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April 17, 2003

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station (GGNS) 2002 Annual Radiological
Environmental Operating Report (AREOR)
Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29

GNRO-2003/00013

Gentlemen:

In accordance with the Grand Gulf Nuclear Station Unit 1 Technical Specification 5.6.2, attached is the Annual Radiological Environmental Operating Report for the period January 1, 2002 through December 31, 2002.

If you have questions or require additional information concerning these reports, please contact Mr. B. D. Bryant at (601) 437-6316, or this office at (601) 437-6685.

This letter does not contain any commitments.

Yours truly,

A handwritten signature in black ink, appearing to be "CAB", with a long horizontal stroke extending to the right.

CAB/MJL
attachment:
cc:

2002 Annual Radiological Environmental Operating Report
(See Next Page)

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**ENTERGY OPERATIONS, INC.
GRAND GULF NUCLEAR STATION**

**ANNUAL
RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT**


January 1, 2002-December 31, 2002

, 4-14-03

Prepared By

, 4-14-03

Reviewed By

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TABLE OF CONTENTS

SUMMARY	6
1.0 INTRODUCTION	10
1.1 Radiological Environmental Monitoring Program	10
1.2 Pathways Monitored	10
1.3 Land Use Census	10
2.0 INTERPRETATION AND TRENDS OF RESULTS	23
2.1 Air Particulate and Radioiodine Sample Results	23
2.2 Thermoluminescent Dosimetry (TLD) Sample Results	23
2.3 Water Sample Results	25
2.4 Sediment Sample Results	25
2.5 Milk Sample Results	26
2.6 Fish Sample Results	26
2.7 Food Product Sample Results	26
2.8 Interlaboratory Comparison Results	26
3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY	27
3.1 Program Results Summary	28

LIST OF TABLES

TABLE 1.1	RADIOLOGICAL ENVIRONMENTAL SAMPLING PROGRAM	12
TABLE 3.1	RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY	28

LIST OF FIGURES

FIGURE 1-1	EXPOSURE PATHWAYS	20
FIGURE 1-2	SAMPLE COLLECTION SITES – NEAR FIELD	21
FIGURE 1-3	SAMPLE COLLECTION SITES – FAR FIELD	22
FIGURE 2-1	TLD READINGS	24

LIST OF ATTACHMENTS

ACHMENT 1	RADIOLOGICAL MONITORING REPORT SUMMARY OF MONITORING RESULTS	33
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Summary

The Annual Radiological Environmental Operating Report presents data obtained through analyses of environmental samples collected for Grand Gulf Nuclear Station's (GGNS) Radiological Environmental Monitoring Program (REMP) for the period January 1, 2002 through December 31, 2002. This report fulfills the requirements of GGNS Technical Specification 5.6.2.

To supplement the REMP, GGNS personnel collected duplicate surface water, ground water, vegetation, sediment and fish samples during the reporting period. Special samples collected during the reporting period included vegetation and venison. GGNS did not detect any plant-related radionuclides in these samples.

Radiological Environmental Monitoring Program

GGNS established the REMP in 1978 prior to the station becoming operational (1985) to provide data on background radiation and radioactivity normally present in the area. GGNS has continued to monitor the environment by sampling air, water, sediment, fish and food products, as well as measuring radiation directly. GGNS also samples milk if commercial milk production is occurring within five miles of the plant.

The REMP includes sampling indicator and control locations within an 18-mile radius of the plant. The REMP utilizes indicator locations near the site to show any increases or buildup of radioactivity that might occur due to station operation, and control locations farther away from the site to indicate the presence of only naturally occurring radioactivity. GGNS personnel compare indicator results with control and preoperational results to assess any impact GGNS operation might have had on the surrounding environment.

In the current year, GGNS personnel collected environmental samples for radiological analysis. They compared results of indicator locations with control locations and previous studies, and concluded that overall no significant relationship exists between GGNS operation and effect on the plant environs. Their review of current year data, in many cases, showed undetectable radiation levels in the environment and near background level in significant pathways associated with GGNS.

Harmful Effects or Irreversible Damage

The REMP monitoring did not detect any harmful effects or evidence of irreversible damage in the current year. Therefore, no analysis or planned course of action to alleviate problems was necessary.

Reporting Levels

GGNS' review indicates that no samples equaled or exceeded reporting levels for radioactivity concentration in environmental samples, as outlined in ODCM Specifications Table 6.12.1-2 when averaged over any calendar quarter, due to GGNS effluents. Therefore, results did not trigger any Radiological Monitoring Program Special Reports.

Radioactivity Not Attributable to GGNS

In previous years, the GGNS REMP detected radioactivity attributable to other sources twice. These include the 25th Chinese nuclear test explosion in 1980, and the radioactivity plume release due to reactor core degradation at the Chernobyl Nuclear Power Plant in 1986.

Comparison to Federal and State Programs

GGNS personnel compared REMP data to federal and state monitoring programs as results became available. Historically, the programs used for comparison have included the U.S. Nuclear Regulatory Commission (NRC) TLD Direct Radiation Monitoring Network and the Mississippi State Department of Health (MSDH), Division of Radiological Health.

The NRC TLD Network Program was discontinued in 1998. Historically these results have compared favorably to those from the GGNS REMP. GGNS TLD results remain similar to the historical average and continue to verify that plant operation is not affecting the ambient radiation levels in the environment.

The MSDH and the GGNS REMP entail similar radiological environmental monitoring program requirements. These programs include concurrent air sampling and splitting or sharing sample media such as water, sediment, fish and food products. Both programs have obtained similar results over previous years. The results of MSDH's monitoring program for the reporting period compared favorably with the GGNS REMP and did not indicate elevated levels of radiation or radioactivity build-up attributed to plant operations.

Sample Deviations

◆ Milk

The REMP did not include milk sampling within five miles (8 km) of GGNS in the current year due to unavailability. ODCM Specifications require collection of milk samples if available commercially within 8 km (5 miles) of the plant. GGNS personnel collected vegetation samples to monitor the ingestion pathway, as specified in ODCM Specifications Table 6.12.1-1, because of milk unavailability.

◆ Required Lower Limit of Detection (LLD) Values

All LLDs during this reporting period were within the acceptable limits required by the ODCM specifications.

◆ Air Samples

The following air sample locations had reduced run times due to weather-related outages or mechanical problems. Required detection limits were achieved in all cases. As described in footnote (a) to ODCM Specification Table 6.12.1-1, deviations from the required sampling schedule are permitted due to malfunction of sampling equipment and other legitimate reasons.

Location	Sample period	Run Time (hr)	Problem Description	Comment
AS1-UH	09/17/02 – 09/24/02	166.86	Weather related power outage	Sample period shortened by 1.37 hours.
AS1-UH	12/3/02 – 12/10/02	23.47	Sampler Failure	Sample period shortened by 141.8 hours.
AS1-UH	12/10/02 – 12/17/02	109.38	Sampler Failure	Sample period shortened by 58.6 hours.
AS7-UH	02/5/02 - 02/12/02	167.15	Weather related power outage	Sample period shortened by 0.93 hours.
AS7-UH	04/2/02 - 04/9/02	166.22	Weather related power outage	Sample period shortened by 0.65 hours.
AS7-UH	07/9/02 - 07/16/02	164.85	Weather related power outage	Sample period shortened by 3.5 hours.
AS7-UH	09/3/02 – 09/10/02	165.00	Weather related power outage	Sample period shortened by 1.27 hours.
AS7-UH	09/17/02 – 09/24/02	168.82	Weather related power outage	Sample period shortened by 1.35 hours.

Based on the total sample collection period reduction of 205.97 hours, air samples were collected 99.2 % of the available time.

♦ **TLDs**

TLD station M-55 (Outer Ring, Sector D, 5.0 miles) was displaced from its designated location by unknown causes during the 3rd quarter of 2002. This data was excluded from reporting. Although 3rd quarter exposure at location M-55 is unknown, GGNS' review of third quarter results for similarly located TLDs indicated no abnormal readings.

TLD station M-25 (Inner Ring, Sector N, 1.6 miles) was underwater due to elevated Mississippi River level during 2nd quarter 2002. This data was excluded from reporting. Although 2nd quarter exposure at location M-25 is unknown, GGNS' review of second quarter results for similarly located TLDs indicated no abnormal readings.

TLDs at station M-40 (Outer Ring, Sector M, 2.3 miles) were discovered on the ground at the end of the 1st quarter 2002 monitoring period. This data was excluded from reporting. 1st quarter exposure at location M-40 indicates a slight high bias as would be expected from placement directly on the ground.

♦ **Missed Samples**

There were no missed samples in the reporting period.

♦ **Unavailable Results**

GGNS received analytical results in adequate time for inclusion in this report. In addition, GGNS' review identified no missing results.

Program Modifications

No program modifications occurred during the reporting period.

Attachments

Attachment 1 contains results of TLD, air, water, sediment, fish, food products and special samples collected. TLDs were analyzed by Waterford-3 Dosimetry. All remaining samples were analyzed by River Bend Station's (RBS) Environmental. Attachment 1 also contains RBS' results from participation in the interlaboratory comparison program.

1.0 Introduction

1.1 Radiological Environmental Monitoring Program

GGNS established the REMP to ensure that plant operating controls properly function to minimize any associated radiation endangerment to human health or the environment. The REMP is designed for:

- Analyzing important pathways for anticipated types and quantities of radionuclides released into the environment.
- Considering the possibility of a buildup of long-lived radionuclides in the environment and identifying physical and biological accumulations that may contribute to human exposures.
- Considering the potential radiation exposure to plant and animal life in the environment surrounding GGNS.
- Correlating levels of radiation and radioactivity in the environment with radioactive releases from station operation.

1.2 Pathways Monitored

The airborne, direct radiation, waterborne and ingestion pathways, as seen in Figure 1-1, are monitored as required by GGNS ODCM Table 6.12.1-1. A description of the GGNS REMP utilized to monitor the exposure pathways is provided in Table 1.1 and shown in Figures 1-2 and 1-3. GGNS may supplement this program with additional sampling in order to provide a comprehensive and well-balanced program. Only sample locations required by the ODCM are shown in Figures 1-2 and 1-3.

Section 2.0 of this report provides a discussion of sampling results with Section 3.0 providing a summary of results for the monitored exposure pathways.

