show compliance with 40CFR190. The dose calculational methodology and reporting requirements have not changed.

The changes made to the Surry ODCM during this Semi-Annual reporting period were administrative in nature and did not reduce the accurancy or reliability of the dose calculations.

Documentation of the Station Nuclear Safety and Operating Committee review may be found on the first page of the procedure change.

BBA

ADM 21-05-01

SUADM-ADM-21
(ADM-60)
ATTACHMENT 13
PAGE 1 OF 4

# REQUEST TO CHANGE PROCEDURE
## SURRY POWER STATION

NOV 0 3 1987

TO SUPERVISOR RESPONSIBLE FOR FOLLOWING PROCEDURE: 1

| | | | |
|---|---|---|---|
| ☐ ABNORMAL | ☐ CURVE BOOK | ☐ OPERATING | ☐ WELDING |
| ☐ ADMINISTRATIVE | ☐ EMERGENCY | ☐ PERIODIC TEST | ☒ ODCM |
| ☐ ANNUNCIATOR | ☐ IN-SERVICE INSPECTION | ☐ HEALTH PHYSICS | ☐ |
| ☐ CALIBRATION | ☐ MAINTENANCE | ☐ SPECIAL TEST | ☐ |
| ☐ CHEMISTRY | ☐ NON-DESTRUCTIVE TEST | ☐ START-UP TEST | ☐ |

| PROCEDURE NO: 2 | UNIT NO: 3 | REVISION DATE: 4 |
|---|---|---|
| HP-ODCM | 1 & 2 | 2-6-86 |

TITLE: 5
OFFSITE DOSE CALCULATION MANUAL

CHANGE REQUESTED: (GIVE STEP NUMBER, EXACT SUGGESTED WORDING, AND LIST REFERENCES. STAPLE COPY OF PROCEDURE, WITH SUGGESTED CHANGES MARKED, TO THIS FORM.) 6

ODCM-11, 12 AND TABLE 7.1 → SEE ATTACHED

REFERENCES:
T.S. 3.11.C.1, 3.11.C.2, 6.6.B.3, REG. GUIDE 1.109

MAY 0 3 1988
STATION

REASON FOR CHANGE: 7
CLARIFICATION, WRONG REFERENCE AND TYPO

| CHANGE REQUESTED BY: 8 | DATE 9 |
|---|---|
| Barry Garber | 2-5-88 |

ACTION TAKEN: 10

SAFETY ANALYSIS REQUIRED? ___ YES ___ NO 10CFR50.59/10CFR72.35 REVIEW REQUIRED? ___ YES ___ NO

| | | |
|---|---|---|
| ___ YES | ___ NO | 1. THE FACILITY, AS DESCRIBED IN THE UFSAR OR TECHNICAL SPECIFICATIONS, WILL BE CHANGED. SECTIONS REVIEWED: UFSAR-11, T.S. 6.6.B.3, 3.11 |
| ___ YES | ✓ NO | 2. THE PROCEDURES OR METHODS OF OPERATION, AS DESCRIBED IN THE UFSAR OR TECHNICAL SPECIFICIATIONS, WILL BE CHANGED. SECTIONS REVIEWED: UFSAR-11, TS 6.6.B.3, 3.11 |
| ___ YES | ✓ NO | 3. A TEST OR EXPERIMENT, WHICH IS NOT DESCRIBED IN THE UFSAR OR TECHNICAL SPECIFICATIONS, IS PROPOSED. |
| ___ YES | ✓ NO | 4. SAFETY-RELATED STRUCTURES, SYSTEMS, EQUIPMENT OR COMPONENTS, NOT DESCRIBED IN THE UFSAR OR TECHNICAL SPECIFICATIONS, WILL BE CHANGED. |
| ___ YES | ✓ NO | 5. THE FACILITY, PROCEDURE, OR METHOD OF OPERATION WHICH COULD AFFECT EQUIPMENT IMPORTANT TO SAFETY WILL BE CHANGED. |

SAFETY ANALYSIS IS REQUIRED FOR ANY "YES" ANSWER. SAFETY ANALYSIS AND 10CFR50.59/10CFR72.35 REVIEW IS REQUIRED FOR ANY "YES" ANSWER IN QUESTIONS 1 THROUGH 3.

