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

Gentlemen:

Re: Turkey Point Units 3 and 4  
Docket Nos. 50-250 and 50-251  
1991 Annual Radiological  
Environmental Operating Report

This letter transmits the subject report in accordance with  
Technical Specification 6.9.1.3 for Turkey Point Units 3 and 4.

Should there be any questions on this information, please contact  
us.

Very truly yours,

T. F. Plunkett  
Vice President  
Turkey Point Nuclear

TFP/CLM/cm

Enclosure

cc: Stewart D. Ebnetter, Regional Administrator, Region II,  
USNRC  
Ross C. Butcher, Senior Resident Inspector, USNRC, Turkey  
Point Plant

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Docket: 05000250

Docket: 05000251





DEPARTMENT OF THE AIR FORCE  
WASHINGTON, DC

Office of the General Counsel

June 8, 2000

SAF/GCN  
1740 Air Force Pentagon  
Washington D.C. 20330-1740

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  
Homestead Air Force Base Property Disposal

On behalf of the Air Force and the Federal Aviation Administration (FAA), I am providing a copy of the Draft Supplemental Environmental Impact Statement (SEIS), *Disposal of Portions of the Former Homestead Air Force Base, Florida* (December 1999). This is in response to a suggestion made to me by Mr. Kahtan Jabbour, Office of Nuclear Reactor Regulation, that it would be useful to have the Draft SEIS available as part of the NRC's document system.

Sincerely,

A handwritten signature in dark ink, appearing to read "Douglas J. Heady", is positioned above the printed name.

Douglas J. Heady  
Associate General Counsel  
(Installations & Environment)

Attachment:  
Draft SEIS, Disposal of Homestead AFB

003723604

A001





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Annual Radioactive Effluent Release Report for January through December 1999

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IE48 - 50.36a(a)(2) Semiannual Effluent Release Reports

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MAR 23 2000

L-2000-074  
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, 1999, through December 31, 1999, 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 us.

Very truly yours,

R. J. Hovey  
Vice President  
Turkey Point Plant

GSS

Attachment

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

IE48

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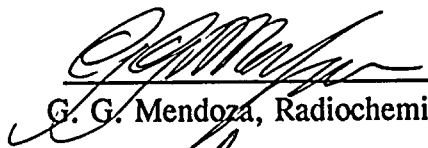
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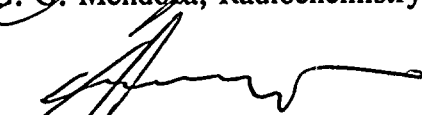
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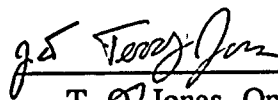
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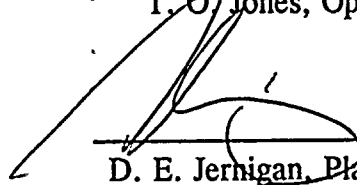
*Submitted by:*

NUCLEAR CHEMISTRY DEPARTMENT  
FLORIDA POWER AND LIGHT COMPANY

 3-10-00  
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C. M. Murray, Chemistry Supervisor

95   
T. O. Jones, Operations Manager

  
D. E. Jernigan, Plant General Manager





TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

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TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

## 1.0 REGULATORY LIMITS

### 1.1 Liquid Effluent

- (a) The concentration of radioactive material released in liquid effluent 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.
- (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.



TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

## 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.a 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 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.



TURKEY POINT UNITS 3 AND 4  
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JANUARY 1999 THROUGH DECEMBER 1999

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 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 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.

TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

#### 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 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 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 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 monitors and the Plant Vent process monitor recorder chart and the current calibration curve for that process 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 1999 through December 1999, in the form of Joint Frequency Distribution Tables, are maintained on site.



TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

#### 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	1.60E+02	1.60E+02
b) Total time period of batch releases, minutes	1.32E+04	1.32E+04
c) Maximum time period for a batch release, minutes	1.45E+02	1.45E+02
d) Average time period for a batch release, minutes	7.82E+01	7.82E+01
e) Minimum time for a batch release, minutes	1.00E+00	1.00E+00
f) Average stream flow during period of release of effluent into a flowing stream, liters-per-minute	4.85E+06	4.85E+06

##### 5.1 GASEOUS

	<u>Unit 3</u>	<u>Unit 4</u>
a) Number of releases	1.05E+01	1.15E+01
b) Total time period of batch releases, minutes	4.04E+02	3.70E+04
c) Maximum time period for a batch release, minutes	4.50E+01	3.66E+04
d) Average time period for a batch release, minutes	3.84E+01	3.22E+03
e) Minimum time for a batch release, minutes	3.00E+01	3.00E+01

TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

## 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 were no unplanned gas releases this period for either Unit 3 or Unit 4.

## 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)	3.67E-08	6.62E-08
Liver (mrem)	1.08E-06	7.90E-07
Thyroid (mrem)	1.83E-05	2.31E-05
Kidney (mrem)	1.12E-06	5.18E-07
Lung (mrem)	1.03E-06	7.22E-07
GI-LLI (mrem)	1.04E-06	7.26E-07
Total Body (mrem)	1.06E-06	7.73E-07

Gamma Air Dose (mrad)	5.01E-05
Beta Air Dose (mrad)	6.87E-05



TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

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

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

- a. Revised Control 5.3, Interlaboratory Comparison Program.

**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**

Revisions were made to the process control program during this reporting period. The revisions included:

- a. Deleted references and sections covering solidification of various types of wastes because of equipment obsolescence.
- b. Added processing requirements for wet radioactive waste such as resins, filters, waste oil, and liquid waste.

**12.0 INOPERABLE EFFLUENT MONITORING INSTRUMENTATION**

No inoperable effluent monitoring instrumentation requiring reportability during this period.

TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

**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	3.31E-02	4.90E-03	3.16E-03	1.15E-02	3.44
2. Average diluted concentration during the period	uCi/ml	9.52E-10	5.79E-10	3.78E-10	9.29E-10	
3. Percent of applicable limit	%	9.52E-03	5.79E-03	3.78E-03	9.29E-03	

**B. TRITIUM**

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	Ci	1.66E+02	5.39E+01	5.80E+01	1.48E+02	2.50
2. Average diluted concentration during the period	uCi/ml	4.77E-06	6.36E-06	6.94E-06	1.20E-05	
3. Percent of applicable limit	%	4.77E-01	6.36E-01	6.94E-01	1.20E+00	

**C. DISSOLVED AND ENTRAINED GASES**

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	Ci	1.93E-03	3.40E-04	8.13E-05	3.26E-04	3.44
2. Average diluted concentration during the period	uCi/ml	5.56E-11	4.01E-11	9.73E-12	2.64E-11	
3. Percent of applicable limit	%	2.78E-05	2.01E-05	4.86E-06	1.32E-05	

**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	1.82E+06	8.64E+05	3.34E+05	4.95E+05	10.00
2. Continuous waste released, prior to dilution	LITERS	--	--	--	--	
3. Dilution water used during period	LITERS	3.47E+10	8.47E+09	8.36E+09	1.24E+10	



TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

**LIQUID EFFLUENTS SUMMARY**

UNIT 3  
TABLE 2

NUCLIDES RELEASED	UNITS	BATCH MODE			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fe-55	Cl	4.97E-08	1.25E-08	2.56E-06	1.11E-03
Sr-89	Cl	2.60E-08	2.10E-08	1.40E-05	1.73E-05
Sr-90	Cl	1.60E-09	3.02E-05	2.01E-07	9.91E-06
Na-24	Cl	--	--	--	--
Cr-51	Cl	2.31E-04	4.45E-05	1.12E-04	--
Mn-54	Cl	1.29E-02	1.68E-04	3.81E-05	6.77E-05
Co-57	Cl	5.52E-05	8.20E-07	2.04E-06	7.13E-05
Co-58	Cl	8.58E-03	2.16E-03	1.37E-03	5.17E-03
Fe-59	Cl	1.96E-04	--	6.53E-06	--
Co-60	Cl	8.79E-03	6.47E-04	6.44E-04	1.80E-03
Zn-65	Cl	--	--	--	--
Nb-95	Cl	3.16E-04	8.20E-05	6.26E-05	5.57E-05
Zr-95	Cl	--	5.25E-05	4.11E-05	1.47E-05
Mo-99	Cl	--	--	--	--
Ru-103	Cl	--	--	--	--
Ag-110	Cl	7.87E-04	1.36E-05	6.06E-04	2.60E-03
Sn-113	Cl	3.49E-05	--	--	--
Sn-117	Cl	3.61E-06	--	--	--
Sb-124	Cl	7.05E-05	4.05E-04	--	--
Sb-125	Cl	6.54E-04	1.27E-03	1.70E-04	4.00E-04
I-131	Cl	2.90E-06	--	--	6.25E-07
I-133	Cl	--	--	--	--
I-134	Cl	--	1.30E-06	--	--
Cs-134	Cl	7.02E-06	--	--	--
I-135	Cl	--	--	--	--
Cs-137	Cl	4.09E-04	3.62E-05	6.94E-06	2.46E-05
La-140	Cl	1.55E-05	--	1.52E-06	1.15E-05
Co-141	Cl	--	--	1.96E-08	--
Co-144	Cl	--	--	--	--
W-187	Cl	2.48E-05	--	7.45E-05	1.38E-04
Np-239	Cl	--	--	--	--
TOTAL FOR PERIOD	Cl	3.31E-02	4.90E-03	3.16E-03	1.15E-02

**LIQUID EFFLUENTS - DISSOLVED GAS SUMMARY**

NUCLIDES RELEASED	UNITS	BATCH MODE			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Ar-41	Cl	--	--	--	--
Kr-85m	Cl	--	--	--	--
Kr-85	Cl	--	--	--	--
Xe-133	Cl	1.92E-03	3.33E-04	8.13E-05	3.26E-04
Xe-133m	Cl	6.65E-06	6.65E-06	--	--
Xe-135	Cl	1.86E-06	--	--	--
Xe-138	Cl	--	--	--	--
TOTAL FOR PERIOD	Cl	1.93E-03	3.40E-04	8.13E-05	3.26E-04

**LIQUID EFFLUENTS - DOSE SUMMATION**

Age group : Teenager Location : Cooling Canal		
Shoreline Deposition	Dose (mrem)	% of Annual Limit
TOTAL BODY	5.92E-04	1.97E-02





TURKEY POINT UNITS 3 AND 4  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY 1999 THROUGH DECEMBER 1999

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	2.69E-01	3.37E-02	1.11E+00	--	2.79
2. Average release rate for the period	uCi/sec	3.46E-02	4.28E-03	1.40E-01	--	
3. Percent of Technical Specification Limit	%	1.17E-12	1.31E-13	4.51E-12	--	

B. IODINES

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	CI	--	--	6.62E-04	--	3.44
2. Average release rate for the period	uCi/sec	--	--	8.33E-05	--	
3. Percent of Technical Specification Limit	%	--	--	1.14E-01	--	

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	%	--	--	--	--	



TURKEY POINT UNITS 3 AND 4  
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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	--	7.36E-08	--	--
Kr-85	CI	3.23E-04	2.91E-03	7.77E-02	--
Kr-85m	CI	2.68E-08	3.56E-06	--	--
Xe-131m	CI	3.24E-03	1.30E-03	--	--
Xe-133	CI	2.63E-01	2.93E-02	1.01E+00	--
Xe-133m	CI	1.94E-03	1.66E-04	9.12E-03	--
Xe-135	CI	7.61E-04	4.74E-05	3.41E-03	--
TOTAL FOR PERIOD	CI	2.69E-01	3.37E-02	1.10E+00	--

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	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	--	--

**B. IODINES**

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Br-82	CI	--	--	--	--
I-131	CI	--	--	2.70E-04	--
I-133	CI	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	2.70E-04	--

**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	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	--	--

TURKEY POINT UNITS 3 AND 4  
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**DOSES DUE TO IODINE, TRITIUM, AND PARTICULATES**

UNIT 3  
TABLE 5

PATHWAY	BONE	LIVER	THYROID	KIDNEY	LUNG	GILL	Skin	TOTAL BODY
Cow milk - Infant (mrem)	1.11E-05	1.33E-05	4.27E-03	3.32E-06	0.00E+00	4.98E-07	0.00E+00	7.77E-06
Fruit & Veg Fresh (mrem)	5.32E-07	5.45E-07	1.77E-04	3.33E-07	0.00E+00	4.68E-08	0.00E+00	4.11E-07
Ground Plane (mrem)	7.38E-08	7.38E-08	7.38E-08	7.38E-08	7.38E-08	7.38E-08	8.97E-08	7.38E-08
Inhalation - Adult (mrem)	2.16E-08	3.06E-08	1.02E-05	5.26E-08	0.00E+00	5.38E-09	0.00E+00	1.75E-08
<b>TOTAL (mrem)</b>	<b>1.17E-05</b>	<b>1.39E-05</b>	<b>4.45E-03</b>	<b>3.78E-06</b>	<b>7.38E-08</b>	<b>6.24E-07</b>	<b>8.97E-08</b>	<b>8.27E-06</b>
<b>% of Annual Limit</b>	<b>7.83E-05</b>	<b>9.28E-05</b>	<b>2.97E-02</b>	<b>2.52E-05</b>	<b>4.92E-07</b>	<b>4.16E-06</b>	<b>5.98E-07</b>	<b>5.52E-05</b>