1.3 Land Use Census

GGNS personnel conduct a land use census biannually, as required by ODCM Specification 6.12.2. The purpose of this census is to identify changes in uses of land within five miles of GGNS that would require modifications to the REMP or the ODCM. The most recent land use census was conducted in 2001. The next land use census will be conducted in 2003. The most important criteria during this census are to determine location in each sector of the nearest:

- 1) Residence
- 2) Animal milked for human consumption
- 3) Garden of greater than 50 m² (500 ft²) producing broadleaf vegetation.

Land Use Census (cont'd)

When performed, GGNS personnel conduct the land use census by:

- Field surveys in each meteorological sector out to five miles in order to confirm:
 - Nearest permanent residence
 - Nearest unoccupied residence
 - Nearest garden and approximate size
 - Nearest milking animal.
- Identifying locations on maps, measuring distances to GGNS and recording results on surveillance data sheets.
- Comparing current land use census results to previous results.
- Contacting the Claiborne County Agent for verification of nearest dairy animals.

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Airborne	Radioiodine and Particulates 1 sample close to the SITE BOUNDARY having the highest calculated annual average groundlevel D/Q.	AS-7 UH (Sector H, Radius 0.5 Miles) – South-southeast of GGNS at the IBEW Union Hall.	Continuous sampler operation with sample collection per 7 days or as required by dust loading, whichever is more frequent	Radioiodine Cannister – I-131; 7 days Particulate Sampler – Gross beta radioactivity following filter change, composite (by location) for gamma isotopic; 92 days
	Radioiodine and Particulates 1 sample from the vicinity of a community having the highest calculated annual average groundlevel D/Q.	AS-1 PG (Sector G, Radius 5.5 Miles) – Southeast of GGNS at the Port Gibson City Barn.		
	Radioiodine and Particulates 1 sample from a control location 15 - 30 km (10 - 20 miles) distance.	AS-3 61VA (Sector B, Radius 18 Miles) – North-northeast of GGNS on Hwy 61, North of the Vicksburg Airport.		
Direct Radiation	TLDs An inner ring of stations in the general areas of the SITE BOUNDARY.	M-16 (Sector A, Radius 0.9 Miles) – Meteorological Tower. M-17 (Sector C, Radius 0.5 Miles) – South Side, Grand Gulf Road. M-19 (Sector E, Radius 0.5 Miles) – Eastern SITE BOUNDARY Property line, North-northeast of HWSA.	92 days	Gamma dose; 92 days

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<u>TLDs</u> An inner ring of stations in the general areas of the SITE BOUNDARY.	M-21 (Sector J, Radius 0.4 Miles) – Near Former Training Center Building on Bald Hill Road. M-22 (Sector G, Radius 0.5 Miles) – Former RR Entrance Crossing On Bald Hill Road. M-23 (Sector Q, Radius 0.5 Miles) – Gin Lake Road 50 Yards North of Heavy Haul Road on Power Pole. M-25 (Sector N, Radius 1.6 Miles) – Radial Well Number 1. M-28 (Sector L, Radius 0.9 Miles) – Former Glodjo Residence. M-94 (Sector R, Radius 0.8 Miles) – Sector R Near Meteorological Tower.	92 days	Gamma dose; 92 days
	<u>TLDs</u> An outer ring approximately 3 to 5 miles from the site.	M-36 (Sector P, Radius 5.0 Miles) – Curve on HW 608, Point Nearest GGNS at Power Pole. M-40 (Sector M, Radius 2.3 Miles) – Headly Drive, Near River Port Entrance.		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<u>TLDs</u> An outer ring approximately 3 to 5 miles from the site.	M-48 (Sector K, Radius 4.8 Miles) – 0.4 Miles South on Mont Gomer Road on West Side. M-49 (Sector H, Radius 4.5 Miles) – Fork in Bessie Weathers Road/Shaffer Road. M-50 (Sector B, Radius 5.3 Miles) – Panola Hunting Club Entrance. M-55 (Sector D, Radius 5.0 Miles) – Near Ingelside Karnac Ferry Road/Ashland Road Intersection. M-57 (Sector F, Radius 4.5 Miles) – Hwy 61, Behind the Welcome to Port Gibson Sign at Glensdale Subdivision.	92 days	Gamma dose; 92 days
	<u>TLDs</u> 8 stations in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations.	M-01 (Sector E, Radius 3.5 Miles) – Across the road from Lake Claiborne Entry Gate. (Special Interest) M-07 (Sector G, Radius 5.5 Miles) – AS-1 PG, Port Gibson City Barn. (Special Interest) M-09 (Sector D, Radius 3.5 Miles) – Warner Tully Y-Camp. (Special Interest) M-10 (Sector A, Radius 1.5 Miles) – Grand Gulf Military Park. (Special Interest)		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<u>TLDs</u> 8 stations in special interest areas such as population centers, nearby residences, schools, and in 1 or 2 areas to serve as control stations	M-14 (Sector B, Radius 18.0 Miles) – AS-3-61VA, Hwy 61, North of Vicksburg Airport. (Control) M-33 (Sector P, Radius 12.5 Miles) – Newellton, Louisiana Water Tower. (Special Interest) M-38 (Sector M, Radius 9.5 Miles) – Lake Bruin State Park, Entrance Road. (Special Interest) M-39 (Sector M, Radius 13.0 Miles) – St. Joseph, Louisiana, Auxilliary Water Tank. (Special Interest)	92 days	Gamma dose; 92 days
	<u>TLDs</u> Sixteen permanent TLD stations at the protected area boundary (these are in addition to ODCM requirements).	M-61 (Sector D, Onsite) – Protected Area Fence. M-62 (Sector E, Onsite) – Protected Area Fence. M-63 (Sector N, Onsite) – Protected Area Fence. M-64 (Sector M, Onsite) – Protected Area Fence.		

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<u>TLDs</u> Sixteen permanent TLD stations at the protected area boundary.	M-65 (Sector L, Onsite) – Protected Area Fence. M-66 (Sector K, Onsite) – Protected Area Fence. M-67 (Sector J, Onsite) – Protected Area Fence. M-68 (Sector H, Onsite) – Protected Area Fence. M-69 (Sector G, Onsite) – Protected Area Fence. M-70 (Sector F, Onsite) – Protected Area Fence. M-71 (Sector C, Onsite) – Protected Area Fence. M-72 (Sector B, Onsite) – Protected Area Fence. M-74 (Sector Q, Onsite) – Protected Area Fence. M-76 (Sector A, Onsite) – Protected Area Fence.	92 days	Gamma dose; 92 days

Table 1.1

Radiological Environmental Sampling Program

Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Direct Radiation	<u>TLDs</u> Sixteen permanent TLD stations at the protected area boundary.	M-77 (Sector R, Onsite) – Protected Area Fence. M-81 (Sector P, Onsite) – Protected Area Fence.	92 days	Gamma dose; 92 days
	<u>TLDs</u> Three TLDs utilized as duplicates at varying locations (these are in addition to ODCM requirements).	M-31 (Sector Varies, Radius Varies) – Duplicate TLD Installed Quarterly At Varying Locations. M-32 (Sector Varies, Radius Varies) – Duplicate TLD Installed Quarterly At Varying Locations. M-60 (Sector Varies, Radius Varies) – Duplicate TLD Installed Quarterly At Varying Locations.		
Waterborne	<u>Surface Water</u> 1 sample upstream.	MRUP (Sector Q - R, Radius 1.8 Miles) - At least 4500 ft upstream of the GGNS discharge point into the Mississippi River to allow adequate mixing of the Mississippi and Big Black Rivers.	92 days	Gamma isotopic and tritium analyses; 92 days
	1 sample downstream.	MRDOWN (Sector N, Radius 1.6 Miles) - At least 5000 ft downstream of the GGNS discharge point into the Mississippi River near Radial Well No. 1.		
	1 sample downstream during a Liquid Radwaste Discharge.	MRDOWN (Sector Q – P, Radius 1.3 Miles) – Downstream of the GGNS discharge point into the Mississippi River near Radial Well No. 5.	366 days	Gamma isotopic and tritium analyses; 366 days

