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SHEARON HARRIS NUCLEAR POWER PLANT
DOCKET NO. 50-400/LICENSE NO. NPF-63
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Dear Sir or Madam:

In accordance with Technical Specification 6.9.1.4 for the Harris Nuclear Plant, Carolina Power & Light Company is providing the enclosed Annual Radioactive Effluent Release Report for 2000.

If you have questions or need additional information regarding this report, please contact Mr. E. A. McCartney at (919) 362-2661.

Sincerely,

R.J. Field
Manager, Regulatory Affairs
Harris Nuclear Plant

MGW

Enclosure

c: Mr. J. B. Brady (NRC Senior Resident Inspector, HNP)
Mr. Rich Laufer (NRR Project Manager, HNP)
Mr. L. A. Reyes (NRC Regional Administrator, Region II)

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Carolina Power & Light
Shearon Harris Nuclear Power Plant

License No. NPF-063

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

January 1, 2000 to December 31, 2000

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Table of Contents

	Page No.
Introduction	i
Discussion	i
Appendix 1. Supplemental Information	1/1
Appendix 2. Effluent and Waste Disposal Report	
1. Lower Limits of Detection (LLDs)	2/1
2. Effluents Released	2/3
3. Solid Waste Disposal	2/12
Appendix 3. Changes to Offsite Dose Calculation Manual (ODCM)	3/1
Appendix 4. Changes to the Environmental Monitoring Program	
1. Environmental Monitoring Program	4/1
2. Land Use Census	4/1
Appendix 5. Additional ODCM Operational Requirements	
1. Inoperability of Liquid Effluent Monitors	5/1
2. Inoperability of Gaseous Effluent Monitors	5/1
3. Unprotected Outdoor Tanks Exceeding Limits	5/1
4. Gas Storage Tanks Exceeding Limits	5/1
Appendix 6. Major Modifications to Radwaste System	6/1
Appendix 7. Meteorological Data	7/1
Appendix 8. Assessment of Radiation Doses	
1. Population Doses due to Effluent Releases	8/1
2. Doses to the General Public Due to Activities Inside the Site Boundary	8/2
3. Doses to Most Likely Exposed Member of the Public	8/4
4. Major Assumptions used to Calculate Radiation Doses	8/9

Introduction

This Annual Radioactive Effluent Release Report is prepared in accordance with Shearon Harris Nuclear Power Plant's Operational Requirements - Offsite Dose Calculation Manual (ODCM), Section F.2, Technical Specification 6.9.1.4, Operating License No. NPF-63.

The Shearon Harris Nuclear Power Plant (SHNPP) achieved initial criticality on January 3, 1987. This Report covers the period from January 1, 2000 to December 31, 2000. During this period, the plant completed Cycle 9 operation in April, 2000 and began Cycle 10 operation in May, 2000 after a refueling outage. The radiological dose assessment from radioactive releases during January 1, 2000 through December 31, 2000 is in Appendix 8 of this report.

Discussion

1. Protection Standards

The main objective in the control of radiation is to ensure that any exposure is kept not only within regulatory limits, but As Low As Reasonably Achievable (ALARA). The ALARA concept applies to reducing radiation exposure both to workers at Harris Nuclear Plant and to the general public. "Reasonably Achievable" means that radiation exposure reduction is based on sound environmental practices, economic decisions, and operating practices. By practicing ALARA, Harris Nuclear Plant and Carolina Power and Light Company minimize health risk, environmental detriment, and ensure that exposures are maintained well below regulatory limits.

2. Sources of Radioactivity Released

During normal operations of a nuclear power station, most of the fission products are retained within the fuel and fuel cladding. However, small quantities of radioactive fission and activation products are present in the primary coolant water. The types of radioactive material released are noble gases, iodines and particulates, and tritium.

The noble gas fission products in the primary coolant are collected by a system designed for collection and storage for radioactive decay prior to release.

Small releases of radioactivity in liquids may occur from equipment associated with the primary coolant system. These liquids are collected and processed for radioactivity removal prior to release.

3. Noble Gas

Some of the fission products released in airborne effluents are radioactive isotopes of noble gases, such as krypton and xenon. Noble gases are by nature inert and do not concentrate in humans or other organisms. Their contribution to human radiation exposure is as an external exposure. Xenon-133 and Xenon-135, with half-lives of approximately 5 days and 9 hours respectively, are the major isotopes released. Half-life is defined as the time required for a radioactive isotope to lose 50 percent of its radioactivity by decay. Noble gases are readily dispersed in the atmosphere.

4. Iodines and Particulates

Annual releases of iodines, and those particulates with half-lives greater than 8 days are small. Factors such as chemical reactivity and solubility in water, combined with high processing efficiencies, minimize their discharge. The main contribution of radioactive iodine to human exposure is to the thyroid gland, where the body concentrates iodine. The principal radioactive particulates are Cobalt-58 and Cobalt-60 which contribute to internal exposure of tissues such as the muscle, liver, and intestines. These particulates can also be a source of exposure if deposited on the ground.

5. Tritium

Tritium, a radioactive isotope of hydrogen, is the predominate radionuclide in liquid and gaseous effluents. Tritium is produced in the reactor coolant as a result of neutron interaction with deuterium (also a hydrogen isotope) and boron, both of which are present in the primary coolant. Tritium contributes very little radiation exposure to the human body, and when it is inhaled or ingested, is dispersed throughout the body until eliminated.

