



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

AUG 04 1992

Report No: 50-416/92-17

Licensee: Entergy Operations, Inc.  
 Jackson, MS 39205

Docket No.: 50-416

License No.: NPF-29

Facility Name: Grand Gulf

Inspection Conducted: June 22-26 and July 15, 1992

Inspector: <u>Thomas R Decker for</u>	<u>7/29/92</u>
N. G. McNeill	Date Signed
<u>Thomas R Decker for</u>	<u>7/29/92</u>
W. B. Gloersen	Date Signed

Accompanying Personnel: T. Volk

Approved by: <u>Thomas R Decker</u>	<u>7/29/92</u>
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 audits; semi-annual radiological effluent reports; annual environmental monitoring reports; offsite dose commitments; solid radioactive waste, shipping, and transportation; confirmatory measurements with the Region II Mobile Laboratory; and the status of previously identified inspection findings.

Results:

During the Semi-annual Radiological Effluent Report period for July 1 through December 31, 1991 there was no airborne or liquid radiological effluent instrumentation inoperable for periods greater than 30 days. The licensee's program to control and quantify radioactive effluents was effective. There were no unplanned radioactive releases that required reporting to the NRC during 1991 or the first half of 1992. Quantities of radioactive

material released in both liquid and gaseous effluents were consistent with the amount released during previous years. Calculated radiation doses to offsite receptors due to liquid and gaseous effluent releases for 1991 were well below the regulatory limits specified in the Technical specifications and 40 CFR 190.

The licensee's audits and activities in the areas of effluent and radioactive materials control were technically sound, thorough, detailed and well documented. The licensee's program for processing, packaging, storing and shipping radioactive solid wastes was effective.

The confirmatory measurement results for gamma and beta emitters were reviewed, and, in general, the licensee results were in agreement with the NRC results 100 percent of the time (Paragraph 8). Five geometries were used, 37 nuclides were analyzed, and 111 measurements were compared. The licensee demonstrated adequate capability to quantify radionuclide concentrations in the various matrices normally encountered in nuclear power plant operations.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*J. Armstrong, Engineering Technician
- J. Barlow, Supervisor, Environmental Sciences
- \*D. Bost, Principal Civil Engineer
- \*W. Cottle, Vice President, Operations
- D. Coulter, Radiation Control Supervisor
- \*C. Ellsaesser, Operations Superintendent
- \*D. Dietrich, Director, Quality
- \*C. Dugger, Manager, Operations
- W. Garner, Audit Supervisor, Quality Programs
- C. Hutchinson, General Manager
- S. Johnson, Radwaste Specialist
- \*J. Lasseter, Chemistry Supervisor
- \*M. Meisner, Director, Nuclear Safety and Regulatory Affairs
- M. Michaliski, Radwaste Supervisor
- \*J. Roberts, Manager, Maintenance
- P. Robinson, Radwaste/Health Physics (HP)
- \*R. Ruffi, Acting Superintendent, Plant Licensing
- P. Stokes, Radwaste/HP
- \*T. Tankersley, Radiation Control Superintendent
- \*R. Tolbert, Chemistry Specialist
- \*T. Williamson, Chemistry Superintendent
- S. Wilson, Radiochemist

#### Nuclear Regulatory Commission

- \*C. Hughey, Resident Inspector
  - \*J. Matzke, Senior Resident Inspector
- \*Attended exit meeting on June 26, 1992

### 2. Licensee Action on Previous Inspection Findings (92701)

(Closed) Inspector Followup Item (IFI) 50-416/91-19-02: Resolution of the differing calibration requirements for the gaseous effluent monitors as documented in the technical specifications and Final Safety Analysis Report (FSAR).

