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

MAY 12 1992

Report Nos.: 50-321/92-10 and 50-366/92-10

Licensee: Georgia Power Company
P. O. Box 1295
Birmingham, AL 35201

Docket Nos.: 50-321 and 50-366 License Nos.: DPR-57 and NPF-5

Facility Name: Hatch 1 and 2

Inspection Conducted: April 13-16, 1992

Inspector: D W Jones 5/8/92
D. W. Jones Date Signed

Approved by: T R Decker 5/8/92
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, announced inspection was conducted in the areas of radiological effluents, radiological environmental monitoring, water chemistry, and confirmatory measurements.

Results:

In the areas inspected, no violations or deviations were identified.

The licensee had implemented and maintained an effective program to monitor and control liquid and gaseous radioactive effluents. The projected offsite doses resulting from those effluents were well within the limits specified in the Technical Specifications and 40 CFR 190 (Paragraph 2).

The licensee's radiological environmental monitoring program was effectively implemented and an effective quality assurance program had been maintained for analysis of environmental samples (Paragraph 3 and 4).

The licensee's chemistry control program was effectively imple nted (Paragraph 5).

The licensee demonstrated adequate capability tc quantify radionuclide concentrations in various matrices normally encountered in nuclear power plant operations (Paragraph 6).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*T. Elton, Supervisor, Nuclear Safety and Compliance
*O. Fraser, Supervisor, SAER
*V. McGowan, Supervisor, Chemistry
*T. Moore, Assistant General Manager, Support
*D. Read, Assistant General Manager, Operations
*K. Russell, Nuclear Specialist, SAER
*D. Smith, Superintendent, Health Physics

Other licensee employees contacted included engineers, technicians, and administrative personnel.

Nuclear Regulatory Commission

R. Musser, Resident Inspector
*L. Wert, Senior Resident Inspector

*Attended exit interview

2. Semiannual Radioactive Effluent Release Reports (84750)

Technical Specifications (TSs) 6.9.1.8 and 6.9.1.9 for both units required the licensee to submit radioactive effluent release reports within 60 days after January 1 and July 1 of each year covering the operation of each unit during the previous six months of operation. The reports were required to include summaries of the quantities of radioactive effluents released following the format of Regulatory Guide 1.21.

The effluent data presented in Table 1 below were extracted from the licensee's reports for the years 1990 and 1991. The inspector reviewed those reports and discussed their content and the data presented in Table 1 with the licensee. The inspector noted that the fission and activation products released in liquid effluents had slightly increased and the fission and activation gases had decreased during 1991 as compared to 1990. The licensee indicated that those changes were a result of two refueling outages occurring during 1991 and only one outage during 1990. Those changes were also a function of the types of activities which were performed during the outages. Chemical decontamination was performed on the Unit 1 reactor water cleanup system during the 1990 outage. The Unit 1 recirculation system and the Unit 2 torus were chemically decontaminated during the 1991 outages. The chemical decontaminations generated additional liquid radwastes which had to be processed through the liquid radwaste treatment system and therefore additional liquid effluents.

Table 1

Effluent Release Summary for Hatch Units 1 and 2

Activity Released (curies)

Liquid Effluents	1990	1991
Fission and Activation Products	0.30	0.72
Tritium	22.59	29.12
Dissolved and Entrained Gases	4.45E-2	3.81E-3
Gaseous Effluents		
Fission and Activation Gases	1104	279
Iodines	6.02E-3	4.71E-3
Particulates	2.56E-3	1.20E-3
Tritium	39.85	33.93