FOR REFERENCE ONLY

RECOMMENDED ACTION: 11 ☒ APPROVED ☐ DISAPPROVED

| BY: 12 | DATE: 13 |
|---|---|
| Barry Garber | 3-30-88 |

REVIEWED FOR QUALITY CONTROL REQUIREMENTS: 14

| BY: 15 | DATE: 16 |
|---|---|
| Joel L. Kelly | 4-13-88 |

REVIEWED BY STATION NUCLEAR SAFETY AND OPERATING COMMITTEE: 17
☒ APPROVED ☐ DISAPPROVED ☐ APPROVED AS MODIFIED BY COMMITTEE

| CHAIRMAN SIGNATURE: 18 | DATE: 19 |
|---|---|
| H. L. Miller | APR 26 1988 |

NEW PROCEDURE REVISION DATE: 20
Carolyn P. Brown 5-2-88

| SURRY POWER STATION | (1) PROCEDURE NUMBER: HP-ODCM |
|---|---|
| | (2) DATE: APR 2 6 1988 |

| (3) TYPE PROCEDURE: HEALTH PHYSICS | (4) UNIT: 1 & 2 |
|---|---|

(5) TITLE: OFFSITE DOSE CALCULATION MANUAL

(6)

CONTENTS



FOR REFERENCE ONLY

Think ALARA

| (7) RECOMMEND APPROVAL: Sunny Sinha | (8) DATE: 3-30-88 |
|---|---|
| (9) QUALITY ASSURANCE REVIEW: Joel A. Kelly | (10) DATE: 4-13-88 |
| (11) APPROVED STATION NUCLEAR SAFETY AND OPERATING COMMITTEE: Harry L Miller | (12) DATE: APR 2 6 1988 |
| (13) APPROVED (MANAGER) (If Required): N/A | (14) DATE: |

HPODCM/bba

APR 2 6 1988

SURRY POWER STATION

OFFSITE DOSE CALCULATION MANUAL

SECTION 11

Total Dose

APR 2 6 1988

1. TECHNICAL SPECIFICATION REQUIREMENT

Technical Specification 3.11.C.1 requires that: "The annual (calendar year) dose or dose commitment to the maximum exposed member of the public, due to releases of radioactivity and radiation, from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the total body or critical organ (except the thyroid, which shall be limited to less than or equal to 75 mrems)".

2. CALCULATIONS

The basis for the above specification is the EPA Uranium Fuel Cycle Standard, 40 CFR 190.

U.S. Nuclear Regulatory Commission NUREG-0543, February 1980, "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR 190)", states "There is reasonable assurance that sites with up to four operating reactors that have releases within Appendix I design objective values (Surry Technical Specifications 3.11.A.2, 3.11.B.2 and 3.11.B.3) are also in conformance with EPA Uranium Fuel Cycle Standard, 40 CFR Part 190.

Technical Specification 3.11.C.2 states that when the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeds twice the limits of Specification 3.11.A.2, 3.11.B.2 or 3.11.B.3, calculations should be made including direct radiation contribution from the reactor units and from outside storage tanks to determine whether the units of Specification 3.11.C.1 have been exceeded.

Cumulative dose contributions from radioactive liquid and gaseous effluents shall be determined in accordance with the methodology presented in HP-ODCM Sections 4, 8 and 9, or Regulatory Guide 1.109, Rev. 1. Direct radiation shall be determined, as required by Specification 3.11.C.2, from an evaluation of environmental TLD's or calculated using the simple methodology presented in Lamarsh, Introduction to Nuclear Engineering, June 1977, or point kernal codes such as QAD.