Inspection Report No. 50-416/91-19 identified FSAR Section 11.5.2.3.2 as being inconsistent with Technical Specification 4.3.7.12, Table 4.3.7.12-1, Footnote 3. In addition, after checking vendor references, the licensee determined that the stated requirement for 15% calibration accuracy, in Sentence 1 of FSAR 11.5.2.3.2, conflicted with applicable vendor data on the installed monitors. No basis for the 15% calibration accuracy could be accounted for through licensee investigations and reference review, including the Standard Review Plan and applicable ANSI Standards. The only correlation that can be derived for the

origins of the 15 percent calibration accuracy appears to be a misapplication and misinterpretation of the logarithmic scale accuracy (Equivalent Linear Full Scale (ELFS) Tolerance) which is 15 percent for the original log chart recorders and 32 percent for the Log Count Rate Meters (LCRMs). Since the actual calibration tolerance varies between the different vendor's equipment installed at the licensee's facility, the licensee deleted this reference in the FSAR. In addition, the change to FSAR Section 11.5.2.3.2 rewords this section to read approximately the same as footnote 3 to Table 4.3.7.12-1 of the Technical Specifications. FSAR Section 11.5.2.3.2 is being changed to the following wording:

The continuous radiation monitor's initial calibration is performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NIST. These standards are to permit calibrating the system over its intended measurement range. For subsequent calibrations, sources that have been related to the initial calibration are to be used. Each continuous monitor is calibrated at times required by the Technical Specifications.

This item is considered closed.

### 3. Audits (84750)

Technical Specification (TS) 6.5.2.8 requires that audits of unit activities be performed under the cognizance of the Safety Review Committee (SRC) in the following areas:

(1) the radiological environmental monitoring program and the results thereof at least once per 12 months; (2) the OFFSITE DOSE CALCULATION MANUAL and implementing procedures at least once per 24 months; (3) the PROCESS CONTROL PROGRAM and implementing procedures for SOLIDIFICATION of wet radioactive wastes at least once per 24 months; and (4) the performance of activities required by the Quality Assurance Program to meet the criteria of Regulatory Guide 4.15, February 1979 at least once per 12 months.

The inspector reviewed the following audit reports:

- ° QSA-91/0034, Low-Level Radioactive Waste and NRC Approved and Shipping and Radioactive Laundry Processing, Handling, Packaging, and Shipping Program, November 1, 1991

- QSA-91/0039, Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs- Effluent Streams and the Environment and the Offsite Dose Calculation Manual, November 6, 1991

The above audits assessed the adequacy and effectiveness of the quality assurance program for radiological effluent monitoring and shipping and transportation of radioactive materials and radwaste. The audits covered the applicable areas specified in TS 6.5.2.8. In general, the audits were thorough, detailed, and well documented. The audits identified some program weaknesses and licensee management made adequate commitments to correct the few deficiencies identified.

No violations or deviations were identified.

#### 4. Dose Commitments (84750)

Grand Gulf Nuclear Station ODCM, Sections 1.2 and 2.2, specifies the method to calculate the annual and quarterly dose calculations for liquid and gaseous effluents, respectively.

The inspector reviewed the quarterly and yearly dose commitments to a member of the public from radioactive materials in gaseous and liquid effluents released during 1991. The dose commitments for 1991 were summarized in the July through December 1991 Semiannual Radioactive Effluent Release Report. The inspector did review the licensee's methodologies for calculating the various individual doses and observed no apparent problems. For the monthly gaseous effluent dose calculations, the licensee uses the worst case, historical meteorological data for operational control purposes. The quarterly dose calculations due to gaseous effluents were based on actual meteorological conditions, real pathways, and receptor locations which were identified in the last land use survey. The following table summarizes the cumulative doses from effluents for calendar year 1991:

Cumulative Doses from Effluents - Calendar Year 1991  
Grand Gulf Nuclear Station

<u>Dose Pathway</u>	<u>Dose</u>	<u>Annual Limit</u>	<u>Percent of Annual Limit</u>
Airborne-Gamma Air Dose	2.1E-02 mrad	20 mrad	< 1 %
Airborne-Beta Air Dose	1.5E-02 mrad	40 mrad	< 1 %
Airborne-Skin Dose	6.2E-01 mrem	30 mrem	2.1 %
Liquid-Total Body Dose	7.6E-02 mrem	6 mrem	1.3 %

Liquid-Max Organ Dose	4.6E-01 mrem	20 mrem	2.3 %
Total Dose-Thyroid	9.8E-01 mrem	75 mrem	1.3 %
Total Dose-Total Body Organ other than Thyroid	3.5E-01 mrem	25 mrem	1.4 %
Direct Radiation (TLD)	2.3E+00 mrem		

As can be seen from the data presented above, the annual dose contributions to the maximum exposed individual from the radionuclides in liquid and gaseous effluent released to unrestricted areas were well below the limits specified in the ODCM and Technical Specifications. These data support the conclusion that the licensee's effluent releases were as low as reasonably achievable (ALARA) and that the radwaste systems were both fully utilized and/or operating within the design criteria. The direct radiation dose was calculated by subtracting the average doses measured by thermoluminescent dosimeter (TLD) badges located at control locations from average doses measured by TLD badges located near the site boundary.

