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April 28, 1993

U.S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Annual Radiological Environmental Operating
Report for 1992

GNRO-93/00055

Gentlemen:

In accordance with the Grand Gulf Nuclear Station Unit 1
Technical Specifications 6.9.1.6 and 6.9.1.7, attached is the
Annual Radiological Environmental Operating Report for the
period January 1, 1992 through December 31, 1992.

Yours truly,

C. R. Hutchinson
Vice President, Operations GGNS

JEO/mtc

attachment: Annual Radiological Environmental Operating
Report

cc: (See Next Page)

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April 28, 1993
GNRO-93/00055
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GRAND GULF NUCLEAR STATION

1992 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

GRAND CULM PROJECT STUDY
ENVIRONMENTAL IMPACT STATEMENT
ENVIRONMENTAL IMPACT STATEMENT REPORT

SUMMARY

The Annual Radiological Environmental Operating Report (AREOR) presents Grand Gulf Nuclear Station (GGNS) Environmental Surveillance Program (ESP) data obtained through analyses of environmental samples collected for the period January 1, 1992 through December 31, 1992. The AREOR fulfills the requirements of GGNS Technical Specifications 6.9.1.6 and 6.9.1.7.

ENVIRONMENTAL SURVEILLANCE PROGRAM

GGNS established the ESP in 1978 before the station became 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, milk, water, vegetation, sediment and fish, as well as measuring radiation directly.

The ESP includes sampling indicator and control locations within an 18-mile radius of the plant. The ESP 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 1992, GGNS personnel collected 1458 environmental samples and had them analyzed for radioactivity. They compared results of indicator locations with control locations and previous studies, and concluded that no significant relationship exists between GGNS operation and effect on the plant environs. Their review of 1992 data, in many cases showed undetectable radiation levels in the environment and near background levels in significant pathways associated with GGNS. Therefore, they concluded that GGNS operation has had no harmful effects or irreversible damage to the environment.

ATTACHMENTS

Attachment I contains results of air, milk, water, vegetation, sediment and fish samples collected in 1992 and analyzed by Entergy Services, Inc., (ESI) System Chemistry Section. It also includes ESI System Chemistry's results in the Environmental Protection Agency (EPA) Interlaboratory Comparison Program.

Attachment II contains results of thermoluminescent dosimeters (TLDs) collected in 1992 and analyzed by Teledyne Isotopes.

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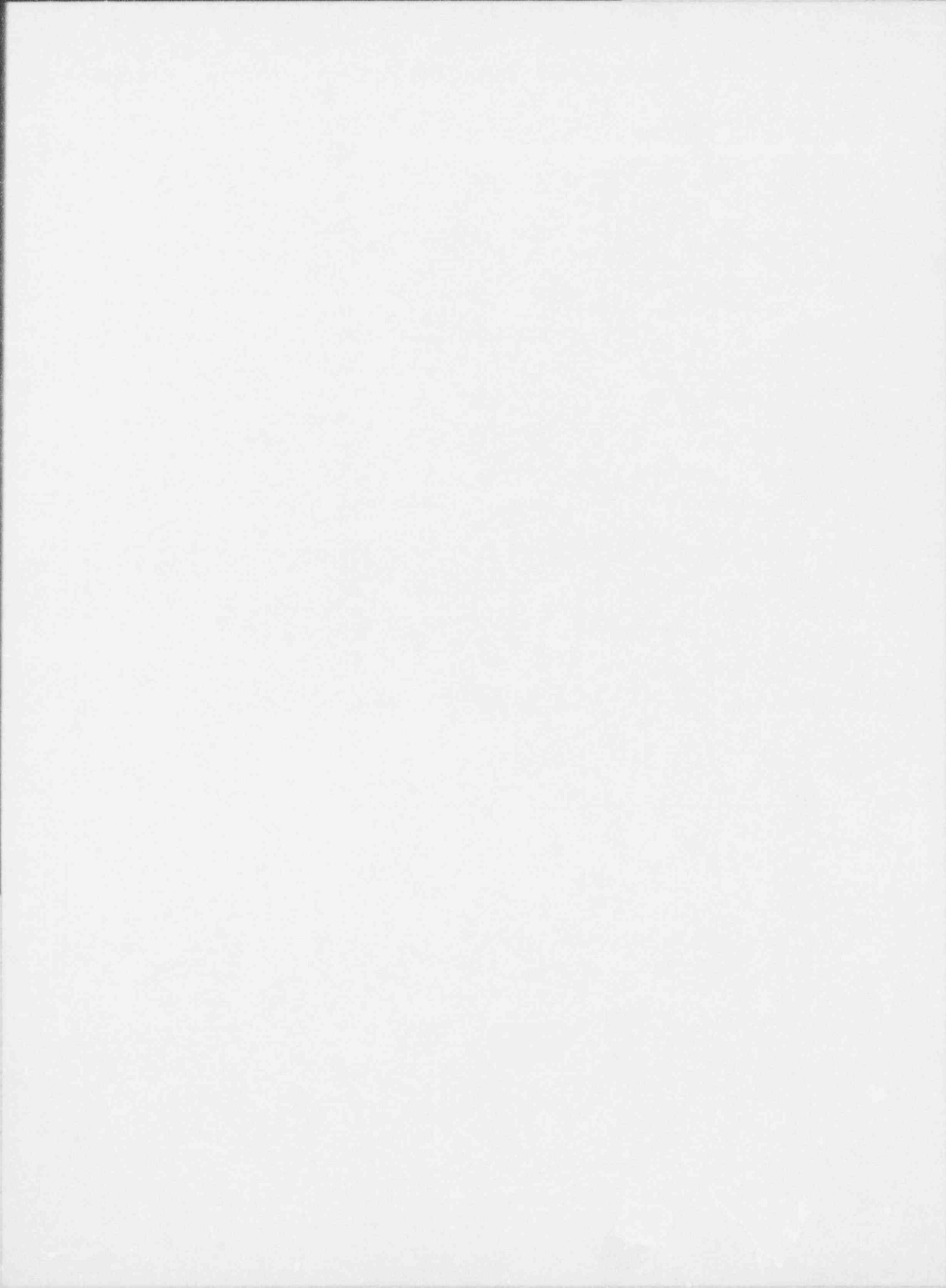
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I	1992 Environmental Sampling and Analytical Report	I-i
II	1992 Thermoluminescent Dosimetry Report	II-i

SECTION 1.0

INTRODUCTION



INTRODUCTION

1.1 RADIATION

Natural radiation affects all people. Natural radiation exposure comes from the sun, naturally occurring radioactive materials present in the earth, dwelling structures, food and water, air and our bodies. Levels of natural or background radiation vary greatly from location to location. For example the average United States resident receives approximately 300 millirem in a year from natural background as shown in Table 1-1. Also, if an individual lives in Denver as shown in Figure 1-1, an additional 80 - 81 millirem could be expected; thereby total exposure would be 380 millirem in a year. Man-made sources, including X-rays, radiation medical treatment, fallout from nuclear explosives testing, and radioactive materials from nuclear power plants, contribute additional exposure. However, Table 1-1 and Figure 1-1 show that an individual receives the major portion of dose from natural background and other sources, with nuclear power plants contributing the least.

1.2 BENEFITS OF RADIATION

Uranium used in nuclear power plays an important part in meeting today's electricity needs, and it will continue to serve as an important source of energy well into the future. Also, other uses for radiation have benefited our everyday lives during the past 20 or 30 years. Industries use radioisotopes and controlled radiation to sterilize medical supplies, to improve food preservation, in industrial processes, in medical science, and in the study of environmental pollution, agriculture and hydrology. The public receives its main exposure to man-made radiation from medical diagnosis and treatment sources, but the benefit in terms of human lives and health is enormous.

1.3 SAFETY OF RADIATION

Radiation and the safety of radiation command considerable public attention. Although it is not generally realized, safety regulations for radioactive materials are much stricter than for other potentially dangerous substances. For example, a person living near a 1000 megawatt electrical (MWe) coal fired plant could receive 7.2 millirem in a year from the naturally occurring radioactive materials contained in the coal that is burnt. A person living adjacent to a similar sized nuclear plant could expect to receive less than 1.0 millirem in a year.

In addition, radioactive elements lose their radioactivity, and resulting toxicity with time. Potentially toxic non-radioactive materials, such as lead, silver and mercury, can remain to be a problem until properly treated and stabilized. Table 1-1 presents illustrations of relative radiation exposure risks as compared to other health risks.

1.4 PURPOSE AND DESIGN CRITERIA OF THE ENVIRONMENTAL SURVEILLANCE PROGRAM

GGNS established the ESP to minimize any associated radiation endangerment to human health or the environment by ensuring that plant operating controls function properly. The ESP purpose involves:

- Evaluating environmental sampling procedures, equipment and techniques
- Measuring radiation levels and their variations in environmental media in the area surrounding the plant
- Determining average levels of radiation and radioactive material in various environmental media
- Detecting effects, if any, of GGNS operation on the environmental radiation levels and concentrations.

The ESP design criteria includes:

- 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.

1.5 DOSE PATHWAYS ASSOCIATED WITH GGNS

Figure 1-2 shows potential exposure pathways that could occur as a result of a nuclear power plant. However, direct dose from gaseous effluent and thyroid dose from ingesting milk involves the most significant environmental dose pathways from a nuclear power station. GGNS operations have little, if any, impact on these pathways due to very low levels of radiation released, remote location and absence of milking animals within five miles of GGNS. In addition, the GGNS Final Environmental Report lists the first use of drinking water from the Mississippi River as more than 200 miles downstream. Therefore, GGNS operations have little, if any, impact on this pathway.

1.6 PATHWAYS MONITORED

The ESP includes the sampling program for monitoring airborne, waterborne, ingestion and direct radiation pathways as required by the Offsite Dose Calculation Manual (ODCM) Specifications. GGNS

supplements this program with additional sampling in order to provide a comprehensive and well-balanced program. Tables 1-2 through 1-5 provide a description of the GGNS ESP sample locations. Only sample locations required by ODCM Specifications are keyed to Figures 1-3 and 1-4 as shown in the Tables.

1.7 PREVIOUS DATA COMPARISON

GGNS personnel observed no significant changes between 1992 results and those from previous years. Results remained at levels similar to those of previous years. Such results confirm proper functioning of GGNS effluent controls and equipment.

TABLE 1-1
RADIATION RISKS

Radiation Risks in Perspective

Radiation Dose Comparisons

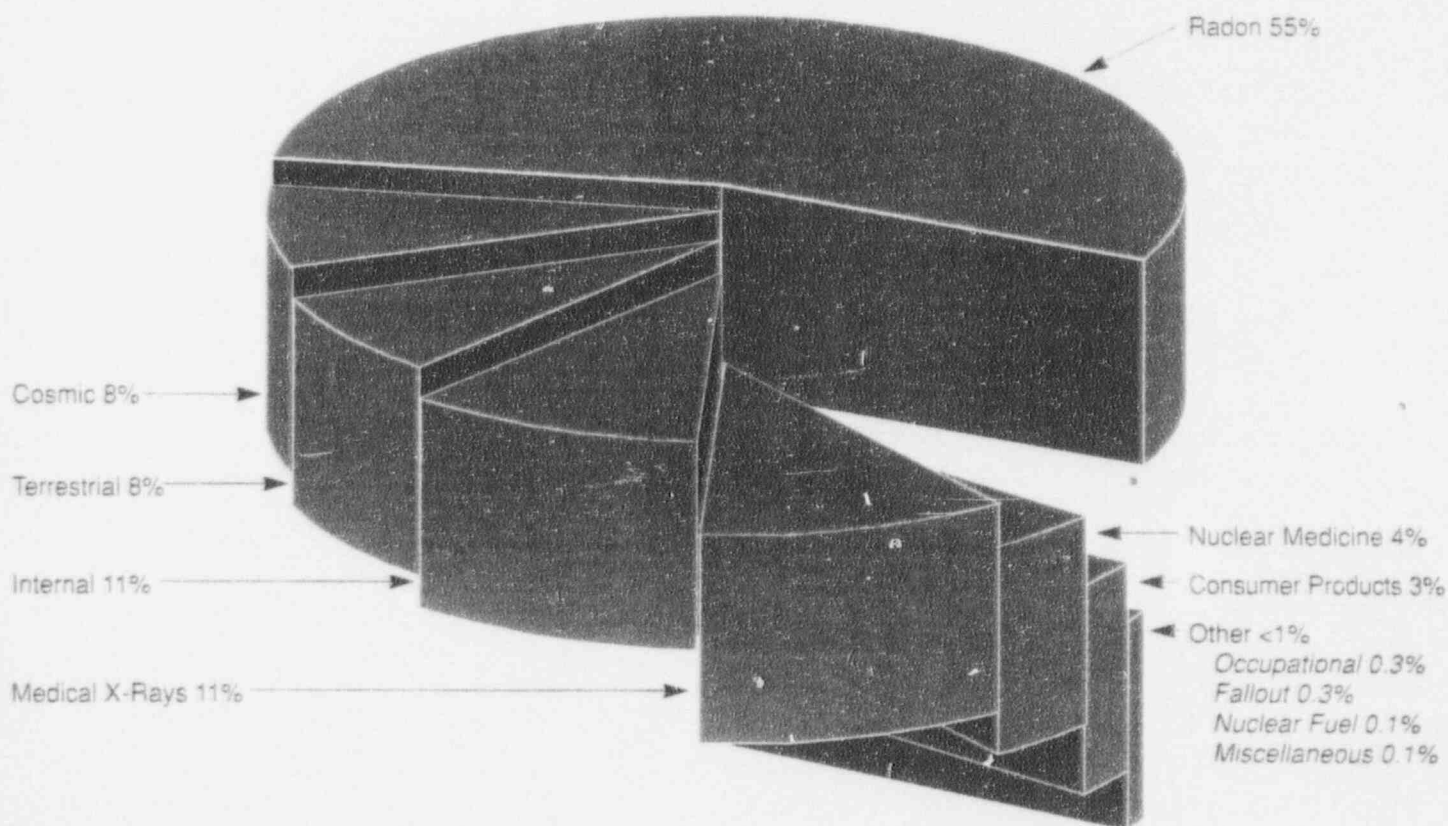
	Approximate MREM/Year
Natural Background	
Average U.S. Resident	300
Average Denver Resident.....	380
Radon in average households	
New York/New Jersey	360
Massachusetts.....	475
Medical Exposure	
Average U.S. Citizen	50
Typical Medical Examination	
Dental X-Rays (Full Mouth)	3,000 (Skin)
Chest X-Rays	10 (Bone)
Gastro-Intestinal Series (Upper & Lower).....	1,400 (Bone)
Occupational Exposure	
Average Pilgrim Station	
Radiation Worker (since 1980)	600 MREM/Year

Estimated Loss of Average Life

Expectancy From Various Health Risks

Health Risk	Estimated Days of Life Expectancy Lost (average)
Smoking 20 Cigarettes/Day	2370 (6.5 years)
Overweight (by 20%).....	985 (2.7 Years)
All Accidents Combined.....	435 (1.2 Years)
Auto Accidents.....	200
Alcohol Consumption (U.S. Average)	130
Home Accidents	95
Drowning	41
Natural Background Radiation.....	8
Medical Diagnostic X-Rays (U.S. Average)	3
All Catastrophes (Earthquake, Etc.)	3.5
One REM Radiation	1

Background Radiation Sources



The percentage contribution of various radiation sources to the total average effective dose equivalent in the U.S. population.

TABLE 1-2
AIR SAMPLE LOCATIONS

<u>AIR SAMPLE NUMBER</u>	<u>FIGURE</u>	<u>LOCATION</u>
AS-1 PG	1-4	Southeast of GGNS at the Port Gibson City Barn (Sector G, Radius 5.5 miles)
AS-3 61VA	1-4	North-northeast of GGNS on Hwy 61, north of the Vicksburg Airport (Sector B, Radius 18 miles)
AS-4 GJOE	Not Shown	Southwest of GGNS, Glodjo property on Bald Hill Road (Sector L, Radius 0.9 miles)
AS-5 TC	Not Shown	South of GGNS behind the Support Services Center (Sector J, Radius 0.4 miles)
AS-6 RS	1-3	Northeast of GGNS, south side of Grand Gulf Road (Sector C, Radius 0.5 miles)
AS-7 MT	1-3	North of GGNS, located next to the Meteorological Tower (Sector A, Radius 0.8 miles)
AS-8 WR	1-3	East of GGNS, located at former site of Maggie Jackson's trailer on Bald Hill Road near the eastern SITE BOUNDARY (Sector E, Radius 0.6 miles)
AS-10 HR*	Not Shown	Near County Road/Heavy Haul Road intersection (Sector P, Radius 0.8 miles)
AS-11 BB*	Not Shown	Near influent end of Basin B (Sector M, Radius 0.3 miles)

* Moved from Louisiana to Mississippi on 3-30-92, which changed station identification from AS-10 NLT and AS-11 STJ to AS-10 HR and AS-11 BB, respectively.

TABLE 1-3
Page 1 of 5
TLD LOCATIONS

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-00	Maintained in lead shield during the exposure period	-	-	-
M-01	Across the road from the Lake Claiborne entry gate	1-3	E	3.5
M-07	Port Gibson City Barn, AS-1	1-4	G	5.5
M-09	Warner Tully Camp	1-3	D	3.5
M-10	Grand Gulf Military Park	1-3	A	1.5
M-14 (Control)	Hwy 61, AS-3-61VA, north of Vicksburg Airport	1-4	B	18.0
M-16	AS-7 MT, Meteorological Tower	1-3	A	0.8
M-17	AS-6-RS, Grand Gulf Road	1-3	C	0.5
M-19	Behind burn pit on fence at eastern SITE BOUNDARY	1-3	E	0.5
M-20	Hazardous Waste Storage Area	1-3	F	0.5
M-21	AS-5-TC, Support Services Center	1-3	J	0.4
M-22	Former RR entrance crossing	1-3	G	0.5
M-23	County Road/Heavy Haul Road 50 yards north on power pole	1-3	Q	0.5
M-25	Radial Well Number 1	1-3	N	1.6
M-27	South point SITE BOUNDARY 200 yards along property line	1-3	M	1.5
M-28	AS-4-GJOE, Glodjo residence	1-3	L	0.9

TABLE 1-3
Page 2 of 5
TLD LOCATIONS

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-31	Duplicate TLD installed quarterly at varying locations	-	-	-
M-32	Duplicate TLD installed quarterly at varying locations	-	-	-
M-33	Newellton, Louisiana, Water Tower	1-4	P	12.5
M-36	Curve on 608, point nearest GGNS at power pole	1-3	P	5.0
M-38	Lake Bruin State Park, second pole	1-4	M	9.5
M-39	St. Joseph, Louisiana, Aux. Water Tank	1-4	M	13.0
M-40	International Paper Road, 5 miles from site	1-3	M	5.0
M-41	Radial Well Number 4	1-3	P	1.5
M-45	Old Visitor Center gate	1-3	D	0.5
M-47	Bridge 0.6 miles west of Rodney Westside Road/ Mont Gomer Road intersection, north side	1-4	L	5.2
M-48	Property line fence 0.4 miles on Mont Gomer Road on West side	1-3	K	4.8
M-49	Fork in Weathers Road	1-3	H	4.5
M-50	Panola Hunting Club entrance	1-4	B	5.5

TABLE 1-3
Page 3 of 5
TLD LOCATIONS

<u>TLD NO</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-51	Ingelside/Deer Camp Road intersection	1-3	C	4.2
M-55	Behind Bonner's Beauty Shop at MSDH air sampler	1-3	D	5.0
M-56	A.W. Watson Elementary and Junior High School	1-3	G	4.2
M-57	Hwy 61, behind the Welcome to Port Gibson sign at Glensdale Subdivision	1-3	F	4.5
M-58	Hwy 61, Big Bayou Pierre bridge, southeast end	1-3	E	5.0
M-59	Off levee at Winter Quarters Hunting camp	1-4	N	5.1
M-60	Duplicate TLD installed quarterly at varying locations	-	-	-
M-61	Protected area fence	Not Shown	D	Onsite
M-62	Protected area fence	Not Shown	E	Onsite
M-63	Protected area fence	Not Shown	N	Onsite
M-64	Protected area fence	Not Shown	M	Onsite
M-65	Protected area fence	Not Shown	L	Onsite
M-66	Protected area fence	Not Shown	K	Onsite

TABLE 1-3
Page 4 of 5
TLD LOCATIONS

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-67	Protected area fence	Not Shown	J	Onsite
M-68	Protected area fence	Not Shown	H	Onsite
M-69	Protected area fence	Not Shown	G	Onsite
M-70	Protected area fence	Not Shown	F	Onsite
M-71	Protected area fence	Not Shown	C	Onsite
M-72	Protected area fence	Not Shown	B	Onsite
M-74	Protected area fence	Not Shown	P	Onsite
M-76	Protected area fence	Not Shown	A	Onsite
M-77	Protected area fence	Not Shown	R	Onsite
M-81	Administration Building	Not Shown	Q	Onsite
M-86	Bechtel gate north SITE BOUNDARY	1-3	B	0.5
M-88	River mile marker 409.5	1-3	A	4.2
M-89	Middle Ground Island	1-3	R	4.4
M-90	Across from Middle Ground Island	1-3	Q	3.5

TABLE 1-3
Page 5 of 5
TLD LOCATIONS

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-91	Transmission line by pond	1-3	J	4.5
M-92	Fence behind orchard	1-3	K	0.4
M-93	Underground cable sign	1-3	H	0.4
M-93	Sector R garden	1-3	R	0.8

TABLE 1-5
Page 1 of 2
MILK AND WATER LOCATIONS

<u>MILK</u>	<u>FIGURE</u>	<u>LOCATION</u>
Alcorn State University	1-4	Located south-southwest of GGNS (Sector K, Radius 10.5 miles)
<u>CISTERN WATER</u>		
McGee Cistern	1-3	Located north of GGNS at the McGee house (Sector A, Radius 0.9 miles)
Willis Cistern	1-4	Located at the C. J. Willis house east-northeast of GGNS across from the Shiloh Baptist Church (Sector D, Radius 6.0 miles)
<u>SURFACE WATER</u>		
Upstream	1-3	4500 ft upstream of the GGNS discharge point into the Mississippi River to allow adequate mixing of the Mississippi and Big Black Rivers (Sector Q-R, 1.8 miles)
Downstream	1-3	5000 ft downstream of the GGNS discharge point into the Mississippi River near Radial Well No. 1 (Sector N, 1.6 miles)
Discharge Basin	1-3	West-northwest of GGNS in parking lot (Sector P, 0.3 miles)

TABLE 1-4
Page 2 of 2
MILK AND WATER LOCATIONS

<u>GROUNDWATER</u>	<u>FIGURE</u>	<u>LOCATION</u>
PGWELL	1-3	PORT GIBSON WELLS - Taken from distribution system or one of the five wells (Sector G, Radius 5.0 miles)
AAWELL	1-3	Arnold Acres Trailer Park, inactive (Sector J, Radius 1.1 miles)

TABLE 1-5
Page 1 of 2
VEGETATION, SEDIMENT AND FISH LOCATIONS

<u>VEGETATION</u>	<u>FIGURE</u>	<u>LOCATION</u>
Broadleaf Vegetation	1-3	South of GGNS near the Support Services Center (Sector J, 0.4 miles)
	1-3	North-northwest of GGNS near the Meteorological Tower (Sector R, 0.8 miles)
	1-4	Alcorn State University south-southwest of GGNS (Sector K, 10.5 miles) when available, otherwise a location 15-30 km distant
<u>SEDIMENT</u>		
SEDHAM	1-3	Downstream of the GGNS discharge point into the Mississippi River in the vicinity of the boat landing near Hamilton Lake outfall (Sector N, 2.0 miles)
SEDBAR	Not Shown	Barge slip (Sector Q, 1.5 miles)
SEDCONT	Not Shown	Upstream from the GGNS discharge point into the Mississippi River in the vicinity of upper Grand Gulf Landing (Sector R, 2.0 miles)

TABLE 1-5
Page 2 of 2
VEGETATION, SEDIMENT AND FISH LOCATIONS

<u>FISH</u>	<u>FIGURE</u>	<u>LOCATION</u>
Commercially or recreationally important species	1-3	Downstream of the GGNS discharge point into the Mississippi River
	1-3	Upstream of the GGNS discharge point into the Mississippi River uninfluenced by the plant operations

