

TURKEY POINT PLANT  
UNITS 3 AND 4

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

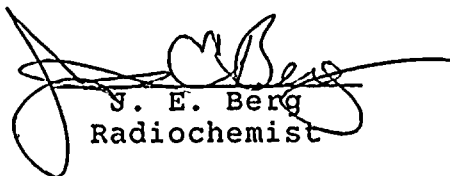
JANUARY 1993 THROUGH JUNE 1993

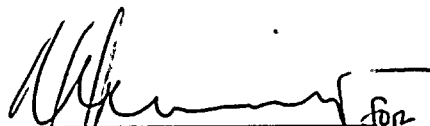
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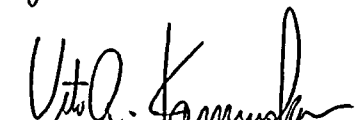
NUCLEAR CHEMISTRY DEPARTMENT


TURKEY POINT PLANT

FLORIDA POWER AND LIGHT COMPANY

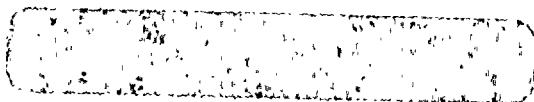
  
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1.0 REGULATORY LIMITS

1.1 Liquid Effluents

- a) The concentration of radioactive material released in liquid effluents to unrestricted areas shall not exceed the concentration 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 not exceed 2.0 E-04 microcuries per milliliter.
- b) The dose or dose commitment per reactor to a member of the public from any radioactive materials in liquid effluent released to unrestricted areas shall be limited as follows:

During any calendar quarter, to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ.

During any calendar year, to less than or equal to 3 mrem to the total body and less than or equal to 10 mrem to any organ.

1.2 Gaseous Effluents

- a) The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

Less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin due to noble gases.

Less than or equal to 1500 mrem/year to any organ due to I-131, I-133, tritium and for all radioactive materials in particulate form with half-lives greater than 8 days.



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- b) The air dose per reactor to areas at and beyond the site boundary due to noble gases released in gaseous effluents shall be limited:

During any calendar quarter, to less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation.

During any calendar year, to less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

- c) The dose per reactor to a member of the public, due to I-131, I-133, tritium and to particulates with half-lives greater than 8 days in airborne effluents released to areas at and beyond the site boundary shall not exceed 7.5 mrem to any organ during any calendar quarter and shall not exceed 15 mrem to any organ during any calendar year.

## 2.0 MAXIMUM PERMISSIBLE CONCENTRATIONS

Water: As per 10CFR20, Appendix B, Table II, Column 2, for entrained or dissolved noble gases as described in 1.1.a of this report.

Air: Release concentrations are limited to dose rate limits described in 1.2.a.

## 3.0 AVERAGE ENERGY

The average energy of fission and activation gases in effluents is not applicable.

## 4.0 MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

All liquid and airborne discharges to the environment during this period were analyzed in accordance with Technical Specification requirements. The minimum frequency of analysis as required by Regulatory Guide 1.21 was met or exceeded.

When alpha, tritium and named nuclides are shown as -----curies on the following tables, this should be interpreted as "no activity was detected on the samples using the Plant Technical Specification analyses techniques to achieve required Lower Level of Detection (LLD) sensitivity for radioactive effluents".



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#### 4.1 Liquid Effluents

Aliquots of representative pre-release samples, from the waste disposal system, were isotopically analyzed for gamma emitting isotopes on a multichannel analyzer.

Frequent periodic sampling and analysis were used to conservatively determine if any radioactivity was being released via the steam generator blowdown system and the storm drain system.

Monthly and quarterly composite samples for the waste disposal system were prepared to give proportional weight to each liquid release made during the designated period of accumulation. The monthly composite was analyzed for tritium and gross alpha radioactivity. Tritium was determined by use of liquid scintillation techniques and gross alpha radioactivity was determined by use of a solid state scintillation system. The quarterly composite was analyzed for Sr-89, Sr-90 and Fe-55 by chemical separation.

All radioactivity concentrations determined from analysis of a pre-release composite were multiplied by the total represented volume of the liquid waste released to determine the total quantity of each isotope and of gross alpha activity released during the report period.

Aliquots of representative pre-release samples from the waste disposal system were analyzed on a per release basis for dissolved fission and activation gases by use of gamma spectrum analysis. The resulting isotope concentrations were multiplied by the total volume released in order to estimate the total dissolved gases released.