Annual Doses

Liquid Effluents	1990		1991	
	Unit 1	Unit 2	Unit 1	Unit 2
Total Body Dose (mrem) (Limit: 3 mrem/unit)	0.299	0.098	0.274	0.122
Percent of Limit	9.97	3.25	9.14	4.05
Gaseous Effluents				
Air Doses due to Noble Gases (mrad)				
Gamma	8.67E-2	6.18E-2	1.92E-2	1.91E-2
Beta	1.48E-1	1.50E-1	4.28E-1	2.37E-2
(Limits: Gamma-10mrad/unit, Beta-20mrad/unit)				
Percent of Limit				
Gamma	0.867	0.618	0.192	0.191
Beta	0.739	0.752	0.214	0.119
Total Body Doses due to Radioiodine, Tritium, and Particulates (mrem) (Limit: 15 mrem/unit)	8.23E-3	1.39E-2	7.25E-3	1.10E-2
Percent of Limit	5.49E-2	9.28E-2	4.83E-2	7.34E-2

Also, during the outages, fission and activation gases were not being produced, therefore the activity in the gaseous effluents decreased.

The inspector also noted that the reports did not indicate whether any of the effluent monitoring instrumentation had been inoperable for more than 30 days. Neither did the reports indicate whether there had been any unplanned releases from the site to unrestricted ares that exceeded 1 curie, excluding dissolved and entrained gases and tritium, in liquid effluents or 150 curies of noble gases or 0.02 curies of radioiodines in gaseous effluents. The licensee indicated that no effluent monitors had been inoperable for more than 30 days and that there had been no unplanned releases during 1990 or 1991. The licensee also indicated that if either had occurred the reports would have so indicated and that future reports will specifically indicate whether either have occurred.

As indicated in Table 1, the annual total body doses from liquid effluents was less than 10 percent of their limits. The annual total body doses and air doses from gaseous effluents were less than one percent of their limits.

Based on the above reviews, it was concluded that the licensee had implemented and maintained an effective program to monitor and control liquid and gaseous radioactive effluents. The projected offsite doses resulting from those effluents were well within the limits specified in the TSs and 40 CFR 190.

No violations or deviations were identified.

3. Radiological Environmental Monitoring (84750)

a. Routine Program

TS 3/4.16.1 for Unit 1 described the operational and surveillance requirements for the radiological environmental monitoring program. The sampling locations, types of samples or measurements, sampling frequency, types and frequency of sample analysis, reporting levels, and analytical lower limits of detection (LLDs) were specified. TSs 6.9.1.6 and 6.9.1.7 for both units delineated the requirements, the submittal dates, and the content of the Annual Radiological Environmental Surveillance Reports. The reports were required to be submitted prior to May 1 of each year and to provide an assessment of the observed impact on the environment resulting from plant operations during the previous calendar year.

The inspector reviewed the licensee's 1990 Annual Radiological Environmental Surveillance Report and discussed its content with the licensee. The report included the following: a summary description of the program, maps indicating sampling locations, summary results of analyses of radiological environmental samples and of environmental radiation measurements, discussion of deviations from the required sampling plan and analyses which did not achieve the required LLD, a summary and discussion of the results for each exposure pathway, analysis of trends and comparisons with previous years and preoperational studies, and an assessment of the impact on the environment resulting from plant operations. The report also included the results of the Land Use Census required by Unit 1 TS 3/4.16.2 and the results of the Interlaboratory Comparison Program required by Unit 1 TS 3/4.16.3. The licensee's evaluation of the 1990 environmental monitoring program data produced the following observations which were documented in the report.

- Direct radiation exposure,as measured by thermoluminescent dosimeters (TLDs), decreased during 1990 as compared to 1989. The overall average quarterly dose for all TLDs was consistent with the doses observed during the three years prior to 1989.

- I-131 was not detected in any milk samples during 1990.

- No manmade radionuclides were detected by gamma isotopic analysis of river water. No intakes for drinking water or irrigation were identified during the annual survey of the Altamaha River.

- No manmade radionuclides were detected by gamma isotopic analysis of the quarterly composites of air particulate filters.

- I-131 was not detected by gamma spectroscopy in any of the charcoal canisters used for adsorbing iodine from the atmosphere.

- No measurable radiological impact upon the environment as a consequence of plant discharges to the atmosphere and to the river was established.