**DOSE DUE TO NOBLE GASES**

	mrad	% of Annual Limit
Gamma Air Dose	8.59E-06	8.59E-05
Beta Air Dose	2.87E-05	1.43E-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	3.31E-02	4.90E-03	3.16E-03	1.15E-02	3.44
2. Average diluted concentration during the period	uCi/ml	9.52E-10	5.79E-10	3.78E-10	9.29E-10	
3. Percent of applicable limit	%	9.52E-03	5.79E-03	3.78E-03	9.29E-03	

**B. TRITIUM**

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	CI	1.66E+02	5.39E+01	5.80E+01	1.48E+02	2.50
2. Average diluted concentration during the period	uCi/ml	4.77E-06	6.36E-06	6.94E-06	1.20E-05	
3. Percent of applicable limit	%	4.77E-01	6.36E-01	6.94E-01	1.20E+00	

**C. DISSOLVED AND ENTRAINED GASES**

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	CI	1.93E-03	3.40E-04	8.13E-05	3.26E-04	3.44
2. Average diluted concentration during the period	uCi/ml	5.56E-11	4.01E-11	9.73E-12	2.64E-11	
3. Percent of applicable limit	%	2.78E-05	2.01E-05	4.86E-06	1.32E-05	

**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	1.82E+06	8.64E+05	3.34E+05	4.95E+05	10.00
2. Continuous waste released, prior to dilution	LITERS	--	--	--	--	
3. Dilution water used during period	LITERS	3.47E+10	8.47E+09	8.36E+09	1.24E+10	



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

**UNIT 4  
TABLE 2**

NUCLIDES RELEASED	UNITS	BATCH MODE			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fe-55	CI	4.97E-06	1.25E-06	2.56E-06	1.11E-03
Sr-89	CI	2.60E-08	2.10E-08	1.40E-05	1.73E-05
Sr-90	CI	1.60E-09	3.02E-05	2.01E-07	9.91E-06
Na-24	CI	--	--	--	--
Cr-51	CI	2.31E-04	4.45E-05	1.12E-04	--
Mn-54	CI	1.29E-02	1.68E-04	3.81E-05	6.77E-05
Co-57	CI	5.52E-05	8.20E-07	2.04E-06	7.13E-05
Co-58	CI	8.58E-03	2.16E-03	1.37E-03	5.17E-03
Fe-59	CI	1.96E-04	--	6.53E-06	--
Co-60	CI	8.79E-03	6.47E-04	6.44E-04	1.80E-03
Zn-65	CI	--	--	--	--
Nb-95	CI	3.16E-04	8.20E-05	8.26E-05	5.57E-05
Zr-95	CI	--	5.25E-05	4.11E-05	1.47E-05
Mo-99	CI	--	--	--	--
Ru-103	CI	--	--	--	--
Ag-110	CI	7.87E-04	1.36E-05	6.06E-04	2.60E-03
Sn-113	CI	3.49E-05	--	--	--
Sn-117	CI	3.61E-06	--	--	--
Sb-124	CI	7.05E-05	4.05E-04	--	--
Sb-125	CI	6.54E-04	1.27E-03	1.70E-04	4.00E-04
I-131	CI	2.90E-06	--	--	6.25E-07
I-133	CI	--	--	--	--
I-134	CI	--	1.30E-06	--	--
Cs-134	CI	7.02E-06	--	--	--
I-135	CI	--	--	--	--
Cs-137	CI	4.09E-04	3.62E-05	6.94E-06	2.46E-05
La-140	CI	1.55E-05	--	1.52E-06	1.15E-05
Co-141	CI	--	--	1.96E-06	--
Ce-144	CI	--	--	--	--
W-187	CI	2.48E-05	--	7.45E-05	1.38E-04
Np-239	CI	--	--	--	--
TOTAL FOR PERIOD	CI	3.31E-02	4.90E-03	3.16E-03	1.15E-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	--	--	--	--
Xe-131m	CI	--	--	--	--
Xe-133	CI	1.92E-03	3.33E-04	8.13E-05	3.26E-04
Xe-133m	CI	6.65E-06	6.65E-06	--	--
Xe-135	CI	1.86E-06	--	--	--
Xe-138	CI	--	--	--	--

TOTAL FOR PERIOD	CI	1.93E-03	3.40E-04	8.13E-05	3.26E-04
------------------	----	----------	----------	----------	----------

**LIQUID EFFLUENTS - DOSE SUMMATION**

Age group : Teenager Location : Cooling Canal		
Shoreline Deposition	Dose (mrem)	% of Annual Limit
TOTAL BODY	5.92E-04	1.97E-02





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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	4.65E-01	3.37E-02	1.11E+00	--	2.79
2. Average release rate for the period	uCi/sec	5.98E-02	4.28E-03	1.40E-01	--	
3. Percent of Technical Specification Limit	%	2.66E-11	1.31E-13	4.51E-12	--	

**B. IODINES**

	UNITS	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est. Error (%)
1. Total Release	CI	--	--	6.62E-04	--	3.44
2. Average release rate for the period	uCi/sec	--	--	8.33E-05	--	
3. Percent of Technical Specification Limit	%	--	--	1.14E-01	--	

**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	3.57E-01	--	--	--	2.50
2. Average release rate for the period	uCi/sec	4.59E-02	--	--	--	
3. Percent of Technical Specification Limit	%	2.68E-06	--	--	--	

TURKEY POINT UNITS 3 AND 4  
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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	1.96E-01	7.36E-08	--	--
Kr-85	CI	3.23E-04	2.91E-03	7.77E-02	--
Kr-85m	CI	2.68E-08	3.56E-06	--	--
Xe-131m	CI	3.24E-03	1.30E-03	1.38E-02	--
Xe-133	CI	2.63E-01	2.93E-02	1.01E+00	--
Xe-133m	CI	1.94E-03	1.66E-04	9.12E-03	--
Xe-135	CI	7.61E-04	4.74E-05	3.41E-03	--
Xe-135m	CI	--	--	--	--
TOTAL FOR PERIOD	CI	4.65E-01	3.37E-02	1.11E+00	0.00E+00

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	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	--	--

**B. IODINES**

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Br-82	CI	--	--	--	--
I-131	CI	--	--	2.70E-04	--
I-133	CI	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	2.70E-04	--

**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	--	--	--	--
TOTAL FOR PERIOD	CI	--	--	--	--



TURKEY POINT UNITS 3 AND 4  
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*DOSES DUE TO IODINE, TRITIUM, AND PARTICULATES*

UNIT 4  
TABLE 5

PATHWAY	BONE	LIVER	THYROID	KIDNEY	LUNG	G-LLI	SKIN	TOTAL BODY
Cow milk - Infant (mrem)	1.11E-05	1.59E-05	4.27E-03	4.50E-06	2.68E-06	3.18E-06	0.00E+00	1.05E-05
Fruit & Veg Fresh (mrem)	5.32E-07	8.25E-07	1.78E-04	5.17E-07	2.80E-07	3.26E-07	0.00E+00	6.91E-07
Ground Plane (mrem)	7.38E-08	7.38E-08	7.38E-08	7.38E-08	7.38E-08	7.38E-08	8.97E-08	7.38E-08
Inhalation - Adult (mrem)	2.16E-08	1.24E-06	1.14E-05	1.26E-06	1.21E-06	1.22E-06	0.00E+00	1.23E-06
<b>TOTAL (mrem)</b>	<b>1.17E-05</b>	<b>1.81E-05</b>	<b>4.46E-03</b>	<b>6.35E-08</b>	<b>4.25E-06</b>	<b>4.80E-06</b>	<b>8.97E-08</b>	<b>1.24E-05</b>
<b>% of Annual Limit</b>	<b>7.83E-05</b>	<b>1.21E-04</b>	<b>2.97E-02</b>	<b>4.24E-05</b>	<b>2.83E-05</b>	<b>3.20E-05</b>	<b>5.98E-07</b>	<b>8.30E-05</b>

*DOSES DUE TO NOBLE GASES*

	mrad	% of Annual Limit
Gamma Air Dose	4.16E-05	4.16E-04
Beta Air Dose	4.00E-05	2.00E-04



TURKEY POINT UNITS 3 AND 4  
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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	2.22E-05	2.92E-05	8.54E-03	7.82E-06	2.68E-06	3.68E-06	0.00E+00	1.82E-05
Fruit & Veg Fresh	1.06E-06	1.37E-06	3.55E-04	8.50E-07	2.80E-07	3.73E-07	0.00E+00	1.10E-06
Ground Plane	1.48E-07	1.48E-07	1.48E-07	1.48E-07	1.48E-07	1.48E-07	1.79E-07	1.48E-07
Inhalation - Adult	4.31E-08	1.27E-06	2.16E-05	1.32E-06	1.21E-06	1.22E-06	0.00E+00	1.25E-06
<b>TOTAL (mrem)</b>	<b>2.35E-05</b>	<b>3.20E-05</b>	<b>8.91E-03</b>	<b>1.01E-05</b>	<b>4.32E-06</b>	<b>5.42E-06</b>	<b>1.79E-07</b>	<b>2.07E-05</b>
<b>% of Annual Limit</b>	<b>1.57E-04</b>	<b>2.13E-04</b>	<b>5.94E-02</b>	<b>6.76E-05</b>	<b>2.88E-05</b>	<b>3.61E-05</b>	<b>1.20E-06</b>	<b>1.38E-04</b>

**DOSES DUE TO NOBLE GASES**

	mrad	% of Annual Limit
Gamma Air Dose	5.01E-05	5.01E-04
Beta Air Dose	6.87E-05	3.43E-04





TURKEY POINT UNITS 3 AND 4  
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TABLE 6

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFF SITE 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, evaporator bottoms	m <sup>3</sup> Ci	17. 830.	20
b.	Dry Compressible waste (Note 1)	m <sup>3</sup> Ci	33. 1.6	20
c.	Irradiated components Control rods, etc.	m <sup>3</sup> Ci	0.00 0.00	
d.	Other non-compressible Waste	m <sup>3</sup> Ci	5. 2.7	20

2. ESTIMATE OF MAJOR NUCLIDE COMPOSITION OF TYPE OF WASTE

	<u>UNITS</u>	<u>VALUE</u>
a. C-14	%	1
MN-54	%	5
FE-55	%	25
Co-57	%	5
Co-60	%	28
NI-63	%	15
NI-59	%	5
AG-110M	%	1
CS-134	%	5
CS-137	%	5
CE-144	%	2
SR-89	%	1
SR-90	%	2

TURKEY POINT UNITS 3 AND 4  
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TABLE 6

b.	<u>UNITS</u>	<u>VALUE</u>
CR-51	%	1
MN-54	%	2
Co-58	%	5
FE-55	%	36
Co-60	%	35
Ni-63	%	17
Nb-95	%	1
SB-125	%	1
C-14	%	1
ZR-95	%	1

c. N/A

d.	<u>UNITS</u>	<u>VALUE</u>
Co-57	%	5
MN-54	%	5
Co-58	%	45
FE-55	%	10
Co-60	%	20
Ni-63	%	10
CS-137	%	5

3. SOLID WASTE DISPOSITION

A.	<u>Number of shipments</u>	<u>Mode of transport</u>	<u>Destination</u>
	10 (Note 2)	Sole use truck	Oak Ridge, TN
	5 (Note 2)	Sole use truck	Barnwell, SC
	1 (Note 2)	Sole use truck	Richland, WA.

B. IRRADIATED FUEL SHIPMENTS

None

TURKEY POINT UNITS 3 AND 4  
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TABLE 6  
SOLID WASTE SHIPMENT

Waste Classification	Total Volume Ft <sup>3</sup>	(NOTE 3) Total Curie Quantity	(NOTE 4) Principal Radionuclides	(NOTE 5) Type of Waste	R.G. 121 Category	(NOTE 6) Type of Container	Solidification or Absorbers Agent
Class A	1165.	1.6	None	Compactable Waste	1b.	Strong Tight	N/A
Class A	189.	2.7	None	Non-Compressible Waste	1d.	Cask	N/A
Class B	120.3	2.7	None	Dewatered Filters	1a.	Cask	N/A
Class B	481.	418	None	Dewatered Resin	1a.	Cask	N/A
Class C	120.3	409	None	Dewatered Resin	1a.	Cask	N/A



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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 was 33 Cubic Meters.
- NOTE 2: 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 or Clive, Utah in accordance with the appropriate burial license activity limits. - The material shipped directly to Barnwell was processed by CNSI and buried. Material transported to Richland, Washington was cosigned to a licensed processing facility.
- 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 analyses for difficult to measure isotopes. Off-site analyses 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 1999**

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

REVISION 8

CHANGE DATED 03/02/99

Florida Power and Light Company

PNSC No. 99-019

PNSC APPROVAL	<i>Thomaz Attalutti</i>	DATE 3/2/99
PLT. MGR. APPROVAL	<i>[Signature]</i>	DATE 3/3/99

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# TURKEY POINT UNIT 3 & 4 OFFSITE DOSE CALCULATION MANUAL

## INTRODUCTION

### PURPOSE

This manual describes methods which are acceptable for calculating radioactivity concentrations in the environment and potential offsite doses associated with liquid and gaseous effluents from the Turkey Point Nuclear Units. These calculations are performed to satisfy Technical Specifications and to ensure that the radioactive dose or dose commitment to any member of the public is not exceeded.