No violations or deviations were identified.

#### 5. Radiological Effluents (84750)

Technical Specification 6.9.1.8 states the requirements for the Semiannual Radiological Effluent Report including timeliness, content, and format.

The inspector reviewed the reports issued for the first and second halves of calendar year 1991 to determine compliance and reviewed data from previous reports to evaluate trends in liquid and gaseous releases. The effluent information presented in the following table was obtained from current and previous effluent reports:

#### EFFLUENT RELEASE SUMMARY FOR GRAND GULF NUCLEAR STATION

Activity Released (curies)	1989	1990	1991
Gaseous Effluents:			
Fission and Activation Products	1.44E+2	1.36E+2	3.17E+1
Iodines and Particulates	1.48E-3	2.52E-3	1.09E-2
Tritium	3.34E+0	3.32E+0	5.57E+0

## Liquid Effluents:

Fission and Activation Products	3.20E-1	6.45E-1	8.77E-1
Tritium	1.32E+1	1.88E+1	2.16E+1
Inoperable Effluent Monitoring Instruments for greater than 30 days	0	0	0
Unplanned Releases			
Liquid	0	1	0
Gaseous	0	0	0

The licensee's program to control and quantify radioactive effluents was effective. The quantities of radioactive material released due to plant operations in 1991 resulted in negligible calculated offsite doses (see Paragraph 4). There were no unplanned radioactive releases that required reporting to the NRC in 1991 or through June 30, 1992 (per telephone call from licensee on July 15, 1992). The licensee's effluent monitoring system was effectively maintained and operated in that there were no effluent monitoring instruments inoperable for greater than 30 days in 1991 or through June 30, 1992 (per telephone call from licensee on July 15, 1992).

No violations or deviations were identified.

## 6. Environmental Monitoring (84750)

Technical Specifications 6.9.1.6 and 6.9.1.7 states the requirements for timeliness, format, and content of the Annual Radiological Environmental Operating Report.

The inspector reviewed the Annual Radiological Environmental Operating Report for 1991, dated April 16, 1992. In general, the environmental monitoring and sampling results for direct radiation monitoring, atmospheric monitoring and sampling, terrestrial monitoring and sampling, and aquatic monitoring and sampling were consistent with previous reported levels. In addition, the inspector reviewed the State of Mississippi Report to the Nuclear Regulatory Commission: Environmental Monitoring at Grand Gulf Nuclear Station Calendar Year 1991 NRC Contract Number NRC-29-83-621. The inspector reviewed the reports noted above to attempt to make a comparison between the licensee and the Mississippi State Department of Health (MSDH) environmental sampling data. In the MSDH report noted above, the sample

media in the table below were compared. The following table identifies the sample type, sample collector (licensee or MSDH), and sample location:

<u>Sample Type</u>	<u>Sample Collector</u>	<u>Sample Location</u>
1. Air Sampling Station (indicator)	Licensee MSDH	Training Center (.3 mi S GGNS) Arnold Acres (.4 mi S GGNS)
2. Air Sampling Station (control)	Licensee MSDH	Vicksburg (18 mi N GGNS) Jackson (51 mi ENE GGNS)
3. Mississippi River Water Samples	Licensee/MSDH	Upstream split (2 mi NNW GGNS) Downstream split (2 mi WSW GGNS)
4. Mississippi River Sediment	Licensee MSDH	Upper G. Gulf Landing (2 mi NNW GGNS) Hamilton Lake (2 mi WSW GGNS) Upstream (2 mi NNW GGNS) Downstream (2 mi WSW GGNS)
5. Milk	Licensee/MSDH	Alcorn Dairy split (11 mi SW GGNS)
6. Edible fish	Licensee/MSDH	Upstream (2 mi NNW GGNS)
7. Venison	Licensee/MSDH	Bucksnort Hunting Club
8. Vegetation	Licensee/MSDH	Sectors R, K, J

