

Grand Gulf Nuclear Station
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
January 1 - June 30, 1988

8809060331 580630
PDR ADOCK 05000416
R PDC

J20SRERR-06/88

IE48

1/1

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
I. INTRODUCTION.....	1
II. DETAILED INFORMATION.....	2
A. Regulatory Limits.....	2
1. 10CFR20 Limits	
a. Fission and Activation Gases.....	2
b. Radioiodines and Particulates.....	2
c. Liquid Effluents.....	2
2. 10CFR50, Appendix I Limits	
a. Fission and Activation Gases.....	3
b. Radioiodines and Particulates.....	3
c. Liquid Effluents.....	3
3. 40CFR190 Limits.....	4
B. Maximum Permissible Concentrations.....	4
1. Airborne.....	4
2. Liquid.....	4
C. Average Energy.....	4
D. Measurements and Approximations of Total Activity.....	5
1. For Fission and Activation Gases.....	5
2. For Particulates and Radioiodines.....	6
3. For Continuous Releases.....	6
4. For Batch Releases: Gases.....	6
5. For Batch Releases: Liquid Effluents.....	7
E. Batch Releases.....	7
1. Liquid.....	7
2. Gaseous.....	8
F. Abnormal Releases.....	8
1. Liquid.....	8
2. Gaseous.....	8

TABLE OF CONTENTS (cont'd)

<u>SUBJECT</u>	<u>PAGE</u>
G. Estimate of Total Error.....	9
1. Liquid.....	9
2. Gaseous.....	9
3. Solid Radioactive Waste.....	10
H. Solid Radioactive Waste Shipments.....	10
I. Meteorological Data.....	10
J. Radioactive Effluent Monitoring Instrumentation Operability	10
III. OFFSITE DOSE CALCULATION MANUAL/PROCESS CONTROL PROGRAM/ RADIOACTIVE WASTE TREATMENT SYSTEM CHANGES	
A. Offsite Dose Calculation Manual (ODCM).....	11
1. ODCM Revision 11.....	11
2. ODCM Revision 12.....	20
B. Process Control Program (PCP).....	23
C. Radioactive Waste Treatment Systems.....	23

LIST OF TABLES

<u>TABLE</u>		<u>PAGE</u>
1A	Gaseous Effluents - Summation of All Releases.....	1A-1
1B	Gaseous Effluents - Elevated Releases.....	1B-1
1C	Gaseous Effluents - Ground-Level Releases.....	1C-1
1D	Radioactive Gaseous Waste Sampling and Analysis Program....	1D-1
2A	Liquid Effluents - Summation of All Releases.....	2A-1
2B	Liquid Effluents - Continuous and Batch Modes.....	2B-1
2C	Radioactive Liquid Waste Sampling and Analysis Program....	2C-1
3	Solid Radioactive Waste and Irradiated Fuel Shipments.....	3-1
4A	Meteorological Data - January-March 1988	4A-1
4B	Meteorological Data - April-June 1988	4B-1
4C	Classification of Atmospheric Stability	4C-1

LIST OF ATTACHMENTS

- I Offsite Dose Calculation Manual (ODCM) Revision 11
Markup of Revision 10
- II Offsite Dose Calculation Manual (ODCM) Revision 11
- III Offsite Dose Calculation Manual (ODCM) Revision 12
Markup of Revision 11
- IV Offsite Dose Calculation Manual (ODCM) Revision 12

I. INTRODUCTION

This Semiannual Radioactive Effluent Release Report for the period of January 1 through June 30, 1988, is submitted in accordance with Section 6.9.1.8 of Appendix A to Grand Gulf Nuclear Station (GGNS) License No. NPF-29. That portion of Appendix A which refers to the monitoring of radioactive effluents, Sections 3/4-11 and 3/4-12, will hereafter be referred to as the Radiological Effluent Technical Specification (RETS).

Airborne discharges at GGNS are ground-level releases. All liquid and airborne discharges to the environment were analyzed in accordance with the RETS requirements. All effluent releases were within the concentration and total release limits specified by the RETS.

Projected offsite doses were within the dose limits specified by the RETS. The doses were projected using the methodology of the GGNS Offsite Dose Calculation Manual (ODCM). Dose calculations will be summarized in the July-December 1988 Semiannual Radioactive Effluent Release Report.

The summation of all gaseous releases during the reporting period is given in Table 1A, while elevated releases and ground-level releases for the reporting period are given in Tables 1B and 1C, respectively. Table 1D describes the radioactive gaseous sampling and analysis program implemented at GGNS.

The summation of all liquid releases during the reporting period is given in Table 2A, while continuous and batch mode releases are given in Table 2B. Table 2C describes the radioactive liquid waste sampling and analysis program implemented at GGNS. Solid radioactive waste and irradiated fuel shipments during the reporting period are summarized in Table 3. Meteorological data is included in Tables 4A - 4C.

II. DETAILED INFORMATION

A. Regulatory Limits

1. 10CFR20 Limits

- a. Fission and Activation Gases - The release rate limit at any time for noble gases to areas at or beyond the site boundary shall be such that:

$$D_{tb} = \text{average total body dose rate in the current year (mrem/yr)}$$

$$= \overline{X/Q} \sum K_i Q'_i \leq 500 \text{ mrem/yr}$$

$$D_s = \text{average skin dose rate in the current year (mrem/year)}$$

$$= \overline{X/Q} \sum (L_i + 1.1 M_i) Q'_i \leq 3000 \text{ mrem/yr}$$

where the terms are defined in the GGNS ODCM.

- b. Radioiodines and Particulates - The release rate limit for the sampling period for all radioiodines, tritium and radioactive materials in particulate form with half-lives greater than 8 days shall be such that:

$$D_o = \text{average organ dose rate in current year (mrem/yr)}$$

$$= \sum_i W f_i \overline{Q}'_i \leq 1500 \text{ mrem/yr}$$

where the terms are defined in the GGNS ODCM.

- c. Liquid Effluents - The concentration of radioactive materials released in liquid effluents to unrestricted areas from the reactors at the site shall not exceed at any time the values specified in 10CFR20, Appendix B, Table II, Column 2. The concentration of dissolved or entrained noble gases, released in liquid effluents to unrestricted areas from all reactors at the site, shall be limited to 2×10^{-4} microcuries/ml maximum concentration.

2. 10CFR50, Appendix I Limits

- a. Fission and Activation Gases - The dose from noble gases in gaseous effluents to areas at or beyond the site boundary shall be such that:

$$D_{\gamma} = \text{air dose due to gamma emissions from noble gases}$$

$$= 3.17 \times 10^{-8} \sum_i M_i \overline{X/Q^T} Q_i \leq 5 \text{ mrad/qr}$$

$$\leq 10 \text{ mrad/yr}$$

$$D_{\beta} = \text{air dose due to beta emissions from noble gas}$$

$$= 3.17 \times 10^{-8} \sum_i N_i \overline{X/Q^T} Q_i \leq 10 \text{ mrad/qr}$$

$$\leq 20 \text{ mrad/yr}$$

where the terms are defined in the GGNS ODCM.

- b. Radioiodines and Particulates - The dose to an individual from tritium, I-131, I-133, and radioactive material in particulate form with half-lives greater than 8 days in gaseous effluents shall be such that:

$$D_P = \text{dose to an individual from tritium, I-131, I-133, and radionuclides in particulate form with half-lives greater than 8 days (mrem)}$$

$$= 3.17 \times 10^{-8} \sum_i R_i W' Q_i \leq 7.5 \text{ mrem/qr Any Organ}$$

$$\leq 15 \text{ mrem/yr Any Organ}$$

where the terms are defined in the GGNS ODCM.

- c. Liquid Effluents - The dose from radioactive materials in liquid effluents shall be such that:

$$D_{\text{Tau}} = \sum_i [A_i \tau_{\text{tau}} \sum_{j=1}^m \Delta t_{j1} C_{j1} F_1] \leq 1.5 \text{ mrem/qr Total Body}$$

$$\leq 5 \text{ mrem/qr Any Organ}$$

$$\leq 3 \text{ mrem/yr Total Body}$$

$$\leq 10 \text{ mrem/yr Any Organ}$$

where the terms are defined in the GGNS ODCM.

3. 40CFR190 Limits

Doses are calculated for Fission and Activation Gases; Radioiodines and Particulates; and Liquid Effluents according to equations contained in Sections 2.(a), (b), and (c), respectively, with the exception that the limits applied are:

≤ 25 mrem/yr, Total Body or Any Organ except Thyroid

≤ 75 mrem/yr, Thyroid

≤ 10 mrad γ /qtr or ≤ 20 mrad γ /yr, Fission and Activation Gases

≤ 20 mrad β /qtr or ≤ 40 mrad β /yr, Fission and Activation Gases

≤ 15 mrem/qtr or ≤ 30 mrem/yr, Any Organ, Iodine and Particulates

≤ 3 mrem/qtr or ≤ 6 mrem/yr, Total Body, Liquid Effluents

≤ 10 mrem/qtr or ≤ 20 mrem/yr, Any Organ, Liquid Effluents

B. Maximum Permissible Concentrations

1. Airborne

The Maximum Permissible Concentration (MPC) of radioactive materials in gaseous effluents is limited by the dose rate restrictions of 10CFR20. In this case, the MPCs are actually determined by the dose factors in Table 2.1-1 of the GGNS ODCM.

2. Liquid

The MPC of radioactive materials in liquid effluents is limited by 10CFR20, Appendix B, Table II, Column 2. The MPC chosen is the most conservative value of either the soluble or insoluble MPC for each radioisotope.

C. Average Energy

Not applicable for GGNS RETS.

D. Measurements and Approximations of Total Activity

The following discussion details the methods used to measure and approximate total activity for the following:

1. Fission and Activation Gases
2. Radioiodines
3. Particulates
4. Liquid Effluents

Tables 1D and 2C give sampling frequencies and minimum detectable sensitivity requirements for the analysis of gaseous and liquid effluent streams, respectively.

Values in the attached tables given as zero do not necessarily imply that the radionuclides were not present. A zero indicates that the radionuclide was not present at levels greater than the sensitivity requirements shown in Tables 1D and 2C. For some radionuclides, lower detection limits than required may be readily achievable; when a radionuclide is measured below its stated limits, it is reported.

1. For Fission and Activation Gases

The following noble gases are considered in evaluating gaseous airborne discharges:

Ar-41	Xe-131m
Kr-85m	Xe-133
Kr-85	Xe-133m
Kr-87	Xe-135m
Kr-88	Xe-135
Kr-89	Xe-138.

Periodic grab samples from Station effluent streams are analyzed by a computerized pulse height analyzer system utilizing high-resolution germanium detectors. (See Table 1D for sampling and analytical requirements.) Isotopic values thus obtained are used for dose release rate calculations as given in Section II.A.1. of this report. Only those radionuclides that are detected are used in this computation. During the period between grab samples, the amount of radioactivity released is based on the effluent monitor readings. Monitors are assigned a calibration factor based upon the last isotopic analysis, using the following relationship:

$$C_i = U_i \div m$$

where

$$C_i = \text{isotopic calibration factor for isotope } i$$

U_i = concentration of isotope i in the grab sample, in uCi/ml.

m = net monitor reading associated with the effluent stream. (Determined at the time of grab sampling).

These calibration factors, along with the hourly effluent monitor values and flow rates, are entered into the laboratory computer where the release rates for individual radionuclides are calculated and stored. If no activity is detected in the grab sample, the calibration factor for Kr-85 and the dose factor for Kr-89 are entered into the laboratory computer.

2. For Particulates and Radioiodines

The radioiodines and radioactive materials in particulate form to be considered are:

Zn-65	I-133
Cr-51	Cs-134
Mn-54	Cs-136
Fe-59	Cs-137
Co-58	Ba-140
Co-60	Ce-141
Sr-89	Other Radionuclides
Sr-90	with half-lives
Zr-95	greater than
Sb-124	8 days.
I-131	

3. For Continuous Releases

Continuous sampling is performed on the continuous release points (i.e., Radwaste Vent, Containment Purge, Fuel Handling Area Vent, Turbine Building Vent). Particulate material is collected by filtration. Radioiodines are collected by adsorption onto a charcoal filter. Periodically these filters are removed and analyzed on the pulse height analyzer to identify and quantify radioactive materials collected on the filters. Particulate filters are then analyzed for gross alpha and Strontium-89 and -90, as required. Gross alpha determinations are made using a 2-pi gas flow proportional counter. Strontium-89 and -90 values are obtained by chemical separation and subsequent analysis using 2-pi gas flow proportional counters. During major operational occurrences, the frequency of sampling is increased to satisfy the requirements of footnote "c" of Table 1D, "Radioactive Gaseous Waste, Sampling and Analysis," (GGNS RETS, Table 4.11.2.1.2-1).

4. For Batch Releases: Gases

The processing of batch type releases (from Containment Purge) is analogous to that for continuous releases.

5. For Batch Releases: Liquid Effluents

The radionuclides listed below are considered when evaluating liquid effluents:

H-3	Mo-99
Co-58	Tc-99m
Co-60	I-131
Fe-55	I-132
Fe-59	I-133
Zn-65	I-135
Mn-54	Cs-134
Cr-51	Cs-137
Sr-89	Cs-140
Sr-90	Ba-140
Nb-95	La-140
Zr-95	Ce-141
	Ce-144

Representative pre-release grab samples are obtained and analyzed as required by Table 2C. Isotopic analyses are performed using the computerized pulse height analysis system previously described. Aliquots of each pre-released sample, proportional to the waste volume released, are composited in accordance with the requirements of Table 2C. Strontium determinations are made by performing a chemical separation and counting the separated strontium using a 2-pi gas flow proportional counter. Gross alpha determinations are made using 2-pi gas flow proportional counters. Tritium and Iron-55 concentrations are determined by using liquid scintillation techniques. Dissolved gases are determined employing grab sampling techniques and then counting on the pulse height analyzer system.

E. Batch Releases

1. Liquid

3rd Quarter 1987

- Number of batch releases: 88
- Total time period for batch releases: 28,669 minutes
- Maximum time period for a batch release: 2,880 minutes
- Average time period for batch releases: 326 minutes
- Minimum time period for a batch release: 235 minutes

4th Quarter 1987

- Number of batch releases: 63
- Total time period for batch releases: 18,379 minutes
- Maximum time period for a batch release: 332 minutes
- Average time period for batch releases: 292 minutes
- Minimum time period for a batch release: 30 minutes

2. Gaseous

1st & 2nd Quarter 1988

No batch releases were made during this period.

F. Abnormal Releases

1. Liquid

1st & 2nd Quarter 1988

One abnormal liquid release occurred during the reporting period. This event was previously documented in Incident Report 88-2-5, and NRC Inspection Reports 50-416/88-01 and 50-416/88-03.

Event Summary

On January 28, 1988, GGNS personnel discovered that a blocked vent line on the Standby Service Water (SSW) basin overflow line had allowed water to siphon from SSW Basin B to the storm drain system. The release was terminated on January 29, 1988 when the vent line was repaired. The total water released was estimated to be 80,000 gallons. Grab samples taken from the storm drains and SSW Basin B showed no detectable radioactivity above background. Though samples were not taken during the actual release period, the SSW radiation monitor was operable and indicated no measurable radioactivity above background.

The cause of the release was an inaccurate Piping and Instrumentation Diagram (P&ID) that did not show the vent line. The overflow lines on SSW A and B were capped on March 16 and 17 to prevent similar events from occurring.

2. Gaseous

1st & 2nd Quarter 1988

One abnormal gaseous release occurred during the reporting period. This event was previously documented in Licensee Event Report (LER) 88-009-00 and NRC Inspection Report 50-416/88-05.

Event Summary

On February 27, 1988, hydrogen ignition occurred in the Offgas System causing ignition of the lower charcoal adsorber beds in A and B trains. The A and B charcoal adsorber trains were isolated with a nitrogen purge to extinguish the charcoal fire. Gaseous effluents were released without treatment by charcoal adsorption until March 2, 1988 when 3 of 4 charcoal beds in Train A were returned to operation.

The maximum release rate during the event corresponded to a 2.1 mrem/year instantaneous whole body dose rate at the site boundary. This was well within the regulatory limit of 500 mrem/year.

The event was caused by a malfunction of the A hydrogen recombiner due to wetting of the catalyst during the SJAE A startup sequence. The system operating instruction for SJAE startup has been revised and design changes are being considered to improve SJAE startup and operating performance.

G. Estimate of Total Error

1. Liquid

The maximum errors are collectively estimated to be

	<u>Fission & Activation Products</u>	<u>Tritium</u>	<u>Dissolved & Entrained Gases</u>	<u>Gross Alpha</u>
Sampling	26%	26%	26%	26%
Measurement	68%	65%	61%	92%
Total	73%	70%	66%	96%

Sampling errors include uncertainty associated with mixing, representative sampling and discharge volume. Measurement errors include uncertainty associated with instrument calibration and the preparation and counting of low-activity samples. Counting errors are based on measurements of blank samples and, for germanium detectors, the least-readily-detectable radioisotope. Calibration errors are calculated by summing the errors associated with the calibration of a particular instrument with a radioactive source.

Total error is calculated by taking the square root of the sum of the squares of the individual errors.

2. Gaseous

The maximum errors (not including sample line loss) are collectively estimated to be

	<u>Fission & Activation Gases</u>	<u>Iodine</u>	<u>Particu- late</u>	<u>Gross Alpha</u>	<u>Tritium</u>
Sampling	32%	23%	22%	23%	23%
Measurement	61%	67%	65%	101%	62%
Total	69%	71%	69%	104%	66%

Sampling errors include uncertainty associated with sample flow, vent flow and monitor calibration.

Measurement errors include uncertainty associated with instrument calibration and preparation and counting of low-activity samples. Measurement and total errors are calculated by the same methods used for liquid effluents.

3. Solid Radioactive Waste

See Table 3 for error terms.

H. Solid Radioactive Waste Shipments

See Table 3 for shipment information.

I. Meteorological Data

1. Meteorological Data Recovery Rate

1st Qtr.

Parameter	% Data Recovery
50m Direction	100.00
50m Wind Speed	95.10
10m Direction	99.73
10m Wind Speed	95.24
Temperature	100.00
Dew Point	94.87
Delta T	100.00
Precipitation	100.00

2nd Qtr.

Parameter	% Data Recovery
50m Direction	99.91
50m Wind Speed	99.91
10m Direction	99.91
10m Wind Speed	99.91
Temperature	99.13
Dew Point	98.40
Delta T	98.81
Precipitation	100.00

2. Meteorological data for the period of the report is included in Tables 4A through 4C.

3. Annual Meteorological Data Summary reported in the July-December 1988 Semiannual Radioactive Effluent Report

J. Radioactive Effluent Monitoring Instrumentation Operability

No reportable instances of inoperability occurred during the report period.

III. OFFSITE DOSE CALCULATION MANUAL/PROCESS CONTROL PROGRAM/RADIOACTIVE WASTE TREATMENT SYSTEM CHANGES

A. Offsite Dose Calculation Manual (ODCM).

1. ODCM Revision 11

Revision 11 to the ODCM was reviewed and approved by the Plant Safety Review Committee on June 23, 1988. The changes within this revision can be characterized as administrative. Based on a technical review and consideration of the reasons for the changes, it was determined that the changes will not reduce the accuracy nor the reliability of the dose calculation or setpoint determinations.

Revision 11 to the GGNS ODCM was necessary to:

- Correct administrative and typographical errors
- Reflect the change in GGNS operator from Mississippi Power & Light Company to System Energy Resources, Inc.
- Insert bioaccumulation and dose factors for antimony
- Clarify X/Q and D/Q use with regard to exposure pathway
- Update descriptions of radiological environmental sampling locations.

A markup copy of Revision 10 showing changes for Revision 11 is included as Attachment I. Revision 11 is included as Attachment II and a detailed outline of Revision 11 is provided below:

SUBJECT: Grand Gulf Nuclear Station Offsite Dose Calculation Manual (ODCM), Revision 11, June 23, 1988.

- Page vi

*Affected Lines: 22 and 23

Revision: Added Reference 8 on Lines 22 and 23

Justification: Reference 8 is the source for antimony dose conversion factors inserted on page 1.0-11.

* Line numbers reflect revision location in the ODCM, Revision 11.

- Page 1.0-9

Affected Lines: 27, 39 and 40

Revision: Inserted bioaccumulation factor for antimony on Line 27 and identified source on Lines 39 and 40.

Justification: Antimony bioaccumulation factor is necessary to calculate ingestion dose commitment factor. The bioaccumulation factor was not included in Reference 3.

- Page 1.0-11

Affected Lines: 21 through 24, 50 and 51

Revision: Inserted dose conversion factors for antimony on Lines 21 through 24 and identified source on Lines 50 and 51.

Justification: Antimony dose conversion factors are necessary to calculate dose commitment factors.

- Page 1.0-14

Affected Lines: 8 through 11

Revision: Inserted dose commitment factors for antimony on Lines 8 through 11.

Justification: Antimony dose commitment factors are required to calculate dose contribution from antimony in GGNS liquid effluents.

- Page 2.0-8

Affected Lines: 7, 8, 9, 10, 11, 14, 15, 17 and 19

Revision:

Lines 7, 8, 14, 15: The phrase "and all tritium pathways" was inserted following "inhalation"

Line 9: The equals and bracket symbols were replaced with the word "or"

Lines 10 and 11: "Other" was replaced with "food and ground plane."

Line 17: "Table" was made plural to indicate Table 2.2-1a and Table 2.2-1b

Line 19: "Sec" was changed to lower case for consistency

Justification: The changes on Lines 7, 8, 9, 10, 11, 14 and 15 provided clarification regarding use of X/Q for tritium dose calculations and D/Q for food and ground plane dose calculations.

- Page 2.0-10

Affected Lines: 17, 18, 19, 20, 21, 23, 24, 27 and 28

Revision:

Lines 17 and 18: Following the word "inhalation," the words "and all tritium pathways" were inserted.

Line 19: The equals and bracket symbols were replaced with the word "or."

Lines 20 and 21: The word "other" was replaced with "food and ground plane."

Lines 23 and 24: Following "(mrem/yr per $\mu\text{Ci}/\text{m}^3$)," inserted the phrase "for inhalation and all tritium pathways."

Lines 27 and 28: The acronym "MP&L" was replaced with "GGNS."

Justification: The changes on Lines 17, 18, 19, 20, 21, 23 and 24 were made to provide clarification regarding use of X/Q for tritium dose calculations and D/Q for food and ground plane dose calculations. The replacement of MP&L with GGNS on Lines 27 and 28 reflects the change in operator of GGNS.

- Page 2.0-23

Affected Line: 22

Revision: Replaced the acronym "MP&L" on Line 22 with "GGNS." Also, the term "site boundary" was changed to all capital letters.

Justification: The operator of GGNS is no longer MP&L. Capitalizing SITE BOUNDARY provided consistency with the Technical Specifications.

- Page 2.0-24

Affected Line: 16

Revision: Removed the symbol σ from underneath the radical sign.

Justification: Corrected a typographical error made in Revision 6.

- Page 3.0-1

Affected Lines: 2 through 6

Revision: The first sentence on Page 3.0-1 was replaced with an expanded, two sentence description of Tables 3.0-1 through 3.0-3.

Justification: The expanded description clarifies that sampling locations in addition to those described in Technical Specification Table 3.12.1-1 are included in Tables 3.0-1 through 3.0-3.

- General Comments for Pages 3.0-2 thru 3.0-6d:

Many of the descriptions of sampling locations included in pages 3.0-2 thru 3.0-6d have been updated or restated for clarification. The only physical changes in sampling locations involve the Trimble cistern and Grand Gulf Military Park well.

Grammatical changes on pages 3.0-2 thru 3.0-6c, such as capitalization and insertion or deletion of hyphens, commas and periods, are not discussed individually in this outline. However, such changes are noted in the markup copy of ODCM, Rev. 10, and indicated with change bars in ODCM, Rev. 11.

- Page 3.0-2

Affected Lines: 8, 10, 12, 14, 15, 16, 20, 21 and 22

Revision/Justification:

Line 8: The word "south" following Hwy. 61 was deleted because the direction (north vs. south) depends on location.