Table 1.1

Radiological Environmental Sampling Program

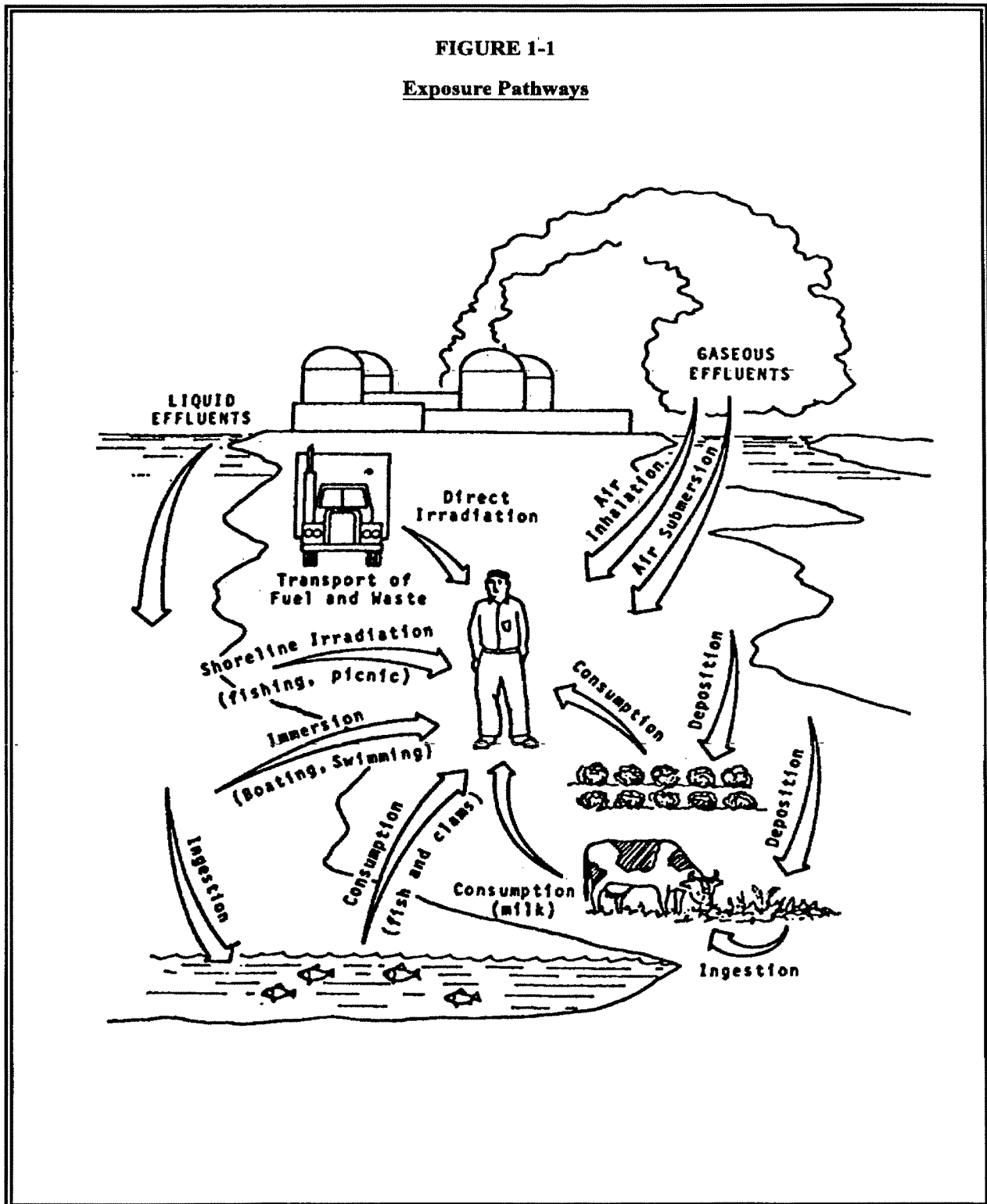
Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Waterborne	Groundwater Samples from 2 sources.	PGWELL (Sector G, Radius 5.0 Miles) - Port Gibson Wells – Take from distribution system or one of the five wells. CONSTWELL (Sector P, Radius 0.4 Miles) – GGNS Construction Water Well – Taken from distribution system or the well.	366 days	Gamma isotopic and tritium analyses; 366 days
	Sediment From Shoreline 1 sample from downstream area. 1 sample from upstream area.	SEDHAM (Sector N, Radius 1.6 Miles) – Downstream of the GGNS discharge point in the Mississippi River near Hamilton Lake outlet. SEDCONT (Minimum of 100 yds) – Upstream of the GGNS discharge point in the Mississippi River.	366 days	Gamma isotopic; 366 days
Ingestion	Milk 1 sample from milking animals within 8 km if milk is available commercially. 1 control sample (only if indicator exists) >8 km if milk is available.	Currently, no available milking animals within 8 km of GGNS. ALCONT (Sector K, Radius 10.5 Miles) - Located South-southwest of GGNS at Alcorn State University.	92 days when required	Gamma isotopic and I-131; 92 days

Table 1.1

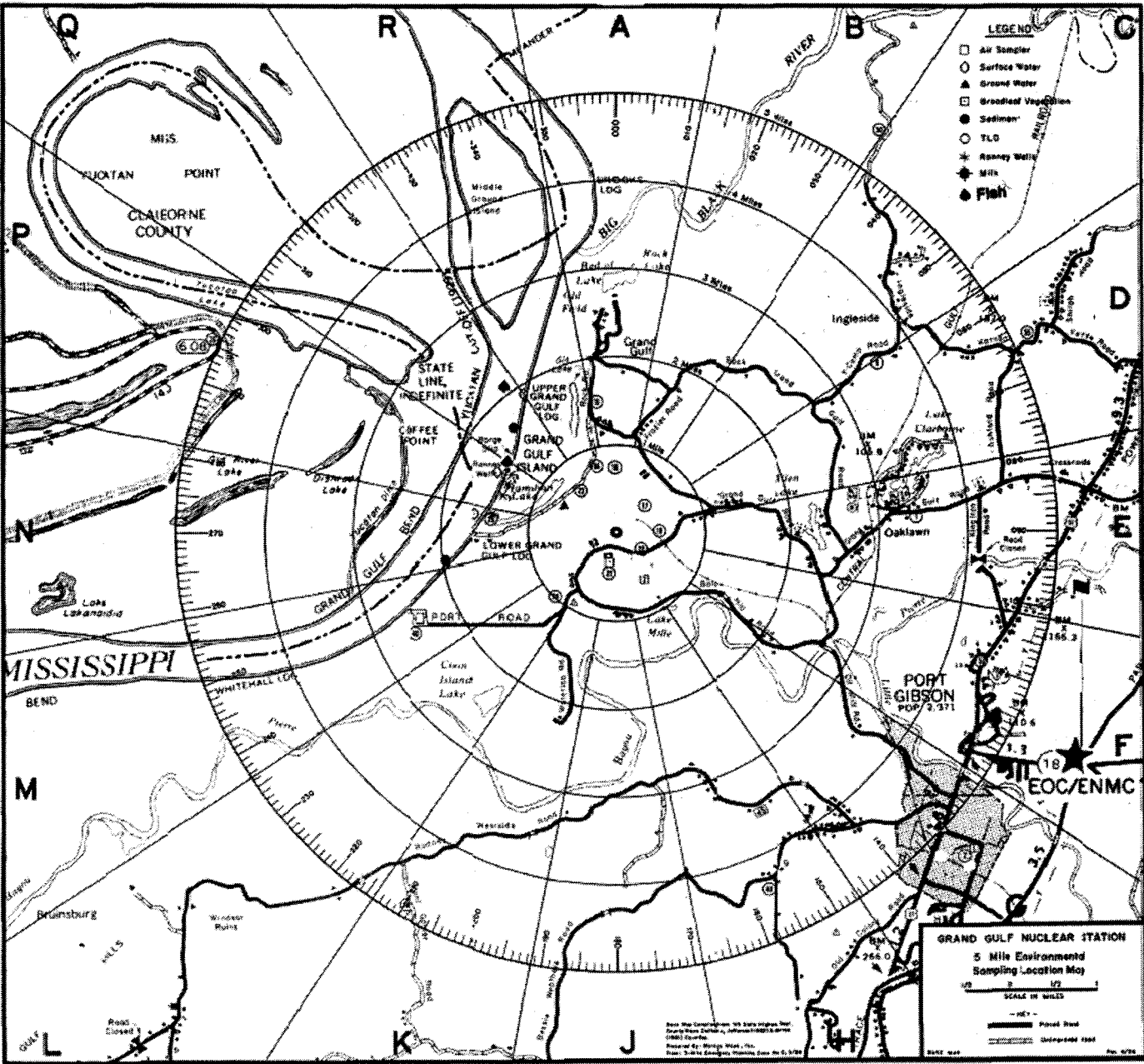
Radiological Environmental Sampling Program

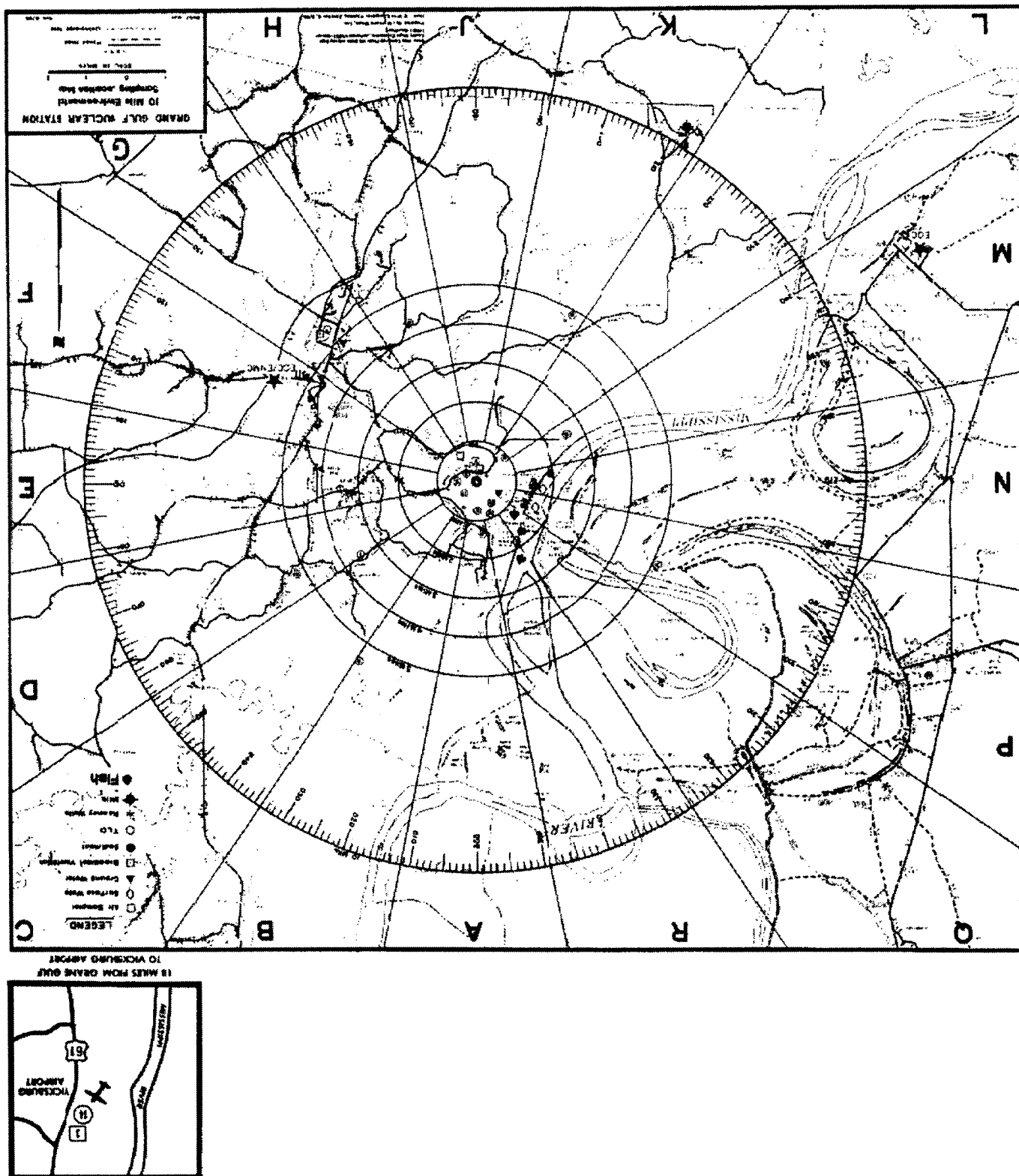
Exposure Pathway	Requirement	Sample Point Description, Distance and Direction	Sampling and Collection Frequency	Type and Frequency Of Analyses
Ingestion	<p>Fish 1 sample in vicinity of GGNS discharge point.</p> <p>1 sample uninfluenced by GGNS discharge.</p>	<p>FISHDOWN – Downstream of the GGNS discharge point into the Mississippi River</p> <p>FISHUP – Upstream of the GGNS discharge point in the Mississippi River uninfluenced by plant operations.</p>	366 days	Gamma isotopic on edible portion; 366 days
	<p>Food Products 1 sample of broadleaf vegetation grown in one of two different offsite locations with highest anticipated annual average ground level D/Q if milk sampling is not performed.</p> <p>1 sample of similar vegetation grown 15 – 30 km distant if milk sampling is not performed.</p>	<p>VEG-J (Sector J, Radius 0.4 Miles) – South of GGNS near former Training Center on Bald Hill Road.</p> <p>VEG-CONT (Sector K, Radius 10.5 Miles) – Alcorn State University south-southwest of GGNS when available, otherwise a location 15-30 km distant.</p>	92 days when available	Gamma isotopic and I-131; 92 days