Data from the licensee's environmental sampling program (ESP) was compared to both federal and state monitoring programs. The federal monitoring program used for the comparison was the USNRC TLD Direct Radiation Monitoring Network. The latest available results from the NRC TLD Network have been comparable to the licensee's collocated stations. These results covered 33 TLD locations, 16 of which were collocated. On the average, collocated TLDs have produced similar results. Prior to 1991, no change in collocated TLD results have been attributed to GGNS operation. Radiation monitoring by MSDH entailed similar

sampling requirements as the licensee's ESP. In many cases air samples and TLDs were collocated, while sample media such as vegetation, water, sediment, fish, and milk were either shared or split. Through 1991, licensee and MSDH results were within similar ranges. The only common location where radioactivity attributable to GGNS has been detected was the GGNS barge slip. Barge slip sediment results were above background due to GGNS effluents.

In summary, both the licensee's and MSDH results were near or below the lower limit of detection (LLD) specified for the various sampling media with the exception of the GGNS barge slip sediment. 1991 barge slip sediment samples indicated the presence of radionuclides which were not present or detected prior to 1985, and their presence may be attributed to a buildup of very small amount of particulates. Although the radionuclide concentrations in the barge slip sediment appear to be stabilizing, no definite correlation between radionuclide concentrations and plant operating levels, effluent releases, or river elevation has been found by the licensee.

From a review of the licensee's environmental report, the inspector concluded that the plant had negligible impact upon the surrounding environment and any activity which may have been present as a result of plant operations did not represent a significant contribution to the exposure of members of the public. In addition, the environmental report fulfilled the RETS requirements.

No violations or deviations were identified.

7. Solid Radioactive Waste Management (26750)

10 CFR 20.311 requires a licensee who transfers radioactive waste to a land disposal facility to prepare all waste so that the waste is classified in accordance with 10 CFR 61.55 and meets the waste characteristic requirements of 10 CFR 61.56. It further establishes specific requirements for conducting a quality control program and for maintaining a manifest tracking system for all shipments.

The inspector reviewed the licensee's solid radioactive waste management program for wastes generated from Grand Gulf Nuclear Station operations. The review included the following: adequacy of implementing procedures to properly classify and characterize waste, to prepare the manifest, and mark packages; overall performance of the process control and quality assurance programs; and the adequacy of required records, reports, and notifications. In addition, the inspector reviewed the methods used by the licensee to assure that the waste was properly classified, met the waste

form and characteristic requirements of 10 CFR 61 and met the disposal site license conditions. In general, the licensee's procedures provided sufficient detail and guidance to allow technicians to properly package and verify radioactive waste package contents, classify the waste, and prepare the waste manifest.

The inspector also discussed with licensee representatives the onsite storage of various forms of radioactive wastes. During tours of the facility and discussions with the licensee, the inspector noted the following types of waste forms stored onsite: (1) one drum of freon contaminated waste; (2) two drums of mineral spirits; (3) contaminated oils; (4) borated water; (5) EHC fluid; (6) 14 liners in the resin storage area- controlled as a locked high radiation area; and (7) one Sea-Land container and four B-25 boxes full of dry active waste (DAW). The inspector noted that the Sea-Land container did not include an accurate description of the contents on the radioactive materials label. The label merely stated "Sea-Land." Following the inspector's discussions with the licensee, the problem was corrected.

No violations or deviations were identified.

8. Shipping of Low-Level Wastes for Disposal, and Transportation (86750)

10 CFR 20.311 (b) requires each shipment of radioactive waste to a land disposal facility to be accompanied by a shipment manifest that indicates as completely as practicable; a physical description of the waste; the volume; the radionuclide identity and quantity; the total radioactivity; and the principal chemical form.

10 CFR 71.5 requires that licensees who transport licensed material outside the confines of its plant or other place of use, or who delivered licensed material to a carrier for transport, shall comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation (DOT) in 49 CFR Parts 170 through 180.

49 CFR 172.203 (d) (i) requires, in part, that a shipping paper contain a 24-hour emergency number, as prescribed in subpart G of Part 172 of this subchapter.