Line 10: The words "south of" following Hwy. 61 were replaced with "north of" to make the description more accurate.

- Lines 12 and 21: Waterloo Road was changed to Bald Hill Road because the road was renamed.
- Lines 14 and 15: The words "MP&L training" on Line 14 were replaced with words "the Support Services" to reflect a name change. On Line 15, the word "building" was deleted because of the change on Line 14.
- Line 16: The word "side" was inserted following the word "south" for additional clarification.
- Line 20: The words "former site of" were inserted preceding the proper name because Ms. M. Jackson's trailer has been relocated.
- Line 22: Provided a more precise distance to location AS-8. Previous distance of 0.5 miles was changed to 0.6 miles.

• Page 3.0-3

Affected Lines: 4, 7, 10, 11, 12, 18, 19, 20, 22, 23 and 24

Revision/Justification:

- Line 4: Page 1 of 2 was changed to Page 1 of 3. This page was incorrectly identified.
- Line 7: Changed "southwest" to "south-southwest" to be more specific regarding compass direction for Sector K.
- Lines 10 through 12: The Trimble cistern was replaced with the McGee cistern. The Trimble cistern is no longer in service. McGee cistern is the closed available continuous service collection location.
- Line 18: Changed Figure No. from "3.0-4" to "3.0-1. This corrected a typographical error made in a previous revision."
- Lines 18 through 20: Provided clarification for the PGWELL sampling location by providing additional details on Lines 18 through 20.

Lines 22 through 24: The GGMPWELL location was replaced with the AAWELL. The well at Grand Gulf Military Park has been abandoned. Water for the Park is now supplied by a community water supply well located approximately four miles from GGNS. To replace this sampling location, the well at the inactive Arnold Acres Trailer Park (AAWELL) is being sampled. The AAWELL is the closed offsite groundwater supply.

• Page 3.0-3a

Affected Lines: 6 thru 14, 16, 19, 21, 26, 31, 32, 34 and 35

Revision/Justification:

Lines 6 thru 12: The descriptions for the upstream and downstream surface water sampling locations were revised to provide additional clarification. The physical location of each sample collection site was not changed.

Line 13: Changed "west" to "west-northwest" to be more specific regarding compass direction for Sector P.

Line 14: The distance to the Discharge Basin was revised from "0.5" to "0.3" miles to reflect current measurement.

Line 16: The words "old training" were replaced with the words "Support Services" to reflect a name change.

Line 19: Revised distance to Sector R garden from "0.7" to "0.8" miles to reflect current measurement.

Line 21: Replaced the acronym "MP&L" with "GGNS." MP&L is no longer the operator of GGNS.

Line 26: "Southwest" was changed to "south-southwest" to be more specific regarding the compass direction for Sector K.

Lines 31, 32, 34 and 35: The descriptions for the fish sampling locations were revised to provide additional clarification. The physical location of each location was not changed.

• Page 3.0-3b

Affected Lines: 4 and 6 through 16

Revision/Justification:

Line 4: The asterisk was moved to Line 6 to provide clarification regarding which sample was a Technical Specifications requirement.

Lines 6 thru 11: For clarification, separate descriptions for locations SEDHAM and SEDBAR were provided on Lines 6 through 10 and Line 11, respectively. Also, the statement requiring collection during low water periods was deleted. A requirement for sample collection during low water periods does not exist. Improved flexibility is accomplished by deleting reference to low water collection.

Lines 12 thru 16: The description of the sediment control sampling location was revised to provide clarification and a Figure No.

• Page 3.0-4

Affected Lines: 4, 8 thru 16, 20 thru 23, 26 thru 29

Revision/Justification:

The descriptions of 11LD locations M-01 thru M-06, M-09, M-10, M-12 and M-13 were revised to provide clarification. The physical location of each site did not change. On Line 4, the page number was changed from 6 to 7 because a page was added.

- Page 3.0-5

Affected Lines: 4, 6, 7, 9, 11, 17, 18, 27, 30

Revision/Justification:

Line 4: The page number was changed from "1 of 6" to "1 of 7" because a page was added.

Lines 6, 7, 9 and 27: Revised the description for TLD locations M-14, M-16 and M-28 to provide additional clarification. The physical location of these sites did not change.

Lines 11 and 18: Inserted the word "former" because the railroad track has been removed.

Line 17: The word "training" was replaced with the words "Support Services" to reflect a name change.

Line 30. Inserted the word "inactive" to reflect the non-operating status of this trailer park.

- Page 3.0-6

Affected Lines: 4, 6 thru 9, 12, 14, 23 and 29

Revision/Justification:

On Line 4, the page number was changed from "1 of 6" to "1 of 7" because a page was added.

The descriptions of TLD locations M-31, M-32, M-34, M-35, M-40 and M-45 were revised to provide clarification. The physical location of each site did not change.

- Page 3.0-6a

Affected Lines: 4, 6, 7, 9, 12, 14, 17, 19, 23, 24 and 26 thru 29

Revision/Justification:

Line 4: The page number was changed from "1 of 6" to "1 of 7" because a page was added.

Line 6: The words "power pole" were replaced with the words "church yard" to be more specific regarding the location of TLD No. M-46.

- Lines 7 and 17: "Waterloo Road" was changed to "Bald Hill Road" to reflect a name change.
- Lines 8 and 9: Inserted "Westside" following the word "Rodney" and replaced "Greenwood" with "Mont Gomer" to reflect name changes.
- Line 12: Replaced "Greenwood" with "Mont Gomer" to reflect a name change.
- Line 14: Inserted Figure No. 3.0-3 for TLD No. M-50.
- Line 17: Deleted the phrase "marked with white paint" for TLD No. M-52 because it is no longer applicable or necessary.
- Line 19: Inserted the word "inactive" preceding "trailer park" to reflect current status of this location.
- Line 23: Changed the acronym "MSBH" to "MSDH" to reflect a name change.
- Line 24: Deleted the word "south" because it was unnecessary and misleading.
- Lines 26, 27, 28, 29: Revised the descriptions of the locations for TLDs M-57 and M-58 to provide additional clarification. The physical location of each site did not change.

- Page 3.0-6b

Affected Lines: 4, 6, 7, 11, 13, 15, 17, 27 and 28

Revision/Justification:

- Line 4: The page number was changed from "1 of 6" to "1 of 7" because a page was added.
- Lines 6, 7, 27 and 28: Revised the description of TLD locations M-60, M-71 and M-72 to provide additional clarification. The physical location of each site did not change.
- Lines 11, 13, 15 and 17: Deleted the acronym "MP&L" because MP&L is no longer the operator of GGNS.

- Page 3.0-6c

Affected Lines: 4 and 25

Revision/Justification:

Line 4: The page number was changed from "1 of 6" to "1 of 7" because a page was added.

Line 25: Inserted "Westside" preceding "Road" to reflect a name change.

- Page 3.0-6d

Affected Lines: All, new page

Revision/Justification:

The last 4 lines (TLDs M-91 thru M-94) were transferred to Page 3.0-6d (new page) to accommodate spacing on Page 3.0-6c.

- Page 3.0-7

Affected Lines: 1, 2 and 3

Revision/Justification:

Line 1: Replaced "Mississippi Power & Light Company" with "System Energy Resources, Inc." Also, deleted "Mississippi Power & Light Company" in lower right corner of map.

Line 2: The "0.5" Mile Area Map was changed to "0-5" to correct a typographical error.

Line 3: Deleted "& 2" to indicate one operating unit.

2. ODCM Revision 12

Revision 12 to the ODCM was reviewed and approved by the Plant Safety Review Committee on August 9, 1988. The changes within this revision can be characterized as administrative. Based on a technical review and consideration of the reasons for the changes, it was determined that the changes will not reduce the accuracy nor the reliability of the dose calculation or setpoint determinations.

Revision 12 to the CGNS ODCM was necessary to:

- Correct administrative and typographical errors
- Revise gaseous setpoint calculation methodology

A markup copy of Revision 11 showing changes for Revision 12 is included as Attachment III. Revision 12 is included as Attachment IV and a detailed outline of Revision 12 is provided below:

SUBJECT: Grand Gulf Nuclear Station Offsite Dose Calculation Manual (ODCM), Revision 12, August 9, 1988.

• Page 2.0-1

* Affected Lines: 7, 8, 9, 10, 11, 13 thru 18, 23, 28, 29

Revision/Justification:

Lines 7 & 8: Inserted "(cpm) above background" for clarification. Also inserted "the" preceding "alarm" for grammatical clarification.

Lines 9 & 11: Replaced "0.25" with the acronym "PF". The correction factor, PF, is the product of the safety and allocation factors.

Line 10: Deleted "(1)" because it was unnecessary.

Lines 13, 14, 15 & 16: Inserted definitions for the product and allocation factors. The revised methodology uses a correction factor to adjust for simultaneous release points, fluctuations in instrument efficiencies and other uncertainties.

Line 17: Replaced "0.25" with "SF" to make defining PF more obvious.

Line 18: Added ", normally set at 0.4" to provide the routine value of SF. Using the normal values of AF (0.25) and SF (0.4), PF equals 1 which is more conservative than the previous value (0.25) used as a correction factor in determining the monitor setpoint. This accounts for uncertainties including the + 25% calculated value provision added in Note 1, Line 6.

Lines 23 & 28: Removed the "less than or equal to" symbols because they were unnecessary.

Line 29: Inserted "(cpm)" for clarification.

* Line numbers reflect revision location in the ODCM, Revision 12.

- Page 2.0-2

Affected Lines: 2 & 14

Revision/Justification: Inserted "(cpm) above background" on Line 2 and "cpm" on Line 14 to clarify the unit of measurement for count rate.

- Page 2.0-4

Affected Lines: 2, 5 thru 15, 17 thru 22, 25 thru 29

Revision/Justification:

Lines 2, 5, 6, 7, 8: Replaced "be regarded as upper" with "determine the allowable" on Line 2. Deleted "lower" on Line 5. Replaced "than" with "that is less than or equal to + 25% of" on Lines 5 & 6. The upper limit was replaced with a + 25% limit to improve flexibility, and takes into account minor changes in isotopic abundances. On Lines 6, 7 & 8, added a provision for using the existing setpoint if radionuclides are not detected in grab sample.

Lines 9 thru 12: The explanatory statement for Note 2) was expanded to clarify that the conservative setpoint methodology could be used to minimize the need for setpoint adjustment as well as when radioactivity was not detectable.

Lines 13 thru 15: Provided the definition of S_V and the equation for determining V_{monitor} setpoint. As indicated by the footnote to the S_V definition, the setpoint will be based only on total body dose because it is always a more conservative value. Therefore, reference to skin dose was deleted.

Lines 17 & 18: Inserted a definition for PF.

Lines 19 & 20: Repeated the definition for AF to avoid confusion.

Lines 21 & 22: Inserted a definition for SF' to account for uncertainties including the $\pm 25\%$ detector efficiency range added by Lines 14 & 15 of Page 2.0-5.

Lines 25 & 26: Simplified the equation for R_t'' by combining the existing equation for R_t'' and the equation for C' . This combination took into consideration the change to reciprocal units for X as noted on page 2.0-5. As a result the definitions for Q'' and C' were no longer necessary and were deleted.

Lines 27, 28, 29: Added a footnote to explain why it was not necessary to calculate a setpoint based on skin dose.

• Page 2.0-5

Affected Lines: 2, 3, 4, 7, 8, 12 thru 15

Revision/Justification:

Lines 2, 3, 4: Restated the definition for X to identify the source of the efficiency factor and to show use of reciprocal units.

Lines 7 & 8: Clarified definitions for conversion factors.

Line 12: Added the value of K from Table 2.1-1 because it is constant for Kr-89. The definitions for R_s'' , L and M were deleted since they will no longer be used.

Line 13: Added a statement identifying the location for definitions of variables not provided on pages 2.0-4 & 5.

Lines 14 & 15: Added a requirement for instrument calibration to ensure efficiencies remain within the $\pm 25\%$ range.

B. Process Control Program (PCP).

No changes were made during the report period.

C. Radioactive Waste Treatment Systems.

No major changes were made during the report period.

TABLE 1A

Grand Gulf Nuclear Station

JANUARY - JUNE 1988

GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
A. Fission & Activation Gases				
1. Total release	Ci	3.23E+01	2.78E+01	6.90E+01
2. Average release rate for period	uCi/sec	4.11E+00	2.90E+00	
3. % of Technical Specification limit	%	1.37E+00	1.13E+00	
B. Iodines				
1. Total Iodine-131	Ci	3.44E-05	8.01E-06	7.10E+01
2. Average release rate for period	uCi/sec	4.38E-06	1.02E-06	
3. % of Technical Specification limit	%	2.28E-01	5.04E-02	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	2.59E-04	2.46E-05	6.90E+01
2. Average release rate for period	uCi/sec	3.29E-05	3.13E-06	
3. % of Technical Specification limit	%	1.38E-02	7.11E-03	
4. Gross alpha radioactivity	Ci	1.06E-07	1.48E-07	
D. Tritium				
1. Total release	Ci	7.33E-01	9.95E-01	6.60E+01
2. Average release rate for period	uCi/sec	9.32E-02	1.27E-01	
3. % of Technical Specification limit	%	6.35E-03	8.61E-03	
E. Tritium, radioiodines and particulates				
1. % of Technical Specification limit	%	2.49E-01	6.61E-02	

TABLE 1B

Grand Gulf Nuclear Station

GASEOUS EFFLUENTS - ELEVATED RELEASES

(Not Applicable - GGNS releases are considered ground level)

TABLE 1C

Grand Gulf Nuclear Station

January - June 1988

GASEOUS EFFLUENTS-GROUND-LEVEL RELEASES

Radionuclides Released	Unit	CONTINUOUS MODE		BATCH MODE		
		Quarter 1	Quarter 2	Quarter 1	Quarter 2	
1. Fission gases						
Xe-133	Ci	2.45E-02	3.98E-03	0.00E+00	0.00E+00	
Xe-131m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Kr-88	Ci	6.79E-01	0.00E+00	0.00E+00	0.00E+00	
Xe-133m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Xe-135	Ci	9.01E-01	2.36E-03	0.00E+00	0.00E+00	
Kr-85m	Ci	2.47E-01	0.00E+00	0.00E+00	0.00E+00	
Kr-87	Ci	1.14E+00	0.00E+00	0.00E+00	0.00E+00	
Xe-138	Ci	2.56E+00	0.00E+00	0.00E+00	0.00E+00	
Xe-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Kr-85	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Xe-135m	Ci	9.21E-01	0.00E+00	0.00E+00	0.00E+00	
Kr-89	Ci	2.38E+01	2.28E+01	0.00E+00	0.00E+00	
Ar-41	Ci	2.02E+00	0.00E+00	0.00E+00	0.00E+00	
Kr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Total for period	Ci	3.23E+01	2.28E+01	0.00E+00	0.00E+00	
2. Iodines						
I-131	Ci	3.44E-05	7.76E-06	0.00E+00	0.00E+00	
I-133	Ci	1.88E-04	2.43E-05	0.00E+00	0.00E+00	
I-132	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
I-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Total for period	Ci	2.22E-04	3.21E-05	0.00E+00	0.00E+00	

TABLE 1C (cont'd)

Radionuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
3. Particulates					
Sr-89	Ci	3.52E-07	1.94E-07	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr-51	Ci	2.25E-04	5.08E-06	0.00E+00	0.00E+00
Ba-140	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	Ci	1.49E-06	0.00E+00	0.00E+00	0.00E+00
Mn-54	Ci	9.16E-06	3.87E-06	0.00E+00	0.00E+00
Fe-59	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-60	Ci	1.36E-05	8.72E-06	0.00E+00	0.00E+00
La-140	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C-14	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
P-32	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-55	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn-65	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y-91	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-103	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	Ci	9.29E-06	3.13E-06	0.00E+00	0.00E+00
Ag-110m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-136	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pr-143	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	Ci	0.00E+00	2.44E-07	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	3.36E-06	0.00E+00	0.00E+00
Total for period	Ci	2.59E-04	2.46E-05	0.00E+00	0.00E+00

TABLE 1D

Grand Gulf Nuclear Station

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection Required (LLD) (μCi/ml) ^a	Lower Limit of Detection (Worst Case) Capability (μCi/ml) ^a
A. (1) Radwaste Building Ventilation Exhaust	M Grab Sample	M	Principal Gamma Emitters ^{b,e}	1E-04	1.5E-07
(2) Fuel Handling Area Ventilation Exhaust	Continuous ^d	W ^c Charcoal Sample	H-3 I-131	1E-06 1E-10	1.8E-10 6.0E-13
(3) Containment Ventilation Exhaust	Continuous ^d	W ^c Particulate Sample	I-133	1E-10	9.0E-13
(4) Turbine Building Ventilation Exhaust	Continuous ^d	M Composite Particulate Sample	Principal Gamma Emitters ^e (I-131, Others)	1E-11	9.6E-13
	Continuous ^d	Q Composite Particulate Sample	Gross Alpha	1E-11	1.8E-14
	Continuous ^d	Q Composite Particulate Sample	Sr-89, Sr-90	1E-11	1.1E-14
	Continuous	Noble Gas Monitor	Noble Gases Gross Beta or Gamma	1E-06	4.4E-07

Note: Footnotes indicated are listed in GGNS Technical Specifications, Table 4.11.2.1.2-1.

TABLE 1D (Continued)

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection Required (LLD) ($\mu\text{Ci}/\text{m}^3$) ^a	Lower Limit of Detection (Worst Case) Capability ($\mu\text{Ci}/\text{m}^3$) ^a
B. (1) Offgas Post Treatment Exhaust, whenever there is flow	M Grab Sample	M	Principal Gamma Emitters ^e	1E-04	5.4E-05
(2) Standby Gas Treatment A Exhaust, whenever there is flow					
(3) Standby Gas Treatment B Exhaust, whenever there is flow					

Note: Footnotes indicated are listed in GGNS Technical Specifications, Table 4.11.2.1.2-1.

TABLE 2A

Grand Gulf Nuclear Station

January - June 1988

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est total Error %
A. Fission & activation products				
1. Total release (not including H3, gases, alpha)	Ci	7.79E-02	4.33E-02	7.30E+01
2. Average diluted concentration during period	uCi/ml	1.23E-07	1.03E-07	
3. Percent of applicable limit	*%	1.88E-01	1.04E-01	
B. Tritium				
1. Total release	Ci	2.05E+00	3.03E+00	7.00E+01
2. Average diluted concentration during period	uCi/ml	3.23E-06	7.19E-06	
3. Percent of applicable limit	*%	1.08E-01	2.40E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	7.21E-05	1.48E-04	6.60E+01
2. Average diluted concentration during period	uCi/ml	1.13E-10	3.51E-10	
3. Percent of applicable limit	*%	1.13E-01	3.38E-01	
D. Gross alpha radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	9.60E+01
E. Volume of waste (prior to dilution)				
	liters	9.31E+06	6.45E+06	5.00E+00
F. Volume of dilution water used				
	liters	6.26E+08	4.14E+08	5.00E+00

* Percentages of applicable limit based on 10CFR20, Appendix B, Table II, Column 2.

TABLE 2B

Grand Gulf Nuclear Station

January - June 1988

LIQUID EFFLUENTS - CONTINUOUS AND BATCH MODES

Radionuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
Sr-89	Ci	0.00E+00	0.00E+00	6.49E-04	3.08E-04
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	Ci	0.00E+00	0.00E+00	3.77E-04	7.68E-06
Cs-137	Ci	0.00E+00	0.00E+00	3.69E-04	0.00E+00
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	1.80E-05
Co-58	Ci	0.00E+00	0.00E+00	3.55E-03	7.88E-04
Co-60	Ci	0.00E+00	0.00E+00	1.78E-02	2.73E-03
Fe-59	Ci	0.00E+00	0.00E+00	1.44E-03	1.20E-03
Zn-65	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mn-54	Ci	0.00E+00	0.00E+00	1.21E-02	2.41E-03
Cr-51	Ci	0.00E+00	0.00E+00	3.67E-02	3.09E-02
Zr-Nb-95	Ci	0.00E+00	0.00E+00	0.00E+00	2.51E-04
Mo-99	Ci	0.00E+00	0.00E+00	0.00E+00	1.13E-04
Tc-99m	Ci	0.00E+00	0.00E+00	3.11E-06	3.39E-04
Ba-La-140	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ru-106	Ci	0.00E+00	0.00E+00	2.36E-04	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	1.78E-05
As-76	Ci	0.00E+00	0.00E+00	3.87E-04	1.11E-03
Mn-56	Ci	0.00E+00	0.00E+00	1.10E-05	0.00E+00
Ag-110m	Ci	0.00E+00	0.00E+00	2.08E-05	3.90E-04
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	1.90E-05
Na-24	Ci	0.00E+00	0.00E+00	8.03E-05	1.85E-04
Cu-64	Ci	0.00E+00	0.00E+00	7.51E-04	4.48E-04
Cs-138	Ci	0.00E+00	0.00E+00	1.51E-05	0.00E+00
Zr-97	Ci	0.00E+00	0.00E+00	0.00E+00	1.27E-05
Sr-92	Ci	0.00E+00	0.00E+00	0.00E+00	6.19E-05
Fe-55	Ci	0.00E+00	0.00E+00	1.37E-03	1.96E-03
Total for period (above)	Ci	0.00E+00	0.00E+00	7.79E-02	4.33E-02
Xe-133	Ci	0.00E+00	0.00E+00	0.00E+00	7.84E-06
Xe-135	Ci	0.00E+00	0.00E+00	7.21E-05	1.40E-04

TABLE 2-C

Grand Gulf Nuclear Station

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection Required (LLD) ($\mu\text{Ci/ml}$) ^a	Lower Limit of Detection (Worst Case) Capability ($\mu\text{Ci/ml}$) ^a
A. Batch Waste Release Tanks ^c	P Each Batch	P Each Batch	Principal Gamma Emitters ^d	5E-07	1.6E-07
			I-131	1E-06	2.3E-08
	P One Batch/M	M	Dissolved and Entrained Gases (gamma emitters)	1E-05	7.1E-08
			P Each Batch	M Composite ^b	H-3
	Gross Alpha	1E-07			3.8E-08
	P Each Batch	Q Composite ^b	Sr-89, Sr-90	5E-08	2.6E-08
Fe-55			1E-06	1.4E-07	
B. SSW Basin (prior to blowdown)	Each Blowdown	Each Batch	Principal Gamma Emitters ^d	5E-07	1.6E-07
			I-131	1E-06	2.3E-08

Note: Footnotes indicated are listed in GGNS Technical Specifications, Table 4.11.1.1.1-1.

TABLE 3

Grand Gulf Nuclear Station

January - June 1988

SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid Waste Shipped Offsite for Burial or Disposal

1.	Type of Waste	Unit	6-month Period	Estimate Total Error, %
a.	Spent resins, filter sludges, oil evaporator bottoms, etc.	m ³ *Ci	2.20E+02 2.15E+02	7.2E+01
b.	Dry compressible waste, contaminated equipment, etc.	m ³ *Ci	1.10E+02 4.34E+00	6.9E+01
c.	Irradiated components, control rods, etc.	m ³ *Ci	None	N/A
d.	Other	m ³ *Ci	None	N/A

* Total curie quantity determined by measurement. Total volume used is burial container volume

2. Estimate of major radionuclide composition (by type of waste as identified above).

a.	Fe-55	30%
	Co-60	26%
	Mn-54	23%
	Cr-51	12%
	Co-58	3%
	All others	6%
b.	Fe-55	21%
	Co-60	19%
	Mn-54	12%
	Cr-51	28%
	Fe-59	2%
	All others	18%
c.	N/A	N/A
d.	N/A	N/A

TABLE 3

SOLID RADIOACTIVE WASTE AND IRRADIATED FUEL SHIPMENTS (cont'd)

3. Solid Waste Disposition

- a. Resins were dewatered in steel liners or polyethylene High Integrity Containers, or solidified in steel liners according to the requirements of the GGNS PCP and shipped LSA.
- b. DAW was packaged in steel 55 gallon drums or steel B-25 boxes and shipped LSA.