The liquid waste treatment system is shared by both units at the site and generally all liquid releases are allocated on a 50/50 basis to each unit.



#### 4.2 Gaseous Effluents

Airborne releases to the atmosphere occurred from: release of gas decay tanks, the instrument bleedline, containment purges, and releases incidental to operation of the plant. The techniques employed in determining the radioactivity in airborne releases are:

- a) Gamma spectrum analysis for fission and activation gases,
- b) Removal of particulate material by filtration and subsequent gamma spectrum analysis, Sr-89, Sr-90 determination and gross alpha analysis,
- c) Absorption of halogen radionuclides on a charcoal filter and subsequent gamma spectrum analysis, and
- d) Analysis of water vapor in a gas sample for tritium using liquid scintillation techniques.

All gas releases from the plant which were not accounted for by the above methods were conservatively estimated as curies of Xe-133 by use of the SPING-4 radiation monitor and the plant vent process monitor recorder chart and the current calibration curve for the monitor.

Portions of the gas waste treatment system are shared by both units and generally all gas releases from the shared system are allocated on a 50/50 basis to each unit.

Meteorological data for the period January 1993 through June 1993, in the form of Joint Frequency Distribution Tables, is maintained on-site.

#### 4.3 Estimate of Errors

- a) Sampling Error

The error associated with volume measurement devices, flow measuring devices, etc., based on calibration data and design tolerances has been conservatively estimated to be collectively less than  $\pm 10\%$ .

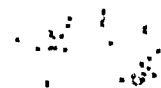
b) Analytical Error

Our quarterly Q.C. cross-check program involves counting unknown samples provided by an independent external lab. The errors associated with our analysis of these unknown samples, and reported to us by the independent lab, were used as the basis for deriving the following analytical error terms.

| <u>NUCLIDE TYPE</u> | <u>AVERAGE ERROR</u> | <u>MAXIMUM ERROR</u> |
|---------------------|----------------------|----------------------|
| Liquid              | $\pm 6.1\%$          | $\pm 17.0\%$         |
| Gaseous             | $\pm 6.2\%$          | $\pm 12.4\%$         |

5.0 BATCH RELEASES

| 5.1 <u>Liquid</u>  | <u>Unit 3</u> | <u>Unit 4</u> |
|--|---------------|---------------|
| a) Number of releases,   | 1.50E+02      | 1.50E+02      |
| b) Total time period of batch releases, minutes  | 1.20E+04      | 1.20E+04      |
| c) Maximum time period for a batch release, minutes                                    | 1.65E+02      | 1.65E+02      |
| d) Average time period for a batch release, minutes                                    | 8.05E+01      | 8.05E+01      |
| e) Minimum time period for a batch release, minutes                                    | 3.00E+01      | 3.00E+01      |
| f) Average stream flow during period of release of effluent into a flowing stream, LPM | 5.25E+06      | 5.25E+06      |
| 5.2 <u>Gaseous</u>   | <u>Unit 3</u> | <u>Unit 4</u> |
| a) Number of batch releases  | 6.0 E+00      | 6.0 E+00      |
| b) Total time period of batch releases, minutes  | 2.23E+02      | 2.23E+02      |
| c) Maximum time period for a batch release, minutes                                    | 2.40E+02      | 2.40E+02      |
| d) Average time period for a batch release, minutes                                    | 4.21E+01      | 4.21E+01      |
| e) Minimum time period for a batch release, minutes                                    | 1.65E+01      | 1.65E+01      |



## 6.0 UNPLANNED RELEASES

| 6.1 <u>Liquid</u>                     | <u>Unit 3</u> | <u>Unit 4</u> |
|---------------------------------------|---------------|---------------|
| a) Number of releases                 | 0             | 0             |
| b) Total activity released,<br>curies | 0             | 0             |
| 6.2 <u>Gaseous</u>                    |               |               |
| a) Number of releases                 | 0             | 0             |
| b) Total activity released,<br>curies | 0             | 0             |

6.3 See Attachment 1, if applicable, for:

- a) A description of the event and equipment involved.
- b) Cause(s) for the unplanned event.

## 7.0 REACTOR COOLANT ACTIVITY

### 7.1 Unit 3

Reactor coolant activity limits of 100/E-bar and 1.0 microCurie per gram Dose Equivalent I-131 were not exceeded.

### 7.2 Unit 4

Reactor coolant activity limits of 100/E-bar and 1.0 microCurie per gram Dose Equivalent I-131 were not exceeded.