FIGURE 1-1
RADIATION SOURCES

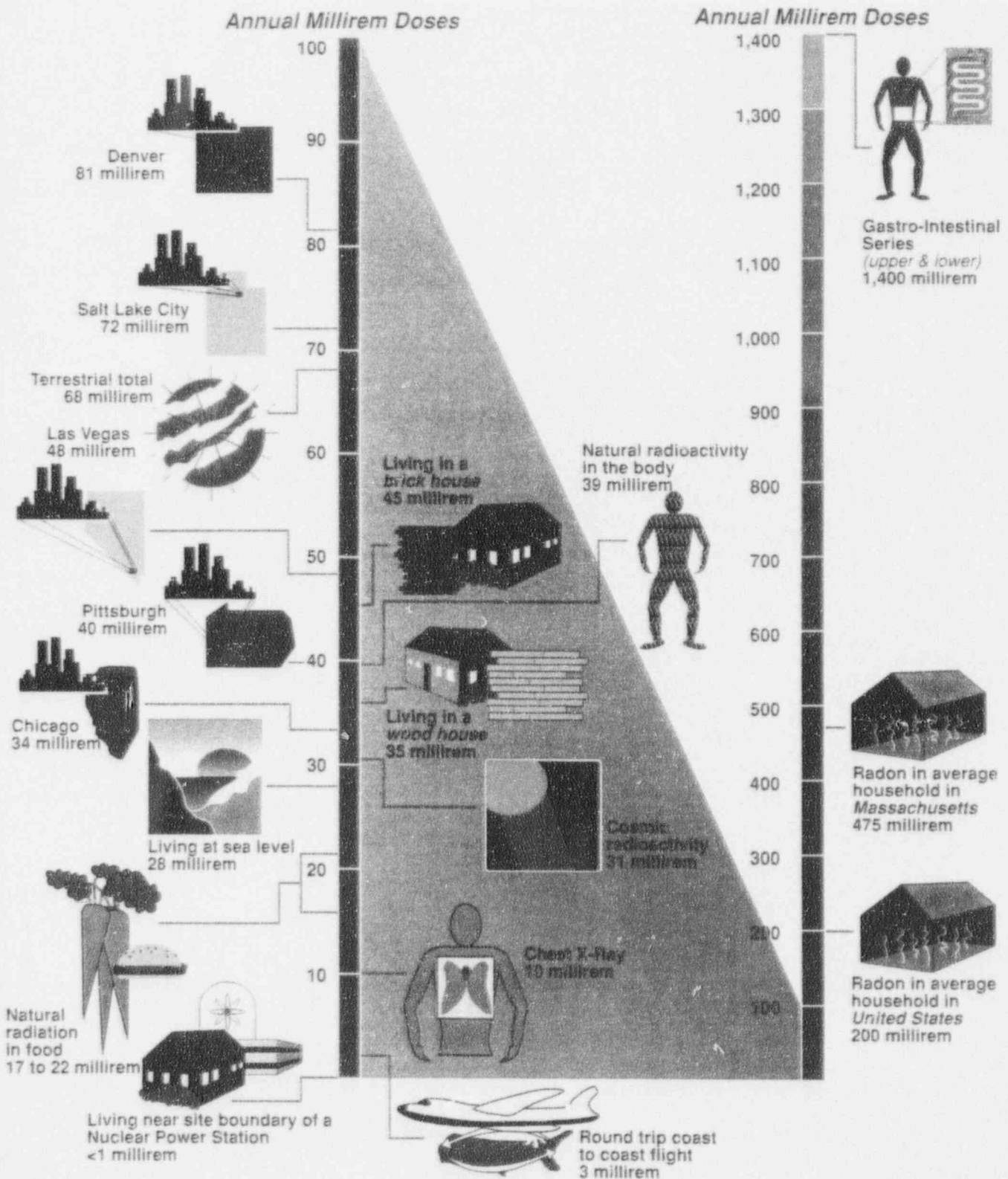


FIGURE 1-2

EXPOSURE PATHWAYS

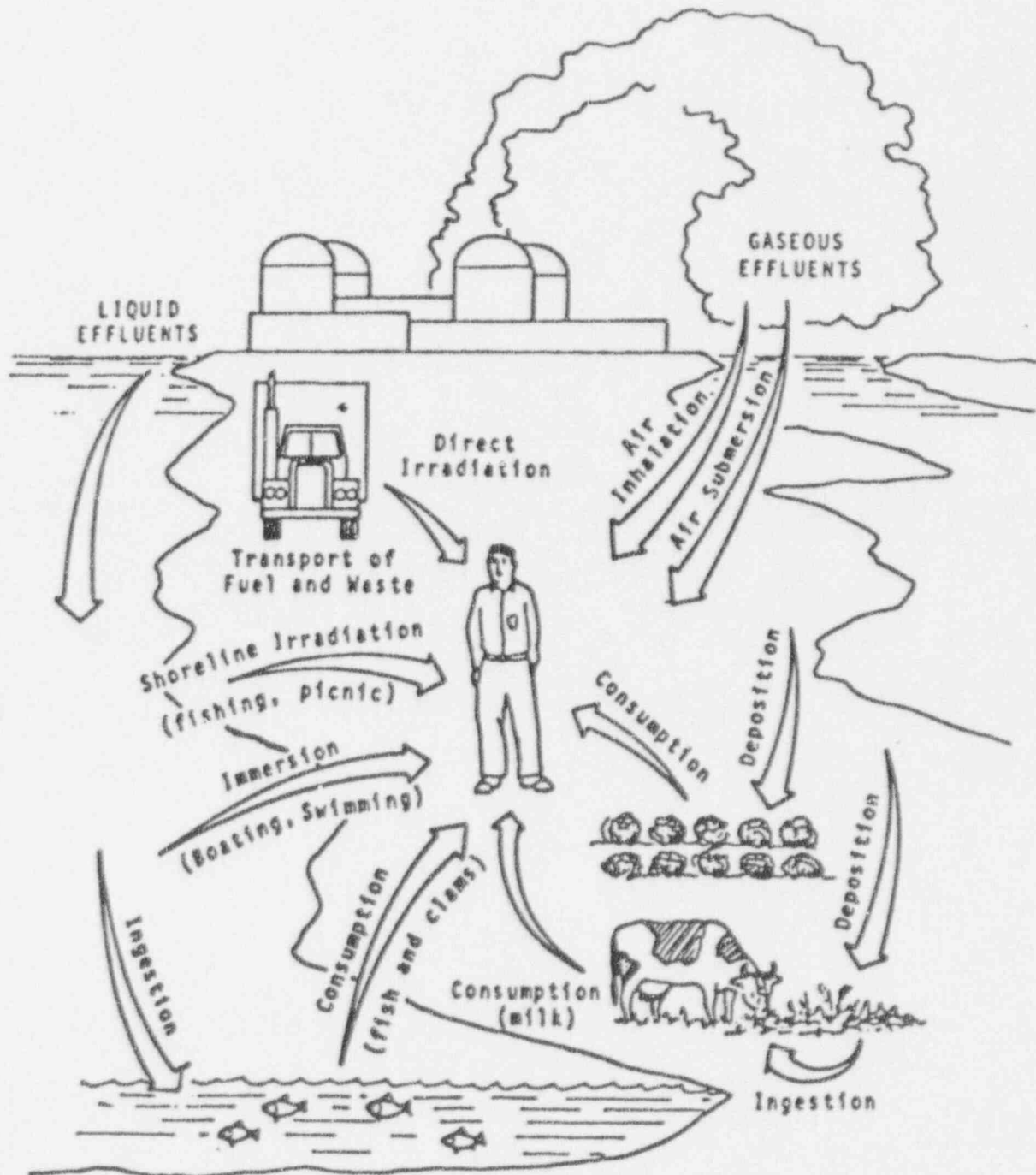


FIGURE 1-3
SAMPLE COLLECTION SITES
(5-MILE MAP)

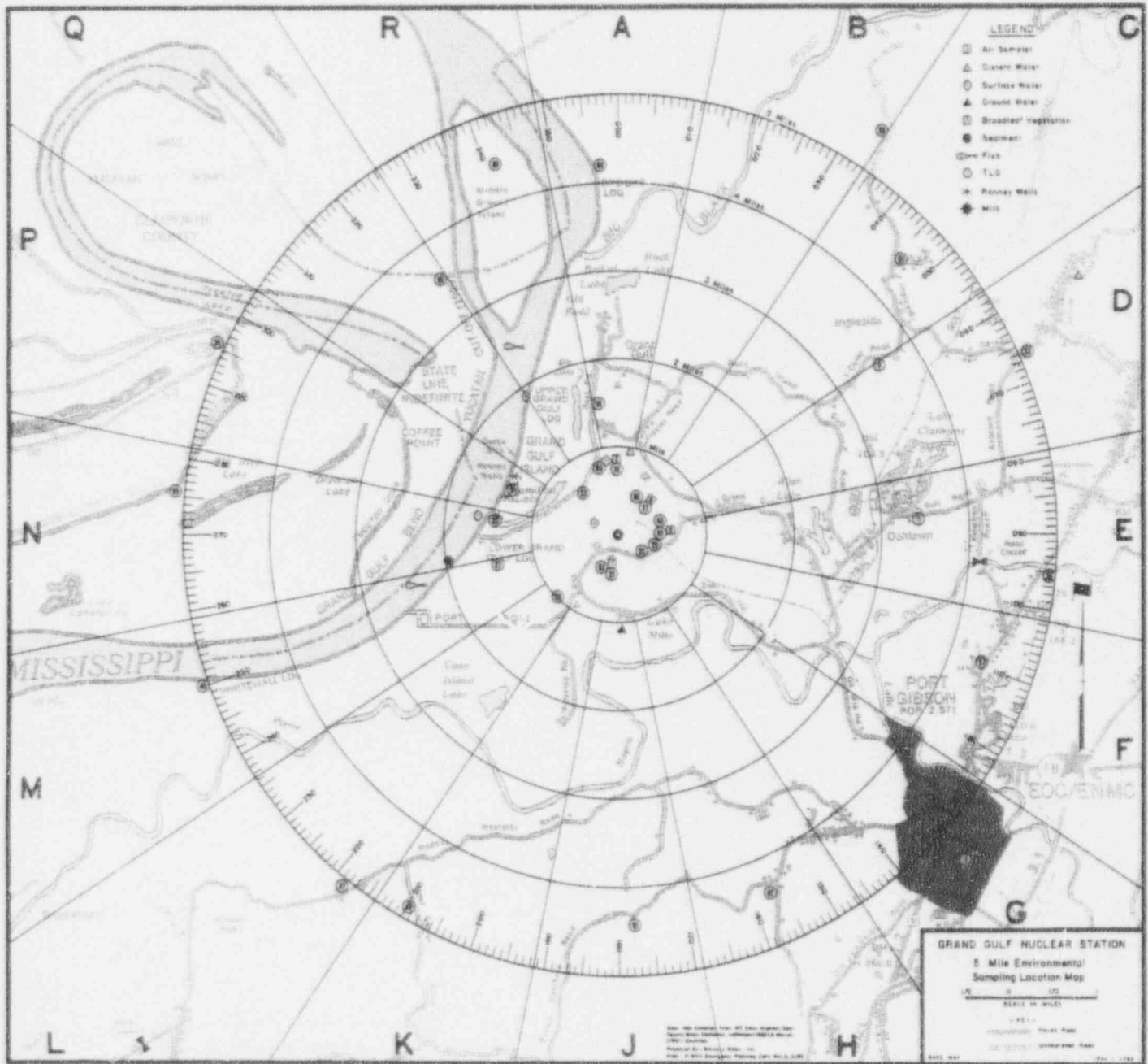
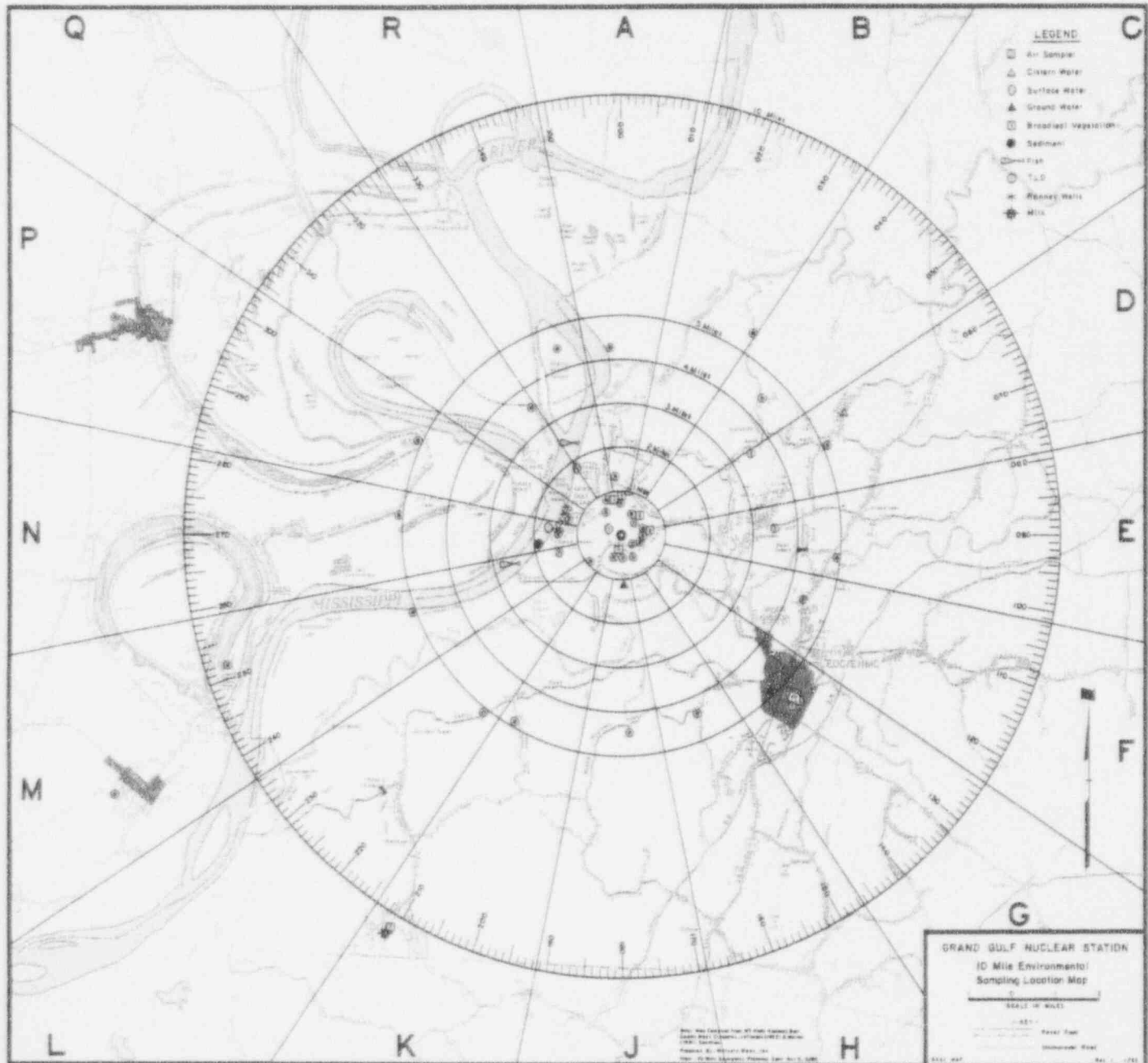


FIGURE 1-4
SAMPLE COLLECTION SITES
(10-MILE MAP)



SECTION 2.0

ENVIRONMENTAL SURVEILLANCE PROGRAM

- **INTERPRETATIONS AND TRENDS OF RESULTS**
 - **PROGRAM DESCRIPTION**
-

2.1 AIR PARTICULATES AND RADIOIODINES

NOTE: Analytical results presented in Tables 1.1 through 1.15 of Attachment I and summarized in Section 4.0.

2.1.1 INTERPRETATIONS AND TRENDS OF RESULTS

Air particulate and Iodine-131 results for 1992 compare similarly to those obtained in previous years of the operational and preoperational ESP. Iodine-131 remained undetectable with gross beta concentrations for ODCM Specification indicator locations ranging from .004 - .046 pCi/m³ with a mean of .016 pCi/m³ as compared to ODCM Specification control locations which ranged from .004 - .063 pCi/m³ with a mean of .016 pCi/m³. These results indicate the airborne exposure pathway has not been affected by the operation of GGNS and that airborne concentrations continue to be at background levels.

Gross beta concentrations shown in Figure 2-1 further emphasize that GGNS has had no influence on ambient radiation levels. This figure shows 1992 monthly average results compared to preoperational results and 1985 through 1992 yearly average results for indicator locations compared to controls. Values compare similarly over the period.

2.1.2 PROGRAM DESCRIPTION

The GGNS ESP utilizes nine continuous air samplers to provide gross beta, gamma and radioiodine activity measurements by the airborne exposure pathway. These air samplers range in distances from 0.3 to 18 miles (Figures 1-3 and 1-4, and Table 1-2). Five air samplers met the requirements of ODCM Specification 4.12.1, located as follows:

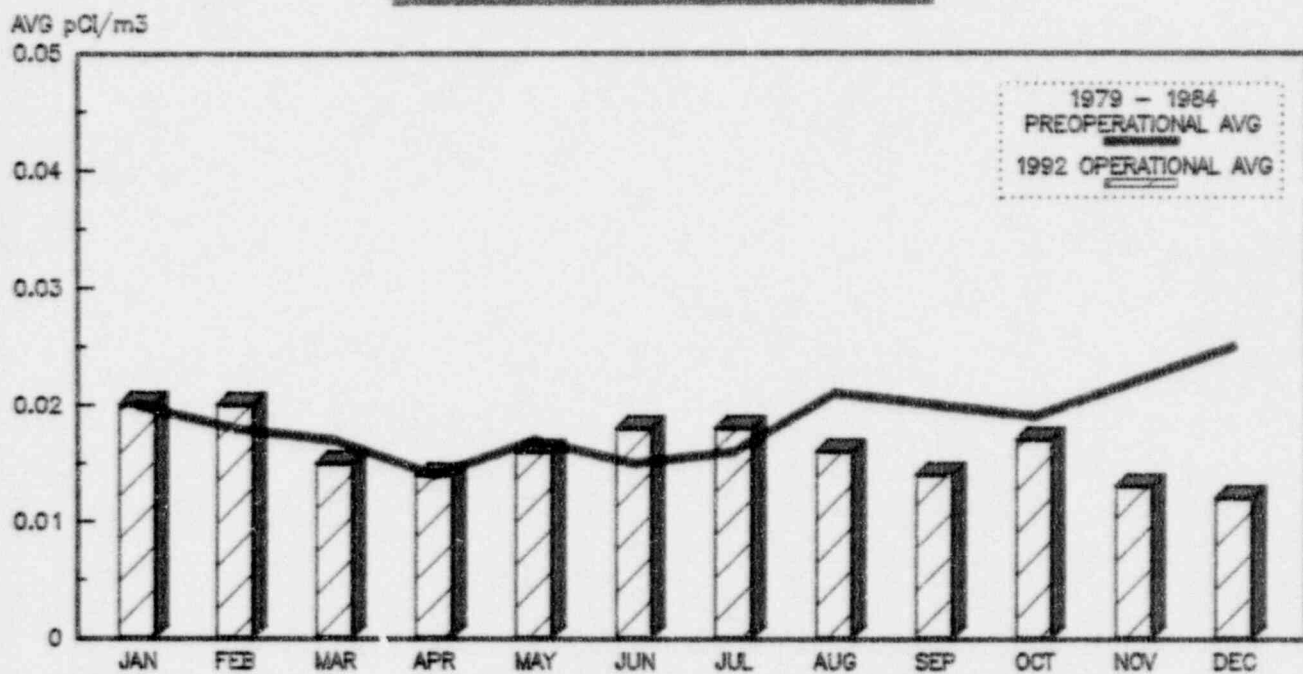
- Three near the SITE BOUNDARY in areas of the highest calculated annual average groundlevel D/Q values
- One in a community that has the highest calculated annual average groundlevel D/Q value (Port Gibson)
- One in a control location (Vicksburg, MS).

GGNS personnel located the remaining four air samplers in areas which provide supplemental data for the ESP.

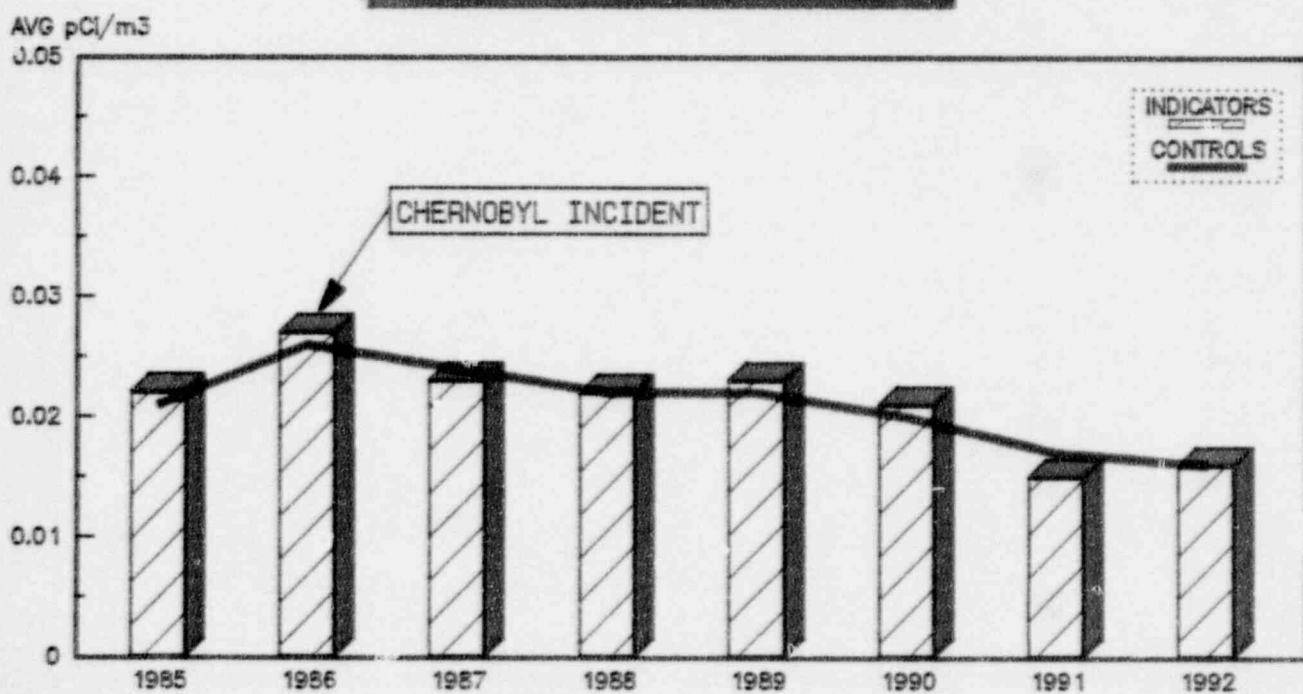
GGNS personnel placed air samplers one meter above the ground in weatherproof houses, with a 2-inch glass fiber filter in the intake line of the vacuum pump and a 2 x 1-inch charcoal cartridge located directly downstream. GGNS personnel maintained air flow at 1.25 cubic feet per minute. They changed filters and cartridges weekly and had them analyzed for gross beta radionuclides and radioiodine activity, respectively. The analytical contractor analyzed quarterly composites of air filters for gamma radionuclides.

FIGURE 2-1
AIR SAMPLE GROSS BETA CONCENTRATIONS

1992 GROSS BETA RESULTS
ODCM SPECIFICATIONS INDICATORS



1985 - 1992 GROSS BETA RESULTS
ODCM SPECIFICATIONS LOCATIONS



2.2 THERMOLUMINESCENT DOSIMETRY

NOTE: Analytical results presented in Attachment II and summarized in Section 4.0.

2.2.1 INTERPRETATIONS AND TRENDS OF RESULTS

Gamma radiation dose in 1992 compared similarly to that obtained in previous years as illustrated in Table 2-1. This indicates that the ambient radiation levels remained at or near background and have been uninfluenced by the operation of GGNS.

Figure 2-2, which further represents this conclusion, shows 1992 quarterly average results compared to 1979-1984 preoperational data and 1985 - 1992 annual average results for indicator locations compared to the Vicksburg control. This figure indicates that ambient radiation levels have remained at or near background levels.

As in previous years, GGNS personnel performed an independent verification of the accuracy of GGNS TLD results through the use of NRC TLDs. Figure 2-3 presents NRC and GGNS results through the third quarter of 1992. The ESP collects consistent, valid data based on the similarity of TLD results.

2.2.2 PROGRAM DESCRIPTION

The ESP measures ambient radiation in the environment surrounding GGNS with 59 TLD cards (calcium sulfate:dysprosium phosphor dosimeters) to provide a quantitative measurement of the area radiation levels. GGNS personnel placed these environmental TLDs at distances from 0 to 18 miles (Figures 1-3 and 1-4, and Table 1-3). They collected dosimeters quarterly.

The ESP used the following criteria in establishing TLD locations:

- ODCM Specification 4.12.1 requires 40 TLDs, positioned as outlined below:
 - An inner ring of 16 stations in the general area of the site boundary with one TLD in each meteorological sector
 - An outer ring of 16 stations approximately in the 3- to 5-mile range with one TLD in each meteorological sector
 - Eight TLDs located in special interest areas such as population centers and residences or utilized as controls.
- Sixteen permanent TLD stations at the protected area boundary.
- The remaining 3 TLDs utilized as duplicates at varying locations.