Based on the above reviews and discussions, it was concluded that the licensee's TS required radiological environmental monitoring program was effectively implemented.

b. Augmented Program

During 1986 an unplanned release of radioactive water from the spent fuel pools drained into the swamp which is located on the east side of the plant site. As a result of the release, the licensee implemented an augmented monitoring program for the swamp area. The program provided for annual collection and analysis of sediment and vegetation samples taken from various locations in and around the contaminated swamp. The sampling locations included the area adjacent to the point where the contaminated water entered the swamp, the area adjacent to where water from the swamp enters the Altamaha River, various locations between those areas, and an upstream/background location. The inspector reviewed the licensee's report which documented an assessment of the program results for the years 1989 through 1991. The assessment included an evaluation of the program results for the years 1989 through 1991 and an evaluation for trends in the program results for the years 1987 through 1991. Based on that assessment, the licensee made the following observations and modifications to the program. The analytical results for the samples taken during 1991 indicated that the activity in the vegetation was near or below background and therefore vegetation sampling will no longer be included in the program. An evaluation of the yearly averages of the positive analytical results for the sediment samples taken during the years 1987 through 1991 indicated a generally steady reduction in activity due to radiological decay and weathering. The NRC will continue to monitor the results of the licensee's augmented environmental monitoring program for the swamp area.

No violations or deviations were identified.

1. Environmental Monitoring Quality Assurance Program (84750)

TS 3/4.16.3 for Unit 1 required the licensee to participate in an interlaboratory comparison program and to include a summary of the program results in the Annual Radiological Environmental Surveillance Report. The licensee's report for 1990 provided a summary of the results from the licensee's participation in the Environmental Protection Agency's

also included descriptions of the various types of samples analyzed and the analyses performed, and an evaluation of the analytical results. A total of 31 samples were analyzed in triplicate. Statistical evaluation of the program data indicated that no EPA control limits had been exceeded but warning limits were exceeded for two samples and one trend was detected. Each of those conditions were investigated and one of the investigations resulted in improved sample preparation and analytical techniques.

Based on the licensee's overall performance in the EPA crosscheck program it was concluded that an effective quality assurance program had been maintained for analysis of environmental samples.

No violations or deviations were identified.

5. Reactor Coolant Chemistry / Fuel Cladding Integrity (84750)

TSs 3/4.6.F.1 and 3/4.15.2.7 for Unit 1 and 3/4.4.5 and 3/4.11.2.7 for Unit 2 described the operational and surveillance requirements for reactor coolant specific activity and noble gas radioactivity rate in the main condenser off-gas prior to treatment. Sampling frequencies and radioactivity concentration limits were specified for various operational conditions.

The inspector reviewed trend plots of reactor coolant dose equivalent I-131 (DEI) for the period January 1, 1990, through April 15, 1992, and noble gas activity in pretreatment off-gas for the period January 1, 1991 through April 15,1992. During the Unit 1 operating cycle which began in June 1990 and ended in September 1991, the DEI was typically less than 5E-4 microcuries per cubic centimeter (μCi/cc). During the current cycle, which began in December 1991, the Unit 1 DEI has generally been less than 3E-4 μCi/cc. The Unit 2 DEI began a steadily decreasing trend in January 1990 from 4.5E-4 μCi/cc to less than 2E-4 μCi/cc in February 1991. From the start of the current cycle, which began in June 1991, until October 1991 the Unit 2 DEI was less than 1E-4 μCi/cc. During the period November 1991 to April 1992 the Unit 2 DEI had a steadily increasing trend from less than 1E-4 μCi/cc to 1.3E-3 μCi/cc. These values were well within the TS limit of 0.2 μCi/gram but the licensee indicated that the increase in the Unit 2 DEI, which started in November 1991, was an indication that a small leak had developed in one or more of the fuel rods. This conclusion was consistent with the observed noble gas radioactivity rate of the pretreatment off-gas in that the increase in the DEI coincided with an increase in the activity of the pretreatment off-gas. The licensee refers to the noble gas radioactivity rate for the isotopes Xe-133,