## 8.0 SITE RADIATION DOSE

The assessment of radiation dose from radioactive effluents to the general public due to their activities inside the site boundary is performed as part of the year ending semiannual report.

## 9.0 OFFSITE DOSE CALCULATION MANUAL REVISIONS

The ODCM was not revised during this reporting period.

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## 10.0 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

No irradiated fuel shipments were made from the site. Common solid waste from Turkey Point Units 3 and 4 was shipped jointly. A summation of these shipments is given in Table 6 of this report.

## 11.0 PROCESS CONTROL PROGRAM REVISIONS

Changes to the Process Control Program during this reporting period are summarized on attachment 1 of this report.

## 12.0 INOPERABLE EFFLUENT MONITORING INSTRUMENTATION

### 12.1 Unit 3 Steam Jet Air Ejector Vent

The Steam Jet Air Ejector (SJAE) effluent monitoring instrumentation required by specification 3.3.3.3, table 3.3-5, item 19.c, was declared out of service on June 10, 1993, due to moisture intrusion into the instrument. Alternate sampling equipment was placed in service for continuous monitoring of iodine and particulate activity, gas grab samples were obtained at 12 hour intervals to monitor gaseous releases, and sampler flow measurements were made at the prescribed frequencies. Temporary modifications to the system were made to prevent moisture from entering the monitor and place the system back in service on June 24, 1993. A permanent plant change, PC/M 93-136, was implemented on July 24, 1993, with no further incidents of moisture intrusion.

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JANUARY 1993 THROUGH JUNE 1993

UNIT 3 TABLE 1

LIQUID EFFLUENTS SUMMARY

A. FISSION AND ACTIVATION PRODUCTS

|   | Units  | Quarter 1 | Quarter 2 | Error % |
|---|--------|-----------|-----------|---------|
| 1. Total Release(not including tritium, gases, alpha) | Ci     | 2.48 E-02 | 5.30 E-02 | 6.1     |
| 2. Average diluted concentration during period        | μCi/ml | 7.19 E-10 | 1.85 E-09 |         |
| 3. Percent of applicable limit                        | %      | 7.35 E-03 | 1.04 E-02 |         |

B. TRITIUM

|  |        |           |           |      |
|--|--------|-----------|-----------|------|
| 1. Total Release                               | Ci     | 5.09 E+01 | 3.77 E+01 | 8.60 |
| 2. Average diluted concentration during period | μCi/ml | 1.47 E-06 | 1.32 E-06 |      |
| 3. Percent of applicable limit                 | %      | 4.90 E-02 | 4.40 E-02 |      |

C. DISSOLVED AND ENTRAINED GASES

|  |        |           |           |      |
|--|--------|-----------|-----------|------|
| 1. Total Release                               | Ci     | 1.17 E-02 | 2.96 E-03 | 6.10 |
| 2. Average diluted concentration during period | μCi/ml | 3.40 E-10 | 1.03 E-10 |      |
| 3. Percent of applicable limit                 | %      | 1.70 E-04 | 5.15 E-05 |      |

D. GROSS ALPHA RADIOACTIVITY

|                  |    |       |       |     |
|------------------|----|-------|-------|-----|
| 1. Total Release | Ci | ----- | ----- | 9.7 |
|------------------|----|-------|-------|-----|

E. LIQUID VOLUMES

|   |        |           |           |    |
|---|--------|-----------|-----------|----|
| 1. Batch waste released, prior to dilution      | liters | 1.02 E+06 | 1.98 E+06 | 10 |
| 2. Continuous waste released, prior to dilution | liters | -----     | -----     | 10 |
| 3. Dilution water used during period            | liters | 3.45 E+10 | 2.87 E+10 | 10 |

