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

NOV 18 1988

Report Nos.: 50-250/88-29 and 50-251/88-29

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

Docket Nos.: 50-250 and 50-251 License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point 3 and 4

Inspection Conducted: October 17-21, 1988

Inspector: John B. Kahle 11/17/88
for S. S. Adamovitz Date Signed

Approved by: John B. Kahle 11/17/88
J. B. Kahle, Section Chief Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection was conducted in the areas of confirmatory measurements, the post accident sampling system and the August 1988 spent fuel pool spill.

Results: No violations or deviations were identified. The NRC/licensee confirmatory measurements in general agreed well. The Chemistry Count Room had recently acquired new equipment which consisted of an intrinsic germanium gamma detector and a Genie mutlichannel analyzer/computer. During 1988, the Chemistry program had been allotted nine additional technician positions and was actively recruiting to fill them.

The licensee had experienced recurrent problems with the operability of the PASS system. The PASS system utilized a series of inline monitors for sample analyses and had the capacity to provide an undiluted grab sample. The licensee was considering a modification of the PASS to provide the capability to produce a diluted grab sample.

The IFIs pertaining to the spent fuel pool spill remain open because decontamination and maintenance work has not been fully completed.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*J. Arias, Jr., Regulatory Compliance Supervisor
*W. Bladow, QA Superintendent
C. Cavin, Lead Mechanical Analyzer
R. Hart, Lead Engineer, Regulation and Compliance
*P. Hughes, Health Physics Supervisor
M. Murray, Plant Technician
*J. Odom, Site Vice President
*S. Quinn, Senior Plant Technician, Acting Radiochemist
J. Reiks, Senior Chemistry Technician
H. Schneider, Special Projects Coordinator
*R. Steinke, Radiochemistry Supervisor, Acting Chemistry Supervisor
J. Webb, Assistant Superintendent, Planning and Scheduling

NRC Resident Inspectors

*T: McElhinney
G. Schnebli

*Attended exit interview

2. Inspector Followup Items (IFIs)(92701)

a. (Open) IFI 50-250, 251/88-25-02: Review licensee decontamination program results in cleanup of August 15-16, 1988 spill. The inspector and a licensee representative toured the area of the spill and discussed continuing decontamination activities.

Decontamination efforts had been completed for the heat exchanger room of the Unit 4 spent fuel pool (SFP) pump and for the asphalted area outside the heat exchanger room. The licensee had removed the contaminated asphalt and subsurface gravel and had drummed it for offsite burial. New fill gravel and asphalt had been poured. Portions of the gravel apron that extended beyond the asphalted area had also been contaminated during this event. The licensee had removed and drummed the contaminated gravel with the exception of one small area (approximately 4x6 feet) adjoining the foundation of the security fence. As of the date of this inspection, the licensee was continuing to investigate the depth of this contaminated area and had not completed surveillance and removal activities. A total of 398 drums of 7.5 cubic feet each had been filled with contaminated asphalt and/or gravel. The licensee estimated that another 20 drums

would be utilized for the small area adjacent to the fence. This item remains open pending completion of the decontamination effort.

b. (Open) IFI 50-250, 251/88-25-03: Review licensee action concerning operation of the spent fuel pool cleanup filter-demineralizer to limit radioactivity concentrations. The filter-demineralizer was shared by two systems: the spent fuel pool and the Refueling Water Storage Tank (RWST). Recent practice at the plant was to use the filter demineralizer loop to service the RWST 80 to 90 percent of the time and the SFP 10 to 20 percent of the time. The licensee sampled the SFP water weekly, and a review of 1988 data indicated use of the filter demineralizer decreased Co-60 activity from the E-02 uCi/ml range to approximately E-04 uCi/ml. When the filter-demineralizer processing was discontinued for the SFP, the Co-60 activity was observed to gradually increase over a period of several weeks to the E-02 uCi/ml range. The licensee was currently evaluating the system and the criteria for initiating operation of the filter-demineralizer for the SFP. Chemistry personnel were considering a procedural requirement for initiating use of the filter-demineralizer when the gross activity of the SFP reached 5E-03 uCi/ml. The SFP activity levels would be tracked by the routine weekly samples. This item remains open.