Xe-135, Xe-138, Kr-85m, Kr-87, and Kr-88 as the "sum of six". For comparative purposes, the Unit 1 pretreatment off-gas sum-of-six was typically less than 3500 microcuries per second (μCi/sec) from January 1991 until the October 1991 refueling outage. During the period December 1991 through April 1992, the Unit 1 pretreatment off-gas sum-of-six was less than 1500 μCi/sec. The Unit 2 pretreatment off-gas sum-of-six was also less than 1500 μCi/sec from January 1991 until October 1991. During November 1991 the Unit 2 pretreatment off-gas sum-of-six increased to ~10,000 μCi/sec and continued on a generally increasing trend. By April 1992 it had reached ~16,000 μCi/sec. Those values were well within the TS limit of 240,000 μCi/sec but the licensee was evaluating this trend to determine whether the off-gas activity could be maintained within the TS limit throughout the summer peak load period. The licensee indicated that the unit may be taken off-line to locate and remove the leaking fuel rods. The NRC will monitor the licensee's activities with regard to this issue.

Based on the above reviews and discussions, it was concluded that the licensee's chemistry control program was effectively implemented.

No violations or deviations were identified.

6. Confirmatory Measurements (84750)

10 CFR 20.201 (b) required the licensee to perform surveys as necessary to evaluate the extent of radiation hazards.

In an effort to evaluate the licensee's analytical capabilities, samples of reactor coolant, liquid radwaste, and post treatment main condenser off-gas were collected and analyzed for radionuclide concentrations by the licensee and the NRC Region II mobile laboratory. A simulated particulate filter was prepared by spiking a filter with liquid radwaste. The licensee was also provided with a spiked charcoal cartridge for analysis. Each of the above samples were analyzed by the licensee's three gamma spectroscopic systems and the results were compared to the results obtained by the mobile laboratory. The purpose of these measurement comparisons was to verify the licensee's capability to accurately detect and identify gamma emitting radionuclides and to quantify their concentrations. 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 in agreement for all samples analyzed.

Based on the above comparisons, it was concluded that the licensee had demonstrated adequate capability to quantify radionuclide concentrations in various matrices normally encountered in nuclear power plant operations.

No violations or deviations were identified.

7. Exit Interview

The inspection scope and results were summarized on April 16, 1992, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the results listed above. 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.

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ATTACHMENT 1

COMPARISON OF NRC AND HATCH ANALYTICAL RESULTS
APRIL 13-16, 1992

Reactor Coolant

Detector #1

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ba-140	5.57e-04	5.46e-04	4.59e-05	12	1.02	Agreement
I-131	1.09e-04	1.13e-04	1.68e-05	7	0.97	Agreement
I-132	4.57e-03	3.91e-03	1.83e-04	21	1.17	Agreement
I-133	1.52e-03	1.45e-03	7.76e-05	19	1.05	Agreement
I-134	1.84e-02	1.92e-02	6.69e-04	29	0.96	Agreement
I-135	4.14e-03	3.79e-03	1.51e-04	25	1.09	Agreement
Mo-99	9.78e-04	1.09e-03	1.17e-04	9	0.90	Agreement
Na-24	6.40e-04	5.48e-04	2.42e-05	23	1.17	Agreement
Np-239	1.18e-02	1.25e-02	4.81e-04	26	0.95	Agreement
Sr-91	3.51e-03	3.50e-03	1.31e-04	27	1.00	Agreement
Sr-92	1.01e-02	1.00e-02	3.38e-04	30	1.01	Agreement
Tc-99m	9.57e-03	8.71e-03	3.06e-04	28	1.10	Agreement
Zn-65	1.03e-03	1.00e-03	5.25e-05	19	1.03	Agreement

