



MAR 28 2005

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10 CFR 50.36a(a)(2)

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Re: Turkey Point Units 3 and 4  
Docket Nos. 50-250 and 50-251  
Annual Radioactive Effluent Release Report

Attached is the Radioactive Effluent Release Report for the period of January 1, 2004, through December 31, 2004, for Turkey Point Units 3 and 4, as required by Technical Specification 6.9.1.4 and 10 CFR 50.36a (a)(2).

Should there be any questions or comments regarding this information, please contact Walter Parker at (305) 246-6632.

Very truly yours,

A handwritten signature in black ink that reads "Terry Jones".

Terry O. Jones  
Vice President  
Turkey Point Nuclear Plant

OH

Attachment

cc: Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, Turkey Point Plant

JE48

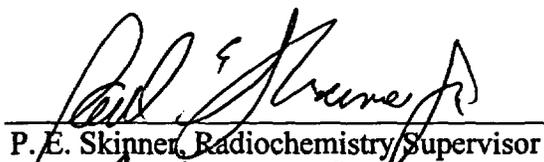
Florida Power and Light  
Turkey Point Plant  
Units 3 and 4

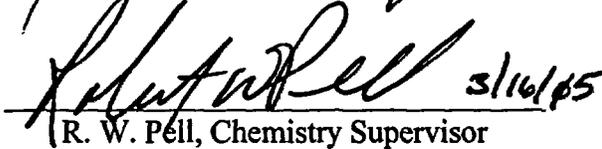
**ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT**

January 2004 through December 2004

*Submitted by:*

NUCLEAR CHEMISTRY DEPARTMENT  
FLORIDA POWER AND LIGHT COMPANY

  
P. E. Skinner, Radiochemistry Supervisor

  
R. W. Pell, Chemistry Supervisor

  
M. Navin, Operations Manager

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## 1.0 REGULATORY LIMITS

### 1.1 Liquid Effluent

- (a) The concentration of radioactive material released in liquid effluents to unrestricted areas shall not exceed ten times the concentration specified in 10CFR20 Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained gases. For dissolved or entrained noble gases, the concentration shall not exceed 2.0E-04 micro-curies per milliliter total activity.
- (b) The dose or dose commitment per reactor to a member of the public from any radioactive materials in liquid effluents 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 less than or equal to 5 mrem to any organ.
  - During any calendar year, to less than or equal to 3.0 mrem to the total body and less than or equal to 10 mrem to any organ.

### 1.2 Gaseous Effluent

- (a) The dose rate due to radioactive materials released in gaseous effluent from the site to areas at and beyond the site boundary shall be limited to the following:
  - Less than or equal to 500 mrem per year to the total body and less than or equal to 3000 mrem per year to the skin due to noble gases.
  - Less than or equal to 1500 mrem per 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.
- (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 to:
  - 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 all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluent 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 EFFLUENT CONCENTRATION

*Water* : In accordance with 10CFR20, Appendix B, Table 2, Column 2, and 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 of this report.

## 3.0 AVERAGE ENERGY

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

## 4.0 MEASUREMENTS AND APPROXIMATIONS OF TOTAL ACTIVITY

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 analysis techniques to achieve the required Lower Limit of Detection ("LLD") sensitivity for radioactive effluents.

### 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 determine if 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, Ni-63, and Fe-55 by chemical separation.

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All radioactivity concentrations determined from sample 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 compositing period.

Aliquots of representative samples from the waste disposal system were analyzed on a pre-release basis by gamma spectral 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 respectively.

There were no continuous liquid effluent releases above the lower limit of detection for either Unit 3 or Unit 4 during this reporting period and therefore these have been omitted from Table 2 of this report.

#### 4.2 Gaseous Effluents

Airborne releases to the atmosphere occurred from the following sources:

- Gas Decay Tanks
- Containment Purges
- Releases incidental to operation of the plant.

The techniques employed in determining the radioactivity in airborne releases are:

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

All gaseous 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 monitors and the Plant Vent process monitor data using the current calibration curve for that process monitor. This method was not used this reporting period.

Both units share portions of the gaseous waste treatment system and generally all gaseous releases from the shared system are allocated on a 50/50 basis to each unit.

Meteorological data for the period January 2004 through December 2004, in the form of Joint Frequency Distribution Tables, are maintained on site.

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4.3 Estimation 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, 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              | $\pm 5.9\%$          | $\pm 11.0\%$         |
| Gaseous             | $\pm 2.7\%$          | $\pm 11.0\%$         |

5.0 BATCH RELEASES

5.1 LIQUID

|  | <u>Unit 3</u> | <u>Unit 4</u> |
|--|---------------|---------------|
| a) Number of releases  | 7.40E+01      | 7.40E+01      |
| b) Total time period of batch releases, minutes  | 7.78E+03      | 7.78E+03      |
| c) Maximum time period for a batch release, minutes  | 1.27E+02      | 1.27E+02      |
| d) Average time period for a batch release, minutes  | 1.04E+02      | 1.04E+02      |
| e) Minimum time for a batch release, minutes   | 2.40E+00      | 2.40E+00      |
| f) Average stream flow during period of release of effluent into a flowing stream, liters-per-minute | 6.33E+06      | 6.33E+06      |

5.1 GASEOUS

|   | <u>Unit 3</u> | <u>Unit 4</u> |
|---|---------------|---------------|
| a) Number of releases                               | 1.60E+01      | 1.20E+01      |
| b) Total time period of batch releases, minutes     | 1.22E+03      | 3.95E+02      |
| c) Maximum time period for a batch release, minutes | 2.40E+02      | 5.50E+01      |
| d) Average time period for a batch release, minutes | 5.75E+01      | 3.29E+01      |
| e) Minimum time for a batch release, minutes        | 3.15E+00      | 3.15E+00      |

## 6.0 UNPLANNED RELEASES

### 6.1 Liquid

There were no unplanned liquid releases this period for either Unit 3 or Unit 4.

### 6.2 Gaseous

There was one unplanned gas release during this reporting period. The "A" Gas Decay Tank was inadvertently vented into the Unit 3 Containment during the setup for testing. A sample of the tank was obtained to account for nuclides released. The plant radioactive effluent monitors monitored the release, and no dose limits were exceeded. Procedure and configuration control changes have been implemented to prevent recurrence.