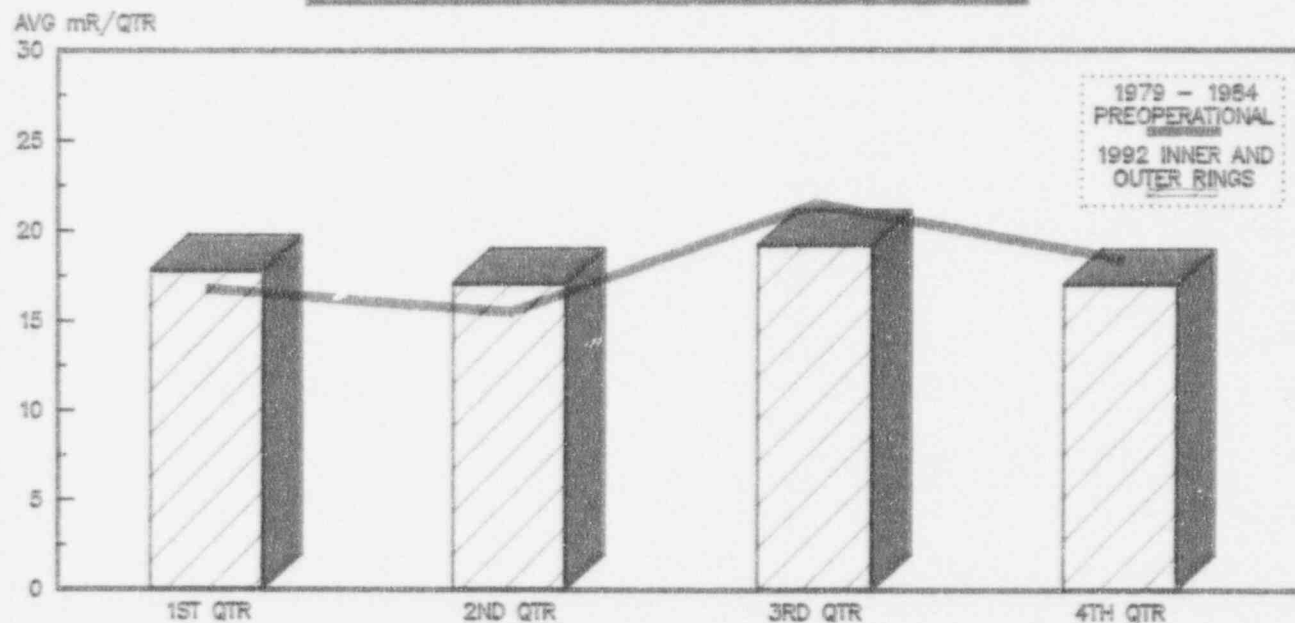
TABLE 2-1

1985-1992 AVERAGE TLD DOSE RATES

Year	Inner Ring Within 2-Mile Radius (mR/Qtr)	Outer Ring, Within 6-Mile Radius (mR/Qtr)	Special Interest Areas (mR/Qtr)	Control (M-14) mR/Qtr	On-Site (Protected Area Boundary) (mR/Qtr)
1985	16.1	16.6	17.0	20.1	20.0
1986	18.6	18.3	18.4	19.8	21.3
1987	18.3	17.7	17.9	18.8	21.8
1988	17.8	16.7	17.3	17.5	22.8
1989	18.0	17.6	18.5	18.2	20.9
1990	17.2	17.0	17.6	17.5	20.7
1991	18.1	17.9	17.8	18.0	23.7
1992	17.6	17.9	17.3	17.4	28.4

FIGURE 2-2
TLD RADIATION DOSE

1992 TLD RESULTS
INNER AND OUTER RINGS ODCM SPECIFICATIONS
WITHIN SIX (6) MILE RADIUS



1985 - 1992 TLD RESULTS
INNER AND OUTER RINGS ODCM SPECIFICATIONS
WITHIN SIX (6) MILE RADIUS

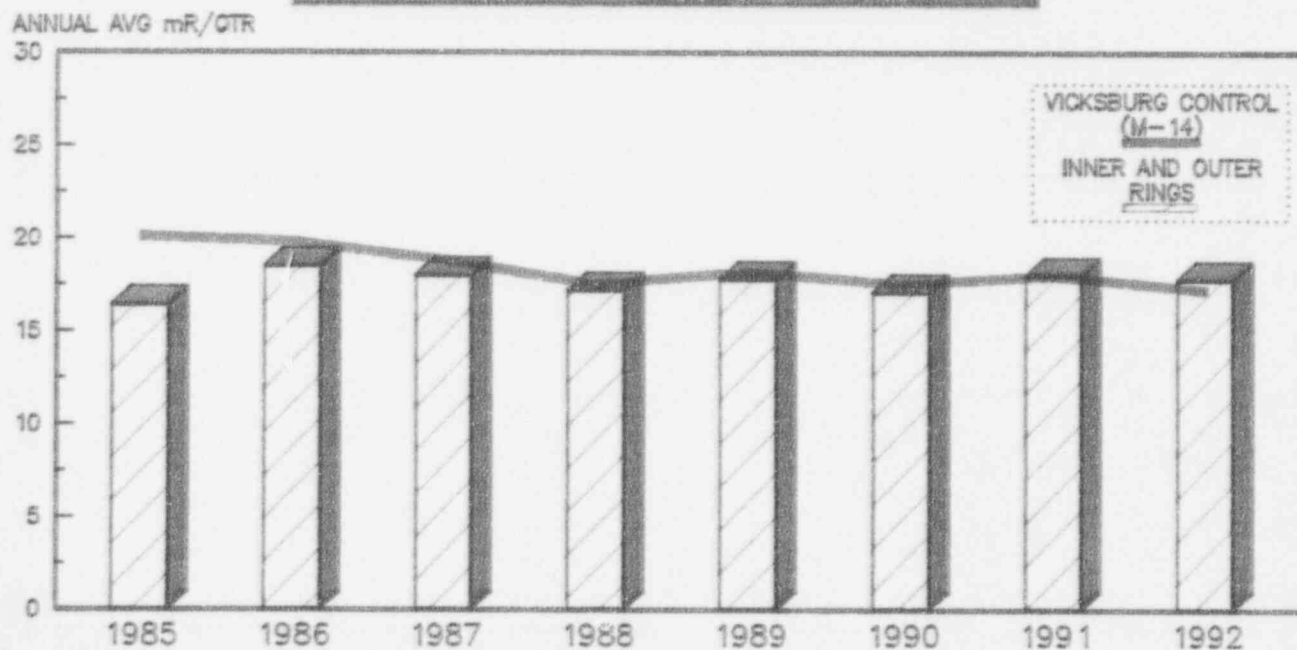
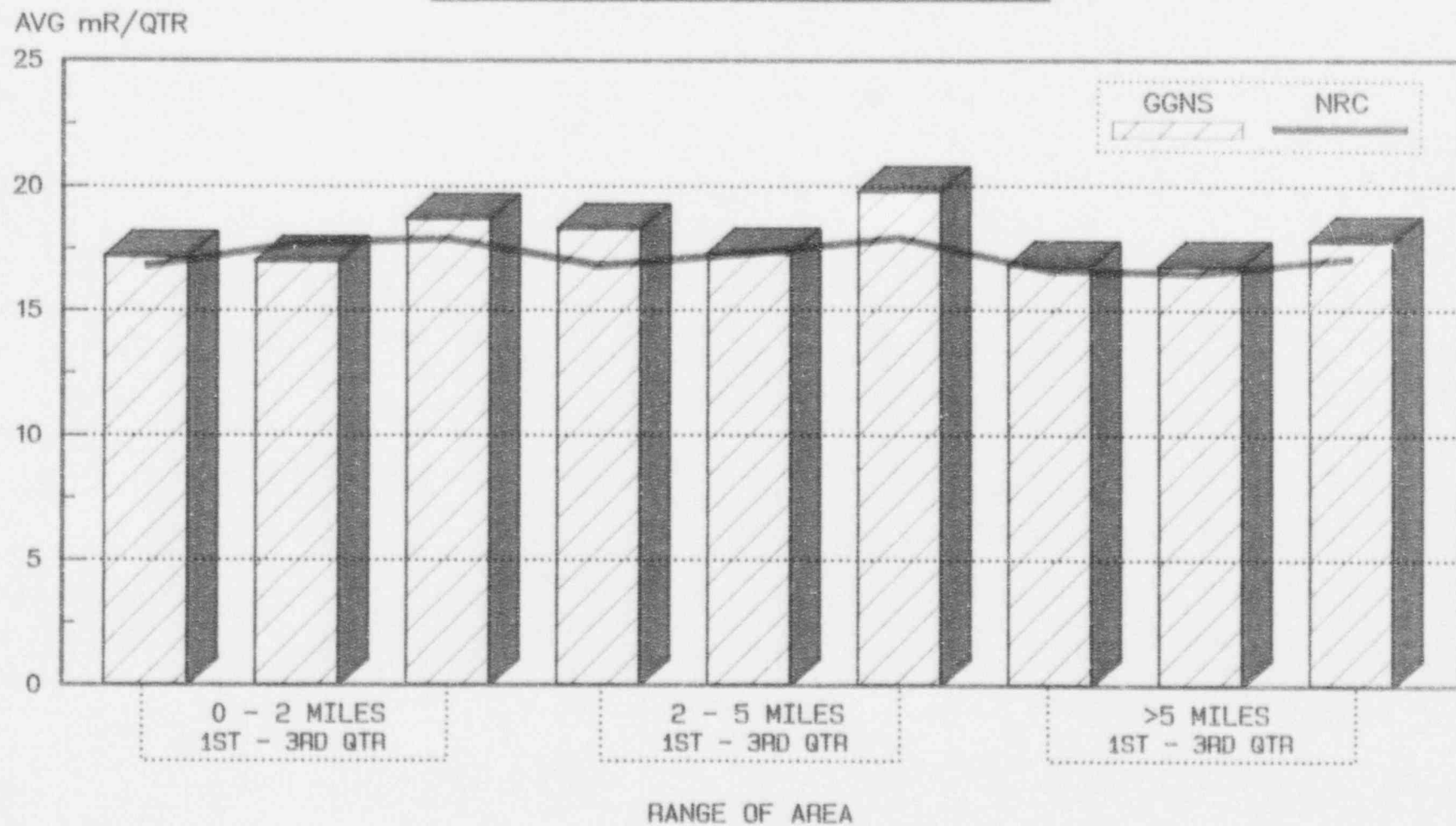


FIGURE 2-3
GGNS AND NRC TLDs

GGNS AND NRC TLD RESULTS
FOR 1992



2.3 MILK

NOTE: Analytical results presented in Table 5.1 of Attachment I and summarized in Section 4.0.

2.3.1 INTERPRETATIONS AND TRENDS OF RESULTS

GGNS personnel did not collect milk samples within five miles of the GGNS site in 1992 due to the absence of milking animals. However, they did collect milk samples from the Alcorn State University control location and had them analyzed for Iodine-131 and gamma radionuclides. As in previous years, radioactivity levels remained undetectable in milk samples.

The ingestion pathway shown in ODCM Specification Table 3.12.1-1 specifies the frequency and location for obtaining milk samples. In addition, Table 3.12.1-1 provides for the use of a food product pathway as an alternative in instances of unavailable milk sampling locations. The ESP utilized this alternative in 1992.

2.3.2 PROGRAM DESCRIPTION

ODCM Specifications require sample collection from milking animals in three locations within a five km distance having the highest dose potential. If unavailable, ODCM Specifications require one sample from milking animals in each of three areas, between five to eight km, where calculated doses exceed one mrem per year. ODCM Specifications also require one control sample at a distance of 15-30 km.

GGNS personnel collect a control milk sample semiannually from the Alcorn State University Dairy (Figure 1-4 and Table 1-4) to establish background data. However, the ESP did not include milk animals in 1992 within eight km (five miles) of GGNS due to unavailability. Therefore, Section 2.5, Vegetation, addresses the unavailability of milk samples within the vicinity of GGNS.

2.4 WATER

NOTE: Analytical results presented in Tables 2.1 through 4.6 of Attachment I and summarized in Section 4.0.

2.4.1 INTERPRETATIONS AND TRENDS OF RESULTS

Cistern Water

GGNS personnel collected cistern water samples and had them analyzed for gross beta radionuclides, Iodine-131, tritium and gamma radionuclides. Tritium and gamma radionuclides remained undetectable. Gross beta concentrations for the indicator locations ranged from 1.1 - 7.0 pCi/l with a mean of 5.1 pCi/l as compared to the control which ranged from 1.5 - 5.4 pCi/l with a mean of 3.3 pCi/l. Both the indicator and control locations contained an Iodine-131 concentration of 0.6 pCi/l and 0.4 pCi/l, respectively. However, since these Iodine-131 levels fall well below the required LLDs, there exists a degree of uncertainty. Overall, concentrations continue to remain at or near background levels.

Surface Water

GGNS personnel collected surface water samples and had them analyzed for tritium and gamma radionuclides. As in previous years, gamma radionuclide concentrations remained at background levels.

Tritium levels for Discharge Basin surface water ranged from 1000-1680 pCi/l with a mean of 1283.3 pCi/l. Plant operations and radwaste discharges in 1992 contributed to these levels. Figure 2-4 provides tritium results from 1985 through 1992 for the Discharge Basin. Tritium activity at the upstream and downstream Mississippi River locations continue to remain at background levels.

Groundwater

GGNS personnel collected groundwater samples quarterly and had them analyzed for gamma radionuclides and tritium. As in previous years, concentrations remained at background levels.

2.4.2 PROGRAM DESCRIPTION

ODCM Specifications require water sample collection in the vicinity of GGNS for the measurement of radioactivity by the waterborne exposure pathway.

GGNS personnel sampled cistern water monthly at two locations, an indicator near the site (McGee) and a control (Willis) (Figure 1-3 and Table 1-4). They had the samples analyzed for gross beta radionuclides, Iodine-131, gamma radionuclides and a quarterly composite tritium.

GGNS personnel sampled surface water from the Mississippi River monthly at points upstream (control) and downstream (indicator) of the plant discharge (Figure 1-3 and Table 1-4). They had the samples analyzed for gamma radionuclides and a quarterly composite tritium.

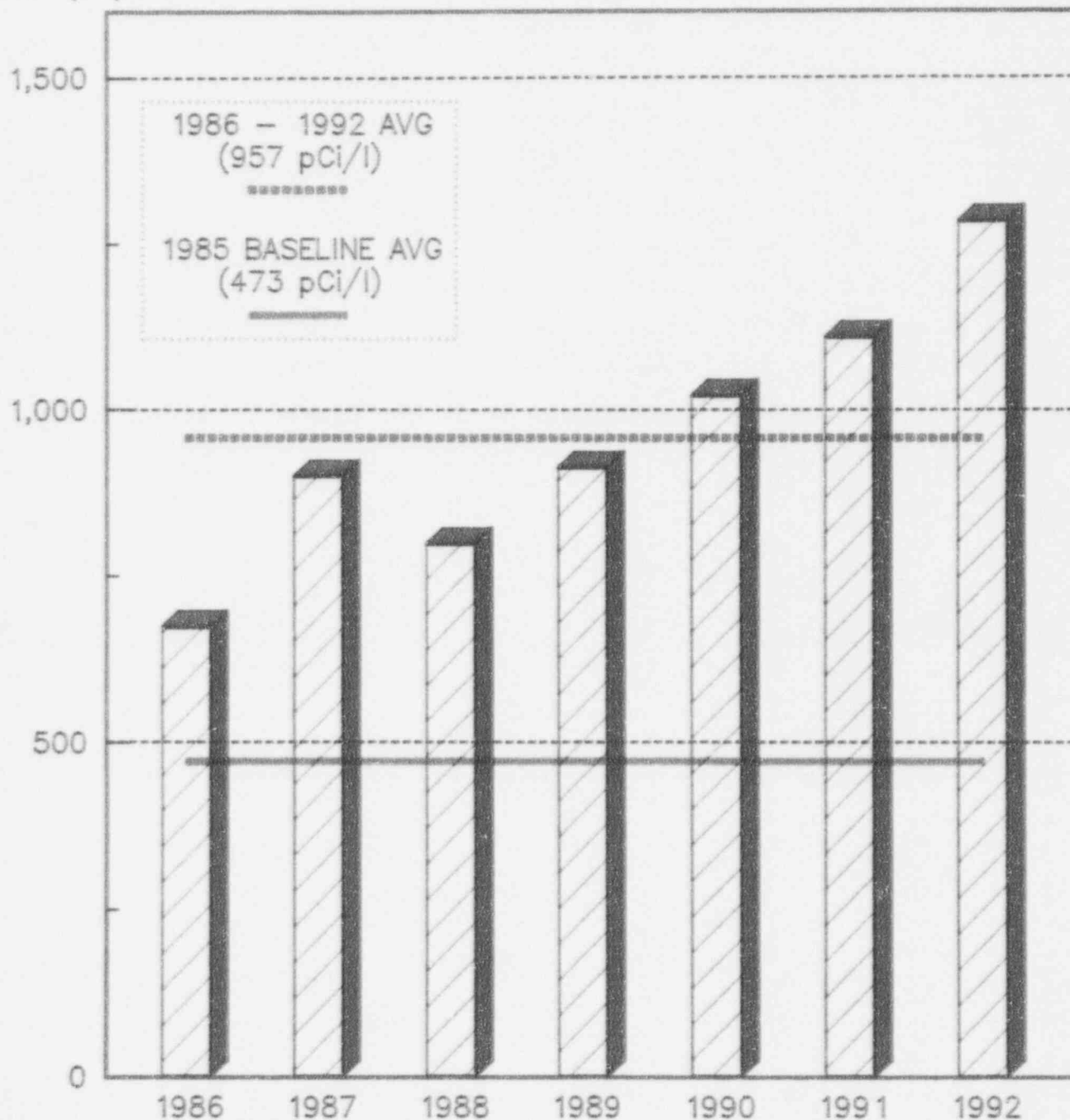
GGNS personnel took an additional surface water sample from the GGNS Discharge Basin. They composited this sample monthly with an automatic sampler that collected a preset volume at hourly intervals. They had the sample analyzed for gamma radionuclides and a quarterly composite tritium.

GGNS personnel sampled groundwater quarterly from two locations (Figure 1-3 and Table 1-4), Arnold Acres (indicator location) and Port Gibson City (control location). They had the samples analyzed for gamma radionuclides and tritium.

FIGURE 2-4
DISCHARGE BASIN TRITIUM RESULTS

TRITIUM RESULTS FOR
DISCHARGE BASIN

AVG pCi/l



2.5 VEGETATION

NOTE: Analytical results presented in Tables 6.1 through 6.3a of Attachment I and summarized in Section 4.0.

2.5.1 INTERPRETATIONS AND TRENDS OF RESULTS

GGNS personnel collected vegetation samples and had them analyzed for gamma radionuclides and Iodine-131. As in previous years, concentrations remained at background levels.

2.5.2 PROGRAM DESCRIPTION

GGNS personnel collected broadleaf vegetation samples monthly for the measurement of radioactivity by the ingestion exposure pathway, due to the unavailability of milk samples within five miles of GGNS. ODCM Specifications require samples of three different kinds of broadleaf vegetation grown nearest each of two different offsite locations with highest anticipated annual average groundlevel D/Q.

GGNS personnel met vegetation sampling requirements by maintaining two gardens inside the SITE BOUNDARY, Sectors J and R. These sampling locations (Figure 1-3 and Table 1-5) provided a more conservative assessment of doses due to the higher deposition rates (D/Qs) than would be measured at offsite sampling locations.

ODCM Specifications also require control samples of each of the similar types of onsite vegetation 15-30 km from the site. To fulfill this requirement, the ESP established a control vegetation sample location in Sector K at Alcorn State University (Figure 1-4 and Table 1-5).

The ESP prefers green-leafy vegetables suitable for human consumption as the primary source of broadleaf vegetation. At times, GGNS personnel took samples of any vegetation with relatively broad leaves on which airborne radioactive particulate material might be deposited, due to unavailability of green-leafy vegetables suitable for human consumption. They had the raw samples analyzed for gamma radionuclides and Iodine-131.

2.6 SEDIMENT

NOTE: Analytical results presented in Table 8.1 of Attachment I and summarized in Section 4.0.

2.6.1 INTERPRETATIONS AND TRENDS OF RESULTS

GGNS personnel collected sediment samples and had them analyzed for gamma radionuclides. Gamma radionuclides remained undetectable at the upstream location. The downstream location (Hamilton Lake) contained a Manganese-54 concentration of 10 pCi/kg and a Cesium-137 concentration which ranged from 67 - 89 pCi/kg with a mean of 78 pCi/kg. However, these levels fall well below the required LLDs. Therefore, they contain a degree of uncertainty.

Table 2-2 provides an analytical results summary for 1985 through 1992 barge slip sediment samples. GGNS personnel attributes the presence of this radioactivity to buildup of very small amounts of particulates since 1985.

Table 2-2 shows radionuclide concentrations in the barge slip sediment stabilizing. However, previous sampling of the barge slip sediment revealed a wide range of activity. GGNS personnel have found no definite correlation between radionuclide concentrations and plant operating levels, effluent releases or river elevation.

2.6.2 PROGRAM DESCRIPTION

GGNS personnel collected sediment samples semiannually at the following locations (Figure 1-3 and Table 1-5):

- River shoreline in plant effluent discharge (Barge Slip)
- Downstream of the barge slip in the vicinity of the Hamilton Lake outfall (indicator location)
- Upstream from the GGNS discharge (Upper Grand Gulf Landing)

ODCM Specifications require only a sediment sample from the downstream location (indicator). However, the ESP utilized additional samples from an upstream location (control) and the barge slip (indicator).

GGNS personnel collected sediment samples near the shoreline from the top one-inch layer of sediment. They then discarded foreign objects and transferred the samples to clean, labeled containers for gamma radionuclide analyses.

TABLE 2-2

1985 - 1992 BARGE SLIP SEDIMENT ANALYTICAL SUMMARY

Radionuclide	1985 Mean (pCi/kg)	1986 Mean pCi/kg)	1987 Mean (pCi/kg)	1988 Mean (pCi/kg)	1989 Mean (pCi/kg)	1990 Mean (pCi/kg)	1991 Mean (pCi/kg)	1992 Mean (pCi/kg)	1985 - 1992 Range (pCi/kg)
Chromium-51	N/A*	N/A*	1454	777	199	853	307	N/A*	168 - 1994
Manganese-54	1293	837	2205	480	734	258	1252	164	10 - 11240
Cobalt-58	493	98	103	82	56	39	59	N/A*	13 - 1050
Cobalt-60	487	263	799	628	736	424	1171	294	74 - 2878
Cesium-134	N/A*	N/A*	87	109	104	N/A*	N/A*	N/A*	72 - 131
Cesium-137	240	99	189	142	159	124	145	76	34 - 414

* None detected

2.7 FISH

NOTE: Analytical results presented in Tables 7.1 and 7.2 of Attachment I and summarized in Section 4.0.

2.7.1 INTERPRETATIONS AND TRENDS OF RESULTS

GGNS personnel collected fish samples semiannually from two locations and had them analyzed for gamma radionuclides. Analytical results for fish in 1992 and previous years have shown no data which was attributable to the operation of GGNS.

2.7.2 PROGRAM DESCRIPTION

GGNS personnel collected fish semiannually in the Mississippi River at the following locations (Figure 1-3 and Table 1-5):

- Downstream of the GGNS discharge point into the Mississippi River (indicator location)
- Upstream of the GGNS discharge point into the Mississippi River uninfluenced by plant operations (control location).

GGNS personnel collected fish by net, trotline, electroshock or purchased from commercial fishermen. They accompanied commercial fishermen, when purchasing samples, to ensure representative and valid samples from required locations.

GGNS personnel collected a sufficient amount from each location to provide a minimum of 1000 grams (wet weight) of eviscerated fish sample. They had the samples analyzed for gamma radionuclides.

2.8 SPECIAL SAMPLES

NOTE: Analytical results presented in Tables 9.1 through 12.1 of Attachment I and summarized in Section 4.0.

2.8.1 INTERPRETATIONS AND TRENDS OF RESULTS

In 1992, GGNS personnel collected twenty special samples and had them analyzed for gamma radionuclides. Discussion below provides descriptions of special samples collected and their results.

- Surface Water - One sample from Outfall 010 - Plant-related radionuclides not detected.
- Sediment - Seven samples from Basin A and seven samples from Basin B - Plant-related radionuclides detected. Section 4.0 summarizes results.
- Sewage Sludge - Five samples from Unit 1 Sewage Plant sludge (Outfall 010) - Plant-related radionuclides detected. Section 4.0 summarizes results.

2.8.2 PROGRAM DESCRIPTION

GGNS personnel collected special samples occasionally from nonroutine ESP locations to provide supplementary data and to address areas of special interests. Sample media may include sediment, water, milk, fish, meat and vegetation and may be analyzed for gamma radionuclides, Iodine-131, tritium or gross beta radionuclides depending upon current interest.

2.9 ANNUAL LAND USE CENSUS

2.9.1 INTERPRETATIONS AND TRENDS OF RESULTS

GGNS did not modify the ESP, even though some minor changes occurred from 1991 to 1992, as shown in Table 2-3. Also, the land use census identified no location which would yield a calculated dose or dose commitment greater than those currently being calculated.

The 1992 Land Use Census results indicated land uses in the zero to 5-mile area surrounding GGNS have remained basically the same as those reported in the 1990 and 1991 Annual Land Use Census. Table 2-4 presents the 1992 Land Use Census data sheets.

In addition to above, GGNS personnel conducted a cistern water survey within a five-mile radius of the plant to identify any potential drinking water users, due to cisterns becoming obsolete within the GGNS area. This survey identified only two cistern water users at a distance of approximately four-miles from the plant. The remaining residences use community or city water.

2.9.2 PROGRAM DESCRIPTION

GGNS personnel conducted an Annual Land Use Census, as required by ODCM Specification 3.12.2. This census identifies changes in uses of land in unrestricted areas surrounding GGNS which would require modifications to the ESP or ODCM. The land use census identified important criteria in each of the 16 meteorological sectors, such as nearest:

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

GGNS personnel conducted the 1992 Land Use Census by:

- Field survey confirmation in each meteorological sector out to five miles in order to locate:
 - Nearest permanent residence
 - Nearest unoccupied residence
 - Nearest garden and approximate size
 - Nearest milking animal.
- Telephone confirmation in several instances when personal contact could not be made.
- Identifying locations on the map, measuring distances to GGNS and recording results on data sheets.
- Comparing 1992 census results to 1991 census results.

TABLE 2-3

1991-1992 LAND USE CENSUS CHANGES

Sector	Parameter	1991 Data*	1992 Data*	Reason for Change
A	Nearest Broadleaf Garden	Michael Presson 2.6	None	No gardens grown within 5 miles in sector
B	Nearest Occupied Resident	Prince Dotson 1.2	Mary J. Dotson 1.2	Prince Dotson deceased.
C	Nearest Broadleaf Garden	Lanell Frazier 1.1	Issac Mays 7.7	Frazier no longer grows garden
F	Nearest Broadleaf Garden	Gerald Baker 7.8	Wilbert Porter Sr. 7.8	House now owned by Wilbert Porter Sr.
G	Nearest Occupied Residence	Buckner (Irvin Errington) 3.1	Buckner (Sherman Williams) 3.1	House now rented by Sherman Williams

* Distances in kilometers

TABLE 2-4
Page 1 of 5
1992 LAND USE CENSUS

PARAMETER		SECTOR A	SECTOR B	SECTOR C	SECTOR D
I. Nearest Occupied Residence	a. Distance (km)	1.5	1.2	1.1	4.3
	b. Name	Elizabeth McGee	Mary J. Dotson*	Lanell Frazier	Ethel M. Ryals
	c. Address	Rt. 2, Box 391	Rt. 2, Box 392	P.O. Box 33	Rt. 2, Box 372B
	d. Number of Occupants	Port Gibson, MS 2*	Port Gibson, MS 4*	Port Gibson, MS 3	Port Gibson, MS 6
II. Nearest Unoccupied Residence	a. Distance (km)				
		None	None	None	None
III. Nearest Milk Animal	a. Distance (km)	None	None	None	None
	b. Owner's Name				
	c. Address				
IV. Nearest Broadleaf Garden	a. Distance (km)	None*	None	7.7*	4.5
	b. Owner's Name			Issac Mays*	John H. Jackson
	c. Address			Rt. 2	Rt. 2, Box 371E*
	d. Garden Size (m ²)			Port Gibson, MS ~290*	Port Gibson, MS ~200*
V. Census Comparison:	a. Is the nearest occupied residence in the same location as last census?	Yes	Yes	Yes	Yes
	b. Is the nearest milk animal in the same location as last census?	N/A	N/A	N/A	N/A
	c. Is the nearest broadleaf garden in the same location as last census?				
		N/A	N/A	No	Yes

*Changed since 1991 census.