c. (Open) IFI 50-250, 251/88-25-04: Review licensee action concerning cleanout of the Auxiliary Building floor drain lines and determine system flowrate capacity. A contributing factor to the extent of the SFP spill was the inability of the floor drain system to accept the flow of water. The inability of the floor drain system to handle the flow caused the SFP water to backup and overflow the SFP pump room's retaining sill. The licensee had identified two contributing factors which led to the drain system's overflow: system blockage and obstruction of the drain openings by Tygon tubing. Subsequent to the August SFP spill, the licensee had "roto-rooted" all floor drain lines to eliminate blockages and was currently evaluating a preventive maintenance program that would require periodic cleaning of the drains. System engineers had not yet developed an acceptable method to determine if the pipes were open, and one method under consideration would use a water flush (approximately 600 gallons) to verify open lines. However, the licensee was also concerned that this flushing process would generate substantial amounts of contaminated water that would require processing. The Tygon tubing that had blocked the drain openings was to be removed by the end of October 1988, and strainers were to be installed in the openings. The tubes would still be used to channel contaminated water leak-offs directly to the drain but would end at the lip of the drain opening. This item remains open.

3. Audits (84750)

The inspector reviewed three audit reports concerning plant chemistry activities:

a. QAO-PTN-87-842, Chemistry Measuring and Test Equipment, conducted June 8, 1987 through August 26, 1987.

b. QAO-PTN-87-853, Radioactive Materials Release, conducted August 11, 1987 through October 14, 1987.

c. QAO-PTN-87-882, Chemical Control, conducted December 10, 1987 through January 20, 1988.

The audits were conducted against technical specification requirements, station quality assurance /quality control practices, and station procedures. The audit reports contained detailed summaries of program findings, and comments. Each noncompliance item was assigned an action number for tracking purposes. Follow-up actions and projected completion dates were also identified and item close-out required subsequent evaluation by the Quality Assurance Group. The inspector also reviewed selected portions of an accompanying checklist and noted procedural or Technical Specification requirements were referenced.

No violations or deviations were identified.

4. Laboratory Quality Control Program (84750)

The inspector reviewed the licensee's quality control program concerning chemistry count room activities using Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Program (Normal Operations) - Effluent Streams and the Environment" as a reference. The licensee utilized NBS traceable radioactive standards in order to determine detector efficiency. Daily performance checks for the gamma spectroscopy systems were specified in the Chemistry department instruction, CH-DI-006, "Operation of the ND-9900" and included activity determinations for the Co-57, Co-60, and Cs-137 isotopes; resolution checks for the Co-57 and Co-60 peaks, and energy checks for the Co-57 and Co-60 peaks. The laboratory cross-check quality control program was defined in the chemistry department procedure, NC-7, "Radiochemistry Quality Control Program", dated April 14, 1988. Interlaboratory cross-checks were comprised of various spiked sample geometries purchased from an NBS traceable vendor, usually on a quarterly basis. Annually, representative effluent samples were split between Turkey Point and St. Lucie, and the results compared utilizing the NRC criteria for comparing analytical measurements. The intralaboratory program was also defined in procedure NC-7 and consisted of duplicate counts on the same sample or a separate replicate sample when possible. The program was set up so that approximately 5 to 10 percent of the samples counted for radioactivity were to be analyzed in duplicate. Sample types included liquid and gaseous effluents, reactor coolant, containment gas and tritium, charcoal

cartridges and particulate filters. The acceptance criteria for agreement between analyses was set at 20 percent of the "known" or first count. The procedure also indicated corrective steps to be taken in order to resolve disagreements.

The responsibility for data review was defined in procedure O-ADM-650, "Chemistry Department Policy Procedures," dated June 14, 1988. Chemistry technicians were assigned the responsibility of initial data review of liquid and gaseous release analyses and other radiochemical analyses. The Radiochemistry Supervisor was required to review unusual results and releases.

The licensee maintained procedures covering the facility's chemistry program. The inspector reviewed procedures dealing with sample collection, count room quality control, equipment operation and calibration, and operation of the post accident sampling system. In reviewing the procedure NC-25B, "Gamma Spectrometer Efficiency Calibration for Various Geometries Using Radioactive Standards" dated April 8, 1986, the inspector noted that there was some confusion regarding frequency of calibration. Discussions with the licensee indicated that Chemistry personnel were to perform annual efficiency determinations or verifications for all current geometries. The inspector also noted that the procedure did not specify comparison of new efficiencies to previously determined efficiencies, although count room personnel were already performing this comparison. The licensee acknowledged the inspector's comments and agreed to clarify the calibration frequency and add a statement requiring comparison of new to old efficiency values.