APR 2 6 1988

SURRY POWER STATION

OFFSITE DOSE CALCULATION MANUAL

SECTION 12

Semiannual Radioactive Effluent Release Report Dose Assessment

APR 2 6 1988

1. TECHNICAL SPECIFICATION REQUIREMENT

Technical Specification 6.6.B.3 requires that the Semi-Annual Radioactive Effluent Release Report submitted within 60 days after January 1 of each year include, in part, an assessment of radiation doses to the maximum exposed member of the public due to the radioactive liquid and gaseous effluents released from the station during the previous calendar year.

2. DOSE ASSESSMENT

1. The radiation doses to individuals due to the radioactive liquid and gaseous effluents from the station during the previous calendar year shall be calculated using the methodology presented in the Manual or in Regulatory Guide 1.109 (Revision 1), October 1977, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I" (see Appendix B). Population doses are not to be included in the dose assessment.

2. The meteorological conditions during the previous calendar year or historical annual average atmospheric dispersion conditions shall be used for determining the gaseous pathway doses.

APR 2 6 1988

TABLE 7.1

GAMMA AND BETA DOSE FACTORS FOR SURRY POWER STATION
UNIT NOS. 1 AND 2

X/Q = 1.0E-06 sec/$m^3$ at 644 meters S Direction

| Dose Factors for Process Vent | | | | |
|---|---|---|---|---|
| Noble Gas Radionuclide | $K_{ipv}$ Total Body mrem/yr Curie/Sec | $L_{ipv}$ Skin mrem/yr Curie/Sec | $M_{ipv}$ Gamma Air mrad/yr Curie/sec | $N_{ipv}$ Beta Air mrad/yr Curie/sec |
| Kr-83m | 7.56E-02 | - | 1.93E+01 | 2.88E+02 |
| Kr-85M | 1.17E+03 | 1.46E+03 | 1.23E+03 | 1.97E+03 |
| Kr-85 | 1.61E+01 | 1.34E+03 | 1.72E+01 | 1.95E+03 |
| Kr-87 | 5.92E+03 | 9.73E+03 | 6.17E+03 | 1.03E+04 |
| Kr-88 | 1.47E+04 | 2.37E+03 | 1.52E+04 | 2.93E+03 |
| Kr-89 | 1.66E+04 | 1.01E+04 | 1.73E+04 | 1.06E+04 |
| Kr-90 | 1.56E+04 | 7.29E+03 | 1.63E+04 | 7.83E+03 |
| Xe-131m | 9.15E+01 | 4.76E+02 | 1.56E+02 | 1.11E+03 |
| Xe-133m | 2.51E+02 | 9.94E+02 | 3.27E+02 | 1.48E+03 |
| Xe-133 | 2.94E+02 | 3.06E+02 | 3.53E+02 | 1.05E+03 |
| Xe-135m | 3.12E+03 | 7.11E+02 | 3.36E+03 | 7.39E+02 |
| Xe-135 | 1.81E+03 | 1.86E+03 | 1.92E+03 | 2.46E+03 |
| Xe-137 | 1.42E+03 | 1.22E+04 | 1.51E+03 | 1.27E+04 |
| Xe-138 | 8.83E+03 | 4.13E+03 | 9.21E+03 | 4.75E+03 |
| Ar-41 | 8.84E+03 | 2.69E+03 | 9.30E+03 | 3.28E+03 |

## REVISIONS TO THE PROCESS CONTROL PROGRAM (PCP)

There were no changes to the Process Control Program during the period of January 1, 1988 through June 30, 1988.

## MAJOR CHANGES TO RADIOACTIVE LIQUID, GASEOUS AND SOLID WASTE TREATMENT SYSTEMS

There were no major changes to Surry's Radioactive Liquid, Gaseous or Solid Waste Treatment Systems during the period of January 1, 1988 through June 30, 1988.