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
41	Truck	Barnwell, SC

B. Irradiated Fuel Shipments (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	N/A	N/A

TABLE 4A

METEOROLOGICAL DATA - JANUARY-MARCH 1988

EXTREMELY UNSTABLE STABILITY CLASS A
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	.6	3.5	.3	.0	.0	.0	.0	4.5	.2
NNE	1.3	1.0	.0	.0	.0	.0	.0	2.3	.1
NE	.6	.3	.0	.0	.0	.0	.0	1.0	.0
ENE	1.0	1.9	.0	.0	.0	.0	.0	2.9	.1
E	1.0	1.3	.0	.0	.0	.0	.0	2.3	.1
ESE	1.0	4.5	.0	.0	.0	.0	.0	5.5	.2
SE	1.0	3.2	.6	.0	.0	.0	.0	4.8	.2
E SSE	.0	.6	1.9	.0	.0	.0	.0	2.6	.2
CS	1.6	3.5	1.3	.3	.0	.0	.0	6.8	.3
NT SSW	1.9	.3	.6	.0	.0	.0	.0	2.9	.1
DI SW	1.9	6.1	.3	.0	.0	.0	.0	8.4	.3
OWSW	3.5	6.8	.6	.0	.0	.0	.0	11.0	.4
NW	5.2	5.2	.3	.0	.0	.0	.0	10.7	.4
MNW	1.6	5.8	2.3	.0	.0	.0	.0	9.7	.5
NW	2.9	9.1	.6	.0	.0	.0	.0	12.6	.5
NNW	.6	11.0	.3	.0	.0	.0	.0	12.0	.5
CALM	.0							.0	

TOTAL	25.9	64.4	9.4	.3	.0	.0	.0	100.0	.3

1. HOURS OF BAD OR MISSING DATA OR .3 PERCENT FOR 310 HOURS

TABLE 4A (CONT.)

MODERATELY UNSTABLE STABILITY CLASS B
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.5	2.5	.0	.0	.0	.0	.0	5.0	.1
NNE	3.8	2.5	.0	.0	.0	.0	.0	6.3	.2
NE	2.5	2.5	.0	.0	.0	.0	.0	5.0	.1
ENE	3.0	1.2	.0	.0	.0	.0	.0	5.0	.1
D E	.0	1.2	.0	.0	.0	.0	.0	1.2	.0
I ESE	1.2	3.8	.0	.0	.0	.0	.0	5.0	.2
R SE	.0	5.0	.0	.0	.0	.0	.0	5.0	.2
W E SSE	5.0	7.5	3.8	.0	.0	.0	.0	16.2	.8
I C S	1.2	3.8	1.2	.0	.0	.0	.0	6.3	.3
N T SSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
D I SW	2.5	1.2	1.2	.0	.0	.0	.0	5.0	.2
O WSW	3.8	6.3	.0	.0	.0	.0	.0	10.0	.4
N W	10.0	1.2	.0	.0	.0	.0	.0	11.2	.3
WNW	5.0	3.8	.0	.0	.0	.0	.0	8.7	.3
NW	3.8	1.2	.0	.0	.0	.0	.0	5.0	.1
NNW	.0	5.0	.0	.0	.0	.0	.0	5.0	.2
CALM	.0							.0	

TOTAL	45.0	48.7	6.3	.0	.0	.0	.0	100.0	.2

1. HOURS OF BAD OR MISSING DATA OR 1.2 PERCENT FOR 81 HOURS

TABLE 4A (CONT.)

SLIGHTLY UNSTABLE STABILITY CLASS C
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	C-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	.8	5.0	.0	.0	.0	.0	.0	5.9	.2
NNE	1.7	1.7	.0	.0	.0	.0	.0	3.4	.1
NE	1.7	.8	.0	.0	.0	.0	.0	2.5	.1
ENE	1.7	.0	.0	.0	.0	.0	.0	1.7	.0
D E	.8	3.4	.0	.0	.0	.0	.0	4.2	.2
I ESE	2.5	3.4	.8	.0	.0	.0	.0	6.7	.3
R SE	2.5	3.4	2.5	.0	.0	.0	.0	8.4	.4
W E SSE	.8	5.9	1.7	.0	.0	.0	.0	8.4	.4
I C S	.8	2.5	6.7	.8	.0	.0	.0	10.9	.7
N T SSW	2.5	.0	.0	.0	.0	.0	.0	2.5	.1
D I SW	3.4	5.0	.0	.0	.0	.0	.0	8.4	.3
O WSW	2.5	.8	.0	.0	.0	.0	.0	3.4	.1
N W	5.0	2.5	.0	.0	.0	.0	.0	7.6	.2
WNW	2.5	2.5	.0	.0	.0	.0	.0	5.0	.2
NW	7.6	3.4	.0	.0	.0	.0	.0	10.9	.3
NNW	2.5	5.9	.0	.0	.0	.0	.0	8.4	.3
CALM	1.7							1.7	

TOTAL	41.2	46.2	11.8	.8	.0	.0	.0	100.0	.2

3. HOURS OF BAD OR MISSING DATA OR 2.5 PERCENT FOR 122 HOURS

TABLE 4A (CONT.)

NEUTRAL STABILITY CLASS D
 PERIOD OF RECORD: 1/ 1/68, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	4.2	12.0	1.1	.0	.0	.0	.0	17.3	.7
NNE	4.3	3.2	.0	.0	.0	.0	.0	7.5	.2
NE	1.5	1.5	.0	.0	.0	.0	.0	3.1	.1
ENE	1.4	1.7	.0	.0	.0	.0	.0	3.1	.1
E	1.5	1.7	.1	.0	.0	.0	.0	3.3	.1
ESE	1.1	7.1	.3	.0	.0	.0	.0	8.5	.4
SE	1.4	5.4	1.9	.0	.0	.0	.0	8.8	.4
SSE	.8	4.9	3.2	.0	.0	.0	.0	8.9	.5
S	1.1	3.1	.7	.3	.0	.0	.0	5.2	.2
SSW	.5	1.4	.5	.0	.0	.0	.0	2.5	.1
SW	2.4	4.5	.0	.0	.0	.0	.0	6.8	.2
WSW	2.4	1.0	.1	.0	.0	.0	.0	3.5	.1
W	1.7	1.4	.1	.0	.0	.0	.0	3.2	.1
WNW	.7	1.7	.0	.0	.0	.0	.0	2.4	.1
Nw	1.8	1.9	1.3	.0	.0	.0	.0	5.0	.2
NNW	3.6	4.2	1.1	.0	.0	.0	.0	8.9	.3
CALM	1.9							1.9	

TOTAL	32.5	56.6	10.6	.3	.0	.0	.0	100.0	.2

96. HOURS OF BAD OR MISSING DATA OR 11.8 PERCENT FOR 813 HOURS

TABLE 4A (CONT.)

SLIGHTLY STABLE STABILITY CLASS E
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	1.8	2.4	.0	.0	.0	.0	.0	4.2	.1
NNE	3.5	1.6	.0	.0	.0	.0	.0	5.1	.1
NE	2.9	2.4	.0	.0	.0	.0	.0	5.3	.1
ENE	1.8	1.5	.0	.0	.0	.0	.0	3.3	.1
D E	1.3	2.4	.0	.0	.0	.0	.0	3.6	.1
I ESE	.9	9.5	.7	.0	.0	.0	.0	11.1	.5
R SE	.7	8.8	.9	.0	.0	.0	.0	10.4	.5
W E SSE	1.1	4.9	1.8	.0	.0	.0	.0	7.9	.4
I C S	.9	5.1	.9	.0	.0	.0	.0	6.9	.3
N T SSW	2.4	9.7	.0	.0	.0	.0	.0	12.1	.4
D I SW	1.8	3.5	.0	.2	.0	.0	.0	5.5	.2
O WSW	.9	.4	.0	.0	.0	.0	.0	1.3	.0
N W	1.3	1.1	.0	.0	.0	.0	.0	2.4	.1
WNW	3.5	4.4	.0	.0	.0	.0	.0	7.9	.3
NW	3.1	3.3	.2	.0	.0	.0	.0	6.6	.2
NNW	1.5	3.1	.4	.0	.0	.0	.0	4.9	.2
CALM	1.5							1.5	

TOTAL	30.9	64.0	4.9	.2	.0	.0	.0	100.0	.2

6. HOURS OF BAD OR MISSING DATA OR 1.1 PERCENT FOR 553 HOURS

TABLE 4A (CONT.)

MODERATELY STABLE STABILITY CLASS F
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	C-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.0	.0	.0	.0	.0	.0	.0	2.0	.0
NNE	3.9	3.3	.0	.0	.0	.0	.0	7.2	.2
NE	1.3	2.6	.0	.0	.0	.0	.0	3.9	.1
ENE	4.6	5.9	.0	.0	.0	.0	.0	10.5	.3
D E	1.3	3.3	.0	.0	.0	.0	.0	4.6	.2
I ESE	.6	7.2	3.3	.0	.0	.0	.0	11.2	.6
R SE	.0	9.9	1.3	.0	.0	.0	.0	11.2	.6
W E SSE	1.3	5.3	.6	.0	.0	.0	.0	7.2	.3
I C S	1.3	2.6	.0	.0	.0	.0	.0	3.9	.1
N T SSW	5.9	5.9	.0	.0	.0	.0	.0	11.8	.3
D I SW	.6	6.6	.0	.0	.0	.0	.0	7.2	.3
O WSW	2.6	1.3	.0	.0	.0	.0	.0	3.9	.1
N W	3.3	1.3	.0	.0	.0	.0	.0	4.6	.1
WNW	3.3	2.0	.0	.0	.0	.0	.0	5.3	.1
NW	.6	.0	.0	.0	.0	.0	.0	.6	.0
NNW	2.6	.0	.0	.0	.0	.0	.0	2.6	.1
CALM	2.0							2.0	

TOTAL	37.5	57.2	5.3	.0	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 152 HOURS

TABLE 4A (CONT.)

EXTREMELY STABLE STABILITY CLASS G
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.0	.0	.0	.0	.0	.0	.0	2.0	.0
NNE	2.6	1.3	.0	.0	.0	.0	.0	3.9	.1
NE	3.3	2.6	.0	.0	.0	.0	.0	5.9	.2
ENE	6.5	3.3	.0	.0	.0	.0	.0	9.8	.3
D E	8.5	8.5	.0	.0	.0	.0	.0	17.0	.5
I ESE	5.2	6.5	.6	.0	.0	.0	.0	12.4	.4
R SE	5.9	6.5	.6	.0	.0	.0	.0	13.1	.4
W E SSE	3.9	5.9	.0	.0	.0	.0	.0	9.8	.3
I C S	5.9	2.0	.0	.0	.0	.0	.0	7.8	.2
N T SSW	1.3	4.6	.0	.0	.0	.0	.0	5.9	.2
U I S	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
C WSW	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
N W	1.3	1.3	.0	.0	.0	.0	.0	2.6	.1
WNW	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
NW	.0	.0	.0	.0	.0	.0	.0	.0	.0
NNW	.6	.0	.0	.0	.0	.0	.0	.6	.0
CALM	5.2							5.2	

TOTAL	56.2	42.5	1.3	.0	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 153 HOURS

TABLE 4A (CONT.)

EXTREMELY UNSTABLE STABILITY CLASS A
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	5.5	3.5	.0	.0	.0	.0	.0	9.1	.3
NNE	1.9	.3	.0	.0	.0	.0	.0	2.3	.0
NE	1.9	.3	.0	.0	.0	.0	.0	2.3	.0
ENE	1.9	.0	.0	.0	.0	.0	.0	1.9	.0
D E	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
I ESE	1.6	.3	.0	.0	.0	.0	.0	1.9	.0
R SE	1.9	.6	.0	.0	.0	.0	.0	2.6	.1
W E SSE	2.3	1.6	.0	.0	.0	.0	.0	3.9	.1
I C S	1.6	3.5	.3	.0	.0	.0	.0	5.5	.2
N T SSW	3.2	1.9	.6	.0	.0	.0	.0	5.8	.2
D I SW	5.5	.0	.0	.0	.0	.0	.0	5.5	.1
O WSW	8.7	4.8	.0	.0	.0	.0	.0	13.6	.4
N W	6.5	.3	.0	.0	.0	.0	.0	6.8	.1
WNW	8.1	.6	.0	.0	.0	.0	.0	8.7	.2
NW	10.0	2.6	.0	.0	.0	.0	.0	12.6	.3
NNW	9.1	7.1	.0	.0	.0	.0	.0	16.2	.5
CALM	.0							.0	

TOTAL	71.2	27.8	1.0	.0	.0	.0	.0	100.0	.2

1. HOURS OF BAD OR MISSING DATA OR .3 PERCENT FOR 310 HOURS

TABLE 4A (CONT.)

MODERATELY UNSTABLE STABILITY CLASS B
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

WIND DIRECTION	WIND SPEED (M/S) AT 10-M LEVEL							TOTAL	AVG SPEED
	C-2	3-5	6-8	9-11	12-14	15-17	18 AND UP		
N	7.4	.0	.0	.0	.0	.0	.0	7.4	.1
NNE	6.2	1.2	.0	.0	.0	.0	.0	7.4	.2
NE	3.7	.0	.0	.0	.0	.0	.0	3.7	.1
ENE	.0	.0	.0	.0	.0	.0	.0	.0	.0
E	4.9	.0	.0	.0	.0	.0	.0	4.9	.1
ESE	1.2	.0	.0	.0	.0	.0	.0	1.2	.0
SE	3.7	.0	.0	.0	.0	.0	.0	3.7	.1
E SSE	.0	1.2	.0	.0	.0	1.2	.0	2.5	.3
S	3.7	13.6	.0	.0	.0	.0	.0	17.3	.7
SSW	1.2	1.2	.0	.0	.0	.0	.0	2.5	.1
SW	2.5	.0	.0	.0	.0	.0	.0	2.5	.0
WSW	12.3	2.5	.0	.0	.0	.0	.0	14.8	.3
W	4.9	.0	.0	.0	.0	.0	.0	4.9	.1
WNW	9.9	1.2	.0	.0	.0	.0	.0	11.1	.2
NW	4.9	1.2	.0	.0	.0	.0	.0	6.2	.1
NNW	8.6	1.2	.0	.0	.0	.0	.0	9.9	.2
CALM	.0							.0	
TOTAL	75.3	23.4	.0	.0	.0	1.2	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 81 HOURS

TABLE 4A (CONT.)

SLIGHTLY UNSTABLE STABILITY CLASS C
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N.	7.5	1.7	.0	.0	.0	.0	.0	9.2	.2
NNE	3.3	.0	.0	.0	.0	.0	.0	3.3	.0
NE	3.3	.0	.0	.0	.0	.0	.0	3.3	.0
ENE	1.7	.0	.0	.0	.0	.0	.0	1.7	.0
D E	3.3	.8	.0	.0	.0	.0	.0	4.2	.1
I ESE	1.7	.0	.0	.0	.0	.0	.0	1.7	.0
R SE	.0	.0	.0	.0	.0	.0	.0	.0	.0
W E SSE	5.0	5.0	.0	.0	.0	.0	.8	10.8	.4
I C S	3.3	11.7	.8	.0	.0	.0	.0	15.8	.7
N T SSW	4.2	1.7	.0	.0	.0	.0	.0	5.8	.2
D I SW	1.7	1.7	.0	.0	.0	.0	.0	3.3	.1
O WSW	6.7	.8	.0	.0	.0	.0	.0	7.5	.2
N W	2.5	.0	.0	.0	.0	.0	.0	2.5	.0
WNW	5.8	.0	.0	.0	.0	.0	.0	5.8	.1
NW	6.7	.0	.0	.0	.0	.0	.0	6.7	.1
NNW	11.7	1.7	.0	.0	.0	.0	.0	13.3	.3
CALM	5.0							5.0	

TOTAL	73.3	25.0	.8	.0	.0	.0	.8	100.0	.2

2. HOURS OF BAD OR MISSING DATA OR 1.6 PERCENT FOR 122 HOURS

TABLE 4A (CONT.)

NEUTRAL STABILITY CLASS D
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

WIND DIRECTION	WIND SPEED (M/S) AT 10-M LEVEL							TOTAL	AVG SPEED
	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP		
N	14.1	4.4	.0	.0	.0	.0	.0	18.5	.4
NNE	6.7	.5	.0	.0	.0	.0	.0	7.2	.1
NE	3.6	.0	.0	.0	.0	.0	.0	3.6	.1
ENE	3.8	.1	.0	.0	.0	.0	.0	3.9	.1
E	1.9	.1	.0	.0	.0	.0	.0	2.1	.0
ESE	2.9	.0	.0	.0	.0	.0	.0	2.9	.0
ESE	2.6	.4	.0	.0	.0	.0	.0	3.1	.1
E SSE	5.4	4.9	.0	.0	.0	.0	.0	10.3	.3
S	4.4	4.2	.3	.0	.1	.0	.0	9.0	.3
SSW	2.9	1.1	.3	.0	.0	.0	.0	4.3	.1
SSW	5.4	.5	.0	.0	.0	.0	.0	6.0	.1
WSW	3.6	1.0	.0	.0	.0	.0	.0	4.6	.1
W	2.2	.0	.0	.0	.0	.0	.0	2.2	.0
WNW	3.1	.0	.0	.0	.0	.0	.0	3.1	.0
NW	2.6	.3	.0	.0	.0	.0	.0	3.1	.0
NNW	8.5	3.1	.0	.0	.0	.0	.0	11.5	.3
CALM	4.4							4.4	
TOTAL	78.5	20.7	.5	.0	.1	.0	.0	100.0	.1

95. HOURS OF BAD OR MISSING DATA OR 11.7 PERCENT FOR 813 HOURS

TABLE 4A (CONT.)

SLIGHTLY STABLE STABILITY CLASS E
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	6.1	.0	.0	.0	.0	.0	.0	6.1	.1
NNE	5.5	.0	.0	.0	.0	.0	.0	5.5	.1
NE	5.5	.0	.0	.0	.0	.0	.0	5.5	.1
ENE	2.6	.0	.0	.0	.0	.0	.0	2.8	.0
E	3.5	.0	.0	.0	.0	.0	.0	3.5	.0
ESE	3.5	.0	.0	.0	.0	.0	.0	3.5	.0
SE	7.5	.2	.0	.0	.0	.0	.0	7.7	.1
SSE	6.3	1.8	.0	.0	.0	.0	.0	8.1	.2
S	7.5	2.8	.0	.0	.0	.0	.0	10.3	.2
SSW	6.8	.7	.0	.0	.0	.0	.0	7.5	.1
SW	4.4	.4	.0	.0	.0	.0	.0	4.8	.1
WSW	2.0	.4	.0	.0	.0	.0	.0	2.4	.0
W	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
WNW	4.0	.0	.0	.0	.0	.0	.0	4.0	.0
NW	3.3	.2	.0	.0	.0	.0	.0	3.5	.1
NNW	5.3	.4	.0	.0	.0	.0	.0	5.7	.1
CALM	17.7							17.7	

TOTAL	93.2	6.8	.0	.0	.0	.0	.0	100.0	.1

10. HOURS OF BAD OR MISSING DATA OR 1.8 PERCENT FOR 553 HOURS

TABLE 4A (CONT.)

MODERATELY STABLE STABILITY CLASS F
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	4.7	.0	.0	.0	.0	.0	.0	4.7	.0
NNE	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
NE	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
ENE	10.7	.0	.0	.0	.0	.0	.0	10.7	.1
D E	11.3	.0	.0	.0	.0	.0	.0	11.3	.1
I ESE	8.0	.0	.0	.0	.0	.0	.0	8.0	.1
R SE	6.0	.0	.0	.0	.0	.0	.0	6.0	.1
W SSE	5.3	.7	.0	.0	.0	.0	.0	6.0	.1
I CS	3.3	.0	.0	.0	.0	.0	.0	3.3	.0
N T SSW	1.3	.0	.0	.0	.0	.0	.0	1.3	.0
D I SW	.7	.0	.0	.0	.0	.0	.0	.7	.0
O WSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
N W	.0	.0	.0	.0	.0	.0	.0	.0	.0
WNW	.0	.0	.0	.0	.0	.0	.0	.0	.0
NW	.7	.0	.0	.0	.0	.0	.0	.7	.0
NNW	.0	.0	.0	.0	.0	.0	.0	.0	.0
CALM	44.7							44.7	

TOTAL	99.3	.7	.0	.0	.0	.0	.0	100.0	.1

2. HOURS OF BAD OR MISSING DATA OR 1.3 PERCENT FOR 152 HOURS

TABLE 4A (CONT.)

EXTREMELY STABLE STABILITY CLASS G
 PERIOD OF RECORD: 1/ 1/88, 000-- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	.5	.0	.0	.0	.0	.0	.0	.6	.0
NNE	.0	.0	.0	.0	.0	.0	.0	.0	.0
NE	3.9	.0	.0	.0	.0	.0	.0	3.9	.0
ENE	10.4	.0	.0	.0	.0	.0	.0	10.4	.1
D E	30.1	.0	.0	.0	.0	.0	.0	30.1	.3
I ESE	10.4	.0	.0	.0	.0	.0	.0	10.4	.1
R SE	5.9	.0	.0	.0	.0	.0	.0	5.9	.1
W E SSE	.6	.0	.0	.0	.0	.0	.0	.6	.0
I C S	.6	.0	.0	.0	.0	.0	.0	.6	.0
N T SSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
D I SW	.0	.0	.0	.0	.0	.0	.0	.0	.0
O WSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
N W	.0	.0	.0	.0	.0	.0	.0	.0	.0
WNW	.0	.0	.0	.0	.0	.0	.0	.0	.0
NW	.0	.0	.0	.0	.0	.0	.0	.0	.0
NNW	.6	.0	.0	.0	.0	.0	.0	.6	.0
CALM	36.6							36.6	
TOTAL	100.0	.0	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 153 HOURS

TABLE 4A (CONT.)

TOTAL FREQUENCY DISTRIBUTION

PERIOD OF RECORD: 1/ 1/88, 000 -- 4/ 1/88, 000

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	8.4	2.2	.0	.0	.0	.0	.0	10.5	.2
NNE	4.6	.3	.0	.0	.0	.0	.0	4.9	.1
NE	3.7	.0	.0	.0	.0	.0	.0	3.8	.0
ENE	3.9	.0	.0	.0	.0	.0	.0	4.0	.0
E	5.2	.1	.0	.0	.0	.0	.0	5.3	.1
ESE	3.7	.0	.0	.0	.0	.0	.0	3.7	.0
SE	4.2	.3	.0	.0	.0	.0	.0	4.5	.1
ESSE	4.6	2.8	.0	.0	.0	.0	.0	7.5	.2
S	4.4	3.9	.2	.0	.0	.0	.0	8.5	.3
SSW	3.7	1.0	.2	.0	.0	.0	.0	4.9	.1
SW	4.1	.4	.0	.0	.0	.0	.0	4.5	.1
WSW	3.9	1.3	.0	.0	.0	.0	.0	5.2	.1
W	2.4	.0	.0	.0	.0	.0	.0	2.4	.0
WNW	4.0	.1	.0	.0	.0	.0	.0	4.2	.1
NW	3.9	.6	.0	.0	.0	.0	.0	4.5	.1
NNW	6.7	2.4	.0	.0	.0	.0	.0	9.1	.2
CALM	6.7							12.4	

TOTAL	83.9	15.5	.4	.0	.0	.0	.0	100.0	.1

110. HOURS OF BAD OR MISSING DATA OR 5.0 PERCENT FOR 2184 HOURS

TABLE 4A (CONT.)