The inspector reviewed a series of records concerning gamma spectroscopy efficiency determinations for 1986 and 1987, inter and intralaboratory cross-checks for 1986 through 1988; and count room equipment performance checks for 1988.

No violations or deviations were identified.

5. Count Room Facilities and Staffing (84750)

The plant maintained two count rooms for radioisotopic analyses: the Chemistry and Health Physics count rooms. The Chemistry Count Room dealt with in-plant and effluent liquid and gaseous samples. The Health Physics (HP) laboratory performed analyses related to in-plant worker safety and contamination control. The HP laboratory also maintained calibrations for selected chemistry geometries in order to act as a backup for the Chemistry lab.

The Chemistry Count Room was equipped with two intrinsic germanium detectors and two germanium-lithium (Ge-Li) detectors for gamma spectroscopy. At the time of this inspection, one of the intrinsic germanium detectors was new and was being calibrated, and one of the Ge-Li detectors was under repair. The Chemistry Count Room also contained a Beckman liquid scintillation counter for tritium and an NMC alpha-beta

proportional counter. The HP count room equipment consisted of two intrinsic germanium detectors, two beta counters, one zinc-sulfide scintillation counter for alpha detection and one alpha-beta proportional counter. The HP count room did not have a liquid scintillation counter for tritium determinations but had ordered a Beckman LS5000 counter. All tritium analyses were currently being performed by the Chemistry Count Room.

Staffing for the Chemistry Department totalled 24 technician positions, which included an increase of nine positions approved in July 1988. Eleven positions were staffed by plant personnel and nine positions were filled by contractors. Four technician positions were currently open; however, personnel had been recruited and were expected to begin employment by the end of the year. The Chemistry Technicians were cross-trained and were routinely rotated through the primary and secondary water chemistry laboratories and the Chemistry Count Room.

No violations or deviations were identified.

6. Confirmatory Measurements (84750)

Reactor coolant and selected liquid and gaseous effluent streams were sampled by the licensee and analyzed for isotopic concentrations using the license's gamma spectroscopy systems and the NRC Region II mobile laboratory. The purpose of these comparative measurements was to verify the licensee's capability to accurately measure gamma radionuclide concentrations in various plant systems and effluent streams. Comparisons were made utilizing the licensee's Chemistry (2 out of 4 detectors operational) and Health Physics count rooms (2 out of 2 operational). Sample types and counting geometries included the following: reactor coolant system (RCS)-500 ml in a 1000 ml sample bottle; liquid waste monitor tank-1000 ml liquid Marinelli, and a waste gas decay tank-33 cc gas bulb. Spiked charcoal cartridge and particulate filter samples were provided in lieu of licensee samples which did not have sufficient activity for comparisons.

Comparison of licensee and NRC results are listed in Attachment 1 with the acceptance criteria listed in Attachment 2. All results were in agreement for the liquid waste monitor tank sample and for the reactor coolant sample with the exception of Xe-133 for one detector. The isotope Xe-133 in the reactor coolant was not compared for the HP detector No. 2 since this detector was not functional during the first part of the week and the sample was held for several days prior to counting. For the spiked particulate filter and the charcoal cartridge, all results were in agreement with the exception of Sn-113 for the Chemistry detectors. Examination of the analytical data revealed that the Chemistry nuclide library had calculated the Sn-113 activity using the 255 KeV peak which has a low abundance of only 3.50 percent. The HP and NRC laboratories utilized a 392 KeV peak which had a much higher abundance of 64.00 percent. Recalculation of the Sn-113 activity using counts from the 392 KeV peak showed agreement for all detectors. Prior to the end of this inspection,

the licensee had modified their nuclide library to provide for calculation of Sn-113 activity using the 392 KeV peak. Initial sampling of the waste gas decay tank showed disagreement for Xe-133 for the Chemistry detector No. 4 and biased low for detector No. 2. The HP count room did not maintain this gas bulb geometry. The inspector and licensee representatives reviewed the analytical results and could not find a cause for the disagreement. The inspector also reviewed cross-check results for gaseous samples and noted agreement for past analytical results. The licensee agreed to collect and count a second waste gas decay tank sample. All results were in agreement for the second gaseous sample.