FIGURE 1-1
EXPOSURE PATHWAYS



SAMPLE COLLECTION SITES – NEAR FIELD





SAMPLE COLLECTION SITES - FAR FIELD

FIGURE 1-3

2.0 Interpretation and Trends of Results

2.1 Air Particulate and Radioiodine Sample Results

GGNS did not detect any plant related gamma emitting radionuclides in the quarterly air particulate composites or Iodine-131 in the radioiodine cartridges during the reporting period, as has been the case in previous years. The REMP detected radioactivity in this pathway attributable to other sources twice. These include the 25th Chinese nuclear test explosion in 1980, and the radioactive plume release due to reactor core degradation at Chernobyl Nuclear Power Plant in 1986. Therefore, the airborne exposure pathway has been unaffected by the operation of GGNS and airborne concentrations continue to be at background levels.

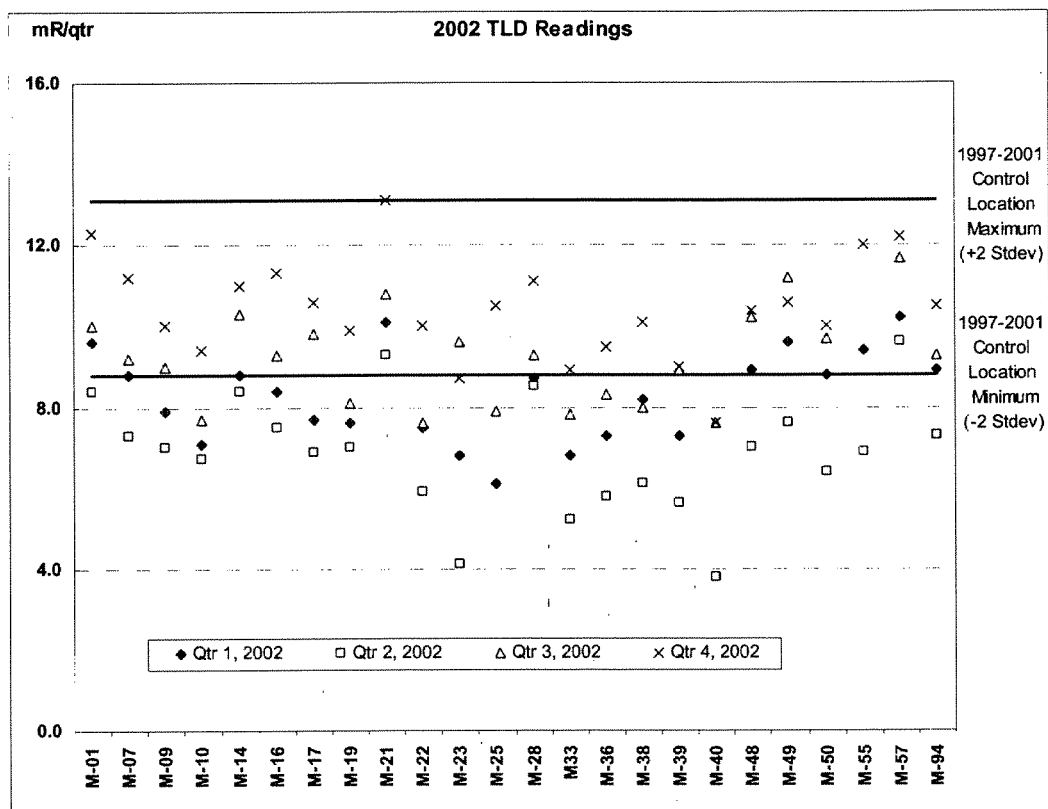
Table 3.1, which includes gross beta concentrations, provides a comparison of the indicator and control means and ranges, further emphasizes that the airborne pathway continues to remain at background levels. In the absence of plant-related gamma radionuclides, gross beta activity is attributed to naturally occurring radionuclides. Consistent trends are present for control and indicator locations. This further supports the presence of naturally occurring activity. The sample period with the highest level of gross beta activity coincided with a sampler malfunction which resulted in reduced sample volume.

2.2 Thermoluminescent Dosimetry Sample Results

GGNS calculates dose by subtracting shield readings from control and indicator location readings and reports measured dose as net exposure normalized to 92 days. GGNS relies on comparison of the indicator locations to the control location as a measure of plant impact. Gamma radiation dose in the reporting period is compared to control location readings for previous years as shown in Figure 2-1.

GGNS' comparison of the indicator results to the control and to previous indicator results, as seen in Figure 2-1 and Table 3.1, indicates that the ambient radiation levels are unaffected by plant operations. Levels continue to remain at or near background.

Figure 2-1



2.3 Water Sample Results

Analytical results for surface water and groundwater samples were similar to those reported in previous years.

Surface water samples were collected from two indicator and one control location and analyzed for gamma emitting radionuclides and tritium. Plant related gamma emitting radionuclides and tritium remained undetectable in the upstream and downstream Mississippi River locations, which is consistent with preoperational and previous operational years. In addition, gamma emitting radionuclides and tritium were undetectable in the downstream sample collected during a liquid radwaste discharge.

Groundwater samples were collected from two locations (indicator and control) and analyzed for gamma emitting radionuclides and tritium. GGNS did not detect any plant related gamma emitting radionuclides or tritium in groundwater samples during the reporting period.

Based on review of results and previous historical data, GGNS concluded that plant operations had no significant impact on this pathway during the reporting period.

2.4 Sediment Sample Results

Sediment samples were collected from two ODCM Specification locations (indicator and control) and analyzed for gamma emitting radionuclides. In this reporting period, plant related gamma emitting radionuclides were below detectable limits in the downstream indicator location.

Cesium-137 was detected in the upstream Control location at an average concentration of 32.7 pCi/Kg. This sample location is beyond influence from plant liquid discharges and is subject to significant erosion and re-sedimentation by the Mississippi River. A review of REMP data collected at this location from 1983 through 2001 indicates the Cesium-137 concentration has ranged from less than detectable to 200 pCi/Kg. When detected, the average concentration was 88.2 pCi/kG. 2002 REMP data is consistent with the previous monitoring periods and is attributed to past atmospheric weapons testing. Therefore, GGNS concluded that plant operations had no significant impact on this pathway during the reporting period.

2.5 Milk Sample Results

GGNS personnel did not collect milk samples within five miles of the site in the reporting period due to the absence of milking animals. Since there are no dairies within five miles of GGNS, it is concluded GGNS' operation had no impact on this pathway.

2.6 Fish Sample Results

Fish samples were collected from two locations (indicator and control) and analyzed for gamma emitting radionuclides. GGNS did not detect any plant related gamma emitting radionuclides in fish samples during the reporting period, as has been the case in preoperational and previous operational years. These results indicate that this pathway has not been affected by plant operations.

2.7 Food Product Sample Results

Food product samples were collected from control and indicator locations when available and analyzed for gamma emitting radionuclides. GGNS did not detect any plant related gamma emitting radionuclides in vegetation samples during the reporting period. Nuclides detected previously at the control and indicator locations are attributed to the Chernobyl release and atmospheric weapons testing. These results indicate that this pathway has not been affected by plant operations.

Three special samples of vegetation were collected at an offsite location to supplement the REMP. The location is under evaluation for a control sample location. One special sample of venison was collected on the GGNS property to supplement the REMP. GGNS did not detect any plant related gamma emitting radionuclides in these special samples.

2.8 Interlaboratory Comparison Results

River Bend Station (RBS) Environmental Laboratory analyzed interlaboratory comparison samples to fulfill the requirements of the ODCM Specifications 6.12.1. Attachment 1, Radiological Environmental Monitoring Report, contains these results in Table 9.1. GGNS' review of RBS' interlaboratory comparison indicated that 97.5% of the sample results for accuracy and 100% of the results for precision were within the acceptable control limits of the three normalized deviations. For those sample results outside the acceptable control limits, GGNS' and RBS's review indicated no impact on previously reported data. Attachment 1 also provides additional discussion regarding sample results outside the acceptable control limits.

3.0 Radiological Environmental Monitoring Program Summary

3.1 Program Results Summary

Table 3.1 summarizes the REMP results. GGNS personnel did not use values reported as less than the lower limit of detection (<LLD) when determining ranges and means for indicator and control locations.