TABLE 2-4
Page 2 of 5
1992 LAND USE CENSUS

PARAMETER		SECTOR E	SECTOR F	SECTOR G	SECTOR H
I. Nearest Occupied Residence	a. Distance (km)	1.0	7.0	3.1	1.8
	b. Name	Roy Rogers	Dykes Cupstid	Sherman Williams*	John Nichols
	c. Address	P.O. Box 783	Rt. 2, Box 156	Rt. 2, Box 415	P.O. Box 437
	d. Number of Occupants	Port Gibson, MS	Port Gibson, MS	Port Gibson, MS	Port Gibson, MS
II. Nearest Unoccupied Residence	a. Distance (km)	2	4	2	2
	b. Name				
	c. Address				
	d. Number of Occupants				
III. Nearest Milk Animal	a. Distance (km)	None	None	None	None
	b. Owner's Name	None	None	None	None
	c. Address				
	d. Number of Occupants				
IV. Nearest Broadleaf Garden	a. Distance (km)	1.5	7.6	3.4	6.7
	b. Owner's Name	Hiram Wells	* Wilbert Porter Sr	Buckner (David Doyle)	L.C. Jones
	c. Address	Rt. 2, Box 392A	Rt. 2, Box 172	Rt. 2, Box 416A	P.O. Box 174
	d. Garden Size (m ²)	Port Gibson, MS	Port Gibson, MS	Port Gibson, MS	Port Gibson, MS
V. Census Comparison:	a. Is the nearest occupied residence in the same location as last census?	~ 100	~ 50	~ 1000 (Grapes)	~ 100
	b. Is the nearest milk animal in the same location as last census?	Yes	Yes	Yes	Yes
	c. Is the nearest broadleaf garden in the same location as last census?	N/A	N/A	N/A	N/A
	d. Is the nearest occupied residence in the same location as last census?	Yes	Yes	Yes	Yes

*Changed since 1991 census.

TABLE 2-4
Page 3 of 5
1992 LAND USE CENSUS

PARAMETER		SECTOR J	SECTOR K	SECTOR L	SECTOR M
I. Nearest Occupied Residence	a. Distance (km)	5.0	3.5	1.4	None
	b. Name	Steve Price	Jim Cassell, Jr	Glodjo (Buddy Roddey)	
	c. Address	Rt. 1, Box 412D	Rt. 2, Box 404	Rt. 2, Box 401	
	d. Number of Occupants	Port Gibson, MS 2	Port Gibson, MS 4	Port Gibson, MS 4	
II. Nearest Unoccupied Residence	a. Distance (km)	3.8 Bill Cassell House	None	None	None
III. Nearest Milk Animal	a. Distance (km)	None	None	None	None
	b. Owner's Name				
	c. Address				
IV. Nearest Broadleaf Garden	a. Distance (km)	0.6	3.5	1.4	None
	b. Owner's Name	GGNS (Env)	Jim Cassell, Jr	Glodjo (Buddy Roddey)	
	c. Address	P.O. Box 756	Rt. 2, Box 404	Rt. 2, Box 401	
	d. Garden Size (m ²)	Port Gibson, MS ~ 410	Port Gibson, MS ~ 50	Port Gibson, MS ~ 100	
V. Census Comparison:	a. Is the nearest occupied residence in the same location as last census?	Yes	Yes	Yes	N/A
	b. Is the nearest milk animal in the same location as last census?	N/A	N/A	N/A	N/A
	c. Is the nearest broadleaf garden in the same location as last census?				
		Yes	Yes	Yes	N/A

*Changed since 1991 census.

TABLE 2-4
Page 4 of 5
1992 LAND USE CENSUS

PARAMETER		SECTOR N	SECTOR P	SECTOR Q	SECTOR R
I. Nearest Occupied Residence	a. Distance (km)	None	7.7	None	1.7
	b. Name		Wallace Watson		Christin Roddey
	c. Address		P.O. Box 312		Rt. 2, Box 390
	d. Number of Occupants		St. Joseph, LA 4*		Port Gibson, MS 5*
II. Nearest Unoccupied Residence	a. Distance (km)	2.6 Bucksnort Camp	6.9 Dr. Cobb Fishing Camp	* 5.6 Yucatan Hunting Club	None
III. Nearest Milk Animal	a. Distance (km)	None	None	None	None
	b. Owner's Name				
	c. Address				
IV. Nearest Broadleaf Garden	a. Distance (km)	None	7.7	None	1.2
	b. Owner's Name		Wallace Watson		GGNS (ENV)
	c. Address		P.O. Box 312		P.O. Box 756
	d. Garden Size (m ²)		St. Joseph, LA ~ 300*		Port Gibson, MS ~ 380
V. Census Comparison:	a. Is the nearest occupied residence in the same location as last census?	N/A	Yes	N/A	Yes
	b. Is the nearest milk animal in the same location as last census?	N/A	N/A	N/A	N/A
	c. Is the nearest broadleaf garden in the same location as last census?				
		N/A	Yes	N/A	Yes

*Changed since 1991 census.

TABLE 2-4
Page 5 of 5
1992 LAND USE CENSUS

VI. Remarks: _____

Census conducted by: RNB/JDB/DKC/WLP

WLP / 12-9-92
Date

Signature WLP

12-9-92

VII. Review:

a. Comparison of previous and present locations:

- ☐ No differences
☒ Differences
☐ Significant
☒ Insignificant

b. Calculations:

- ☒ Not required
☐ Required

Completed by: _____

WLP
Signature

12-9-92
Date

VIII. Reviewed/Approved: _____

[Signature]
Supervisor, Environmental Services

12-8-92
Date

SECTION 3.0

ANALYTICAL PROGRAM TECHNICAL DESCRIPTION

3.1 SAMPLE HANDLING AND TREATMENT

The laboratory staff treats and stores samples upon receipt. Environmental samples frequently require treatment prior to analysis, depending on media and analyses type.

3.1.1 Water Samples

Generally, field personnel acidify one-gallon water samples with five milliliters (ml) of concentrated HCl acid when collected, unless otherwise directed by the analytical laboratory. Tritium samples for analyses are not usually stored in polyethylene bottles for more than three or four months because water can evaporate through polyethylene.

3.1.2 Air Filters

The laboratory handled air filters with care during heavy dust loadings to avoid removing any particulate matter. They normally received air filters in plastic containers; the container as well as sample required analysis for some extremely low-level analyses.

3.1.3 Milk

The laboratory usually refrigerated milk samples until analyzed. They added a preservative (formaldehyde), if analyses delayed for more than a few days, to inhibit bacterial growth and retard spoilage. Unless shipped on ice, milk samples analyzed for Iodine-131 require addition of 100 ml formaldehyde, of which field personnel normally add 40 ml prior to shipment, to avoid binding of the iodine that may occur with smaller levels of formaldehyde.

3.1.4 Soil and Bottom Sediment

The laboratory dried, pulverized and sieved soil and sediment samples before analysis. They then mixed the samples to ensure a homogeneous mixture.

3.1.5 Other Samples

The laboratory preserved perishable samples by refrigeration or freezing. Vegetation and other samples may require drying, pulverizing or ashing before or after analysis for long-term storage.

3.2 ANALYSIS OF AIR SAMPLES FOR GROSS BETA RADIONUCLIDES

The laboratory counted air filters in a low-background alpha-beta counter at least 24 hours after collection to allow for decay of short-lived materials such as radon and thoron.

They performed calculations of the results, two sigma error and lower limit of detection (LLD) as indicated below:

$$\text{BETA RESULT (pCi/m}^3\text{)} = [(N/T)-(B/t)-(r)(N/T)] / (2.22 \cdot V \cdot E)$$

$$\text{TWO SIGMA ERROR (pCi/m}^3\text{)} = 1.96 \sqrt{(N/T^2)+(B/t^2)} / (2.22 \cdot V \cdot E)$$

$$\text{LLD (pCi/m}^3\text{)} = 4.66 \sqrt{B} / (2.22 \cdot V \cdot E \cdot t)$$

where: N	= Gross counts of sample
T	= Number of minutes sample counted
B	= Counts of blank
t	= Number of minutes blank counted
2.22	= dpm/pCi
V	= Sample size (cubic meters)
E	= Counting efficiency
r	= Ratio of alpha counts in beta counting (cross-talk)

3.3 ANALYSIS OF WATER SAMPLES FOR GROSS BETA RADIONUCLIDES

Section 3.3 describes process used to measure overall beta radionuclides of water samples without identifying specific radioactive isotope present. This analysis involves evaporating a two hundred ml sample in a beaker and then drying beaker residue in a 2-inch stainless steel planchet at 100°C.

The laboratory counted the planchets for 100 minutes in a low-background alpha-beta counting system. Activity calculation includes a self-absorption correction factor for counter efficiency based on weight of residue on each planchet.

They performed calculations of the results, two sigma error and LLD as indicated below:

$$\text{BETA RESULT (pCi/l)} = [(N/T) - (B/t) - (r)(N/T)] / (2.22 \cdot V \cdot E)$$

$$\text{TWO SIGMA ERROR (pCi/l)} = 1.96 \sqrt{(N/T^2) + (B/t^2)} / (2.22 \cdot V \cdot E \cdot t)$$

$$\text{LLD (pCi/l)} = 4.66 \sqrt{B} / (2.22 \cdot V \cdot E \cdot t)$$

where: N	= Gross counts of sample
T	= Number of minutes sample counted
B	= Counts of blank
t	= Number of minutes blank counted
2.22	= dpm/pCi
V	= Sample aliquot size (liters)
E	= Counting efficiency
r	= Ratio of alpha counts in beta counting (cross-talk)

3.4 ANALYSIS OF WATER SAMPLES FOR TRITIUM

The laboratory added five ml of water to 15 ml of liquid scintillation solution in a 25 ml vial and then inserted the vial into a liquid scintillation spectrometer for a 300-500 minute count.

They performed calculations of the results, two sigma error and LLD as indicated below:

$$\text{RESULT (pCi/l)} = [(N/T)-(B/t)] / [(2.22 \cdot V \cdot E) \exp(-\lambda \Delta t_2)]$$

$$\text{TWO SIGMA ERROR (pCi/l)} = 1.96 \sqrt{(N/T^2)+(B/t^2)} / [(2.22 \cdot V \cdot E) \exp(-\lambda \Delta t_2)]$$

$$\text{LLD (pCi/l)} = \frac{4.66 \sqrt{B}}{2.22 \cdot E \cdot V \cdot t \cdot \exp(-\lambda \Delta t_2)}$$

where: N	= Gross counts of sample
T	= Number of minutes sample counted
B	= Counts of blank
t	= Number of minutes blank counted
2.22	= dpm/pCi
V	= Sample aliquot size (l)
E	= Counting efficiency
$\exp(-\lambda \Delta t_2)$	= Decay correction where $\lambda \Delta t_2$ represents time elapsed between collection of sample and date of counting.

3.5 ANALYSIS OF SAMPLES FOR IODINE-131

The laboratory mixed up to four liters of sample with a stable iodine carrier solution and then passed the sample through an anion exchange resin column to remove iodine from the sample. They then strip the iodine from the resin with a sodium hypochlorite solution, reduce with hydroxylamine hydrochloride and extract into carbon tetrachloride as free iodine. They then back-extract the free iodine into sodium bisulfite solution and precipitate as silver iodide. The laboratory then weighs the precipitate to determine chemical yield and mounts on a stainless steel planchet for low-level beta counting. They then correct the chemical yield by measuring the stable iodide content of milk or water with a specific ion electrode.

They performed calculations of the results, two sigma error and LLD as indicated below:

RESULT (pCi/l)	$= (N/t - B/t) / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)]$
TWO SIGMA ERROR (pCi/l)	$= 1.96 \sqrt{(N/t^2) + (B/t^2)} / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)]$
LLD (pCi/l)	$= 4.66 \sqrt{(B/t^2)} / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)]$
where: N	= Total counts from sample (counts)
t	= Counting time for sample (min)
B	= Total counts of blank (counts)
2.22	= dpm/pCi
E	= Efficiency of the counter for Iodine I-131 corrected for self absorption effects
V	= Volume of sample analyzed
Y	= Chemical yield of the amount of sample counted
$\exp(-\lambda \Delta t_2)$	= Decay factor from the time of collection to the counting date

3.6 ANALYSIS OF SAMPLES FOR GAMMA RADIONUCLIDES

3.6.1 Milk and Water

The laboratory fills a 3.5-liter Marinelli beaker with a representative aliquot of the sample and counts for a minimum of 240 minutes, or until required LLDs were achieved, in a shielded Germanium-Lithium (GeLi) detector coupled to a computer-based data acquisition system which performed a pulse height analysis.

A computer software program defines peaks by certain changes in slope of the spectrum. The program also compares energy of each peak with a library of peaks for radionuclide identification and then performs calculation using appropriate fractional gamma ray abundance, half life, detector efficiency and net counts in the peak region.

3.6.2 Vegetation, Food and Garden Crops, and Fish

The laboratory loads a maximum quantity of undried vegetation, food or garden crop sample into a tared 3.5-liter Marinelli beaker and weighs. They then count the sample for a minimum of 200 minutes, or until required LLDs achieved, in a shielded GeLi detector as described in Section 3.6.1.

The laboratory loads as much as possible (up to the total sample) of the edible portion of a fish into a tared Marinelli beaker and weighs. They then diluted the sample with deionized water to weigh 3.5 kg and then count for a minimum of 240 minutes in a shielded GeLi detector as described in Section 3.6.1.

3.6.3 Soils and Sediments

The laboratory dries soils and sediments at a low temperature (less than 100°C), loads into a tared 1.0-liter Marinelli beaker and weighs. They then count the sample for 240 minutes, or until required LLDs achieved, in a shielded GeLi detector as described in Section 3.6.1.

3.6.4 Charcoal Cartridges

The laboratory counts charcoal cartridges in a Marinelli beaker, with one to four cartridges positioned on the face of a GeLi detector and up to seven cartridges on its side. They calibrate each detector for both top and side positions and determine counting efficiency. They determine the Iodine-131 detection limit for each charcoal cartridge, assuming no positive results for Iodine-131, by utilizing smallest volume of air recorded for a cartridge within the Marinelli beaker. The laboratory counts each charcoal separately, if Iodine-131 observed in the screening count, by positioning on face of the detector.

3.6.5 Air Particulate

The laboratory stacks 12 to 14 (depending on calendar quarter) air particulate filters for a quarterly composite for each field station one on top of

another. They then count the samples for at least four hours, or until required LLDs achieved, in a shielded GeLi detector as described in Section 3.6.1.

The laboratory performs calculations of the results, two sigma error and LLD in pCi/volume or pCi/mass as indicated below:

RESULT	=	$(S-B) / [(2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)]$
TWO SIGMA ERROR	=	$1.96 \sqrt{S+B} / [(2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)]$
LLD	=	$4.66 \sqrt{B} / [(2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)]$
where: S	=	Area, in counts, of sample peak and background (region of spectrum of interest)
B	=	Background area, in counts, under sample peak, determined by a linear interpolation of the representative backgrounds on either side of the peak
2.22	=	dpm/pCi
T	=	Length of time in minutes sample counted
E	=	Detector efficiency for energy of interest and geometry of sample
V	=	Sample aliquot size (liters, cubic meters, kilograms, or grams)
F	=	Fractional gamma abundance (specific for each emitted gamma)
$\exp(-\lambda \Delta t_2)$	=	Decay factor from the time of collection to the counting date

3.7 THERMOLUMINESCENT DOSIMETERS

The GGNS ESP uses TLD cards impregnated with calcium sulfate: dysprosium phosphor sealed in plastic protective holders. These TLD cards contain four main readout areas utilized in calculating dose rates and four reserve areas as a backup dosimeter.

The laboratory spreads out the cards prior to installation in a single layer on a perforated metal tray and anneals for two hours at 250-260°C. They then mount the cards

after cooling in a card holder, seal in a plastic protective holder and ship for placement in the field.

The laboratory reads the TLD cards, upon return from the field, in a Teledyne Isotopes Model 8300 TLD Reader. They then anneal the cards again after readout and irradiate with a known dose using a Radium-226 source encapsulated in an iridium needle. The laboratory then reads the TLD cards again to determine the card efficiency. The laboratory calculated net exposure by computer after subtracting in-transit exposure.

3.8 DATA REPORTING CONVENTIONS

The laboratory calculated mean of analytical results as follows:

$$\bar{X} = \sum X_i / n$$

where: \bar{X} = Mean
 X_i = Individual sample results
 n = Number of sample results

They rounded calculated values by inspection of digits to the right of last reported digit, with values less than 5 rounded down and values greater than 5 rounded up. They rounded a reported value to an even number, when value equaled 5.

The laboratory reported analytical results less than the 2 sigma counting error as less than LLD calculated for that sample. They reported analytical results greater than the 2 sigma counting error along with associated 2 sigma counting error as a plus or minus (\pm) term.

The laboratory considers calendar quarters as the following time periods:

1ST QUARTER = JAN - MAR
2ND QUARTER = APR - JUN
3RD QUARTER = JUL - SEP
4TH QUARTER = OCT - DEC

SECTION 4.0

ENVIRONMENTAL SURVEILLANCE PROGRAM SUMMARY

4.1 1992 PROGRAM RESULTS SUMMARY

Table 4-1 summarizes required ODCM Specifications and supplemental ESP sample results for 1992. Table 4-2 lists indicator and control locations utilized to develop Table 4-1. Overall, 1992 results compare to that encountered in previous years.

GGNS personnel did not use values reported as less than (<) for determining indicator and control location ranges and means.

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ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility Grand Gulf Nuclear Station Docket No. 50-416
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Sample Type (Units)	Type and 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 Non-Routine Results ^c
				Location ^d	Mean (F) ^c [Range]		
Air Particulate* (pCi/m ³)	GB 260	0.01	.016 (154/156) [.004 - .046]	AS-7 MT (Sector A, 0.8 mi)	.018 (52/52) [.006 - .040]	.016 (104/104) [.004 - .063]	0
	GS 20						
	Cs-134	0.05	< LLD	N/A	N/A	< LLD	0
	Cs-137	0.06	< LLD	N/A	N/A	< LLD	0
Air Particulate (pCi/m ³)	GB 208	0.01	.015 (205/208) [.003 - .043]	AS-5 TC (Sector J, 0.4 mi)	.017 (52/52) [.006 - .043]	N/A	0
	GS 16						
	Cs-134	0.05	< LLD	N/A	N/A	N/A	0
	Cs-137	0.06	< LLD	N/A	N/A	N/A	0
Airborne Iodine* (pCi/m ³)	I-131 260	0.07	< LLD	N/A	N/A	< LLD	0
Airborne Iodine (pCi/m ³)	I-131 208	0.07	< LLD	N/A	N/A	N/A	0
TLD (Inner Ring)* (mR/Qtr.)	Gamma 64	(f)	17.6 (64/64) [10.6 - 21.6]	M-93 (Sector H, 0.4 mi.)	20.7 (4/4) [20.1 - 21.6]	N/A	0
TLD (Outer Ring)* (mR/Qtr.)	Gamma 60	(f)	17.9 (60/60) [12.8 - 24.6]	M-55 (Sector D, 5.0 mi)	22.5 (4/4) [21.2 - 24.6]	N/A	0

*Required by ODCM Specifications

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ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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(County, State)

Sample Type (Units)	Type and 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 Non-Routine Results ^c
				Location ^d	Mean (F) ^c [Range]		
TLD (Special Interest Areas)* (mR/Qtr.)	Gamma 27	(f)	17.3 (27/27) [13.5 - 20.3]	M-01 (Sector E, 3.5 mi.)	20.0 (4/4) [19.4 - 20.3]	N/A	0
TLD (Control)* (mR/Qtr.)	Gamma 4	(f)	N/A	N/A	N/A	17.4 (4/4) [15.9 - 18.8]	0
TLD (Protected Area) (mR/Qtr)	Gamma 64	(f)	28.4 (64/64) [12.8 - 86.2]	M-69 (Sector G, Onsite)	73.6 (4/4) [42.1 - 86.2]	N/A	0
Cistern Water* (pCi/l)	GB 24	4	3.8 (3/12) [1.1 - 7.0]	McGee Cistern (Sector A, 0.9 mi.)	3.8 (3/12) [1.1 - 7.0]	3.3 (7/12) [1.5 - 5.4]	0
	I-131 24	1.0	0.6 (1/12) [N/A]	McGee Cistern (Sector A, 0.9 mi.)	0.6 (1/12) [NA]	0.4 (1/12) [NA]	0
	H-3 8	2000	<LLD	N/A	<LLD	<LLD	0
	GS 24						
	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	<LLD	0
	La-140 15		<LLD	N/A	N/A	<LLD	0

*Required by ODCM Specifications

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ENVIRONMENTAL MONITORING PROGRAM SUMMARYName of Facility Grand Gulf Nuclear Station Docket No. 50-416Location of Facility Claiborne, Mississippi Reporting Period January - December 1992

(County, State)

Sample Type (Units)	Type and 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 Non-Routine Results ^c
				Location ^d	Mean (F) ^c [Range]		
Surface Water* (pCi/l)	H-3 12	2000	1283.3 (3/8) [1000 - 1680]	Discharge Basin (Sector P, 0.3 mi)	1283.3 (3/4) [1000 - 1680]	< LLD	0
	GS 36						
	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	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0
Surface Water (pCi/l)	GS 1						
	Mn-54	15	< LLD	N/A	N/A	N/A	0
	Fe-59	30	< LLD	N/A	N/A	N/A	0
	Co-58	15	< LLD	N/A	N/A	N/A	0
	Co-60	15	< LLD	N/A	N/A	N/A	0
	Zn-65	30	< LLD	N/A	N/A	N/A	0
	Zr-95	30	< LLD	N/A	N/A	N/A	0
	Nb-95	15	< LLD	N/A	N/A	N/A	0
	Cs-134	15	< LLD	N/A	N/A	N/A	0
	Cs-137	18	< LLD	N/A	N/A	N/A	0
	Ba-140	60	< LLD	N/A	N/A	N/A	0
	La-140	15	< LLD	N/A	N/A	N/A	0

*Required by ODCM Specifications

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(County, State)

Sample Type (Units)	Type and 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 Non-Routine Results ^c
				Location ^d	Mean (F) ^c [Range]		
Well Water* (pCi/l)	H-3 8	2000	<LLD	N/A	N/A	<LLD	0
	GS 8						
	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	<LLD	0
	La-140 15		<LLD	N/A	N/A	<LLD	0
Milk* (pCi/l)	I-131 2	1.0	N/A	N/A	N/A	<LLD	0
	GS 2						
	Cs-134 15		N/A	N/A	N/A	<LLD	0
	Cs-137 18		N/A	N/A	N/A	<LLD	0
	Ba-140 60		N/A	N/A	N/A	<LLD	0
	La-140 15		N/A	N/A	N/A	<LLD	0
Vegetation* (pCi/kg wet)	I-131 108	60	<LLD	N/A	N/A	<LLD	0
	GS 108						
	Cs-134 60		<LLD	N/A	N/A	<LLD	0
	Cs-137 80		<LLD	N/A	N/A	<LLD	0

*Required by ODCM Specifications

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(County, State)

Sample Type (Units)	Type and 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 Non-Routine Results ^c
				Location ^d	Mean (F) ^c [Range]		
Fish* (pCi/kg wet)	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
Bottom Sediment* (pCi/kg dry)	GS 2						
	Mn-54	150	10 (1/2) [N/A]	Hamilton Lake (Sector N, 2 mi.)	10 (1/2) [N/A]	N/A	0
	Cs-134	150	< LLD	N/A	N/A	N/A	0
	Cs-137	180	78 (2/2) [67-89]	Hamilton Lake (Sector N, 2 mi.)	78 (2/2) [67 - 89]	N/A	0
Bottom Sediment (pCi/kg dry)	GS 18						
	Fe-59	(f)	82 (1/16) [N/A]	Basin B (Sector M, 0.3 mi.)	82 (1/7) [N/A]	< LLD	0
	Mn-54	(f)	158.1 (11/16) [20 - 897]	Basin B (Sector M, 0.3mi.)	209.3 (7/7) [20-897]	< LLD	0
	Co-58	(f)	32 (1/16) [N/A]	Basin B (Sector M, 0.3 mi.)	32 (1/7) [N/A]	< LLD	0
	Co-60	(f)	127.8 (9/16) [15 - 415]	Barge Slip (Sector Q, 1.5mi.)	294 (1/2) [N/A]	< LLD	0
	Cs-134	(f)	90.7 (3/16) [35 - 140]	Basin B (Sector M, 0.3 mi.)	90.7 (3/7) [35 - 140]	< LLD	0
	Cs-137	(f)	40.9 (11/16) [8 - 110]	Barge Slip (Sector Q, 1.5 mi.)	76 (2/2) [42 - 110]	< LLD	0

^aRequired by ODCM Specifications

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(County, State)

Sample Type (Units)	Type and 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 Non-Routine Results ^e
				Location ^d	Mean (F) ^c [Range]		
Sewage Sludge (pCi/kg wet)	GS						
	Mn-54	150	225.2 (5/5) [152 - 392]	Unit 1 Sewage Plant (Sector A, 0.3 mi)	225.5 (5/5) [157 - 392]	N/A	0
	Co-60	150	446.6 (5/5) [306 - 833]	Unit 1 Sewage Plant (Sector A, 0.3 mi)	446.6 (5/5) [306 - 833]	N/A	0
	Cs-134	150	< LLD	N/A	N/A	N/A	0
	Cs-137	180	< 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 Grand Gulf Nuclear Station ODCM Specification Table 4.12.1-1.
- c** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).
- d** Locations are specified (1) by name and (2) sector 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 not defined in GGNS ODCM Specification Table 4.12.1-1.