## 7.0 REACTOR COOLANT ACTIVITY

### 7.1 Unit 3

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

### 7.2 Unit 4

Reactor coolant activity limits of 100/E-Bar and 1.0 uCi/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 assumes a visitor was at the child development center/fitness center for ten hours a day, five days each week for fifty weeks of the year, receiving exposure from both Unit 3 and Unit 4 at Turkey Point. The child development center/fitness center is located approximately 1.75 miles WNW of the plant. Specific activities used in these calculations are the sum of the activities listed in Unit 3 Table 3 and Unit 4 Table 3. The following dose calculations were made using historical, meteorological data :

|                   | Adult Inhalation | Child Inhalation |
|-------------------|------------------|------------------|
| Bone (mrem)       | 3.80E-10         | 5.57E-10         |
| Liver (mrem)      | 2.56E-08         | 1.82E-08         |
| Thyroid (mrem)    | 1.71E-07         | 2.06E-07         |
| Kidney (mrem)     | 2.59E-08         | 1.20E-08         |
| Lung (mrem)       | 3.67E-08         | 3.11E-08         |
| GI-LLI (mrem)     | 2.57E-08         | 1.79E-08         |
| Total Body (mrem) | 2.54E-08         | 1.81E-08         |

|                       |          |
|-----------------------|----------|
| Gamma Air Dose (mrad) | 6.92E-06 |
| Beta Air Dose (mrad)  | 5.47E-06 |

## **9.0 OFFSITE DOSE CALCULATION MANUAL (ODCM) REVISIONS**

The ODCM was revised once during this reporting period. The changes are included in Appendix A.

## **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**

There were no revisions to the Process Control Program during this reporting period.

## **12.0 INOPERABLE EFFLUENT MONITORING INSTRUMENTATION**

During this period it was discovered that several radiation monitoring equipment did not comply with ODCM calibration requirements. Due to this fact they were administratively placed out of service. The monitors remained functional until the calibrations were completed. The monitors were calibrated and returned to service. No adjustments to radiation monitoring equipment were required to complete the calibrations.

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**LIQUID EFFLUENTS SUMMARY**

**UNIT 3  
TABLE 1**

**A. FISSION AND ACTIVATION PRODUCTS**

|   | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|--------|----------|----------|----------|----------|----------------|
| 1. Total Release (not including tritium,gases, alpha) | Ci     | 7.27E-03 | 5.92E-03 | 1.55E-02 | 2.07E-02 | 3.44           |
| 2. Average diluted concentration during the period    | uCi/ml | 8.88E-10 | 7.16E-10 | 8.94E-10 | 1.34E-09 |                |
| 3. Percent of applicable limit                        | %      | 2.72E-02 | 2.93E-02 | 7.05E-02 | 2.99E-01 |                |

**B. TRITIUM**

|  | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|--|--------|----------|----------|----------|----------|----------------|
| 1. Total Release                                   | Ci     | 8.91E+01 | 1.55E+02 | 3.11E+02 | 6.18E+01 | 2.50           |
| 2. Average diluted concentration during the period | uCi/ml | 1.09E-05 | 1.87E-05 | 1.79E-05 | 4.00E-06 |                |
| 3. Percent of applicable limit                     | %      | 1.09E+00 | 1.87E+00 | 1.79E+00 | 4.00E-01 |                |

**C. DISSOLVED AND ENTRAINED GASES**

|  | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|--|--------|----------|----------|----------|----------|----------------|
| 1. Total Release                                   | Ci     | 3.47E-04 | 2.27E-04 | 4.61E-04 | 1.47E-04 | 3.44           |
| 2. Average diluted concentration during the period | uCi/ml | 4.24E-11 | 2.74E-11 | 2.66E-11 | 9.53E-12 |                |
| 3. Percent of applicable limit                     | %      | 2.12E-05 | 1.37E-05 | 1.33E-05 | 4.77E-06 |                |

**D. GROSS ALPHA RADIOACTIVITY**

|                  | UNITS | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Est. Error (%) |
|------------------|-------|-------|-------|-------|-------|----------------|
| 1. Total Release | Ci    | --    | --    | --    | --    |                |

**E. LIQUID VOLUMES**

|   | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|--------|----------|----------|----------|----------|----------------|
| 1. Batch waste released, prior to dilution      | LITERS | 3.29E+05 | 3.21E+05 | 6.64E+05 | 7.90E+05 | 10.00          |
| 2. Continuous waste released, prior to dilution | LITERS | --       | --       | --       | --       |                |
| 3. Dilution water used during period            | LITERS | 8.19E+09 | 8.27E+09 | 1.74E+10 | 1.55E+10 |                |

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**LIQUID EFFLUENTS SUMMARY**

**UNIT 3  
TABLE 2**

| NUCLIDES RELEASED | UNITS | BATCH MODE |          |          |          |
|-------------------|-------|------------|----------|----------|----------|
|                   |       | Qtr 1      | Qtr 2    | Qtr 3    | Qtr 4    |
| Fe-55             | Ci    | 2.72E-03   | 1.59E-04 | 1.59E-03 | 8.53E-04 |
| Ni-63             | Ci    | 7.53E-04   | 1.44E-03 | 9.63E-03 | 4.82E-03 |
| Sr-89             | Ci    | --         | --       | --       | --       |
| Sr-90             | Ci    | --         | --       | --       | --       |
| Na-24             | Ci    | --         | --       | --       | 2.02E-06 |
| Cr-51             | Ci    | 1.32E-05   | 4.70E-05 | --       | 9.95E-05 |
| Mn-54             | Ci    | --         | --       | 2.43E-05 | 1.04E-04 |
| Co-57             | Ci    | --         | --       | 1.23E-05 | 1.56E-05 |
| Co-58             | Ci    | 4.82E-04   | 3.74E-04 | 4.90E-04 | 3.07E-03 |
| Fe-59             | Ci    | 1.51E-06   | --       | --       | --       |
| Co-60             | Ci    | 1.38E-04   | 2.18E-04 | 1.44E-03 | 9.13E-04 |
| Zn-65             | Ci    | --         | --       | --       | 1.52E-05 |
| Nb-95             | Ci    | 8.30E-07   | --       | 5.65E-06 | --       |
| Zr-95             | Ci    | --         | --       | --       | --       |
| Mo-99             | Ci    | --         | --       | --       | --       |
| Ru-106            | Ci    | --         | --       | --       | --       |
| Ag-110m           | Ci    | 2.14E-05   | 3.23E-06 | 4.81E-04 | 7.80E-06 |
| Sn-113            | Ci    | --         | --       | --       | --       |
| Sn-117m           | Ci    | 5.20E-06   | --       | --       | 2.86E-06 |
| Sb-124            | Ci    | 7.22E-05   | 6.07E-06 | --       | 7.88E-04 |
| Sb-125            | Ci    | 3.07E-03   | 3.67E-03 | 1.38E-03 | 6.31E-03 |
| I-131             | Ci    | --         | --       | --       | --       |
| I-133             | Ci    | --         | --       | --       | --       |
| I-134             | Ci    | --         | --       | --       | --       |
| Ce-134            | Ci    | --         | 1.25E-06 | 1.18E-04 | 1.04E-03 |
| I-135             | Ci    | --         | --       | --       | --       |
| Cs-137            | Ci    | 1.57E-06   | 9.51E-06 | 3.49E-04 | 2.62E-03 |
| La-140            | Ci    | --         | --       | --       | --       |
| Ce-141            | Ci    | --         | --       | --       | --       |
| Ce-144            | Ci    | --         | --       | --       | --       |
| W-187             | Ci    | --         | --       | --       | --       |
| Np-239            | Ci    | --         | --       | --       | --       |
| Te-129            | Ci    | --         | --       | --       | 7.35E-05 |
| TOTAL FOR PERIOD  | Ci    | 7.27E-03   | 5.92E-03 | 1.55E-02 | 2.07E-02 |