The inspector observed collection of the Unit 3 reactor coolant sample, the liquid waste monitor Tank C sample and the waste gas decay tank No. 1 sample. The inspector noted that approved procedures were being utilized for sample collection and that the technicians appeared to be knowledgeable of the sampling process.

No violations or deviations were identified.

7. Post Accident Sampling System (PASS) (84750)

The inspector discussed system operation and toured selected portions of the PASS system, which was shared between Units 3 and 4. The liquid system sampled from Unit 3 or Unit 4 loop "A", and sample parameters were analyzed by a series of inline monitors which included chloride, boron, pH, isotopic gamma, and hydrogen. The liquid PASS system also had the capability for collection of an undiluted grab sample. The licensee was currently making arrangements for offsite shipment and analysis of the undiluted grab by a vendor. The gaseous PASS system sampled containment atmosphere and also used inline monitors for hydrogen and isotopic gamma analyses.

The licensee had experienced chronic problems with PASS system operability and maintenance, as indicated by discussions with cognizant licensee representatives and review of plant records. The licensee contracted with a vendor to perform a complete walkdown of the system during December 1987 and to make recommendations for performance improvement. The licensee had also initiated a monthly service contract during June 1988 for all major inline instrumentation with the exception of the gamma detectors. This contract had been renewed for 1989. Currently, the chloride analyzer was nonfunctional and a replacement had been ordered for installation during early 1989. One gamma detector had been damaged when the detector was not maintained at liquid nitrogen temperature due to dewar leakage. This detector had been replaced but had not been calibrated as of the end of this inspection. The licensee was also considering installation or modification of the grab sample mechanism in order to provide a diluted aliquot. The inspector informed licensee representatives that tracking PASS system modifications and operability testing would be considered a followup item.

(Opened) IFI 50-250, 251/88-29-01: Track PASS system modifications and operability testing.

No violations or deviations were identified.

8. Information Notices (92703)

a. (Closed) IE Information Notice No. 88-22, "Disposal of Sludge from Onsite Sewage Treatment Facilities." The inspector reviewed the licensee's response which consisted of an evaluation of the current sampling program for sanitary sewage. The licensee had been sampling the sewage collection facilities in the radiation controlled area prior to release. However, the onsite sewage treatment plant had not been included in this sampling program. An initial sample was requested and a procedural requirement was added for sampling the sludge from the sewage treatment plant. This item is considered closed.

b. (Closed) IE Information Notice No. 88-31, "Steam Generator Tube Rupture Analysis Deficiency." The licensee had received and evaluated this notice which had limited applicability to Turkey Point since the plant did not have once-through-steam generators. A vendor was analyzing the effect of steam generator tube bundle uncoverage on the validity of the iodine partitioning coefficients. This item is considered closed.

9. Exit Interview

The inspection scope and results were summarized on October 21, 1988, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

The Chemistry Count Room had recently acquired new equipment which consisted of an intrinsic germanium gamma detector and a Genie multichannel analyzer/computer. During 1988, the Chemistry program had been allotted nine additional technician positions and was actively recruiting to fill them. The NRC/licensee confirmatory measurements in general agreed well. An initial disagreement for gaseous Xe-133 for one detector showed agreement upon resampling.

The licensee had experienced recurrent problems with the operability of the PASS system. The PASS system utilized a series of inline monitors for sample analyses and had the capacity to provide an undiluted grab sample. The licensee was considering a modification of the PASS to provide the capability to produce a diluted grab sample.

Subsequent to the August 1988 spent fuel pool spill, the licensee had initiated decontamination and preventive maintenance activities. These

had not been completed at the time of this inspection and the associated followup items could not be closed.