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UNIT 3 TABLE 2

LIQUID EFFLUENTS SUMMARY

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Na-24             | Ci    | -----           | -----     | -----      | -----     |
| Cr-51             | Ci    | -----           | -----     | 4.28 E-05  | 1.87 E-04 |
| Mn-54             | Ci    | -----           | -----     | 5.87 E-03  | 6.32 E-03 |
| Fe-55             | Ci    | -----           | -----     | 3.11 E-04  | 1.29 E-02 |
| Co-57             | Ci    | -----           | -----     | -----      | 4.10 E-05 |
| Co-58             | Ci    | -----           | -----     | 3.28 E-03  | 1.53 E-02 |
| Fe-59             | Ci    | -----           | -----     | -----      | 6.95 E-06 |
| Co-60             | Ci    | -----           | -----     | 5.85 E-03  | 1.13 E-02 |
| Zn-65             | Ci    | -----           | -----     | -----      | 3.86 E-03 |
| Sr-90             | Ci    | -----           | -----     | -----      | 1.09 E-03 |
| Nb-95             | Ci    | -----           | -----     | 3.30 E-05  | 1.53 E-05 |
| Zr-97             | Ci    | -----           | -----     | 5.63 E-05  | -----     |
| Ag-110            | Ci    | -----           | -----     | 4.00 E-03  | 2.08 E-04 |
| Sn-113            | Ci    | -----           | -----     | -----      | -----     |
| Sb-124            | Ci    | -----           | -----     | 2.51 E-04  | 3.31 E-05 |
| Sb-125            | Ci    | -----           | -----     | 2.28 E-03  | 3.45 E-04 |
| I-131             | Ci    | -----           | -----     | 5.83 E-04  | 1.71 E-04 |
| I-133             | Ci    | -----           | -----     | -----      | 6.15 E-06 |
| Cs-134            | Ci    | -----           | -----     | 2.92 E-04  | 1.77 E-04 |
| Cs-137            | Ci    | -----           | -----     | 1.66 E-03  | 1.03 E-03 |
| La-140            | Ci    | -----           | -----     | 9.89 E-05  | 1.16 E-05 |
| W-187             | Ci    | -----           | -----     | 1.48 E-04  | -----     |
| Total for period  | Ci    | -----           | -----     | 2.48 E-02  | 5.30 E-02 |

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UNIT 3 TABLE 2 (continued)

LIQUID EFFLUENTS SUMMARY

LIQUID DISSOLVED GAS

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Ar-41             | Ci    | -----           | -----     | -----      | -----     |
| Kr-85m            | Ci    | -----           | -----     | -----      | -----     |
| Kr-87             | Ci    | -----           | -----     | -----      | -----     |
| Xe-133            | Ci    | -----           | -----     | 1.17 E-02  | 2.96 E-03 |
| Xe-133m           | Ci    | -----           | -----     | -----      | -----     |
| Xe-135            | Ci    | -----           | -----     | -----      | 8.70 E-07 |
| Total for Period  | Ci    | -----           | -----     | 1.17 E-02  | 2.96 E-03 |

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TURKEY POINT PLANT  
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UNIT 3 TABLE 3

GASEOUS EFFLUENTS SUMMARY

A. FISSION AND ACTIVATION PRODUCTS

|   | Units              | Quarter 1 | Quarter 2 | % Error |
|---|--------------------|-----------|-----------|---------|
| 1. Total Release                            | Ci                 | 3.23 E+01 | 1.73 E+02 | 4.5     |
| 2. Average Release Rate for Period          | $\mu\text{Ci/sec}$ | 4.15 E+00 | 2.20 E+01 |         |
| 3. Percent of Technical Specification limit | %                  | 3.98 E-05 | 2.17 E-04 |         |

B. IODINES

|   |                    |           |           |     |
|---|--------------------|-----------|-----------|-----|
| 1. Total Iodine-131                         | Ci                 | 1.67 E-04 | 5.60 E-04 | 8.0 |
| 2. Average Release Rate for Period          | $\mu\text{Ci/sec}$ | 2.14 E-05 | 7.10 E-05 |     |
| 3. Percent of Technical Specification limit | %                  | 2.03 E-01 | 6.83 E-01 |     |

C. PARTICULATES

|   |                    |           |       |     |
|---|--------------------|-----------|-------|-----|
| 1. Particulates T <sub>1/2</sub> > 8 days   | Ci                 | 9.35 E-07 | ----- | 6.4 |
| 2. Average Release Rate for Period          | $\mu\text{Ci/sec}$ | 1.20 E-07 | ----- |     |
| 3. Percent of Technical Specification limit | %                  | (1)       | (1)   |     |
| 4. Gross Alpha Radioactivity                | Ci                 | -----     | ----- |     |

D. TRITIUM

|   |                    |           |       |     |
|---|--------------------|-----------|-------|-----|
| 1. Total Release                            | Ci                 | 4.47 E+00 | ----- | 8.8 |
| 2. Average Release Rate for Period          | $\mu\text{Ci/sec}$ | 5.75 E-01 | ----- |     |
| 3. Percent of Technical Specification limit | %                  | (1)       | (1)   |     |

(1) These percentages are included in the Iodine limit calculation.