The radioactivity concentration calculations and dose estimates in this manual are used to demonstrate compliance with the Technical Specifications required by 10 CFR 50.36. The methods used are acceptable for demonstrating operational compliance with 10 CFR 20.1302, 10CFR50 Appendix I, and 40CFR190. Only the doses attributable to Turkey Point Units 3 and 4 are determined in demonstrating compliance with 40CFR190 since there are no other nuclear facilities within 50 miles of the plant. Monthly calculations are performed to verify that potential offsite releases do not exceed Technical Specifications and to provide guidance for the management of radioactive effluents. The dose receptor is described such that the exposure of any member of the public is not likely to be substantially underestimated.

Quarterly and annual calculations of committed dose are also performed to verify compliance with regulatory limits of offsite dose. For these calculations, the dose receptor is chosen on the basis of applicable exposure pathways identified in a land use survey and the maximum ground level atmospheric dispersion factor ( $\chi/Q$ ) at a residence, or on the basis of more conservative conditions such that the dose to any resident near the plant is not likely to be underestimated.

The radioactive effluent controls set forth in this ODCM are designed to allow operational flexibility but still maintain releases and doses "as low as is reasonably achievable"; that is, within the objectives of Appendix I, 10 CFR Part 50 and comply with the limits in 10 CFR 20.1302.

The methods specified in the OFFSITE DOSE CALCULATION MANUAL (ODCM) for calculating doses due to planned or actual releases are consistent with the guidance and methods provided in:

Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1. October 1977.

Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977.

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

### INTRODUCTION, (continued)

Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

The required detection capabilities for radioactive materials in liquid and gaseous waste samples are tabulated in terms of the lower limits of detection (LDD's). Detailed discussion of the LLD and other detection limits, can be found in Currie, L. A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4077 (September 1984), in HASL Procedures Manual, HASL300 and in Hartwell, J. K. "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).





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

### 5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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#### CONTROL 5.3: INTERLABORATORY COMPARISON PROGRAM

Analyses shall be performed on all samples, supplied as part of an Interlaboratory Comparison Program, that correspond to the matrices shown on Table 5.3-1

This control may be satisfied by participation in a government sponsored radiological measurements Intercomparison program that involves at least three of the matrices shown in Table 5.3-1

**APPLICABILITY:** At all times.

#### **ACTION:**

- a. With analysis not being performed as required above, report the corrective actions taken to prevent recurrence to the Commission in the Annual Radiological Environmental Operating Report pursuant to Control 1.4.
- b. The provisions of Control 1.6.3 are not applicable.

#### **SURVEILLANCE REQUIREMENTS:**

- 5.3.1 A summary of the results obtained, as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Control 1.4.

#### **METHOD 5.3:**

- 5.3.1 The Program shall be conducted such that on an annual basis:  
At least three of the matrices will be involved, and at least two of the analytical methods will be evaluated, and for Gamma Spectroscopy, a majority of the nuclides shown in Table 5.3-1 will be included.
- 5.3.2 Any laboratory approved by FP&L may provide samples for the Intercomparison Program provided that the radioisotopes used for sample preparation are traceable to the National Institute of Standards and Technology (NIST).

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

### 5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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#### METHOD 5.3: ( continued )

- 5.3.3 Analysis of Matrix samples shall be capable of achieving ODCM Table 5.1-3 prescribed Lower Limit of Detection (LLD) on a blank sample.
- 5.3.4 Results within 20% of expected should be considered acceptable. Results exceeding 20% but within 35% require a description of probable cause and actions performed to bring the analysis into conformance. Results exceeding 35% are considered Not Acceptable; the Matrix shall be replaced and reanalyzed.

#### BASIS 5.3: INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR 50.

The Interlaboratory Comparison Program described herein provides an independent check on the precision and accuracy of the radiological monitoring measurements conducted as part of the Radiological Environmental Monitoring Program. The purpose of the Interlaboratory Comparison Program described in this appendix is to provide adequate confidence in the results of Turkey Point's radiological monitoring measurements, by providing an independent test of the ability to measure radionuclides in the sample medium.

TURKEY POINT UNIT 3 & 4 OFFSITE DOCSE CALCULATION MANUAL

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

TABLE 5.3-1

INTERLABORATORY COMPARISON PROGRAM SAMPLE ANALYSIS <sup>(1)</sup>

Analytical Method <sup>(2)</sup>	ANALYSIS	WATER <sup>(3)</sup>	AIRBORNE PARTICULATE OR GASES	SOIL	VEGETATION
GB	Gross Beta		X		
H3	H-3	X			
GS	Co-57		X		
	Co-60	X	X		X
	Cs-134	X	X		
	Cs-137	X	X	X	X
	Ce-144		X		
	Mn-54		X		
	K-40			X	X
	Ru-106		X		
	Sb-125		X		

100-100000

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

5.0

### RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

#### TABLE NOTATIONS

1. The sample matrices shown on table 5.3-1 correspond to the matrices shown in Tables 5.1-1 & 5.1-2, with the following exceptions:
  - a. Milk is not currently in the REMP sampling program; there are no milk animals in the area encompassed by the Land Use Census. Therefore, inclusion of milk samples in the Interlaboratory Comparison Program is not required. Continued exclusion of milk in the Interlaboratory Comparison Program is acceptable until the Land Use Census indicates the existence of milk producing animals within the geographic area covered by REMP; see note 3, below.
  - b. The INGESTION exposure pathway is represented by inclusion of Broad Leaf Vegetation in the Interlaboratory Comparison Program cross checks. Fish and Invertebrate samples are not included in the cross check program due to the instability of maintaining radioactivity in a fixed matrix due to decaying tissue and refrigeration limitations.
2. The analytical methods to be evaluated are those applied in the current REMP:
  - a. GB – Gross Beta analysis of an Air Filter matrix
  - b. H3 – Tritium in water, using method employed in REMP
  - c. GS – Gamma Spectroscopy, Quantitative.
3. The Gamma Spectroscopy method for water will suffice for Gamma Spectroscopy of Milk, should milk samples become available. Milk is over 98 % water.



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LICENSE NOS. DPR-31, DPR-41

DOCKET NOS. 50-250, 50-251

DATA SUBMITTED BY: FLORIDA DHRS

PREPARED BY: Peter G. Brady 3/18/92

REVIEWED BY: J. L. Jancik 3/30/92

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EXECUTIVE SUMMARY

The data obtained through the Turkey Point Radiological Environmental Monitoring Program verifies the levels of radiation and concentrations of radioactive material in environmental samples is not increasing. These measurements verify that the dose or dose commitment to members of the public, due to operation of Turkey Point Units 3 & 4, during the surveillance year, is well within the limits established by 10 CFR 50, Appendix I. .



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I. INTRODUCTION

This report is submitted pursuant to Specification 6.9 of Turkey Point Units 3 & 4 Technical Specifications. The Annual Radiological Environmental Operating Report provides information, summaries and analytical results pertaining to the Radiological Environmental Monitoring Program for the calendar year indicated. This report covers surveillance activities meeting the requirements of Unit 3 and Unit 4 Technical Specifications.

II. RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

A. Purpose

The purpose of the radiological environmental monitoring program is to provide representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of members of the public resulting from station operation. The radiological environmental monitoring program also supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways.

B. Program Description

The Radiological Environmental Monitoring Program for the Turkey Point Plant is conducted pursuant to Technical Specifications 3/4.12 of Turkey Point Unit 3 & 4 Technical Specifications.

1. Sample Locations, Types and Frequencies:

- a. Direct radiation gamma exposure rate is monitored continuously at 21 locations by thermoluminescent dosimeters (TLDs). TLDs are collected and analyzed quarterly.
- b. Airborne radioiodine and particulate samplers are operated continuously at five locations. Samples are collected and analyzed weekly. Analyses include Iodine-131, gross beta, and gamma isotopic measurements.



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- c. Surface water samples are collected from three locations. Samples are collected and analyzed monthly. Analyses include gamma isotopic and tritium measurements.
- d. Shoreline sediment samples are collected from three locations coinciding with the locations for surface water samples. Samples are collected and analyzed semi-annually. Sediment samples are analyzed by gamma isotopic measurements.
- e. Fish and invertebrate samples are collected from the two locations coinciding with two of the locations for surface water samples. Samples are collected and analyzed semi-annually. Fish and invertebrate samples are analyzed by gamma isotopic measurements.
- f. Broad leaf vegetation samples are collected from three locations. Samples are collected and analyzed monthly. Broad leaf vegetation samples are analyzed by gamma isotopic measurements.

Attachment A provides specific information pertaining to sample locations, types and frequencies.

2. Analytical Responsibility:

Radiological environmental monitoring for the Turkey Point Plant is conducted by the State of Florida, Department of Health and Rehabilitative Services (HRS). Samples are collected and analyzed by HRS personnel. Samples are analyzed at the HRS Environmental Radiation Control Laboratory in Orlando, Florida.

C. Analytical Results

Table 1, Environmental Radiological Monitoring Program Annual Summary provides a summary for all specified samples collected during the referenced surveillance period. Deviations from the sample schedule, missing data and/or samples not meeting the specified "A PRIORI" LLD, if any, are noted and explained in Tables 1A and 1B respectively. Analysis data for all specified samples analyzed during the surveillance period is provided in Attachment B.





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D. Land Use Census

A land use census out to a distance of 5 miles radius from the Turkey Point Plant is conducted annually to determine the location of the nearest milk animal, residence, and garden producing broad leaf vegetation in each of the sixteen meteorological sectors. A summary of the land use census for the surveillance year is provided in Table 2, Land Use Census Summary.

No locations yielding a calculated dose or dose commitment greater than the values currently being calculated were identified by the land use census.

No locations yielding a calculated dose or dose commitment (via the same exposure pathway) 20% greater than locations currently being sampled in the radiological environmental monitoring program were identified by the land use census.

E. Interlaboratory Comparison Program

The State of Florida HRS Environmental Radiation Control Laboratory participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by the Environmental Protection Agency. Results from the Interlaboratory Comparison Program are provided in Attachment C.

III. DISCUSSION AND INTERPRETATION OF RESULTS

A. Reporting of Results

The Annual Radiological Environmental Operating Report contains the summaries, interpretations and information required by the Turkey Point Units 3 & 4 Technical Specifications. Table 1 provides a summary of the measurements made for the nuclides required by Technical Specifications, Table 3.12-2, for all samples specified by Table 3.12-1. In addition, summaries are provided for other nuclides identified in the specified samples, including those not related to station operation. These include nuclides such as K-40, Th-232, Ra-226, and Be-7 which are common in the Florida environment.



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**B. Interpretation of Results**

**1. Direct Radiation:**

The results for direct radiation monitoring are consistent with past measurements for the specified locations. The exposure rate data shows no indication of any trends attributed to effluents from the plant. The measured exposure rates are consistent with exposure rates that were observed during the preoperational surveillance program. Direct radiation monitoring results are summarized in Table 1.

**2. Air Particulates/Radioiodine:**

Results of gross beta measurement are consistent with past measurements. No radioiodine was detected. The only identified isotope is cosmic-ray produced Be-7 at levels consistent with past measurements.

**3. Waterborne; Surface Water:**

The results for radioactivity measurements in surface water samples are consistent with past measurements. Tritium was reported as present in the surface water samples collected from sites T-81 and T-42. These results are consistent with the known subsurface interchange that occurs between the closed cooling canal and its surrounding waters, and the pressure gradients caused by the flow of aquifer subsurface waters in South Florida. The highest reported tritium is about 1.5% of the reporting value specified by Technical Specifications, Table 3.12-2.

**4. Waterborne; Sediment, and Food Products:**

**4.1 Sediment:** The results are consistent with past measurements; only naturally occurring radionuclides were detected.



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4.2 Food Products: The results are consistent with past measurements; only naturally occurring radionuclides were detected.

5. Broad Leaf Vegetation:

The results for radioactivity measurements are consistent with past measurements. Cs-137 was detected, as in the past, in samples collected from all locations. The maximum value, occurring at location T-40 (3 mi. W), is about 19% of the table 3.12-2 reporting level. No other fission products were detected.

C. Conclusions

The data obtained through the Turkey Point Plant Radiological Environmental Monitoring Program verifies that the levels of radiation and concentrations of radioactive materials in environmental samples, representing the highest potential exposure pathways to members of the public, are not being increased. The measurements verify that the dose or dose commitment to members of the public, due to operation of Turkey Point Units 3 & 4, during the surveillance year, are well within "as low as reasonably achievable (ALARA)" criteria established by 10 CFR 50, Appendix I.



ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251  
 Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
 (County, State)

PATHWAY: DIRECT RADIATION

SAMPLES COLLECTED: TLD

UNITS: MICRO - R/hr

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
Exposure Rate, 84 <sup>d</sup>	---	5.8 (84/84) 4.7 - 7.9	NW-10 10 mi., NW	7.7 (4/4) 7.5 - 7.9	---

Number of Nonroutine Reported Measurements = 0





## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
(County, State)

PATHWAY: AIRBORNE

SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES

UNITS: PICO - Ci/M<sup>3</sup>

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
<sup>131</sup> I, 265	0.024	<MDA	---	---	<MDA
Gross Beta, 265	0.0025	0.010 (259/265) 0.004 - 0.030	T-57 4 mi., NW	0.011 (52/53) 0.004 - 0.023	0.010 (52/53) 0.004 - 0.026
Composite Gamma Isotopic, 20					
<sup>7</sup> Be	0.0052	0.100 (20/20) 0.068 - 0.129	T-58 1 mi., NW	0.108 (4/4) 0.094 - 0.129	0.097 (4/4) 0.068 - 0.113
<sup>134</sup> Cs	0.00069	<MDA	---	---	<MDA
<sup>137</sup> Cs	0.00066	<MDA	---	---	<MDA

Number of Nonroutine Reported Measurements = 0



ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251

Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
(County, State)

PATHWAY: WATERBORNE

SAMPLES COLLECTED: SURFACE WATER

UNITS: PICO - Ci/LITER

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
Tritium, 36	230	188 (4/36) 98 - 421	T-81 6 mi., S	217 (3/12) 103 - 421	<MDA
Gamma Isotopic, 36					
<sup>40</sup> K	60	285 (36/36) 164 - 391	T-81 6 mi., S	306 (12/12) 215 - 367	256 (12/12) 187 - 335
<sup>54</sup> Mn	4	<MDA	---	---	<MDA
<sup>59</sup> Fe	8	<MDA	---	---	<MDA
<sup>58</sup> Co	4	<MDA	---	---	<MDA
<sup>60</sup> Co	4	<MDA	---	---	<MDA
<sup>65</sup> Zn	8	<MDA	---	---	<MDA
<sup>95</sup> Zr-Nb	7	<MDA	---	---	<MDA
<sup>131</sup> I	5	<MDA	---	---	<MDA
<sup>134</sup> Cs	5	<MDA	---	---	<MDA
<sup>137</sup> Cs	5	<MDA	---	---	<MDA
<sup>140</sup> Ba-La	11	<MDA	---	---	<MDA

Number of Nonroutine Reported Measurements = 0



ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251  
 Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
 (County, State)

PATHWAY: WATERBORNE  
 SAMPLES COLLECTED: SHORELINE SEDIMENT  
 UNITS: PICO - Ci/Kg, DRY

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
Gamma Isotopic, 6					
<sup>7</sup> Be	100	382 (1/6)	T-42 <1 mi., ENE	382 (1/2)	<MDA
<sup>40</sup> K	140	375 (6/6) 221 - 892	T-42 <1 mi., ENE	623 (2/2) 354 - 892	233 (2/2) 221 - 245
<sup>232</sup> Th	52	111 (1/6)	T-42 <1 mi., ENE	111 (1/2)	<MDA
<sup>226</sup> Ra	49	466 (4/6) 212 - 703	T-42 <1 mi., ENE	656 (2/2) 609-703	<MDA
<sup>238</sup> U	---	724 (1/6)	T-42 <1 mi., ENE	724 (1/6)	<MDA
<sup>58</sup> Co	9	<MDA	---	---	<MDA
<sup>60</sup> Co	12	<MDA	---	---	<MDA
<sup>134</sup> Cs	14	<MDA	---	---	<MDA
<sup>137</sup> Cs	12	<MDA	---	---	<MDA
Number of Nonroutine Reported Measurements = 0					



## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
(County, State)PATHWAY: INGESTION  
SAMPLES COLLECTED: CRUSTACEA  
UNITS: PICO - Ci/Kg, WET

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
Gamma Isotopic, 4					
<sup>40</sup> K	130	1674 (4/4) 1517 - 1832	T-81 6 mi., S	1778 (2/2) 1724 - 1832	1569 (2/2) 1517 - 1621
<sup>226</sup> Ra	20	224 (4/4) 98 - 508	T-81 6 mi., S	348 (2/2) 188 - 508	99 (2/2) 98 - 100
<sup>228</sup> Ra	---	94 (1/4)	T-81 6 mi., S	94 (1/2)	<MDA
<sup>54</sup> Mn	9	<MDA	---	---	<MDA
<sup>59</sup> Fe	16	<MDA	---	---	<MDA
<sup>58</sup> Co	9	<MDA	---	---	<MDA
<sup>60</sup> Co	19	<MDA	---	---	<MDA
<sup>65</sup> Zn	17	<MDA	---	---	<MDA
<sup>134</sup> Cs	9	<MDA	---	---	<MDA
<sup>137</sup> Cs	9	<MDA	---	---	<MDA

Number of Nonroutine Reported Measurements = 0





## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
(County, State)

PATHWAY: INGESTION

SAMPLES COLLECTED: FISH

UNITS: PICO - Ci/Kg, WET

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	
Gamma Isotopic, 4					
<sup>40</sup> K	130	2400 (4/4) 2004 - 2641	T-81 6 mi., S	2477 (2/2) 2343 - 2611	2322 (2/2) 2004 - 2641
<sup>226</sup> Ra	18	90 (1/4)	T-81 6 mi. S	90 (1/2)	<MDA
<sup>54</sup> Mn	9	<MDA	---	---	<MDA
<sup>59</sup> Fe	16	<MDA	---	---	<MDA
<sup>58</sup> Co	9	<MDA	---	---	<MDA
<sup>60</sup> Co	10	<MDA	---	---	<MDA
<sup>65</sup> Zn	17	<MDA	---	---	<MDA
<sup>134</sup> Cs	9	<MDA	---	---	<MDA
<sup>137</sup> Cs	9	<MDA	---	---	<MDA

Number of Nonroutine Reported Measurements = 0



## ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 3 & 4, Docket No(s). 50-250 & 50-251Location of Facility Dade, Florida, Reporting Period January 1 - December 31, 1991  
(County, State)

PATHWAY: INGESTION

SAMPLES COLLECTED: BROAD LEAF VEGETATION

UNITS: PICO - Ci/Kg, WET

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with Highest Annual Mean		Control Locations Mean (f) <sup>b</sup> Range
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	
			Distance & Direction	Range	
Gamma Isotopic, 36					
<sup>7</sup> Be	71	1211 (36/36) 435 - 3548	T-41 2 mi., W/NW	1320 (12/12) 504 - 3548	1177 (12/12) 760 - 1569
<sup>40</sup> K	100	3516 (36/36) 1284 - 5261	T-40 3 mi., W	4128 (12/12) 2902 - 5261	1920 (12/12) 1284 - 2982
<sup>137</sup> Cs	8	159 (36/36) 16 - 583	T-67 6 mi., S	275 (12/12) 33 - 583	275 (12/12) 33 - 583
<sup>226</sup> Ra	19	46 (3/36) 36 - 52	T-40 3 mi. W	52 (2/12) 51 - 52	36 (1/12)
<sup>131</sup> I	9	<MDA	---	---	<MDA
<sup>134</sup> Cs	8	<MDA	---	---	<MDA

Number of Nonroutine Reported Measurements = 0



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TABLE 1

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ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Turkey Point Units 1 & 2

Docket No.(s) 50-250 and 50-251

Location of Facility Dade, Florida  
(County, State)

Reporting Period January 1 - December 31, 1991

NOTES

- a. The LLD is an "a priori" lower limit of detection which establishes the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a real signal.

LLDs in this column are at time of measurement. The MDAs reported in Attachment B for the individual samples have been corrected to the time of sample collection.

- b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f).
- c. Specific identifying information for each sample location is provided in Attachment A.
- d. Results are based upon the average net response of two TLDs. (Thermoluminescent dosimeters).

MDA refers to minimum detectable activity.



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TABLE 1A

DEVIATIONS/MISSING DATA

- A) Pathway: Airborne
- Location: T-58 (1 mile, NW)
- Date: 4/25/91 to 4/30/91
- Deviation: Failure to continuously provide air sampling at this location.
- Description of Problem: Mechanical failure of sampling apparatus; estimated to have sampled for 40 out of the 166 hours of this period.
- Corrective Action: Replacement of sampling apparatus.
- 
- B) Pathway: Airborne
- Location: T-58 (1 mile, NW)
- Date: 4/30/91 to 5/6/91
- Deviation: Failure to continuously provide air sampling at this location.
- Description of Problem: Electrical failure, motor burnout of replacement sampling apparatus. Estimated to have run for 117 hours out of the 143 hours of this period.
- Corrective Action: Replacement of sampling apparatus.





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TABLE 1B

ANALYSES WITH LLDs ABOVE TABLE 4.12-1 DETECTION CAPABILITIES  
1/1/91 - 12/31/91

The values specified in Table 4.12-1, Detection Capabilities, were achieved for all samples.



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TABLE 2

LAND USE CENSUS

Distance to Nearest (a, b)

Sector	5/91 Milk (c) Animal	5/91 Residence	5/91 Garden (d)
N	L (e)	2.1/350 (g)	L
NNE	O (f)	O	O
NE	O	O	O
ENE	O	O	O
E	O	O	O
ESE	O	O	O
SE	O	O	O
SSE	O	O	O
S	L	L (g)	O
SSW	L	L	L
SW	L	L	L
WSW	L	L	L
W	L	L	L
WNW	L	L	L
NW	L	L	3.8/305
NNW	L	L (g)	4.0/328



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TABLE 2

LAND USE CENSUS

NOTES

- a. All categories surveyed out to 5 miles radius from the Turkey Point Plant.
- b. The following format is used to denote the location:

distance (miles)/bearing (degrees)

For example, a residence located in the north sector at a distance of 2.1 miles bearing 350 degrees is recorded as 2.1/350.

- c. Potential milk animal locations.
- d. Gardens with an estimated growing area of 500 square feet or more.
- e. L denotes that the sector area is predominantly a land area unoccupied by the category type.
- f. O denotes that the sector area is predominantly an ocean area.
- g. Non-residential occupied buildings in these sectors include the following:

<u>Sector</u>	<u>Distance</u>	<u>Description</u>
N	1.8/349	24-hour Security Staffing Building
S	4.9/171	Small building/boat dock - not considered a residence
NNW	4.5/327	2 mobile homes used for field offices
NNW	1.8/345	Security booth at park entrance



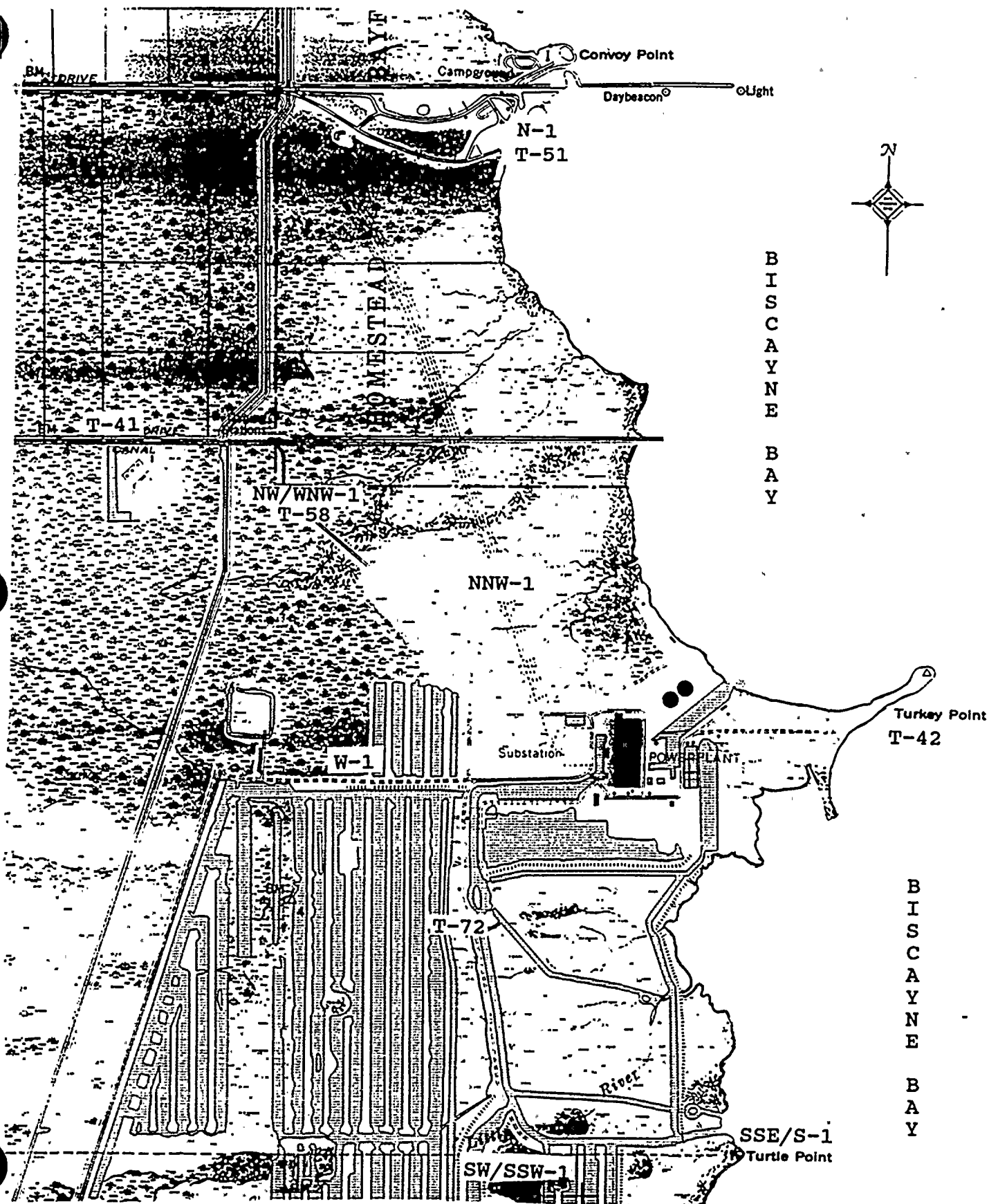
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ATTACHMENT A