**LIQUID EFFLUENTS - DISSOLVED GAS SUMMARY**

| NUCLIDES RELEASED | UNITS | BATCH MODE |          |          |          |
|-------------------|-------|------------|----------|----------|----------|
|                   |       | Qtr 1      | Qtr 2    | Qtr 3    | Qtr 4    |
| Ar-41             | Ci    | --         | --       | --       | --       |
| Kr-85m            | Ci    | --         | --       | --       | --       |
| Kr-85             | Ci    | 3.47E-04   | 2.27E-04 | 4.12E-04 | --       |
| Xe-131            | Ci    | --         | --       | --       | --       |
| Xe-133            | Ci    | --         | --       | 4.78E-05 | 1.43E-04 |
| Xe-133m           | Ci    | --         | --       | --       | 4.67E-06 |
| Xe-135            | Ci    | --         | --       | 1.57E-06 | 2.36E-07 |
| Xe-138            | Ci    | --         | --       | --       | --       |
| TOTAL FOR PERIOD  | Ci    | 3.47E-04   | 2.27E-04 | 4.61E-04 | 1.47E-04 |

**LIQUID EFFLUENTS - DOSE SUMMATION**

|                          |             |                   |
|--------------------------|-------------|-------------------|
| Age group : Teenager     |             |                   |
| Location : Cooling Canal |             |                   |
| Shoreline Deposition     | Dose (mrem) | % of Annual Limit |
| TOTAL BODY               | 2.61E-04    | 8.70E-03          |

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**GASEOUS EFFLUENTS SUMMARY**

**UNIT 3  
TABLE 3**

**A. FISSION AND ACTIVATION PRODUCTS**

|   | UNITS   | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|---------|----------|----------|----------|----------|----------------|
| 1. Total Release                            | Ci      | 4.33E-03 | 5.73E-02 | 3.22E-01 | 3.20E-01 | 2.79           |
| 2. Average release rate for the period      | uCi/sec | 5.57E-04 | 7.29E-03 | 4.05E-02 | 4.11E-02 |                |
| 3. Percent of Technical Specification Limit | %       | 1.51E-15 | 2.57E-14 | 2.84E-11 | 1.33E-12 |                |

**B. IODINES**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|---------|-------|-------|----------|----------|----------------|
| 1. Total Release                            | Ci      | --    | --    | 1.42E-06 | 1.71E-06 | 3.44           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | 1.78E-07 | 2.15E-07 |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | 2.43E-04 | 2.94E-04 |                |

**C. PARTICULATES**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4    | Est. Error (%) |
|---|---------|-------|-------|-------|----------|----------------|
| 1. Particulates with half-life >8 days      | Ci      | --    | --    | --    | 7.21E-07 | 2.50           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | --    | 9.07E-08 |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | --    | 1.17E-08 |                |
| 4. Gross Alpha Radioactivity                | Ci      | --    | --    | --    | --       |                |

**D. TRITIUM**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|---------|-------|-------|----------|----------|----------------|
| 1. Total Release                            | Ci      | --    | --    | 1.35E-03 | 7.36E-03 | 2.50           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | 1.70E-04 | 9.46E-04 |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | 1.01E-08 | 5.53E-08 |                |

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**GASEOUS EFFLUENTS SUMMARY**

**UNIT 3  
TABLE 4**

**A. FISSION GASES**

| NUCLIDES RELEASED       | UNITS     | BATCH MODE      |                 |                 |                 |
|-------------------------|-----------|-----------------|-----------------|-----------------|-----------------|
|                         |           | Qtr 1           | Qtr 2           | Qtr 3           | Qtr 4           |
| Ar-41                   | Ci        | --              | --              | 2.15E-01        | --              |
| Kr-85                   | Ci        | 4.22E-03        | 5.44E-02        | 9.24E-03        | 1.21E-02        |
| Kr-85m                  | Ci        | --              | 2.64E-07        | --              | --              |
| Xe-131m                 | Ci        | --              | --              | 2.24E-04        | 2.07E-04        |
| Xe-133                  | Ci        | 1.18E-04        | 2.91E-03        | 9.74E-02        | 3.07E-01        |
| Xe-133m                 | Ci        | --              | --              | 2.80E-04        | 5.85E-06        |
| Xe-135                  | Ci        | --              | 1.06E-05        | 6.03E-05        | 5.13E-06        |
| Xe-135m                 | Ci        | --              | --              | --              | --              |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>4.33E-03</b> | <b>5.73E-02</b> | <b>3.22E-01</b> | <b>3.20E-01</b> |