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UNIT 3 TABLE 4

GASEOUS EFFLUENTS SUMMARY

A. FISSION GASES

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Kr-85             | Ci    | -----           | -----     | -----      | 9.71 E-01 |
| Kr-85m            | Ci    | -----           | 1.03 E-04 | 1.15 E-04  | -----     |
| Xe-131m           | Ci    | -----           | 2.41 E+00 | 2.20 E-02  | 1.01 E-01 |
| Xe-133            | Ci    | 2.24 E+01       | 1.62 E+02 | 9.25 E+00  | 1.49 E+00 |
| Xe-133m           | Ci    | -----           | -----     | 6.73 E-02  | 1.92 E-03 |
| Xe-135            | Ci    | 4.81 E-01       | 6.01 E+00 | 2.63 E-02  | -----     |
| Ar-41             | Ci    | -----           | -----     | -----      | 9.17 E-01 |
| Total for period  | Ci    | 2.29 E+01       | 1.70 E+02 | 9.43 E+00  | 2.51 E+00 |

B. IODINES

| Nuclides Released | Units | Continuous Mode |           |
|-------------------|-------|-----------------|-----------|
|                   |       | Quarter 1       | Quarter 2 |
| Br-82             | Ci    | -----           | 3.98 E-05 |
| I-131             | Ci    | 1.67 E-04       | 5.60 E-04 |
| I-133             | Ci    | 8.10 E-06       | 2.56 E-05 |
| Total for period  | Ci    | 1.75 E-04       | 6.25 E-04 |

C. PARTICULATES

| Nuclides Released | Units | Continuous Mode |           |
|-------------------|-------|-----------------|-----------|
|                   |       | Quarter 1       | Quarter 2 |
| Co-58             | Ci    | -----           | -----     |
| Co-60             | Ci    | -----           | -----     |
| Cs-137            | Ci    | 9.35 E-07       | -----     |
| Total for period  | Ci    | 9.35 E-07       | -----     |

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UNIT 4 TABLE 1

LIQUID EFFLUENTS SUMMARY

A. FISSION AND ACTIVATION PRODUCTS

|   | Units  | Quarter 1 | Quarter 2 | % Error |
|---|--------|-----------|-----------|---------|
| 1. Total Release(not including tritium, gases, alpha) | Ci     | 2.48 E-02 | 5.30 E-02 | 6.1     |
| 2. Average diluted concentration during period        | μCi/ml | 7.19 E-10 | 1.89 E-09 |         |
| 3. Percent of applicable limit                        | %      | 7.35 E-03 | 1.04 E-02 |         |

B. TRITIUM

|  |        |           |           |     |
|--|--------|-----------|-----------|-----|
| 1. Total Release                               | Ci     | 5.09 E+01 | 3.77 E+01 | 8.6 |
| 2. Average diluted concentration during period | μCi/ml | 1.47 E-06 | 1.32 E-06 |     |
| 3. Percent of applicable limit                 | %      | 4.90 E-02 | 4.40 E-02 |     |

C. DISSOLVED AND ENTRAINED GASES

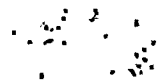
|  |        |           |           |     |
|--|--------|-----------|-----------|-----|
| 1. Total Release                               | Ci     | 1.17 E-02 | 2.96 E-03 | 6.1 |
| 2. Average diluted concentration during period | μCi/ml | 3.40 E-10 | 1.03 E-10 |     |
| 3. Percent of applicable limit                 | %      | 1.70 E-04 | 5.15 E-05 |     |

D. GROSS ALPHA RADIOACTIVITY

|                  |    |       |       |     |
|------------------|----|-------|-------|-----|
| 1. Total Release | Ci | ----- | ----- | 9.7 |
|------------------|----|-------|-------|-----|

E. LIQUID VOLUMES

|   |        |           |           |    |
|---|--------|-----------|-----------|----|
| 1. Batch waste released, prior to dilution      | liters | 1.02 E+06 | 1.98 E+06 | 10 |
| 2. Continuous waste released, prior to dilution | liters | -----     | -----     | 10 |
| 3. Dilution water used during period            | liters | 3.45 E+10 | 2.87 E+10 | 10 |