The inspectors reviewed selected records of radioactive waste and radioactive materials shipments performed from November 1991 to June 1992. The shipping manifests examined were consistent with the DOT requirements. The radiation and contamination survey results were within the limits

specified for the mode of transport and shipment classification and the shipping documents were being completed and maintained as required.

In addition, the inspector verified that for NRC-certified packagings used by the licensee, the Certificate of Compliance (COC) for the Chem-Nuclear Systems, Inc. (CNS) Type B shipping cask was maintained and up-to-date. The inspector reviewed the procedures, license, and safety analysis report for the Chem-Nuclear Systems, Inc. Type B package and identified no apparent problems.

The inspector also reviewed nine waste shipment manifests during the time period noted above to determine compliance with the 24-hour emergency telephone requirements specified in 49 CFR 172.203(d). The inspector noted that the 24-hour emergency response telephone number was correctly and clearly specified on the Bill of Lading; however, the 24-hour emergency response telephone number was incorrectly specified on the waste manifest cover sheet and on the emergency response information sheet. The inspector discussed this administrative error with the licensee and the licensee immediately corrected the radioactive materials shipment manifest and waste manifest generating software to include the correct 24-hour emergency response telephone number. The inspector reviewed procedure 10-S-01-32, Radioactive Material Transportation Accident Plan, Revision 0, September 14, 1990. This procedure provided the notification requirements in the event of a transportation accident involving the shipment of radioactive materials. The Shift Superintendent (SS) was responsible for receiving an incoming phone call, obtaining the required information, and performing the notification to the on-call manager. The on-call manager was responsible for notifying the on-call Radiation Protection Manager (RPM) and the on-call Offsite Emergency Coordinator (OEC). The on-call RPM was responsible for providing technical HP assistance for transportation accidents to the on-call OEC and the on-call Information Specialist.

No violations or deviations were identified.

9. Turbine Building Roof Hatches (84750)

During tours of the facility, the inspector noted several turbine building roof hatches in the opened position. These automatic roof hatches were located above the operating deck and were designed to provide additional smoke ventilation in the event of a turbine building fire. The inspector had determined that the roof hatches were manually opened on June 11, 1992 to vent out hydrogen that had accumulated due to leaks from various components. The inspector inquired as

to why the roof hatches were still opened during the week of June 22, 1992 even though the hydrogen leak had been terminated. During the exit meeting, the licensee indicated that the turbine building roof hatches had been left open due to an administrative oversight. The NRC resident inspector indicated that an operational review of this issue would be performed to determine if there is any regulatory significance.

Aside from the operational aspects of unintentionally leaving the turbine building roof hatches open, the inspector had an additional concern regarding the potential for an unidentified, unmonitored release pathway for noble gases and iodines. The inspector had discussed this concern with licensee representatives on June 25, 1992. Licensee representatives had acknowledged that the open turbine building roof hatches represented a potentially unmonitored release pathway. The licensee informed the inspector that similar unmonitored release pathways from the turbine building had been addressed in the Final Safety Analysis Report (FSAR). Although the licensee did routinely collect low-volume air samples on the main deck of the turbine building, these samples would not necessarily be representative of any radioactive material exiting the roof hatches. Hence, the relationship between the turbine building roof hatch releases to the radioactive effluent limits of 10 CFR 20 and the facility's Technical Specification and to the environmental dose limits of 40 CFR 190 were technically not evaluated.

The turbine building exhaust air system consists of two full-capacity exhaust air fans in parallel, filter housing (including prefilters, HEPA filters and charcoal adsorbers), isolation dampers, ductwork, and controls. The system exhausts air from the condenser area, turbine building equipment compartments, and the turbine building equipment drain sumps. Air is drawn out through a system of exhaust ductwork to the filter train via one of the exhaust fans. Offsite dose analysis has shown that charcoal and HEPA filters are not necessary for the turbine building exhaust, however, these components have been installed but no credit was taken for their operation. In addition, Section 9.5 of the FSAR acknowledged that inadvertent operation of the turbine building smoke exhaust fans would result in an unmonitored discharge; however, this would be considered a remote possibility, and levels are expected to be low.

