



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

NOV 20 1984

Report Nos.: 50-250/84-32 and 50-251/84-33

Licensee: Florida Power and Light Company  
9250 West Flagler Street  
Miami, FL 33101

Docket Nos.: 50-250 and 50-251

License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: October 22-26, 1984

Inspector: G. B. Kuzo *G. B. Kuzo* 19 November 1984  
Date Signed

Accompanying Personnel: P. C. McPhail

Approved by: D. M. Montgomery *D. M. Montgomery* 11/19/84  
Date Signed  
D. M. Montgomery, Section Chief  
Emergency Preparedness and Radiological  
Protection Branch  
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection entailed 66 inspector-hours at the site during normal duty hours, in the areas of quality control and confirmatory measurements including review of the laboratory quality control program; review of chemical and radiochemical procedures; review of quality control records and logs; and comparison of the results of split samples analyzed by the licensee and NRC Region II Mobile Laboratory.

Results: No violations or deviations were identified.

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## REPORT DETAILS

### 1. Licensee Employees Contacted

- \*K. N. Harris, Site Vice President
- \*D. D. Brandage, Plant Manager, Acting
- \*V. A. Kaminskas, Reactor Supervisor
- \*D. E. Meils, Nuclear Chemistry Laboratory Supervisor
- \*E. R. LaPierre, Radiochemist
- \*P. Hughes, Health Physics Supervisor
- \*A. D. Rice, Nuclear Chemistry Technician
- W. Bladow, QA Supervisor

Other licensee employees contacted included three technicians.

NRC Resident Inspector

\*T. Peebles

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on October 26, 1984, with those persons indicated in Paragraph 1 above. The inspector discussed a new inspector followup item concerning the laboratory QC program discussed in Paragraph 5 and the unresolved item\* identified in Paragraph 9b concerning effluent stack gas measurements. The licensee committed to developing and evaluating Sr-89, 90 and Fe-55 procedures by March 1, 1985 (IFI Paragraph 9c). Licensee representatives acknowledged the inspector's comments and expressed no contrary opinions.

### 3. Licensee Action on Previous Enforcement Matters

(Closed) Violation 50-250/83-18-02 & 50-251/83-18-02, Failure to Document and Approve Procedure Changes for the Gas Flow Proportional Counting System. The inspector noted from review of the appropriate procedures and counting room instrumentation that the licensee was now utilizing approved permanent procedures for operation of the gas flow proportional counting systems.

(Closed) Violation 50-250/83-18-03 & 50-251/83-18-03, Inadequate Surveys of Gaseous Releases. From review of the 33 cc gas bulb geometry calibration tables and comparison of licensee and NRC Mobile Laboratory split sample analysis, the inspector determined that evaluations of gaseous concentrations in samples prior to offsite release were adequate.

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\*An unresolved item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

4. Laboratory Quality Control Program (84725)

The inspector reviewed selected portions of the Quality Assurance Program with cognizant licensee representatives and determined that organizational structure and program management had not changed since the previous inspection (IE 50-250/83-18 and 50-251/83-18). The inspector reviewed the licensee's program against guidance established in Regulatory Guide 4.15 "Quality Assurance for Radiological Monitoring Programs", and noted that program implementation did not include detailed intra- and interlaboratory cross check procedures. The inspector discussed the need for an established cross check program to provide independent validation of analytical procedures and subsequent measurements conducted by the chemistry and counting room as noted in Paragraph 8. Licensee representatives informed the inspector they are presently establishing a cross check program for the radiochemistry laboratory. The fully implemented procedure will be evaluated during a subsequent inspection (50-250/84-32-01, 50-251/84-33-01).

5. Audits (84725)

Technical Specification 6.5.2.8 requires audits of unit activities shall be performed under the cognizance of the CNRB encompassing the conformance of unit operation to provisions contained within the Technical Specifications and applicable license conditions at least once per 12 months; the radiological environmental monitoring program and the results thereof at least once per 24 months; and the Offsite Dose Calculation Manual and implementing procedures at least once per 24 months.