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |           |           |
|-------------------------|-----------|-----------------|-----------|-----------|-----------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3     | Qtr 4     |
| Ar-41                   | Ci        | --              | --        | --        | --        |
| Kr-85                   | Ci        | --              | --        | --        | --        |
| Kr-85m                  | Ci        | --              | --        | --        | --        |
| Kr-87                   | Ci        | --              | --        | --        | --        |
| Kr-88                   | Ci        | --              | --        | --        | --        |
| Xe-131m                 | Ci        | --              | --        | --        | --        |
| Xe-133                  | Ci        | --              | --        | --        | --        |
| Xe-133m                 | Ci        | --              | --        | --        | --        |
| Xe-135                  | Ci        | --              | --        | --        | --        |
| Xe-135m                 | Ci        | --              | --        | --        | --        |
| Xe-138                  | Ci        | --              | --        | --        | --        |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>--</b> | <b>--</b> |

**B. IODINES**

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |                 |                 |
|-------------------------|-----------|-----------------|-----------|-----------------|-----------------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3           | Qtr 4           |
| Br-82                   | Ci        | --              | --        | --              | --              |
| I-131                   | Ci        | --              | --        | 1.42E-06        | 1.71E-06        |
| I-133                   | Ci        | --              | --        | --              | --              |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>1.42E-06</b> | <b>1.71E-06</b> |

**C. PARTICULATES**

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |           |                 |
|-------------------------|-----------|-----------------|-----------|-----------|-----------------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3     | Qtr 4           |
| Co-58                   | Ci        | --              | --        | --        | --              |
| Co-60                   | Ci        | --              | --        | --        | 7.21E-07        |
| Mn-54                   | Ci        | --              | --        | --        | --              |
| Cr-51                   | Ci        | --              | --        | --        | --              |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>--</b> | <b>7.21E-07</b> |

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**DOSES DUE TO IODINE, TRITIUM, AND PARTICULATES**

**UNIT 3  
TABLE 5**

| PATHWAY                   | BONE            | LIVER           | THYROID         | KIDNEY          | LUNG            | GI-LLI          | SKIN            | TOTAL BODY      |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cow milk - Infant (mrem)  | 1.29E-07        | 1.65E-07        | 4.94E-05        | 4.29E-08        | 1.01E-08        | 1.84E-08        | --              | 1.02E-07        |
| Fruit & Veg Fresh (mrem)  | 6.16E-09        | 7.63E-09        | 2.05E-06        | 4.55E-09        | 1.06E-09        | 3.07E-09        | --              | 6.62E-09        |
| Ground Plane (mrem)       | 2.47E-07        | 2.47E-07        | 2.47E-07        | 2.47E-07        | 2.47E-07        | 2.47E-07        | 2.90E-07        | 2.47E-07        |
| Inhalation - Adult (mrem) | 2.50E-10        | 4.96E-09        | 1.22E-07        | 5.19E-09        | 1.82E-08        | 5.29E-09        | --              | 4.82E-09        |
| <b>TOTAL (mrem)</b>       | <b>3.82E-07</b> | <b>4.25E-07</b> | <b>5.18E-05</b> | <b>3.00E-07</b> | <b>2.77E-07</b> | <b>2.74E-07</b> | <b>2.90E-07</b> | <b>3.61E-07</b> |
| <b>% of Annual Limit</b>  | <b>2.55E-06</b> | <b>2.83E-06</b> | <b>3.45E-04</b> | <b>2.00E-06</b> | <b>1.85E-06</b> | <b>1.83E-06</b> | <b>1.93E-06</b> | <b>2.41E-06</b> |

**DOSE DUE TO NOBLE GASES**

|                | mrad     | % of Annual Limit |
|----------------|----------|-------------------|
| Gamma Air Dose | 3.88E-05 | 3.88E-04          |
| Beta Air Dose  | 2.32E-05 | 1.16E-04          |

TURKEY POINT UNITS 3 AND 4  
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**LIQUID EFFLUENTS SUMMARY**

**UNIT 4  
TABLE 1**

**A. FISSION AND ACTIVATION PRODUCTS**

|   | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|--------|----------|----------|----------|----------|----------------|
| 1. Total Release (not including tritium,gases, alpha) | Ci     | 7.27E-03 | 5.92E-03 | 1.55E-02 | 2.07E-02 | 3.44           |
| 2. Average diluted concentration during the period    | uCi/ml | 8.88E-10 | 7.16E-10 | 8.94E-10 | 1.34E-09 |                |
| 3. Percent of applicable limit                        | %      | 2.72E-02 | 2.93E-02 | 7.05E-02 | 2.99E-01 |                |

**B. TRITIUM**

|  | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|--|--------|----------|----------|----------|----------|----------------|
| 1. Total Release                                   | Ci     | 8.91E+01 | 1.55E+02 | 3.11E+02 | 6.18E+01 | 2.50           |
| 2. Average diluted concentration during the period | uCi/ml | 1.09E-05 | 1.87E-05 | 1.79E-05 | 4.00E-06 |                |
| 3. Percent of applicable limit                     | %      | 1.09E+00 | 1.87E+00 | 1.79E+00 | 4.00E-01 |                |

**C. DISSOLVED AND ENTRAINED GASES**

|  | UNITS  | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|--|--------|----------|----------|----------|----------|----------------|
| 1. Total Release                                   | Ci     | 3.47E-04 | 2.27E-04 | 4.61E-04 | 1.47E-04 | 3.44           |
| 2. Average diluted concentration during the period | uCi/ml | 4.24E-11 | 2.74E-11 | 2.66E-11 | 9.53E-12 |                |
| 3. Percent of applicable limit                     | %      | 2.12E-05 | 1.37E-05 | 1.33E-05 | 4.77E-06 |                |

**D. GROSS ALPHA RADIOACTIVITY**

|                  | UNITS | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Est. Error (%) |
|------------------|-------|-------|-------|-------|-------|----------------|
| 1. Total Release | Ci    | --    | --    | --    | --    |                |

**E. LIQUID VOLUMES**

|   |        | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|--------|----------|----------|----------|----------|----------------|
| 1. Batch waste released, prior to dilution      | LITERS | 3.29E+05 | 3.21E+05 | 6.64E+05 | 7.90E+05 | 10.00          |
| 2. Continuous waste released, prior to dilution | LITERS | --       | --       | --       | --       |                |
| 3. Dilution water used during period            | LITERS | 8.19E+09 | 8.27E+09 | 1.74E+10 | 1.55E+10 |                |

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**LIQUID EFFLUENTS SUMMARY**