KEY TO SAMPLE LOCATIONS



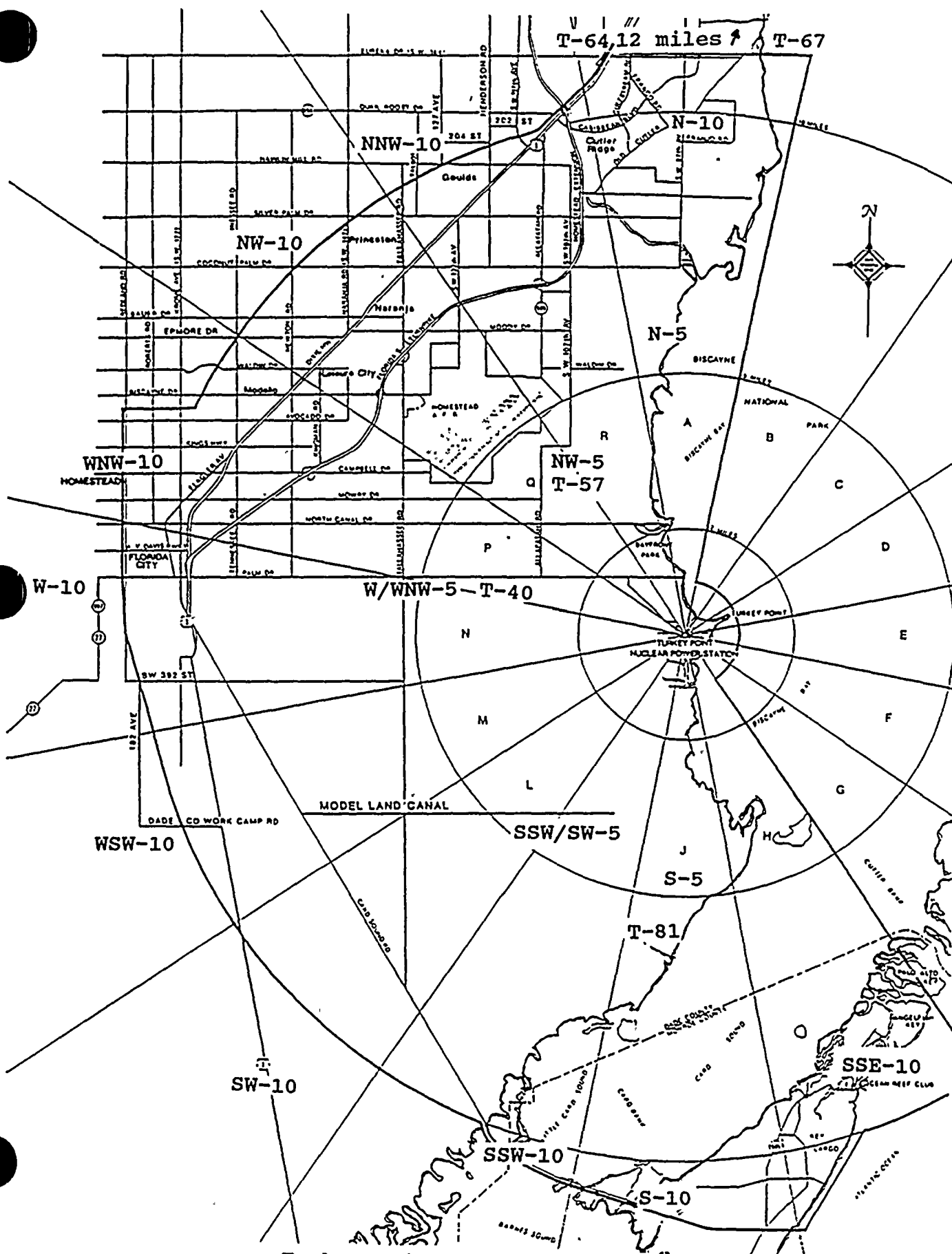
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Turkey Point Sampling Locations  
Plant Site Area



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Turkey Point Sampling Locations

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ATTACHMENT A

Page 1 of 4

PATHWAY: DIRECT RADIATION  
SAMPLES COLLECTED: TLD  
SAMPLE COLLECTION FREQUENCY: QUARTERLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
N-1	N	1	Convoy Point
N-5	N	6	North of Moody Drive
N-10	N	12	Old Cutler Rd. at S.W. 87 Avenue
NNW-1	NNW	<1	Turkey Point Entrance Rd.
NNW-10	NNW	9	Burr Rd. at Hainlin Mill Dr.
NW/WNW-1	WNW	1	Turkey Point Entrance Rd.
NW-5	NNW	4	Dolan's Farm on Kings Hwy.
NW-10	NW	10	Intersec Farm Lite & Coconut Palm
WNW-5	W	5	Palm Dr. at Tallahassee Rd.
NW-10	WNW	9	Homestead near Vehicle Inspect. Station
W-1	W	1	On-Site near Cooling Tower
W-10	W	10	Florida City near Fire Tower
WSW-10	WSW	12	Old Hawk Missile Site, South of Florida City
SW/SSW-1	SSW	1	On-Site near Land Utilization Offices
SW-10	SW	10	U.S. 1 South of Florida City
SSW/SW-5	SSW	5	On-Site, Southeast Corner of Cooling Canals
SSW-10	SSW	10	At Card Sound Bridge
S-5	S	5	On-Site, South End of Cooling Canals
S-10	S	10	Card Sound Road at Steamboat Creek
SSE/S-1	SSE	1	Turtle Point
SSE-10	SSE	8	Ocean Reef



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ATTACHMENT A

Page 2 of 4

PATHWAY: AIRBORNE

SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES

SAMPLE COLLECTION FREQUENCY: WEEKLY

<u>Location</u> <u>Name</u>	<u>Direction</u> <u>Sector</u>	<u>Approximate</u> <u>Distance</u> <u>(miles)</u>	<u>Description</u>
T-51	NNW	2	Homestead Bayfront Park
T-57	NW	4	Tree Nursery on 316th Street
T-58	NW	1	Turkey Point Entrance Road
T-72	WSW	<1	Turkey Point Boy Scout Camp

Control:

-64	NNE	22	Natoma Substation
-----	-----	----	-------------------



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ATTACHMENT A

Page 3 of 4

PATHWAY: WATERBORNE  
SAMPLES COLLECTED: SURFACE WATER (OCEAN)  
SAMPLE COLLECTION FREQUENCY: MONTHLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
T-42	ENE	<1	Biscayne Bay at Turkey Point
T-81	S	6	Card Sound, near Mouth of Old Discharge Canal

Control:

T-67	N, NNE	13-18	Near Biscayne Bay, Vicinity of Cutler Plant, North to Matheson Hammock Park
------	--------	-------	---

SAMPLES COLLECTED: SHORELINE SEDIMENT  
SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
T-42	ENE	<1	Biscayne Bay at Turkey Point A1A
T-81	S	6	Card Sound, near Mouth of Old Discharge Canal

Control:

T-67	N, NNE	13-18	Near Biscayne Bay, Vicinity of Cutler Plant, North to Matheson Hammock Park
------	--------	-------	---



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ATTACHMENT A

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PATHWAY: INGESTION  
SAMPLES COLLECTED: CRUSTACEA AND FISH  
SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
T-81	S	6	Card Sound Vicinity of Turkey Point Facility

Control:

T-67	N, NNE	13-18	Near Biscayne Bay, Vicinity of Cutler Park, North to Matheson Hammock Park
------	--------	-------	--

SAMPLES COLLECTED: BROAD LEAF VEGETATION  
SAMPLE COLLECTION FREQUENCY: MONTHLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
T-40	W	3	South of Palm Dr. on S.W. 117th Street Extension
T-41	WNW	2	Palm Dr., West of Old Missile Site near Plant Site Boundary

Control:

T-67	N, NNE	13-18	Near Biscayne Bay, Vicinity of Cutler Park, North to Matheson Hammock Park
------	--------	-------	--

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TURKEY POINT PLANT, UNITS 3 & 4

ATTACHMENT B

RADIOLOGICAL SURVEILLANCE OF  
FLORIDA POWER AND LIGHT COMPANY'S

TURKEY POINT SITE

1991

First Quarter, 1991

Second Quarter, 1991

Third Quarter, 1991

Fourth Quarter, 1991

RADIOLOGICAL SURVEILLANCE OF  
FLORIDA POWER AND LIGHT COMPANY'S  
TURKEY POINT SITE

First Quarter, 1991

Office of Radiation Control

Florida Department of Health  
and Rehabilitative Services



# TURKEY POINT SITE

## Technical Specifications Sampling

First Quarter, 1991

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	21	42
2. Airborne			
2.a Air Iodines	Weekly	5	65
2.b Air Particulates	Weekly	5	69*
3. Waterborne			
3.a Surface Water	Monthly	3	9
3.b Shoreline Sediment	Semiannually	3	3
4. Ingestion			
4.a Fish and Invertebrates			
4.a.1 Crustacea	Semiannually	2	2
4.a.2 Fish	Semiannually	2	2
4.b Food Products			
4.b.1 Broadleaf Vegetation	Monthly	3	9

---

Total: 201

\* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are not significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

1. DIRECT RADIATION - TLDs - (micro-R/hour)

Each result is the average net response of two dosimeters.

<u>Sample Site</u>	<u>Deployment Collection</u>	<u>12-18-90 03-13-91</u>
N-1	6.7 ± 0.4	
N-5	6.1 ± 0.3	
N-10	5.8 ± 0.3	
NNW-1	6.5 ± 0.3	
NNW-10	6.4 ± 0.3	
NW/WNW-1	5.3 ± 0.3	
NW-5	5.7 ± 0.3	
NW-10	7.9 ± 0.4	
W/WNW-5	4.9 ± 0.3	
WNW-10	6.5 ± 0.3	
W-1	5.2 ± 0.3	
W-10	6.5 ± 0.3	
WSW-10	4.9 ± 0.3	
SW/SSW-1	4.7 ± 0.2	
SW-10	4.9 ± 0.3	
SSW/SW-5	5.8 ± 0.3	
SSW-10	6.0 ± 0.3	
S-5	5.5 ± 0.3	
S-10	6.1 ± 0.3	
SSE/S-1	5.9 ± 0.3	
SSE-10	5.1 ± 0.3	

2.a IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

<u>Collection Date</u>	<u>Sample Site</u>				
	<u>T51</u>	<u>T57</u>	<u>T58</u>	<u>T64</u>	<u>T72</u>
01-02-91	<0.03	<0.03	<0.03	<0.03	<0.03
01-08-91	<0.03	<0.02	<0.02	<0.02	<0.02
01-15-91	<0.03	<0.03	<0.03	<0.03	<0.03
01-23-91	<0.02	<0.02	<0.02	<0.02	<0.02
01-29-91	<0.03	<0.03	<0.03	<0.03	<0.03
02-05-91	<0.02	<0.02	<0.02	<0.02	<0.02
02-12-91	<0.03	<0.03	<0.03	<0.03	<0.03
02-18-91	<0.03	<0.04	<0.03	<0.03	<0.03
02-27-91	<0.02	<0.02	<0.02	<0.02	<0.02
03-04-91	<0.04	<0.04	<0.04	<0.04	<0.04
03-12-91	<0.03	<0.03	<0.02	<0.03	<0.02
03-20-91	<0.02	<0.02	<0.03	<0.02	<0.03
03-26-91	<0.03	<0.03	<0.03	<0.03	<0.03



2.b

AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Collection Date	Sample Site				
	T51	T57	T58	T64	T72
01-02-91	0.008 ± 0.002	0.004 ± 0.001	0.007 ± 0.002	0.005 ± 0.001	0.007 ± 0.002
01-08-91	<0.005	0.004 ± 0.002	<0.005	<0.005	<0.005
01-15-91	0.010 ± 0.002	0.007 ± 0.002	0.007 ± 0.002	0.008 ± 0.002	0.010 ± 0.002
01-23-91	0.015 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.014 ± 0.002	0.010 ± 0.002
01-29-91	0.010 ± 0.002	0.014 ± 0.002	0.012 ± 0.002	0.012 ± 0.002	0.019 ± 0.002
02-05-91	0.013 ± 0.002	0.008 ± 0.002	*0.006 ± 0.002	0.007 ± 0.002	0.008 ± 0.002
02-12-91	0.013 ± 0.002	0.016 ± 0.002	*0.015 ± 0.002	0.013 ± 0.002	0.013 ± 0.002
02-18-91	0.016 ± 0.002	0.015 ± 0.002	*0.016 ± 0.002	0.016 ± 0.002	0.015 ± 0.002
02-27-91	0.007 ± 0.001	0.008 ± 0.001	*0.007 ± 0.001	0.003 ± 0.001	0.005 ± 0.001
03-04-91	0.009 ± 0.002	0.012 ± 0.002	0.017 ± 0.002	0.010 ± 0.002	0.012 ± 0.002
03-12-91	0.016 ± 0.002	0.015 ± 0.002	0.014 ± 0.002	0.016 ± 0.002	0.016 ± 0.002
03-20-91	0.015 ± 0.002	0.016 ± 0.002	0.015 ± 0.002	0.011 ± 0.002	0.012 ± 0.002
03-26-91	0.019 ± 0.002	0.015 ± 0.002	0.019 ± 0.002	0.013 ± 0.002	0.018 ± 0.002
Means:	0.013 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.012 ± 0.001

\* - NRC split samples.