TOTAL FREQUENCY DISTRIBUTION

PERIOD OF RECORD: 1/ 1/88, 000 -- 4/ 1/88, 000

WIND SPEED (H/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.4	5.7	.4	.0	.0	.0	.0	8.6	.3
NNE	3.3	2.2	.0	.0	.0	.0	.0	5.5	.1
NE	1.9	1.7	.0	.0	.0	.0	.0	3.6	.1
ENE	2.2	2.0	.0	.0	.0	.0	.0	4.1	.1
E	1.8	2.5	.0	.0	.0	.0	.0	4.3	.1
ESE	1.4	7.0	.6	.0	.0	.0	.0	9.0	.4
SE	1.4	6.3	1.3	.0	.0	.0	.0	8.9	.4
E SSE	1.2	4.5	2.2	.0	.0	.0	.0	7.9	.4
S	1.5	3.6	1.1	.2	.0	.0	.0	6.3	.3
SSW	1.8	3.8	.3	.0	.0	.0	.0	5.9	.2
SW	2.0	4.2	.1	.0	.0	.0	.0	6.3	.2
WSW	2.2	1.6	.1	.0	.0	.0	.0	4.1	.1
W	2.7	1.9	.1	.0	.0	.0	.0	4.7	.1
WNW	2.1	3.0	.3	.0	.0	.0	.0	5.4	.2
NW	2.5	3.1	.6	.0	.0	.0	.0	6.2	.2
NNW	2.1	4.4	.5	.0	.0	.0	.0	7.1	.3
CALM	2.1							1.7	

TOTAL	34.2	57.8	7.7	.2	.0	.0	.0	100.0	.2

107. HOURS OF BAD OR MISSING DATA OR 4.9 PERCENT FOR 2184 HOURS

TABLE 4A (CONT.)

PERCENT BAD DATA REPORT REPORT COVERS 2184HOURS		
	HOURS	PERCENT
50M DIRECTION	0.	.00
50M WIND SPEED	107.	4.90
10M DIRECTION	6.	.27
10M WIND SPEED	104.	4.76
TEMPERATURE	0.	.00
DEW POINT	112.	5.13
DELTA T	0.	.00
PRECIPITATION	0.	.00

TABLE 4B

METEOROLOGICAL DATA - APRIL-JUNE 1988

EXTREMELY UNSTABLE STABILITY CLASS A
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	5.1	6.0	.0	.0	.0	.0	.0	11.1	.3
NNE	4.4	3.5	.0	.0	.0	.0	.0	8.0	.2
NE	4.4	2.6	.0	.0	.0	.0	.0	7.1	.2
ENE	3.8	1.1	.0	.0	.0	.0	.0	4.9	.1
E	4.2	1.1	.0	.0	.0	.0	.0	5.3	.1
ESE	2.0	1.1	.0	.0	.0	.0	.0	3.1	.1
SE	2.0	.9	.0	.0	.0	.0	.0	2.9	.1
ESSE	.4	2.2	.7	.0	.0	.0	.0	3.3	.1
S	1.1	1.5	.0	.0	.0	.0	.0	2.6	.1
SSW	2.9	1.1	.2	.0	.0	.0	.0	4.2	.1
SW	3.8	4.0	1.1	.0	.0	.0	.0	8.8	.3
WSW	2.4	2.0	.0	.0	.0	.0	.0	4.4	.1
W	3.1	1.8	.2	.0	.0	.0	.0	5.1	.1
WNW	2.9	2.4	.4	.0	.0	.0	.0	5.7	.2
NW	6.0	5.3	1.3	.0	.0	.0	.0	12.6	.4
NNW	6.0	4.4	.4	.0	.0	.0	.0	10.8	.3
CALM	.0							.0	

TOTAL	54.4	41.1	4.4	.0	.0	.0	.0	100.0	.2

1. HOURS OF BAD OR MISSING DATA OR .2 PERCENT FOR 453 HOURS

TABLE 4B (CONT.)

MODERATELY UNSTABLE STABILITY CLASS B
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	5-8	9-11	12-14	15-17	18 AND UP	TOT.L	AVG SPEED
N	1.9	1.9	.0	.0	.0	.0	.0	3.8	.1
NNE	4.8	2.9	.0	.0	.0	.0	.0	7.7	.2
NE	4.8	1.9	.0	.0	.0	.0	.0	6.7	.2
ENE	4.8	1.0	.0	.0	.0	.0	.0	5.8	.1
D E	1.0	2.9	.0	.0	.0	.0	.0	3.8	.1
I ESE	3.8	1.0	.0	.0	.0	.0	.0	4.8	.1
R SE	2.9	1.9	.0	.0	.0	.0	.0	4.8	.1
W E SSE	2.9	1.0	.0	.0	.0	.0	.0	3.8	.1
I C S	1.9	7.7	.0	.0	.0	.0	.0	9.6	.4
N T SSW	1.0	2.9	1.0	.0	.0	.0	.0	4.8	.2
D I SW	3.8	6.7	1.0	.0	.0	.0	.0	11.5	.4
O WSW	4.8	1.0	.0	.0	.0	.0	.0	5.8	.1
N W	2.9	.0	1.0	.0	.0	.0	.0	3.8	.1
WNW	1.9	.0	1.0	.0	.0	.0	.0	2.9	.1
HW	6.7	3.8	.0	.0	.0	.0	.0	10.6	.3
NNW	7.7	.0	1.0	.0	.0	.0	.0	8.6	.2
CA.M	1.0							1.0	

TOTAL	58.6	36.5	4.8	.0	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 104 HOURS

TABLE 4B (CONT.)

SLIGHTLY UNSTABLE STABILITY CLASS C
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.8	2.8	.0	.0	.0	.0	.0	5.7	.1
NNE	2.8	3.8	.0	.0	.0	.0	.0	6.7	.2
NE	6.7	1.9	.0	.0	.0	.0	.0	8.6	.2
ENE	3.8	.9	.0	.0	.0	.0	.0	4.8	.1
E	.9	1.9	.0	.0	.0	.0	.0	2.8	.1
ESE	1.9	2.8	.0	.0	.0	.0	.0	4.8	.1
SE	3.8	7.6	.0	.0	.0	.0	.0	11.4	.4
SESE	.9	2.8	.9	.0	.0	.0	.0	4.8	.2
CS	2.8	6.7	.0	.0	.0	.0	.0	9.5	.3
SSW	2.8	5.7	.9	.0	.0	.0	.0	9.5	.4
SSW	7.6	3.8	1.9	.0	.0	.0	.0	13.3	.5
WSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
W	2.8	.9	.9	.0	.0	.0	.0	4.8	.2
WNW	3.8	.0	.9	.0	.0	.0	.0	4.8	.1
NW	2.8	.0	.0	.0	.0	.0	.0	2.8	.0
NNW	3.8	1.9	.0	.0	.0	.0	.0	5.7	.2
CALN	.0							.0	

TOTAL	50.5	43.8	5.7	.0	.0	.0	.0	100.0	.2

1. HOURS OF BAD OR MISSING DATA OR .9 PERCENT FOR 106 HOURS

TABLE 4B (CONT.)

NEUTRAL STABILITY CLASS D
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	1.1	2.4	.2	.0	.0	.0	.0	3.7	.1
NNE	2.8	1.5	.0	.0	.0	.0	.0	4.4	.1
NE	2.2	2.0	.0	.0	.0	.0	.0	4.2	.1
ENE	1.7	.2	.0	.0	.0	.0	.0	2.0	.0
D E	2.6	.9	.0	.0	.0	.0	.0	3.5	.1
I ESE	2.6	3.9	.0	.2	.0	.0	.0	6.8	.2
R SE	2.6	3.1	.0	.2	.0	.0	.0	5.9	.2
W E SSE	2.4	4.4	.4	.0	.0	.0	.0	7.2	.3
I C S	3.9	9.0	1.5	.0	.0	.0	.0	14.5	.6
N T SSW	2.2	4.8	.2	.0	.0	.0	.0	7.2	.3
D I SW	5.3	4.2	.4	.0	.0	.0	.0	9.9	.3
O WSW	2.6	1.3	.4	.0	.0	.0	.0	4.4	.1
N W	3.9	2.6	1.5	.0	.0	.0	.0	8.1	.3
WNW	2.6	2.0	1.3	.0	.0	.0	.0	5.9	.2
NW	2.8	2.4	.9	.0	.0	.0	.0	6.1	.2
NNW	2.8	2.2	.4	.0	.0	.0	.0	5.5	.2
CALM	.4							.4	
TOTAL	45.0	47.0	7.5	.4	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 455 HOURS

TABLE 4B (CONT.)

SLIGHTLY STABLE STABILITY CLASS E
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	1.9	1.6	.0	.0	.0	.0	.0	3.5	.1
NNE	2.1	4.0	.0	.0	.0	.0	.0	6.1	.2
NE	1.4	3.3	.0	.0	.0	.0	.0	4.7	.1
ENE	1.4	2.3	.0	.0	.0	.0	.0	3.7	.1
D E	2.8	4.4	.0	.0	.0	.0	.0	7.2	.2
I ESE	3.0	5.1	.2	.0	.0	.0	.0	8.4	.3
R SE	3.7	1.9	.5	.9	.0	.0	.0	7.0	.3
W E SSE	3.0	4.0	.0	.0	.0	.0	.0	7.0	.2
I C S	3.3	8.4	.0	.0	.0	.0	.0	11.7	.4
N T SSW	4.0	8.7	.0	.0	.0	.0	.0	12.6	.4
D I SW	2.6	4.7	.0	.0	.0	.0	.0	7.2	.2
O WSW	2.1	1.2	.0	.0	.0	.0	.0	3.3	.1
N W	2.8	.7	.0	.0	.0	.0	.0	3.5	.1
WNW	1.2	2.8	.7	.0	.0	.0	.0	4.7	.2
NW	2.8	2.6	.2	.0	.0	.0	.0	5.6	.2
NNW	1.4	2.1	.0	.0	.0	.0	.0	3.5	.1
CALM	.0							.0	

TOTAL	39.6	57.8	1.6	.9	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 427 HOURS

TABLE 4B (CONT.)

MODERATELY STABLE STABILITY CLASS F
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 50-M LEVEL

		C-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
D I R E C T I O N	N	1.6	2.4	.0	.0	.0	.0	.0	4.0	.1
	NNE	3.6	8.8	.0	.0	.0	.0	.0	12.4	.4
	NE	2.4	7.6	.0	.0	.0	.0	.0	10.0	.4
	ENE	1.2	4.4	.0	.0	.0	.0	.0	5.6	.2
	E	2.4	6.4	.0	.0	.0	.0	.0	8.8	.3
	ESE	2.4	7.2	.0	.0	.0	.0	.0	9.6	.3
	SE	3.2	3.2	.0	.0	.0	.0	.0	6.4	.2
	SSE	4.4	2.0	.0	.0	.0	.0	.0	6.4	.2
	S	4.0	1.6	.0	.0	.0	.0	.0	5.6	.1
	SSW	4.4	3.2	.0	.0	.0	.0	.0	7.6	.2
	SW	4.0	.8	.0	.0	.0	.0	.0	4.8	.1
	WSW	4.0	.8	.0	.0	.0	.0	.0	4.8	.1
	W	2.0	.4	.0	.0	.0	.0	.0	2.4	.0
	WNW	1.2	.8	.0	.0	.0	.0	.0	2.0	.0
NW	3.6	1.6	.0	.0	.0	.0	.0	5.2	.1	
NNW	2.0	1.6	.0	.0	.0	.0	.0	3.6	.1	
CALM	.4							.4		
TOTAL		47.0	53.0	.0	.0	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 249 HOURS

TABLE 4B (CONT.)

EXTREMELY STABLE STABILITY CLASS G
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 50-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	3.6	.8	.0	.0	.0	.0	.0	4.4	.1
NNE	4.1	2.2	.0	.0	.0	.0	.0	6.3	.1
NE	2.7	4.7	.0	.0	.0	.0	.0	7.4	.2
ENE	2.5	6.0	.0	.0	.0	.0	.0	8.5	.3
D E	1.9	7.7	.0	.0	.0	.0	.0	9.6	.4
I ESE	2.7	8.2	.0	.0	.0	.0	.0	11.0	.4
R SE	5.5	3.0	.0	.0	.0	.0	.0	8.5	.2
W E SSE	3.6	2.2	.0	.0	.0	.0	.0	5.8	.2
I C S	4.4	1.9	.0	.0	.0	.0	.0	6.3	.1
N T SSW	5.8	1.6	.0	.0	.0	.0	.0	7.4	.2
D I Sw	6.3	1.9	.0	.0	.0	.0	.0	8.2	.2
O WSW	3.8	.3	.0	.0	.0	.0	.0	4.1	.1
N W	1.4	.0	.0	.0	.0	.0	.0	1.4	.0
WNW	2.2	.0	.0	.0	.0	.0	.0	2.2	.0
NW	3.6	.3	.0	.0	.0	.0	.0	3.8	.1
NNW	2.5	.8	.0	.0	.0	.0	.0	3.3	.1
CALM	1.6							1.6	

TOTAL	58.2	41.7	.0	.0	.0	.0	.0	100.0	.2

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 364 HOURS

TABLE 4B (CONT.)

EXTREMELY UNSTABLE STABILITY CLASS A
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	7.3	2.2	.0	.0	.0	.0	.0	9.5	.2
NNE	10.6	.7	.0	.0	.0	.0	.0	11.3	.2
NE	6.4	.0	.0	.0	.0	.0	.0	6.4	.1
ENE	3.8	.4	.0	.0	.0	.0	.0	4.2	.1
E	1.1	.0	.0	.0	.0	.0	.0	1.1	.0
ESE	1.5	.0	.0	.0	.0	.0	.0	1.5	.0
SE	1.1	.4	.0	.0	.0	.0	.0	1.5	.0
E SSE	2.0	.7	.0	.0	.0	.0	.0	2.6	.1
CS	2.4	1.1	.0	.0	.0	.0	.0	3.5	.1
SSW	4.2	1.5	.0	.0	.0	.0	.0	5.7	.1
SW	7.7	1.5	.0	.0	.0	.0	.0	9.3	.2
WSW	4.4	.9	.0	.0	.0	.0	.0	5.3	.1
W	5.1	.2	.0	.0	.0	.0	.0	5.3	.1
WNW	5.3	.4	.0	.0	.0	.0	.0	5.7	.1
NW	9.9	2.2	.0	.0	.0	.0	.0	12.2	.2
NNW	9.3	5.1	.2	.0	.0	.0	.0	14.6	.4
CALM	.0							.0	

TOTAL	82.3	17.5	.2	.0	.0	.0	.0	100.0	.1

1. HOURS OF BAD OR MISSING DATA OR .2 PERCENT FOR 453 HOURS

TABLE 4B (CONT.)

MODERATELY UNSTABLE STABILITY CLASS B
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	3.8	1.0	.0	.0	.0	.0	.0	4.8	.1
NNE	7.7	.0	.0	.0	.0	.0	.0	7.7	.2
NE	8.6	1.0	.0	.0	.0	.0	.0	9.6	.2
ENE	2.9	.0	.0	.0	.0	.0	.0	2.9	.0
E	3.8	.0	.0	.0	.0	.0	.0	3.8	.1
ESE	2.9	.0	.0	.0	.0	.0	.0	2.9	.0
SE	2.9	.0	.0	.0	.0	.0	.0	2.9	.0
SSE	4.8	1.9	.0	.0	.0	.0	.0	6.7	.1
S	3.8	3.8	.0	.0	.0	.0	.0	7.7	.2
SSW	4.8	1.0	.0	.0	.0	.0	.0	5.8	.2
SW	12.5	1.9	.0	.0	.0	.0	.0	14.4	.3
WSW	5.8	.0	.0	.0	.0	.0	.0	5.8	.1
W	4.8	1.0	.0	.0	.0	.0	.0	5.8	.1
WNW	4.8	.0	.0	.0	.0	.0	.0	4.8	.1
NW	2.9	.0	.0	.0	.0	.0	.0	2.9	.0
NNW	9.6	1.9	.0	.0	.0	.0	.0	11.5	.2
CALM	.0							.0	

TOTAL	86.5	13.5	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 104 HOURS

TABLE 4B (CONT.)

SLIGHTLY UNSTABLE STABILITY CLASS C
 PERIOD OF RECORD: 4/ 1/8^P, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	5.7	1.9	.0	.0	.0	.0	.0	7.6	.2
NNE	9.5	.0	.0	.0	.0	.0	.0	9.5	.2
NE	9.5	.0	.0	.0	.0	.0	.0	9.5	.2
ENE	1.9	.0	.0	.0	.0	.0	.0	1.9	.0
D E	.9	.0	.0	.0	.0	.0	.0	.9	.0
I ESE	.0	.0	.0	.0	.0	.0	.0	.0	.0
R SE	2.8	.0	.0	.0	.0	.0	.0	2.8	.0
W E SSE	6.7	1.9	.0	.0	.0	.0	.0	8.6	.1
I C S	8.6	3.8	.0	.0	.0	.0	.0	12.4	.3
N T SSW	7.6	4.8	.0	.0	.0	.0	.0	12.4	.3
D I SW	9.5	2.8	.0	.0	.0	.0	.0	12.4	.3
O WSW	4.8	.0	.0	.0	.0	.0	.0	4.8	.1
N W	2.8	.9	.0	.0	.0	.0	.0	3.8	.1
WNW	3.8	.0	.0	.0	.0	.0	.0	3.8	.0
Nw	2.8	.9	.0	.0	.0	.0	.0	3.8	.1
NNW	3.8	1.9	.0	.0	.0	.0	.0	5.7	.1
CALM	.0							.0	

TOTAL	80.9	19.0	.0	.0	.0	.0	.0	100.0	.1

1. HOURS OF BAD OR MISSING DATA OR .9 PERCENT FOR 106 HOURS

TABLE 4B (CONT.)

NEUTRAL STABILITY CLASS D
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	5.0	.6	.0	.0	.0	.0	.0	5.7	.1
NNE	4.8	.0	.0	.0	.0	.0	.0	4.8	.1
NE	4.2	.2	.0	.0	.0	.0	.0	4.4	.1
ENE	2.4	.0	.0	.0	.0	.0	.0	2.4	.0
E	3.3	.0	.0	.0	.0	.0	.0	3.3	.0
ESE	2.4	.0	.0	.0	.0	.0	.0	2.4	.0
SE	2.6	.0	.0	.0	.0	.0	.0	2.6	.0
SSE	3.3	.4	.0	.0	.0	.0	.0	3.7	.1
S	15.2	5.0	.0	.0	.0	.0	.0	20.2	.5
SSW	9.2	1.3	.0	.0	.0	.0	.0	10.5	.2
SW	7.7	1.5	.0	.0	.0	.0	.0	9.2	.2
WSW	3.3	.4	.0	.0	.0	.0	.0	3.7	.1
W	4.8	.6	.0	.0	.0	.0	.0	5.5	.1
WNW	5.5	.6	.0	.0	.0	.0	.0	6.1	.1
NW	3.9	1.7	.0	.0	.0	.0	.0	5.7	.1
MNW	7.0	1.3	.0	.0	.0	.0	.0	8.3	.2
CALM	1.1							1.1	

TOTAL	85.9	14.1	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 455 HOURS

TABLE 4B (CONT.)

SLIGHTLY STABLE STABILITY CLASS E
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88,2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	5.6	.0	.0	.0	.0	.0	.0	5.6	.1
NNE	8.9	.0	.0	.0	.0	.0	.0	8.9	.1
NE	5.8	.0	.0	.0	.0	.0	.0	5.8	.1
ENE	4.9	.0	.0	.0	.0	.0	.0	4.9	.0
E	3.3	.2	.0	.0	.0	.0	.0	3.5	.0
ESE	1.9	.0	.0	.0	.0	.0	.0	1.9	.0
ESE	4.2	.5	.0	.0	.0	.0	.0	4.7	.1
E SSE	7.7	.2	.0	.0	.0	.0	.0	8.0	.1
E S	11.5	.9	.0	.0	.0	.0	.0	12.4	.2
E SSW	12.9	.2	.0	.0	.0	.0	.0	13.1	.2
E SW	4.2	.0	.0	.0	.0	.0	.0	4.2	.1
E WSW	1.6	.0	.0	.0	.0	.0	.0	1.6	.0
E W	2.6	.0	.0	.0	.0	.0	.0	2.6	.0
E WNW	2.3	.9	.0	.0	.0	.0	.0	3.3	.1
E W	2.6	.2	.0	.0	.0	.0	.0	2.8	.0
E NNW	4.0	.0	.0	.0	.0	.0	.0	4.0	.0
E CALM	12.6							12.6	
<hr style="border-top: 1px dashed black;"/>									
TOTAL	96.7	3.3	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 427 HOURS

TABLE 4B (CONT.)

MODERATELY STABLE STABILITY CLASS F
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	2.8	.0	.0	.0	.0	.0	.0	2.8	.0
NNE	12.4	.0	.0	.0	.0	.0	.0	12.4	.1
NE	14.0	.0	.0	.0	.0	.0	.0	14.0	.1
ENE	12.4	.0	.0	.0	.0	.0	.0	12.4	.1
D E	6.4	.0	.0	.0	.0	.0	.0	6.4	.0
I ESE	8.0	.0	.0	.0	.0	.0	.0	8.0	.1
R SE	3.6	.0	.0	.0	.0	.0	.0	3.6	.0
W E SSE	4.4	.0	.0	.0	.0	.0	.0	4.4	.0
I C S	1.6	.0	.0	.0	.0	.7	.0	1.6	.0
N T SSW	.8	.0	.0	.0	.0	.0	.0	.8	.0
D I SW	.0	.0	.0	.0	.0	.0	.0	.0	.0
O WSW	.8	.0	.0	.0	.0	.0	.0	.8	.0
N W	.4	.0	.0	.0	.0	.0	.0	.4	.0
WNW	.4	.0	.0	.0	.0	.0	.0	.4	.0
NW	1.6	.0	.0	.0	.0	.0	.0	1.6	.0
NNW	1.6	.0	.0	.0	.0	.0	.0	1.6	.0
CALM	28.5							28.5	
TOTAL	100.0	.0	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 249 HOURS

TABLE 4B (CONT.)

EXTREMELY STABLE STABILITY CLASS G
 PERIOD OF RECORD: 4/ 1/88, 000-- 6/30/88, 2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	1.1	.0	.0	.0	.0	.0	.0	1.1	.0
NNE	2.5	.0	.0	.0	.0	.0	.0	2.5	.0
NE	9.9	.0	.0	.0	.0	.0	.0	9.9	.1
ENE	33.0	.0	.0	.0	.0	.0	.0	33.0	.3
D E	17.3	.0	.0	.0	.0	.0	.0	17.3	.2
I ESE	4.9	.0	.0	.0	.0	.0	.0	4.9	.0
R SE	2.2	.0	.0	.0	.0	.0	.0	2.2	.0
W E SSE	.8	.0	.0	.0	.0	.0	.0	.8	.0
I C S	.3	.0	.0	.0	.0	.0	.0	.3	.0
N T SSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
D I SW	.0	.0	.0	.0	.0	.0	.0	.0	.0
O WSW	.0	.0	.0	.0	.0	.0	.0	.0	.0
N W	.0	.0	.0	.0	.0	.0	.0	.0	.0
WNW	.0	.0	.0	.0	.0	.0	.0	.0	.0
NW	.3	.0	.0	.0	.0	.0	.0	.3	.0
NNW	.0	.0	.0	.0	.0	.0	.0	.0	.0
CALM	27.7							27.7	

TOTAL	100.0	.0	.0	.0	.0	.0	.0	100.0	.1

0. HOURS OF BAD OR MISSING DATA OR .0 PERCENT FOR 364 HOURS

TABLE 4B (CONT.)