Detector #2

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ba-140	4.49e-04	5.46e-04	4.59e-05	12	0.82	Agreement
I-131	8.60e-05	1.13e-04	1.68e-05	7	0.76	Agreement
I-132	4.63e-03	3.91e-03	1.83e-04	21	1.18	Agreement
I-133	1.54e-03	1.45e-03	7.76e-05	19	1.06	Agreement
I-134	1.89e-02	1.92e-02	6.69e-04	29	0.99	Agreement
I-135	3.74e-03	3.79e-03	1.51e-04	25	0.99	Agreement
Na-24	6.27e-04	5.48e-04	2.42e-05	23	1.14	Agreement
Np-239	1.28e-02	1.25e-02	4.81e-04	26	1.03	Agreement
Sr-91	3.46e-03	3.50e-03	1.31e-04	27	0.99	Agreement
Sr-92	1.05e-02	1.00e-02	3.38e-04	30	1.05	Agreement
Tc-99m	9.79e-03	8.71e-03	3.06e-04	28	1.12	Agreement
Zn-65	1.04e-03	1.00e-03	5.25e-05	19	1.04	Agreement

Detector #3

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ba-140	4.98e-04	5.46e-04	4.59e-05	12	0.91	Agreement
I-131	7.95e-05	1.13e-04	1.68e-05	7	0.70	Agreement
I-132	4.14e-03	3.91e-03	1.83e-04	21	1.06	Agreement
I-133	1.56e-03	1.45e-03	7.76e-05	19	1.07	Agreement
I-134	1.89e-02	1.92e-02	6.69e-04	29	0.98	Agreement
I-135	3.78e-03	3.79e-03	1.51e-04	25	1.00	Agreement
Mo-99	1.03e-03	1.09e-03	1.17e-04	9	0.94	Agreement
Na-24	6.26e-04	5.48e-04	2.42e-05	23	1.14	Agreement
Nb-95	1.91e-04	1.39e-04	1.0[illegible]e-05	13	1.37	Agreement
Np-239	1.22e-02	1.25e-02	4.8[illegible]e-04	26	0.97	Agreement
Sr-91	3.48e-03	3.50e-03	1.31e-04	27	0.99	Agreement
Sr-92	1.01e-02	1.00e-02	3.38e-04	30	1.01	Agreement
Tc-99m	9.30e-03	8.71e-03	3.06e-04	28	1.07	Agreement
Zn-65	1.08e-03	1.00e-03	5.25e-05	19	1.08	Agreement

Attachment 1

Liquid Radwaste

Detector #1

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cs-134	8.20e-07	7.68e-07	6.83e-08	11	1.07	Agreement
Cs-137	1.10e-06	1.06e-06	8.81e-08	12	1.04	Agreement
I-131	3.91e-07	4.82e-07	6.07e-08	8	0.81	Agreement
I-133	1.32e-06	1.21e-06	1.08e-07	11	1.09	Agreement
Na-24	2.73e-06	2.54e-06	1.81e-07	14	1.07	Agreement
Np-239	6.57e-05	7.25e-05	2.70e-06	27	0.91	Agreement

Detector #2

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cs-134	8.88e-07	7.68e-07	6.83e-08	11	1.16	Agreement
Cs-137	9.83e-07	1.06e-06	8.81e-08	12	0.93	Agreement
I-131	3.46e-07	4.82e-07	6.07e-08	8	0.72	Agreement
I-133	1.18e-06	1.21e-06	1.08e-07	11	0.97	Agreement
Na-24	2.61e-06	2.54e-06	1.81e-07	14	1.03	Agreement
Np-239	6.62e-05	7.25e-05	2.70e-06	27	0.91	Agreement

Detector #3

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cs-134	8.25e-07	7.68e-07	6.83e-08	11	1.07	Agreement
Cs-137	9.63e-07	1.06e-06	8.81e-08	12	0.91	Agreement
I-131	3.48e-07	4.82e-07	6.07e-08	8	0.72	Agreement
I-133	1.32e-06	1.21e-06	1.08e-07	11	1.09	Agreement
Na-24	2.52e-06	2.54e-06	1.81e-07	14	0.99	Agreement
Np-239	6.61e-05	7.25e-05	2.70e-06	27	0.91	Agreement

Attachment 1

Post Treatment Off-Gas

Detector #1

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ar-41	4.22e-07	2.82e-07	5.25e-08	5	1.50	Agreement
Xe-131m	1.97e-05	1.71e-05	1.69e-06	10	1.15	Agreement
Xe-133	6.23e-05	7.42e-05	2.15e-06	35	0.84	Agreement