2.b

AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

First Quarter, 1991

Sample Site	Be-7	K-40	Cs-134	Cs-137
T51	0.1199 ± 0.0112	<0.0205	<0.0011	<0.0010
T57	0.0929 ± 0.0105	<0.0207	<0.0010	<0.0011
T58	0.1286 ± 0.0108	<0.0189	<0.0010	<0.0010
T64	0.1116 ± 0.0109	<0.0155	<0.0010	<0.0011
T72	0.1253 ± 0.0122	<0.0200	<0.0008	<0.0010





3.a

## SURFACE WATER - (pCi/l)

Sample Site	Collection Date	H-3	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
T42	01-28-91	<145	364 ± 39	<4	<8	<4	<4	<8	<6	<5	<4	<3	<6
	02-18-91	<163	391 ± 44	<2	<9	<4	<4	<8	<7	<7	<4	<5	<7
	03-18-91	<138	274 ± 40	<4	<8	<4	<5	<11	<8	<6	<4	<4	<5
T67	01-28-91	<145	262 ± 35	<4	<9	<4	<5	<9	<5	<6	<4	<5	<6
	02-15-91	<163	274 ± 41	<4	<6	<4	<5	<10	<7	<9	<5	<4	<6
	03-18-91	<138	279 ± 36	<4	<8	<4	<4	<10	<8	<6	<3	<5	<5
T81	01-24-91	<145	321 ± 39	<4	<7	<3	<5	<8	<8	<6	<5	<4	<8
	02-15-91	<163	367 ± 38	<4	<8	<4	<5	<6	<7	<8	<5	<5	<8
	03-18-91	103 ± 45	321 ± 35	<4	<9	<4	<5	<9	<6	<7	<5	<4	<4

(A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.



3.b

SEDIMENT - (pCi/kg, dry weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Others</u>
T42	01-17-91	<127	354 ± 64	<12	<11	<13	<12	Ra-226: 609 ± 15 U-238: 724 ± 98
T67	01-16-91	<49	221 ± 41	<6	<4	<8	<7	ND
T81	01-14-91	<72	227 ± 50	<9	<6	<9	<8	Ra-226: 212 ± 8

4.a.1 CRUSTACEA - (T67: Mixed Crab Species) (T81: Blue Crab) - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
T67	02-12-91	1517 ± 102	<11	<24	<8	<12	<22	<10	<10	100 ± 8	ND
T81	01-25-91	1724 ± 126	<10	<26	<11	<15	<24	<15	<14	508 ± 14	94 ± 21

4.a.2 FISH - Mixed Species - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>
T67	02-12-91	2004 ± 122	<11	<22	<10	<12	<27	<9	<11
T81	02-25-91	2611 ± 136	<11	<49	<18	<14	<26	<11	<13

ND - Non-detectable.

4.b.1 BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
T40	01-28-91	996 ± 69	5261 ± 197	<12	<15	71 ± 7
	02-18-91	963 ± 60	4907 ± 167	<17	<11	38 ± 7
	03-18-91	1256 ± 69	4093 ± 158	<16	<11	31 ± 6
T41	01-28-91	989 ± 67	3013 ± 141	<12	<10	107 ± 9
	02-18-91	1018 ± 78	3689 ± 171	<17	<14	46 ± 7
	03-18-91	975 ± 76	3939 ± 161	<18	<11	105 ± 9
T67	01-28-91	899 ± 74	2982 ± 150	<15	<10	510 ± 16
	02-15-91	1232 ± 72	2077 ± 113	<23	<10	171 ± 10
	03-18-91	1412 ± 83	1456 ± 105	<18	<12	115 ± 8



RADIOLOGICAL SURVEILLANCE OF  
FLORIDA POWER AND LIGHT COMPANY'S  
TURKEY POINT SITE

Second Quarter, 1991

Office of Radiation Control  
Florida Department of Health  
and Rehabilitative Services





# TURKEY POINT SITE

## Technical Specifications Sampling

Second Quarter, 1991

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	21	42
2. Airborne			
2.a Air Iodines	Weekly	5	65
2.b Air Particulates	Weekly	5	69*
3. Waterborne			
3.a Surface Water	Monthly	3	9
3.b Shoreline Sediment	Semiannually	0	0
4. Ingestion			
4.a Fish and Invertebrates			
4.a.1 Crustacea	Semiannually	0	0
4.a.2 Fish	Semiannually	0	0
4.b Food Products			
4.b.1 Broadleaf Vegetation	Monthly	3	10*

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Total: 195

\* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are not significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.



1. DIRECT RADIATION - TLDS - (micro-R/hour)

Each result is the average net response of two dosimeters.

<u>Sample Site</u>	<u>Deployment Collection</u>	<u>03-13-91</u> <u>06-18-91</u>
N-1	6.6 ± 0.3	
N-5	5.8 ± 0.3	
N-10	5.6 ± 0.3	
NNW-1 (A)	5.9 ± 0.3	
NNW-10	6.3 ± 0.3	
NW/WNW-1	5.1 ± 0.3	
NW-5	5.5 ± 0.3	
NW-10	7.7 ± 0.4	
W/WNW-5	4.9 ± 0.3	
WNW-10	6.5 ± 0.3	
W-1 (B)		
W-10	6.6 ± 0.3	
WSW-10	4.9 ± 0.3	
SW/SSW-1	4.7 ± 0.2	
SW-10	4.8 ± 0.3	
SSW/SW-5	5.7 ± 0.3	
SSW-10	5.7 ± 0.3	
S-5	5.0 ± 0.3	
S-10	5.6 ± 0.3	
SSE/S-1	5.5 ± 0.3	
SSE-10	4.9 ± 0.3	

(A) - The dosimeters at site NNW-1 were found lying on the ground. They had apparently fallen from their mounting, which had come loose.

(B) - The dosimeters at site W-1 and the chain link fence on which they were mounted were missing when collection was attempted on 06-19-91. The fence had been removed on 03-25-91. The dosimeters were found lying on a concrete slab near the deployment site during a search of the area on 06-20-91. The result from these dosimeters was  $5.9 \pm 0.3$  micro-R per hour. This is slightly higher than the normal readings at this site, which have a long-term average of 5.2 micro-R per hour. This difference is probably due to the dosimeters having been moved when the fence was taken down.

2.a IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

<u>Collection Date</u>	<u>Sample Site</u>				
	<u>T51</u>	<u>T57</u>	<u>T58</u>	<u>T64</u>	<u>T72</u>
04-02-91	<0.02	<0.02	<0.02	<0.02	<0.02
04-09-91	<0.02	<0.02	<0.02	<0.02	<0.02
04-16-91	<0.03	<0.03	<0.03	<0.03	<0.03
04-23-91	<0.02	<0.02	<0.02	<0.02	<0.02
04-30-91	<0.03	<0.03	<0.06 (A)	<0.03	<0.03
05-06-91	<0.04	<0.04	<0.04 (B)	<0.04	<0.04
05-16-91	<0.01	<0.01	<0.01	<0.01	<0.01
05-22-91	<0.02	<0.02	<0.02	<0.02	<0.02
05-29-91	<0.03	<0.03	<0.03	<0.03	<0.03
06-04-91	<0.02	<0.02	<0.02	<0.02	<0.02
06-12-91	<0.03	<0.03	<0.03	<0.03	<0.03
06-19-91	<0.02	<0.02	<0.02	<0.02	<0.02
06-25-91	<0.03	<0.03	<0.03	<0.03	<0.03

(A) - This sample had a low collected volume due to mechanical failure of the air pump. The equipment is estimated to have run for 40 hours out of the 166 total hours for this sampling interval.

(B) - This sample had a low collected volume due to electrical failure of the replacement air pump. The equipment is estimated to have run for 117 hours out of the 143 total hours for this sampling interval.

2.b

AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Collection Date	Sample Site				
	T51	T57	T58	T64	T72
04-02-91	0.014 ± 0.002	0.017 ± 0.002	0.012 ± 0.002	0.011 ± 0.002	0.014 ± 0.002
04-09-91	0.011 ± 0.002	0.011 ± 0.002	0.009 ± 0.002	0.010 ± 0.002	0.010 ± 0.002
04-16-91	0.012 ± 0.002	0.017 ± 0.002	0.014 ± 0.002	0.013 ± 0.002	0.015 ± 0.002
04-23-91	0.016 ± 0.002	0.013 ± 0.002	0.014 ± 0.002	0.011 ± 0.002	0.015 ± 0.002
04-30-91	0.010 ± 0.002	0.012 ± 0.002	(A)0.013 ± 0.005	0.008 ± 0.002	0.013 ± 0.002
05-06-91	0.018 ± 0.002	0.018 ± 0.002	(B)*0.022 ± 0.003	0.014 ± 0.002	0.017 ± 0.002
05-16-91	0.014 ± 0.002	0.017 ± 0.002	*0.015 ± 0.002	0.012 ± 0.002	0.013 ± 0.002
05-22-91	0.005 ± 0.002	0.008 ± 0.002	*0.005 ± 0.002	0.007 ± 0.002	0.007 ± 0.002
05-29-91	0.007 ± 0.002	0.011 ± 0.002	*0.012 ± 0.002	0.007 ± 0.002	0.008 ± 0.002
06-04-91	0.011 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.012 ± 0.002	0.012 ± 0.002
06-12-91	0.007 ± 0.001	0.006 ± 0.001	0.004 ± 0.001	0.008 ± 0.001	0.008 ± 0.001
06-19-91	0.008 ± 0.002	0.012 ± 0.002	0.007 ± 0.001	0.009 ± 0.002	0.011 ± 0.002
06-25-91	0.006 ± 0.002	0.008 ± 0.002	0.008 ± 0.002	0.008 ± 0.002	0.012 ± 0.002
Means:	0.011 ± 0.001	0.013 ± 0.001	0.011 ± 0.001	0.010 ± 0.001	0.012 ± 0.001

\* - NRC split samples.

- (A) - This sample had a low collected volume due to mechanical failure of the air pump. The equipment is estimated to have run for 40 hours out of the 166 total hours for this sampling interval.
- (B) - This sample had a low collected volume due to electrical failure of the replacement air pump. The equipment is estimated to have run for 117 hours out of the 143 total hours for this sampling interval.

2.b

AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

Second Quarter, 1991

Sample Site	Be-7	K-40	Cs-134	Cs-137
T51	0.0986 ± 0.0104	<0.0209	<0.0013	<0.0009
T57	0.1014 ± 0.0107	<0.0193	<0.0012	<0.0008
T58	0.1108 ± 0.0114	<0.0162	<0.0010	<0.0009
T64	0.0939 ± 0.0107	<0.0229	<0.0009	<0.0011
T72	0.1170 ± 0.0114	<0.0213	<0.0007	<0.0009



3.a

## SURFACE WATER - (pCi/l)

Sample Site	Collection Date	H-3	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
T42	04-12-91	<145	307 ± 40	<4	<8	<5	<5	<9	<5	<6	<5	<4	<7
	05-22-91	<126	330 ± 35	<3	<8	<3	<5	<9	<7	<4	<4	<4	<8
	06-19-91	<128	317 ± 37	<4	<7	<4	<3	<10	<5	<5	<4	<4	<8
T67	04-12-91	<145	335 ± 38	<4	<7	<4	<4	<8	<8	<7	<4	<4	<6
	05-22-91	<126	333 ± 35	<4	<10	<3	<4	<8	<6	<4	<4	<5	<8
	06-14-91	<128	187 ± 39	<4	<9	<4	<4	<9	<6	<8	<4	<4	<5
T81	04-12-91	<145	354 ± 41	<4	<10	<4	<5	<8	<5	<6	<5	<5	<6
	05-22-91	<126	309 ± 36	<3	<5	<4	<5	<11	<6	<6	<4	<3	<5
	06-19-91	<128	275 ± 35	<3	<9	<4	<5	<9	<5	<4	<4	<4	<7

(A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.