ATTACHMENT 1

RESULTS OF GAMMA SPECTROSCOPY CONFIRMATORY MEASUREMENTS AT TURKEY POINT, OCTOBER 17-21, 1988

SAMPLE	ISOTOPE	CONCENTRATION LICENSEE	CONCENTRATION NRC	RESOLUTION	RATIO LICENSEE/NRC	COMPARISION
1. Waste Monitor Tank, Liquid - 1000 ml Marinelli						
a. Chemistry Detector No. 2 (SN1187)	Mn-54	2.81E-6	2.78 0.12 E-6	23	1.01	Agreement
	Co-58	5.84E-6	5.77 0.17 E-6	34	1.01	Agreement
	Co-60	1.50E-6	1.59 0.11 E-6	14	0.94	Agreement
	Sb-125	3.42E-5	3.44 0.07 E-5	49	0.99	Agreement
	Cs-134	5.42E-6	4.52 0.17 E-6	26	1.20	Agreement
	Cs-137	1.32E-5	1.33 0.02 E-5	66	0.99	Agreement
b. Chemistry Detector No. 4 (SN1427-A)	Mn-54	2.66E-6	2.78 0.12 E-6	23	0.96	Agreement
	Co-58	5.78E-6	5.77 0.17 E-6	34	1.00	Agreement
	Co-60	1.50E-6	1.59 0.11 E-6	14	0.94	Agreement
	Sb-125	3.41E-5	3.44 0.07 E-5	49	0.99	Agreement
	Cs-134	4.79E-6	4.52 0.17 E-6	26	1.06	Agreement
	Cs-137	1.22E-5	1.33 0.02 E-5	66	0.92	Agreement
c. HP Detector No. 1 (SN20-P-691)	Mn-54	2.64E-6	2.78 0.12 E-6	23	0.95	Agreement
	Co-58	5.60E-6	5.77 0.17 E-6	34	0.97	Agreement
	Co-60	1.50E-6	1.59 0.11 E-6	14	0.94	Agreement
	Sb-125	3.41E-5	3.44 0.07 E-5	49	0.99	Agreement
	Cs-134	4.63E-6	4.52 0.17 E-6	26	1.02	Agreement
	Cs-137	1.34E-5	1.33 0.02 E-5	66	1.01	Agreement
d. HP Detector No. 2 (SN24-P-18TB)	Mn-54	2.96E-6	2.78 0.12 E-6	23	1.06	Agreement
	Co-58	5.70E-6	5.77 0.17 E-6	34	0.99	Agreement
	Co-60	1.44E-6	1.59 0.11 E-6	14	0.91	Agreement
	Sb-125	3.42E-5	3.44 0.07 E-5	49	0.99	Agreement
	Cs-134	4.90E-6	4.52 0.17 E-6	26	1.08	Agreement
	Cs-137	1.32E-5	1.33 0.02 E-5	66	0.99	Agreement
2. Reactor Coolant - 500 ml in a 1000 ml sample bottle						
a. Chemistry Detector No. 2 (SN1187)	Xe-133	7.37E-3	7.19 0.35 E-3	20	1.02	Agreement
	Co-58	9.66E-3	1.16 0.04 E-2	29	0.83	Agreement
	I-131	4.76E-3	4.74 0.21 E-3	22	1.00	Agreement