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
 Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2002

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Air Particulates (pCi/m ³)	GB 159	0.01	0.023 (106 / 106) [0.009 - 0.068]	AS-1 PG (Sector G, 5.5 mi)	0.023 (53 / 53) [0.010 - 0.068]	0.022 (53 / 53) [0.011 - 0.044]	0
	GS 12						
	Cs-134	0.05	<LLD	N/A	N/A	<LLD	0
	Cs-137	0.06	<LLD	N/A	N/A	<LLD	0
Airborne Iodine (pCi/m ³)	I-131 159	0.07	<LLD	N/A	N/A	<LLD	0
Inner Ring TLDs (mR/Qtr)	Gamma 36	(f)	8.7 (35 / 36) [4.1 - 13.1]	M-21 (Sector J, 0.4 mi.)	10.8 (4 / 4) [9.3 - 13.1]	N/A	0
Outer Ring TLDs (mR/Qtr)	Gamma 28	(f)	8.9 (26 / 28) [3.8 - 12.2]	M-57 (Sector F, 4.5 mi.)	10.9 (4 / 4) [9.6 - 12.2]	N/A	0
Special Interest TLDs (mR/Qtr)	Gamma 28	(f)	8.3 (28 / 28) [5.2 - 12.3]	M-01 (Sector E, 3.5 mi.)	10.1 (4 / 4) [8.4 - 12.3]	N/A	0
Control TLDs (mR/Qtr)	Gamma 4	(f)	N/A	N/A	N/A	9.6 (4 / 4) [8.4 - 11.0]	0
Protected Area TLDs (mR/Qtr)	Gamma 64	(f)	36.6 (64 / 64) [6.0 - 154.6]	M-69 (Sector G, Onsite)	101.5 (4 / 4) [66.3 - 154.6]	N/A	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
 Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2002

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Surface Water (pCi/l)	H-3 12	3000	< LLD	N/A	N/A	<LLD	0
	GS 12						
	I-131 15	15	<LLD	N/A	N/A	<LLD	0
	Mn-54 15	15	<LLD	N/A	N/A	<LLD	0
	Fe-59 30	30	<LLD	N/A	N/A	<LLD	0
	Co-58 15	15	<LLD	N/A	N/A	<LLD	0
	Co-60 15	15	<LLD	N/A	N/A	<LLD	0
	Zn-65 30	30	<LLD	N/A	N/A	<LLD	0
	Zr-95 30	30	<LLD	N/A	N/A	<LLD	0
	Nb-95 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-134 15	15	<LLD	N/A	N/A	<LLD	0
	Cs-137 18	18	<LLD	N/A	N/A	<LLD	0
	Ba-140 60	60	<LLD	N/A	N/A	<LLD	0
	La-140 15	15	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
 Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2002

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Locations Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Groundwater (pCi/l)	H-3 4	2000	<LLD	N/A	N/A	<LLD	0
	I-131 4	1	<LLD	N/A	N/A	<LLD	0
	GS 4						
	Mn-54	15	<LLD	N/A	N/A	<LLD	0
	Fe-59	30	<LLD	N/A	N/A	<LLD	0
	Co-58	15	<LLD	N/A	N/A	<LLD	0
	Co-60	15	<LLD	N/A	N/A	<LLD	0
	Zn-65	30	<LLD	N/A	N/A	<LLD	0
	Zr-95	30	<LLD	N/A	N/A	<LLD	0
	Nb-95	15	<LLD	N/A	N/A	<LLD	0
	Cs-134	15	<LLD	N/A	N/A	<LLD	0
	Cs-137	18	<LLD	N/A	N/A	<LLD	0
	Ba-140	60	<LLD	N/A	N/A	<LLD2	0
	La-140	15	<LLD	N/A	N/A	<LLD	0
Bottom Sediment (pCi/kg)	GS 4						
	Cs-134	150	<LLD	N/A	N/A	<LLD	0
	Cs-137	180	<LLD	N/A	N/A	32.7 (2 / 2) [19.5 – 45.9]	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
 Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2002

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Fish (pCi/kg)	GS 4						
	Mn-54	130	<LLD	N/A	N/A	<LLD	0
	Fe-59	260	<LLD	N/A	N/A	<LLD	0
	Co-58	130	<LLD	N/A	N/A	<LLD	0
	Co-60	130	<LLD	N/A	N/A	<LLD	0
	Zn-65	260	<LLD	N/A	N/A	<LLD	0
	Cs-134	130	<LLD	N/A	N/A	<LLD	0
	Cs-137	150	<LLD	N/A	N/A	<LLD	0
Food Products (pCi/kg)	I-131 10	60	<LLD	N/A	N/A	<LLD	0
	GS 10						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0

TABLE 3.1

Radiological Environmental Monitoring Program Summary

Name of Facility: Grand Gulf Nuclear Station Docket No: 50-416
 Location of Facility: Claiborne County, Mississippi Reporting Period: January - December 2002

Sample Type (Units)	Type & Number of Analyses ^a	LLD ^b	Indicator Location Mean (F) ^c [Range]	Location with Highest Annual Mean		Control Locations Mean (F) ^c [Range]	Number of Nonroutine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Vegetation (Special) (pCi/kg)	I-131 3	60	<LLD	N/A	N/A	<LLD	0
	GS 3						
	Cs-134	60	<LLD	N/A	N/A	<LLD	0
	Cs-137	80	<LLD	N/A	N/A	<LLD	0
Venison (Special) (pCi/kg)	GS 1						
	Mn-54	130	<LLD	N/A	N/A	32.7	0
	Fe-59	260	<LLD	N/A	N/A	N/A	0
	Co-58	130	<LLD	N/A	N/A	N/A	0
	Co-60	130	<LLD	N/A	N/A	N/A	0
	Zn-65	260	<LLD	N/A	N/A	N/A	0
	Cs-134	130	<LLD	N/A	N/A	N/A	0
	Cs-137	150	<LLD	N/A	N/A	N/A	0

^a GB = Gross beta; I-131 = Iodine-131; H-3 = Tritium; GS = Gamma scan.

^b LLD = Required lower limit of detection based on GGNS ODCM Table 6.12.1-3.

^c Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis (F).

^d Locations are specified (1) by name and (2) degrees relative to reactor site.

^e Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

^f LLD is not defined in GGNS ODCM Table 6.12.1-3.

Attachment 1

Radiological Monitoring Report

Summary of Monitoring Results

TABLE OF CONTENTS

TABLE 1.1	AIR PARTICULATE FILTER GROSS BETA AND CHARCOAL CARTRIDGE IODINE-131	35
TABLE 1.2	AIR PARTICULATE FILTER GAMMA	47
TABLE 2.1	THERMOLUMINESCENT DOSIMETERS	48
TABLE 2.2	THERMOLUMINESCENT DOSIMETERS	49
TABLE 2.3	THERMOLUMINESCENT DOSIMETERS	50
TABLE 3.1	SURFACE WATER GAMMA	51
TABLE 3.2	SURFACE WATER TRITIUM	52
TABLE 4.1	GROUNDWATER GAMMA	53
TABLE 4.2	GROUNDWATER TRITIUM	54
TABLE 4.3	GROUNDWATER IODINE-131	55
TABLE 5.1	SEDIMENT	56
TABLE 6.1	FISH	57
TABLE 7.1	FOOD PRODUCTS	58
TABLE 8.1	SPECIAL SAMPLES	59
TABLE 9.1	INTERLABORATORY COMPARISON	60

Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³**AIR SAMPLE AS-1 PG - GGNS Nearest Community**

LLD (pCi/m ³)	AS-1 PG			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020005	12/26/2001	1/2/2002		< 0.016	0.035 +/-0.002
20020022	1/2/2002	1/8/2002		< 0.020	0.028 +/-0.003
20020040	1/8/2002	1/15/2002		< 0.014	0.026 +/-0.002
20020055	1/15/2002	1/22/2002		< 0.019	0.023 +/-0.002
20020072	1/22/2002	1/29/2002		< 0.018	0.021 +/-0.002
20020097	1/29/2002	2/5/2002		< 0.018	0.019 +/-0.002
20020111	2/5/2002	2/12/2002		< 0.016	0.020 +/-0.002
20020125	2/12/2002	2/19/2002		< 0.018	0.021 +/-0.002
20020143	2/19/2002	2/26/2002		< 0.013	0.022 +/-0.002
20020157	2/26/2002	3/5/2002		< 0.013	0.023 +/-0.002
20020167	3/5/2002	3/12/2002		< 0.014	0.023 +/-0.002
20020194	3/12/2002	3/19/2002		< 0.015	0.013 +/-0.002
20020228	3/19/2002	3/26/2002		< 0.018	0.024 +/-0.002
20020255	3/26/2002	4/2/2002		< 0.014	0.015 +/-0.002
20020272	4/2/2002	4/9/2002		< 0.017	0.024 +/-0.002

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-1 PG			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020296	4/9/2002	4/16/2002		< 0.022	0.014 +/-0.002
20020307	4/16/2002	4/23/2002		< 0.014	0.013 +/-0.002
20020333	4/28/2002	4/30/2002		< 0.021	0.019 +/-0.002
20020358	4/30/2002	5/7/2002		< 0.014	0.017 +/-0.002
20020382	5/7/2002	5/14/2002		< 0.020	0.017 +/-0.002
20020387	5/14/2002	5/21/2002		< 0.019	0.018 +/-0.002
20020413	5/21/2002	5/28/2002		< 0.024	0.018 +/-0.002
20020419	5/28/2002	6/4/2002		< 0.016	0.017 +/-0.002
20020442	6/4/2002	6/11/2002		< 0.019	0.018 +/-0.002
20020470	6/11/2002	6/18/2002		< 0.021	0.019 +/-0.002
20020493	6/18/2002	6/25/2002		< 0.014	0.019 +/-0.002
20020500	6/25/2002	7/2/2002		< 0.014	0.020 +/-0.002
20020536	7/2/2002	7/9/2002		< 0.013	0.025 +/-0.002
20020557	7/9/2002	7/16/2002		< 0.016	0.021 +/-0.002
20020579	7/16/2002	7/23/2002		< 0.015	0.018 +/-0.002
20020585	7/23/2002	7/30/2002		< 0.015	0.015 +/-0.002

Sample Type: **Air Particulate Filter and Radioiodine Cartridge**

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-1 PG			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020614	7/30/2002	8/6/2002		< 0.017	0.021 +/-0.002
20020629	8/6/2002	8/13/2002		< 0.018	0.020 +/-0.002
20020642	8/13/2002	8/20/2002		< 0.015	0.010 +/-0.002
20020646	8/20/2002	8/27/2002		< 0.017	0.015 +/-0.002
20020667	8/27/2002	9/3/2002		< 0.020	0.025 +/-0.002
20020687	9/3/2002	9/10/2002		< 0.015	0.021 +/-0.002
20020711	9/10/2002	9/17/2002		< 0.024	0.042 +/-0.003
20020748	9/17/2002	9/24/2002		< 0.025	0.020 +/-0.002
20020757	9/24/2002	10/1/2002		< 0.013	0.018 +/-0.002
20020774	10/1/2002	10/8/2002		< 0.017	0.015 +/-0.002
20020803	10/8/2002	10/15/2002		< 0.018	0.020 +/-0.002
20020829	10/15/2002	10/22/2002		< 0.015	0.027 +/-0.002
20020851	10/22/2002	10/29/2002		< 0.016	0.020 +/-0.002
20020875	10/29/2002	11/5/2002		< 0.017	0.014 +/-0.002
20020898	11/5/2002	11/12/2002		< 0.015	0.045 +/-0.003
20020918	11/12/2002	11/19/2002		< 0.015	0.020 +/-0.002