**UNIT 4  
TABLE 2**

| NUCLIDES<br>RELEASED    | UNITS     | BATCH MODE      |                 |                 |                 |
|-------------------------|-----------|-----------------|-----------------|-----------------|-----------------|
|                         |           | Qtr 1           | Qtr 2           | Qtr 3           | Qtr 4           |
| Fe-55                   | Ci        | 2.72E-03        | 1.59E-04        | 1.59E-03        | 8.53E-04        |
| Ni-63                   | Ci        | 7.53E-04        | 1.44E-03        | 9.63E-03        | 4.82E-03        |
| Sr-89                   | Ci        | --              | --              | --              | --              |
| Sr-90                   | Ci        | --              | --              | --              | --              |
| Na-24                   | Ci        | --              | --              | --              | 2.02E-06        |
| Cr-51                   | Ci        | 1.32E-05        | 4.70E-05        | --              | 9.95E-05        |
| Mn-54                   | Ci        | --              | --              | 2.43E-05        | 1.04E-04        |
| Co-57                   | Ci        | --              | --              | 1.23E-05        | 1.56E-05        |
| Co-58                   | Ci        | 4.82E-04        | 3.74E-04        | 4.90E-04        | 3.07E-03        |
| Fe-59                   | Ci        | 1.51E-06        | --              | --              | --              |
| Co-60                   | Ci        | 1.38E-04        | 2.18E-04        | 1.44E-03        | 9.13E-04        |
| Zn-65                   | Ci        | --              | --              | --              | 1.52E-05        |
| Nb-95                   | Ci        | 8.30E-07        | --              | 5.65E-06        | --              |
| Zr-95                   | Ci        | --              | --              | --              | --              |
| Mo-99                   | Ci        | --              | --              | --              | --              |
| Ru-106                  | Ci        | --              | --              | --              | --              |
| Ag-110m                 | Ci        | 2.14E-05        | 3.23E-06        | 4.81E-04        | 7.80E-06        |
| Sn-113                  | Ci        | --              | --              | --              | --              |
| Sn-117m                 | Ci        | 5.20E-06        | --              | --              | 2.86E-06        |
| Sb-124                  | Ci        | 7.22E-05        | 6.07E-06        | --              | 7.88E-04        |
| Sb-125                  | Ci        | 3.07E-03        | 3.67E-03        | 1.38E-03        | 6.31E-03        |
| I-131                   | Ci        | --              | --              | --              | --              |
| I-133                   | Ci        | --              | --              | --              | --              |
| I-134                   | Ci        | --              | --              | --              | --              |
| Cs-134                  | Ci        | --              | 1.25E-06        | 1.18E-04        | 1.04E-03        |
| I-135                   | Ci        | --              | --              | --              | --              |
| Cs-137                  | Ci        | 1.57E-06        | 9.51E-06        | 3.49E-04        | 2.62E-03        |
| La-140                  | Ci        | --              | --              | --              | --              |
| Ce-141                  | Ci        | --              | --              | --              | --              |
| Ce-144                  | Ci        | --              | --              | --              | --              |
| W-187                   | Ci        | --              | --              | --              | --              |
| Np-239                  | Ci        | --              | --              | --              | --              |
| Te-129                  | Ci        | --              | --              | --              | 7.35E-05        |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>7.27E-03</b> | <b>5.92E-03</b> | <b>1.55E-02</b> | <b>2.07E-02</b> |

**LIQUID EFFLUENTS - DISSOLVED GAS SUMMARY**

| NUCLIDES<br>RELEASED    | UNITS     | BATCH MODE      |                 |                 |                 |
|-------------------------|-----------|-----------------|-----------------|-----------------|-----------------|
|                         |           | Qtr 1           | Qtr 2           | Qtr 3           | Qtr 4           |
| Ar-41                   | Ci        | --              | --              | --              | --              |
| Kr-85m                  | Ci        | --              | --              | --              | --              |
| Kr-85                   | Ci        | 3.47E-04        | 2.27E-04        | 4.12E-04        | --              |
| Xe-131                  | Ci        | --              | --              | --              | --              |
| Xe-133                  | Ci        | --              | --              | 4.78E-05        | 1.43E-04        |
| Xe-133m                 | Ci        | --              | --              | --              | 4.67E-06        |
| Xe-135                  | Ci        | --              | --              | 1.57E-06        | 2.36E-07        |
| Xe-138                  | Ci        | --              | --              | --              | --              |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>3.47E-04</b> | <b>2.27E-04</b> | <b>4.61E-04</b> | <b>1.47E-04</b> |

**LIQUID EFFLUENTS - DOSE SUMMATION**

|                          |                 |                   |
|--------------------------|-----------------|-------------------|
| Age group : Teenager     |                 |                   |
| Location : Cooling Canal |                 |                   |
| Shoreline Deposition     | Dose (mrem)     | % of Annual Limit |
| <b>TOTAL BODY</b>        | <b>2.61E-04</b> | <b>8.70E-03</b>   |

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**GASEOUS EFFLUENTS SUMMARY**

**UNIT 4  
TABLE 3**

**A. FISSION AND ACTIVATION PRODUCTS**

|   | UNITS   | Qtr 1    | Qtr 2    | Qtr 3    | Qtr 4    | Est. Error (%) |
|---|---------|----------|----------|----------|----------|----------------|
| 1. Total Release                            | Ci      | 4.33E-03 | 5.73E-02 | 3.06E-02 | 3.20E-01 | 2.79           |
| 2. Average release rate for the period      | uCi/sec | 5.57E-04 | 7.29E-03 | 3.85E-03 | 4.11E-02 |                |
| 3. Percent of Technical Specification Limit | %       | 1.51E-15 | 2.57E-14 | 9.48E-14 | 1.33E-12 |                |

**B. IODINES**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3    | Qtr 4 | Est. Error (%) |
|---|---------|-------|-------|----------|-------|----------------|
| 1. Total Release                            | Ci      | --    | --    | 1.42E-06 | --    | 3.44           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | 1.78E-07 | --    |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | 2.43E-04 | --    |                |

**C. PARTICULATES**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Est. Error (%) |
|---|---------|-------|-------|-------|-------|----------------|
| 1. Particulates with half-life >8 days      | Ci      | --    | --    | --    | --    | 2.50           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | --    | --    |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | --    | --    |                |
| 4. Gross Alpha Radioactivity                | Ci      | --    | --    | --    | --    |                |