## INOPERABILITY OF RADIOACTIVE LIQUID AND GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Technical Specification 3.7.E.2 requires the Semi-Annual Report to include an explanation why monitors required by Technical Specification Tables 3.7-5(a) and 3.7-5(b) which were determined inoperable, were not returned to operable status within 30 days.

Two monitors require explanation under this criteria for the period of January 1, 1988 through June 30, 1988. They are the Component Cooling Service Water Monitor and the Waste Gas Holdup System Explosive Gas Oxygen Monitor.

1. The Component Cooling Service Water Monitor (RM-SW-107) continues to be inoperable as described in the previous Semi-Annual Report.

   A Technical Specification Change will be proposed to eliminate the radiation monitoring requirement and replace it with service water grab sampling and component cooling level monitoring. An evaluation is being performed to determine if the monitoring interval as specified in Technical Specifications (twelve hours) is appropriate for the proposed change. Resolution of this issue will be completed by February 1989.

   Grab sampling, as required by Table 3.7-5(a) when the monitor is out of service, has been performed since the monitor became inoperable. The grab sampling will continue until this matter is resolved.

2. Replacement of the Waste Gas Holdup System Oxygen Monitors and modification of the sample lines were completed in August of 1986. However, normal operation of the system caused alarm annunciations in the control room. Modification of the annunciator to prevent spurious alarms under normal station operations was completed in December 1987. However, full operation of the monitors has not yet been achieved.

   Grab sampling as required by Technical Specification Table 3.7-5(b) when the monitor is out of service, has been performed since the monitor became inoperable. At this time, the monitor cannot be calibrated within the tolerance of Technical Specifications. Grab sampling will continue to satisfy the monitoring requirements until the vendor supplies a new method for calibration. Resolution of this issue will be completed by February 1989.

## UNPLANNED RELEASES

There has been no Unplanned Liquid or Gaseous Releases that exceeded Technical Specification 3.11.A.1.a and 3.11.B.1.a during the period January 1, 1988 through June 30, 1988.