In addition, of the four monitored release pathways for gaseous effluents (radwaste, containment, fuel handling, and turbine buildings), the turbine building exhaust represented the largest contribution of noble gases for the first two quarters of 1992. According to Table 11.3-10 of the Grand

Gulf FSAR, the following three potentially unmonitored release points from the turbine building (discharge point is at the side of the building with louvers) were identified: (1) smoke exhaust; (2) battery room exhaust; and (3) lube oil room exhaust.

In summary, the inspector discussed with the licensee the concern with the potentially unmonitored release pathway via the turbine building roof hatches and whether the monitoring of the release pathway via the turbine building roof hatches would have been reasonable under the circumstances to evaluate the extent of the radiation hazards that may be present as required by 10 CFR 20.201 and whether the unplanned, unmonitored release be reported in the Semi-Annual Effluent Release Report. The licensee provided the inspector with applicable sections of the FSAR, gaseous release summaries for the first half of 1992 and turbine building floor low-volume air samples. The inspector indicated at the exit meeting that this issue would be reviewed by the NRC and tracked as an inspector followup item (IFI: 50-416/92-17-01).

10. 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 waste gas were collected and analyzed for radionuclide concentrations by the licensee and the NRC Region II mobile laboratory. The licensee was also provided with a spiked charcoal cartridge and a spiked particulate filter for analysis. Each of the above samples were analyzed by three of the licensee's four detectors. One of the licensee's detectors had just been returned from the manufacturer for repairs and was not as yet ready for analysis. The licensee's 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 comparisons.

The inspector reviewed the procedures listed below and determined that they were adequate for the types of samples collected for this inspection. The inspector also accompanied the licensee during the collection of the

reactor coolant, radwaste liquid (Floor Drain Collector Tank), and waste gas samples and determined that the procedures were followed.

CI # 08-5-04-14 "Sample Preparation"  
 CI # 08-5-04-9 "Obtaining Liquid Samples"  
 CI # 08-5-04-208 "Off Gas Vial Sampling"

Also as a part of the NRC Confirmatory Measurements Program, spiked liquid samples were sent to the Grand Gulf Nuclear Station by the Idaho National Engineering Laboratory (INEL), Radiological and Environmental Science Laboratory (RESL). A resample of the tritium samples was required for the original analysis performed in February 1992. The NRC received the resample analytical results in a letter dated April 16, 1992. The comparison of licensee results to known values are presented in Attachment 2. The acceptance criteria for the comparisons are the same as those for the previous comparisons as presented in Attachment 3 above. The results were in agreement.

Based on the above comparisons as well as the reviews and observations, 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.

#### 11. Exit Meeting

The inspector met with licensee representatives indicated in Paragraph 1 at the conclusion of the inspection on June 26, 1992. The inspector summarized the scope and findings of the inspection. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any proprietary documents or processes during this inspection. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Category, Description, and Reference</u>
50-416/92-15-01	IFI - Evaluation of the turbine building roof hatch unmonitored release pathway with respect to 10 CFR 20.201 requirements and inclusion in the Semi-Annual Effluent Release Report (Paragraph 9).

## ATTACHMENT 1

Grand Gulf  
June 23, 1992

## Pretreatment Gas

Nuclide	Licensee Value	NRC Value	Error	Resolution	Ratio	Comparison
Detector #2						
AR-41	4.24E-03	3.92E-03	+ - 3.40E-04	12	1.08	Agreement
KR-87	1.27E-02	1.00E-02	+ - 7.51E-04	13	1.27	Agreement
KR-88	5.61E-03	4.92E-03	+ - 3.98E-04	12	1.14	Agreement
XE-135	4.32E-03	3.76E-03	+ - 1.65E-04	23	1.15	Agreement
Detector #3						
AR-41	4.60E-03	3.92E-03	+ - 3.40E-04	12	1.17	Agreement
KR-87	1.14E-02	1.00E-02	+ - 7.51E-04	13	1.14	Agreement
KR-88	5.70E-03	4.92E-03	+ - 3.98E-04	12	1.16	Agreement
XE-135	4.49E-03	3.76E-03	+ - 1.65E-04	23	1.19	Agreement
Detector #4						
AR-41	4.16E-03	3.92E-03	+ - 3.40E-04	12	1.06	Agreement
KR-87	1.07E-02	1.00E-02	+ - 7.51E-04	13	1.07	Agreement
KR-88	5.22E-03	4.92E-03	+ - 3.98E-04	12	1.06	Agreement
XE-135	4.29E-03	3.76E-03	+ - 1.65E-04	23	1.14	Agreement