TABLE 4-2
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INDICATOR & CONTROL LOCATIONS

Sample Type	Locations	Total No. of Samples	Total No. & Type of Analyses
• <u>AIR</u>	• Indicators* - AS-6 RS AS-7 MT AS-8 WR	52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
	• Controls* - AS-1 PG AS-3 61VA	52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
	• Indicators - AS-4 GJOE AS-5 TC AS-10 HR AS-11 BB	52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
		52	52 ea. - Gross Beta, I-131; 4-Gamma
• <u>TLDs</u>	• Indicators*		
	- Inner Ring M-16, 17, 19, 20, 21, 22, 23, 25, 27, 28, 41, 45, 86, 92, 93, 94	64	64-Gamma
	- Outer Ring M-36, 40, 47, 48, 49, 50, 51, 55 56, 57, 58, 59, 88, 89, 90, 91	60	60-Gamma
	- Special Interest Areas M-01, 07, 09, 10, 33, 38, 39	27	27-Gamma
	• Control* - M-14	4	4-Gamma
	• Indicators - Protected Area M-61, 62, 63, 64, 65, 66, 67, 68 69, 70, 71, 72, 74, 76, 77, 81	64	64-Gamma

* Required by ODCM Specifications

TABLE 4-2
Page 2 of 3
INDICATOR & CONTROL LOCATIONS

Sample Type	Location	Total No. of Samples	Total No. & Type of Analysis
• <u>WATER</u>	<u>Cistern</u>		
	• Indicator* - McGee	12	12 ea. - Gross Beta, I-131, Gamma; 4-Tritium
	• Control* - Willis	12	12 ea. - Gross Beta, I-131, Gamma; 4-Tritium
	<u>Surface</u>		
	• Indicators* - Downstream Mississippi River	12	4 - Tritium (H-3); 12-Gamma
	Discharge Basin	12	4 - Tritium (H-3); 12-Gamma
	• Control* - Upstream Mississippi River	12	4 - Tritium (H-3); 12-Gamma
	• Indicator* - Outfall 010	1	1 - Gamma
	<u>Groundwater</u>		
	• Indicator - Arnold Acres	4	4 ea. - Tritium (H-3); Gamma
	• Control* - Port Gibson City	4	4 ea. - Tritium (H-3); Gamma
• <u>MILK</u>	• Indicator* - None	N/A	N/A
	• Control* - Alcorn State University	2	2 ea. - I-131, Gamma

*Required by ODCM Specifications

TABLE 4-2
Page 3 of 3
INDICATOR & CONTROL LOCATIONS

Sample Type	Location	Total No. of Samples	Total No. & Type of Analysis
• <u>VEGETATION</u>	• Indicators* - Sector J Garden	36	36 ea. - I-131, Gamma
	Sector R Garden	36	36 ea. - I-131, Gamma
	• Control* - Sector K (Alcorn State University)	36	36 ea. - I-131, Gamma
• <u>FISH</u>	• Indicator* - Downstream Mississippi River	2	2-Gamma
	• Control* - Upstream Mississippi River	2	2-Gamma
• <u>SEDIMENT</u>	• Indicator* - Hamilton Lake (SEDHAM)	2	2-Gamma
	-----	-----	-----
	• Indicators - Barge Slip (SEDBAR)	2	2-Gamma
	Basin A	7	7-Gamma
	Basin B	7	7-Gamma
	• Control - Upstream Mississippi River (SEDCONT)	2	2-Gamma
• <u>SEWAGE SLUDGE</u>	• Indicator - Unit 1 Sewage Plant Sludge (Outfall 010)	5	5-Gamma
	• Control - None	N/A	N/A

*Required by ODCM Specifications

SECTION 5.0
QUALITY CONTROL DATA

5.1 CROSSCHECK PROGRAM RESULTS

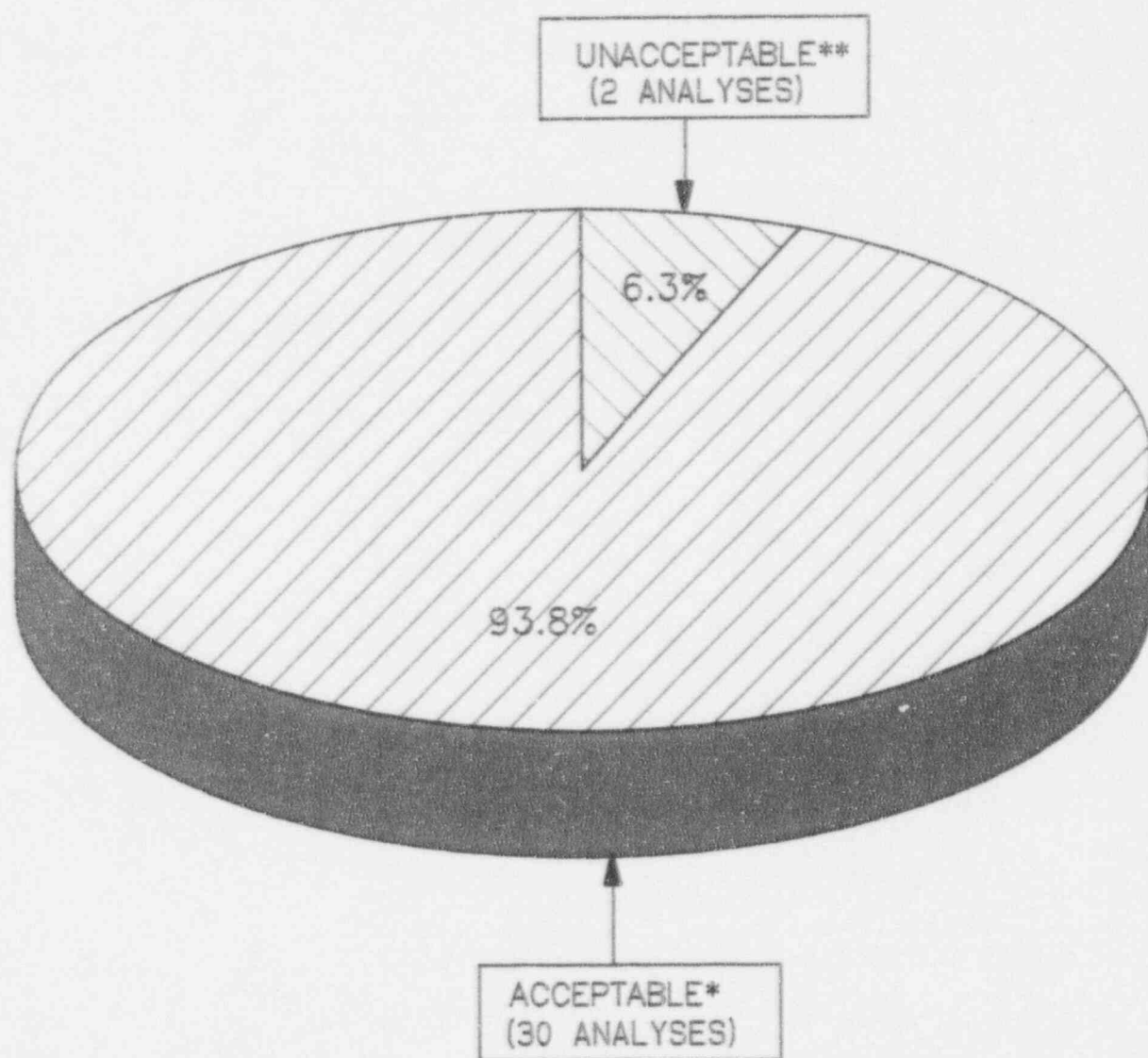
ESI System Chemistry analyzed EPA crosscheck samples for GGNS. Attachment I contains these results. ESI System Chemistry's analysis participation, shown in Figure 5-1, indicates consistent, valid reported data based on acceptable sample results that fall within the three standard deviation range.

5.2 DUPLICATE SAMPLES

Attachment I contains duplicate samples, identified by suffix "GG" accompanying the laboratory number, submitted by GGNS to ESI System Chemistry for analysis. Attachment II contains duplicate TLDs submitted to Teledyne. GGNS personnel's review of all duplicate sample results indicates consistent, valid reported data based on similarity of results.

FIGURE 5-1
EPA INTERCOMPARISON STUDY

EPA INTERLABORATORY COMPARISON
RESULTS FOR 1992



* WITHIN THREE STANDARD DEVIATION RANGE
** OUTSIDE THREE STANDARD DEVIATION RANGE

SECTION 6.0

1992 SAMPLING AND ANALYTICAL RESULTS

6.1 1992 DATA

Attachments I and II present data obtained by ESI System Chemistry and Teledyne Isotopes Midwest Laboratory on samples collected from January through December 1992. ESI System Chemistry provides data in monthly progress reports. Teledyne Isotope provides TLD data in quarterly reports. Data presented in Attachments I and II compare to that encountered in previous years.

6.2 LOWER LIMIT OF DETECTION

ESI System Chemistry routinely counts lower than the maximum LLD required by ODCM Specification Table 4.12.1-1. Factors such as unavoidable small sample size, background fluctuations, presence of interfering radionuclides or other uncontrollable circumstances cause ODCM Specifications' LLD to be unachievable in some instances. However, GGNS personnel's review of 1992 results indicates acceptable LLDs within required ODCM Specification limits.

6.3 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 3.12.1-2 when averaged over any calendar quarter, due to GGNS effluents. Therefore, 1992 results did not trigger any Radiological Monitoring Program Special Reports.

6.4 SAMPLING DEVIATIONS

The ESP lost five TLDs required by ODCM Specifications during 1992, due to vandalism or flooding from the Mississippi River. Other TLD programs experience losses of this type. In 1992, GGNS personnel calculated a 97%

(155 of 160) recovery rate for required ODCM Specification TLDs, which compares with other TLD programs.

The ESP did not include milk sampling within five miles (8 km) of GGNS in 1992 due to unavailability. Therefore, GGNS personnel reduced sampling frequency at the Alcorn State University Control location to semiannually until such time that milk samples become available within five miles (8 km) of GGNS. They collected vegetation samples to monitor the ingestion pathway, as specified in ODCM Specifications Table 3.12.1-1, because of milk unavailability.

GGNS personnel conducted all other ESP activities required by ODCM Specification without exception.

6.5 RADIOACTIVITY NOT ATTRIBUTABLE TO GGNS

The GGNS ESP detected radioactivity 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.

6.6 SAMPLING RELOCATION

Vegetation and milk sampling locations did not change in 1992. Therefore, GGNS personnel did not identify any new locations or report circumstances of unavailability in the Semiannual Radioactive Effluent Release Report.

6.7 SAMPLING MODIFICATIONS

In 1992, GGNS personnel moved supplemental air sampling control stations AS-10 NLT and AS-11 STJ from Louisiana to Mississippi near the GGNS plant (Heavy Haul Road and Basin B). This move changed their identification to AS-10 HR and AS-11 BB indicator locations. GGNS personnel considered these air sampling stations as indicator locations for all of 1992.

In addition, they removed supplemental sampling locations from the ODCM, updated descriptions of selected sampling locations and centrally located selected TLDs. These changes, which GGNS included in the Semiannual Radioactive Effluent Release Report, occurred in ODCM, Revision 13.

Also, GGNS discontinued supplemental sampling locations from the ESP in 1992. GGNS provided a description of these changes in memo (CIN-92/00459) dated June 30, 1992. For annual reporting purposes, summaries, interpretations and trends of results do not include data from discontinued locations shown in Attachments I and II.

6.8 COMPARISON TO FEDERAL AND STATE PROGRAMS

GGNS personnel compared GGNS data to federal and state monitoring programs as results became available. The programs used for comparison include 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 latest available NRC TLD Network results compare to those from the GGNS ESP. In addition, as shown in Section 2.2 of this report, GGNS and NRC TLDs produced similar results on the average.

The MSDH and the GGNS ESP entail similar radiological monitoring sampling requirements. These programs include collocated air samples and splitting or sharing sample media such as vegetation, water, sediment, meat, fish and milk. Both programs have obtained similar results over previous years. In 1992, the MSDH and GGNS detected radioactivity attributable to the plant in the barge slip due to effluents, as in previous years.

6.9 **UNAVAILABLE RESULTS**

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

6.10 **HARMFUL EFFECTS OR IRREVERSIBLE DAMAGE**

The ESP monitoring did not detect any harmful effects or evidence of irreversible damage in 1992. Therefore, GGNS personnel addressed no problems.

ATTACHMENT I

1992 ENVIRONMENTAL SAMPLING AND ANALYTICAL REPORT

GRAND GULF
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
DECEMBER, 1992

PREPARED BY:

SYSTEM CHEMISTRY SECTION
ENTERGY SERVICES, INC.

GRAND GULF
RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

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Summary of Monitoring Results

Plant-related isotopes were detected in surface water, sediment and sewage sludge during the reporting year.

The term "GG" ending of a lab number denotes a duplicate sample.

Table No.: 1.1

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-1, PG

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	I-131
920058	12/31/91	01/06/92	0.029 +/-0.003	< 0.032
920161	01/06/92	01/14/92	0.024 +/-0.003	< 0.012
920194	01/14/92	01/21/92	0.012 +/-0.002	< 0.015
920229	01/21/92	01/28/92	0.019 +/-0.002	< 0.015
920253	01/28/92	02/04/92	0.051 +/-0.003	< 0.011
920308	02/04/92	02/11/92	0.014 +/-0.002	< 0.014
920325	02/11/92	02/18/92	0.010 +/-0.002	< 0.010
920368	02/18/92	02/25/92	0.016 +/-0.002	< 0.021
920401	02/25/92	03/03/92	0.030 +/-0.002	< 0.016
920440	03/03/92	03/10/92	0.015 +/-0.002	< 0.020
920475	03/10/92	03/17/92	0.010 +/-0.002	< 0.026
920510	03/17/92	03/24/92	0.015 +/-0.002	< 0.012
920563	03/24/92	03/31/92	0.012 +/-0.002	< 0.024
920634	03/31/92	04/07/92	0.016 +/-0.002	< 0.028
920676	04/07/92	04/14/92	0.008 +/-0.002	< 0.016
920710	04/14/92	04/21/92	0.011 +/-0.002	< 0.010
920770	04/21/92	04/28/92	0.008 +/-0.002	< 0.011
920810	04/28/92	05/05/92	0.024 +/-0.003	< 0.029
920860	05/05/92	05/12/92	0.010 +/-0.002	< 0.015
920892	05/12/92	05/19/92	0.024 +/-0.003	< 0.018
920924	05/19/92	05/26/92	0.008 +/-0.002	< 0.015

= Control Location * = Low Level Analysis

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920962	05/26/92	06/02/92	0.025 +/-0.003	< 0.020
921032	06/02/92	06/09/92	0.008 +/-0.002	< 0.016
921068	06/09/92	06/16/92	0.008 +/-0.002	< 0.013
921103	06/16/92	06/23/92	0.009 +/-0.002	< 0.013
921144	06/23/92	06/30/92	0.040 +/-0.003	< 0.012
921237	06/30/92	07/07/92	0.013 +/-0.002	< 0.017
921259	07/07/92	07/14/92	0.021 +/-0.002	< 0.016
921323	07/14/92	07/21/92	0.012 +/-0.002	< 0.015
921347	07/21/92	07/28/92	0.012 +/-0.002	< 0.008
921396	07/28/92	08/04/92	0.013 +/-0.002	< 0.016
921422	08/04/92	08/11/92	0.013 +/-0.002	< 0.024
921451	08/11/92	08/18/92	0.011 +/-0.002	< 0.025
921481	08/18/92	08/25/92	0.020 +/-0.002	< 0.018
911534	08/25/92	09/01/92	0.010 +/-0.002	< 0.016
921555	09/01/92	09/09/92	0.011 +/-0.002	< 0.009
921592	09/09/92	09/15/92	0.028 +/-0.003	< 0.030
921645	09/15/92	09/22/92	0.006 +/-0.002	< 0.030
921672	09/22/92	09/29/92	0.017 +/-0.002	< 0.019
921749	09/29/92	10/06/92	0.016 +/-0.002	< 0.009
921793	10/06/92	10/13/92	0.022 +/-0.002	< 0.013
921840	10/13/92	10/20/92	0.019 +/-0.002	< 0.018
921892	10/20/92	10/27/92	0.030 +/-0.002	< 0.032

Table No.: 1.1b

Sample: Air Samples, (Beta, 1-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-1, PG

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	1-131
921933	10/27/92	11/03/92	0.014 +/- 0.002	< 0.024
921963	11/03/92	11/10/92	0.014 +/- 0.002	< 0.019
921982	11/10/92	11/17/92	0.010 +/- 0.002	< 0.009
922016	11/17/92	11/24/92	0.009 +/- 0.002	< 0.008
922052	11/24/92	12/01/92	0.012 +/- 0.002	< 0.015
922090	12/01/92	12/08/92	0.013 +/- 0.002	< 0.015
922125	12/08/92	12/15/92	0.009 +/- 0.002	< 0.013
922189	12/15/92	12/22/92	0.011 +/- 0.002	< 0.025
922199	12/22/92	12/29/92	0.015 +/- 0.002	< 0.016

= Control Location * = Low Level Analysis

Table No.: 1.2

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-2, 61N

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920059	12/31/91	01/06/92	0.035 +/- 0.003	< 0.032
920162	01/06/92	01/16/92	0.026 +/- 0.003	< 0.012
920195	01/16/92	01/21/92	0.015 +/- 0.002	< 0.015
920230	01/21/92	01/28/92 (1)	0.017 +/- 0.002	< 0.015

(1) Sampling station discontinued.

= Control Location * = Low Level Analysis

Table No.: 1.3

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-3, 61VA

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	I-131
920060	12/31/91	01/06/92	0.026 +/- 0.003	< 0.032
920163	01/06/92	01/14/92	0.023 +/- 0.003	< 0.012
920196	01/14/92	01/21/92	0.011 +/- 0.002	< 0.015
920231	01/21/92	01/28/92	0.022 +/- 0.002	< 0.015
920254	01/28/92	02/04/92	0.063 +/- 0.003	< 0.011
920309	02/04/92	02/11/92	0.014 +/- 0.002	< 0.014
920326	02/11/92	02/18/92	0.016 +/- 0.002	< 0.010
920369	02/18/92	02/25/92	0.019 +/- 0.002	< 0.021
920402	02/25/92	03/03/92	0.026 +/- 0.002	< 0.016
920441	03/03/92	03/10/92	0.017 +/- 0.002	< 0.020
920476	03/10/92	03/17/92	0.012 +/- 0.002	< 0.026
920511	03/17/92	03/24/92	0.017 +/- 0.002	< 0.012
920564	03/24/92	03/31/92	0.016 +/- 0.002	< 0.024
920635	03/31/92	04/07/92	0.022 +/- 0.002	< 0.028
920677	04/07/92	04/14/92	0.012 +/- 0.002	< 0.016
920711	04/14/92	04/21/92	0.013 +/- 0.002	< 0.010
920771	04/21/92	04/28/92	0.013 +/- 0.002	< 0.011
920811	04/28/92	05/05/92	0.025 +/- 0.003	< 0.029
920861	05/05/92	05/12/92	0.016 +/- 0.003	< 0.015
920893	05/12/92	05/19/92	0.028 +/- 0.003	< 0.018
920925	05/19/92	05/26/92	0.013 +/- 0.003	< 0.015

= Control Location * = Low Level Analysis

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920963	05/26/92	06/02/92	0.027 +/-0.003	< 0.020
921033	06/02/92	06/09/92	0.013 +/-0.002	< 0.016
921069	06/09/92	06/16/92	0.011 +/-0.002	< 0.013
921104	06/16/92	06/23/92 (1)	0.011 +/-0.004	< 0.013
921145	06/23/92	06/30/92	0.034 +/-0.003	< 0.012
921238	06/30/92	07/07/92	0.015 +/-0.003	< 0.017
921260	07/07/92	07/14/92	0.027 +/-0.003	< 0.016
921324	07/14/92	07/21/92	0.008 +/-0.002	< 0.015
921348	07/21/92	07/28/92	0.012 +/-0.002	< 0.008
921397	07/28/92	08/04/92	0.004 +/-0.002	< 0.016
921423	08/04/92	08/11/92	0.013 +/-0.002	< 0.024
921452	08/11/92	08/18/92	0.011 +/-0.002	< 0.025
921482	08/18/92	08/25/92	0.013 +/-0.002	< 0.018
921535	08/25/92	09/01/92	0.011 +/-0.002	< 0.016
921556	09/01/92	09/09/92	0.009 +/-0.002	< 0.009
921593	09/09/92	09/15/92	0.017 +/-0.002	< 0.030
921646	09/15/92	09/22/92	0.004 +/-0.002	< 0.030
921673	09/22/92	09/29/92	0.011 +/-0.002	< 0.019
921750	09/29/92	10/06/92	0.017 +/-0.002	< 0.009
921794	10/06/92	10/13/92	0.015 +/-0.002	< 0.013
921841	10/13/92	10/20/92	0.016 +/-0.002	< 0.018
921893	10/20/92	10/27/92	0.023 +/-0.002	< 0.032

(1) Pump failure at 82.34 hours run time.

Table No.: 1.3b

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-3, 61VA

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921934	10/27/92	11/03/92	0.017 +/- 0.002	< 0.024
921964	11/03/92	11/10/92	0.009 +/- 0.002	< 0.019
921983	11/10/92	11/17/92	0.008 +/- 0.002	< 0.009
922017	11/17/92	11/24/92	0.006 +/- 0.002	< 0.008
922053	11/24/92	12/01/92	0.012 +/- 0.002	< 0.015
922091	12/01/92	12/08/92	0.009 +/- 0.002	< 0.015
922126	12/08/92	12/15/92	0.009 +/- 0.002	< 0.013
922190	12/15/92	12/22/92	0.014 +/- 0.002	< 0.025
922200	12/22/92	12/29/92	0.014 +/- 0.002	< 0.016

= Control Location * = Low Level Analysis

Table No.: 1.4
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Unit: $\mu\text{Ci}/\text{m}^3$

Location: AS-4, GJOE

Lab No.	Begin Date	End Date	Gross Beta	I-131
920061	12/31/91	01/06/92	0.036 +/- 0.004	< 0.032
920164	01/06/92	01/14/92	0.025 +/- 0.003	< 0.012
920197	01/14/92	01/21/92	0.010 +/- 0.002	< 0.015
920232	01/21/92	01/28/92	0.018 +/- 0.002	< 0.015
920255	01/28/92	02/04/92	0.040 +/- 0.003	< 0.011
920310	02/04/92	02/11/92	0.014 +/- 0.002	< 0.014
920327	02/11/92	02/18/92	0.013 +/- 0.002	< 0.010
920370	02/18/92	02/25/92	0.016 +/- 0.002	< 0.021
920403	02/25/92	03/03/92	0.031 +/- 0.003	< 0.016
920442	03/03/92	03/10/92	0.018 +/- 0.002	< 0.020
920477	03/10/92	03/17/92	0.010 +/- 0.002	< 0.026
920518	03/17/92	03/24/92	0.017 +/- 0.002	< 0.012
920565	03/24/92	03/31/92	0.014 +/- 0.002	< 0.024
920636	03/31/92	04/07/92	0.020 +/- 0.002	< 0.028
920678	04/07/92	04/14/92	0.007 +/- 0.002	< 0.016
920712	04/14/92	04/21/92	0.011 +/- 0.002	< 0.010
920772	04/21/92	04/28/92	0.009 +/- 0.002	< 0.011
920812	04/28/92	05/05/92	0.021 +/- 0.002	< 0.029
920862	05/05/92	05/12/92	0.019 +/- 0.003	< 0.015
920894	05/12/92	05/19/92 (1)	< 0.004	< 0.018
920926	05/19/92	05/26/92	0.011 +/- 0.002	< 0.015

(1) Power failure at 141.20 hours run time.

= Control Location * = Low Level Analysis

Environmental Radiological Monitoring Report

Table No.: 1.4a
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-4, GJOE

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920964	05/26/92	06/02/92	0.036 +/- 0.003	< 0.020
921034	06/02/92	06/09/92	0.010 +/- 0.002	< 0.016
921070	06/09/92	06/16/92	0.009 +/- 0.002	< 0.013
921105	06/16/92	06/23/92	0.010 +/- 0.002	< 0.013
921146	06/23/92	06/30/92 (2)	0.041 +/- 0.003	< 0.012
921239	06/30/92	07/07/92	0.016 +/- 0.003	< 0.017
921261	07/07/92	07/14/92	0.024 +/- 0.003	< 0.016
921325	07/14/92	07/21/92	0.009 +/- 0.002	< 0.015
921349	07/21/92	07/28/92	0.012 +/- 0.002	< 0.008
921398	07/28/92	08/04/92	0.012 +/- 0.002	< 0.016
921424	08/04/92	08/11/92	0.013 +/- 0.002	< 0.024
921453	08/11/92	08/18/92	0.009 +/- 0.002	< 0.025
921483	08/18/92	08/25/92	0.017 +/- 0.002	< 0.018
921536	08/25/92	09/01/92	0.010 +/- 0.002	< 0.016
921557	09/01/92	09/09/92	0.008 +/- 0.002	< 0.009
921594	09/09/92	09/15/92	0.024 +/- 0.002	< 0.030
921647	09/15/92	09/22/92	0.004 +/- 0.002	< 0.030
921674	09/22/92	09/29/92	0.013 +/- 0.002	< 0.019
921751	09/29/92	10/06/92	0.010 +/- 0.002	< 0.009
921795	10/06/92	10/13/92	0.017 +/- 0.002	< 0.013
921842	10/13/92	10/20/92	0.013 +/- 0.002	< 0.018
921894	10/20/92	10/27/92	0.022 +/- 0.002	< 0.032

(2) Blown fuse at 146.6 hours run time.

