UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

NOV 21 1991

Report Nos: 50-335/91-20 and 50-389/91-20

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, FL 33102

Docket Nos.: 50-335 and 50-389 License Nos.: DPR-67 and NPF-16

Facility Name: St. Lucie 1 and 2

Inspection Conducted: October 15-18, 1991

Inspector: /s/ R. Decker for 11/19/91
R. P. Carrion Date Signed

Accompanied by: T. R. Volk

Approved by: /s/ R. Decker 11/19/91
T. R. Decker, Chief Date Signed
Radiological Effluents and
Chemistry Section
Radiological Protection and Emergency
Preparedness Branch
Division of Radiation Safety and
Safeguards

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of confirmatory measurements, plant water chemistry, and contaminated soil.

Results:

The confirmatory measurement comparison showed good agreement between the results of the licensee and the NRC mobile lab. However, two disagreements were identified. The licensee had established a good Count Room radiochemical analysis program. (Paragraph 2)

Plant water chemistry was maintained well within Technical Specification (TS) limits. (Paragraph 3)

Contaminated soil was not a problem on site. (Paragraph 4)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Breen, Licensing Engineer
*R. Cox, Chemistry Effluents Supervisor
*R. F. Englmeier, Site Quality Manager
D. Faulkner, Primary Chemistry Supervisor
*J. E. Geiger, Vice President of Nuclear Assurance
*K. N. Harris, Senior Vice President
J. Holt, Licensing Engineer
*L. Leblanc, Chemistry Technician
*H. Mercer, Health Physics Technical Supervisor
*D. A. Sager, Plant Vice President
B. Somers, Radioactive Waste Supervisor
*D. M. Wolf, Site Engineering Supervisor

Other licensee employees contacted during this inspection included technicians and administrative personnel.

Nuclear Regulatory Commission

*M. Scott, Resident Inspector

*Attended exit interview

2. Confirmatory Measurements (84750)

10 CFR 20.201(b) requires the licensee to perform surveys as necessary to evaluate the extent of radiation hazards. To evaluate the licensee's analytical capability to make consistently accurate radioactivity measurements, the following samples were analyzed for radionuclide concentrations by the licensee and the NRC Region II mobile laboratory: reactor coolant, liquid radwaste, and noble gases (which were collected by the licensee) and an NRC-spiked particulate filter and an NRC-spiked charcoal cartridge. The purpose of these comparative measurements was to verify the licensee's capability to accurately detect and identify gamma emitting radionuclides and to quantify their concentrations. The licensee analyzed all of the samples in the Chemistry Count Room, which was equipped with two High Purity Germanium (HpGe) gamma spectroscopy detectors with a Nuclear Data ND 9900 analysis system. (Detector #1 was not in service and was being replaced by a new unit.) Detector #2 was a Princeton Gamma Tech, Inc. (PGT) 1982, Model # IGC 1020, with an efficiency of 12.5%. Detector #3 was an EG&G 23-P-65WB, serial #39283-78, with an efficiency of 10%. Both in-service detectors were used to count all samples. The inspector reviewed selected portions

of Chemistry Procedure C-48C, Rev. 2, entitled "Operation of the Nuclear Data (ND) 9900 Computer Based Counting System," approved on March 3, 1990. The procedure provided instruction for the calibration of the detectors and the determination of radionuclide activities of samples based on their gamma emissions. The inspector reviewed control charts and calibration curves and found them to be current and sufficient.

The inspector reviewed selected portions of Chemistry Operating Procedures C-70, Rev. 23, entitled "Processing Aerated Liquid Wastes," approved on August 30, 1990 and C-72, Rev. 28, entitled "Processing Gaseous Waste," approved on August 8, 1990. The portions reviewed included sampling instructions and were adequate for the intended purpose. The source of the liquid waste sample was the A Waste Storage Tank (WST) and the source of the noble gases sample was the Waste Gas Decay Tank. The inspector observed a licensee technician obtain the reactor coolant, liquid waste, and noble gas samples and noted that the procedures were followed closely by the technician as he completed his duties. Proper sampling techniques and health physics practices were utilized.