The inspector reviewed the following audit reports:

- (1) QA Audit QAO-PTP-84-569, September 1984
- (2) QA Audit QAO-PTP-84-554, September 1984
- (3) QA Audit QAO-PTP-83-07-473, August 1983
- (4) QA Audit QAO-PTP-83-04-463, May 1983

Audits verified the adequacy of Technical Specification effluent release requirements and reactor coolant operating status. The inspector discussed with cognizant licensee representatives the use of Regulatory Guide 4.15 "Quality Assurance for Radiological Monitoring Programs (Normal Operations), Effluent Streams and the Environment" for audits concerning plant chemistry and radiochemistry programs. Cognizant licensee representatives agreed to evaluate this document for inclusion in the chemistry and radiochemistry audit program.

No violations or deviations were identified.

## 6. Procedures (84725)

Technical Specification 6.8.1 requires written procedures to be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, the Offsite Dose Calculation Manual quality control program for effluent monitoring, using the guidance in Regulatory Guide 1.21, Revision 1, June 1974; and Quality Control Program for environmental monitoring using the guidance in Regulatory Guide 4.1, Revision 1, April 1975. The inspector reviewed selected portions of the following procedures:

- (1) NC-2        Schedule for Periodic Tests, 9/18/84.
- (2) NC-10       Calibration of the Plant Vent Stack Gas Monitor (Process Monitor R-14), 4/15/82.
- (3) NC-13       Gas Flow Proportional Counter Efficiency Check, 9/5/84.
- (4) NC-16       Calibration of the Gas Channel on the Plant Vent Nuclear Measurement Corporation (NMC) Monitor, 6/17/82.
- (5) NC-20       Schedule for Instrument and Equipment Performance Evaluation, 6/4/84.
- (6) NC-21C      ND 6700 - Normal Operation, 4/10/84
- (7) NC-25b      Gamma Spectrometer Efficiency Calibration for Various Geometries Using Radioactive Standards, 4/10/84.
- (8) NC-41       Determination of Sr-89, 90 Activity in the Monthly Liquid Release Composites, 5/10/84.
- (9) NC-45       Determination of Tritium Activity for Liquid Release Composites, 11/3/83.
- (10) NC-51      Determination of Strontium 89-90 Activity on Plant Vent and Spent Fuel Pit Filters, 6/17/84.
- (11) NC-52      Sampling and Analysis, Preparation and Documentation of Gas Decay Tank Releases, 11/23/83.
- (12) NC-60      Reactor Coolant System Isotopic Identification, 11/23/83.
- (13) NC-62      Tritium Determination, 11/10/83.
- (14) NC-64      Determination of E-Bar (The Average Beta and Gamma Energy Per Disintegration for a Mixture of Radionuclides in the Reactor Coolant, 11/23/83.
- (15) NC-65      Determination of Radioactive Dose Equivalent I-131 DEI in the Reactor Coolant System, 7/18/84.

- (16) NC-66 Determination of Gross Beta-Gamma or Gross Alpha Activity, 11/23/83.

The inspector noted that procedures were being reviewed, updated, and approved in accordance with established procedures.

No violations or deviations were identified.

7. Records (84725)

- a. The inspector reviewed selected portions of the following quality control, calibration and primary coolant reactor chemistry records:

- (1) LS 3800 Tritium QC and Efficiency Worksheet, July - October 1984.
- (2) Gas Flow Proportional Counter Nos. 1 and QA Records for July - October 1984 including:
  - (a) Performance Checks
  - (b) Background Count Checks
  - (c) Detector Plateau Curves
- (3) Annual Ge(Li) Detector System Nos. PGT-1754, PGT-1187 and PGT-1599 Efficiency Calibration Data for the following geometries: 1 liter polybottle, 1 liter liquid marinelli, glass tritium vial, stainless steel 2 inch planchet, millipore filter 2 inch planchet, charcoal cartridge - particulate filter, 33 cc gas bulb, and 1 liter gas marinelli.
- (4) Ge(Li) Detector System Nos. PGT-1754, PGT-1187, and PGT-1599 QC Records for June - October 1984 including:
  - (a) QC Control Charts
  - (b) Daily Calibration Results: Centroid Check, Resolution Check, Efficiency Check.
- (5) Primary Chemistry QC Records for October including:
  - (a) Specific Ion Meter Weekly Slope and Stability Checks for pH, Fluoride, Chloride and Boron.
  - (b) Atomic Absorption Control Charts and Records for Copper, Iron, Sodium, and Lithium.
  - (c) UV-VIS Spectrophotometer QC Checks of Wave Length Repeatability, Photometric Accuracy and Linearity, and Noise Check.

(6) Turkey Point Plant Monthly Radiochemistry Analyses including:

- (a) Water Report Reactor Coolant System, Units 3 & 4 Records for July - October 1984 including: pH, conductivity, B, Cl, F, DO, Gross Beta-Gamma, H-3, and Li.
- (b) Daily Isotopic Results for January - September 1984.
- (c) E-bar Determinations for Units 3 & 4, July 1984.

- b. The inspector noted that QC data for the radiochemistry instrumentation were not maintained on trend charts in the counting room. The inspector discussed the use of QC trend charts in facility analysis and review of the chemistry and radiochemistry program. Licensee representatives are presently developing methodology to conduct trending of primary chemistry and QC data for the radiochemistry department. This area will be reviewed during a subsequent inspection.

No violations or deviations were identified.

8. Confirmatory Measurements (84725)

- a. During the inspection, reactor coolant and selected liquid and gaseous plant effluent process streams were sampled and the resultant sample matrices analyzed for radionuclide concentrations using licensee and NRC Region II Mobile Laboratory gamma-ray spectroscopy systems. The purpose of these comparative measurements was to verify the licensee's capability to adequately measure radionuclides in various plant systems. Analyses were conducted utilizing as many of the licensee's gamma spectroscopy systems as practicable. Samples included the following: a reactor coolant sample, simulated liquid waste sample, plant vent charcoal filter, 33 cc gas bulb waste gas decay tank sample and 1000 cc marinelli containment atmosphere samples. Spiked particulate filter and charcoal cartridge samples were utilized for additional analyses. Comparison of licensee and NRC results are presented in Table 1 with the acceptance criteria listed in Attachment 1. The results showed agreement for all nuclides in the reactor coolant, liquid waste, particulate and charcoal filters, and the 33 cc gas bulb geometries. Results for the gas marinelli geometry samples were systematically high, ranging from 16 to 66 percent above NRC values. These results are further discussed in Paragraph 9b.
- b. For the gas marinelli geometry analyzed using Ge(Li) Detector System Nos. PGT-1754 and PGT-1187 results were in disagreement. Samples analyzed using Ge(Li) Detector PGT-1599 were in agreement. The systematically high differences were observed for a second sample for both detectors. The inspector reviewed the gas marinelli Ge(Li) calibration records and initial calibration data worksheets. No calibration errors were noted and gaseous analyses conducted utilizing these systems would not have resulted in the licensee exceeding Technical Specification nor compliance limits. The inspector informed

licensee representatives that the differences among the NRC and licensee results for two of their detectors would be considered an unresolved item until licensee detector calibrations could be evaluated. The evaluation and results will be reviewed during a subsequent inspection (50-250/84-32-02 and 50-251/84-33-02).