## LOWER LEVEL OF DETECTION FOR EFFLUENT SAMPLE ANALYSIS

| | Isotope | Required LLD (uCi/ml) | Typical LLD (uCi/ml) |
|---|---|---|---|
| GASEOUS: | Kr-87 | 1.00 E-4 | 4.88 E-7 - 8.14 E-7 |
| | Kr-88 | 1.00 E-4 | 4.71 E-7 - 5.41 E-7 |
| | Xe-133 | 1.00 E-4 | 2.34 E-7 - 2.93 E-7 |
| | Xe-133m | 1.00 E-4 | 1.09 E-6 - 1.51 E-6 |
| | Xe-135 | 1.00 E-4 | 1.44 E-7 - 2.17 E-7 |
| | Xe-135m | 1.00 E-4 | 3.03 E-6 - 4.99 E-6 |
| | Xe-138 | 1.00 E-4 | 8.17 E-6 - 1.12 E-5 |
| | I-131 | 1.00 E-12 | 8.97 E-14 - 1.20 E-13 |
| | Sr-89 | 1.00 E-11 | 9.00 E-15 - 9.00 E-14 |
| | Sr-90 | 1.00 E-11 | 1.00 E-16 - 2.00 E-14 |
| | Cs-134 | 1.00 E-11 | 4.99 E-14 - 8.92 E-14 |
| | Cs-137 | 1.00 E-11 | 8.75 E-14 - 1.58 E-13 |
| | Mn-54 | 1.00 E-11 | 5.62 E-14 - 7.22 E-14 |
| | Fe-59 | 1.00 E-11 | 1.33 E-13 - 1.87 E-13 |
| | Co-58 | 1.00 E-11 | 5.44 E-14 - 8.04 E-13 |
| | Co-60 | 1.00 E-11 | 1.06 E-13 - 1.16 E-13 |
| | Zn-65 | 1.00 E-11 | 1.36 E-13 - 1.86 E-13 |
| | Mo-99 | 1.00 E-11 | 9.43 E-13 - 1.38 E-12 |
| | Ce-141 | 1.00 E-11 | 3.47 E-14 - 5.32 E-14 |
| | Ce-144 | 1.00 E-11 | 1.50 E-13 - 1.92 E-13 |
| | Alpha | 1.00 E-11 | 3.53 E-14 - 3.97 E-14 |
| | Tritium | 1.00 E-6 | 7.72 E-9 - 9.03 E-9 |
| LIQUID: | Sr-89 | 5.00 E-8 | 4.00 E-8 - 5.00 E-8 |
| | Sr-90 | 5.00 E-8 | 6.00 E-9 - 2.00 E-8 |
| | Cs-134 | 5.00 E-7 | 5.10 E-8 - 9.15 E-8 |
| | Cs-137 | 5.00 E-7 | 6.44 E-8 - 1.05 E-7 |
| | I-131 | 1.00 E-6 | 3.68 E-8 - 4.84 E-8 |
| | Co-58 | 5.00 E-7 | 3.47 E-8 - 5.95 E-8 |
| | Co-60 | 5.00 E-7 | 6.90 E-8 - 1.00 E-7 |
| | Fe-59 | 5.00 E-7 | 9.52 E-8 - 1.21 E-7 |
| | Zn-65 | 5.00 E-7 | 1.10 E-7 - 1.31 E-7 |
| | Mn-54 | 5.00 E-7 | 4.13 E-8 - 5.29 E-8 |
| | Mo-99 | 5.00 E-7 | 2.78 E-7 - 3.68 E-7 |
| | Ce-141 | 5.00 E-7 | 4.41 E-8 - 5.77 E-8 |
| | Ce-144 | 5.00 E-7 | 1.78 E-7 - 2.53 E-7 |
| | Fe-55 | 1.00 E-6 | 9.00 E-7 - 1.00 E-6 |
| | Alpha | 1.00 E-7 | 8.75 E-9 - 9.83 E-9 |
| | Tritium | 1.00 E-5 | 2.57 E-6 - 3.01 E-6 |
| | Xe-133 | 1.00 E-5 | 7.09 E-8 - 1.16 E-7 |
| | Xe-135 | 1.00 E-5 | 3.61 E-8 - 4.81 E-8 |
| | Xe-133m | 1.00 E-5 | 3.06 E-7 - 3.48 E-7 |
| | Xe-135m | 1.00 E-5 | 6.37 E-7 - 8.65 E-7 |
| | Xe-138 | 1.00 E-5 | 2.05 E-6 - 2.69 E-6 |
| | Kr-87 | 1.00 E-5 | 1.22 E-7 - 1.42 E-7 |
| | Kr-88 | 1.00 E-5 | 1.02 E-7 - 1.38 E-7 |

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

August 29, 1988

D. S. CRUDEN
VICE PRESIDENT-NUCLEAR

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. 88-562
NO/DAS:vlh
Docket Nos. 50-280
50-281
72-2
License Nos. DPR-32
DPR-37
SNM-2501

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Enclosed is the Surry Power Station Semi-Annual Radioactive Effluent Release Report for January 1, 1988 through June 30, 1988. The report, submitted pursuant to Surry Power Station Technical Specification 6.6.B.3 and ISFSI Technical Specification 1.4.1 of Appendix C, includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released during the previous six months, as outlined in Regulatory Guide 1.21, Revision 1, June 1974.

Very truly yours,

N. E. Hardwick for
D. S. Cruden

Enclosure

cc: U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

Mr. W. E. Holland
NRC Senior Resident Inspector
Surry Power Station

Mr. Hugh L. Thompson, Jr., Director
Office of Nuclear Material Safety and Safeguards
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