Attachment 1 provides a comparison of the licensee's results to the NRC's results for each sample. Attachment 2 provides the criteria for assessing the agreement between the analytical results. As indicated in Attachment 1, the results were generally in agreement for the samples analyzed. However, there were two isotopes of disagreement, one each in the Liquid Radwaste sample and the Waste Gas Decay Tank sample. In the case of the I-133 in the Liquid Radwaste sample, the disagreement was not given much credibility because the agreement with I-133 in the Reactor Coolant was so close. The most likely reason for the apparent disagreement was the presence of short-lived radioisotopes with energies of approximately the same as those of I-133 and the inability of the NRC mobile lab to identify them. In the case of the Kr-85m in the Waste Gas Decay Tank, there was no other sample containing this isotope for comparison. However, the presence of short-lived isotopes with energies of approximately the same as those of the Kr-85m was suspected. Before the disagreement could be resolved, either by recounting the sample or by using manual techniques to resolve energy peaks, the computer system of the NRC mobile lab malfunctioned and efforts to restore it were unsuccessful.

From the observations made during this inspection, the inspector concluded that the licensee demonstrated that a good Count Room radiochemical analysis program was in place.

No violations or deviations were identified.

3. Plant Water Chemistry (84750)

TS 3.4.7 specifies the limits within which the reactor coolant system must be maintained for dissolved oxygen (DO), chloride, and fluoride. TS 3.4.8 specifies the limits for the specific activity of the reactor coolant. These parameters are related to corrosion resistance and fuel integrity.

Pursuant to the TS requirements, the inspector reviewed tabular summaries which correlated reactor power output to chloride, fluoride, and dissolved oxygen concentrations, as well as specific activity and dose equivalent iodine of the reactor coolant for the period of July 1, 1991 through September 30, 1991, for both units. All of the reviewed parameters satisfied the TS requirements.

No violations of deviations were identified.

4. Contaminated Soil (84750)

The inspector discussed the issue of contaminated soil with the Radioactive Waste Supervisor to determine on-site quantities, activity levels and associated isotopic characterization, contamination sources, and plans for dealing with it.

Basically, the only contaminated soil on site is that which resulted from pump/valve leaks, spilled resin, spent sandblasting grit (which may contain oxides of activation products removed during the process), etc. An estimated 500-1000 cubic feet of this material was stored in B-25 boxes and 55-gallon drums awaiting analysis and eventual shipping for disposal if found to be contaminated. Activity levels of soil on site ranged from less than Lower Limits of Detection (LLD) to approximately 1.0E-5 micro-Curies per gram (uCi/g).

No violations or deviations were identified.

5. Exit Interview

The inspection scope and results were summarized on October 18, 1991, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed the inspection results, including likely informational content of the inspection report with regard to documents and/or processes reviewed during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.

ATTACHMENT 1

COMPARISON OF NRC AND ST. LUCIE ANALYTICAL RESULTS
October 15-18, 1991

Type of Sample: Reactor Coolant

Sample Container: NRC 50 ml bottle
St Lucie 50 ml bottle

Radio-nuclide	Licensee's Value	NRC Value	Resolution	Ratio	Comparison
Detector #2					
I-131	1.04E-2	(1.01 +/- 0.02)E-2	50	1.03	Agree
I-132	4.26E-2	(4.46 +/- 0.04)E-2	112	0.96	Agree
I-133	4.14E-2	(4.06 +/- 0.02)E-2	203	1.02	Agree
I-135	5.09E-2	(5.12 +/- 0.10)E-2	51	0.99	Agree
Detector #3					
I-131	1.09E-2	(1.01 +/- 0.02)E-2	50	1.08	Agree
I-132	4.28E-2	(4.46 +/- 0.04)E-2	112	0.96	Agree
I-133	3.98E-2	(4.06 +/- 0.02)E-2	203	0.98	Agree
I-135	4.98E-2	(5.12 +/- 0.10)E-2	51	0.97	Agree