- c. The inspector reviewed licensee results for H-3, Sr-89 and Sr-90 analyses of a spiked sample prepared by the NRC contract laboratory. Comparisons of licensee results with the NRC contract laboratory results are listed in Table 2 with the acceptance criteria in Attachment 1. The results are in agreement for the H-3 and Sr-90 values and in disagreement for the Sr-89 value. The inspector noted that inconsistencies were noted for strontium analyses during previous inspections. The inspector requested that immediate action be taken to evaluate the strontium analysis procedures and verify their accuracy. In addition, the inspector noted that Fe-55 analyses will become a Technical Specification required analysis in 1985 and requested a similar evaluation and verification of this analysis. The licensee agreed to complete evaluations for both strontium and Fe-55 procedures by March 1, 1985. Following this evaluation, a simulated liquid sample for verification of Sr-89, 90 and Fe-55 analysis would be provided to the licensee by the NRC. This item will be reviewed during a subsequent inspection (50-250/84-32-03 and 50-251/84-33-03).

No violations or deviations were identified.

9. Review of Inspector Followup Items (92701)

- a. (Closed) 50-250/83-18-01 & 50-251/83-18-01 Revision of Gamma Spectroscopy Procedures. The inspector noted from review of procedures and records that percent dead time for the Ge(Li) Detector Systems has been limited to 10% in the approved procedure.
- b. (Closed) 50-250/83-18-04 & 50-251/83-18-04 Development of Adequate Sr-89, 90 Analysis Procedure. The licensee agreed to develop and verify both Sr-89, 90 & Fe-55 procedures by, March 1, 1985. This item will be reviewed as a new followup item (Paragraph 9c).

TABLE 1

## RESULTS OF CONFIRMATORY MEASUREMENTS AT TURKEY POINT NUCLEAR PLANT

October 22-26, 1984

SAMPLE	ISOTOPE	CONCENTRATION ( $\mu\text{Ci/cc}$ )		RESOLUTION	RATIO LICENSEE/NRC	COMPARISON
		LICENSEE	NRC			
(2) Reactor Coolant	I-131	3.57 E-3	3.42 $\pm$ 0.25 E-3	14	1.04	Agreement