SAMPLE	ISOTOPE	CONCENTRATION LICENSEE	CONCENTRATION NRC	RESOLUTION	RATIO LICENSEE/NRC	COMPARISION
b. Chemistry Detector No. 4 (SN1427-A)	Xe-133	2.40E-3	7.19 0.35 E-3	20	0.33	Disagreement
	Co-58	1.01E-2	1.16 0.04 E-2	29	0.87	Agreement
	I-131	4.27E-3	4.74 0.21 E-3	22	0.90	Agreement
c. HP Detector No. 1 (SN20-P-691)	Xe-133	5.75E-3	7.19 0.35 E-3	20	0.80	Agreement
	Co-58	9.82E-3	1.16 0.04 E-2	29	0.85	Agreement
	I-131	4.72E-3	4.74 0.21 E-3	22	1.00	Agreement
d. HP Detector No. 2 (SN24-P-18TB)	Co-58	9.71E-3	1.16 0.04 E-2	29	0.84	Agreement
	I-131	4.60E-3	4.74 0.21 E-3	22	0.97	Agreement
3. Particulate Filter, NRC Spike						
a. Chemistry Detector No. 2 (SN1187)	Co-60	4.10E-2	4.42 0.06 E-2	74	0.93	Agreement
	Sr-85	9.80E-4	9.10 1.12 E-4	8	1.08	Agreement
	Cd-109	1.32E-1	1.39 0.02 E-1	70	0.95	Agreement
	Sn-113	2.82E-3	4.35 0.20 E-3	22	0.65	Disagreement
	Ce-139	1.81E-3	1.89 0.07 E-3	27	0.96	Agreement
	Co-57	3.69E-3	3.61 0.08 E-3	45	1.02	Agreement
	Y-88	7.87E-3	7.98 0.29 E-3	28	0.99	Agreement
	Cs-137	3.94E-2	4.05 0.04 E-2	101	0.97	Agreement
b. Chemistry Detector No. 4 (SN1427-A)	Co-60	4.31E-2	4.42 0.06 E-2	74	0.98	Agreement
	Sr-85	9.85E-4	9.10 1.12 E-4	8	1.08	Agreement
	Cd-109	1.41E-1	1.39 0.02 E-1	70	1.01	Agreement
	Sn-113	4.64E-3	4.35 0.20 E-3	22	1.07	Agreement
	Ce-139	1.88E-3	1.89 0.07 E-3	27	0.99	Agreement
	Co-57	3.80E-3	3.61 0.08 E-3	45	1.05	Agreement
	Y-88	7.78E-3	7.98 0.29 E-3	28	0.97	Agreement
	Cs-137	4.15E-2	4.05 0.04 E-2	101	1.02	Agreement
c. HP Detector No. 1 (SN20-P-691)	Co-60	4.19E-2	4.42 0.06 E-2	74	0.95	Agreement
	Sr-85	9.23E-4	9.10 1.12 E-4	8	1.01	Agreement
	Cd-109	1.40E-1	1.39 0.02 E-1	70	1.01	Agreement
	Sn-113	4.50E-3	4.35 0.20 E-3	22	1.03	Agreement
	Ce-139	1.82E-3	1.89 0.07 E-3	27	0.96	Agreement
	Co-57	3.76E-3	3.61 0.08 E-3	45	1.04	Agreement
	Y-88	7.99E-3	7.98 0.29 E-3	28	1.00	Agreement
	Cs-137	3.99E-2	4.05 0.04 E-2	101	0.98	Agreement
d. Detector No. 2 (SN24-P-18TB)	Co-60	4.32E-2	4.42 0.06 E-2	74	0.98	Agreement
	Sr-85	9.16E-4	9.10 1.12 E-4	8	1.01	Agreement
	Cd-109	1.43E-1	1.39 0.02 E-1	70	1.03	Agreement
	Sn-113	4.77E-3	4.35 0.20 E-3	22	1.10	Agreement
	Ce-139	1.90E-3	1.89 0.07 E-3	27	1.01	Agreement
	Co-57	3.87E-3	3.61 0.08 E-3	45	1.07	Agreement
	Y-88	8.12E-3	7.98 0.29 E-3	28	1.02	Agreement
	Cs-137	4.10E-2	4.05 0.04 E-2	101	1.01	Agreement