**D. TRITIUM**

|   | UNITS   | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Est. Error (%) |
|---|---------|-------|-------|-------|-------|----------------|
| 1. Total Release                            | Ci      | --    | --    | --    | --    | 2.50           |
| 2. Average release rate for the period      | uCi/sec | --    | --    | --    | --    |                |
| 3. Percent of Technical Specification Limit | %       | --    | --    | --    | --    |                |

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**GASEOUS EFFLUENTS SUMMARY**

**UNIT 4  
TABLE 4**

**A. FISSION GASES**

| NUCLIDES RELEASED       | UNITS     | BATCH MODE      |                 |                 |                 |
|-------------------------|-----------|-----------------|-----------------|-----------------|-----------------|
|                         |           | Qtr 1           | Qtr 2           | Qtr 3           | Qtr 4           |
| Ar-41                   | Ci        | --              | --              | --              | --              |
| Kr-85                   | Ci        | 4.22E-03        | 5.44E-02        | 9.24E-03        | 1.21E-02        |
| Kr-85m                  | Ci        | --              | 2.64E-07        | --              | --              |
| Xe-131m                 | Ci        | --              | --              | 2.24E-04        | 2.07E-04        |
| Xe-133                  | Ci        | 1.18E-04        | 2.91E-03        | 2.08E-02        | 3.07E-01        |
| Xe-133m                 | Ci        | --              | --              | 2.80E-04        | 5.85E-06        |
| Xe-135                  | Ci        | --              | 1.06E-05        | 6.03E-05        | 5.13E-06        |
| Xe-135m                 | Ci        | --              | --              | --              | --              |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>4.34E-03</b> | <b>5.73E-02</b> | <b>3.06E-02</b> | <b>3.20E-01</b> |

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |           |           |
|-------------------------|-----------|-----------------|-----------|-----------|-----------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3     | Qtr 4     |
| Ar-41                   | Ci        | --              | --        | --        | --        |
| Kr-85                   | Ci        | --              | --        | --        | --        |
| Kr-85m                  | Ci        | --              | --        | --        | --        |
| Kr-87                   | Ci        | --              | --        | --        | --        |
| Kr-88                   | Ci        | --              | --        | --        | --        |
| Xe-131m                 | Ci        | --              | --        | --        | --        |
| Xe-133                  | Ci        | --              | --        | --        | --        |
| Xe-133m                 | Ci        | --              | --        | --        | --        |
| Xe-135                  | Ci        | --              | --        | --        | --        |
| Xe-135m                 | Ci        | --              | --        | --        | --        |
| Xe-138                  | Ci        | --              | --        | --        | --        |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>--</b> | <b>--</b> |

**B. IODINES**

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |                 |           |
|-------------------------|-----------|-----------------|-----------|-----------------|-----------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3           | Qtr 4     |
| Br-82                   | Ci        | --              | --        | --              | --        |
| I-131                   | Ci        | --              | --        | 1.42E-06        | --        |
| I-133                   | Ci        | --              | --        | --              | --        |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>1.42E-06</b> | <b>--</b> |

**C. PARTICULATES**

| NUCLIDES RELEASED       | UNITS     | CONTINUOUS MODE |           |           |           |
|-------------------------|-----------|-----------------|-----------|-----------|-----------|
|                         |           | Qtr 1           | Qtr 2     | Qtr 3     | Qtr 4     |
| Co-58                   | Ci        | --              | --        | --        | --        |
| Co-60                   | Ci        | --              | --        | --        | --        |
| Mn-54                   | Ci        | --              | --        | --        | --        |
| Cr-51                   | Ci        | --              | --        | --        | --        |
| <b>TOTAL FOR PERIOD</b> | <b>Ci</b> | <b>--</b>       | <b>--</b> | <b>--</b> | <b>--</b> |

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**DOSES DUE TO IODINE, TRITIUM, AND PARTICULATES**

|                           |
|---------------------------|
| <b>UNIT 4<br/>TABLE 6</b> |
|---------------------------|

| PATHWAY                   | BONE            | LIVER           | THYROID         | KIDNEY          | LUNG            | GI-LI           | SKIN            | TOTAL BODY      |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cow milk - Infant (mrem)  | 5.83E-08        | 6.95E-08        | 2.24E-05        | 1.74E-08        | —               | 2.61E-09        | —               | 4.07E-08        |
| Fruit & Veg Fresh (mrem)  | 2.79E-09        | 2.86E-09        | 9.29E-07        | 1.74E-09        | —               | 2.45E-10        | —               | 2.16E-09        |
| Ground Plane (mrem)       | 3.87E-10        | 3.87E-10        | 3.87E-10        | 3.87E-10        | 3.87E-10        | 3.87E-10        | 4.70E-10        | 3.87E-10        |
| Inhalation - Adult (mrem) | 1.13E-10        | 1.61E-10        | 5.34E-08        | 2.75E-10        | —               | 2.82E-11        | —               | 9.20E-11        |
| <b>TOTAL (mrem)</b>       | <b>6.16E-08</b> | <b>7.29E-08</b> | <b>2.33E-05</b> | <b>1.98E-08</b> | <b>3.87E-10</b> | <b>3.27E-09</b> | <b>4.70E-10</b> | <b>4.34E-08</b> |
| <b>% of Annual Limit</b>  | <b>4.10E-07</b> | <b>4.86E-07</b> | <b>1.56E-04</b> | <b>1.32E-07</b> | <b>2.58E-09</b> | <b>2.18E-08</b> | <b>3.13E-09</b> | <b>2.89E-07</b> |

**DOSES DUE TO NOBLE GASES**

|                | mrad     | % of Annual Limit |
|----------------|----------|-------------------|
| Gamma Air Dose | 2.14E-06 | 2.14E-05          |
| Beta Air Dose  | 9.23E-06 | 4.61E-05          |