Table No.: 1.4b

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-6, 6JOE

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921935	10/27/92	11/03/92	0.011 +/- 0.002	< 0.024
921965	11/03/92	11/10/92	0.011 +/- 0.002	< 0.019
921984	11/10/92	11/17/92	0.008 +/- 0.002	< 0.009
922018	11/17/92	11/24/92	0.007 +/- 0.002	< 0.008
922054	11/24/92	12/01/92	0.009 +/- 0.002	< 0.015
922092	12/01/92	12/08/92	0.008 +/- 0.002	< 0.015
922127	12/08/92	12/15/92	0.008 +/- 0.002	< 0.013
922191	12/15/92	12/22/92	0.010 +/- 0.002	< 0.025
922201	12/22/92	12/29/92	0.010 +/- 0.002	< 0.016

= Control Location * = Low Level Analysis

Table No.: 1.5

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-5, TC

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920062	12/31/91	01/06/92	0.036 +/- 0.004	< 0.032
920165	01/06/92	01/14/92	0.030 +/- 0.003	< 0.012
920198	01/14/92	01/21/92	0.010 +/- 0.002	< 0.015
920233	01/21/92	01/28/92	0.017 +/- 0.002	< 0.015
920256	01/28/92	02/04/92	0.031 +/- 0.002	< 0.011
920311	02/04/92	02/11/92	0.014 +/- 0.002	< 0.014
920328	02/11/92	02/18/92	0.011 +/- 0.002	< 0.010
920371	02/18/92	02/25/92	0.019 +/- 0.002	< 0.021
920404	02/25/92	03/03/92	0.023 +/- 0.002	< 0.016
920443	03/03/92	03/10/92	0.016 +/- 0.002	< 0.020
920478	03/10/92	03/17/92	0.010 +/- 0.002	< 0.026
920512	03/17/92	03/24/92	0.018 +/- 0.002	< 0.012
920566	03/24/92	03/31/92	0.015 +/- 0.002	< 0.024
920637	03/31/92	04/07/92	0.018 +/- 0.002	< 0.028
920679	04/07/92	04/14/92	0.013 +/- 0.002	< 0.016
920713	04/14/92	04/21/92	0.011 +/- 0.002	< 0.010
920773	04/21/92	04/28/92	0.012 +/- 0.002	< 0.011
920813	04/28/92	05/05/92	0.016 +/- 0.002	< 0.029
920863	05/05/92	05/12/92	0.016 +/- 0.003	< 0.015
920895	05/12/92	05/19/92	0.027 +/- 0.003	< 0.018
920927	05/19/92	05/26/92	0.010 +/- 0.002	< 0.015

= Control Location * = Low Level Analysis

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-5, TC

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920965	05/26/92	06/02/92	0.027 +/-0.003	< 0.020
921035	06/02/92	06/09/92	0.010 +/-0.002	< 0.016
921071	06/09/92	06/16/92	0.008 +/-0.002	< 0.013
921106	06/16/92	06/23/92	0.014 +/-0.002	< 0.013
921147	06/23/92	06/30/92 (1)	0.043 +/-0.003	< 0.012
921240	06/30/92	07/07/92 (2)	0.018 +/-0.003	< 0.017
921262	07/07/92	07/14/92	0.028 +/-0.003	< 0.016
921326	07/14/92	07/21/92	0.010 +/-0.002	< 0.015
921350	07/21/92	07/28/92	0.007 +/-0.002	< 0.008
921399	07/28/92	08/04/92	0.013 +/-0.002	< 0.016
921425	08/04/92	08/11/92	0.016 +/-0.002	< 0.024
921454	08/11/92	08/18/92	0.009 +/-0.002	< 0.025
921484	08/18/92	08/25/92	0.019 +/-0.002	< 0.018
921537	08/25/92	09/01/92	0.010 +/-0.002	< 0.016
921558	09/01/92	09/09/92	0.011 +/-0.002	< 0.009
921595	09/09/92	09/15/92	0.017 +/-0.002	< 0.030
921648	09/15/92	09/22/92	0.006 +/-0.002	< 0.030
921675	09/22/92	09/29/92	0.010 +/-0.002	< 0.019
921752	09/29/92	10/06/92	0.011 +/-0.002	< 0.009
921796	10/06/92	10/13/92	0.014 +/-0.002	< 0.013
921843	10/13/92	10/20/92	0.015 +/-0.002	< 0.018
921895	10/20/92	10/27/92	0.018 +/-0.002	< 0.032

(1) Blown fuse at 142.26 hours run time.
 (2) No flow at collection.

Table No.: 1.5b

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-5, TC

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921936	10/27/92	11/03/92	0.017 +/-0.002	< 0.024
921966	11/03/92	11/10/92	0.010 +/-0.002	< 0.019
921985	11/10/92	11/17/92	0.010 +/-0.002	< 0.009
922019	11/17/92	11/24/92	0.008 +/-0.004	< 0.008
922055	11/24/92	12/01/92	0.029 +/-0.002	< 0.015
922093	12/01/92	12/08/92 (2)	0.020 +/-0.002	< 0.015
922128	12/08/92	12/15/92	0.020 +/-0.002	< 0.013
922192	12/15/92	12/22/92	0.025 +/-0.002	< 0.025
922202	12/22/92	12/29/92	0.016 +/-0.002	< 0.016

(2) No flow at collection.

= Control Location * = Low Level Analysis

Table No.: 1.6

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-6, RS

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	I-131
920063	12/31/91	01/06/92	0.028 +/-0.003	< 0.032
920166	01/06/92	01/14/92	0.025 +/-0.003	< 0.012
920199	01/14/92	01/21/92	0.012 +/-0.002	< 0.015
920234	01/21/92	01/28/92	0.015 +/-0.002	< 0.015
920257	01/28/92	02/04/92	0.046 +/-0.003	< 0.011
920312	02/04/92	02/11/92	0.015 +/-0.002	< 0.014
920329	02/11/92	02/18/92	0.008 +/-0.002	< 0.010
920372	02/18/92	02/25/92	0.017 +/-0.002	< 0.021
920405	02/25/92	03/03/92	0.022 +/-0.002	< 0.016
920444	03/03/92	03/10/92	0.017 +/-0.002	< 0.020
920479	03/10/92	03/17/92	0.008 +/-0.002	< 0.026
920513	03/17/92	03/24/92	0.018 +/-0.002	< 0.012
930567	03/24/92	03/31/92	0.014 +/-0.002	< 0.024
920638	03/31/92	04/07/92	0.016 +/-0.002	< 0.028
920680	04/07/92	04/14/92	0.008 +/-0.002	< 0.016
920714	04/14/92	04/21/92	0.011 +/-0.002	< 0.010
920774	04/21/92	04/28/92	0.012 +/-0.002	< 0.011
920814	04/28/92	05/05/92	0.019 +/-0.002	< 0.029
920864	05/05/92	05/12/92	0.018 +/-0.003	< 0.015
920896	05/12/92	05/19/92	0.022 +/-0.003	< 0.018
920928	05/19/92	05/26/92	0.010 +/-0.002	< 0.015

= Control Location * = Low Level Analysis

Table No.: 1.6a

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-6, RS

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	I-131
920966	05/26/92	06/02/92	0.027 +/-0.003	< 0.020
921036	06/02/92	06/09/92	0.010 +/-0.002	< 0.016
921072	06/09/92	06/16/92	0.014 +/-0.003	< 0.013
921107	06/16/92	06/23/92	0.009 +/-0.002	< 0.013
921148	06/23/92	06/30/92	< 0.003	< 0.012
921241	06/30/92	07/07/92 (1)	< 0.004	< 0.017
921263	07/07/92	07/14/92	0.028 +/-0.003	< 0.016
921327	07/14/92	07/21/92	0.007 +/-0.002	< 0.015
921351	07/21/92	07/28/92	0.014 +/-0.002	< 0.008
921400	07/28/92	08/04/92	0.009 +/-0.002	< 0.016
921426	08/04/92	08/11/92	0.018 +/-0.002	< 0.024
921455	08/11/92	08/18/92	0.010 +/-0.002	< 0.025
921485	08/18/92	08/25/92	0.017 +/-0.002	< 0.018
921538	08/25/92	09/01/92 (2)	0.011 +/-0.002	< 0.016
921559	09/01/92	09/09/92 (3)	0.026 +/-0.004	< 0.009
921596	09/09/92	09/15/92	0.023 +/-0.002	< 0.030
921649	09/15/92	09/22/92 (4)	0.004 +/-0.002	< 0.030
921676	09/22/92	09/29/92	0.014 +/-0.002	< 0.019
921753	09/29/92	10/06/92	0.014 +/-0.002	< 0.009
921797	10/06/92	10/13/92	0.016 +/-0.002	< 0.013
921844	10/13/92	10/20/92	0.017 +/-0.002	< 0.018
921896	10/20/92	10/27/92	0.025 +/-0.003	< 0.032

- (1) No flow at collection.
 (2) Short run time of 115.1 hours due to power outage.
 (3) Blown fuse at 70.12 hours run time.
 (4) Poor flow at collection (140.5 hours run time).

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921937	10/27/92	11/03/92	0.015 +/-0.002	< 0.024
921967	11/03/92	11/10/92	0.006 +/-0.002	< 0.019
921986	11/10/92	11/17/92 (5)	0.010 +/-0.007	< 0.009
922020	11/17/92	11/24/92	0.004 +/-0.002	< 0.008
922056	11/24/92	12/01/92	0.016 +/-0.002	< 0.015
922094	12/01/92	12/08/92	0.009 +/-0.002	< 0.015
922129	12/08/92	12/15/92	0.011 +/-0.002	< 0.013
922193	12/15/92	12/22/92	0.011 +/-0.002	< 0.025
922203	12/22/92	12/29/92	0.016 +/-0.002	< 0.016

(5) Not working properly at collection (no run time showing).

Environmental Radiological Monitoring Report

Table No.: 1.7
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-7, MT

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920064	12/31/91	01/06/92	0.030 +/-0.003	< 0.032
920167	01/06/92	01/14/92	0.027 +/-0.003	< 0.012
920200	01/14/92	01/21/92	0.009 +/-0.002	< 0.015
920235	01/21/92	01/28/92	0.015 +/-0.002	< 0.015
920258	01/28/92	02/04/92	0.033 +/-0.002	< 0.011
920313	02/04/92	02/11/92	0.014 +/-0.002	< 0.014
920330	02/11/92	02/18/92	0.012 +/-0.002	< 0.010
920373	02/18/92	02/25/92	0.014 +/-0.002	< 0.021
920406	02/25/92	03/03/92	0.023 +/-0.002	< 0.016
920445	03/03/92	03/10/92	0.018 +/-0.002	< 0.020
920480	03/10/92	03/17/92	0.009 +/-0.002	< 0.026
920514	03/17/92	03/24/92	0.020 +/-0.002	< 0.012
920568	03/24/92	03/31/92	0.010 +/-0.002	< 0.024
920639	03/31/92	04/07/92	0.018 +/-0.002	< 0.028
920681	04/07/92	04/14/92	0.015 +/-0.002	< 0.016
920715	04/14/92	04/21/92	0.012 +/-0.002	< 0.010
920775	04/21/92	04/28/92	0.015 +/-0.002	< 0.011
920815	04/28/92	05/05/92	0.019 +/-0.002	< 0.029
920865	05/05/92	05/12/92	0.016 +/-0.002	< 0.015
920897	05/12/92	05/19/92	0.019 +/-0.003	< 0.018
920929	05/19/92	05/26/92	0.011 +/-0.002	< 0.015

Environmental Radiological Monitoring Report

Table No.: 1.7a
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-7, MT

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920967	05/26/92	06/02/92	0.025 +/-0.003	< 0.020
921037	06/02/92	06/09/92	0.007 +/-0.002	< 0.016
921073	06/09/92	06/16/92	0.013 +/-0.002	< 0.013
921108	06/16/92	06/23/92	0.019 +/-0.002	< 0.013
921149	06/23/92	06/30/92	0.038 +/-0.003	< 0.012
921242	06/30/92	07/07/92	0.024 +/-0.003	< 0.017
921264	07/07/92	07/14/92	0.038 +/-0.003	< 0.016
921328	07/14/92	07/21/92	0.011 +/-0.002	< 0.015
921352	07/21/92	07/28/92	0.018 +/-0.002	< 0.008
921401	07/28/92	08/04/92	0.016 +/-0.002	< 0.016
921427	08/04/92	08/11/92	0.022 +/-0.003	< 0.024
921456	08/11/92	08/18/92	0.025 +/-0.003	< 0.025
921486	08/18/92	08/25/92	0.028 +/-0.002	< 0.018
921539	08/25/92	09/01/92	0.016 +/-0.003	< 0.016
921560	09/01/92	09/09/92	0.019 +/-0.003	< 0.009
921597	09/09/92	09/15/92	0.019 +/-0.002	< 0.030
921650	09/15/92	09/22/92	0.007 +/-0.002	< 0.030
921677	09/22/92	09/29/92	0.015 +/-0.002	< 0.019
921754	09/29/92	10/06/92	0.018 +/-0.002	< 0.009
921798	10/06/92	10/13/92	0.020 +/-0.002	< 0.013
921845	10/13/92	10/20/92	0.019 +/-0.002	< 0.018
921897	10/20/92	10/27/92	0.026 +/-0.002	< 0.032

- (1) Electrical failure at 104.2 hours run time.
 (2) Short run time of 114.5 hours due to power outage.

= Control Location * = Low Level Analysis

Table No.: 1.7b

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: A5-7, MT

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921938	10/27/92	11/03/92	0.020 +/-0.002	< 0.024
921948	11/03/92	11/10/92	0.014 +/-0.002	< 0.019
921987	11/10/92	11/17/92 (.3)	0.040 +/-0.031	< 0.009
922021	11/17/92	11/24/92	0.006 +/-0.002	< 0.008
922057	11/24/92	12/01/92	0.016 +/-0.002	< 0.015
922095	12/01/92	12/08/92	0.011 +/-0.002	< 0.015
922130	12/08/92	12/15/92	0.011 +/-0.002	< 0.013
922194	12/15/92	12/22/92	0.012 +/-0.002	< 0.025
922204	12/22/92	12/29/92	0.015 +/-0.002	< 0.016

(3) Blown fuse at 9.59 hours run time.

Environmental Radiological Monitoring Report

Table No.: 1.8

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-8, WR

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920065	12/31/91	01/06/92	0.032 +/-0.003	< 0.032
920168	01/06/92	01/14/92	0.023 +/-0.003	< 0.012
920201	01/14/92	01/21/92	0.006 +/-0.002	< 0.015
920236	01/21/92	01/28/92	0.016 +/-0.002	< 0.015
920259	01/28/92	02/04/92	0.034 +/-0.002	< 0.011
920314	02/04/92	02/11/92	0.015 +/-0.002	< 0.014
920331	02/11/92	02/18/92	0.009 +/-0.002	< 0.010
920374	02/18/92	02/25/92	0.016 +/-0.002	< 0.021
920407	02/25/92	03/03/92	0.020 +/-0.002	< 0.016
920446	03/03/92	03/10/92	0.016 +/-0.002	< 0.020
920481	03/10/92	03/17/92	0.010 +/-0.002	< 0.026
920515	03/17/92	03/24/92	0.017 +/-0.002	< 0.012
920569	03/24/92	03/31/92	0.009 +/-0.002	< 0.024
920640	03/31/92	04/07/92	0.017 +/-0.002	< 0.028
920682	04/07/92	04/14/92	0.012 +/-0.002	< 0.016
920716	04/14/92	04/21/92	0.010 +/-0.002	< 0.010
920776	04/21/92	04/28/92	0.016 +/-0.002	< 0.011
920816	04/28/92	05/05/92	0.017 +/-0.002	< 0.029
920866	05/05/92	05/12/92	0.016 +/-0.003	< 0.015
920898	05/12/92	05/19/92	0.021 +/-0.003	< 0.018
920930	05/19/92	05/26/92	0.008 +/-0.002	< 0.015

= Control Location * = Low Level Analysis

Environmental Radiological Monitoring Report

Table No.: 1.8a
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³±3

Location: AS-8, WR

Lab No.	Begin Date	End Date	Gross Beta	I-131
920968	05/26/92	06/02/92	0.023 +/-0.003	< 0.020
921038	06/02/92	06/09/92	0.011 +/-0.002	< 0.016
921074	06/09/92	06/16/92	0.011 +/-0.002	< 0.013
921109	06/16/92	06/23/92	0.015 +/-0.002	< 0.013
921150	06/23/92	06/30/92	0.034 +/-0.003	< 0.012
921243	06/30/92	07/07/92	0.012 +/-0.002	< 0.017
921265	07/07/92	07/14/92	0.028 +/-0.003	< 0.016
921329	07/14/92	07/21/92	0.006 +/-0.002	< 0.015
921353	07/21/92	07/28/92	0.009 +/-0.002	< 0.008
921402	07/28/92	08/04/92	0.008 +/-0.002	< 0.016
921428	08/04/92	08/11/92	0.012 +/-0.002	< 0.024
921457	08/11/92	08/18/92	0.010 +/-0.002	< 0.025
921487	08/18/92	08/25/92	0.015 +/-0.002	< 0.018
921540	08/25/92	09/01/92	0.009 +/-0.002	< 0.016
921561	09/01/92	09/09/92	0.008 +/-0.002	< 0.009
921598	09/09/92	09/15/92	0.019 +/-0.003	< 0.030
921651	09/15/92	09/22/92	0.007 +/-0.002	< 0.030
921678	09/22/92	09/29/92	0.009 +/-0.002	< 0.019
921755	09/29/92	10/06/92	0.012 +/-0.002	< 0.009
921799	10/06/92	10/13/92	0.013 +/-0.002	< 0.013
921846	10/13/92	10/20/92	0.015 +/-0.002	< 0.018
921898	10/20/92	10/27/92	0.020 +/-0.002	< 0.032

Environmental Radiological Monitoring Report

Table No.: 1.8b
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-B, UR

Lab No.	Begin Date	End Date	Gross Beta	I-131
921939	10/27/92	11/03/92	0.015 +/-0.002	< 0.024
921949	11/03/92	11/10/92	0.008 +/-0.002	< 0.019
921988	11/10/92	11/17/92	0.011 +/-0.002	< 0.009
922022	11/17/92	11/24/92	0.006 +/-0.002	< 0.008
922058	11/24/92	12/01/92	0.013 +/-0.002	< 0.015
922096	12/01/92	12/08/92	0.010 +/-0.002	< 0.015
922131	12/08/92	12/15/92	0.009 +/-0.002	< 0.013
922195	12/15/92	12/22/92	0.012 +/-0.002	< 0.025
922205	12/22/92	12/29/92	0.012 +/-0.002	< 0.016

= Control Location * = Low Level Analysis

Table No.: 1.9

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-9, GGMP

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920066	12/31/91	01/06/92	0.030 +/-0.003	< 0.032
920169	01/06/92	01/14/92	0.018 +/-0.002	< 0.012
920202	01/14/92	01/21/92	0.006 +/-0.002	< 0.015
920237	01/21/92	01/28/92 (1)	0.016 +/-0.002	< 0.015

(1) Sampling station discontinued.

= Control Location * = Low Level Analysis

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-10, HR

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920067	12/31/91	01/06/92	0.040 +/-0.004	< 0.032
920170	01/06/92	01/14/92	0.022 +/-0.002	< 0.012
920203	01/14/92	01/21/92	0.009 +/-0.002	< 0.015
920238	01/21/92	01/28/92	0.021 +/-0.002	< 0.015
920260	01/28/92	02/03/92	0.023 +/-0.002	< 0.011
920315	02/03/92	02/11/92	0.010 +/-0.002	< 0.014
920332	02/11/92	02/17/92	0.011 +/-0.002	< 0.010
920375	02/17/92	02/25/92	0.012 +/-0.002	< 0.021
920408	02/25/92	03/02/92	0.020 +/-0.002	< 0.016
920447	03/02/92	03/10/92	0.018 +/-0.002	< 0.020
920482	03/10/92	03/16/92	0.013 +/-0.003	< 0.026
920516	03/16/92	03/24/92	0.018 +/-0.002	< 0.012
920570	03/24/92	03/30/92 (1)	0.015 +/-0.003	< 0.024
920641	03/30/92	04/07/92	0.015 +/-0.002	< 0.028
920683	04/07/92	04/14/92	0.009 +/-0.002	< 0.016
920717	04/14/92	04/21/92	0.011 +/-0.002	< 0.010
920777	04/21/92	04/28/92	0.013 +/-0.002	< 0.011
920817	04/28/92	05/05/92	0.020 +/-0.002	< 0.029
920867	05/05/92	05/12/92 (2)	0.015 +/-0.002	< 0.015
920899	05/12/92	05/19/92	0.017 +/-0.003	< 0.018
920931	05/19/92	05/26/92	0.008 +/-0.002	< 0.015

- (1) Moved to Mississippi side near Heavy Haul Road on 3-30-92,
which changed station ID from AS-10 NLT to AS-10 HR.
- (2) Power failure at 147.2 hours run time.

Table No.: 1.10a

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-10, HR

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920969	05/26/92	06/02/92	0.016 +/-0.002	< 0.020
921039	06/02/92	06/09/92	0.009 +/-0.002	< 0.016
921075	06/09/92	06/16/92	0.009 +/-0.002	< 0.013
921110	06/16/92	06/23/92	0.013 +/-0.002	< 0.013
921151	06/23/92	06/30/92	0.025 +/-0.002	< 0.012
921244	06/30/92	07/07/92	0.012 +/-0.002	< 0.017
921266	07/07/92	07/14/92	0.023 +/-0.003	< 0.016
921330	07/14/92	07/21/92 (3)	0.003 +/-0.002	< 0.015
921354	07/21/92	07/28/92	0.006 +/-0.002	< 0.008
921403	07/28/92	08/04/92	0.008 +/-0.002	< 0.016
921429	08/04/92	08/11/92	0.011 +/-0.002	< 0.024
921458	08/11/92	08/18/92	0.010 +/-0.002	< 0.025
921488	08/18/92	08/25/92 (4)	0.023 +/-0.003	< 0.018
921541	08/25/92	09/01/92 (5)	0.011 +/-0.003	< 0.016
921562	09/01/92	09/09/92	0.005 +/-0.001	< 0.009
921599	09/09/92	09/15/92 (6)	0.016 +/-0.002	< 0.030
921652	09/15/92	09/22/92	0.006 +/-0.002	< 0.030
921679	09/22/92	09/29/92 (7)	0.011 +/-0.005	< 0.019
921756	09/29/92	10/06/92	0.017 +/-0.002	< 0.009
921800	10/06/92	10/13/92	0.020 +/-0.002	< 0.013
921847	10/13/92	10/20/92	0.015 +/-0.002	< 0.018
921899	10/20/92	10/27/92 (8)	0.027 +/-0.005	< 0.032

(3) No flow at collection.

(4) Inoperable at collection (97.52 hours run time).

(5) Short run time of 109.27 hours due to power outage.

(6) Blown fuse at 137.07 hours run time.

(7) Blown fuse at 54.54 hours run time.

(8) Blown fuse at 60.14 hours run time.

= Control Location * = Low Level Analysis

Environmental Radiological Monitoring Report

Table No.: 1.10b
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-10, HR

Lab No.	Begin Date	End Date	Gross Beta	I-131
921940	10/27/92	11/03/92	0.018 +/-0.002	< 0.024
921970	11/03/92	11/10/92	0.014 +/-0.002	< 0.019
921989	11/10/92	11/17/92	0.012 +/-0.002	< 0.009
922023	11/17/92	11/24/92	0.008 +/-0.002	< 0.008
922059	11/24/92	12/01/92	0.016 +/-0.002	< 0.015
922097	12/01/92	12/08/92	0.009 +/-0.002	< 0.015
922132	12/08/92	12/15/92	0.008 +/-0.002	< 0.013
922196	12/15/92	12/22/92	0.011 +/-0.002	< 0.025
922206	12/22/92	12/29/92	0.012 +/-0.002	< 0.016

= Control Location * = Low Level Analysis

Table No.: 1.11

Sample: Air Samples, (Beta, I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m³

Location: AS-11, BB

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab No.	Begin Date	End Date	Gross Beta	I-131
920068	12/31/91	01/06/92	0.025 +/-0.003	< 0.032
920171	01/06/92	01/14/92	0.024 +/-0.003	< 0.012
920204	01/14/92	01/21/92	0.012 +/-0.002	< 0.015
920239	01/21/92	01/28/92	0.017 +/-0.002	< 0.015
920261	01/28/92	02/03/92	0.030 +/-0.003	< 0.011
920316	02/03/92	02/11/92	0.012 +/-0.002	< 0.014
920333	02/11/92	02/17/92	0.015 +/-0.002	< 0.010
920376	02/17/92	02/25/92	0.014 +/-0.002	< 0.021
920409	02/25/92	03/02/92	0.025 +/-0.003	< 0.016
920448	03/02/92	03/10/92	0.013 +/-0.002	< 0.020
920483	03/10/92	03/16/92	0.014 +/-0.003	< 0.026
920517	03/16/92	03/24/92	0.016 +/-0.002	< 0.012
920571	03/24/92	03/30/92 (1)	0.016 +/-0.003	< 0.024
920642	03/30/92	04/07/92	0.015 +/-0.002	< 0.028
920684	04/07/92	04/14/92	0.014 +/-0.002	< 0.016
920718	04/14/92	04/21/92	0.011 +/-0.002	< 0.010
920778	04/21/92	04/28/92	0.013 +/-0.002	< 0.011
920818	04/28/92	05/05/92	0.016 +/-0.002	< 0.029
920868	05/05/92	05/12/92	0.015 +/-0.002	< 0.015
920900	05/12/92	05/19/92	0.020 +/-0.003	< 0.018
920932	05/19/92	05/26/92	0.008 +/-0.002	< 0.015

(1) Moved to Mississippi side near Basin B on 3-30-92,
which changed station ID from AS-11 STJ to AS-11 BB.