	I-132	4.37 E-2	5.12 $\pm$ 0.13 E-2	39	0.85	Agreement
	I-133	4.41 E-2	4.04 $\pm$ 0.06 E-2	67	1.09	Agreement
	I-135	6.82 E-2	7.10 $\pm$ 0.23 E-2	31	0.96	Agreement
(3) Reactor Coolant	I-131	3.66 E-3	3.42 $\pm$ 0.25 E-3	14	1.07	Agreement
	I-132	3.98 E-2	5.12 $\pm$ 0.13 E-2	39	0.78	Agreement
	I-133	4.19 E-2	4.04 $\pm$ 0.06 E-2	67	1.04	Agreement
	I-135	7.05 E-2	7.10 $\pm$ 0.23 E-2	31	0.99	Agreement
(2) Liquid Waste	Cr-51	3.14 E-4	3.35 $\pm$ 0.08 E-4	42	0.94	Agreement
	Mn-54	3.95 E-6	5.63 $\pm$ 0.60 E-6	9	0.70	Agreement
	Co-58	1.87 E-4	1.79 $\pm$ 0.02 E-4	90	1.04	Agreement
	Co-60	8.04 E-5	7.74 $\pm$ 0.17 E-5	46	1.04	Agreement
	Zr-95	6.73 E-5	6.12 $\pm$ 0.20 E-5	31	1.10	Agreement
	I-131	6.72 E-6	4.55 $\pm$ 0.77 E-6	6	1.48	Agreement
	Cs-134	2.23 E-5	1.98 $\pm$ 0.10 E-5	20	1.13	Agreement
	Cs-137	3.27 E-5	2.54 $\pm$ 0.11 E-5	23	1.29	Agreement
(3) Liquid Waste	Cr-51	3.42 E-4	3.35 $\pm$ 0.08 E-4	42	1.02	Agreement
	Mn-54	4.29 E-6	5.63 $\pm$ 0.60 E-6	9	0.76	Agreement
	Co-58	1.80 E-4	1.79 $\pm$ 0.02 E-4	90	1.01	Agreement
	Co-60	7.71 E-5	7.74 $\pm$ 0.17 E-5	46	0.99	Agreement
	Zr-95	6.53 E-5	6.12 $\pm$ 0.20 E-5	31	1.07	Agreement
	I-131	8.77 E-6	4.55 $\pm$ 0.77 E-6	6	1.93	Agreement
	Cs-134	2.16 E-5	1.98 $\pm$ 0.10 E-5	20	1.09	Agreement
	Cs-137	2.63 E-5	2.54 $\pm$ 0.11 E-5	23	1.04	Agreement
(1) Particulate Filter Spiked Sample	Co-57	2.63 E-3	2.19 $\pm$ 0.06 E-3	36	1.20	Agreement
	Co-60	2.99 E-2	2.76 $\pm$ 0.05 E-2	55	1.08	Agreement
	Cd-109	9.82 E-2	8.58 $\pm$ 0.19 E-2	45	1.14	Agreement
	Cs-137	2.93 E-2	2.82 $\pm$ 0.04 E-2	70	1.04	Agreement
(2) Particulate Filter Spiked Sample	Co-57	2.60 E-3	2.19 $\pm$ 0.06 E-3	36	1.19	Agreement
	Co-60	3.04 E-2	2.76 $\pm$ 0.05 E-2	55	1.10	Agreement
	Cd-109	9.78 E-2	8.58 $\pm$ 0.19 E-2	45	1.14	Agreement
	Cs-137	2.92 E-2	2.82 $\pm$ 0.04 E-2	70	1.04	Agreement
(3) Particulate Filter Spiked Sample	Co-57	2.67 E-3	2.19 $\pm$ 0.06 E-3	36	1.22	Agreement
	Co-60	3.07 E-2	2.76 $\pm$ 0.05 E-2	55	1.11	Agreement
	Cd-109	1.02 E-1	8.58 $\pm$ 0.19 E-2	45	1.19	Agreement
	Cs-137	2.99 E-2	2.82 $\pm$ 0.04 E-2	70	1.06	Agreement