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**DOSES DUE TO IODINE, TRITIUM, AND PARTICULATES**

**Summation  
Table 5**

| PATHWAY                  | BONE            | LIVER           | THYROID         | KIDNEY          | LUNG            | GI-LLI          | SKIN            | TOTAL BODY      |
|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cow milk - Infant        | 1.87E-07        | 2.34E-07        | 7.18E-05        | 6.03E-08        | 1.01E-08        | 2.10E-08        | --              | 1.43E-07        |
| Fruit & Veg Fresh        | 8.95E-09        | 1.05E-08        | 2.98E-06        | 6.29E-09        | 1.06E-09        | 3.31E-09        | --              | 8.77E-09        |
| Ground Plane             | 2.48E-07        | 2.48E-07        | 2.48E-07        | 2.48E-07        | 2.48E-07        | 2.48E-07        | 2.90E-07        | 2.48E-07        |
| Inhalation - Adult       | 3.63E-10        | 5.12E-09        | 1.76E-07        | 5.46E-09        | 1.82E-08        | 5.32E-09        | --              | 4.91E-09        |
| <b>TOTAL (mrem)</b>      | <b>4.44E-07</b> | <b>4.98E-07</b> | <b>7.52E-05</b> | <b>3.20E-07</b> | <b>2.77E-07</b> | <b>2.77E-07</b> | <b>2.90E-07</b> | <b>4.05E-07</b> |
| <b>% of Annual Limit</b> | <b>2.96E-06</b> | <b>3.32E-06</b> | <b>5.01E-04</b> | <b>2.13E-06</b> | <b>1.85E-06</b> | <b>1.85E-06</b> | <b>1.94E-06</b> | <b>2.70E-06</b> |

**DOSES DUE TO NOBLE GASES**

|                | mrad     | % of Annual Limit |
|----------------|----------|-------------------|
| Gamma Air Dose | 4.09E-05 | 4.09E-04          |
| Beta Air Dose  | 3.24E-05 | 1.62E-04          |

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**TABLE 6**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

**A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL**

| 1. | <u>TYPE OF WASTE</u>                                      | <u>UNITS</u>         | <u>12 MONTH PERIOD</u> | <u>% ERROR</u> |
|----|---|----------------------|------------------------|----------------|
| a. | Spent resin, filters, sludge,<br>evaporator bottoms, etc. | m <sup>3</sup><br>Ci | 2.35E +00<br>4.22E +01 | 2.00E +00      |
| b. | Dry compressible waste<br>(Note 1)                        | m <sup>3</sup><br>Ci | 6.78E+01<br>1.43E+00   | 2.00E+00       |
| c. | Irradiated components,<br>control rods, etc.              | m <sup>3</sup><br>Ci | (None shipped)         |                |
| d. | Other:<br>non-compressed                                  | m <sup>3</sup><br>Ci | (None shipped)         |                |

**2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION ( by type of waste)**

| a. | <u>NUCLIDE</u> | <u>UNITS</u> | <u>VALUE</u> |
|----|----------------|--------------|--------------|
|    | Co-60          | %            | 1.38 E+01    |
|    | Cs-134         | %            | 2.37E+00     |
|    | Cs-137         | %            | 4.27 E+00    |
|    | Fe-55          | %            | 1.88 E+01    |
|    | Ni-63          | %            | 3.15 E+01    |

| b. | <u>NUCLIDE</u> | <u>UNITS</u> | <u>VALUE</u> |
|----|----------------|--------------|--------------|
|    | Fe-55          | %            | 3.81E+01     |
|    | Co-58          | %            | 1.04E+00     |
|    | Co-60          | %            | 1.98E+01     |
|    | Ni-63          | %            | 3.83E+01     |

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**TABLE 6**

c. (None shipped)

d. (None shipped)

3. **SOLID WASTE DISPOSITION (Note 2)**

| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u>                      |
|----------------------------|-------------------------------|---|
| 34                         | Sole use truck                | Envirocare (Clive, Utah)                |
| 3                          | Sole use truck                | Barnwell, (Barnwell,<br>South Carolina) |

**B. IRRADIATED FUEL SHIPMENTS (Disposition)**

None.

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**TABLE 6**

**SOLID WASTE SHIPMENTS**

| Waste<br>Classification | Total Volume<br>Cubic Feet | (Note 3) Total<br>Curies | (Note 4)<br>Principal<br>Radionuclides | (Note 5)<br>Type of Waste | R.G. 1.21<br>Category | (Note 6)<br>Type of Container |
|-------------------------|----------------------------|--------------------------|--|---------------------------|-----------------------|-------------------------------|
| Class A                 | 2.40 E+03                  | 1.43 E+00                | None                                   | Compressible<br>Waste     | 1.b                   | General Design                |
| Class B                 | 5.35 E+01                  | 3.82 E+01                | None                                   | Spent Resin               | 1.b.                  | Type B                        |

**No solidification or absorbing agents were used or needed in the shipment of these waste types**

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**TABLE 6**

- NOTE 1:** Dry compressible waste volume indicates volume shipped to a burial site following reduction by a waste processing facility.
- NOTE 2:** Material transported to 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 or Clive Utah in accordance with the appropriate burial license activity limits. The material shipped directly to Barnwell was processed by CNSI / Duratek Inc. and buried.
- NOTE 3:** 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.
- The composition of radionuclides in the waste is determined by periodic off-site analysis for difficult to measure isotopes. Off-site analysis are used to establish scaling factors or other estimates for difficult to measure isotopes and principle Gamma emitters.
- NOTE 4:** 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 61.55.
- NOTE 5:** 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 6:** Type of container refers to the transport package.

**APPENDIX A**  
**ODCM CHANGES 2004**

## **APPENDIX A**

### **REVISION OF TURKEY POINT ODCM 2004**

#### **Chapter 1**

Added definitions of Initial Calibration and Traceable Source.

#### **Chapter 3**

Change: Control 3.1, tables 3.1-1 and 3.1-2. Clarified requirement for compensatory monitoring.

A copy of the changed pages is attached.

OFFSITE DOSE CALCULATION MANUAL  
FOR  
GASEOUS AND LIQUID EFFLUENTS  
FROM THE  
TURKEY POINT PLANT UNITS 3 AND 4

REVISION 13

CHANGE DATED 10/14/04

Florida Power and Light Company

# TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

## LIST OF EFFECTIVE PAGES

### Offsite Dose Calculation Manual

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# TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

## 1.0 ADMINISTRATIVE CONTROLS

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### 1.5 DEFINITIONS (continued)

#### DOSE EQUIVALENT I-131

- 1.5.5 DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microCurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites" or Table E-7 of NRC Regulatory Guide 1.109, Revision 1, October 1977.