## ATTACHMENT 1

Charcoal Cartridge  
NRC spike (F&J)

Nuclide	Licensee Value	NRC Value	Error	Resolution	Ratio	Comparison
Detector #2						
CD-109	3.29E-01	4.10E-01	+ - 1.18E-02	35	0.80	Agreement
CE-139	2.10E-01	1.82E-03	+ - 9.65E-05	19	1.15	Agreement
CO-57	5.25E-03	5.46E-03	+ - 1.91E-04	29	0.96	Agreement
CO-60	4.42E-02	4.51E-02	+ - 1.57E-03	29	0.98	Agreement
CS-137	4.69E-02	4.79E-02	+ - 2.12E-03	22	0.98	Agreement
SN-113	2.35E-03	2.51E-03	+ - 2.49E-04	10	0.94	Agreement
Y-88	3.06E-03	3.76E-03	+ - 3.72E-04	10	0.81	Agreement
Detector #3						
CD-109	3.17E-01	4.10E-01	+ - 1.18E-02	35	0.77	Agreement
CE-139	2.03E-03	1.82E-03	+ - 9.65E-05	19	1.12	Agreement
CO-57	5.14E-03	5.46E-03	+ - 1.91E-04	29	0.94	Agreement
CO-60	4.32E-02	4.51E-02	+ - 1.57E-03	29	0.96	Agreement
CS-137	4.49E-02	4.79E-02	+ - 2.12E-03	22	0.94	Agreement
SN-113	2.23E-03	2.51E-03	+ - 2.49E-04	10	0.89	Agreement
Y-88	3.07E-03	3.76E-03	+ - 3.72E-04	10	0.82	Agreement
Detector #4						
CD-109	3.19E-01	4.10E-01	+ - 1.18E-02	35	0.78	Agreement
CE-139	2.05E-03	1.82E-03	+ - 9.65E-05	19	1.13	Agreement
CO-57	5.44E-03	5.46E-03	+ - 1.91E-04	29	1.00	Agreement
CO-60	4.55E-02	4.51E-02	+ - 1.57E-03	29	1.01	Agreement
CS-137	4.84E-02	4.79E-02	+ - 2.12E-03	22	1.01	Agreement
SN-113	2.05E-03	2.51E-03	+ - 2.49E-04	10	0.82	Agreement
Y-88	3.10E-03	3.76E-03	+ - 3.72E-04	10	0.82	Agreement

## ATTACHMENT 1

Particulate Filter  
NRC spike

Nuclide	Licensee Value	NRC Value	Error	Resolution	Ratio	Comparison
Detector #2						
CD-109	7.56E-02	9.42E-02	+ - 3.19E-03	30	0.80	Agreement
CE-139	9.93E-04	9.48E-04	+ - 5.47E-05	17	1.05	Agreement
CO-57	2.13E-03	2.36E-03	+ - 9.20E-05	26	0.90	Agreement
CO-60	2.48E-02	2.55E-02	+ - 9.13E-04	28	0.97	Agreement
CS-137	2.31E-02	2.38E-02	+ - 1.07E-03	22	0.97	Agreement
SN-113	2.62E-03	2.52E-03	+ - 1.89E-04	13	1.04	Agreement
SR-85	5.86E-04	4.66E-04	+ - 9.72E-05	5	1.26	Agreement
Y-88	4.53E-03	4.45E-03	+ - 2.45E-04	18	1.02	Agreement
Detector #3						
CD-109	7.76E-02	9.42E-02	+ - 3.19E-03	30	0.82	Agreement
CE-139	1.06E-04	9.48E-04	+ - 5.47E-05	17	1.11	Agreement
CO-57	2.16E-03	2.36E-03	+ - 9.20E-05	26	0.92	Agreement
CO-60	2.41E-02	2.55E-02	+ - 9.13E-04	28	0.94	Agreement
CS-137	2.30E-02	2.38E-02	+ - 1.07E-03	22	0.97	Agreement
SN-113	2.51E-03	2.52E-03	+ - 1.89E-04	13	1.00	Agreement
SR-85	5.86E-04	4.66E-04	+ - 9.72E-05	5	1.26	Agreement
Y-88	4.42E-03	4.45E-03	+ - 2.45E-04	18	0.99	Agreement
Detector #4						
CD-109	7.96E-02	9.42E-02	+ - 3.19E-03	30	0.84	Agreement
CE-139	1.00E-03	9.48E-04	+ - 5.47E-05	17	1.05	Agreement
CO-57	2.08E-03	2.36E-03	+ - 9.20E-05	26	0.88	Agreement
CO-60	2.51E-02	2.55E-02	+ - 9.13E-04	28	0.98	Agreement
CS-137	2.35E-02	2.38E-02	+ - 1.07E-03	22	0.99	Agreement
SN-113	2.55E-03	2.52E-03	+ - 1.89E-04	13	0.99	Agreement
SR-85	5.13E-04	4.66E-04	+ - 9.72E-05	5	1.10	Agreement
Y-88	4.62E-03	4.45E-03	+ - 2.45E-04	18	1.04	Agreement