Type of Sample: Liquid Radwaste (Waste Tank, Split)

Sample Container: NRC 1000 ml liquid marinelli
St Lucie 1000 ml liquid marinelli

Radio-nuclide	Licensee's Value	NRC Value	Resolution	Ratio	Comparison
Detector #2					
Co-60	1.91E-5	(1.95 +/- 0.05)E-5	39	0.98	Agree
I-131	1.31E-5	(1.33 +/- 0.03)E-5	44	0.98	Agree
I-133	2.33E-5	(3.13 +/- 0.04)E-5	78	0.74	Disagree
Detector #3					
Co-60	1.85E-5	(1.95 +/- 0.05)E-5	39	0.95	Agree
I-131	1.30E-5	(1.33 +/- 0.03)E-5	44	0.98	Agree
I-133	2.29E-5	(3.13 +/- 0.04)E-5	78	0.73	Disagree

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Type of Sample: Waste Gas Decay Tank

Sample Container: NRC 30 cc glass bulb
St Lucie 30 cc glass bulb

Radio-nuclide	Licensee's Value	NRC Value	Reso-lution	Ratio	Compar-ison
Detector #2					
Kr-85m	4.74E-4	(1.03 +/- 0.02)E-3	52	0.46	Disagree
Kr-85	2.18E-2	(2.09 +/- 0.10)E-2	21	1.04	Agree
Xe-133m	6.92E-3	(6.26 +/- 0.10)E-3	63	1.10	Agree
Xe-133	3.17E-1	(3.20 +/- 0.01)E-1	320	0.99	Agree
Xe-135	2.02E-2	(1.85 +/- 0.01)E-2	185	1.09	Agree
Detector #3					
Kr-85m	4.58E-4	(1.03 +/- 0.02)E-3	52	0.44	Disagree
Kr-85	2.61E-2	(2.09 +/- 0.10)E-2	21	1.25	Agree
Xe-133m	7.20E-3	(6.26 +/- 0.10)E-3	63	1.15	Agree
Xe-133	3.14E-1	(3.20 +/- 0.01)E-1	320	0.98	Agree
Xe-135	2.00E-2	(1.85 +/- 0.01)E-2	185	1.08	Agree

Type of Sample: Particulate Filter (NRC Spike)

Radio-nuclide	Licensee's Value	NRC Value	Reso-lution	Ratio	Compar-ison
Detector #2					
Co-60	2.86E-2	(2.73 +/- 0.05)E-2	55	1.05	Agree
Sr-85	7.41E-3	(8.06 +/- 0.19)E-3	42	0.92	Agree
Cd-109	1.19E-1	(1.25 +/- 0.02)E-1	62	0.95	Agree
Sn-113	1.28E-2	(1.21 +/- 0.02)E-2	60	1.06	Agree
Ce-139	3.97E-3	(3.93 +/- 0.10)E-3	39	1.01	Agree
Hg-203	2.73E-3	(2.76 +/- 0.12)E-3	23	0.99	Agree
Co-57	4.57E-3	(4.31 +/- 0.09)E-3	48	1.06	Agree
Y-88	2.50E-2	(2.42 +/- 0.05)E-2	48	1.03	Agree
Cs-137	2.54E-2	(2.45 +/- 0.04)E-2	61	1.04	Agree
Detector #3					
Co-60	2.88E-2	(2.73 +/- 0.05)E-2	55	1.05	Agree
Sr-85	8.10E-3	(8.06 +/- 0.19)E-3	42	1.00	Agree
Cd-109	1.24E-1	(1.25 +/- 0.02)E-1	62	0.99	Agree
Sn-113	1.26E-2	(1.21 +/- 0.02)E-2	60	1.04	Agree
Ce-139	3.87E-3	(3.93 +/- 0.10)E-3	39	0.98	Agree
Hg-203	2.84E-3	(2.76 +/- 0.12)E-3	23	1.03	Agree
Co-57	4.56E-3	(4.31 +/- 0.09)E-3	48	1.06	Agree
Y-88	2.47E-2	(2.42 +/- 0.05)E-2	48	1.02	Agree
Cs-137	2.47E-2	(2.45 +/- 0.04)E-2	61	1.01	Agree