TOTAL FREQUENCY DISTRIBUTION
 PERIOD OF RECORD: 4/ 1/88, 000 -- 6/30/88, 2400

WIND SPEED (M/S) AT 50-M LEVEL

WIND DIRECTION	WIND SPEED (M/S) AT 50-M LEVEL							TOTAL	AVG SPEED
	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP		
N	2.7	2.7	.0	.0	.0	.0	.0	5.5	.2
NNE	3.4	3.6	.0	.0	.0	.0	.0	7.0	.2
NE	3.0	3.5	.0	.0	.0	.0	.0	6.4	.2
ENE	2.4	2.4	.0	.0	.0	.0	.0	4.8	.1
D E	2.7	3.6	.0	.0	.0	.0	.0	6.3	.2
I R ESE	2.6	4.5	.0	.0	.0	.0	.0	7.2	.2
E S E	3.3	2.6	.1	.2	.0	.0	.0	6.2	.2
E S S E	2.5	3.0	.3	.0	.0	.0	.0	5.7	.2
I C S	3.1	5.1	.3	.0	.0	.0	.0	8.6	.3
S S W	3.5	4.0	.2	.0	.0	.0	.0	7.7	.2
D I S W	3.5	3.6	.5	.0	.0	.0	.0	8.5	.3
O W S W	1.8	1.1	.1	.0	.0	.0	.0	4.0	.1
N W	2.8	1.1	.5	.0	.0	.0	.0	4.4	.1
W N W	2.2	1.6	.6	.0	.0	.0	.0	4.3	.1
N W	3.9	2.6	.5	.0	.0	.0	.0	6.9	.2
N N W	3.3	2.2	.2	.0	.0	.0	.0	5.8	.2
CALM	3.3							.5	

TOTAL	49.3	47.1	3.3	.3	.0	.0	.0	100.0	.2

28. HOURS OF BAD OR MISSING DATA OR 1.3 PERCENT FOR 2184 HOURS

TABLE 4B (CONT.)

TOTAL FREQUENCY DISTRIBUTION

PERIOD OF RECORD: 4/ 1/88, 000 -- 6/30/88, 2400

WIND SPEED (M/S) AT 10-M LEVEL

	0-2	3-5	6-8	9-11	12-14	15-17	18 AND UP	TOTAL	AVG SPEED
N	4.7	.7	.0	.0	.0	.0	.0	5.4	.1
NNE	7.7	.1	.0	.0	.0	.0	.0	7.8	.1
NE	7.6	.1	.0	.0	.0	.0	.0	7.7	.1
ENE	9.5	.1	.0	.0	.0	.0	.0	9.6	.1
D E	5.5	.0	.0	.0	.0	.0	.0	5.5	.1
I ESE	3.1	.0	.0	.0	.0	.0	.0	3.1	.0
R SE	2.7	.2	.0	.0	.0	.0	.0	2.9	.0
W E SSE	3.8	.5	.0	.0	.0	.0	.0	4.3	.1
I C S	6.8	1.9	.0	.0	.0	.0	.0	8.7	.2
N T SSW	6.1	.9	.0	.0	.0	.0	.0	7.0	.1
D I SW	5.1	.9	.0	.0	.0	.0	.0	6.0	.1
O MSW	2.6	.3	.0	.0	.0	.0	.0	2.8	.0
N W	3.0	.3	.0	.0	.0	.0	.0	3.3	.0
WNW	3.2	.4	.0	.0	.0	.0	.0	3.6	.1
NW	3.9	.9	.0	.0	.0	.0	.0	4.9	.1
NNW	5.0	1.5	.0	.0	.0	.0	.0	6.6	.1
CALM	5.0							10.7	

TOTAL	91.1	8.8	.0	.0	.0	.0	.0	100.0	.1

28. HOURS OF BAD OR MISSING DATA OR 1.3 PERCENT FOR 2184 HOURS

TABLE 4B (CONT.)

PERCENT BAD DATA REPCRT REPORT COVERS 2184HOURS		
	HOURS	PERCENT
50M DIRECTION	2.	.09
50M WIND SPEED	2.	.09
10M DIRECTION	2.	.09
10M WIND SPEED	2.	.09
TEMPERATURE	19.	.87
DEW POINT	35.	1.60
DELTA T	26.	1.19
PRECIPITATION	0.	.00

ATTACHMENT I

OFFSITE DOSE CALCULATION MANUAL (ODCM) REVISION 11

MARKUP
of
REVISION 10

ODDM
LIST OF REFERENCES

1. Boegli, T. S., R. R. Bellamy, W. L. Britz, and R. L. Waterfield, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", NUREG-0133 (October 1978).
2. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, U.S. NRC Regulatory Guide 1.109 (March 1976).
3. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, U.S. NRC Regulatory Guide 1.109, Rev. 1 (October 1977).
4. "Environmental Report", Mississippi Power and Light Company, Grand Gulf Nuclear Station, Units 1 and 2.
5. "Final Safety Analysis Report", Mississippi Power and Light Company, Grand Gulf Nuclear Station.
6. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light - Water - Cooled Reactors, U.S. NRC Regulatory Guide 1.111 (March 1976).
7. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light - Water - Cooled Reactors, U.S. NRC Regulatory Guide 1.111, Rev. 1 (July 1977).

8. Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake, NUREG-0172, November 1977.

TABLE 1.2-1
BIOACCUMULATION FACTORS (Bf)
 (pCi/kg per pCi/liter)*

ELEMENT	FRESHWATER	
	FISH	INVERTEBRATE
H	9.0E-01	9.0E-01
C	4.6E+03	9.1E+03
N	1.0E+02	2.0E+02
P	1.0E+05	2.0E+04
CR	2.0E+02	2.0E+03
HN	4.0E+02	9.0E+04
FE	1.0E+02	3.2E+03
CO	5.0E+01	2.0E+02
NI	1.0E+02	1.0E+02
CU	5.0E+01	4.0E+02
ZN	2.0E+03	1.0E+04
BR	4.2E+02	3.3E+02
RE	2.0E+03	1.0E+03
SR	3.0E+01	1.0E+02
Y	2.5E+01	1.0E+03
ZR	3.3E+00	6.7E+00
NB	3.0E+04	1.0E+02
MO	1.0E+01	1.0E+01
TC	1.5E+01	5.0E+00
FU	1.0E+01	3.0E+02
RH	1.0E+01	3.0E+02
TE	4.0E+02	6.1E+03
I	1.5E+01	5.0E+00
CS	2.0E+03	1.0E+03
BA	4.0E+00	2.0E+02
LA	2.5E+01	1.0E+03
CE	1.0E+00	1.0E+03
FR	2.5E+01	1.0E+03
ND	2.5E+01	1.0E+03
W	1.2E+03	1.0E+01
NP	1.0E+01	4.0E+02

1.0E+01
 1.0E+00
 SB



*Values in Table 1.2-1 are taken from Reference 3, Table A-17

, except for SB which was taken from Reference 2, Table A-8.

TABLE 1.2-2 (Continued)

Page 2 of 3

INGESTION DOSE CONVERSION FACTORS FOR ADULTS (DFi)
(mrem per pCi ingested) *

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	2.68E-09	NO DATA	7.40E-11	NO DATA	NO DATA	NO DATA	8.50E-05
ZR 95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05
ZR 97	1.68E-09	3.39E-10	1.55E-10	NO DATA	5.12E-10	NO DATA	1.05E-04
NB 95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05
MO 99	NO DATA	4.31E-06	8.20E-07	NO DATA	9.76E-06	NO DATA	9.99E-06
TC 99M	2.47E-10	6.98E-10	8.89E-09	NO DATA	1.06E-08	3.42E-10	4.13E-07
TC101	2.54E-10	3.66E-10	3.59E-09	NO DATA	6.59E-09	1.87E-10	1.10E-21
RU103	1.85E-07	NO DATA	7.97E-08	NO DATA	7.06E-07	NO DATA	2.16E-05
RU105	1.54E-08	NO DATA	6.08E-09	NO DATA	1.99E-07	NO DATA	9.42E-06
RU106	2.75E-06	NO DATA	3.48E-07	NO DATA	5.31E-06	NO DATA	1.78E-04
AG110M	1.60E-07	1.48E-07	8.79E-08	NO DATA	2.91E-07	NO DATA	6.04E-05
TE125M	2.68E-06	9.71E-07	3.59E-07	8.06E-07	1.09E-05	NO DATA	1.07E-05
TE127M	6.77E-06	2.42E-06	8.25E-07	1.73E-06	2.75E-05	NO DATA	2.27E-05
TE127	1.10E-07	3.95E-08	2.38E-08	8.15E-08	4.48E-07	NO DATA	8.68E-06
TE129M	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	NO DATA	5.79E-05
TE129	3.14E-08	1.18E-08	7.65E-09	2.41E-08	1.32E-07	NO DATA	2.37E-08
TE131M	1.73E-06	8.46E-07	7.05E-07	1.34E-06	8.57E-06	NO DATA	8.40E-05
TE131	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	NO DATA	2.79E-09
TE132	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	NO DATA	7.71E-05
I 130	7.56E-07	2.23E-06	8.80E-07	1.89E-04	3.48E-06	NO DATA	1.92E-06
I 131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06
I 132	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	NO DATA	1.02E-07
I 133	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	NO DATA	2.22E-06
I 134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	NO DATA	2.51E-10
I 135	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	NO DATA	1.31E-06
CS134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06
CS136	6.51E-06	2.57E-05	1.85E-05	NO DATA	1.43E-05	1.96E-06	2.92E-06
CS137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06
CS138	5.52E-08	1.09E-07	5.40E-08	NO DATA	8.01E-08	7.91E-09	4.65E-13
BA139	9.70E-08	6.91E-11	2.84E-09	NO DATA	6.46E-11	3.92E-11	1.72E-07

* Values taken from Reference 3, Table E-11

, except for SB values which were taken from Reference 8, Table 4.

TABLE 1.2-3 (Continued)

Page 2 of 2

GRAND GULF SITE RELATED INGESTION DOSE COMMITMENT FACTOR, $A_{1\tau}$
(mrem/hr per uCi/ml) *

NUCLIDE	BONE	LIVER	T.BODY	THYROID	KIDNEY	LUNG	GI-LLI
Ru-106	6.58E+01	0.00E+00	8.33E+00	0.00E+00	1.27E+02	0.00E+00	4.26E+03
Ag-110m	8.81E-01	8.15E-01	4.84E-01	0.00E+00	1.60E+00	0.00E+00	3.30E+02
Te-125m	2.57E+03	9.30E+02	3.44E+02	7.72E+02	1.04E+04	0.00E+00	1.02E+04
Te-127m	6.48E+03	2.32E+03	7.90E-02	1.66E+03	2.63E+04	0.00E+00	2.17E+04
Te-127	1.05E+02	3.78E+01	2.28E+01	7.80E+01	4.29E+02	0.00E+00	8.31E+03
Te-129m	1.10E+04	4.11E+03	1.74E+03	3.78E+03	4.60E+04	0.00E+00	5.54E+04
Te-129	3.01E+01	1.13E+01	7.33E+00	2.31E+01	1.26E+02	0.00E+00	2.27E+01
Te-131m	1.66E+03	8.10E+02	6.75E+02	1.28E+03	8.21E+03	0.00E+00	8.04E+04
Te-131	1.89E+01	7.88E+00	5.96E+00	1.55E+01	8.26E+01	0.00E+00	2.67E+00
Te-132	2.41E+03	1.56E+03	1.47E+03	1.72E+03	1.50E+04	0.00E+00	7.38E+04
I-130	2.71E+01	8.01E+01	3.16E+01	6.79E+03	1.25E+02	0.00E+00	6.89E+01
I-131	1.49E+02	2.14E+02	1.22E+02	7.00E+04	3.66E+02	0.00E+00	5.64E+01
I-132	7.29E+00	1.95E+01	6.82E+00	5.82E+02	3.11E+01	0.00E+00	3.66E+00
I-133	5.10E+01	8.87E+01	2.70E+01	1.30E+04	1.55E+02	0.00E+00	7.97E+01
I-134	3.81E+00	1.03E+01	3.70E+00	1.79E+02	1.64E+01	0.00E+00	9.01E-03
I-135	1.59E+01	4.17E+01	1.54E+01	2.75E+03	6.68E+01	0.00E+00	4.70E+01
Cs-134	2.98E+05	7.09E+05	5.79E+05	0.00E+00	2.29E+05	7.51E+04	1.24E+04
Cs-136	3.12E+04	1.23E+05	8.86E+04	0.00E+00	6.85E+04	9.38E+03	1.40E+04
Cs-137	3.82E+05	5.22E+05	3.42E+05	0.00E+00	1.77E+05	5.89E+04	1.01E+04
Cs-138	2.64E+02	5.22E+02	2.59E+02	0.00E+00	3.84E+02	3.79E+01	2.23E-03
Ba-139	9.29E-01	6.62E-04	2.72E-02	0.00E+00	6.19E-04	3.75E-04	1.65E+00
Ba-140	1.94E+02	2.44E-01	1.27E+01	0.00E+00	8.30E-02	1.40E-01	4.00E+02
Ba-141	1.94E+02	2.44E-01	1.27E+01	0.00E+00	8.30E-02	1.40E-01	4.00E+02
Ba-142	4.51E-01	3.41E-04	1.52E-02	0.00E+00	3.17E-04	1.93E-04	2.13E-10
La-140	2.04E-01	2.10E-04	1.28E-02	0.00E+00	1.77E-04	1.19E-04	2.87E-19
La-142	1.50E-01	7.54E-02	1.99E-02	0.00E+00	0.00E+00	0.00E+00	5.54E+03
La-142	7.66E-03	3.48E-03	8.68E-04	0.00E+00	0.00E+00	0.00E+00	2.54E+01
Ce-141	2.24E-02	1.52E-02	1.72E-03	0.00E+00	7.04E-03	0.00E+00	5.79E+01
Ce-143	3.95E-03	2.92E+00	3.23E-04	0.00E+00	1.29E-03	0.00E+00	1.09E+02
Ce-144	1.17E+00	4.88E-01	6.27E-02	0.00E+00	2.90E-01	0.00E+00	3.95E+02
Pr-143	5.51E-01	2.21E-01	2.73E-02	0.00E+00	1.27E-01	0.00E+00	2.41E+03
Pr-144	1.80E-03	7.48E-04	9.16E-05	0.00E+00	4.22E-04	0.00E+00	2.59E-10
Nd-147	3.76E-01	4.35E-01	2.60E-02	0.00E+00	2.54E-01	0.00E+00	2.09E+03
W-187	2.96E+02	2.47E+02	8.65E+01	0.00E+00	0.00E+00	0.00E+00	8.10E+04
Np-239	2.85E-02	2.80E-03	1.54E-03	0.00E+00	8.74E-03	0.00E+00	5.75E+02

* Calculated from Equation 8.

Sb-124	6.70E+00	1.27E-01	2.66E+00	1.63E-02	0.00E+00	5.22E+00	1.90E+02
Sb-125	4.29E+00	4.79E-02	1.02E+00	4.36E-03	0.00E+00	3.30E+00	4.72E+01
Sb-126	2.75E+00	5.60E-02	9.94E-01	1.69E-02	0.00E+00	1.69E+00	2.25E+02
Sb-127	6.18E-01	1.35E-02	2.37E-01	7.42E-03	0.00E+00	3.66E-01	1.41E+02

W = controlling sector annual average atmospheric dispersion at the SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY for the appropriate pathway.

and all tritium pathways

food and ground plane

$\bar{X}/Q = 4.537 \times 10^{-6*} \text{ sec/m}^3$ for inhalation in the WNW sector.

or

$\bar{D}/Q = 1.301 \times 10^{-8**} \text{ m}^{-2}$ for ~~these~~ pathways in the SSE sector

P_i = the total dose parameter for radionuclide i, (mrem/yr per uCi/m³) for inhalation and (m². mrem/yr per uCi/sec) for food and ground plane pathways, from Table 2.2-1/a-b.

Q'_i = rate of release of noble gas radionuclide i (uCi/sec) from the release point.

\bar{Q}'_i = average release rate of isotope i of tritium, I-131, I-133 or other radionuclide in particulate form, with half-lives greater than eight (8) days in the current year (uCi/sec).

6

6

* The highest annual average X/Q for the GGNS SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY is Hamilton Lake (WNW, 0.75 miles). This value is taken from the Grand Gulf Nuclear Station Final Environmental Report, Table 6.1.28.

** Value taken from Reference 4, Table 6.1.26.

Q_i = cumulative release of radionuclide i of noble gas, tritium, I-131, I-133, or material in particulate form over the period of interest (uCi).

2.2.2.b Dose to an individual from tritium, I-131, I-133 and radioactive materials in particulate form, with half-lives greater than eight (8) days will be calculated for the purpose of implementation of Specification 3.11.2.3 as follows:

D_p = dose to an individual from tritium, I-131, I-133 and radionuclides in particulate form, with half-life greater than eight days (mrem)

$$= 3.17 \times 10^{-8} \sum_i R_i W' Q_i$$

and all tritium pathways

Where,

W' = relative concentration at a controlling location for an individual

or

$$\overline{X/Q'} = \frac{4.057 \times 10^{-6}}{A} \text{ sec/m}^3 \text{ for inhalation in the S sector}$$

food and ground plane

$$\overline{D/Q'} = \frac{1.408 \times 10^{-8}}{A} \text{ m}^{-2} \text{ for other pathways in the S Sector}$$

for inhalation and all tritium pathways

R_i = the total dose factor for radionuclide i , (mrem/yr per uCi/m³) and (m² · mrem/yr per uCi/sec) for food and ground plane pathways from Tables 2.2-2a - d

GGNS

* This conservative approach utilizes values for the onsite gardens (Tables 2.2-3 and 2.3-1). As an alternative, one may use the most conservative offsite controlling locations identified in the above referenced tables.

TABLE 2.2-3

CONTROLLING RECEPTORS, LOCATIONS, AND PATHWAYS

<u>Sector</u>	<u>Distance (Meters)</u>	** <u>Miles</u>	<u>Pathway</u>	<u>Age Group</u>	<u>Origin (for info only)</u>	
(A) N	1481	0.92	Vegetation	Adult	garden	10
(B) NNE	1207	0.75	Vegetation	Teenager	garden	
(C) NE	1062	0.66	Vegetation	Teenager	garden	10
(D) ENE	4300	2.69	Inhal/Gnd Plane	Child	residence	
(E) E	982	0.61	Inhal/Gnd Plane	Adult	residence	
(F) ESE	7000	4.38	Inhal/Gnd Plane	Adult	residence	
(G) SE	3100	1.94	Inhal/Gnd Plane	Child	residence	10
(H) SSE	1800	1.13	Inhal/Gnd Plane	Adult	residence	
(J) S	805	0.50	Vegetation	Child	hypothetical*	
(K) SSW	3734	2.33	Vegetation	Child	garden	10
(L) SW	1432	0.90	Inhal/Gnd Plane	Adult	residence	
(M) WSW	8047	5.00	Cow/Milk	Infant	hypothetical	
(N) W	8047	5.00	Cow/Milk	Infant	hypothetical	
(P) WNW	7680	4.80	Vegetation	Child	garden	10
(Q) NW	6047	5.00	Cow/Milk	Infant	hypothetical	
(R) NNW	1207	0.75	Vegetation	Child	hypothetical*	

Table based on 1986 Land Use Census

GGNS

* These locations represent ~~MBL~~ gardens located inside the site boundary.

** Distances shown are actual mileage in each sector.

2.3 Meteorological Model

2.3.1 The atmospheric dispersion for gaseous releases may be calculated using a ground level, wake-split form of the straight line flow model.

$$X/Q = \text{atmospheric dispersion (sec/m}^3\text{)}$$
$$\frac{2.03 \delta k}{ru \Sigma}$$


Where,

r = distance (m) from release point to location of interest

δ = plume depletion factor at distance r from Figure 2.3-1

μ = wind speed at ground level (m/sec)

k = open terrain recirculation factor at distance r, from page 2.0-34

Σ = the lesser of $(\sigma^2 + \frac{b^2}{\pi})^{\frac{1}{2}}$ or 

Where,

σ = vertical standard deviation (m) of the plume at distance r for ground level releases under the stability category indicated by \bar{T} , from Figure 2.3-2.

\bar{T} = temperature differential with vertical separation ($^{\circ}\text{K}/100\text{m}$)

b = height of the reactor building = 53.3m.

10

.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

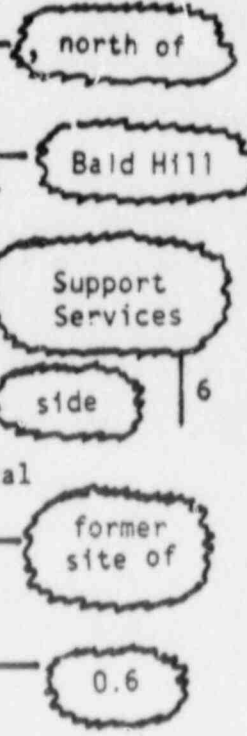
~~Sampling locations as required in Section 3/4.12.1 of the Radiological Effluent Technical Specification are described in Tables 3.0-1 through 3.0-3 and shown on maps in Figures 3.0-1 through 3.0-3.~~ The types of vegetation and fish which are normally available for sampling are identified in Tables 3.0-4 and 3.0-5 respectively.

Sampling locations for the GGNS Environmental Surveillance Program are described in Tables 3.0-1 through 3.0-3 and shown on maps in Figures 3.0-1 through 3.0-3. Those sampling locations required to fulfill the requirements of Technical Specification 3/4.12.1, as described in Table 3.12.1-1, are identified with an asterisk in Tables 3.0-1 through 3.0-3.

ODCM
TABLE-3.0-1
AIR SAMPLER COLLECTION SITES

AIR SAMPLERS

<u>NUMBER</u>	<u>FIGURE</u>	<u>LOCATION</u>
* AS-1 PG	3.0-3	Southeast of GGNS at the Port Gibson City Barn. (Sector G Radius 5.5 miles)
AS-2 61N	3.0-2	North-Northeast of GGNS on Hwy. 61, South across from the Yokena Church. (Sector B Radius 13 miles)
* AS-3 61 VA	3.0-2	North-Northeast of GGNS on Hwy. 61, South at the Vicksburg Airport. (Sector B Radius 18 miles)
AS-4 GJOE	3.0-1	Southwest of GGNS, Glodjo property on Waterloo ² Road. (Sector L Radius .9 miles)
AS-5 TC	3.0-1	South of GGNS behind MPSI training center building (Sector J Radius .4 miles)
* AS-6 RS	3.0-1	Northeast of GGNS, South of Grand Gulf Road. (Sector C Radius .5 miles)
* AS-7 MT	3.0-1	North of GGNS, located next to the Meteorological Tower. (Sector A Radius .8 miles)
* AS-8 WR	3.0-1	East of GGNS, located at Maggie Jackson's trailer on Waterloo Road near the Eastern SITE BOUNDARY. (Sector E Radius .5 miles)
AS-9 GGMP	3.0-1	North of GGNS, located in Grand Gulf Military Park. (Sector A Radius 1.5 miles)
AS-10 NLT	3.0-3	West-Northwest of GGNS, located at Newellton, Louisiana. (Sector P Radius 12.5 miles)
AS-11 STJ	3.0-3	West-Southwest of GGNS, located at St. Joseph, Louisiana. (Sector M Radius 13.0 miles)



* Technical Specification requirements

ODCM
TABLE 3.0-2
MISCELLANEOUS COLLECTION SITES

PAGE 1 of 2

MILK SAMPLES (CONTROL LOCATION)

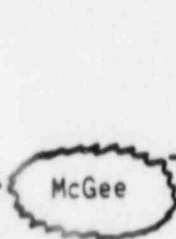
Alcorn State University*

Figure
3.0-3

3 south-
Located southwest of GGNS.
(Sector K Radius 10.5 miles)

CISTERN WATER

1. ~~Tribble Cistern*~~



3.0-3

1 north
Located ~~west~~ of GGNS at the
~~Tribble Tenant~~ house. (Sector ~~A~~
Radius ~~5~~ miles)

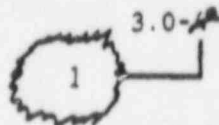
2. Willis Cistern*

3.0-3

0.9
Located at the C. E. Willis house
East-Northeast of GGNS across
from the Shiloh Baptist Church.
(Sector D Radius 6 miles)

GROUND WATER

1. PGWELL*



3.0-3

PORT GIBSON WELL - Taken ~~at Port
Gibson City Water Lift Station~~
(Sector G Radius 5.0 miles)

2. ~~GPWELL*~~

3.0-3

~~GRAND GULF MILITARY PARK - Taken
from faucet at the Grand Gulf
Military Park. (Sector A Radius
1.5 miles)~~

3. LAKE BRUIN

3.0-3

Taken from faucet at the bath
house in Lake Bruin State Park,
Louisiana. (Sector M Radius 9.5
miles)

* Technical Specification requirements

from
distribution system or one of
the five wells.