TABLE 1 (Continued)

SAMPLE	ISOTOPE	CONCENTRATION ( $\mu\text{Ci/cc}$ )		RESOLUTION	RATIO LICENSEE/NRC	COMPARISON
		LICENSEE	NRC			
(1) Charcoal Filter Spiked Sample	Co-57	2.62 E-3	2.66±0.07 E-3	38	0.98	Agreement
	Co-60	3.12 E-2	3.42±0.05 E-2	68	0.91	Agreement
	Y-38	5.61 E-3	5.70±0.24 E-3	24	0.98	Agreement
	Cd-109	9.20 E-2	1.06±0.02 E-1	53	0.87	Agreement
	Cs-137	2.93 E-2	3.20±0.04 E-2	80	0.92	Agreement
(2) Charcoal Filter Spiked Sample	Co-57	2.69 E-3	2.66±0.07 E-3	38	1.01	Agreement
	Co-60	3.14 E-2	3.42±0.05 E-2	68	0.92	Agreement
	Y-88	5.31 E-3	5.70±0.24 E-3	24	0.93	Agreement
	Cd-109	9.23 E-2	1.06±0.02 E-1	53	0.87	Agreement
	Cs-137	3.07 E-2	3.20±0.04 E-2	80	0.96	Agreement
(3) Charcoal Filter Spiked Sample	Co-57	2.57 E-3	2.66±0.07 E-3	38	0.97	Agreement
	Co-60	3.18 E-2	3.42±0.05 E-2	68	0.93	Agreement
	Y-88	5.77 E-3	5.70±0.24 E-3	24	1.01	Agreement
	Cd-109	8.92 E-2	1.06±0.02 E-1	53	0.84	Agreement
	Cs-137	2.97 E-2	3.20±0.04 E-2	80	0.93	Agreement
(1) Charcoal Filter Plant Vent	I-131	2.91 E-2	2.87±0.02 E-2	144	1.01	Agreement
	I-133	1.35 E-4	1.16±0.28 E-4	4	1.16	Agreement
(2) Charcoal Filter Plant Vent	I-131	2.96 E-2	2.87±0.02 E-2	144	1.03	Agreement
	I-133	1.14 E-4	1.16±0.28 E-4	4	0.98	Agreement
(1) Gas Bulb - Waste Gas Decay Tank - Sample 1	Xe-133	1.32 E-2	1.24±0.005 E-2	248	1.06	Agreement
(2) Gas Bulb - Waste Gas Decay Tank - Sample 1	Xe-133	1.39 E-2	1.24±0.005 E-2	248	1.12	Agreement
(3) Gas Bulb - Waste Gas Decay Tank - Sample 1	Xe-133	1.36 E-2	1.24±0.005 E-2	248	1.10	Agreement
(1) Gas Marinelli-1000 cc Containment Atmosphere Sample 1	Xe-133	1.51 E-4	1.02±0.007 E-4	146	1.48	Disagreement
	Xe-135	3.99 E-6	2.89±0.08 E-6	36	1.38	Disagreement
(2) Gas Marinelli-1000 cc Containment Atmosphere Sample 1	Xe-133	1.60 E-4	1.02±0.007 E-4	146	1.57	Disagreement
	Xe-135	4.80 E-6	2.89±0.08 E-6	36	1.66	Disagreement
(3) Gas Marinelli-1000 cc Containment Atmosphere Sample 1	Xe-133	1.18 E-4	1.02±0.007 E-4	146	1.16	Agreement
	Xe-135	3.36 E-6	2.89±0.03 E-6	36	1.16	Agreement
(1) Gas Marinelli-1000 cc Containment Atmosphere Sample 2	Xe-133	1.52 E-4	1.07±0.005 E-4	214	1.42	Disagreement
	Xe-135	3.17 E-6	2.45±0.06 E-6	41	1.29	Agreement
(2) Gas Marinelli-1000 cc Containment Atmosphere Sample 2	Xe-133	1.54 E-4	1.07±0.005 E-4	214	1.44	Disagreement
	Xe-135	3.47 E-6	2.45±0.06 E-6	41	1.42	Disagreement

TABLE 1 (Continued)

SAMPLE	ISOTOPE	CONCENTRATION (uCi/cc)		RESOLUTION	RATIO LICENSEE/NRC	COMPARISON
		LICENSEE	NRC			
(3) Gas Marinelli-1000 cc Containment Atmosphere Sample 2	Xe-133	1.27 E-4	1.07±0.005 E-4	214	1.18	Agreement
	Xe-135	3.20 E-6	2.45±0.06 E-6	41	1.30	Agreement

- (1) Analyzed using Ge(Li) Detector System No. PGT-1754
- (2) Analyzed using Ge(Li) Detector System No. PGT-1187
- (3) Analyzed using Ge(Li) Detector System No. PGT-1599

TABLE 2

RESULTS OF H-3, Sr-89, AND Sr-90 ANALYSES FOR TURKEY POINT NUCLEAR PLANT

October 22-26, 1984

SAMPLE	ISOTOPE	CONCENTRATION (uCi/cc)		RESOLUTION	RATIO LICENSEE/NRC	COMPARISON
		LICENSEE	NRC			
NRC Contract Lab Spiked Liquid Sample April 1984	H-3	2.6 E-5	2.75±0.07 E-5	39	0.94	Agreement
	Sr-89	1.0 E-4	7.59±0.15 E-5	51	1.32	Disagreement
	Sr-90	1.1 E-5	1.24±0.04 E-5	31	0.89	Agreement

Attachment 1

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgement limits are variable in relation to the comparison of the NRC's value to its associated uncertainty. As that ratio, referred to in this program as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement must be considered acceptable as the resolution decreases.

$$\text{RATIO} = \frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$$

<u>Resolution</u>	<u>Agreement</u>
<4	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
>200	0.85 - 1.18