Environmental Radiological Monitoring Report

Table No.: 1.11a
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-11, BB

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920970	05/26/92	06/02/92	0.020 +/-0.003	< 0.020
921040	06/02/92	06/09/92	0.014 +/-0.002	< 0.016
921076	06/09/92	06/16/92	0.011 +/-0.002	< 0.013
921111	06/16/92	06/23/92	0.015 +/-0.002	< 0.013
921152	06/23/92	06/30/92	0.029 +/-0.003	< 0.012
921245	06/30/92	07/07/92	0.010 +/-0.002	< 0.017
921267	07/07/92	07/14/92	0.026 +/-0.003	< 0.016
921331	07/14/92	07/21/92 (2)	< 0.003	< 0.015
921355	07/21/92	07/28/92 (2)	0.003 +/-0.002	< 0.008
921404	07/28/92	08/04/92	0.017 +/-0.003	< 0.016
921430	08/04/92	08/11/92 (3)	< 0.008	< 0.024
921459	08/11/92	08/18/92	0.014 +/-0.002	< 0.025
921489	08/18/92	08/25/92 (4)	0.015 +/-0.003	< 0.018
921542	08/25/92	09/01/92	0.009 +/-0.002	< 0.016
921563	09/01/92	09/09/92	0.008 +/-0.002	< 0.009
921600	09/09/92	09/15/92	0.014 +/-0.002	< 0.030
921653	09/15/92	09/22/92	0.006 +/-0.002	< 0.030
921680	09/22/92	09/29/92	0.010 +/-0.002	< 0.019
921757	09/29/92	10/06/92	0.013 +/-0.002	< 0.009
921801	10/06/92	10/13/92	0.017 +/-0.002	< 0.013
921848	10/13/92	10/20/92	0.013 +/-0.002	< 0.018
921900	10/20/92	10/27/92	0.022 +/-0.002	< 0.032

- (2) No flow at collection.
 (3) Electrical failure at 72.54 hours run time.
 (4) Run time of 92.46 hours due to mechanical problems.

= Control Location * = Low level Analysis

Environmental Radiological Monitoring Report

Table No.: 1.11b
 Sample: Air Samples, (Beta, I-131)
 Collection: Continuous with Weekly Exchange
 Units: pCi/m³

Location: AS-11, 8B

Lab No.	Begin Date	End Date	Gross Beta	I-131
921941	10/27/92	11/03/92	0.014 +/-0.002	< 0.024
921971	11/03/92	11/10/92	0.006 +/-0.002	< 0.019
921990	11/10/92	11/17/92	0.012 +/-0.002	< 0.009
922024	11/17/92	11/24/92	0.007 +/-0.002	< 0.008
922060	11/24/92	12/01/92	0.017 +/-0.002	< 0.015
922098	12/01/92	12/08/92	0.012 +/-0.002	< 0.015
922133	12/08/92	12/15/92	0.009 +/-0.002	< 0.013
922197	12/15/92	12/22/92	0.009 +/-0.002	< 0.025
922207	12/22/92	12/29/92	0.013 +/-0.002	< 0.016

Environmental Radiological Monitoring Report

Date: 01/20/93

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
AS-1, PG	920595	12/31/91	03/31/92	< 0.0011	< 0.0007
AS-2, 61N	920596	12/31/91	01/28/92	< 0.0035	< 0.0038
AS-3, 61VA	920597	12/31/91	03/31/92	< 0.0012	< 0.0011
AS-4, 61OE	920598	12/31/91	03/31/92	< 0.0013	< 0.0010
AS-5, TC	920599	12/31/91	03/31/92	< 0.0012	< 0.0011
AS-6, RS	920600	12/31/91	03/31/92	< 0.0013	< 0.0011
AS-7, MT	920601	12/31/91	03/31/92	< 0.0006	< 0.0005
AS-8, WR	920602	12/31/91	03/31/92	< 0.0011	< 0.0011
AS-9, GOMP	920603	12/31/91	01/28/92	< 0.0050	< 0.0036
AS-10, HR (1)	920604	12/31/91	03/30/92	< 0.0008	< 0.0005
AS-11, BB (1)	920605	12/31/91	03/30/92	< 0.0011	< 0.0008

(1) This composite consists of filters from their previous location in Louisiana (AS-10 NLT and AS-11 STJ).

Table No.: 1.13

Sample: Air Samples, (Gamma)

Collection: Quarterly Composite of Weekly Samples

Units: pCi/m³

Environmental Radiological Monitoring Report

Date: 01/20/93

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
AS-1, PG	921131	03/31/92	06/30/92	< 0.0007	< 0.0005
AS-3, 61VA	921132	03/31/92	06/30/92	< 0.0013	< 0.0009
AS-4, GJOE	921133	03/31/92	06/30/92	< 0.0013	< 0.0008
AS-5, TC	921134	03/31/92	06/30/92	< 0.0012	< 0.0010
AS-6, RS	921135	03/31/92	06/30/92	< 0.0008	< 0.0005
AS-7, MT	921136	03/31/92	06/30/92	< 0.0011	< 0.0008
AS-8, WR	921137	03/31/92	06/30/92	< 0.0013	< 0.0009
AS-10, HR	921138	03/30/92	06/30/92	< 0.0008	< 0.0005
AS-11, BB	921139	03/30/92	06/30/92	< 0.0009	< 0.0009

= Control Location * = Low Level Analysis

Environmental Radiological Monitoring Report

Date: 01/20/93

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
AS-1, PG	921739	06/30/92	09/29/92	< 0.0013	< 0.0012
AS-3, 61VA	921740	06/30/92	09/29/92	< 0.0015	< 0.0012
AS-4, GJOE	921741	06/30/92	09/29/92	< 0.0009	< 0.0008
AS-5, TC	921742	06/30/92	09/29/92	< 0.0014	< 0.0012
AS-6, RS	921743	06/30/92	09/29/92	< 0.0007	< 0.0006
AS-7, MT	921744	06/30/92	09/29/92	< 0.0011	< 0.0009
AS-8, WR	921745	06/30/92	09/29/92	< 0.0016	< 0.0012
AS-10, HR	921746	06/30/92	09/29/92	< 0.0008	< 0.0005
AS-11, BB	921747	06/30/92	09/29/92	< 0.0011	< 0.0009

Table No.: 1.15

Sample: Air Samples,(Gamma)

Collection: Quarterly Composite of Weekly Samples

Units: pCi/m³

Environmental Radiological Monitoring Report

Date: 01/20/93

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
AS-1, PG	922244	09/29/92	12/29/92	< 0.0010	< 0.0009
AS-3, 61VA	922245	09/29/92	12/29/92	< 0.0005	< 0.0004
AS-4, GJOE	922246	09/29/92	12/29/92	< 0.0008	< 0.0007
AS-5, TC	922247	09/29/92	12/29/92	< 0.0010	< 0.0008
AS-6, RS	922248	09/29/92	12/29/92	< 0.0007	< 0.0005
AS-7, MT	922249	09/29/92	12/29/92	< 0.0008	< 0.0008
AS-8, WR	922250	09/29/92	12/29/92	< 0.0011	< 0.0009
AS-10, HR	922251	09/29/92	12/29/92	< 0.0006	< 0.0005
AS-11, BB	922252	09/29/92	12/29/92	< 0.0007	< 0.0007

= Control Location * = Low Level Analysis

Sample: Cistern Water, (Beta, I-131, Gamma)

Collection: Monthly

Units: pCi/L

Location: WILLIS CISTERN

Lab. No.	Collection		Beta	I-131*	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
	Date														
920172	01/15/92	< 2.6	< 0.3	< 2	< 2	< 3	< 3	< 5	< 3	< 5	< 3	< 2	< 10	< 3	
920319	02/14/92	3.9+/-0.9	< 0.3	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 3	< 2	< 10	< 3	
920489	03/16/92	< 2.2	< 0.3	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 10	< 3	
920685	04/15/92	< 3.4	< 0.4	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 2	
920687GG	04/15/92	< 3.4	< 0.4	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 3	
920903	05/20/92	5.4+/-2.2	< 0.3	< 4	< 3	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 15	< 4	
921086GG	06/19/92	4.5+/-1.5	< 0.3	< 3	< 3	< 4	< 3	< 7	< 4	< 7	< 4	< 3	< 14	< 4	
921092	06/19/92	3.5+/-1.4	< 0.3	< 3	< 4	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 17	< 5	
921332	07/20/92	3.0+/-2.0	0.4+/-0.2	< 3	< 3	< 5	< 4	< 8	< 4	< 9	< 4	< 4	< 28	< 5	
921470	08/19/92	2.6+/-2.1	< 0.2	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 2	< 2	< 8	< 3	
921640	09/22/92	3.0+/-1.5	< 0.2	< 3	< 3	< 4	< 4	< 7	< 3	< 7	< 4	< 3	< 13	< 4	
921880	10/23/92	< 3.3	< 0.3	< 2	< 2	< 4	< 2	< 6	< 2	< 4	< 2	< 2	< 10	< 3	
922013	11/19/92	1.5+/-1.1	< 0.5	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 3	
922160	12/16/92	< 1.9	< 0.3	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 2	< 2	< 10	< 3	

Table No.: 2.2

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Cistern Water, (H-3)

Collection: Quarterly composite.

Units: pCi/L

Location: WILLIS CISTERN

Lab. No.	Begin Date	End Date	H-3
920491	01/15/92	03/16/92	< 590
920492GG	01/15/92	03/16/92	< 590
921088GG	04/15/92	06/19/92	< 630
921090	04/15/92	06/19/92	< 630
921642	07/20/92	09/22/92	< 510
922162	10/23/92	12/16/92	< 470
922163GG	10/23/92	12/16/92	< 470

Sample: Cistern Water, (Beta, I-131, Gamma)

Collection: Monthly

Units: pCi/L

Location: MCGEE CISTERN

Collection														
Lab. No.	Date	Beta	I-131*	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
920173	01/15/92	< 2.5	< 0.3	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 3
920320	02/14/92	< 1.2	< 0.3	< 4	< 4	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 18	< 4
920490	03/16/92	< 1.9	< 0.3	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 7	< 2
920686	04/15/92	< 3.3	< 0.3	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 5	< 2
920688GG	04/15/92	< 3.3	< 0.3	< 3	< 3	< 5	< 4	< 7	< 4	< 8	< 4	< 4	< 15	< 4
920904	05/20/92	7.0+/-2.1	< 0.3	< 3	< 4	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 17	< 5
921087GG	06/19/92	2.1+/-1.2	< 0.3	< 3	< 3	< 4	< 2	< 5	< 3	< 6	< 3	< 2	< 10	< 4
921093	06/19/92	< 1.9	< 0.4	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 3
921333	07/20/92	3.2+/-1.9	0.6+/-0.2	< 2	< 2	< 3	< 3	< 5	< 3	< 5	< 3	< 2	< 12	< 4
921471	08/19/92	< 3.3	< 0.2	< 2	< 1	< 2	< 2	< 3	< 2	< 3	< 2	< 1	< 6	< 2
921641	09/22/92	< 2.0	< 0.2	< 1	< 1	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 7	< 2
921881	10/23/92	< 3.3	< 0.3	< 3	< 3	< 5	< 4	< 7	< 4	< 8	< 4	< 4	< 16	< 5
922014	11/19/92	< 2.0	< 0.5	< 2	< 2	< 4	< 3	< 5	< 2	< 5	< 3	< 3	< 10	< 3
922161	12/16/92	1.1+/-1.1	< 0.3	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 8	< 3

Table No.: 2.4

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Cistern Water, (H-3)

Collection: Quarterly composite.

Units: pCi/L

Location: MCGEE CISTERN

Lab. No.	Begin Date	End Date	H-3
920493	01/15/92	03/16/92	< 590
920494GG	01/15/92	03/16/92	< 590
921089GG	04/15/92	06/19/92	< 630
921091	04/15/92	06/19/92	< 630
921643	07/20/92	09/22/92	< 510
922164	10/23/92	12/16/92	< 470
922165GG	10/23/92	12/16/92	< 470

Sample: Ground Water, (H-3, Gamma)

Collection: Quarterly

Units: pCi/L

Location: PGWELL P. Gibson

Lab. No.	Collection		H-3	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
	Date														
920052	01/02/92	< 370	< 2	< 2	< 2	< 3	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 8	< 2
920579	04/01/92	< 590	< 3	< 2	< 4	< 3	< 3	< 5	< 5	< 3	< 4	< 3	< 3	< 13	< 4
9205816G	04/01/92	< 590	< 3	< 4	< 5	< 4	< 4	< 7	< 8	< 4	< 6	< 4	< 3	< 18	< 6
921232	07/07/92	< 630	< 2	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 10	< 3
921692	10/01/92	< 490	< 3	< 3	< 5	< 3	< 3	< 7	< 8	< 4	< 6	< 4	< 4	< 15	< 5

Table No.: 3.2

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Ground Water, (H-3, Gamma)

Collection: Quarterly

Units: pCi/L

Location: AAMELL, Arnold Acr

		Collection													
Lab. No.	Date	H-3	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140	
920053	01/02/92	< 370	< 2	< 2	< 3	< 2	< 5	< 5	< 2	< 4	< 2	< 2	< 10	< 3	
920580	04/01/92	< 590	< 2	< 2	< 2	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 8	< 3	
920582GG	04/01/92	< 590	< 4	< 4	< 5	< 4	< 8	< 8	< 4	< 7	< 4	< 4	< 18	< 5	
921233	07/07/92	< 630	< 2	< 2	< 3	< 2	< 5	< 5	< 2	< 3	< 2	< 2	< 8	< 3	
921693	10/01/92	< 490	< 3	< 3	< 5	< 3	< 8	< 8	< 4	< 6	< 4	< 4	< 15	< 4	

Table No.: 3.3

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Ground Water, (H-3, Gamma)

Collection: Quarterly

Units: pCi/L

Location: Lake Bruin Well (1)

Collection

Lab. No.	Date	H-3	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920054	12/31/91	< 370	< 3	< 2	< 4	< 3	< 5	< 5	< 3	< 5	< 3	< 2	< 13	< 5

(1) Sampling station discontinued.

Table No.: 4.1

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Surface water, Grab (Gamma)

Collection: Monthly.

Units: pCi/L

Location: MISS. RIVER UP

Lab. No.	Date	Collection											
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920055	01/02/92	< 3	< 4	< 3	< 3	< 7	< 7	< 4	< 5	< 4	< 3	< 15	< 5
920273	02/04/92	< 4	< 5	< 3	< 4	< 8	< 8	< 4	< 5	< 4	< 4	< 16	< 4
920418	03/03/92	< 3	< 4	< 3	< 3	< 8	< 8	< 4	< 5	< 4	< 4	< 15	< 4
920625	04/07/92	< 2	< 3	< 2	< 2	< 4	< 5	< 3	< 4	< 3	< 2	< 11	< 3
920627GG	04/07/92	< 4	< 6	< 4	< 4	< 10	< 10	< 5	< 9	< 5	< 4	< 23	< 6
920829	05/05/92	< 4	< 6	< 5	< 4	< 10	< 10	< 5	< 8	< 5	< 5	< 22	< 6
920941	06/02/92	< 4	< 5	< 4	< 4	< 9	< 9	< 4	< 5	< 5	< 4	< 16	< 4
920943GG	06/02/92	< 3	< 3	< 2	< 3	< 4	< 5	< 2	< 3	< 3	< 3	< 17	< 3
921234	07/07/92	< 3	< 4	< 3	< 3	< 7	< 7	< 3	< 4	< 4	< 3	< 13	< 4
921392	08/04/92	< 4	< 6	< 4	< 4	< 9	< 10	< 5	< 9	< 5	< 4	< 20	< 6
921522	09/01/92	< 3	< 5	< 4	< 3	< 8	< 8	< 4	< 7	< 4	< 4	< 17	< 5
921765	10/06/92	< 2	< 3	< 2	< 3	< 5	< 5	< 3	< 4	< 3	< 2	< 12	< 4
921944	11/03/92	< 4	< 5	< 3	< 4	< 8	< 9	< 4	< 6	< 4	< 4	< 17	< 6
922072	12/01/92	< 3	< 5	< 4	< 4	< 7	< 8	< 3	< 6	< 4	< 4	< 16	< 6

Table No.: 4.2
Sample: Surface Water, (H-3)
Collection: Quarterly Composite
Units: pCi/L

Location: MISS. RIVER UP

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab. No.	Begin Date	End Date	H-3
920420	01/02/92	03/03/92	< 600
92042166	01/02/92	03/03/92	< 600
920945	04/07/92	06/02/92	< 610
92094666	04/07/92	06/02/92	< 610
921525	07/07/92	09/01/92	< 510
922075	10/06/92	12/01/92	< 480
92207766	10/06/92	12/01/92	< 480

= Control Location * = Low Level Analysis

Table No.: 4.3

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Surface water, Grab (Gamma)

Collection: Monthly.

Units: pCi/L

Location: MISS. RIVER DOWN

Lab. No.	Collection												
	Date	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920056	01/02/92	< 4	< 5	< 4	< 4	< 8	< 9	< 4	< 7	< 4	< 4	< 19	< 5
920274	02/04/92	< 2	< 3	< 2	< 3	< 5	< 5	< 3	< 4	< 3	< 2	< 10	< 3
920419	03/03/92	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 7	< 3
920626	04/07/92	< 2	< 3	< 2	< 5	< 5	< 5	< 3	< 4	< 3	< 2	< 10	< 4
920628GG	04/07/92	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 9	< 3
920830	05/05/92	< 3	< 4	< 3	< 4	< 7	< 7	< 3	< 6	< 3	< 3	< 15	< 5
920942	06/02/92	< 3	< 5	< 4	< 4	< 8	< 9	< 4	< 4	< 4	< 4	< 14	< 4
920944GG	06/02/92	< 4	< 5	< 3	< 4	< 8	< 8	< 4	< 5	< 4	< 4	< 15	< 4
921235	07/07/92	< 2	< 3	< 2	< 3	< 5	< 6	< 3	< 9	< 3	< 3	< 19	< 3
921393	08/04/92	< 2	< 2	< 2	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 9	< 3
921523	09/01/92	< 3	< 4	< 3	< 3	< 7	< 8	< 4	< 5	< 4	< 4	< 14	< 4
921766	10/06/92	< 3	< 5	< 3	< 3	< 6	< 8	< 4	< 6	< 4	< 3	< 16	< 5
921945	11/03/92	< 2	< 4	< 3	< 3	< 5	< 6	< 3	< 4	< 3	< 3	< 12	< 4
922073	12/01/92	< 2	< 4	< 3	< 3	< 6	< 6	< 3	< 4	< 3	< 3	< 12	< 5

= Control location * = Low Level Analysis

Table No.: 4.4

Sample: Surface Water, (H-3)

Collection: Quarterly Composite

Units: pCi/L

Location: MISS. RIVER DOWN

Environmental Radiological Monitoring Report

Date: 01/20/93

Lab. No.	Begin Date	End Date	H-3
920422	01/02/92	03/03/92	< 600
920423GG	01/02/92	03/03/92	< 600
920947	04/07/92	06/02/92	< 610
920948GG	04/07/92	06/02/92	< 610
921526	07/07/92	09/01/92	< 510
922076	10/06/92	12/01/92	< 480
922078GG	10/06/92	12/01/92	< 480

= Control Location * = Low Level Analysis

Table No.: 4.5

Environmental Radiological Monitoring Report

Date: 01/26/93

Sample: Surface Water, (Gamma)

Collection: Monthly Composite

Units: pCi/L

Location: DISCHARGE BASIN

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Hb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
930033	12/01/92	01/05/93	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 4	< 2	< 2	< 10	< 4
930034GG	12/01/92	01/05/93	< 3	< 3	< 5	< 4	< 8	< 4	< 8	< 7	< 4	< 3	< 17	< 6
920275	12/31/91	01/31/92	< 1	< 2	< 2	< 2	< 4	< 2	< 3	< 3	< 2	< 2	< 8	< 3
920397	01/31/92	02/28/92	< 2	< 2	< 4	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 7	< 3
920629	02/28/92	03/31/92	< 2	< 3	< 5	< 3	< 7	< 3	< 5	< 8	< 3	< 2	< 17	< 6
920828	03/31/92	04/30/92	< 2	< 2	< 3	< 2	< 6	< 2	< 4	< 5	< 2	< 2	< 11	< 4
920933GG	03/31/92	04/30/92	< 1	< 1	< 2	< 1	< 2	< 2	< 3	< 12	< 1	< 1	< 17	< 6
920949	04/30/92	06/02/92	< 3	< 3	< 4	< 3	< 7	< 3	< 6	< 4	< 3	< 3	< 12	< 4
921165	06/02/92	07/01/92	< 3	< 3	< 4	< 3	< 5	< 3	< 6	< 4	< 3	< 3	< 13	< 4
921166GG	06/02/92	07/01/92	< 4	< 4	< 5	< 4	< 9	< 4	< 9	< 6	< 4	< 4	< 19	< 5
921394	07/01/92	08/04/92	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 10	< 3
921524	08/04/92	09/01/92	< 2	< 3	< 3	< 3	< 5	< 3	< 6	< 5	< 3	< 2	< 12	< 4
921694	09/01/92	10/02/92	< 1	< 2	< 3	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 7	< 3
921946	10/02/92	11/03/92	< 2	< 2	< 2	< 2	< 4	< 3	< 5	< 3	< 2	< 2	< 10	< 3
922074	11/03/92	12/01/92	< 2	< 1	< 2	< 2	< 3	< 2	< 4	< 3	< 2	< 2	< 8	< 3

= Control Location * = Low Level Analysis

Table No.: 4.6

Sample: Surface Water, (H-3)

Collection: Quarterly Composite

Units: pCi/L

Location: DISCHARGE BASIN

Environmental Radiological Monitoring Report

Date: 01/25/93

Lab. No.	Begin Date	End Date	H-3
930035	10/02/92	01/05/93	< 510
930036GG	10/02/92	01/05/93	< 510
920630	12/31/91	03/31/92	1680 +/- 370
920631 GG	12/31/91	03/31/92	1700 +/- 370
921167	03/31/92	07/01/92	1170 +/- 390
921168GG	03/31/92	07/01/92	1130 +/- 390
921695	07/01/92	10/02/92	1000 +/- 290

= Control Location * = Low Level Analysis

Table No.: 5.1

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR K, 17 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920081	01/08/92	RAPE	< 15	< 16	< 15
920082	01/08/92	COLLARDS	< 15	< 15	< 14
920083	01/08/92	KALE	< 14	< 15	< 13
920286	02/11/92	ASPARAGUS	< 16	< 16	< 13
920287	02/11/92	CABBAGE	< 15	< 18	< 14
920288	02/11/92	RAPE	< 21	< 20	< 17
920456	03/11/92	COLLARDS	< 15	< 10	< 9
920457	03/11/92	KALE	< 12	< 15	< 13
920458	03/11/92	RAPE	< 9	< 7	< 6
920650 GG	04/13/92	COLLARD	< 19	< 20	< 19
920651	04/13/92	COLLARD	< 21	< 18	< 20
920652	04/13/92	KALE	< 15	< 16	< 13
920653	04/13/92	SWISS CHARD	< 14	< 15	< 13
920845	05/11/92	SWISS CHARD	< 37	< 34	< 32
920846	05/11/92	COLLARDS	< 19	< 17	< 16
920847	05/11/92	CABBAGE	< 16	< 14	< 13
921013	06/10/92	SWISS CHARD	< 21	< 19	< 13
921014GG	06/10/92	SWISS CHARD DUP	< 16	< 12	< 13
921015	06/10/92	CABBAGE	< 17	< 12	< 11
921016GG	06/10/92	CABBAGE DUP.	< 20	< 15	< 14
921017	06/10/92	COLLARDS	< 17	< 14	< 12
921018GG	06/10/92	COLLARDS DUP.	< 21	< 16	< 15

= Control Location * = Low Level Analysis

Table No.: 5.1a

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR K, 17 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921287	07/14/92	SWISS CHARD	< 21	< 14	< 11
921288	07/14/92	COLLARDS	< 15	< 15	< 14
921289	07/14/92	CABBAGE	< 19	< 18	< 16
921434	08/12/92	SQUASH	< 26	< 22	< 18
921435	08/12/92	SWISS CHARD	< 7	< 6	< 5
921436	08/12/92	PEANUTS	< 20	< 19	< 14
921582	09/14/92	CAULIFLOWER	< 10	< 9	< 8
921583	09/14/92	BROCCOLI	< 20	< 23	< 18
921584	09/14/92	COLLARDS	< 17	< 15	< 13
921811	10/13/92	BROCCOLI	< 36	< 30	< 27
921812	10/13/92	CABBAGE	< 42	< 41	< 37
921813	10/13/92	PEANUTS	< 42	< 37	< 33
921972	11/11/92	CAULIFLOWER	< 14	< 14	< 15
921973	11/11/92	BROCCOLI	< 16	< 18	< 16
921974	11/11/92	COLLARDS	< 18	< 15	< 14
922109	12/09/92	BRUSSEL SPROUTS	< 17	< 13	< 12
922110	12/09/92	KALE	< 24	< 17	< 15
922111	12/09/92	MUSTARD GREENS	< 8	< 8	< 7

= Control Location * = Low Level Analysis

Table No.: 5.2

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR J, 0.6 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920084	01/08/92	COLLARDS	< 19	< 16	< 17
920085	01/08/92	COLLARDS	< 13	< 12	< 11
920086	01/08/92	SWISS CHARD	< 16	< 13	< 12
920289	02/11/92	TURNIP	< 15	< 18	< 13
920290	02/11/92	CHARD	< 11	< 12	< 10
920291	02/11/92	CABBAGE	< 21	< 22	< 20
920459	03/11/92	SWISS CHARD	< 7	< 5	< 5
920460	03/11/92	KALE	< 16	< 20	< 20
920461	03/11/92	CABBAGE	< 17	< 19	< 15
920654 GG	04/13/92	SWISS CHARD	< 19	< 22	< 17
920655	04/13/92	BRUSSEL SPROUTS	< 14	< 11	< 13
920656	04/13/92	COLLARD	< 31	< 29	< 25
920657	04/13/92	SWISS CHARD	< 27	< 23	< 23
920848	05/11/92	BRUSSEL SPROUTS	< 29	< 25	< 23
920849	05/11/92	SWISS CHARD	< 17	< 16	< 14
920850	05/11/92	COLLARDS	< 19	< 20	< 16
921019	06/10/92	SWISS CHARD	< 15	< 11	< 11
921020GG	06/10/92	SWISS CHARD DUP	< 6	< 5	< 4
921021	06/10/92	BROCCOLI	< 23	< 17	< 15
921022GG	06/10/92	BROCCOLI DUP.	< 25	< 20	< 20
921023	06/10/92	CABBAGE	< 31	< 24	< 20
921024GG	06/10/92	CABBAGE DUP.	< 17	< 11	< 11

= Control Location * = Low Level Analysis.