AAWELL*

3.0-1

Arnold Acres Trailer Park,
inactive. (Sector J Radius 1.1
miles)

ODCM
TABLE 3.0-2 (CONTINUED)
 Page 2 of 3

SURFACE WATER

Upstream *	FIGURE 3.0-1	4500 ft y upstream of the GGNS outfall to allow adequate mixing of the Mississippi and Big Black Rivers (Sector Q)	No. 1
Downstream *	3.0-1	5000 ft y downstream of GGNS outfall near the most southern Radial Bell (Sector N)	in parking lot (Sector P, 0.3 miles)
Discharge Basin *	3.0-1	West of GGNS, 0.5 miles, Sector P	Support Services
<u>VEGETATION</u>			
Broad Leaf Vegetation*	3.0-1	South of GGNS near the old training center (Sector J, 0.4 miles) and North-northwest of GGNS near the Meteorological Tower (Sector R, 0.7 miles)	0.8

← NOTE :

GGNS

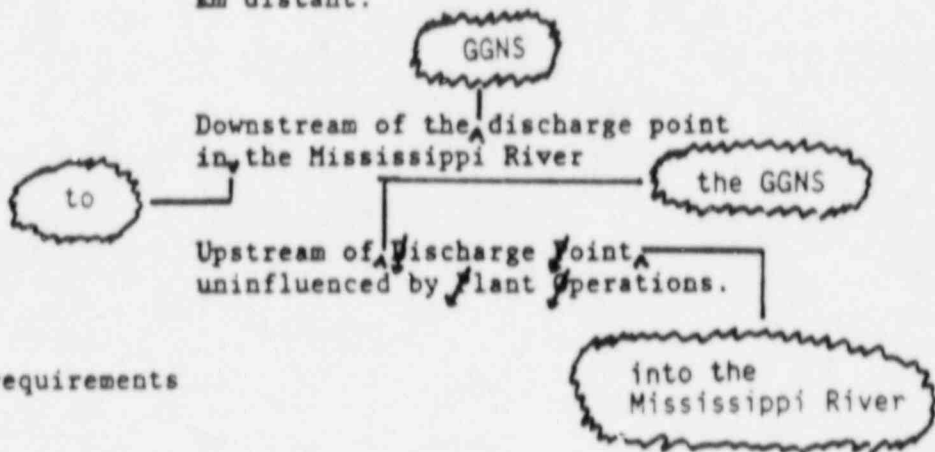
The above locations are gardens maintained by ~~MPC~~ inside the SITE BOUNDARY in order to provide a more conservative calculation of doses due to the potential ingestion of contaminated vegetation. These two sampling sites exceed the requirements of Technical Specification 3.12.1.

south-

Alcorn State University, southwest of GGNS (Sector K, 10.5 miles) when available, otherwise a location 15-30 km distant.

FISH SAMPLES

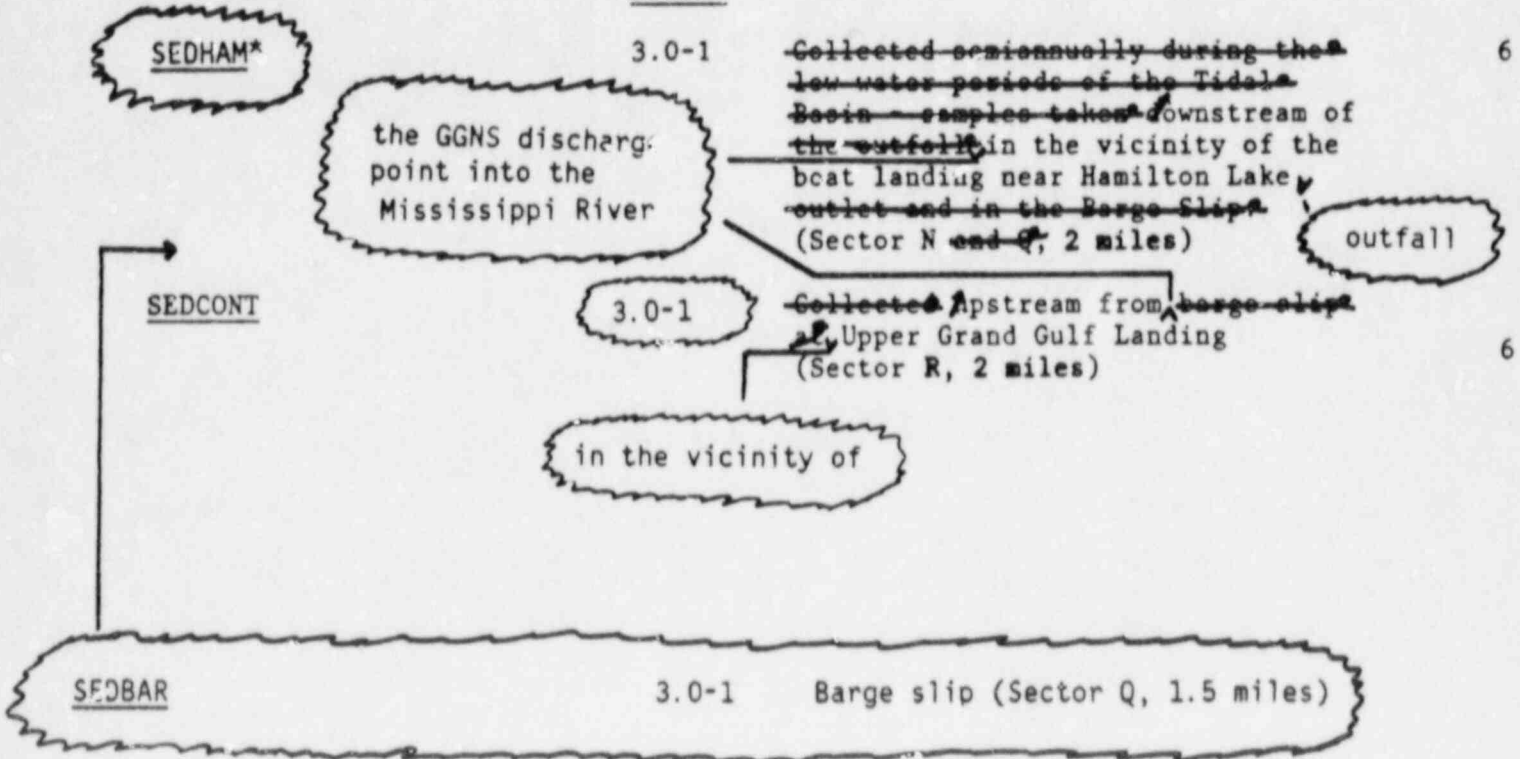
Commercially or recreationally important species *



* Technical Specification requirements

SEDIMENT SAMPLES

FIGURE



* Hamilton Lake outfall is a Technical Specification requirement

7

TLD NO.	LOCATION	FIGURE	SECTOR	MILE
M-00	Maintained in lead shield during the exposure period	-	-	-
* M-01	REA Pole East of <u>Entry Gate</u> at Lake Claiborne	3.0-3	E	3.5
M-02	REA Pole Left of <u>Entry Gate</u> Windsor Ruins	3.0-3	L	7.0
M-03	REA Pole East Side Hwy. 61 P.G. Country Club entrance	3.0-3	H	7.0
M-04	MPSI Pole Hwy. 547 North Side between Twin Tower Poles	3.0-3	G	6.5
M-05	50 yards North of Hwy 18 Approximately 5 miles East of U.S. 61	3.0-3	F	9.0
M-06	REA Pole East of Willows Beyond Church , MS Hwy. 462	3.0-3	D	10.0
* M-07	Port Gibson City Barn, AS-1	3.0-3	G	5.5
M-08	West Side Big Black River, South Entrance	3.0-3	C	8.5
* M-09	Oak Tree Hanger South Warner Tully Camp <u>entrance</u>	3.0-3	D	3.5
* M-10	<u>Entrance Gate</u> Grand Gulf Military Park	3.0-1	R	1.5
M-11	Hwy. 61, 3 miles North of Big Black River at Twin Tower	3.0-3	C	10.5
M-12	Hwy. 61 at AS-2-61 North <u>across from</u> Yokena <u>Church</u>	3.0-2	B	13.0
M-13	Hwy. 61, Letourneau Hill West Side of Road	3.0-2	B	15.0

* Technical Specification requirements

north of Vicksburg Airport

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
Page 2 of 2

7

TLD NO.	LOCATION	FIGURE	SECTOR	MILE
* M-14 (CONTROL)	Hwy. 61, AS-3-61VA, at Cockett Company	3.0-2	B	18.0
M-15	Barge Slip (South edge)	3.0-1	P	1.5
* M-16	AS-7-M/T, Tower Meteorological	3.0-1	A	0.8
M-17	AS-6-RS, Grand Gulf Road	3.0-1	C	0.5
* M-18	Railroad Crossing Eastern SITE BOUNDARY	3.0-1	F	0.5
M-19	Behind Burn pit on fence at Eastern SITE BOUNDARY	3.0-1	E	0.5
M-20	Eastern site boundary behind hazardous waste storage area	3.0-1	F	0.5
M-21	AS-5-TC, Training Center former	3.0-1	J	0.4
M-22	100 yards south of RR Entrance Crossing on West Side	3.0-1	G	0.5
M-23	County Road/Heavy Haul Road 50 yards North on Lower Pole	3.0-1	Q	0.5
M-24	Upper Grand Gulf Landing	3.0-1	R	2.2
* M-25	Hamilton Lake Boat Launch	3.0-1	N	1.0
M-26	Hamilton Lake Outfall	3.0-1	N	1.5
* M-27	South Point SITE BOUNDARY 200 yards along Property Line	3.0-1	M	1.5
* M-28	AS-4-1038, Residence Glodjo	3.0-1	I	0.9
M-29	In sharp curve of Waterloo Road to Waterloo Plantation	3.0-1	K	1.5
* M-30	Arnold Acres Trailer Park Entrance	3.0-1	J	1.1
* Technical Specification requirements			(inactive)	

Former

Support Services

GJOE

5

quarterly at
varying locations

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
Page 3 of 6

7

TLD NO.	LOCATION	FIGURE	S' TOR :	MILE
M-31	Duplicate TLD Installed at designated Site Number	-	-	-
M-32	Duplicate TLD Installed at designated Site Number	-	-	-
* M-33	Newellton, Louisiana, Water Tower	3.0-3	P	12.5
M-34	Primary Levee at End of County Road at Point Pleasant, Louisiana	3.0-3	R	8.0
M-35	How Landing - Lake Yucatan	3.0-3	Q	8.0
* M-36	Curve on 608, Joint Nearest GGNSY at Power Pole	3.0-3	P	5.0
M-37	Winter Quarters Home	3.0-3	N	8.0
* M-38	Lake Bruin State Park, Second Pole	3.0-3	M	9.5
* M-39	St. Joseph, Louisiana, Aux. Water Tank	3.0-3	M	13.0
* M-40	International Paper Road, Approximately 5 miles from Site	3.0-3	M	5.0
* M-41	Heavy Haul Road - J Pipe on Concrete Block	3.0-1	P	1.0
* M-42	Heavy Haul Road North Iron Gate	3.0-1	Q	1.0
* M-43	Gin Lake Entrance	3.0-1	R	1.2
* M-44	Truck Bypass on Grand Gulf Road	3.0-1	C	0.5
* M-45	Visitor Center Gate East Side	3.0-1	D	0.5
* Technical Specification requirements				

Amacker

Old

5

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
Page 4 of 6

7

TLD NO.	LOCATION	FIGURE	SECTOR	MILE
* M-46	Power Pole cross from Grand Gulf/Waterloo roads intersection	3.0-1	E	1.0
Bald Hill		Westside		
* M-47	Bridge 0.6 miles past Rodney Road/Greenwood Road intersection, North side west of	3.0-3	L	5.2
Mont Gomer				
* M-48	Property line fence 0.4 miles on Greenwood Road on West side	3.0-3	K	4.8
* M-49	Fork in Weathers Road	3.0-3	H	4.5
* M-50	Panola Hunting Club Entrance	3.0-3	B	5.5
* M-51	Power pole 0.5 miles on Gravel road to Big Black on West side	3.0-3	C	4.8
Bald Hill				
* M-52	Power pole Waterloo Road Marked with White Paint	3.0-1	K	1.0
* M-53	Arnold Acres Property fence East Trailer Park	3.0-1	H	1.1
inactive				
* M-54	Bottom of curve past Arnold's house	3.0-1	G	1.0
* M-55	Behind Bonner's Beauty Shop at MSDH Air Sample	3.0-3	D	5.0
MSDH		r		
* M-56	Hwy. 61 South at "All Creatures Veterinary Hospital"	3.0-3	G	5.0
* M-57	Hwy. 61 North behind the Welcome to Port Gibson sign	3.0-3	F	4.5
at Glensdale Subdivision				
* M-58	Big Bayou Pierre Bridge, Southeast End	3.0-3	E	5.0
* M-59	Off Levee at Winter Quarters Hunting Camp	3.0-3	N	5.1
Hwy. 61,				

* Technical Specification requirements

5

5

installed quarterly at varying locations

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
Page 5 of 5

7

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-60	Duplicate TLD A	-	-	-
M-61	Protected area fence by the vehicle entrance gate	Not Shown	P	Onsite
M-62	Protected area fence, North-east corner MPLS parking lot	"	N	"
M-63	Protected area fence middle MPLS parking lot	"	N	"
M-64	Protected area fence, South-east corner MPLS parking lot	"	M	"
M-65	South protected area fence behind MPLS warehouse	"	L	"
M-66	South protected area fence across from cooling tower	"	K	"
M-67	South protected area fence east end	"	J	"
M-68	East protected area fence across from chlorination tank	"	H	"
M-69	East protected area fence near electric bus	"	G	"
M-70	North fence behind Turbine Bldg.	"	F	"
M-71	133' railway bay elevation	"	C	"
M-72	133' railway bay	"	B	"
M-73	Corner of fence outside Control Bldg.	"	P	"

* Technical Specification requirements

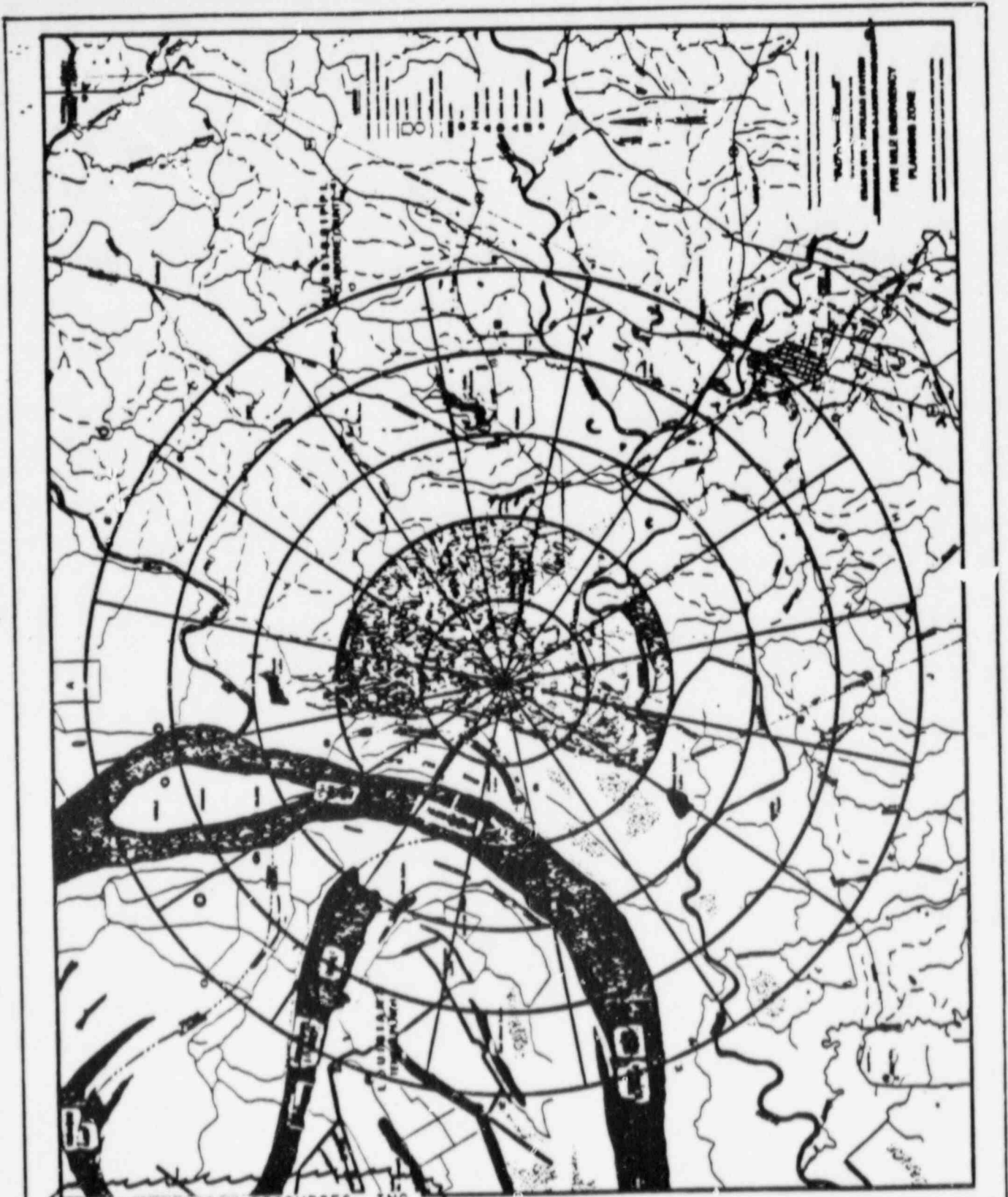
ODCM
 TABLE 3.0-3 (CONTINUED)
 TLD LOCATIONS
 Page 6 of 8

7

<u>TLD No.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-74	Midway of North fence	Not Shown	P	Onsite
M-75	Corner in fence in front of Maintenance Shop	"	A	"
M-76	Southeast corner SSW Lines	"	A	"
M-77	Protected area fence behind Maintenance Shop	"	R	"
M-78	Outside vault in Admin. Bldg.	"	Q	"
M-79	Well in Central Records (middle)	"	Q	"
M-80	Wall in Central Records old library location	"	Q	"
M-81	Inside Admin. Bldg., 2nd floor, northeast wall	"	Q	"
M-82	Tech. Support Area	"	Q	"
M-83	Tech. Support Secretary's office	"	Q	"
M-84	Security Island	"	P	"
M-85	Lee Electric Building Across from Port Gibson High School	3.0-3	G	5.2
* M-86	Bechtel Gate North Site Boundary	3.0-1	B	0.5
M-87	Intersection of Rodney Road & transmission line	3.0-3	J	3.5
* M-88	River mile marker 409.5	3.0-1	A	4.2
* M-89	Middle Ground Island	3.0-1	R	4.4
* M-90	Across from Middle Ground Island	3.0-1	Q	3.5
* M-91	Transmission line by pond	3.0-1	J	4.5
M-92	Fence behind Orchard	Not Shown	K	0.4
M-93	Underground Cable Sign	Not Shown	H	0.4
M-94	Sector R Garden	Not Shown	R	0.8

Westside

* Technical Specification requirements



SYSTEM ENERGY RESOURCES, INC.

~~MISSISSIPPI POWER & LIGHT COMPANY~~
 GRAND GULF NUCLEAR STATION
 UNIT 1
 ODCM

COLLECTION SITE LOCATIONS

0-5 MILE AREA MAP
 FIGURE 3.0-1

ATTACHMENT II

OFFSITE DOSE CALCULATION MANUAL (ODCM) REVISION 11

GRAND GULF NUCLEAR STATION ODCM
INSTRUCTIONS FOR ENTRY OF REVISION

ODCM Revision No. 11

Attached are revised pages of the GGNS ODCM. Please remove and insert as directed below:

<u>REMOVE</u>	<u>INSERT</u>
Cover Page, Rev. 10	Cover Page, Rev. 11
Page i, Rev. 10	Page i, Rev. 11
Page vi, Rev. 2	Page vi, Rev. 11
Page vii, Rev. 10	Page vii, Rev. 11
Page 1.0-9, Rev. 2	Page 1.0-9, Rev. 11
Page 1.0-11, Rev. 0	Page 1.0-11, Rev. 11
Page 1.0-14, Rev. 1	Page 1.0-14, Rev. 11
Page 2.0-8, Rev. 6	Page 2.0-8, Rev. 11
Page 2.0-10, Rev. 5	Page 2.0-10, Rev. 11
Page 2.0-23, Rev. 10	Page 2.0-23, Rev. 11
Page 2.0-24, Rev. 10	Page 2.0-24, Rev. 11
Pages 3.0-1 & 3.0-2, Rev. 6	Pages 3.0-1 & 3.0-2, Rev. 11
Pages 3.0-3 & 3.0-3a, Rev. 7	Pages 3.0-3 & 3.0-3a, Rev. 11
Pages 3.0-3b & 3.0-4, Rev. 6	Pages 3.0-3b & 3.0-4, Rev. 11
Pages 3.0-5, 3.0-6, 3.0-6a, 3.0-6b, Rev. 5	Pages 3.0-5, 3.0-6, 3.0-6a, 3.0-6b, Rev. 11
Page 3.0-6c, Rev. 10	Page 3.0-6c & 3.0-6d, Rev. 11
Page 3.0-7, Rev. 3	Page 3.0-7, Rev. 11

Please sign and date the Transmittal and Acknowledgement Form and return, as indicated, as soon as possible.

OFF-SITE DOSE CALCULATION MANUAL
GRAND GULF NUCLEAR STATION

GRAND GULF NUCLEAR STATION
OFFSITE DOSE CALCULATION MANUAL
SAFETY RELATED

EVALUATION APPLICABILITY

SAFETY EVALUATION

ENVIRONMENTAL EVALUATION

[] APPLICABLE

[X] APPLICABLE

[X] NOT APPLICABLE

[] NOT APPLICABLE

Reviewed/Approved: Rita R Jackson / 6-6-88
Supervisor, Environmental Services Date

Reviewed/Approved: Say L Harrison For ALB. / 6-7-88
Supervisor, Radiological Services Date

Reviewed/Approved: JRMckay / JUN 09 1988
Manager, Radiological & Environmental Services Date

Reviewed/Approved: JRMckay for T.E. Reaves, Jr. / JUN 09 1988
Director, Nuclear Support Date

Reviewed/Approved: Michael Wright / 6-23-88
Chairman, Plant Safety Review Committee Date

ODCM
LIST OF REFERENCES

1. Boegli, T. S., R. R. Bellamy, W. L. Britz, and R. L. Waterfield, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," NUREG-0133 (October 1978).
2. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, U.S. NRC Regulatory Guide 1.109 (March 1976).
3. Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I, U.S. NRC Regulatory Guide 1.109, Rev. 1 (October 1977).
4. "Environmental Report," Mississippi Power and Light Company, Grand Gulf Nuclear Station, Units 1 and 2.
5. "Final Safety Analysis Report," Mississippi Power and Light Company, Grand Gulf Nuclear Station.
6. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light - Water - Cooled Reactors, U.S. NRC Regulatory Guide 1.111 (March 1976).
7. Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light - Water - Cooled Reactors, U.S. NRC Regulatory Guide 1.111, Rev. 1 (July 1977).
8. Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake, NUREG-0172, November 1977.