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-1 PG			0.07	0.01
LAB ID		START DATE	END DATE	I-131	GROSS BETA
20020959		11/19/2002	11/26/2002	< 0.017	0.029 +/-0.002
20020965		11/26/2002	12/3/2002	< 0.013	0.032 +/-0.002
20020999		12/3/2002	12/10/2002	< 0.065	0.049 +/-0.002
20021023		12/10/2002	12/17/2002	< 0.046	0.068 +/-0.007
20021053		12/17/2002	12/23/2002	< 0.019	0.027 +/-0.003
20021079		12/23/2002	12/31/2002	< 0.015	0.024 +/-0.002
Average:					0.023
Maximum					0.068
Minimum:					0.010

Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³**AIR SAMPLE AS-361VA - GGNS - Control**

LLD (pCi/m ³)	AS-361VA		0.07	0.01
LAB ID	START DATE	END DATE	I-131	GROSS BETA
20020006	12/26/2001	1/2/2002	< 0.017	0.032 +/-0.002
20020023	1/2/2002	1/8/2002	< 0.019	0.028 +/-0.003
20020041	1/8/2002	1/15/2002	< 0.014	0.023 +/-0.002
20020056	1/15/2002	1/22/2002	< 0.017	0.021 +/-0.002
20020073	1/22/2002	1/29/2002	< 0.014	0.021 +/-0.002
20020098	1/29/2002	2/5/2002	< 0.019	0.022 +/-0.002
20020112	2/5/2002	2/12/2002	< 0.017	0.019 +/-0.002
20020126	2/12/2002	2/19/2002	< 0.015	0.019 +/-0.002
20020144	2/19/2002	2/26/2002	< 0.016	0.021 +/-0.002
20020158	2/26/2002	3/5/2002	< 0.015	0.025 +/-0.002
20020168	3/5/2002	3/12/2002	< 0.016	0.024 +/-0.002
20020195	3/12/2002	3/19/2002	< 0.015	0.011 +/-0.002
20020229	3/19/2002	3/26/2002	< 0.017	0.023 +/-0.002
20020256	3/26/2002	4/2/2002	< 0.019	0.012 +/-0.002
20020273	4/2/2002	4/9/2002	< 0.015	0.020 +/-0.002

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³) AS-361VA				0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020297	4/9/2002	4/16/2002		< 0.020	0.014 +/-0.002
20020308	4/16/2002	4/23/2002		< 0.019	0.012 +/-0.002
20020334	4/23/2002	4/30/2002		< 0.014	0.018 +/-0.002
20020359	4/30/2002	5/7/2002		< 0.021	0.018 +/-0.002
20020383	5/7/2002	5/14/2002		< 0.016	0.016 +/-0.002
20020388	5/14/2002	5/21/2002		< 0.015	0.020 +/-0.002
20020414	5/21/2002	5/28/2002		< 0.027	0.023 +/-0.002
20020420	5/28/2002	6/4/2002		< 0.020	0.020 +/-0.002
20020443	6/4/2002	6/11/2002		< 0.015	0.018 +/-0.002
20020471	6/11/2002	6/18/2002		< 0.013	0.023 +/-0.002
20020494	6/18/2002	6/25/2002		< 0.015	0.018 +/-0.002
20020501	6/25/2002	7/2/2002		< 0.017	0.016 +/-0.002
20020537	7/2/2002	7/9/2002		< 0.014	0.026 +/-0.002
20020558	7/9/2002	7/16/2002		< 0.019	0.020 +/-0.002
20020580	7/16/2002	7/23/2002		< 0.019	0.018 +/-0.002
20020586	7/23/2002	7/30/2002		< 0.017	0.014 +/-0.002

Sample Type: **Air Particulate Filter and Radioiodine Cartridge**

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-361VA			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020615	7/30/2002	8/6/2002		< 0.017	0.024 +/-0.002
20020630	8/6/2002	8/13/2002		< 0.017	0.018 +/-0.002
20020643	8/13/2002	8/20/2002		< 0.016	0.012 +/-0.002
20020647	8/20/2002	8/27/2002		< 0.015	0.014 +/-0.002
20020668	8/27/2002	9/3/2002		< 0.017	0.026 +/-0.002
20020688	9/3/2002	9/10/2002		< 0.017	0.021 +/-0.002
20020712	9/10/2002	9/17/2002		< 0.016	0.042 +/-0.003
20020749	9/17/2002	9/24/2002		< 0.022	0.020 +/-0.002
20020758	9/24/2002	10/1/2002		< 0.016	0.015 +/-0.002
20020775	10/1/2002	10/8/2002		< 0.016	0.016 +/-0.002
20020804	10/8/2002	10/15/2002		< 0.020	0.020 +/-0.002
20020830	10/15/2002	10/22/2002		< 0.015	0.022 +/-0.002
20020852	10/22/2002	10/29/2002		< 0.016	0.020 +/-0.002
20020876	10/29/2002	11/5/2002		< 0.017	0.016 +/-0.002
20020899	11/5/2002	11/12/2002		< 0.018	0.044 +/-0.003
20020919	11/12/2002	11/19/2002		< 0.019	0.033 +/-0.002

Sample Type: **Air Particulate Filter and Radioiodine Cartridge**

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³) AS-361VA				0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020960	11/19/2002	11/26/2002		< 0.019	0.027 +/-0.002
20020966	11/26/2002	12/3/2002		< 0.016	0.028 +/-0.002
20021000	12/3/2002	12/10/2002		< 0.014	0.034 +/-0.003
20021024	12/10/2002	12/17/2002		< 0.015	0.040 +/-0.003
20021054	12/17/2002	12/23/2002		< 0.020	0.031 +/-0.003
20021080	12/23/2002	12/31/2002		< 0.018	0.020 +/-0.002
Average:					0.022
Maximum					0.044
Minimum:					0.011

Table 1.1

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³**AIR SAMPLE AS-7 - GGNS - Indicator**

LLD (pCi/m ³)	AS-7UH			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020007	12/26/2001	1/2/2002		< 0.014	0.036 +/-0.002
20020024	1/2/2002	1/8/2002		< 0.020	0.028 +/-0.003
20020042	1/8/2002	1/15/2002		< 0.018	0.025 +/-0.002
20020057	1/15/2002	1/22/2002		< 0.016	0.023 +/-0.002
20020074	1/22/2002	1/29/2002		< 0.016	0.020 +/-0.002
20020099	1/29/2002	2/5/2002		< 0.016	0.019 +/-0.002
20020113	2/5/2002	2/12/2002		< 0.016	0.019 +/-0.002
20020127	2/12/2002	2/19/2002		< 0.013	0.020 +/-0.002
20020145	2/19/2002	2/26/2002		< 0.014	0.026 +/-0.002
20020159	2/26/2002	3/5/2002		< 0.016	0.022 +/-0.002
20020169	3/5/2002	3/12/2002		< 0.016	0.024 +/-0.002
20020196	3/12/2002	3/19/2002		< 0.019	0.012 +/-0.002
20020230	3/19/2002	3/26/2002		< 0.015	0.022 +/-0.002
20020257	3/26/2002	4/2/2002		< 0.018	0.012 +/-0.002

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-7UH			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020274	4/2/2002	4/9/2002		< 0.017	0.023 +/-0.002
20020298	4/9/2002	4/16/2002		< 0.018	0.015 +/-0.002
20020309	4/16/2002	4/23/2002		< 0.015	0.013 +/-0.002
20020335	4/23/2002	4/30/2002		< 0.020	0.021 +/-0.002
20020360	4/30/2002	5/7/2002		< 0.016	0.015 +/-0.002
20020384	5/7/2002	5/14/2002		< 0.017	0.017 +/-0.002
20020389	5/14/2002	5/21/2002		< 0.016	0.018 +/-0.002
20020415	5/21/2002	5/28/2002		< 0.024	0.020 +/-0.002
20020421	5/28/2002	6/4/2002		< 0.015	0.017 +/-0.002
20020444	6/4/2002	6/11/2002		< 0.016	0.019 +/-0.002
20020472	6/11/2002	6/18/2002		< 0.015	0.021 +/-0.002
20020495	6/18/2002	6/25/2002		< 0.012	0.018 +/-0.002
20020502	6/25/2002	7/2/2002		< 0.015	0.015 +/-0.002
20020538	7/2/2002	7/9/2002		< 0.018	0.023 +/-0.002
20020559	7/9/2002	7/16/2002		< 0.014	0.019 +/-0.002
20020581	7/16/2002	7/23/2002		< 0.013	0.018 +/-0.002

Sample Type: Air Particulate Filter and Radioiodine Cartridge

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³)	AS-7UH			0.07	0.01
LAB ID	START DATE	END DATE		I-131	GROSS BETA
20020587	7/23/2002	7/30/2002		< 0.016	0.012 +/-0.002
20020616	7/30/2002	8/6/2002		< 0.015	0.022 +/-0.002
20020631	8/6/2002	8/13/2002		< 0.016	0.020 +/-0.002
20020644	8/13/2002	8/20/2002		< 0.014	0.009 +/-0.002
20020648	8/20/2002	8/27/2002		< 0.016	0.016 +/-0.002
20020669	8/27/2002	9/3/2002		< 0.018	0.028 +/-0.002
20020689	9/3/2002	9/10/2002		< 0.018	0.017 +/-0.002
20020713	9/10/2002	9/17/2002		< 0.021	0.041 +/-0.003
20020750	9/17/2002	9/24/2002		< 0.020	0.019 +/-0.002
20020759	9/24/2002	10/1/2002		< 0.014	0.015 +/-0.002
20020776	10/1/2002	10/8/2002		< 0.013	0.015 +/-0.002
20020805	10/8/2002	10/15/2002		< 0.016	0.019 +/-0.002
20020831	10/15/2002	10/22/2002		< 0.015	0.027 +/-0.002
20020853	10/22/2002	10/29/2002		< 0.015	0.019 +/-0.002
20020877	10/29/2002	11/5/2002		< 0.017	0.012 +/-0.002
20020900	11/5/2002	11/12/2002		< 0.015	0.045 +/-0.003