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Type of Sample: Charcoal Cartridge (NRC spike)

Radio-nuclide	Licensee's Value	NRC Value	Reso-lution	Ratio	Compar-ison
Detector #2					
Co-60	5.76E-2	(4.87 +/- 0.06)E-2	81	1.18	Agree
Cd-109	4.93E-1	(5.14 +/- 0.05)E-1	103	0.96	Agree
Sn-113	1.21E-2	(1.19 +/- 0.03)E-2	40	1.02	Agree
Ce-139	7.75E-3	(7.44 +/- 0.14)E-3	53	1.04	Agree
Am-241	6.05E-2	(6.06 +/- 0.07)E-2	87	1.00	Agree
Co-57	1.08E-2	(9.99 +/- 0.13)E-3	77	1.08	Agree
Y-88	1.68E-2	(1.68 +/- 0.04)E-2	42	1.00	Agree
Cs-137	4.81E-2	(4.87 +/- 0.05)E-2	97	0.99	Agree
Detector #3					
Co-60	4.86E-2	(4.87 +/- 0.06)E-2	81	1.00	Agree
Cd-109	4.88E-1	(5.14 +/- 0.05)E-1	103	0.95	Agree
Sn-113	1.25E-2	(1.19 +/- 0.03)E-2	40	1.05	Agree
Ce-139	7.17E-3	(7.44 +/- 0.14)E-3	53	0.96	Agree
Am-241	6.49E-2	(6.06 +/- 0.07)E-2	87	1.07	Agree
Co-57	1.06E-2	(9.99 +/- 0.13)E-3	77	1.06	Agree
Y-88	1.69E-2	(1.68 +/- 0.04)E-2	42	1.00	Agree
Cs-137	4.82E-2	(4.87 +/- 0.05)E-2	97	0.99	Agree

ATTACHMENT 2

CRITERIA FOR COMPARISONS OF ANALYTICAL MEASUREMENTS

This attachment provides criteria for the comparison of results of analytical radioactivity measurements. These criteria are based on empirical relationships which combine prior experience in comparing radioactivity analyses, the measurement of the statistically random process of radioactive emission, and the accuracy needs of this program.

In these criteria, the "Comparison Ratio Limits"[1] denoting agreement or disagreement between licensee and NRC results are variable. This variability is a function of the ratio of the NRC's analytical value relative to its associated statistical and analytical uncertainty, referred to in this program as "Resolution"[2].

For comparison purposes, a ratio between the licensee's analytical value and the NRC's analytical value is computed for each radionuclide present in a given sample. The computed ratios are then evaluated for agreement or disagreement based on "Resolution." The corresponding values for "Resolution" and the "Comparison Ratio Limits" are listed in the Table below. Ratio values which are either above or below the "Comparison Ratio Limits" are considered to be in disagreement, while ratio values within or encompassed by the "Comparison Ratio Limits" are considered to be in agreement.

TABLE

NRC Confirmatory Measurements Acceptance Criteria
Resolution vs. Comparison Ratio Limits

Resolution	Comparison Ratio Limits for Agreement
<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

[1]Comparison Ratio = $\frac{\text{Licensee Value}}{\text{NRC Reference Value}}$

[2]Resolution = $\frac{\text{NRC Reference Value}}{\text{Associated Uncertainty}}$