Detector #2

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ar-41	2.88e-07	2.82e-07	5.25e-08	5	1.02	Agreement
Xe-131m	2.09e-05	1.71e-05	1.69e-06	10	1.22	Agreement
Xe-133	6.28e-05	7.42e-05	2.15e-06	35	0.85	Agreement

Detector #3

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ar-41	3.49e-07	2.82e-07	5.25e-08	5	1.24	Agreement
Xe-131m	2.12e-05	1.71e-05	1.69e-06	10	1.24	Agreement
Xe-133	6.72e-05	7.42e-05	2.15e-06	35	0.91	Agreement

Attachment 1

Charcoal Cartridge, NRC spike

Detector #1

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cd-109	4.04e-01	4.52e-01	1.26e-02	36	0.89	Agreement
Ce-139	3.07e-03	2.84e-03	1.14e-04	25	1.08	Agreement
Co-57	6.71e-03	6.70e-03	2.17e-04	31	1.00	Agreement
Co-60	4.62e-02	4.64e-02	1.56e-03	30	1.00	Agreement
Cs-137	4.98e-02	4.72e-02	2.06e-03	23	1.06	Agreement
Sn-113	4.17e-03	4.09e-03	2.85e-04	14	1.02	Agreement

Detector #2

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cd-109	3.87e-01	4.52e-01	1.26e-02	36	0.86	Agreement
Ce-139	3.04e-03	2.84e-03	1.14e-04	25	1.07	Agreement
Co-57	6.64e-03	6.70e-03	2.17e-04	31	0.99	Agreement
Co-60	4.64e-02	4.64e-02	1.56e-03	30	1.00	Agreement
Cs-137	4.91e-02	4.72e-02	2.06e-03	23	1.04	Agreement
Sn-113	3.99e-03	4.09e-03	2.85e-04	14	0.97	Agreement

Detector #3

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Cd-109	4.10e-01	4.52e-01	1.26e-02	36	0.91	Agreement
Ce-139	3.18e-03	2.84e-03	1.14e-04	25	1.12	Agreement
Co-57	6.89e-03	6.70e-03	2.17e-04	31	1.03	Agreement
Co-60	4.77e-02	4.64e-02	1.56e-03	30	1.03	Agreement
Cs-137	5.03e-02	4.72e-02	2.06e-03	23	1.07	Agreement
Sn-113	4.32e-03	4.09e-03	2.85e-04	14	1.06	Agreement

Attachment 1

Particulate Filter

Detector #1

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Ba-140	1.49e-04	1.44e-04	7.41e-06	19	1.04	Agreement
Ce-141	3.93e-05	3.60e-05	1.92e-06	19	1.09	Agreement
Ce-144	6.07e-05	6.76e-05	6.47e-06	10	0.90	Agreement
Co-58	7.37e-05	6.57e-05	2.51e-06	26	1.12	Agreement
Co-60	5.74e-04	5.07e-04	1.63e-05	31	1.13	Agreement
Cr-51	3.95e-03	3.73e-03	4.68e-04	8	1.06	Agreement
Fe-59	6.79e-05	6.13e-05	3.01e-06	20	1.11	Agreement
I-131	2.26e-05	2.09e-05	1.64e-06	13	1.08	Agreement
I-133	1.82e-04	1.68e-04	8.38e-06	20	1.08	Agreement
La-140	2.11e-04	1.74e-04	6.38e-06	27	1.21	Agreement
Mn-54	6.34e-05	5.87e-05	2.43e-06	24	1.08	Agreement
Nb-95	5.06e-05	4.35e-05	1.76e-06	25	1.16	Agreement
Np-239	1.78e-03	1.68e-03	6.87e-05	24	1.06	Agreement
Ru-103	1.42e-05	1.26e-05	8.10e-07	16	1.12	Agreement
Sr-91	2.25e-04	1.81e-04	2.09e-05	9	1.24	Agreement
Tc-99m	1.96e-03	1.81e-03	6.59e-05	27	1.08	Agreement
Zn-65	1.29e-03	1.18e-03	3.64e-05	32	1.09	Agreement
Zr-95	4.91e-05	3.30e-05	2.43e-06	14	1.49	Agreement