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UNIT 4 TABLE 2

LIQUID EFFLUENTS SUMMARY

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Na-24             | Ci    | -----           | -----     | -----      | -----     |
| Cr-51             | Ci    | -----           | -----     | 4.28 E-05  | 1.87 E-04 |
| Mn-54             | Ci    | -----           | -----     | 5.87 E-03  | 6.32 E-03 |
| Fe-55             | Ci    | -----           | -----     | 3.11 E-04  | 1.29 E-02 |
| Co-57             | Ci    | -----           | -----     | -----      | 4.10 E-05 |
| Co-58             | Ci    | -----           | -----     | 3.28 E-03  | 1.53 E-02 |
| Fe-59             | Ci    | -----           | -----     | -----      | 6.95 E-06 |
| Co-60             | Ci    | -----           | -----     | 5.85 E-03  | 1.13 E-02 |
| Zn-65             | Ci    | -----           | -----     | -----      | 3.86 E-03 |
| Sr-90             | Ci    | -----           | -----     | -----      | 1.09 E-03 |
| Nb-95             | Ci    | -----           | -----     | 3.30 E-05  | 1.53 E-05 |
| Zr-97             | Ci    | -----           | -----     | 5.63 E-05  | -----     |
| Ag-110            | Ci    | -----           | -----     | 4.00 E-03  | 2.08 E-04 |
| Sn-113            | Ci    | -----           | -----     | -----      | -----     |
| Sb-124            | Ci    | -----           | -----     | 2.51 E-04  | 3.31 E-05 |
| Sb-125            | Ci    | -----           | -----     | 2.28 E-03  | 3.45 E-04 |
| I-131             | Ci    | -----           | -----     | 5.83 E-04  | 1.71 E-04 |
| I-133             | Ci    | -----           | -----     | -----      | 6.15 E-06 |
| Cs-134            | Ci    | -----           | -----     | 2.92 E-04  | 1.77 E-04 |
| Cs-137            | Ci    | -----           | -----     | 1.66 E-03  | 1.03 E-03 |
| La-140            | Ci    | -----           | -----     | 9.89 E-05  | 1.16 E-05 |
| W-187             | Ci    | -----           | -----     | 1.48 E-04  | -----     |
| Total for period  | Ci    | -----           | -----     | 2.48 E-02  | 5.30 E-02 |

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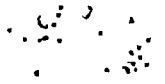
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UNIT 4 TABLE 2 (continued)

LIQUID EFFLUENTS SUMMARY

LIQUID DISSOLVED GAS

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Ar-41             | Ci    | -----           | -----     | -----      | -----     |
| Kr-85m            | Ci    | -----           | -----     | -----      | -----     |
| Kr-87             | Ci    | -----           | -----     | -----      | -----     |
| Xe-133            | Ci    | -----           | -----     | 1.17 E-02  | 2.96 E-03 |
| Xe-133m           | Ci    | -----           | -----     | -----      | -----     |
| Xe-135            | Ci    | -----           | -----     | -----      | 8.70 E-07 |
| Total for Period  | Ci    | -----           | -----     | 1.17 E-02  | 2.96 E-03 |



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UNIT 4 TABLE 3

GASEOUS EFFLUENTS SUMMARY

A. FISSION AND ACTIVATION PRODUCTS

|  | Units   | Quarter 1 | Quarter 2 | % Error |
|--|---------|-----------|-----------|---------|
| 1. Total Release   | Ci      | 1.46 E+01 | 1.90 E+02 | 4.5     |
| 2. Average Release Rate for Period                         | μCi/sec | 1.88 E+00 | 2.42 E+01 |         |
| 3. Percent of Technical Specification limit (500 mrem/yr.) | %       | 1.84 E-05 | 1.22 E-03 |         |

B. IODINES

|   |         |           |           |     |
|---|---------|-----------|-----------|-----|
| 1. Total Iodine-131   | Ci      | 1.67 E-04 | 5.60 E-04 | 8.0 |
| 2. Average Release Rate for Period                          | μCi/sec | 2.14 E-05 | 7.10 E-05 |     |
| 3. Percent of Technical Specification limit (1500 mrem/yr.) | %       | 2.03 E-01 | 6.83 E-01 |     |

C. PARTICULATES

|   |         |           |       |     |
|---|---------|-----------|-------|-----|
| 1. Particulates T1/2 > 8 days                               | Ci      | 9.35 E-07 | ----- | 6.4 |
| 2. Average Release Rate for Period                          | μCi/sec | 1.20 E-07 | ----- |     |
| 3. Percent of Technical Specification limit (1500 mrem/yr.) | %       | (1)       | (1)   |     |
| 4. Gross Alpha Radioactivity                                | Ci      | -----     | ----- |     |