Sample Type: **Air Particulate Filter and Radioiodine Cartridge**

Analysis: Gross Beta and I-131

Units: pCi/m³

LLD (pCi/m ³) AS-7UH		0.07		0.01	
LAB ID	START DATE	END DATE	I-131	GROSS BETA	
20020920	11/12/2002	11/19/2002	< 0.015	0.025 +/-0.002	
20020961	11/19/2002	11/26/2002	< 0.014	0.026 +/-0.002	
20020967	11/26/2002	12/3/2002	< 0.015	0.031 +/-0.002	
20021001	12/3/2002	12/10/2002	< 0.016	0.035 +/-0.003	
20021025	12/10/2002	12/17/2002	< 0.013	0.042 +/-0.003	
20021055	12/17/2002	12/23/2002	< 0.020	0.027 +/-0.003	
20021081	12/23/2002	12/31/2002	< 0.016	0.021 +/-0.002	
Average:				0.022	
Maximum				0.045	
Minimum:				0.009	

Table 1.2
Sample Type: **Air Particulate Filter**
Analysis: Gamma Isotopic
Units: pCi/m³

AIR PARTICULATE FILTER QUARTERLY COMPOSITES (GAMMA) - GGNS

LLD (pCi/m ³)			0.05	0.06
LAB ID	LOCATION	DATE	CS-134	CS-137
20020260	AS-1 PG	2/9/2002	< 0.002	< 0.002
20020261	AS-3 61VA	2/9/2002	< 0.002	< 0.002
20020262	AS-7 UH	2/9/2002	< 0.002	< 0.002
20020517	AS-1 PG	5/10/2002	< 0.002	< 0.001
20020518	AS-3 61VA	5/10/2002	< 0.002	< 0.001
20020519	AS-7 UH	5/10/2002	< 0.002	< 0.002
20020799	AS-1 PG	8/9/2002	< 0.002	< 0.002
20020800	AS-3 61VA	8/9/2002	< 0.002	< 0.002
20020801	AS-7 UH	8/9/2002	< 0.002	< 0.002
20021091	AS-1 PG	11/8/2002	< 0.001	< 0.002
20021092	AS-3 61VA	11/8/2002	< 0.002	< 0.002
20021093	AS-7 UH	11/8/2002	< 0.002	< 0.001

Table 2.1
Sample Type: Thermoluminescent Dosimeters
Analysis: Gamma Dose
Units: mrem/Qtr

Inner Ring - Within General Area of Site Boundary (ODCM Specifications)					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-16	8.4	7.5	9.3	11.3	9.1
M-17	7.7	6.9	9.8	10.6	8.7
M-19	7.6	7.0	8.1	9.9	8.2
M-21 *	10.1	9.3	10.8	13.1	10.8
M-22	7.5	5.9	7.6	10.0	7.8
M-23	6.8	4.1	9.6	9.1	7.4
M-25	6.1	**	7.9	10.5	8.1
M-28	8.7	8.5	9.3	11.1	9.4
M-94	8.9	7.3	9.3	10.5	9.0

Outer Ring – Approximately Three (3) to Five (5) Miles from the Site (ODCM Specifications)					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-36	7.3	5.8	8.3	9.5	7.7
M-40	**	3.8	7.6	7.6	6.4
M-48	8.9	7.0	10.2	10.4	9.1
M-49	9.6	7.6	11.2	10.6	9.7
M-50	8.8	6.4	9.7	10.0	8.7
M-55	9.4	6.9	**	12.0	9.4
M-57 *	10.2	9.6	11.7	12.2	10.9

* Location with highest annual mean.

** Excluded from reporting, see Sample Deviations, TLDs, Page 9.

Table 2.2
Sample Type: **Thermoluminescent Dosimeters**
Analysis: Gamma Dose
Units: mrem/Qtr

Special Interest Areas – Population Centers & Schools (ODCM Specifications)					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-01 *	9.6	8.4	10.0	12.3	10.1
M-07	8.8	7.3	9.2	11.2	9.1
M-09	7.9	7.0	9.0	10.0	8.5
M-10	7.1	6.7	7.7	9.4	7.7
M-33	6.8	5.2	7.8	8.9	7.2
M-38	8.2	6.1	8.0	10.1	8.1
M-39	7.3	5.6	8.9	9.0	7.7

* Location with highest annual mean.

Special Interest Areas – Control (ODCM Specifications)					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-14	8.8	8.4	10.3	11.0	9.6

Table 2.3

Sample Type: **Thermoluminescent Dosimeters**

Analysis: Gamma Dose

Units: mrem/Qtr

Protected Area Boundary					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-61	53.4	45.8	39.6	76.9	53.9
M-62	79.2	66.4	49.3	117.9	78.2
M-63	15.4	14.0	15.5	23.3	17.1
M-64	19.3	16.5	14.3	28.5	19.6
M-65	15.7	14.1	13.3	24.2	16.8
M-66	19.5	17.3	14.8	30.1	20.4
M-67	19.2	15.9	15.3	27.1	19.4
M-68	80.9	69.7	52.0	127.7	82.6
M-69*	100.1	85.3	66.3	154.6	101.5
M-70	98.7	84.3	66.3	136.6	96.5
M-71	21.6	17.3	16.1	33.3	22.1
M-72	18.4	13.7	13.5	23.3	17.2
M-74	10.6	7.0	8.8	13.8	10.1
M-76	14.8	10.2	10.7	19.2	13.7
M-77	8.8	6.0	7.4	11.9	8.5
M-81	8.5	6.3	8.6	10.2	8.4

- **Location with highest annual mean.**

Duplicates					
Station	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Mean
M-31	8.3	7.6	7.8	10.4	8.6
M-32	7.2	7.8	7.8	11.3	8.5
M-60	10.6	7.4	8.0	10.4	9.1

Table 3.1
Sample Type: **Surface Water**
Analysis: Gamma Isotopic
Units: pCi/l

SURFACE WATER SAMPLES (GAMMA) - GGNS

LLD (pCi/l)			15	15	30	15	30	15	30	15	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	I-131	CS-134	CS-137	BA-140	LA-140
20020018	MR DOWN	1/8/2002	< 9.64	< 8.52	< 16.10	< 7.70	< 15.50	< 9.87	< 13.40	< 9.58	< 6.80	< 6.85	< 30.10	< 13.30
20020020	MR UP	1/8/2002	< 11.30	< 7.53	< 16.20	< 8.99	< 14.70	< 10.20	< 16.30	< 12.00	< 10.50	< 10.20	< 41.10	< 11.00
20020275	MR DOWN	4/9/2002	< 8.34	< 7.09	< 19.10	< 8.34	< 15.70	< 8.35	< 12.10	< 9.18	< 6.88	< 7.32	< 20.90	< 14.40
20020277	MR UP	4/9/2002	< 8.83	< 7.19	< 17.90	< 5.17	< 16.90	< 8.34	< 11.10	< 8.11	< 8.15	< 8.49	< 16.90	< 7.42
20020508	MR DOWN	7/2/2002	< 9.55	< 6.81	< 13.30	< 9.67	< 18.00	< 9.31	< 10.30	< 8.19	< 5.24	< 7.08	< 23.10	< 10.50
20020510	MR UP	7/2/2002	< 7.69	< 8.19	< 13.60	< 9.33	< 21.80	< 9.06	< 15.10	< 9.56	< 12.00	< 7.31	< 22.30	< 9.04
20020781	MR DOWN	10/8/2002	< 10.50	< 12.50	< 17.20	< 5.25	< 28.60	< 14.50	< 13.60	< 12.60	< 10.90	< 9.47	< 40.90	< 13.00
20020783	MR UP	10/8/2002	< 8.38	< 9.95	< 13.50	< 9.47	< 22.20	< 13.80	< 12.80	< 12.50	< 4.74	< 11.70	< 34.20	< 11.20
20020785	MR DOWN GG	10/8/2002	< 7.55	< 9.98	< 14.90	< 9.69	< 28.60	< 9.58	< 17.70	< 10.60	< 10.50	< 9.16	< 37.00	< 12.40
20020786	MR UP GG	10/8/2002	< 8.65	< 8.79	< 16.10	< 8.38	< 13.70	< 7.84	< 14.00	< 9.41	< 8.25	< 7.70	< 36.60	< 14.00
20020833*	MR DOWN	10/23/2002	< 10.70	< 7.17	< 16.20	< 8.65	< 18.30	< 8.18	< 17.00	< 12.60	< 9.27	< 7.44	< 38.70	< 14.50
20020835*	MR DOWN GG	10/23/2002	< 9.16	< 5.65	< 13.70	< 7.22	< 18.20	< 9.52	< 18.80	< 11.80	< 9.10	< 7.62	< 38.20	< 12.40

* Annual Sample collected during liquid discharge
“GG” – indicates duplicate sample.

Table 3.2

Sample Type: Surface Water

Analysis: Tritium

Units: pCi/l

SURFACE WATER SAMPLES (H-3) - GGNS

LLD (pCi/l)			3000
LAB ID	LOCATION	DATE	TRITIUM
20020019	MR DOWN	1/8/2002	< 541
20020021	MR UP	1/8/2002	< 541
20020276	MR DOWN	4/9/2002	< 575
20020278	MR UP	4/9/2002	< 533
20020509	MR DOWN	7/2/2002	< 577
20020511	MR UP	7/2/2002	< 572
20020782	MR DOWN	10/8/2002	< 591
20020784	MR UP	10/8/2002	< 590
20020785	MR DOWN GG	10/8/2002	< 586
20020786	MR UP GG	10/8/2002	< 593
20020834*	MR DOWN	10/23/2002	< 591
20020836*	MR DOWN GG	10/23/2002	< 592

* Annual Sample collected during liquid discharge

"GG" -- indicates duplicate sample.