Detector #2

Nuclide	Licensee Value	NRC Value	NRC Error	Reso-lution	Ratio	Comparison
Ba-140	1.46e-04	1.44e-04	7.41e-06	19	1.02	Agreement
Ce-141	4.12e-05	3.60e-05	1.92e-06	19	1.14	Agreement
Ce-144	6.75e-05	6.76e-05	6.47e-06	10	1.00	Agreement
Co-58	7.35e-05	6.57e-05	2.51e-06	26	1.12	Agreement
Co-60	5.75e-04	5.07e-04	1.63e-05	31	1.13	Agreement
Cr-51	3.94e-03	3.73e-03	4.68e-04	8	1.06	Agreement
Fe-59	6.72e-05	6.13e-05	3.01e-06	20	1.10	Agreement
I-131	2.22e-05	2.09e-05	1.64e-06	13	1.06	Agreement
I-133	1.79e-04	1.68e-04	8.38e-06	20	1.07	Agreement
La-140	2.03e-04	1.74e-04	6.38e-06	27	1.17	Agreement
Mn-54	6.20e-05	5.87e-05	2.43e-06	24	1.06	Agreement
Nb-95	5.49e-05	4.35e-05	1.76e-06	25	1.26	Agreement
Np-239	1.79e-03	1.68e-03	6.87e-05	24	1.06	Agreement
Ru-103	1.63e-05	1.26e-05	8.10e-07	16	1.29	Agreement
Sr-91	2.72e-04	1.81e-04	2.09e-05	9	1.50	Agreement
Tc-99m	1.78e-03	1.81e-03	6.59e-05	27	0.98	Agreement
Zn-65	1.30e-03	1.18e-03	3.64e-05	32	1.10	Agreement
Zr-95	4.75e-05	3.30e-05	2.43e-06	14	1.44	Agreement

Attachment 1

Particulate Filter

Detector #3

Nuclide	Licensee Value	NRC Value	NRC Error	Resolution	Ratio	Comparison
Ba-140	1.56e-04	1.44e-04	7.41e-06	19	1.09	Agreement
Ce-141	4.19e-05	3.60e-05	1.92e-06	19	1.16	Agreement
Ce-144	6.93e-05	6.76e-05	6.47e-06	10	1.03	Agreement
Co-58	7.09e-05	6.57e-05	2.51e-06	26	1.08	Agreement
Co-60	5.82e-04	5.07e-04	1.63e-05	31	1.15	Agreement
Cr-51	3.91e-03	3.73e-03	4.68e-04	8	1.05	Agreement
Fe-59	6.80e-05	6.13e-05	3.01e-06	20	1.11	Agreement
I-131	2.30e-05	2.09e-05	1.64e-06	13	1.10	Agreement
I-133	1.72e-04	1.68e-04	8.38e-06	20	1.03	Agreement
La-140	2.11e-04	1.74e-04	6.38e-06	27	1.21	Agreement
Mn-54	6.59e-05	5.87e-05	2.43e-06	24	1.12	Agreement
Nb-95	4.79e-05	4.35e-05	1.76e-06	25	1.10	Agreement
Np-239	1.80e-03	1.68e-03	6.87e-05	24	1.07	Agreement
Ru-103	1.39e-05	1.26e-05	8.10e-07	16	1.10	Agreement
Sr-91	2.01e-04	1.81e-04	2.09e-05	9	1.11	Agreement
Tc-99m	1.92e-03	1.81e-03	6.59e-05	27	1.06	Agreement
Zn-65	1.30e-03	1.18e-03	3.64e-05	32	1.10	Agreement
Zr-95	4.34e-05	3.30e-05	2.43e-06	14	1.31	Agreement

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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 = $\frac{\text{NRC Reference Value}}{\text{Associated Uncertainty}}$