## ATTACHMENT 1

Floor Drain Collection Tank  
1 liter Marinelli

Nuclide	Licensee Value	NRC Value	Error	Resolution	Ratio	Comparison
Detector #2						
CO-58	1.25E-05	1.48E-05	+- 7.37E-07	20	0.84	Agreement
CO-60	1.62E-04	1.83E-04	+- 5.93E-06	31	0.89	Agreement
CR-51	3.58E-05	4.57E-05	+- 6.25E-06	7	0.78	Agreement
CS-134	2.69E-06	3.25E-06	+- 4.75E-07	7	0.83	Agreement
CS-137	2.86E-06	3.40E-06	+- 4.34E-07	8	0.84	Agreement
FE-59	2.37E-05	2.95E-05	+- 1.57E-06	19	0.80	Agreement
MN-54	2.05E-04	2.39E-04	+- 7.60E-06	31	0.86	Agreement
NA-24	2.72E-06	2.85E-06	+- 2.80E-07	10	0.95	Agreement
Detector #3						
CO-58	1.21E-05	1.48E-05	+- 7.37E-07	20	0.82	Agreement
CO-60	1.62E-04	1.83E-04	+- 5.93E-06	31	0.89	Agreement
CR-51	3.84E-05	4.57E-05	+- 6.25E-06	7	0.84	Agreement
CS-134	3.04E-06	3.25E-06	+- 4.75E-07	7	0.94	Agreement
CS-137	3.07E-06	3.40E-06	+- 4.34E-07	8	0.90	Agreement
FE-59	2.47E-05	2.95E-05	+- 1.57E-06	19	0.84	Agreement
MN-54	2.12E-04	2.39E-04	+- 7.60E-06	31	0.89	Agreement
NA-24	2.68E-06	2.85E-06	+- 2.80E-07	10	0.94	Agreement
Detector #4						
CO-58	1.30E-05	1.48E-05	+- 7.37E-07	20	0.88	Agreement
CO-60	1.75E-04	1.83E-04	+- 5.93E-06	31	0.96	Agreement
CR-51	3.99E-05	4.57E-05	+- 6.25E-06	7	0.87	Agreement
CS-134	3.23E-06	3.25E-06	+- 4.75E-07	7	0.99	Agreement
CS-137	2.80E-06	3.40E-06	+- 4.34E-07	8	0.82	Agreement
FE-59	2.65E-05	2.95E-05	+- 1.57E-06	19	0.90	Agreement
MN-54	2.27E-04	2.39E-04	+- 7.60E-06	31	0.95	Agreement
NA-24	2.67E-06	2.85E-06	+- 2.80E-07	10	0.94	Agreement

ATTACHMENT 2

CONFIRMATORY MEASUREMENT COMPARISONS FOR  
GRAND GULF NUCLEAR STATION

Isotope	NRC (uCi/ml)	Licensee (uCi/ml)	Resolution	Ratio (Licensee/ NRC)	Comparison
H-3	1.05 ± 0.53E-4	1.07E-4	20	1.02	Agreement

### ATTACHMENT 3

#### 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" <sup>1</sup> 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" <sup>2</sup>.

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

<u>Resolution</u>	<u>Comparison Ratio Limits for 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

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

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