SAMPLE	ISOTOPE	CONCENTRATION LICENSEE	CONCENTRATION NRC	RESOLUTION	RATIO LICENSEE/NRC	COMPARISION
4. Charcoal Cartridge, - NRC Spike	Cd-109	8.62E-1	9.65± 0.04 E-1	241	0.89	Agreement
	Sn-113	8.49E-3	1.17± 0.03 E-2	39	0.72	Disagreement
a. Chemistry Detector No. 2 (SN1187)	Ce-139	6.83E-3	7.86± 0.13 E-3	60	0.87	Agreement
	Hg-203	1.18E-3	1.23± 0.11 E-3	11	0.96	Agreement
	Co-57	1.37E-2	1.52± 0.01 E-2	152	0.90	Agreement
	Y-88	1.68E-2	1.88± 0.05 E-2	38	0.89	Agreement
	Cs-137	4.11E-2	4.40± 0.05 E-2	88	0.93	Agreement
	Co-60	4.10E-2	4.38± 0.06 E-2	73	0.94	Agreement
b. Chemistry Detector No. 4 (SN1427-A)	Cd-109	9.18E-1	9.65± 0.04 E-1	241	0.95	Agreement
	Sn-113	8.45E-3	1.17± 0.03 E-2	39	0.72	Disagreement
	Ce-139	7.27E-3	7.86± 0.13 E-3	60	0.92	Agreement
	Hg-203	1.20E-3	1.23± 0.11 E-3	11	0.98	Agreement
	Co-57	1.46E-2	1.52± 0.01 E-2	152	0.96	Agreement
	Y-88	1.76E-2	1.88± 0.05 E-2	38	0.94	Agreement
	Cs-137	4.27E-2	4.40± 0.05 E-2	88	0.97	Agreement
	Co-60	4.21E-2	4.38± 0.06 E-2	73	0.96	Agreement
c. HP Detector No. 1 (SN20-P-691)	Cd-109	9.97E-1	9.65± 0.04 E-1	241	1.03	Agreement
	Sn-113	1.19E-2	1.17± 0.03 E-3	39	1.02	Agreement
	Ce-139	7.82E-3	7.86± 0.13 E-3	60	0.99	Agreement
	Hg-203	1.25E-3	1.23± 0.11 E-3	11	1.02	Agreement
	Co-57	1.58E-2	1.52± 0.01 E-2	152	1.04	Agreement
	Y-88	1.88E-2	1.88± 0.05 E-2	38	1.00	Agreement
	Cs-137	4.58E-2	4.40± 0.05 E-2	88	1.04	Agreement
	Co-60	4.61E-2	4.38± 0.06 E-2	73	1.05	Agreement
d. HP Detector No. 2 (SN24-P-18TB)	Cd-109	9.08E-1	9.65± 0.04 E-1	241	0.94	Agreement
	Sn-113	1.09E-2	1.17± 0.03 E-2	39	0.93	Agreement
	Ce-139	7.05E-3	7.86± 0.13 E-3	60	0.90	Agreement
	Hg-203	1.19E-3	1.23± 0.11 E-3	11	0.97	Agreement
	Co-57	1.40E-2	1.52± 0.01 E-2	152	0.92	Agreement
	Y-88	1.71E-2	1.88± 0.05 E-2	38	0.91	Agreement
	Cs-137	4.14E-2	4.40± 0.05 E-2	88	0.94	Agreement
	Co-60	4.16E-2	4.38± 0.06 E-2	73	0.95	Agreement
5. Waste Gas Decay Tank - Sample No. 1 33cc gas bulb						
a. Chemistry Detector No. 2 (SN1187)	Kr-85	2.65E-3	2.90± 0.27 E-3	11	0.91	Agreement
	Xe-131M	1.86E-3	2.01± 0.07 E-3	29	0.92	Agreement
	Xe-133M	4.14E-5	4.47± 0.64 E-5	7	0.93	Agreement
	Xe-133	6.13E-2	7.13± 0.01 E-2	>200	0.86	Agreement
b. Chemistry Detector No. 4 (SN1427-A)	Kr-85	2.81E-3	2.90± 0.27 E-3	11	0.97	Agreement
	Xe-131M	1.95E-3	2.01± 0.07 E-3	29	0.97	Agreement
	Xe-133M	4.27E-5	4.47± 0.64 E-5	7	0.96	Agreement
	Xe-133	5.93E-2	7.13± 0.01 E-2	>200	0.83	Disagreement

SAMPLE	ISOTOPE	CONCENTRATION LICENSEE	CONCENTRATION NRC	RESOLUTION	RATIO LICENSEE/NRC	COMPARISION
6. Waste Gas Decay Tank, Sample No: 2 33 cc gas bulb						
a. Chemistry Detector No. 2 (SN1187)	Xe-131M	1.54E-3	1.56± 0.06 E-3	26	0.99	Agreement
	Xe-133	4.17E-2	4.07± 0.01 E-2	>200	1.02	Agreement
b. Chemistry Detector No. 4 (SN1427-A)	Xe-131M	1.29E-3	1.56± 0.06 E-3	26	0.83	Agreement
	Xe-133	4.45E-2	4.07± 0.01 E-2	>200	1.09	Agreement

ATTACHMENT 2

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 measurements should be more selective. Conversely, poorer agreement must be considered acceptable as the resolution decreases.

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

Resolution	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