4.b.1 BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
T40	04-12-91	435 ± 54	5005 ± 178	<21	<12	<14
	*05-22-91	719 ± 43	3859 ± 131	<7	<8	28 ± 4
	06-19-91	1388 ± 74	4269 ± 157	<13	<9	348 ± 12
T41	04-12-91	504 ± 67	4706 ± 177	<23	<12	152 ± 11
	05-22-91	766 ± 59	3246 ± 147	<10	<10	26 ± 6
	06-19-91	949 ± 62	3352 ± 152	<12	<10	93 ± 8
T67	04-12-91	1354 ± 86	1583 ± 114	<27	<9	100 ± 9
	05-22-91	760 ± 73	2826 ± 153	<10	<13	33 ± 7
	06-19-91	1246 ± 71	1473 ± 104	<15	<7	220 ± 12

\* - NRC split sample.



RADIOLOGICAL SURVEILLANCE OF  
FLORIDA POWER AND LIGHT COMPANY'S  
TURKEY POINT SITE

Third Quarter, 1991

Office of Radiation Control

Florida Department of Health  
and Rehabilitative Services



# TURKEY POINT SITE

## Technical Specifications Sampling

Third Quarter, 1991

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	21	42
2. Airborne			
2.a Air Iodines	Weekly	5	65
2.b Air Particulates	Weekly	5	69*
3. Waterborne			
3.a Surface Water	Monthly	3	9
3.b Shoreline Sediment	Semiannually	3	3
4. Ingestion			
4.a Fish and Invertebrates			
4.a.1 Crustacea	Semiannually	2	2
4.a.2 Fish	Semiannually	2	2
4.b Food Products			
4.b.1 Broadleaf Vegetation	Monthly	3	9
			Total: 201

\* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are not significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

1. DIRECT RADIATION - TLDs - (micro-R/hour)

Each result is the average net response of two dosimeters.

<u>Sample Site</u>	<u>Deployment Collection</u>	<u>06-18-91</u> <u>09-17-91</u>
N-1	6.4 ± 0.3	
N-5	6.0 ± 0.3	
N-10	5.5 ± 0.3	
NNW-1	5.7 ± 0.3	
NNW-10	6.3 ± 0.3	
NW/WNW-1	4.9 ± 0.3	
NW-5	5.6 ± 0.3	
NW-10	7.7 ± 0.4	
W/WNW-5	4.8 ± 0.3	
WNW-10	6.6 ± 0.3	
W-1 (A)	6.2 ± 0.3	
W-10	6.6 ± 0.3	
WSW-10	4.9 ± 0.3	
SW/SSW-1	4.8 ± 0.3	
SW-10	4.7 ± 0.2	
SSW/SW-5	5.7 ± 0.3	
SSW-10	5.6 ± 0.3	
S-5	5.3 ± 0.3	
S-10	5.9 ± 0.3	
SSE/S-1	5.7 ± 0.3	
SSE-10	4.9 ± 0.3	

- (A) - The dosimeters at site W-1 were mounted on the side of a small concrete block utility building on 06-19-91. The chain link fence previously used to hold these dosimeters had been removed, and this was the only other secure structure in the area. The measurement result obtained in the new configuration is significantly higher than the previous long-term average of 5.2 micro-R per hour at this site. This is believed to be due to the presence of naturally-occurring radioactivity in the materials of which this utility building is constructed.

2.a IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

<u>Collection Date</u>	<u>Sample Site</u>				
	<u>T51</u>	<u>T57</u>	<u>T58</u>	<u>T64</u>	<u>T72</u>
07-02-91	<0.03	<0.03	<0.03	<0.03	<0.03
07-09-91	<0.02	<0.02	<0.02	<0.03	<0.02
07-16-91	<0.02	<0.02	<0.02	<0.02	<0.02
07-23-91	<0.02	<0.02	<0.02	<0.02	<0.02
07-30-91	<0.02	<0.02	<0.02	<0.02	<0.02
08-06-91	<0.03	<0.03	<0.03	<0.03	<0.03
08-13-91	<0.03	<0.03	<0.03	<0.03	<0.03
08-20-91	<0.02	<0.02	<0.02	<0.02	<0.02
08-28-91	<0.02	<0.02	<0.02	<0.02	<0.02
09-03-91	<0.03	<0.03	<0.03	<0.03	<0.03
09-11-91	<0.03	<0.03	<0.03	<0.03	<0.03
09-17-91	<0.03	<0.03	<0.03	<0.03	<0.03
09-25-91	<0.03	<0.03	<0.03	<0.03	<0.03





2.b

AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Collection Date	Sample Site				
	T51	T57	T58	T64	T72
07-02-91	0.007 ± 0.001	0.008 ± 0.002	0.008 ± 0.002	0.008 ± 0.001	0.009 ± 0.002
07-09-91	0.012 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
07-16-91	0.008 ± 0.002	0.005 ± 0.001	0.009 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
07-23-91	0.009 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.008 ± 0.002	0.010 ± 0.002
07-30-91	0.007 ± 0.002	0.005 ± 0.001	0.008 ± 0.002	0.004 ± 0.001	0.008 ± 0.002
08-06-91	0.006 ± 0.001	0.006 ± 0.001	*0.007 ± 0.001	0.005 ± 0.001	0.004 ± 0.001
08-13-91	0.009 ± 0.002	0.007 ± 0.002	*0.007 ± 0.002	0.004 ± 0.001	0.007 ± 0.002
08-20-91	0.013 ± 0.002	0.018 ± 0.002	*0.015 ± 0.002	0.013 ± 0.002	0.019 ± 0.002
08-28-91	0.009 ± 0.002	0.008 ± 0.001	*0.008 ± 0.001	0.009 ± 0.001	0.008 ± 0.002
09-03-91	0.007 ± 0.002	0.007 ± 0.002	0.006 ± 0.002	0.006 ± 0.002	0.006 ± 0.002
09-11-91	0.005 ± 0.001	0.007 ± 0.002	0.006 ± 0.001	0.009 ± 0.002	0.007 ± 0.001
09-17-91	0.008 ± 0.002	0.010 ± 0.002	0.009 ± 0.002	0.009 ± 0.002	0.009 ± 0.002
09-25-91	0.014 ± 0.002	0.015 ± 0.002	0.012 ± 0.002	0.014 ± 0.002	0.013 ± 0.002
Means:	0.009 ± 0.001	0.009 ± 0.001	0.009 ± 0.001	0.009 ± 0.001	0.009 ± 0.001

\* - NRC split samples.

2.b

AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

Third Quarter, 1991					
Sample Site	Be-7	K-40	Cs-134	Cs-137	
T51	0.0870 ± 0.0093	<0.0199	<0.0012	<0.0011	
T57	0.0750 ± 0.0087	<0.0171	<0.0012	<0.0009	
T58	0.0936 ± 0.0101	<0.0155	<0.0010	<0.0008	
T64	0.0682 ± 0.0084	<0.0174	<0.0013	<0.0010	
T72	0.0760 ± 0.0094	<0.0212	<0.0014	<0.0009	



3.a

## SURFACE WATER - (pCi/l)

Sample Site	Collection Date	H-3	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
T42	07-19-91	<132	297 ± 32	<4	<8	<4	<4	<8	<9	<6	<4	<4	<6
	08-20-91	<136	366 ± 36	<4	<9	<4	<4	<8	<6	<4	<4	<4	<5
	09-18-91	98 ± 44	260 ± 40	<3	<7	<4	<4	<10	<7	<5	<4	<3	<4
T67	07-19-91	<132	202 ± 33	<4	<10	<4	<4	<9	<7	<7	<5	<4	<5
	08-19-91	<136	238 ± 41	<3	<7	<4	<4	<10	<6	<4	<5	<3	<2
	09-17-91	<137	298 ± 35	<4	<8	<3	<4	<10	<7	<6	<4	<5	<5
T81	07-17-91	421 ± 51	324 ± 39	<4	<10	<4	<4	<8	<6	<6	<4	<5	<7
	08-19-91	128 ± 45	326 ± 39	<3	<10	<5	<5	<8	<7	<4	<5	<4	<4
	09-13-91	<137	324 ± 37	<4	<10	<4	<5	<10	<6	<9	<4	<5	<7

(A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

3.b

SEDIMENT - (pCi/kg, dry weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Th-232</u>
T42	07-19-91	382 ± 58	892 ± 107	<13	<15	<18	<15	703 ± 17	111 ± 22
T67	07-19-91	<59	245 ± 39	<7	<6	<5	<7	ND	ND
T81	07-17-91	<79	312 ± 44	<8	<9	<8	<7	342 ± 10	ND

4.a.1

CRUSTACEA - Blue Crab - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
T67	09-11-91	1621 ± 114	<10	<25	<8	<11	<22	<12	<10	98 ± 7	ND
T81	09-28-91	1832 ± 156	<14	<28	<12	<18	<29	<12	<12	188 ± 12	ND

4.a.2

FISH - (T67: Mixed Species) (T81: Catfish) - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
T67	09-13-91	2641 ± 140	<9	<28	<10	<14	<23	<12	<12	ND	ND
T81	09-18-91	2343 ± 157	<13	<36	<10	<13	<28	<9	<15	90 ± 10	ND

ND - Non-detectable.



RADIOLOGICAL SURVEILLANCE OF  
FLORIDA POWER AND LIGHT COMPANY'S  
TURKEY POINT SITE

Fourth Quarter, 1991

Office of Radiation Control  
Florida Department of Health  
and Rehabilitative Services



# TURKEY POINT SITE

## Technical Specifications Sampling

Fourth Quarter, 1991

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	21	42
2. Airborne			
2.a Air Iodines	Weekly	5	70
2.b Air Particulates	Weekly	5	74*
3. Waterborne			
3.a Surface Water	Monthly	3	9
3.b Shoreline Sediment	Semiannually	0	0
4. Ingestion			
4.a Fish and Invertebrates			
4.a.1 Crustacea	Semiannually	0	0
4.a.2 Fish	Semiannually	0	0
4.b Food Products			
4.b.1 Broadleaf Vegetation	Monthly	3	10*
			Total: 205

\* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are not significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.





Each result is the average net response of two dosimeters.

<u>Sample Site</u>	<u>Deployment Collection</u> 09-17-91 12-03-91
N-1	6.7 ± 0.4
N-5	5.7 ± 0.3
N-10 (A)	5.7 ± 0.3
NNW-1	5.5 ± 0.3
NNW-10	6.4 ± 0.3
NW/WNW-1	5.2 ± 0.3
NW-5	5.4 ± 0.3
NW-10	7.5 ± 0.4
W/WNW-5	5.1 ± 0.3
WNW-10	6.8 ± 0.4
W-1	6.4 ± 0.3
W-10	6.9 ± 0.4
WSW-10	5.1 ± 0.3
SW/SSW-1	4.7 ± 0.2
SW-10	4.9 ± 0.3
SSW/SW-5	5.9 ± 0.3
SSW-10	6.1 ± 0.3
S-5	5.0 ± 0.3
S-10	5.5 ± 0.3
SSE/S-1	5.5 ± 0.3
SSE-10	4.8 ± 0.3

(A) - The result for site N-10 is based on a single dosimeter due to an anomalous response from the other.