D. TRITIUM

|   |         |           |           |     |
|---|---------|-----------|-----------|-----|
| 1. Total Release  | Ci      | 2.47 E+00 | 1.58 E-02 | 8.8 |
| 2. Average Release Rate for Period                          | μCi/sec | 3.18 E-01 | 2.01 E-03 |     |
| 3. Percent of Technical Specification limit (1500 mrem/yr.) | %       | (1)       | (1)       |     |

(1) These percentages are included in the Iodine limit calculation

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UNIT 4 TABLE 4

GASEOUS EFFLUENTS SUMMARY

A. FISSION GASES

| Nuclides Released | Units | Continuous Mode |           | Batch Mode |           |
|-------------------|-------|-----------------|-----------|------------|-----------|
|                   |       | Quarter 1       | Quarter 2 | Quarter 1  | Quarter 2 |
| Kr-85             | Ci    | -----           | -----     | -----      | 9.17 E-01 |
| Kr-85m            | Ci    | -----           | -----     | 1.15 E-04  | 4.10 E-03 |
| Xe-131m           | Ci    | -----           | 2.41 E+00 | 2.20 E-02  | 1.01 E-01 |
| Xe-133            | Ci    | 1.28 E+01       | 1.62 E+02 | 1.25 E+00  | 1.85 E+01 |
| Xe-133m           | Ci    | -----           | -----     | 2.80 E-03  | 1.62 E-01 |
| Xe-135            | Ci    | 4.80 E-01       | 6.01 E+00 | 2.83 E-03  | 1.06 E-01 |
| Ar-41             | Ci    | -----           | -----     | -----      | 2.30 E-01 |
| Total for period  | Ci    | 1.33 E+01       | 1.70 E+02 | 1.28 E+00  | 2.00 E+01 |

B. IODINES

| Nuclides Released | Units | Continuous Mode |           |
|-------------------|-------|-----------------|-----------|
|                   |       | Quarter 1       | Quarter 2 |
| Br-82             | Ci    | -----           | 3.98 E-05 |
| I-131             | Ci    | 1.67 E-04       | 5.60 E-04 |
| I-133             | Ci    | 8.10 E-06       | 2.56 E-05 |
| Total for period  | Ci    | 1.75 E-04       | 6.25 E-04 |

C. PARTICULATES

| Nuclides Released | Units | Continuous Mode |           |
|-------------------|-------|-----------------|-----------|
|                   |       | Quarter 1       | Quarter 2 |
| Co-58             | Ci    | -----           | -----     |
| Co-60             | Ci    | -----           | -----     |
| Cs-137            | Ci    | 9.35 E-07       | -----     |
| Total for period  | Ci    | 9.35 E-07       | -----     |

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UNITS 3 AND 4 TABLE 6

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

| 1. TYPE OF WASTE                       | UNITS          | 6 MONTH PERIOD |    | %ERR |
|--|----------------|----------------|----|------|
| a. Spent resin, filters                | m <sup>3</sup> | 2.24           | E1 | 20   |
| sludge, evaporator bottoms<br>(Note 1) | Ci             | 2.90           | E1 |      |
| b. Dry Compressible waste              | m <sup>3</sup> | 2.76           | E1 | 20   |
| (Note 2)                               | Ci             | 2.06           | E1 |      |
| c. Irradiated components               | m <sup>3</sup> | 0.00           | E0 |      |
| Control rods, etc.                     | Ci             | 0.00           | E0 |      |
| d. Other non-compressible              | m <sup>3</sup> | 0.00           | E0 |      |
| Waste                                  | Ci             | 0.00           | E0 |      |

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION BY TYPE OF WASTE

|          | UNITS | VALUE |
|----------|-------|-------|
| a. Co-60 | %     | 40    |
| Fe-55    | %     | 35    |
| Nb-95    | %     | 11    |
| Ni-63    | %     | 6     |
| Co-58    | %     | 5     |
| Cr-51    | %     | 2     |
| Fe-59    | %     | 1     |
| b. Fe-55 | %     | 45    |
| Co-60    | %     | 33    |
| Ni-63    | %     | 16    |
| Co-58    | %     | 3     |
| Cs-137   | %     | 2     |
| Sb-125   | %     | 1     |
| c. _____ | _____ | _____ |