ODCM

LIST OF EFFECTIVE PAGES

<u>PAGE NO.</u>	<u>REV. NO.</u>	<u>PAGE NO.</u>	<u>REV. NO.</u>
i	11	2.0-22	1
ii	2	2.0-23	11
iii	8	2.0-24	11
iv	8	2.0-25	0
v	6	2.0-26	10
vi	11	2.0-27	3
vii	11	2.0-28	5
		2.0-29	3
1.0-1	0	2.0-30	3
1.0-2	10	2.0-31	0
1.0-3	10	2.0-32	0
1.0-4	1	2.0-33	0
1.0-5	10	2.0-34	0
1.0-6	10	2.0-35	8
1.0-7	5	2.0-35a	8
1.0-8	8	2.0-36	10
1.0-9	11	2.0-37	10
1.0-10	0		
1.0-11	11	3.0-1	11
1.0-12	0	3.0-2	11
1.0-13	2	3.0-3	11
1.0-14	11	3.0-3a	11
1.0-15	8	3.0-3b	11
1.0-16	8	3.0-4	11
		3.0-5	11
2.0-1	5	3.0-6	11
2.0-2	5	3.0-6a	11
2.0-3	2	3.0-6b	11
2.0-4	6	3.0-6c	11
2.0-5	6	3.0-6d	11
2.0-6	0	3.0-7	11
2.0-7	5	3.0-8	1
2.0-8	11	3.0-9	3
2.0-9	6	3.0-10	5
2.0-10	11	3.0-11	5
2.0-10a	8		
2.0-11	1		
2.0-12	1		
2.0-13	2		
2.0-14	1		
2.0-15	2		
2.0-16	2		
2.0-17	1		
2.0-18	2		
2.0-19	1		
2.0-20	1		
2.0-21	2		

TABLE 1.2-1
BIOACCUMULATION FACTORS (Bfi)
 (pCi/kg per pCi/liter)^a

FRESHWATER

<u>ELEMENT</u>	<u>FISH</u>	<u>INVERTEBRATE</u>
H	9.0E-01	9.0E-01
C	4.6E+03	9.1E+03
NA	1.0E+02	2.0E+02
P	1.0E+05	2.0E+04
CR	2.0E+02	2.0E+03
MN	4.0E+02	9.0E+04
FE	1.0E+02	3.2E+03
CO	5.0E+01	2.0E+02
NI	1.0E+02	1.0E+02
CU	5.0E+01	4.0E+02
ZN	2.0E+03	1.0E+04
BR	4.2E+02	3.3E+02
KB	2.0E+03	1.0E+03
SR	3.0E+01	1.0E+02
Y	2.5E+01	1.0E+03
ZR	3.3E+00	6.7E+00
NB	3.0E+04	1.0E+02
MO	1.0E+01	1.0E+01
TC	1.5E+01	5.0E+00
RU	1.0E+01	3.0E+02
RH	1.0E+01	3.0E+02
SB	1.0E+00	1.0E+01
TE	4.0E+02	6.1E+03
I	1.5E+01	5.0E+00
CS	2.0E+03	1.0E+03
BA	4.0E+00	2.0E+02
LA	2.5E+01	1.0E+03
CE	1.0E+00	1.0E+03
PR	2.5E+01	1.0E+03
ND	2.5E+01	1.0E+03
W	1.2E+03	1.0E+01
NP	1.0E+01	4.0E+02

* Values in Table 1.2-1 are taken from Reference 3, Table A-1, except for SB which was taken from Reference 2, Table A-8.

TABLE 1.2-2 (Continued)
 Page 2 of 3
 INGESTION DOSE CONVERSION FACTORS FOR ADULTS (DFI)
 (mrem per pCi ingested) *

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
Y 93	2.68E-09	NO DATA	7.40E-11	NO DATA	NO DATA	NO DATA	8.50E-05
ZR 95	3.04E-08	9.75E-09	6.60E-09	NO DATA	1.53E-08	NO DATA	3.09E-05
ZR 97	1.68E-09	3.39E-10	1.55E-10	NO DATA	5.12E-10	NO DATA	1.05E-04
NB 95	6.22E-09	3.46E-09	1.86E-09	NO DATA	3.42E-09	NO DATA	2.10E-05
MO 99	NO DATA	4.31E-06	8.20E-07	NO DATA	9.76E-06	NO DATA	9.99E-06
TC 99M	2.47E-10	6.98E-10	8.89E-09	NO DATA	1.06E-08	3.42E-10	4.13E-07
TC101	2.54E-10	3.66E-10	3.59E-09	NO DATA	6.59E-09	1.87E-10	1.10E-21
RU103	1.85E-07	NO DATA	7.97E-08	NO DATA	7.06E-07	NO DATA	2.16E-05
RU105	1.54E-08	NO DATA	6.08E-09	NO DATA	1.99E-07	NO DATA	9.42E-06
RU106	2.75E-06	NO DATA	3.48E-07	NO DATA	5.31E-06	NO DATA	1.78E-04
AG110M	1.60E-07	1.48E-07	8.79E-08	NO DATA	2.91E-07	NO DATA	6.04E-05
SB124	2.80E-06	5.29E-08	1.11E-06	6.79E-09	0.0	2.18E-06	7.95E-05
SB125+D	1.79E-06	2.00E-08	4.26E-07	1.82E-09	0.0	1.38E-06	1.97E-05
SB126	1.15E-06	2.34E-08	4.15E-07	7.04E-09	0.0	7.05E-07	9.40E-05
SB127	2.58E-07	5.65E-09	9.90E-08	3.10E-09	0.0	1.53E-07	5.90E-05
TE125M	2.68E-06	9.71E-07	3.59E-07	8.06E-07	1.09E-05	NO DATA	1.07E-05
TE127M	6.77E-06	2.42E-06	8.25E-07	1.73E-06	2.75E-05	NO DATA	2.27E-05
TE127	1.10E-07	3.95E-08	2.38E-08	8.15E-08	4.48E-07	NO DATA	8.68E-06
TE129M	1.15E-05	4.29E-06	1.82E-06	3.95E-06	4.80E-05	NO DATA	5.79E-05
TE129	3.14E-08	1.18E-08	7.65E-09	2.41E-08	1.32E-07	NO DATA	2.37E-08
TE131M	1.73E-06	8.45E-07	7.05E-07	1.34E-06	8.57E-06	NO DATA	8.40E-05
TE131	1.97E-08	8.23E-09	6.22E-09	1.62E-08	8.63E-08	NO DATA	2.79E-09
TE132	2.52E-06	1.63E-06	1.53E-06	1.80E-06	1.57E-05	NO DATA	7.71E-05
I 130	7.56E-07	2.23E-06	8.80E-07	1.89E-04	3.48E-06	NO DATA	1.92E-06
I 131	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	NO DATA	1.57E-06
I 132	2.03E-07	5.43E-07	1.90E-07	1.90E-05	8.65E-07	NO DATA	1.02E-07
I 133	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	NO DATA	2.22E-06
I 134	1.06E-07	2.88E-07	1.03E-07	4.99E-06	4.58E-07	NO DATA	2.51E-10
I 135	4.43E-07	1.16E-06	4.28E-07	7.65E-05	1.86E-06	NO DATA	1.31E-06
CS134	6.22E-05	1.48E-04	1.21E-04	NO DATA	4.79E-05	1.59E-05	2.59E-06
CS136	6.51E-06	2.57E-05	1.85E-05	NO DATA	1.43E-05	1.96E-06	2.92E-06
CS137	7.97E-05	1.09E-04	7.14E-05	NO DATA	3.70E-05	1.23E-05	2.11E-06
CS138	5.52E-08	1.09E-07	5.40E-08	NO DATA	8.01E-08	7.91E-09	4.65E-13
BA139	9.70E-08	6.91E-11	2.84E-09	NO DATA	6.46E-11	3.92E-11	1.72E-07

* Values taken from Reference 3, Table E-11, except for SB values which were taken from Reference 8, Table 4.

TABLE 1.2-3 (Continued)

Page 2 of 2

GRAND GULF SITE RELATED INGESTION DOSE COMMITMENT FACTOR, $A_{i\tau}$
(mrem/hr per uCi/ml)*

NUCLIDE	BONE	LIVER	T. BODY	THYROID	KIDNEY	LUNG	GI-LLI
Ru-106	6.58E+01	0.00E+00	8.33E+00	0.00E+00	1.27E+02	0.00E+00	4.26E+03
Ag-110m	8.81E-01	8.15E-01	4.84E-01	0.00E+00	1.60E+00	0.00E+00	3.30E+02
Sr-124	6.70E+00	1.27E-01	2.66E+00	1.63E-02	0.00E+00	5.22E+00	1.90E+02
Sb-125	4.29E+00	4.79E-02	1.02E+00	4.36E-03	0.00E+00	3.30E+00	4.72E+01
Sb-126	2.75E+00	5.60E-02	9.94E-01	1.69E-02	0.00E+00	1.69E+00	2.25E+02
Sb-127	6.18E-01	1.35E-02	2.37E-01	7.42E-03	0.00E+00	3.66E-01	1.41E+02
Te-125m	2.57E+03	9.30E+02	3.44E+02	7.72E+02	1.04E+04	0.00E+00	1.02E+04
Te-127m	6.46E+03	2.32E+03	7.90E-02	1.66E+03	2.63E+04	0.00E+00	2.17E+04
Te-127	1.05E+02	3.78E+01	2.28E+01	7.80E+01	4.29E+02	0.00E+00	8.31E+03
Te-129m	1.10E+04	4.11E+03	1.74E+03	3.78E+03	4.60E+04	0.00E+00	5.54E+04
Te-129	3.01E+01	1.13E+01	7.33E+00	2.31E+01	1.26E+02	0.00E+00	2.27E+01
Te-131m	1.66E+03	8.10E+02	6.75E+02	1.28E+03	8.21E+03	0.00E+00	8.04E+04
Te-131	1.89E+01	7.88E+00	5.96E+00	1.55E+01	8.26E+01	0.00E+00	2.67E+00
Te-132	2.41E+03	1.56E+03	1.47E+03	1.72E+03	1.50E+04	0.00E+00	7.38E+04
I-130	2.71E+01	8.01E+01	3.16E+01	6.79E+03	1.25E+02	0.00E+00	6.89E+01
I-131	1.49E+02	2.14E+02	1.22E+02	7.00E+04	3.66E+02	0.00E+00	5.64E+01
I-132	7.29E+00	1.95E+01	6.82E+00	6.82E+02	3.11E+01	0.00E+00	3.66E+00
I-133	5.10E+01	8.87E+01	2.70E+01	1.30E+04	1.55E+02	0.00E+00	7.97E+01
I-134	3.81E+00	1.03E+01	3.70E+00	1.79E+02	1.64E+01	0.00E+00	9.01E-03
I-135	1.59E+01	4.17E+01	1.54E+01	2.75E+03	6.68E+01	0.00E+00	4.70E+01
Cs-134	2.98E+05	7.09E+05	5.79E+05	0.00E+00	2.29E+05	7.61E+04	1.24E+04
Cs-136	3.12E+04	1.23E+05	8.86E+04	0.00E+00	6.85E+04	9.38E+03	1.40E+04
Cs-137	3.82E+05	5.22E+05	3.42E+05	0.00E+00	1.77E+05	5.89E+04	1.01E+04
Cs-138	2.64E+02	5.22E+02	2.59E+02	0.00E+00	3.84E+02	3.79E+01	2.23E-03
Ba-139	9.29E-01	6.62E-04	2.72E-02	0.00E+00	6.19E-04	3.75E-04	1.65E+00
Ba-140	1.94E+02	2.44E-01	1.27E+01	0.00E+00	8.30E-02	1.40E-01	4.00E+02
Ba-141	4.51E-01	3.41E-04	1.52E-02	0.00E+00	3.17E-04	1.53E-04	2.13E-10
Ba-142	2.04E-01	2.10E-04	1.28E-02	0.00E+00	1.77E-04	1.19E-04	2.87E-19
La-140	1.50E-01	7.54E-02	1.99E-02	0.00E+00	0.00E+00	0.00E+00	5.54E+03
La-142	7.66E-03	3.48E-03	8.68E-04	0.00E+00	0.00E+00	0.00E+00	2.54E+01
Ce-141	2.24E-02	1.52E-02	1.72E-03	0.00E+00	7.04E-03	0.00E+00	5.79E+01
Ce-143	3.95E-03	2.92E+00	3.23E-04	0.00E+00	1.29E-03	0.00E+00	1.09E+02
Ce-144	1.17E+00	4.88E-01	6.27E-02	0.00E+00	2.90E-01	0.00E+00	3.95E+02
Pr-143	5.51E-01	2.21E-01	2.73E-02	0.00E+00	1.27E-01	0.00E+00	2.41E+03
Pr-144	1.80E-03	7.48E-04	9.16E-05	0.00E+00	4.22E-04	0.00E+00	2.59E-10
Nd-147	3.76E-01	4.35E-01	2.60E-02	0.00E+00	2.54E-01	0.00E+00	2.09E+03
W-187	2.96E+02	2.47E+02	8.65E+01	0.00E+00	0.00E+00	0.00E+00	8.10E+04
Np-239	2.85E-02	2.80E-03	1.54E-03	0.00E+00	8.74E-03	0.00E+00	5.75E+02

* Calculated from Equation 8.

W = controlling sector annual average atmospheric dispersion at the SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY for the appropriate pathway.

$$\overline{X/Q} = 4.537 \times 10^{-6*} \text{ sec/m}^3 \text{ for inhalation and all tritium pathways in the WNW sector.}$$

or

$$\overline{D/Q} = 1.301 \times 10^{-8**} \text{ m}^{-2} \text{ for food and ground plane pathways in the SSE sector}$$

P_i = the total dose parameter for radionuclide i, (mrem/yr per $\mu\text{Ci/m}^3$) for inhalation and all tritium pathways and ($\text{m}^2 \cdot \text{mrem/yr per } \mu\text{Ci/sec}$) for food and ground plane pathways, from Tables 2.2-1a-b.

Q'_i = rate of release of noble gas radionuclide i ($\mu\text{Ci/sec}$) from the release point.

$\overline{Q''_i}$ = average release rate of isotope i of tritium, I-131, I-133 or other radionuclide in particulate form, with half-lives greater than eight (8) days in the current year ($\mu\text{Ci/sec}$).

* The highest annual average X/Q for the GGNS SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY is Hamilton Lake (WNW, 0.75 miles). This value is taken from the Grand Gulf Nuclear Station Final Environmental Report, Table 6.1.28.

** Value taken from Reference 4, Table 6.1.26.

Q_i = cumulative release of radionuclide i of noble gas, tritium, I-131, I-133, or material in particulate form over the period of interest (uCi).

2.2.2.b Dose to an individual from tritium, I-131, I-133 and radioactive materials in particulate form, with half-lives greater than eight (8) days will be calculated for the purpose of implementation of Specification 3.11.2.3 as follows:

$$D_p = \text{dose to an individual from tritium, I-131, I-133 and radionuclides in particulate form, with half-life greater than eight days (mrem)}$$

$$= 3.17 \times 10^{-8} \sum_i R_i W' Q_i$$

Where,

W' = relative concentration at a controlling location for an individual

$$\overline{X/Q}' = \frac{4.057 \times 10^{-6} \text{ sec/m}^3 \text{ for inhalation and all tritium pathways in the S sector}}{11}$$

or

$$\overline{D/Q}' = \frac{1.408 \times 10^{-8} \text{ m}^{-2} \text{ for food and ground plane pathways in the S Sector}}{11}$$

R_i = the total dose factor for radionuclide i , (mrem/yr per uCi/m³) for inhalation and all tritium pathways and (m² · mrem/yr per uCi/sec) for food and ground plane pathways from Tables 2.2-2a - d

* This conservative approach utilizes values for the onsite GGNS gardens (Tables 2.2-3 and 2.3-1). As an alternative GGNS may use the most conservative offsite controlling locations identified in the above referenced tables.

TABLE 2.2-3
CONTROLLING RECEPTORS, LOCATIONS, AND PATHWAYS

<u>Sector</u>	<u>Distance (Meters)</u>	<u>Miles**</u>	<u>Pathway</u>	<u>Age Group</u>	<u>Origin (for info only)</u>
(A) N	1481	0.92	Vegetation	Adult	garden
(B) NNE	1207	0.75	Vegetation	Teenager	garden
(C) NE	1062	0.66	Vegetation	Teenager	garden
(D) ENE	4300	2.69	Inhal/Gnd Plane	Child	residence
(E) E	982	0.61	Inhal/Gnd Plane	Adult	residence
(F) ESE	7000	4.38	Inhal/Gnd Plane	Adult	residence
(G) SE	3100	1.94	Inhal/Gnd Plane	Child	residence
(H) SSE	1800	1.13	Inhal/Gnd Plane	Adult	residence
(J) S	805	0.50	Vegetation	Child	hypothetical*
(K) SSW	3734	2.33	Vegetation	Child	garden
(L) SW	1432	0.90	Inhal/Gnd Plane	Adult	residence
(M) WSW	8047	5.00	Cow/Milk	Infant	hypothetical
(N) W	8047	5.00	Cow/Milk	Infant	hypothetical
(P) WNW	7680	4.80	Vegetation	Child	garden
(Q) NW	8047	5.00	Cow/Milk	Infant	hypothetical
(R) NNW	1207	0.75	Vegetation	Child	hypothetical*

Table based on 1986 Land Use Census

* These locations represent GGNS gardens located inside the SITE BOUNDARY.

** Distances shown are actual mileage in each sector.

2.3 Meteorological Model

2.3.1 The atmospheric dispersion for gaseous releases may be calculated using a ground level, wake-split form of the straight line flow model.

$$X/Q = \text{atmospheric dispersion (sec/m}^3\text{)}$$
$$\frac{2.03 \delta k}{ru \Sigma}$$

Where,

r = distance (m) from release point to location of interest

δ = plume depletion factor at distance r from Figure 2.3-1

μ = wind speed at ground level (m/sec)

k = open terrain recirculation factor at distance r, from page 2.0-34

Σ = the lesser of $(\sigma^2 + \frac{b^2}{\pi})^{\frac{1}{2}}$ or $\sqrt{3} \sigma$

| 11

Where,

σ = vertical standard deviation (m) of the plume at distance r for ground level releases under the stability category indicated by \dot{T} , from Figure 2.3-2.

\dot{T} = temperature differential with vertical separation ($^{\circ}\text{K}/100\text{m}$)

b = height of the reactor building = 53.3m.

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

Sampling locations for the GGNS Environmental Surveillance Program are described in Tables 3.0-1 through 3.0-3 and shown on maps in Figures 3.0-1 through 3.0-3. Those sampling locations required to fulfill the requirements of Technical Specification 3/4.12.1, as described in Table 3.12.1-1, are identified with an asterisk in Tables 3.0-1 through 3.0-3. The types of vegetation and fish which are normally available for sampling are identified in Tables 3.0-4 and 3.0-5, respectively.

11

ODCM
TABLE 3.0-1
AIR SAMPLER COLLECTION SITES

AIR SAMPLERS

<u>NUMBER</u>	<u>FIGURE</u>	<u>LOCATION</u>	
* AS-1 PG	3.0-3	Southeast of GGNS at the Port Gibson City Barn. (Sector G Radius 5.5 miles)	
AS-2 61N	3.0-2	North-northeast of GGNS on Hwy. 61, across from the Yokena Church. (Sector B Radius 13 miles)	11
* AS-3 61VA	3.0-2	North-northeast of GGNS on Hwy. 61, north of the Vicksburg Airport. (Sector B Radius 18 miles)	11
AS-4 GJGE	3.0-1	Southwest of GGNS, Glodjo property on Bald Hill Road. (Sector L Radius .9 miles)	11
AS-5 TC	3.0-1	South of GGNS behind the Support Services Center. (Sector J Radius .4 miles)	11
* AS-6 RS	3.0-1	Northeast of GGNS, south side of Grand Gulf Road. (Sector C Radius .5 miles)	
* AS-7 MT	3.0-1	North of GGNS, located next to the Meteorological Tower. (Sector A Radius .8 miles)	
* AS-8 WR	3.0-1	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)	11
AS-9 GGMP	3.0-1	North of GGNS, located in Grand Gulf Military Park. (Sector A Radius 1.5 miles)	
AS-10 NLT	3.0-3	West-northwest of GGNS, located at Newellton, Louisiana. (Sector P Radius 12.5 miles)	11
AS-11 STJ	3.0-3	West-southwest of GGNS, located at St. Joseph, Louisiana. (Sector M Radius 13.0 miles)	11

* Technical Specification requirements

ODCM
 TABLE 3.0-2
MISCELLANEOUS COLLECTION SITES
 Page 1 of 3

11

MILK SAMPLES (CONTROL LOCATION)

Alcorn State University*

FIGURE
3.0-3

Located south-southwest of GGNS.
(Sector K Radius 10.5 miles)

11

CISTERN WATER

1. McGee Cistern*

3.0-1

Located north of GGNS at the
McGee house. (Sector A
Radius 0.9 miles)

11

2. Willis Cistern*

3.0-3

Located at the C. E. Willis house
east-northeast of GGNS across
from the Shiloh Baptist Church.
(Sector D Radius 6 miles)

11

GROUND WATER

1. PGWELL*

3.0-1

PORT GIBSON WELLS - Taken from
distribution system or one of
the five wells. (Sector G Radius
5.0 miles)

11

2. AAWELL*

3.0-1

Arnold Acres Trailer Park,
inactive. (Sector J Radius 1.1
miles)

3. LAKE BRUIN

3.0-3

Taken from faucet at the bath
house in Lake Bruin State Park,
Louisiana. (Sector M Radius 9.5
miles)

* Technical Specification requirements

ODCM
TABLE 3.0-2 (CONTINUED)
 Page 2 of 3

SURFACE WATER

	<u>FIGURE</u>		
Upstream *	3.0-1	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)	
Downstream *	3.0-1	5000 ft downstream of the GGNS discharge point into the Mississippi River near Radial Well No. 1 (Sector N)	11
Discharge Basin *	3.0-1	West-northwest of GGNS in parking lot (Sector P, 0.3 miles)	

VEGETATION

Broadleaf Vegetation *	3.0-1	South of GGNS near the Support Services Center (Sector J, 0.4 miles) and north-northwest of GGNS near the Meteorological Tower (Sector R, 0.8 miles)	11
------------------------	-------	--	----

NOTE: The above locations are gardens maintained by GGNS inside the SITE BOUNDARY in order to provide a more conservative calculation of doses due to the potential ingestion of contaminated vegetation. These two sampling sites exceed the requirements of Technical Specification 3.12.1.