#### FREQUENCY NOTATION

- 1.5.6 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.5-1

#### GAS DECAY TANK SYSTEM

- 1.5.7 A GAS DECAY TANK SYSTEM shall be any system designed and installed to reduce radioactive gaseous effluents by collecting Reactor Coolant System off gases from the Reactor Coolant System and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

#### INITIAL CALIBRATION

- 1.5.8 INITIAL CALIBRATION – An INITIAL CALIBRATION is the determination of the detector sensitivity when the detector is exposed in a known geometry to radiation from sources of known energies and activity levels traceable to National Institute of Standards & Technology (NIST). The vendor usually performs this calibration. Furthermore, subsequent CHANNEL CALIBRATIONS should include the use of a TRACEABLE SOURCE positioned in a reproducible geometry with respect to the sensor whose effect on the system was established at the time of the initial calibration. This CHANNEL CALIBRATION will establish the dynamic capabilities of a detector, electronics and power supplies in such a way as to ensure that the detector will perform its basic task of sensing radiation at the predetermined minimum detectable concentration based on the Initial Calibration.

#### MEMBER(S) OF THE PUBLIC

- 1.5.9 MEMBER(S) OF THE PUBLIC shall mean any individual except when that individual is receiving an occupational dose.

## TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

### 1.0 ADMINISTRATIVE CONTROLS

#### 1.5 DEFINITIONS (continued)

#### OFFSITE DOSE CALCULATION MANUAL

- 1.5.10 The OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Tech Spec Section 6.8.4 and (2) descriptions of the information that should be included in the Annual Radioactive Effluent Release Report and the Annual Radiological Environmental Operating Report required by Controls 1.3 and 1.4.

#### OPERABLE - OPERABILITY

- 1.5.11 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

#### OPERATIONAL MODE - MODE

- 1.5.12 An OPERATIONAL MODE (i.e., MODE) shall correspond to any one inclusive combination of core reactivity condition, power level, and average reactor coolant temperature specified in Table 1.5-2

#### PROCESS CONTROL PROGRAM

- 1.5.13 The PROCESS CONTROL PROGRAM (PCP) shall contain the current formulas, sampling, analysis, tests, and determinations to be made to ensure that processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Parts 20, 61, and 71 and Federal and State regulations, burial ground requirements, and other requirements governing the disposal of radioactive waste.

## TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

### 1.0 ADMINISTRATIVE CONTROLS

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#### 1.5 DEFINITIONS (continued)

##### PURGE - PURGING

- 1.5.14 PURGE or PURGING shall be any controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

##### RATED THERMAL POWER

- 1.5.15 RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 2300 MWt

##### REPORTABLE EVENT

- 1.5.16 A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 of 10 CFR Part 50.

##### SITE BOUNDARY

- 1.5.17 The SITE BOUNDARY shall mean that line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee, see figure 1.5 - 1.

##### SOURCE CHECK

- 1.5.18 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

##### THERMAL POWER

- 1.5.19 THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

##### TRACEABLE SOURCE

- 1.5.20 TRACEABLE SOURCE – Radiation sources that are related not only to the reference sources that were used for the INITIAL CALIBRATION but also certified by the National Institute of Standards & Technology (NIST). These transfer sources will calibrate the detector by positioning it in a reproducible geometry as prescribed by the INITIAL CALIBRATION.

##### UNRESTRICTED AREA

- 1.5.21 An UNRESTRICTED AREA shall mean an area, access to which is neither limited nor controlled by the licensee.

## TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

### 1.0 ADMINISTRATIVE CONTROLS

#### 1.5 DEFINITIONS (continued)

#### VENTILATION EXHAUST TREATMENT SYSTEM

- 1.5.22 A VENTILATION EXHAUST TREATMENT SYSTEM shall be any system designed and installed to reduce gaseous radioactive iodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal absorbers and/or HEPA filters for the purpose of removing iodine or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Engineered Safety Features Atmospheric Cleanup Systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

#### VENTING

- 1.5.23 VENTING shall be the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration, or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

TABLE 1.5-1

#### FREQUENCY NOTATION

| <u>NOTATION</u> | <u>FREQUENCY</u>                       |
|-----------------|--|
| S               | At least once per 12 hours.            |
| D               | At least once per 24 hours.            |
| W               | At least once per 7 days.              |
| M               | At least once per 31 days.             |
| Q               | At least once per 92 days.             |
| SA              | At least once per 184 days.            |
| R               | At least once per 18 months.           |
| S/U             | Prior to each reactor startup.         |
| NA              | Not applicable.                        |
| P               | Completed prior to each batch release. |

# TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

## 3.0 RADIOACTIVE GASEOUS EFFLUENT

### **CONTROL 3.1 :** Radioactive Gaseous Effluent Monitoring Instrumentation; Operability and Alarm/Trip Setpoints, (continued)

TABLE 3.1-1 (Continued)  
TABLE NOTATION

- \* At all times.
- # Applies during MODE 1, 2, 3 and 4.
- ## Applies during MODE 1, 2, 3 and 4 when primary to secondary leakage is detected.

**ACTION 3.1.1 -** With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the tank(s) may be released to the environment provided that prior to initiating the release:

- a. At least two independent samples of the tank's contents are analyzed, and
- b. At least two technically qualified members of the facility staff independently verify the release rate calculations and discharge valve lineup;

Otherwise, suspend release of radioactive effluents via this pathway.

**ACTION 3.1.2 -** With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.

**ACTION 3.1.3 -** With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours.

**ACTION 3.1.4 -** With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue provided continuous sample collection with auxiliary sampling equipment, as required by Table 3.2-1 and analyzed at least weekly.

## TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

### 3.0 RADIOACTIVE GASEOUS EFFLUENT

**CONTROL 3.1 :** Radioactive Gaseous Effluent Monitoring Instrumentation; Operability and Alarm/Trip Setpoints. (continued)

TABLE 3.1-2 (Continued)

#### TABLE NOTATIONS

- \* At all times during periods of release.
- # Applies during MODE 1, 2, 3 and 4.
- ## Applies during MODE 1, 2, 3 and 4 when primary to secondary leakage is detected.

- (1) The ANALOG CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occurs if the instrument indicates measured levels above the Alarm/Trip Setpoint.
- (2) The ANALOG CHANNEL OPERATIONAL TEST shall also demonstrate that if the instrument indicates measured levels above the Alarm Setpoint, alarm annunciation occurs in the control room (for PRMS only) and in the computer room (for SPING only).
- (3) The initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. When practical, these standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used.
- (4) CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.
- (5) The CHANNEL CHECK shall consist of changing and analyzing the filter on a weekly basis.