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR J, 0.6 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921290	07/14/92	SWISS CHARD	< 37	< 16	< 19
921291	07/14/92	BRUSSEL SPROUTS	< 22	< 20	< 18
921292	07/14/92	COLLARDS	< 22	< 18	< 17
921437	08/12/92	SWISS CHARD	< 38	< 26	< 22
921438	08/12/92	COW PEAS	< 26	< 19	< 17
921439	08/12/92	SQUASH	< 15	< 11	< 11
921585	09/14/92	SWISS CHARD	< 31	< 29	< 28
921586	09/14/92	COMPEAS	< 22	< 21	< 19
921587	09/14/92	SQUASH	< 24	< 26	< 23
921814	10/13/92	CROWDER PEAS	< 24	< 18	< 18
921815	10/13/92	LIMA BEANS	< 26	< 25	< 22
921816	10/13/92	SWISS CHARD	< 25	< 21	< 21
921975	11/11/92	BROCCOLI	< 16	< 12	< 12
921976	11/11/92	SWISS CHARD	< 14	< 12	< 14
921977	11/11/92	CAULIFLOWER	< 22	< 15	< 13
922112	12/09/92	SWISS CHARD	< 18	< 17	< 16
922113	12/09/92	CABBAGE	< 18	< 13	< 12
922114	12/09/92	CAULIFLOWER	< 11	< 12	< 10

Table No.: 5.3

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR R, 1.2 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920087	01/08/92	COLLARDS	< 23	< 16	< 14
920088	01/08/92	SWISS CHARD	< 17	< 18	< 16
920089	01/08/92	CABBAGE	< 32	< 29	< 26
920292	02/11/92	CHARD	< 17	< 18	< 12
920293	02/11/92	CABBAGE	< 10	< 11	< 10
920294	02/11/92	ASPARAGUS	< 33	< 30	< 26
920462	03/11/92	SWISS CHARD	< 15	< 16	< 12
920463	03/11/92	KALE	< 15	< 16	< 16
920464	03/11/92	CABBAGE	< 13	< 13	< 13
920658 GG	04/13/92	SWISS CHARD	< 18	< 14	< 15
920659	04/13/92	SWISS CHARD	< 14	< 15	< 12
920660	04/13/92	CABBAGE	< 19	< 15	< 16
920661	04/13/92	COLLARD	< 26	< 22	< 22
920851	05/11/92	CABBAGE	< 17	< 20	< 14
920852	05/11/92	SWISS CHARD	< 34	< 29	< 28
920853	05/11/92	COLLARDS	< 18	< 16	< 15
921025	06/10/92	SWISS CHARD	< 21	< 15	< 13
921026GG	06/10/92	SWISS CHARD DUP	< 17	< 12	< 11
921027	06/10/92	BEANS	< 34	< 24	< 21
921028GG	06/10/92	BEANS DUP.	< 41	< 30	< 26
921029	06/10/92	CABBAGE	< 21	< 13	< 15
921030GG	06/10/92	CABBAGE DUP.	< 28	< 19	< 18

Table No.: 5.3a

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: Broadleaf, (I-131, Gamma)

Collection: Monthly when available.

Units: pCi/kg

Location: SECTOR R, 1.2 KM

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921293	07/14/92	SWISS CHARD	< 15	< 15	< 14
921294	14/92	COLLARDS	< 36	< 17	< 16
921295	07/14/92	SQUASH	< 34	< 17	< 19
921440	08/12/92	COW PEAS	< 26	< 16	< 14
921441	08/12/92	SWISS CHARD	< 30	< 21	< 22
921442	08/12/92	SQUASH	< 10	< 9	< 8
921588	09/14/92	SWISS CHARD	< 26	< 23	< 21
921589	09/14/92	GARDEN VEG.	< 23	< 24	< 22
921590	09/14/9	BEANS	< 25	< 28	< 24
921817	10/13/92	SWISS CHARD	< 30	< 26	< 22
921818	10/13/92	BROCCOLI	< 24	< 20	< 19
921819	10/13/92	EGGPLANT	< 22	< 20	< 18
921978	11/11/92	CABBAGE	< 18	< 18	< 16
921979	11/11/92	BROCCOLI	< 26	< 22	< 20
921980	11/11/92	SWISS CHARD	< 23	< 17	< 17
922115	12/09/92	CABBAGE	< 14	< 11	< 9
922116	12/09/92	BROCCOLI	< 13	< 13	< 13
922117	12/09/92	SWISS CHARD	< 16	< 17	< 16

= Control Location * = Low Level Analysis

Environmental Radiological Monitoring Report

Table No.: 6.1
 Sample: Milk, (I-131*, Gamma)
 Collection: Semiannually
 Units: pCi/L

Location: ALCON STATE

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
921006	06/10/92	< 0.2	< 3	< 3	< 11	< 4
921007GG	06/10/92	< 0.2	< 2	< 2	< 8	< 3
922123	12/09/92	< 0.3	< 2	< 2	< 10	< 3

= Control Location, * = Low Level Analysis

Table No.: 7.1

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Fish Samples,(Gamma)

Collection: Semiannually

Units: pCi/kg

Location: MISS. RIVER UP

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
921169	06/28/92 *	CATFISH	< 8	< 9	< 14	< 9	< 21	< 9	< 9
921171GG	06/28/92	CATFISH	< 15	< 17	< 25	< 17	< 39	< 18	< 14
922107	12/08/92	BUFFALO	< 12	< 12	< 20	< 14	< 29	< 13	< 13

= Control Location * = Low Level Analysis

Table No.: 7.2

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Fish Samples,(Gamma)

Collection: Semiannually

Units: pCi/kg

Location: MISS. RIVER DOWN

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
921170	06/28/92	BUFFALO, CATFISH	< 10	< 10	< 16	< 10	< 22	< 11	< 9
921172GG	06/28/92	BUFFALO, CATFISH	< 8	< 8	< 11	< 8	< 18	< 9	< 8
922108	12/08/92	BUFFALO	< 9	< 9	< 13	< 10	< 22	< 10	< 9

Sample: Sediment, (Gamma)

Collection: Semiannually

Units: pCi/kg

Location	Lab No.	Collection Date	Cr-51	Mn-54	Co-58	Co-60	Cs-134	Cs-137
SEDBAR, Barge slip	921045	06/10/92	<114	164 +/-16	< 14	294 +/-20	< 20	110 +/-13
SEDBAR, Barge slip	921046GG	06/10/92	<126	200 +/-13	14 +/-10	354 +/-17	112 +/-14	117 +/-12
SEDBAR, Barge slip	922158	12/11/92	< 75	< 7	< 8	< 7	< 9	42 +/-7
SEDCONT, Upstream	921043	06/09/92	< 89	< 11	< 11	< 11	< 13	< 10
SEDCONT, Upstream	921044GG	06/09/92	<109	< 11	< 11	< 12	< 13	< 11
SEDCONT, Upstream	922157	12/11/92	< 49	< 5	< 6	< 6	< 6	< 5
SEDHAM, Hamilton L	921047	06/09/92	< 76	< 10	< 9	< 10	< 12	89 +/-8
SEDHAM, Hamilton L	921048GG	06/09/92	<167	16 +/-9	< 15	< 17	< 19	93 +/-18
SEDHAM, Hamilton L	922159	12/11/92	< 81	10 +/-6	< 8	< 9	< 11	67 +/-8

Table No.: 9.1

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Special surface water, sewage eff; (Gamma)

Collection: As requested.

Units: pCi/L

Location: UNIT 1

Lab. No.	Date	Collection											
		Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920632	04/02/92	< 3	< 3	< 5	< 3	< 6	< 4	< 7	< 9	< 4	< 3	< 17	< 7

Environmental Radiological Monitoring Report

Date: 01/20/93

Table No.: 9.2

Sample: SEWAGE SLUDGE

Collection: AS REQUESTED

Units: pCi/kg

Location: SEW. PLANT DRY BED

Lab No.	Collection Date	Cr-51	Mn-54	Fe-59	Co-58	Co-60	Cs-134	Cs-137
920833	05/06/92	<107	392 +/-24	< 21	< 15	833 +/-30	< 19	< 16
921058	06/16/92	< 51	207 +/-12	< 12	< 8	393 +/-14	< 9	< 8
921094	06/18/92	<111	175 +/-20	< 21	< 14	329 +/-20	< 16	< 15
921096	06/18/92	<143	195 +/-28	< 24	< 17	372 +/-30	< 20	< 15
921095	06/19/92	< 61	157 +/-16	< 14	< 10	306 +/-18	< 11	< 8

= Control Location * = Low Level Analysis

Table No.: 9.3

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Special sediment, (Gamma)

Collection: As requested.

Units: pCi/kg

Location: BASIN A INFLUENT

Lab No.	Collection Date	Cr-51	Mn-54	Co-58	Co-60	Cs-134	Cs-137	Fe-59
920831	04/30/92	<121	40 +/-10	< 13	67 +/-15	< 16	27 +/-7	< 20
920957	05/22/92	< 86	28 +/-7	< 9	60 +/-12	< 12	17 +/-6	< 16
920958	05/22/92	< 72	< 8	< 8	< 7	< 10	12 +/-6	< 13
921300	07/17/92	< 68	42 +/-8	< 8	84 +/-11	< 11	25 +/-8	< 11
921301	07/17/92	< 58	< 8	< 8	< 9	< 10	< 8	< 12
921302	07/17/92	< 65	< 8	< 8	< 8	< 11	< 8	< 11
921303	07/17/92	< 40	< 5	< 5	< 5	< 7	< 5	< 8

Table No.: 9.4

Environmental Radiological Monitoring Report

Date: 01/29/93

Sample: Special sediment, (Gamma)

Collection: As requested.

Units: pCi/kg

Location: BASIN B INFLUENT

Lab No.	Collection Date	Cr-51	Mn-54	Co-58	Co-60	Cs-134	Cs-137	Fe-59
920832	04/30/92	< 85	194 +/-13	< 9	81 +/-10	35 +/-8	16 +/-7	< 15
920959	05/22/92	< 92	897 +/-20	32 +/-8	415 +/-16	140 +/-12	106 +/-12	82 +/-17
920960	05/22/92	<141	262 +/-14	< 14	95 +/-14	97 +/-14	52 +/-10	< 23
921304	07/17/92	< 23	23 +/-3	< 3	15 +/-4	< 5	8 +/-3	< 4
921305	07/17/92	< 54	27 +/-7	< 7	< 10	< 10	< 8	< 12
921306	07/17/92	<133	42 +/-16	< 16	39 +/-20	< 22	35 +/-20	< 23
921307	07/17/92	< 67	20 +/-7	< 7	< 9	< 10	< 8	< 11

= Control Location * = Low Level Analysis

EPA CROSS CHECK RESULTS

EPA PREP DATE	DATE RESULTS ISSUED	MEDIA	NUCLIDE	EPA RESULTS	ESI, SYSTEM CHEMISTRY RESULTS	NORM DEV. KNOWN
01/31/92	04/01/92	WATER (pCi/L)	Beta	30.0	20.67	-3.23**1
02/07/92	04/15/92	WATER (pCi/L)	I-131	59.0	60.33	0.38
02/14/92	04/10/92	WATER (pCi/L)	Co-60	40.0	39.67	-0.12
			Zn-65	148.0	148.00	0.00
			Ru-106	203.0	184.67	-1.59
			Cs-134	31.0	29.33	-0.58
			Cs-137	49.0	50.33	0.46
			Ba-133	76.0	80.33	0.94
02/21/92	04/10/92	WATER (pCi/L)	H-3	7904.0	8340.00	0.96
03/27/92	07/15/92	AIR FILTER (pCi/FILTER)	Beta	41.0	50.33	3.23**2
			Cs-137	10.0	10.33	0.12
04/14/92	08/04/92	WATER BLIND B (pCi/L)	Beta	140.0	115.33	-2.03
			Cs-134	24.0	22.00	-0.69
			Cs-137	22.0	23.33	0.46
04/24/92	08/04/92	MILK (pCi/L)	I-131	78.0	78.67	0.14
			Cs-137	39.0	40.67	0.58
			K	1710.0	1763.33	1.07
04/24/92	08/25/92	WATER (pCi/L)	Co-60	20.0	20.33	0.12
			Zn-65	99.0	100.67	0.29
			Ru-106	141.0	132.67	-1.03
			Cs-134	15.0	15.33	0.12
			Cs-137	15.0	14.67	-0.12
			Ba-133	98.0	99.67	0.29
05/15/92	07/15/92	WATER (pCi/L)	Beta	44.0	43.67	-0.12
06/19/92	08/19/92	WATER (pCi/L)	H-3	2125.0	2503.33	1.89
08/07/92	10/28/92	WATER (pCi/L)	I-131	45.0	49.00	1.15
08/28/92	12/29/92	AIR FILTER (pCi/FILTER)	Beta	69.0	70.33	0.23
			Cs-137	18.0	18.00	0.00
09/25/92	01/12/93	MILK (pCi/L)	I-131	100.0	98.00	-0.35
			Cs-137	15.0	16.00	0.35
			K	1750.0	1706.67	-0.85
10/23/92	12/21/92	WATER (pCi/L)	H-3	5962.0	5703.33	-0.75

- **1 A new efficiency curve was determined for the beta counter. Recalculation of the 1/31/92 beta in water sample using the new efficiency curve gives results within the control limits.
- **2 A new efficiency curve was determined for air filter samples. Recalculation of the 3/27/92 air filter sample using the new efficiency value gives results within the control limits.

ATTACHMENT II

1992 THERMOLUMINESCENT DOSIMETRY REPORT

GRAND GULF NUCLEAR STATION

TABLE 1. Gamma Radiation, as Measured by TLDs, 1992 (Not required by ODCM Specification 4.12.1)

Additional Locations, Within Fifteen (15) Mile Radius				
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Date Annealed:	12-13-91	03-12-92	06-15-92	09-16-92
Date Read:	04-10-92	07-20-92	10-18-92	01-12-93
Location	Average mR/Quarter			
M-06	19.4±0.5	18.0±0.6	ND ^a	ND ^a
M-11	<u>16.2±0.4</u>	<u>17.8±0.6</u>	ND ^a	ND ^a
Mean ± s.d.	17.8±2.3	17.9±0.1		

^a ND = No Data; location eliminated.

The error given is the probable counting error at 95% confidence level (2 Sigma).

APPROVED BY L.G. Huebner BC- Date 1-14-93
 L.G. Huebner
 General Manager

GRAND GULF NUCLEAR STATION

Table 2. Gamma Radiation, as Measured by TLDs, 1992.
(Not required by Technical Specification 3.12.1)

Additional Locations, Within Fifteen (15) Mile Radius	
	<u>1st Quarter</u>
Date Annealed:	12-13-91
Date Read:	04-10-92
Location	Average mR/Quarter
M-02	15.7±0.5
M-03	18.8±0.5
M-04	20.5±0.7
M-05	18.4±0.6
M-06	19.4±0.5
M-08	ND ^a
M-11	16.2±0.4
M-12	18.5±1.4
M-13	15.2±0.4
M-15	13.6±0.5
M-18	21.4±0.7
M-24	ND ^a
M-26	18.0±0.5
M-29	18.6±1.0
M-30	14.9±1.0
M-34	20.7±0.8
M-35	17.3±0.5
M-37	19.2±0.4
M-42	19.5±1.0
M-43	17.3±0.6
M-44	ND ^a
M-46	16.1±0.6
M-52	21.5±0.7
M-53	16.8±0.3
M-54	21.9±0.9
M-73	20.8±0.4
M-75	18.8±0.8
M-78	15.1±0.7
M-79	12.6±0.6
M-80	17.6±0.4
M-82	ND ^a
M-83	15.6±0.4
M-84	15.6±0.9
M-85	ND ^a
M-87	19.9±0.5
Mean ± s.d.	17.9±2.4

^a ND = No data; TLDs missing - deleted location.

The error given is the probable counting error at the 95% confidence level (2 sigma).

Approved by L. G. Huebner / BC
L. G. Huebner
General Manager

Date 5-12-92

GRAND GULF NUCLEAR STATION

TABLE 1. Gamma Radiation, as Measured by TLDs, 1992 (Required by ODCM Specification 4.12.1)

Inner Ring, Within Two (2) Mile Radius				
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Date Annealed:	12-13-91	03-12-92	06-15-92	09-16-92
Date Read:	04-10-92	07-20-92	10-18-92	01-12-93
Location	Average mR/Quarter			
M-16	17.7±0.6	18.0±0.5	19.3±0.4	18.1±0.4
M-17	17.4±0.5	14.2±0.2	18.7±0.3	16.1±0.4
M-19	18.6±0.4	18.4±0.3	20.0±0.3	18.1±0.2
M-20	14.7±0.9	17.2±0.6	16.6±0.7	16.8±0.5
M-21	19.9±0.8	19.9±0.4	21.1±0.4	20.6±0.3
M-22	18.2±0.4	16.1±0.5	18.8±0.4	16.8±0.3
M-23	17.6±0.5	19.0±0.2	19.2±0.5	19.3±0.3
M-25	14.4±0.4	13.0±0.3	14.6±0.3	13.2±0.4
M-27	19.6±0.9	20.4±0.2	20.7±0.3	20.5±0.8
M-28	18.6±0.5	19.5±0.4	20.6±0.5	19.5±0.4
M-41	12.8±0.7	11.4±0.6	14.2±0.2	10.6±0.6
M-45	18.6±0.3	17.4±0.5	19.5±0.4	11.8±0.4
M-86	18.5±0.8	20.4±0.4	21.0±0.6	17.6±0.4
M-92	15.8±1.1	15.2±0.4	16.7±0.8	14.9±0.3
M-93	20.7±1.3	20.1±0.6	21.6±0.8	20.4±0.6
M-94	<u>15.6±0.4</u>	<u>13.9±0.2</u>	<u>19.9±0.5</u>	<u>16.3±0.6</u>
Mean ± s.d.	17.4±2.2	17.1±2.9	18.9±2.2	16.9±3.0

The error given is the probable counting error at 95% confidence level (2 Sigma).

APPROVED BY L.G. Huebner BC
 L.G. Huebner
 General Manager

Date 1-19-93

GRAND GULF NUCLEAR STATION

TABLE 1. Gamma Radiation, as Measured by TLDs, 1992 (Required by ODCM Specification 4.12.1)

Outer Ring, Within Six (6) Mile Radius				
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Date Annealed:	12-13-91	03-12-92	06-15-92	09-16-92
Date Read:	04-10-92	07-20-92	10-18-92	01-12-93
Location	Average mR/Quarter			
M-36	17.8±0.4	13.8±0.4	19.7±0.3	13.7±0.3
M-40	19.5±0.4	17.7±0.5	21.6±0.3	19.6±0.3
M-47	15.1±1.2	12.8±0.2	15.6±1.3	13.3±0.2
M-48	16.6±0.4	ND ^a	19.4±0.3	16.6±0.4
M-49	20.1±0.5	17.8±0.2	20.6±0.6	18.7±0.2
M-50	19.3±0.6	17.1±0.7	18.7±0.3 ^b	18.1±0.3
M-51	18.4±0.6	16.8±0.7	ND ^a	17.7±0.3
M-55	24.6±0.8	21.2±0.4	23.0±0.4	21.2±0.4
M-56	17.4±0.4	20.8±0.4	18.9±0.4	20.5±0.6
M-57	21.2±1.0	19.7±0.2	21.5±0.4	ND ^a
M-58	16.7±0.4	14.6±0.4	19.2±0.3	16.3±0.7
M-59	17.7±0.6	19.2±0.3	16.6±0.4	16.0±0.7
M-88	14.6±0.9	15.7±0.4	16.9±0.5	16.1±0.7
M-89	16.5±0.5	16.3±0.3	ND ^a	16.7±0.6
M-90	16.6±0.5	14.5±0.4	18.7±0.2	14.9±0.4
M-91	<u>19.2±0.8</u>	<u>17.0±0.6</u>	<u>20.9±0.6</u>	<u>17.7±0.4</u>
Mean ± s.d.	18.2±2.5	17.0±2.5	19.4±2.1	17.1±2.3

^a ND - No Data; TLD missing.^b TLD in field for 3rd and 4th Qtr., 1992 (182 days). Results are prorated for 91 days.

The error given is the probable counting error at 95% confidence level (2 Sigma).

APPROVED BY L.G. Huebner Date 1-14-93
 L.G. Huebner
 General Manager

GRAND GULF NUCLEAR STATION

TABLE 1. Gamma Radiation, as Measured by TLDs, 1992 (Required by ODCM Specification 4.12.1)

	Special Interest Areas			
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Date Annealed:	12-13-91	03-12-92	06-15-92	09-16-92
Date Read:	04-10-92	07-20-92	10-18-92	01-12-93
Location	Average mR/Quarter			
M-01	19.4±1.1	20.3±0.3	20.1±0.5	20.1±0.8
M-07	17.8±0.6	18.6±0.2	20.2±1.2	19.7±0.4
M-09	15.3±0.7	16.6±0.4	16.5±0.3 ^a	17.7±0.2
M-10	14.1±0.7	15.0±0.5	14.9±0.3	16.2±0.4
M-33	17.1±0.3	17.3±0.7	17.7±0.3	17.6±0.3
M-38	15.5±0.7	18.3±0.4	ND ^b	18.4±0.3
M-39	<u>16.3±0.3</u>	<u>13.5±0.3</u>	<u>18.8±0.4</u>	<u>14.2±0.3</u>
Mean ± s.d.	16.5±1.8	17.1±2.3	18.0±2.1	17.7±2.0
<u>CONTROL</u>				
M-14	15.9±0.4	17.9±0.6	17.1±0.5	18.8±0.4
<u>SHIELD</u>				
M-00	6.5±0.5	6.1±0.2	7.8±0.4	6.0±0.2

^a TLD in field for 3rd and 4th Qtr., 1992 (182 days). Results are prorated for 91 days.^b ND = No Data; TLD missing.

The error given is the probable counting error at 95% confidence level (2 Sigma).

APPROVED BY

L. G. HuebnerL.G. Huebner
General Manager

Date

1-14-93

GRAND GULF NUCLEAR STATION

TABLE 1. Gamma Radiation, as Measured by TLDs, 1992 (Not required by ODCM Specification 4.12.1)

	On-Site			
	<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>	<u>4th Quarter</u>
Date Annealed:	12-13-91	03-12-92	06-15-92	09-16-92
Date Read:	04-10-92	07-20-92	10-18-92	01-12-93
Location	Average mR/Quarter			
M-61	22.6±0.4	15.0±0.3	28.7±1.0	24.0±1.4
M-62	33.3±0.5	21.7±0.8	42.5±1.1	42.1±1.5
M-63	18.3±0.9	13.9±0.2	19.8±1.3	18.7±0.5
M-64	20.5±1.1	14.3±0.3	21.6±0.7	20.5±0.5
M-65	19.2±0.3	13.4±0.3	19.3±0.4	19.7±0.4
M-66	25.1±1.1	17.1±0.6	23.1±0.5	23.2±0.3
M-67	21.7±0.4	17.2±0.6	21.0±0.5	24.2±0.4
M-68	66.8±1.7	37.3±1.2	69.3±1.6	69.6±0.7
M-69	85.5±1.2	42.1±0.3	80.5±0.7	86.2±0.6
M-70	71.7±2.0	35.3±0.3	75.0±1.4	72.1±1.7
M-71	15.2±0.7	15.3±0.3	20.3±0.6	19.6±0.9
M-72	22.2±0.7	12.8±0.4	19.7±0.4	15.1±0.7
M-74	19.5±0.6	15.8±0.3	21.6±0.7	17.8±0.4
M-76	15.6±0.9	14.4±0.4	16.6±0.7	17.7±0.3
M-77	15.9±0.4	14.4±0.5	17.4±0.5	15.3±0.6
M-81	<u>18.0±0.5</u>	<u>14.8±0.4</u>	<u>18.1±1.0</u>	<u>14.1±0.4</u>
Mean ± s.d.	30.7±22.5	19.7±9.5	32.2±22.2	31.2±23.3
<u>Duplicate TLDs</u>				
M-31	19.0±0.8	13.8±0.2	17.2±0.4	10.6±0.6
M-32	18.8±0.6	16.0±0.3	19.1±0.3	16.2±0.3
M-60	<u>18.7±0.8</u>	<u>15.4±0.3</u>	<u>20.9±0.5</u>	<u>18.3±0.4</u>
Mean ± s.d.	18.8±0.2	15.1±1.1	19.1±1.8	15.0±4.0

The error given is the probable counting error at 95% confidence level (2 Sigma).

APPROVED BY L.G. Huebner
 L.G. Huebner
 General Manager

Date 1-19-93