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 UNITS 3 AND 4 TABLE 6

|                              | <u>UNITS</u>      | <u>VALUE</u>  |
|------------------------------|-------------------|---------------|
| d. _____                     | _____             | _____         |
| 3. SOLID WASTE DISPOSITION   |                   |               |
| NUMBER OF SHIPMENTS          | MODE OF TRANSPORT | DESTINATION   |
| 9 (Note 3)                   | Sole use truck    | Oak Ridge, TN |
| 7                            | Sole use truck    | Barnwell, SC  |
| B. IRRADIATED FUEL SHIPMENTS |                   |               |
| None                         |                   |               |





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 UNITS 3 & 4 TABLE 6  
 SOLID WASTE SUPPLEMENT

| Waste<br>Classification | Total<br>Volume<br>Ft <sup>3</sup> | (NOTE 4)<br>Total<br>Curie<br>Quantity | (NOTE 5)<br>Principal<br>Radionuclides | (NOTE 6)<br>Type of<br>Waste             | R.G. 1.21<br>Category | (NOTE 7)<br>Type of<br>Container | Solidification<br>or Absorbent<br>Agent  |
|-------------------------|------------------------------------|--|--|--|-----------------------|----------------------------------|--|
| Class A<br>Cement       | 614.6                              | 10.8                                   | None                                   | Dewatered<br>Resin Filters<br><br>Sludge | 1a.                   | >Type A,<br>LSA<br><br>Cask      | Envirostone<br>Gypsum<br><br>(199.4 ft.) |
| Class A                 | 976.3                              | 0.206                                  | None                                   | Compactable<br>Waste                     | 1b.                   | Strong<br>Tight                  | N/A                                      |
| Class B                 | 42.6                               | 1.67                                   | Ni-63<br>Sr-90<br>Cs-137               | Dewatered Resin<br>Filters, Sludge       | 1a.                   | >Type A<br>LSA<br>Cask           | N/A                                      |
| Class C                 | 132.4                              | 16.5                                   | C-14, Co-60<br>Ni-63,<br>Cs-137        | Dewatered Resin<br>Filters, Sludge       | 1a.                   | Type B,                          | N/A                                      |



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UNITS 3 AND 4 TABLE 6

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPMENT OFFSITE FOR BURIAL OR DISPOSAL

- Note 1: Spent resin, filters, sludge, and evaporator bottoms volume indicates volume shipped directly to burial site.
- Note 2: Dry compressible waste volume indicates volume shipped to burial site following reduction by a waste processing facility. Volume shipped to the waste processing facility was 652.4 m<sup>3</sup>
- Note 3: Material transported to Oak Ridge, Tennessee, was consigned to licensed processing facilities for volume reduction and decontamination activities. The material remaining after processing was transported by the processor to Barnwell, South Carolina, for burial.
- Note 4: The total curie quantity and radionuclide composition of solid waste shipped from the Turkey Point Plant Units 3 and 4 are determined using a combination of qualitative and quantitative techniques. The Turkey Point Plant follows the guidelines in the Low Level Waste Licensing Branch Technical Position on Radioactive Waste Classification (5/11/83) for these determinations.

The most frequently used techniques for determining the total activity in a package are the dose to curie method and inference from specific activity and mass or activity concentration and volume. Activation analysis may be applied when it is appropriate. The total activity determination by any of these methods is considered to be an estimate.

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UNITS 3 AND 4 TABLE 6

The composition of radionuclides in the waste is determined by both on-site analysis for principle gamma emitters and periodic off-site analyses for difficult to measure isotopes. The on-site analyses are performed either on a batch basis or on a routine basis using representative samples appropriate for the waste type. Off-site analyses are used to establish scaling factors or other estimates for difficult to measure isotopes.

- Note 5: Principle radionuclide refers to those radionuclides contained in the waste in concentrations greater than 0.01 times the concentration of the nuclide listed in Table 1 or 0.01 times the smallest concentration of the nuclide listed in Table 2 of 10 CFR 61.
- Note 6: Type of waste is specified as described in NUREG 0782, Draft Environment Impact Statement on 10 CFR 61 "Licensing Requirements for Land Disposal of Radioactive Waste".
- Note 7: Type of container refers to the transport package.

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UNITS 3 AND 4 ATTACHMENT 1

SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM

Pacific Nuclear, Inc., Waste Services Group Procedure PT-51-WS, Solidification Process Control Procedure, Revision 10, May 21, 1992, was deleted during this reporting period, at the end of a solidification campaign.