Table 4.1
Sample Type: **Groundwater**
Analysis: Gamma Isotopic
Units: pCi/l

GROUND WATER SAMPLES (GAMMA) - GGNS

LLD (pCi/l)			15	15	30	15	30	15	30	15	18	60	15
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	NB-95	ZR-95	CS-134	CS-137	BA-140	LA-140
20020861	PGWELL	10/29/2002	< 7.78	< 6.19	< 13.60	< 9.66	< 20.20	< 6.90	< 13.60	< 8.17	< 9.26	< 27.50	< 8.09
20020862	PGWELL GG	10/29/2002	< 6.93	< 8.79	< 13.30	< 9.33	< 24.00	< 9.81	< 15.30	< 8.17	< 10.90	< 35.50	< 14.50
20020867	CONSTWELL	10/30/2002	< 10.00	< 8.34	< 18.30	< 14.30	< 13.50	< 11.70	< 11.00	< 11.50	< 13.60	< 37.40	< 7.11
20020868	CONSTWELL GG	10/30/2002	< 11.50	< 10.40	< 21.90	< 10.20	< 25.10	< 10.00	< 15.50	< 10.30	< 9.82	< 34.30	< 12.50

“GG” – indicates duplicate sample.

Table 4.2
Sample Type: Groundwater
Analysis: Tritium
Units: pCi/l

GROUND WATER SAMPLES (TRITIUM) - GGNS

LLD (pCi/l)			2000
LAB ID	LOCATION	DATE	TRITIUM
20020865	PGWELL	10/29/2002	< 605
20020866	PGWELL GG	10/29/2002	< 605
20020871	CONSTWELL	10/30/2002	< 572
20020872	CONSTWELL GG	10/30/2002	< 571

“GG” – indicates duplicate sample.

Table 4.3

Sample Type: Groundwater

Analysis: Iodine

Units: pCi/l

GROUND WATER SAMPLES (Iodine-131) - GGNS

LLD (pCi/l)			1.0
LAB ID	LOCATION	DATE	IODINE
20020863	PGWELL	10/29/2002	< 0.89
20020864	PGWELL GG	10/29/2002	< 0.87
20020869	CONSTWELL	10/30/2002	< 0.89
20020870	CONSTWELL GG	10/30/2002	< 0.84

“GG” – indicates duplicate sample.

Table 5.1

Sample Type: **Sediment**

Analysis: Gamma Isotopic

Units: pCi/kg

SEDIMENT SAMPLES - GGNS

LLD (pCi/KG)			150	180
LAB ID	LOCATION	DATE	CS-134	CS-137
20021008	SEDHAM	12/16/2002	< 32.7	< 37.7
20021009	SEDCONT	12/16/2002	< 26.9	45.9 +/-13.0
20021010	SEDHAM GG	12/16/2002	< 27.8	< 34.2
20021011	SEDCONT GG	12/16/2002	< 30.2	19.5 +/-9.23

“GG” – indicates duplicate sample.

Table 6.1
Sample Type: **Fish**
Analysis: Gamma Isotopic
Units: pCi/kg

FISH SAMPLES - GGNS

LLD (pCi/kg)			130	130	260	130	260	130	150
LAB ID	LOCATION	DATE	MN-54	C0-58	FE-59	CO-60	ZN-65	CS-134	CS-137
20020954	FISHUP	11/25/2002	< 19.00	< 20.30	< 58.90	< 27.20	< 59.20	< 14.40	< 21.50
20020955	FISHDOWN	11/25/2002	< 19.80	< 26.10	< 47.00	< 28.00	< 54.50	< 21.00	< 22.60
20020956	FISHUP GG	11/25/2002	< 17.50	< 20.20	< 59.80	< 21.20	< 45.20	< 18.90	< 21.50
20020957	FISHDOWN GG	11/25/2002	< 11.10	< 9.89	< 33.90	< 16.60	< 23.30	< 10.30	< 8.22

“GG” – indicates duplicate sample.

Table 7.1

Sample Type: **Food Products**

Analysis: Iodine-131 and Gamma Isotopic

Units: pCi/kg

VEGETATION SAMPLES (GAMMA) - GGNS

LLD (pCi/kg)			60	60	80
LAB ID	LOCATION	DATE	I-131	CS-134	CS-137
20020258	VEG-CONT	3/29/2002	< 59.70	< 28.50	< 26.60
20020259	VEG-J	3/29/2002	< 50.10	< 48.90	< 42.90
20020539	VEG-CONT	7/9/2002	< 59.30	< 52.00	< 39.80
20020540	VEG-J	7/9/2002	< 57.90	< 48.10	< 41.10
20020796	VEG-CONT	10/10/2002	< 40.90	< 27.20	< 22.60
20020797	VEG-J	10/10/2002	< 59.20	< 36.30	< 39.10
20021038	VEG-CONT	12/16/2002	< 58.10	< 44.30	< 41.00
20021039	VEG-CONT GG	12/16/2002	< 55.40	< 33.80	< 44.90
20021040	VEG-J	12/17/2002	< 57.00	< 23.70	< 28.60
20021041	VEG-J GG	12/17/2002	< 58.60	< 43.40	< 34.80

“GG” – indicates duplicate sample.

Table 8.1

Sample Type: **Special Samples**

Analysis: Gamma Isotopic

Units: pCi/kg

SPECIAL VENISON SAMPLES - GGNS

LLD (pCi/kg)			130	130	260	130	260	130	150
LAB ID	LOCATION	DATE	MN-54	CO-58	FE-59	CO-60	ZN-65	CS-134	CS-137
20020963	VENISON	11/1/2002	< 19.40	< 20.90	< 73.80	< 12.50	< 41.30	<18.80	<17.40

SPECIAL VEGETATION SAMPLES – GGNS

LLD (pCi/kg)Veg			60	60	80
LAB ID	LOCATION	DATE	I-131	CS-134	CS-137
20020798	VEG-SPECIAL	10/10/2002	< 28.10	< 20.70	< 19.40
20021042	VEG-SPECIAL	12/16/2002	< 59.6	< 43.3	< 41.2
20021043	VEG-SPEC GG	12/16/2002	< 59.90	<32.70	< 33.60

Table 9.1

Sample Type: Interlaboratory Comparison

Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
Charcoal Cartridge (pCi/cartridge)	E3236-125	6/13/02	I-131	94.0 ± 16.28	93.4	-0.12	0.358
Water (pCi/liter)	E3049-125	3/14/02	BETA	130 ± 22.5	137	0.98	0.273
	E3047-125	3/14/02	CR-51	198 ± 34.3	209	0.96	0.776
			MN-54	166 ± 28.7	177	1.11	0.605
			FE-59	86.0 ± 14.9	97.8	2.37	0.103
			CO-60	117 ± 20.3	116	-0.10	0.252
			ZN-65	164 ± 28.4	176	1.27	0.432
			I-131	61.0 ± 10.6	58.7	-0.65	0.271
			CS-134	91.0 ± 15.8	89.8	-0.23	0.032
			CS-137	197 ± 34.1	196	-0.06	0.120
			CE-141	242 ± 41.9	241	-0.05	0.024
	E3048-125 (Duplicate)	3/14/02	CR-51	198 ± 34.3	204	0.52	0.955
			MN-54	166 ± 28.7	179	1.36	0.320
			FE-59	86.0 ± 14.9	96.4	2.09	1.264
			CO-60	117 ± 20.3	113	-0.64	0.404
			ZN-65	164 ± 28.4	176	1.30	0.864
			I-131	61.0 ± 10.6	62.7	0.47	0.504
			CS-134	91.0 ± 15.8	89.0	-0.37	0.435
			CS-137	197 ± 34.1	202	0.41	0.420
			CE-141	242 ± 41.9	243	0.05	0.073
	E3235-125	6/13/02	H-3	6970 ± 1207	7298	0.82	0.217
Air Filter (pCi/filter)	E3323-125	9/12/02	BETA	69.0 ± 11.95	73.4	1.11	0.094
	E3382-125	9/12/02	CR-51	171 ± 29.6	178	0.68	1.105
			MN-54	115 ± 19.9	132	2.61	0.308
			CO-58	73.0 ± 12.6	77.2	1.00	0.372
			FE-59	67.0 ± 11.6	80.8	3.57 d	0.062
			CO-60	112 ± 19.4	124	1.86	0.422
			ZN-65	141 ± 24.4	156	1.84	0.628
			CS-134	99.0 ± 17.2	99.4	0.08	0.024
			CS-137	95.0 ± 16.5	103	1.46	0.249
			CE-141	120 ± 20.8	133	1.83	0.148

Table 9.1

Sample Type: **Interlaboratory Comparison**

Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Sample Type (units)	Study	Date	Analysis	"Known" Value ^a	RBS Value	RBS N-DEV ^b	RBS N-RANGE ^c
Sediment (pCi/gram)	E3383-125	9/12/02	CR-51	0.354 ± 0.061	0.366	0.603	0.818
			MN-54	0.238 ± 0.041	0.266	2.038	0.347
			CO-58	0.151 ± 0.026	0.159	0.956	0.196
			FE-59	0.138 ± 0.024	0.150	1.464	0.300
			CO-60	0.232 ± 0.040	0.243	0.846	0.229
			ZN-65	0.293 ± 0.051	0.330	2.207	0.403
			CS-134	0.205 ± 0.036	0.204	-0.056	0.288
			CS-137	0.282 ± 0.049	0.323	2.539	0.105
			CE-141	0.249 ± 0.043	0.272	1.577	0.735

NOTES:

- (a) The "known" values are listed with a range reflecting control (3 sigma) limits.
- (b) The normalized deviation from the "known" value is computed from the deviation and the standard error of the mean; ± 2.000 is the warning limit and ± 3.000 is the control limit. This is a measure of accuracy of the analytical methods.
- (c) The normalized range is computed from the mean range, the control limit, and the standard error of the range; $+2.000$ is the warning limit and $+3.000$ is the control limit. This is a measure of precision of the analytical methods.
- (d) The results reported were out of the control limits.

Table 9.1

Sample Type: **Interlaboratory Comparison**

Analysis: Gross Beta, Tritium, Iodine-131 and Gamma Isotopic

Exceptions:

There was one result outside the control limits for accuracy in the 2002 cross check program participation studies. This result was in a gamma isotopic analysis of a air particulate filter sample.

The study result outside the control limits for accuracy was in the analysis of the nuclide Fe-59 in sample study 3382-125 of 9/12/2002. RBS normalized-deviation for the analysis was +3.57 with control limits of ± 3.00 . This high bias result is considered conservative and is considered as having no impact on past results of the program. The bias high result for Fe-59 is contributed to coincidence summing effects present in the calibration curve. A coincidence summing correction was employed in the past, but was discontinued due to the production of non-conservative low-bias results. Fe-59 results were all within control limits in other cross check samples for the year 2002.