Alcorn State University south-southwest of GGNS (Sector K, 10.5 miles) when available, otherwise a location 15-30 km distant

FISH SAMPLES

Commercially or recreationally important species *		Downstream of the GGNS discharge point into the Mississippi River	11
		Upstream of the GGNS discharge point into the Mississippi River uninfluenced by plant operations	11

* Technical Specification requirements

ODCM
TABLE 3.0-2 (CONTINUED)
Page 3 of 3

SEDIMENT SAMPLES

	<u>FIGURE</u>		
<u>SEDHAM*</u>	3.0-1	Downstream of the GGNS discharge point into the Mississippi River in the vicinity of the boat landing near Hamilton Lake outfall (Sector N, 2 miles)	
<u>SEDBAR</u>	3.0-1	Barge slip (Sector Q, 1.5 miles)	11
<u>SEDCONT</u>	3.0-1	Upstream from the GGNS discharge point into the Mississippi River in the vicinity of Upper Grand Gulf Landing (Sector R, 2 miles)	

* Hamilton Lake outfall is a Technical Specifications requirement

ODCM
 TABLE 3.0-3
 TLD LOCATIONS
 Page 1 of 7

11

<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	3.0-3	E	3.5
M-02	Windsor Ruins entry gate	3.0-3	L	7.0
M-03	Hwy. 61 across from P.G. Country Club entrance	3.0-3	H	7.0
M-04	Hwy. 547 between twin power poles	3.0-3	G	6.5
M-05	Hwy. 18, 5 miles east of Hwy. 61	3.0-3	F	9.0
M-06	REA pole east of Willows beyond Campbell Church, Miss. Hwy. 462	3.0-3	D	10.0
* M-07	Port Gibson City Barn, AS-1	3.0-3	G	5.5
M-08	West side Big Black River, south entrance	3.0-3	C	8.5
* M-09	Tree adjacent to Warner Tully Camp entrance	3.0-3	D	2.5
* M-10	Grand Gulf Military Park entrance gate	3.0-1	R	1.5
M-11	Hwy. 61, 3 miles north of Big Black River at twin tower	3.0-3	C	10.5
M-12	Hwy. 61 at AS-2-61 across from Yokena Church	3.0-2	B	13.0
M-13	West side of Hwy. 61, Letourneau Hill	3.0-2	B	15.0

11

11

* Technical Specification requirements

ODCM
 TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
 Page 2 of 7

11

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
* M-14 (CONTROL)	Hwy. 61, AS-3-61VA, north of Vicksburg Airport	3.0-2	B	18.0
M-15	Barge slip (south edge)	3.0-1	P	1.5
* M-16	AS-7 MT, Meteorological Tower	3.0-1	A	0.8
M-17	AS-6-RS, Grand Gulf Road	3.0-1	C	0.5
* M-18	Former railroad crossing eastern SITE BOUNDARY	3.0-1	F	0.5
M-19	Behind burn pit on fence at eastern SITE BOUNDARY	3.0-1	E	0.5
M-20	Eastern SITE BOUNDARY behind hazardous waste storage area	3.0-1	F	0.5
M-21	AS-5-TC, Support Services Center	3.0-1	J	0.4
M-22	100 yards south of former RR entrance crossing on west side	3.0-1	G	0.5
M-23	County Road/Heavy Haul Road 50 yards north on power pole	3.0-1	Q	0.5
M-24	Upper Grand Gulf Landing	3.0-1	R	2.2
* M-25	Hamilton Lake boat launch	3.0-1	N	1.0
M-26	Hamilton Lake outfall	3.0-1	N	1.5
* M-27	South point SITE BOUNDARY 200 yards along property line	3.0-1	M	1.5
* M-28	AS-4-GJOE, Glodjo residence	3.0-1	L	0.9
M-29	In sharp curve of Waterloo Road to Waterloo Plantation	3.0-1	K	1.5
* M-30	Arnold Acres Trailer Park (inactive) entrance	3.0-1	J	1.1

* Technical Specification requirements

ODCM
 TABLE 3.0-3 (CONTINUED)
 TLD LOCATIONS
 Page 3 of 7

11

<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	3.0-3	P	12.5
M-34	Levee at end of County Road at Point Pleasant, Louisiana	3.0-3	R	8.0
M-35	Amacker Landing - Lake Yucatan	3.0-3	Q	8.0
* M-36	Curve on 608, point nearest GGNS at power pole	3.0-3	P	5.0
M-37	Winter Quarters Home	3.0-3	N	8.0
* M-38	Lake Bruin State Park, second pole	3.0-3	M	9.5
* M-39	St. Joseph, Louisiana, Aux. Water Tank	3.0-3	M	13.0
* M-40	International Paper Road, 3 miles from site	3.0-3	M	5.0
* M-41	Heavy Haul Road - J pipe on concrete block	3.0-1	P	1.0
* M-42	Heavy Haul Road north iron gate	3.0-1	Q	1.0
* M-43	Gin Lake entrance	3.0-1	R	1.2
* M-44	Truck bypass on Grand Gulf Road	3.0-1	C	0.5
* M-45	Old Visitor Center gate	3.0-1	D	0.5

* Technical Specification requirements

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
 Page 4 of 7

11

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
* M-46	Church yard across from Grand Gulf/Bald Hill Roads intersection	3.0-1	E	1.0
* M-47	Bridge 0.6 miles west of Rodney Westside Road/Mont Gomer Road intersection, north side	3.0-3	L	5.2
* M-48	Property line fence 0.4 miles on Mont Gomer Road on west side	3.0-3	K	4.8
* M-49	Fork in Weathers Road	3.0-3	H	4.5
* M-50	Panola Hunting Club entrance	3.0-3	B	5.5
* M-51	Power pole 0.5 miles on gravel road to Big Black on west side	3.0-3	C	4.8
* M-52	Power pole, Bald Hill Road	3.0-1	K	1.0
* M-53	Arnold Acres property fence past inactive trailer park	3.0-1	H	1.1
* M-54	Bottom of curve past Arnold's house	3.0-1	G	1.0
* M-55	Behind Bonner's Beauty Shop at MSDH air sampler	3.0-3	D	5.0
* M-56	Hwy. 61 at "All Creatures Veterinary Hospital"	3.0-3	G	5.0
* M-57	Hwy. 61, behind the Welcome to Port Gibson sign at Glensdale Subdivision	3.0-3	F	4.5
* M-58	Hwy. 61, Big Bayou Pierre bridge, southeast end	3.0-3	E	5.0
* M-59	Off levee at Winter Quarters Hunting Camp	3.0-3	N	5.1

* Technical Specification requirements

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
 Page 5 of 7

11

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-60	Duplicate TLD installed quarterly at varying locations	-	-	-
M-61	Protected area fence by the vehicle entrance gate	Not Shown	P	Onsite
M-62	Protected area fence northeast corner parking lot	"	N	"
M-63	Protected area fence middle parking lot	"	N	"
M-64	Protected area fence southeast corner parking lot	"	M	"
M-65	South protected area fence behind warehouse	"	L	"
M-66	South protected area fence across from cooling tower	"	K	"
M-67	South protected area fence east end	"	J	"
M-68	East protected area fence across from chlorination tank	"	H	"
M-69	East protected area fence near electric bus	"	G	"
M-70	North fence behind Turbine Bldg.	"	F	"
M-71	133' elevation railway bay	"	C	"
M-72	133' elevation railway bay	"	B	"
M-73	Corner of fence outside Control Bldg.	"	P	"

* Technical Specification requirements

ODCM
 TABLE 3.0-3 (CONTINUED)
 TLD LOCATIONS
 Page 6 of 7

11

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
M-74	Midway of north fence	Not Shown	P	Onsite ¹¹
M-75	Corner in fence in front of Maintenance Shop	"	A	"
M-76	Southeast corner SSW Basins	"	A	"
M-77	Protected area fence beside Maintenance Shop	"	R	" ¹¹
M-78	Outside vault in Admin. Bldg.	"	Q	"
M-79	Wall in Central Records (middle)	"	Q	"
M-80	Wall in Central Records, old library location	"	Q	"
M-81	Inside Admin. Bldg., 2nd floor, northeast wall	"	Q	" ¹¹
M-82	Tech Support area	"	Q	" ¹¹
M-83	Tech Support secretary's office	"	Q	" ¹¹
M-84	Security Island	"	P	"
M-85	Lee Electric Building across from Port Gibson High School	3.0-3	G	5.2 ¹¹
* M-86	Bechtel gate north SITE BOUNDARY	3.0-1	B	0.5 ¹¹
M-87	Intersection of Rodney Westside Road & transmission line	3.0-3	J	3.5
* M-88	River mile marker 409.5	3.0-1	A	4.2
* M-89	Middle Ground Island	3.0-1	R	4.4
* M-90	Across from Middle Ground Island	3.0-1	Q	3.5

* Technical Specification requirements

ODCM
TABLE 3.0-3 (CONTINUED)
TLD LOCATIONS
 Page 7 of 7

<u>TLD NO.</u>	<u>LOCATION</u>	<u>FIGURE</u>	<u>SECTOR</u>	<u>MILE</u>
* M-91	Transmission line by pond	3.0-1	J	4.5
M-92	Fence behind orchard	Not Shown	K	0.4
M-93	Underground cable sign	Not Shown	H	0.4
M-94	Sector R garden	Not Shown	R	0.8

* Technical Specification requirements



SYSTEM ENERGY RESOURCES, INC.
 GRAND GULF NUCLEAR STATION
 UNIT 1
 ODCM

COLLECTION SITE LOCATIONS
 0-5 MILE AREA MAP
 FIGURE 3.0-1

ATTACHMENT III

OFFSITE DOSE CALCULATION MANUAL (ODCM) REVISION 12

MARKUP
of
REVISION 11

2.0 GASEOUS EFFLUENTS

2.1 Gaseous Effluent Monitor Setpoints

2.1.1 For the purpose of implementation of Specification 3.3.7.12 of the RETS, the alarm setpoint level for continuous ventilation noble gas monitors will be calculated as follows:

S_V = Count rate of vent noble gas monitor at alarm setpoint level

= the lesser of

$$\left. \begin{array}{l} D_{TB} \times R_t \times D_{TB} \\ \text{or} \\ D_{TB} \times R_s \times D_{SS} \end{array} \right\}$$

Where,

D_{TB} = safety factor allowing for cumulative uncertainties of measurements

D_{TB} = Dose rate limit to the total body of an individual at the SITE BOUNDARY or at UNRESTRICTED AREAS inside the SITE BOUNDARY required to limit dose to 500 mrem in one year.

= 500 mrem/yr

D_{SS} = Dose rate limit to the skin of the body of an individual at the SITE BOUNDARY or at UNRESTRICTED AREAS inside the SITE BOUNDARY required to limit dose to 3000 mrem in one year.

= 3000 mrem/yr

R_t = count rate per mrem/yr to the total body

$$= C + \left[\frac{\bar{x}}{Q} \sum_i K_i Q_i' \right]$$

(cpm) above background

the

PF = product of allocation factor (AF) and safety factor (SF), normally set at 0.1
 AF = allocation factor allowing for a total of four normal effluent release points, normally set at 0.25

SF

normally set at 0.4

(cpm)

(cpm) above background

Where,

C = count rate of the vent monitor corresponding to grab sample radionuclide concentrations

$\overline{X/Q}$ = highest sector annual average atmospheric dispersion at the SITE BOUNDARY or at UNRESTRICTED AREAS inside the SITE BOUNDARY

= 4.537×10^{-6} sec/m³ in the WNW sector.

K_i = total body dose factor due to gamma emissions from each noble gas radionuclide i (mrem/yr per uCi/m³) from Table 2.1-1.

Q'_i = rate of release of noble gas radionuclide i (uCi/sec) from the release point

(cpm)

R_s = count rate per mrem/yr to the skin

$$= C \div \overline{X/Q} \left[\sum_i (L_i + 1.1 M_i) Q'_i \right]$$

L_i = skin dose factor due to beta emissions from isotope i (mrem/yr per uCi/m³) from Table 2.1-1

1.1 = mrem skin dose per mrad air dose

M_i = air dose factor due to gamma emissions from isotope i (mrad/yr per uCi/m³) from Table 2.1-1

* The highest annual average X/Q for the GGNS SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY is Hamilton Lake (WNW, 0.75 miles). This value is taken from the Grand Gulf Nuclear Station Final Environmental Report, Table 6.1.2B.

NOTES For Section 2.1.1

determine the allowable

that is less than or equal to + 25% of

1) The calculated setpoint values will ~~be regarded as upper~~ bounds for the actual setpoint adjustments. That is, setpoint adjustments are not required to be performed if the existing setpoint level corresponds to a ~~lower~~ count rate ~~than~~ the calculated value.

2) A more conservative setpoint may be calculated ~~to~~ ~~minimize requirements for adjustment of the monitor~~ ~~utilizing the calculations provided in section 2.1.1 and~~ ~~the terms listed below:~~

SEE NEXT PAGE FOR CHANGES TO NOTES 1 & 2

~~$D_{TB} = 500 \text{ mrem/yr}$~~

~~$D_{SS} = 2000 \text{ mrem/yr}$~~

$R_t'' =$ conservative count rate per mrem/yr to the total body (Xe-133 detection, Kr-89 dose)

~~$= C' + (X/Q) \times V \times \bar{Q}''$~~

~~where~~

~~$\bar{Q}'' =$ Assigned release rate value of, for example, 1.0 uCi/sec, Xe-133. Flow rate utilized is the minimum designed flow. (See definition of C' below.)~~

~~$C' =$ count rate of vent monitor for an effluent concentration of Xe-133 corresponding to a 1.0 uCi/sec release rate of Xe-133. (Note: Calculate the related concentration based on dilution flow.)~~

~~$= (X) \frac{\bar{Q}''}{V} (3.53E-5) (60)$~~

If radionuclides are not detected in the grab sample, then the previously calculated setpoint may remain as the valid setpoint.

- 2) A more conservative setpoint may be calculated using the conservative Kr-89 total body dose factor. This method may be used when there are no valid isotopics available. The conservative setpoint will be calculated as follows:

$$S_v = \text{count rate (CPM) above background of vent noble gas monitor at the alarm setpoint level}^*$$

$$= PF' \times D_{TB} \times R_t''$$

Where:

PF' = product of allocation factor (AF) and safety factor (SF'), normally set at 0.2

AF = allocation factor allowing for a total of four normal effluent release points, normally set at 0.25

SF' = safety factor allowing for cumulative uncertainties of measurements, normally set at 0.8

R_t'' = conservative count rate per mrem/yr to the total body (Xe-133 detection, Kr-89 dose)

$$= \frac{(3.53E-5) (60)}{X/Q (X)(V)(K)}$$

* The setpoint calculation based on a Kr-89 skin dose is not required because the setpoint based on a Kr-89 total body dose will always be more conservative.

Xe-133

detector

Where,

in $\mu\text{Ci}/\text{cc}/\text{cpm}$ as determined by the primary calibration*

$X = A$ volume efficiency factor of the system for Xe-133 in $\text{cpm}/\mu\text{Ci}/\text{cc}$

$V =$ maximum designed ventilation flow rate in cubic feet per minute (cfm)

$3.53\text{E}-5 =$ conversion factor, cc/m^3

ft^3 per cc

$60 =$ conversion factor, $\text{seconds}/\text{minute}$

seconds per minute

$K =$ total body dose factor for Kr-89, the most restrictive isotope, from Table 2.1-1.

~~$\frac{D}{S} =$ sensitive count rate per mrem/yr to the skin~~

~~$$= C' \cdot \left[\frac{X}{V} \cdot (L + 1.1N) \cdot \frac{60}{K} \right]$$~~

~~library~~

~~$L =$ skin dose factor for Kr-89, from Table 2.1-1~~

~~$N =$ air dose factor for Kr-89 from Table 2.1-1~~

$$= 1.66\text{E} + 04 \text{ mrem/yr per } \mu\text{Ci}/\text{m}^3$$

Other variables as defined in Section 2.1.1

* The instrument calibration procedures will include checks to ensure that the detector efficiency does not vary by more than $\pm 25\%$.

ATTACHMENT IV

OFFSITE DOSE CALCULATION MANUAL (ODCM), REVISION 12

GRAND GULF NUCLEAR STATION ODCM
INSTRUCTIONS FOR ENTRY OF REVISION

ODCM Revision No. 12

Attached are revised pages of the GGNS ODCM. Please remove and insert as directed below:

<u>REMOVE</u>	<u>INSERT</u>
Cover Page, Rev. 11	Cover Page, Rev. 12
Page i, Rev. 11	Page i, Rev. 12
Page vii, Rev. 11	Page vii, Rev. 12
Page 2.0-1, Rev. 5	Page 2.0-1, Rev. 12
Page 2.0-2, Rev. 5	Page 2.0-2, Rev. 12
Page 2.0-4, Rev. 6	Page 2.0-4, Rev. 12
Page 2.0-5, Rev. 6	Page 2.0-5, Rev. 12

Please sign and date the Transmittal and Acknowledgement Form and return, as indicated, as soon as possible.

OFFSITE DOSE CALCULATION MANUAL

GRAND GULF NUCLEAR STATION

GRAND GULF NUCLEAR STATION
OFFSITE DOSE CALCULATION MANUAL
SAFETY RELATED

EVALUATION APPLICABILITY

<u>SAFETY EVALUATION</u>	<u>ENVIRONMENTAL EVALUATION</u>
<input checked="" type="checkbox"/> APPLICABLE	<input checked="" type="checkbox"/> APPLICABLE
<input type="checkbox"/> NOT APPLICABLE	<input type="checkbox"/> NOT APPLICABLE

Reviewed/Approved: Rita R Jackson / 8/4/88
Supervisor, Environmental Services Date

Reviewed/Approved: Suzanne Curran / 8/4/88
Supervisor, Radiological Services Date

Reviewed/Approved: JRM Kay / 8/8/88
Manager, Radiological & Environmental Services Date

Reviewed/Approved: JRM Kay to T.E. Reaves, Jr. / 8/8/88
Director, Nuclear Support Date

Reviewed/Approved: Michael Wright / 8-9-88
Chairman, Plant Safety Review Committee Date

ODCM

LIST OF EFFECTIVE PAGES

<u>PAGE NO.</u>	<u>REV. NO.</u>	<u>PAGE NO.</u>	<u>REV. NO.</u>
i	12	2.0-22	1
ii	2	2.0-23	11
iii	8	2.0-24	11
iv	8	2.0-25	0
v	6	2.0-26	10
vi	11	2.0-27	3
vii	12	2.0-28	5
		2.0-29	3
1.0-1	0	2.0-30	3
1.0-2	10	2.0-31	0
1.0-3	10	2.0-32	0
1.0-4	1	2.0-33	0
1.0-5	10	2.0-34	0
1.0-6	10	2.0-35	8
1.0-7	5	2.0-35a	8
1.0-8	8	2.0-36	10
1.0-9	11	2.0-37	10
1.0-10	0		
1.0-11	11	3.0-1	11
1.0-12	0	3.0-2	11
1.0-13	2	3.0-3	11
1.0-14	11	3.0-3a	11
1.0-15	8	3.0-3b	11
1.0-16	8	3.0-4	11
		3.0-5	11
2.0-1	12	3.0-6	11
2.0-2	12	3.0-6a	11
2.0-3	2	3.0-6b	11
2.0-4	12	3.0-6c	11
2.0-5	12	3.0-6d	11
2.0-6	0	3.0-7	11
2.0-7	5	3.0-8	1
2.0-8	11	3.0-9	3
2.0-9	6	3.0-10	5
2.0-10	11	3.0-11	5
2.0-10a	8		
2.0-11	1		
2.0-12	1		
2.0-13	2		
2.0-14	1		
2.0-15	2		
2.0-16	2		
2.0-17	1		
2.0-18	2		
2.0-19	1		
2.0-20	1		
2.0-21	2		

2.0 GASEOUS EFFLUENTS

2.1 Gaseous Effluent Monitor Setpoints

2.1.1 For the purpose of implementation of Specification 3.3.7.12 of the RETS, the alarm setpoint level for continuous ventilation noble gas monitors will be calculated as follows:

S_V = Count rate (cpm) above background of vent noble gas monitor at the alarm setpoint level

$$= \text{the lesser of } \begin{array}{l} \text{PF} \times R_t \times D_{TB} \\ \text{or} \\ \text{PF} \times R_s \times D_{ss} \end{array}$$

12

Where,

PF = product of allocation factor (AF) and safety factor (SF), normally set at 0.1

AF = allocation factor allowing for a total of four normal effluent release points, normally set at 0.25

12

SF = safety factor allowing for cumulative uncertainties of measurements, normally set at 0.4

D_{TB} = Dose rate limit to the total body of an individual at the SITE BOUNDARY or at UNRESTRICTED AREAS inside the SITE BOUNDARY required to limit dose to 500 mrem in one year.

$$= 500 \text{ mrem/yr}$$

12

D_{ss} = Dose rate limit to the skin of the body of an individual at the SITE BOUNDARY or at UNRESTRICTED AREAS inside the SITE BOUNDARY required to limit dose to 3000 mrem in one year.

$$= 3000 \text{ mrem/yr}$$

R_t = count rate (cpm) per mrem/yr to the total body

12

$$= C \div \left[\overline{X/Q} \sum_i K_i Q'_i \right]$$

Where,

C = count rate (cpm) above background of the vent monitor
corresponding to grab sample radionuclide
concentrations | 12

$\overline{X/Q}$ = highest sector annual average atmospheric
dispersion at the SITE BOUNDARY or at
UNRESTRICTED AREAS inside the SITE BOUNDARY
= 4.537×10^{-6} * sec/m³ in the WNW sector.

K_i = total body dose factor due to gamma emissions from
each noble gas radionuclide i (mrem/yr per μCi/m³)
from Table 2.1-1.

Q'_i = rate of release of noble gas radionuclide i
(μCi/sec) from the release point

R_s = count rate (cpm) per mrem/yr to the skin | 12

$$= C \div \overline{X/Q} [\sum_i (L_i + 1.1 M_i) Q'_i]$$

L_i = skin dose factor due to beta emissions from
isotope i (mrem/yr per μCi/m³) from Table 2.1-1

1.1 = mrem skin dose per mrad air dose

M_i = air dose factor due to gamma emissions from isotope i
(mrad/yr per μCi/m³) from Table 2.1-1

* The highest annual average X/Q for the GGNS SITE BOUNDARY or UNRESTRICTED AREAS inside the SITE BOUNDARY is Hamilton Lake (WNW, 0.75 miles). This value is taken from the Grand Gulf Nuclear Station Final Environmental Report, Table 6.1.28.

NOTES For Section 2.1.1

- 1) The calculated setpoint values will determine the allowable bounds for the actual setpoint adjustments. That is, setpoint adjustments are not required to be performed if the existing setpoint level corresponds to a count rate that is less than or equal to + 25% of the calculated value. If radionuclides are not detected in the grab sample, then the previously calculated setpoint may remain as the valid setpoint.
- 2) A more conservative setpoint may be calculated using the conservative Kr-89 total body dose factor. This method may be used when there are no valid isotopics available. The conservative setpoint will be calculated as follows:

$$S_v = \text{count rate (CPM) above background of vent noble gas monitor at the alarm setpoint level}^*$$
$$= PF' \times D_{TB} \times R_t''$$

Where:

PF' = product of allocation factor (AF) and safety factor (SF'), normally set at 0.2

AF = allocation factor allowing for a total of four normal effluent release points, normally set at 0.25

SF' = safety factor allowing for cumulative uncertainties of measurements, normally set at 0.8

$R_t'' = \text{conservative count rate per mrem/yr to the total body (Xe-133 detection, Kr-89 dose)}$

$$= \frac{(3.53E-5) (60)}{X/Q (X)(V)(K)}$$

* The setpoint calculation based on a Kr-89 skin dose is not required because the setpoint based on a Kr-89 total body dose will always be more conservative.

Where,

X = Xe-133 volume efficiency factor of the detector system in $\mu\text{Ci}/\text{cc}/\text{cpm}$ as determined by the primary calibration* | 12

V = maximum designed ventilation flow rate in cubic feet per minute (cfm)

$3.53\text{E}-5$ = conversion factor, ft^3 per cc | 12

60 = conversion factor, seconds per minute

K = total body dose factor for Kr-89, the most restrictive isotope, from Table 2.1-1.

= $1.66\text{E} + 04$ mrem/yr per $\mu\text{Ci}/\text{m}^3$ | 12

Other variables as defined in Section 2.1.1 | 12

* The instrument calibration procedures will include checks to ensure that the detector efficiency does not vary by more than $\pm 25\%$. | 12



OLIVER D. KINGSLEY, JR.
Vice President
Nuclear Operations

August 30, 1988

U. S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D. C. 20555

Attention: Document Control Desk

gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Semiannual Radioactive Effluent
Release Report
AECM-88/0174

Attached is the System Energy Resources, Inc. (SERI) Semiannual Radioactive Effluent Release Report for Grand Gulf Nuclear Station (GGNS) for the period January 1, 1988 through June 30, 1988. This report is submitted in compliance with the requirements of 10CFR50.36a(a)(2) and the GGNS Technical Specifications 6.9.1.8, 6.9.1.9, 6.13 and 6.14.

Questions concerning this report should be directed to this office.

Yours truly,

FOR
ODKINGSLEYJR

ODK:ctp
Attachment

cc: Mr. T. H. Clininger (w/a)
Mr. R. B. McGehee (w/a)
Mr. H. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)
Mr. J. L. Mathis (w/a)

Dr. J. Nelson Grace, Regional Administrator (w/a)
U. S. Nuclear Regulatory Commission
Region II
101 Marietta St., N. W., Suite 2900
Atlanta, Georgia 30323

Mr. L. L. Kintner, Project Manager (w/a)
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop 14820
Washington, D.C. 20555

1698
11