2.a IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

<u>Collection Date</u>	<u>Sample Site</u>				
	<u>T51</u>	<u>T57</u>	<u>T58</u>	<u>T64</u>	<u>T72</u>
10-01-91	<0.03	<0.03	<0.03	<0.03	<0.03
10-09-91	<0.02	<0.02	<0.02	<0.02	<0.02
10-15-91	<0.02	<0.02	<0.02	<0.02	<0.02
10-22-91	<0.03	<0.03	<0.03	<0.03	<0.03
10-28-91	<0.04	<0.04	<0.04	<0.04	<0.04
11-05-91	<0.03	<0.03	<0.03	<0.03	<0.03
11-13-91	<0.03	<0.03	<0.03	<0.03	<0.03
11-20-91	<0.03	<0.03	<0.02	<0.02	<0.02
11-26-91	<0.04	<0.04	<0.04	<0.04	<0.04
12-03-91	<0.04	<0.04	<0.04	<0.05	<0.04
12-10-91	<0.03	<0.03	<0.03	<0.02	<0.03
12-17-91	<0.03	<0.03	<0.03	<0.03	<0.03
12-23-91	<0.02	<0.02	<0.02	<0.02	<0.02
12-30-91	<0.02	<0.02	<0.02	<0.02	<0.02



2.b

AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Collection Date	Sample Site				
	T51	T57	T58	T64	T72
10-01-91	0.010 ± 0.002	0.016 ± 0.002	0.014 ± 0.002	0.019 ± 0.002	0.017 ± 0.002
10-09-91	<0.004	0.007 ± 0.002	0.006 ± 0.002	0.005 ± 0.002	0.005 ± 0.001
10-15-91	0.013 ± 0.002	0.013 ± 0.002	0.015 ± 0.002	0.012 ± 0.002	0.015 ± 0.002
10-22-91	0.009 ± 0.002	0.012 ± 0.002	0.007 ± 0.002	0.008 ± 0.002	0.011 ± 0.002
10-28-91	0.006 ± 0.002	0.007 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	0.008 ± 0.002
11-05-91	0.015 ± 0.002	0.017 ± 0.002	*0.014 ± 0.002	0.013 ± 0.002	0.018 ± 0.002
11-13-91	0.022 ± 0.002	0.023 ± 0.002	*0.030 ± 0.003	0.026 ± 0.002	0.021 ± 0.002
11-20-91	0.016 ± 0.002	0.016 ± 0.002	*0.016 ± 0.002	0.016 ± 0.002	0.017 ± 0.002
11-26-91	0.005 ± 0.002	0.011 ± 0.002	*0.010 ± 0.002	0.010 ± 0.002	0.009 ± 0.002
12-03-91	0.005 ± 0.001	<0.004	0.004 ± 0.001	0.006 ± 0.002	0.005 ± 0.001
12-10-91	0.009 ± 0.002	0.007 ± 0.002	0.009 ± 0.002	0.008 ± 0.001	0.012 ± 0.002
12-17-91	0.010 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.011 ± 0.002	0.011 ± 0.002
12-23-91	0.015 ± 0.002	0.013 ± 0.002	0.007 ± 0.002	0.017 ± 0.002	0.015 ± 0.002
12-30-91	0.008 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.011 ± 0.002	0.010 ± 0.002
Means:	0.011 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.012 ± 0.001

\* - NRC split samples.

2.b

AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

Fourth Quarter, 1991

Sample Site	Be-7	K-40	Cs-134	Cs-137
T51	0.0947 ± 0.0117	<0.0156	<0.0008	<0.0008
T57	0.0949 ± 0.0094	<0.0144	<0.0007	<0.0008
T58	0.1006 ± 0.0093	<0.0172	<0.0008	<0.0005
T64	0.1126 ± 0.0111	<0.0162	<0.0008	<0.0006
T72	0.0988 ± 0.0104	<0.0198	<0.0007	<0.0011



3.a

## SURFACE WATER - (pCi/l)

Sample Site	Collection Date	H-3	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
T42	10-14-91	<136	224 ± 33	<3	<8	<4	<4	<8	<6	<4	<4	<4	<4
	11-15-91	<133	210 ± 32	<4	<10	<5	<4	<7	<8	<6	<4	<3	<6
	12-13-91	<132	164 ± 28	<4	<9	<4	<4	<8	<7	<9	<4	<4	<7
T67	10-14-91	<136	216 ± 32	<4	<9	<4	<4	<10	<7	<4	<4	<4	<6
	11-18-91	<133	229 ± 40	<3	<8	<4	<3	<7	<8	<5	<4	<4	<6
	12-16-91	<132	225 ± 33	<4	<9	<4	<5	<9	<6	<11	<5	<4	<6
T81	10-14-91	<136	279 ± 34	<4	<8	<4	<5	<8	<7	<4	<5	<4	<5
	11-15-91	<133	215 ± 31	<3	<10	<4	<4	<10	<8	<5	<4	<4	<5
	12-13-91	<132	262 ± 40	<4	<11	<4	<4	<10	<8	<12	<4	<4	<5

(A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.





4.b.1 BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>
T40	10-14-91	1646 ± 89	3444 ± 160	<12	<10	262 ± 13	ND
	*11-18-91	931 ± 56	3025 ± 125	<10	<8	16 ± 4	ND
	12-16-91	1800 ± 80	4705 ± 154	<22	<9	367 ± 11	ND
T41	10-14-91	1275 ± 70	2848 ± 134	<10	<8	64 ± 6	ND
	11-18-91	3548 ± 108	3307 ± 150	<13	<10	93 ± 8	ND
	12-16-91	1474 ± 70	3567 ± 159	<23	<12	87 ± 8	ND
T67	10-14-91	909 ± 68	1389 ± 108	<11	<11	197 ± 10	ND
	11-18-91	1569 ± 76	1944 ± 112	<13	<9	440 ± 13	ND
	12-16-91	1212 ± 86	2929 ± 139	<23	<10	583 ± 16	36 ± 9

\* - NRC split sample.

ND - Non-detectable.



4.b.1 BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>
T40	07-23-91	1296 ± 82	4785 ± 179	<17	<13	97 ± 9	52 ± 8
	08-19-91	842 ± 52	2902 ± 129	<9	<10	24 ± 5	51 ± 6
	09-18-91	1344 ± 66	3279 ± 126	<15	<8	27 ± 5	ND
T41	07-23-91	1095 ± 76	2866 ± 150	<14	<12	138 ± 11	ND
	08-19-91	1040 ± 64	3103 ± 147	<10	<10	124 ± 9	ND
	09-18-91	2216 ± 94	3403 ± 154	<17	<11	73 ± 7	ND
T67	07-22-91	1174 ± 73	1661 ± 112	<14	<8	298 ± 13	ND
	08-19-91	1252 ± 73	1441 ± 104	<13	<11	344 ± 13	ND
	09-17-91	1103 ± 72	1284 ± 97	<19	<9	285 ± 11	ND

ND - Non-detectable.



1991  
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT  
TURKEY POINT PLANT, UNITS 3 & 4

ATTACHMENT C

RESULTS FROM THE INTERLABORATORY  
COMPARISON PROGRAM 1991

423



FLORIDA DEPT. OF HRS - EPA INTERLABORATORY CROSS-CHECK PROGRAM DATA

January through June, 1991

Media	Nuclide	Collection			EPA	Units	Normal.	Mean of	N.D.K.	Action
		Mon	Day	Yr	Known		Range	Analyses		Level
FILTER	Alpha	03	29	91	25	pCi/F	0.098	30.67	1.64	
FILTER	Beta	03	29	91	124	pCi/F	0.098	117.33	-1.92	
FILTER	Cs-137	03	29	91	40	pCi/F	0.354	58.33	6.35	1
FILTER	Sr-90	03	29	91	40	pCi/F	0.354	34.33	-1.96	
MILK	I-131	04	26	91	60	pCi/L	0.000	59.00	-0.29	
MILK	Cs-137	04	26	91	49	pCi/L	0.118	50.67	0.58	
MILK	K	04	26	91	1650	mg/L	0.157	1617.00	-0.69	
MILK	Sr-89	04	26	91	32	pCi/L	0.118	11.67	-7.04	2
MILK	Sr-90	04	26	91	32	pCi/L	0.354	14.33	-6.12	3
WATER	Alpha	01	25	91	5	pCi/L	0.118	5.67	0.23	
WATER	Alpha	05	17	91	24	pCi/L	0.098	20.67	-0.96	
WATER	Beta	01	25	91	5	pCi/L	0.118	6.67	0.58	
WATER	Beta	05	17	91	46	pCi/L	0.118	49.33	1.15	
WATER	Co-60	02	08	91	40	pCi/L	0.118	39.33	-0.23	
WATER	Co-60	06	07	91	10	pCi/L	0.000	10.00	0.00	
WATER	Zn-65	02	08	91	149	pCi/L	0.118	145.33	-0.42	
WATER	Zn-65	06	07	91	108	pCi/L	0.215	106.33	-0.26	
WATER	Ru-106	02	08	91	186	pCi/L	0.528	195.00	0.82	
WATER	Ru-106	06	07	91	149	pCi/L	0.591	141.67	-0.85	
WATER	Ba-133	02	08	91	75	pCi/L	0.148	71.33	-0.79	
WATER	Ba-133	06	07	91	62	pCi/L	0.098	59.67	-0.67	
WATER	Cs-134	02	08	91	8	pCi/L	0.118	7.33	-0.23	
WATER	Cs-134	06	07	91	15	pCi/L	0.118	14.33	-0.23	
WATER	Cs-137	02	08	91	8	pCi/L	0.000	9.00	0.35	
WATER	Cs-137	06	07	91	14	pCi/L	0.236	15.33	0.46	
WATER	H-3	02	22	91	4418	pCi/L	0.277	4880.33	1.81	
WATER	H-3	06	21	91	12480	pCi/L	0.142	12274.33	-0.29	
WATER	I-131	02	15	91	75	pCi/L	0.148	74.67	-0.07	
WATER	Sr-89	01	11	91	5	pCi/L	0.118	3.67	-0.46	
WATER	Sr-89	05	10	91	39	pCi/L	0.118	31.67	-2.54	
WATER	Sr-90	01	11	91	5	pCi/L	0.236	4.00	-0.35	
WATER	Sr-90	05	10	91	24	pCi/L	0.354	21.67	-0.81	



100-100000



NOTES:

- Normal.: Normalized range. As defined in "Environmental Radioactivity Laboratory Intercomparison Studies Program Fiscal Year 1981 - 1982", Environmental Monitoring Systems Laboratory, U. S. Environmental Protection Agency, P. O. Box 93478, Las Vegas, Nevada, 89193-3478. EPA-600/4-81-004, February, 1981.
- N.D.K.: Normalized deviation of the mean from the known value, as defined in EPA-600/4-81-004.
- NDP: No data provided. No data was provided to EPA for inclusion in their report.
- NA: Not available. Report containing this data has not yet been received from EPA, Las Vegas.

ACTION LEVEL:

- (1) Cause: Very poor, new calibration of detector.  
Corrective Action: Recalibrate the detector for this nuclide, and, in the future, always compare a new calibration with previous calibrations for similarity.
- (2) Cause: Erroneously over estimated chemical recovery of strontium carrier.  
Corrective Action: Try to improve purity of isolated strontium carrier.
- (3) Cause: Erroneously over estimated chemical recovery of strontium carrier.  
Corrective Action: Try to improve purity of isolated strontium carrier.

100



FLORIDA DEPT. OF HRS - EPA INTERLABORATORY CROSS-CHECK PROGRAM DATA

July through December, 1991

Media	Nuclide	Collection			EPA	Units	Normal.	Mean of	N.D.K.	Action
		Mon	Day	Yr	Known		Range	Analyses		Level
FILTER	Alpha	08	30	91	25	pCi/F	0.197	32.00	2.02	
FILTER	Beta	08	30	91	92	pCi/F	0.177	89.33	-0.46	
FILTER	Cs-137	08	30	91	30	pCi/F	0.000	34.00	1.39	
FILTER	Sr-90	08	30	91	30	pCi/F	0.236	28.00	-0.69	
MILK	I-131	09	27	91	108	pCi/L	0.161	103.67	-0.68	
MILK	Cs-137	09	27	91	30	pCi/L	0.236	30.67	0.23	
MILK	K	09	27	91	1740	mg/L	0.068	1583.33	-3.12	1
MILK	Sr-89	09	27	91	25	pCi/L	0.354	17.67	-2.54	
MILK	Sr-90	09	27	91	25	pCi/L	0.236	19.00	-2.08	
WATER	Alpha	09	20	91	10	pCi/L	0.236	11.00	0.35	
WATER	Beta	09	20	91	20	pCi/L	0.118	24.33	1.50	
WATER	Co-60	10	04	91	29	pCi/L	0.354	30.33	0.46	
WATER	Zn-65	10	04	91	73	pCi/L	0.422	72.33	-0.16	
WATER	Ru-106	10	04	91	199	pCi/L	0.384	198.00	-0.09	
WATER	Ba-133	10	04	91	98	pCi/L	0.059	93.67	-0.75	
WATER	Cs-134	10	04	91	10	pCi/L	0.118	9.67	-0.12	
WATER	Cs-137	10	04	91	10	pCi/L	0.236	10.67	0.23	
WATER	H-3	10	18	91	2454	pCi/L	0.144	2470.67	0.08	
WATER	I-131	08	09	91	20	pCi/L	0.098	18.33	-0.48	
WATER	Sr-89	09	13	91	49	pCi/L	0.473	46.67	-0.81	
WATER	Sr-90	09	13	91	25	pCi/L	0.118	22.33	-0.92	

100-100000



NOTES:

Normal.: Normalized range. As defined in "Environmental  
Range Radioactivity Laboratory Intercomparison Studies Program  
Fiscal Year 1981 - 1982", Environmental Monitoring  
Systems Laboratory, U. S. Environmental Protection  
Agency, P. O. Box 93478, Las Vegas, Nevada, 89193-3478.  
EPA-600/4-81-004, February, 1981.

N.D.K.: Normalized deviation of the mean from the known value, as  
defined in EPA-600/4-81-004.

NDP: No data provided. No data was provided to EPA for  
inclusion in their report.

NA: Not available. Report containing this data has not yet  
been received from EPA, Las Vegas.

ACTION LEVEL:

- (1) Cause: Unknown. Examination of the input data, raw  
counting data, efficiency file, and calculations did not  
reveal the cause of the problem.  
Corrective Action: None at this time.