6. Processing and Monitoring

Effluents are strictly controlled and monitored to ensure that radioactivity released to the environment is minimal and within regulatory limits. Effluent control includes the operation of radiation monitoring systems, in-plant and environmental sampling and analyses, quality assurance programs for both in-plant and environmental sampling and analyses, and procedures that address effluent and environmental monitoring.

The plant radiation monitoring system has monitors that are designed to ensure that all releases are below regulatory limits. Each instrument provides indication of the amount of radioactivity present and is equipped with alarms and indicators in the control room. The alarm setpoints are set lower than the ODCM Operational Requirements to ensure that the limits are not exceeded. If a monitor alarms, a release from a tank is automatically suspended. Additionally, batch releases are sampled and analyzed in the laboratory prior to discharge. The sampling and analysis done in the laboratory provides a more sensitive and precise method of determining effluent composition than in-plant monitoring instruments.

The plant has a meteorological tower which is linked to computers which record the meteorological data. The meteorological data and the release data is used to calculate the dose to the public.

In addition to in-plant equipment the company maintains a Radiological Environmental Monitoring Program which consists of devices used to constantly sample the air and water in the environment. The samples collected from the surrounding environment are analyzed to determine any presence of radioactive material in the environs.

7. Exposure Pathways

Radiological exposure pathways are the methods by which people may become exposed to radioactive material. The major pathways of concern are those which could cause the highest calculated radiation dose. The projected pathways are determined from the type and amount of radioactive material that may have been released, the environmental transport mechanism, and the use of the environment. Environmental transport mechanisms include, but are not limited to, hydrological (water) and meteorological (weather) characteristics of the area. Information on water flow, wind speed and direction, dietary intake of residents, recreational use of the area and location of homes and farms in the area are some of the many factors used to calculate the potential exposure to offsite personnel.

The release of radioactive gaseous effluents includes pathways such as external whole body exposure, deposition on plants and soils, and human inhalation. The release of radioactive material in liquid effluents includes pathways such as drinking water, fish consumption, and direct exposure from the lake at the shoreline and submersion dose while swimming.

Even though radionuclides can reach humans by many different pathways, some radionuclides result in more exposure than others. The critical pathway is the exposure which will provide, for a specific radionuclide, the greatest exposure to a population, or a specific group of the population, called the critical group. The critical group may vary depending on the radionuclides involved, the age and diet of the group, and other cultural factors. The exposure may be received to the whole body or to a specific organ, with the organ receiving the largest fraction of the exposure called the critical organ.

The exposures to the general public in the area surrounding Harris are calculated for gaseous and liquid releases. The exposure due to radioactive material released in gaseous effluents is calculated using factors such as the amount of radioactive material released, the concentration beyond the site boundary, weather conditions at the time of release, locations of exposure pathways, and usage factors. The exposures calculated due to radioactive materials released in liquid effluents are calculated using factors such as the total volume of liquid, the total volume of dilution water, and usage factors.

8. Results

The quantities of radioactive gaseous and liquid effluents and solid waste are reported using the format per Regulatory Guide 1.21 (Rev. 1) Appendix B.

The doses were calculated by the programs LADTAP II (for liquid effluents) and GASPAR (for gaseous effluents). LADTAP II and GASPAR are NRC approved programs using the methodology in Reg. Guide 1.109 (Calculation of Annual Doses to Man From Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I) which is also the basis of the ODCM calculations. When appropriate, the doses are also broken down by age group (adult, teen, etc.) and organ (bone, thyroid, etc.). The radiological dose assessment results are reported in Appendix 8.

The Radioactive Effluent Release Report is a detailed listing of the radioactivity released from the Harris Nuclear Plant during the period from January 1, 2000 through December 31, 2000.

During the period of January 1, 2000 through December 31, 2000, the estimated maximum individual offsite dose due to radioactivity released in effluents was:

Liquid Effluents:

	Limit
• 4.63 E-02 mrem, Total Body	3.0 E+00 mrem
• 5.24 E-02 mrem, Max Organ (GI-LLI)	1.0 E+01 mrem

Gaseous Effluents:

Noble Gases

	Limit
• 1.15 E-03 mrad, Beta	2.0 E+01 mrad
• 3.83 E-04 mrad, Gamma	1.0 E+01 mrad

Noble Gases, Tritium, Radioiodines, and Particulates with greater than a 8 Day Half Life:

	Limit(*)
• 1.55 E-02 mrem, Total Body	1.5 E+01 mrem
• 1.59 E-02 mrem, Skin	1.5 E+01 mrem

(*) Limit applies to Tritium, Radioiodines, and Particulates with greater than a 8 Day Half Life:

These doses are much lower than anyone would have received from natural background in the area surrounding the Harris Nuclear Plant (300 mrem per year).

Appendix 1: Supplemental Information

I. Regulatory Limits

A. Fission and Activation Gases:

ODCM Operational Requirements Maximum Instantaneous Release Rate

Total Body Dose ≤500 mrem/yr

Skin Dose ≤3000 mrem/yr

10CFR20, Limits

Annual Average Concentrations as specified in 10CFR20, Appendix B, Table 2, Column 1. This is based on 100 mrem/yr.

10CFR50, Appendix I

For Calendar Quarter

Gamma Dose ≤5 mrad (Used for calculating percent of applicable limit.)

Beta Dose ≤10 mrad (Used for calculating percent of applicable limit.)

For Calendar Year

Gamma Dose ≤10 mrad

Beta Dose ≤20 mrad

B. Iodine - 131 and 133, Tritium, and Particulates >8 day half-lives:

ODCM Operational Requirements Maximum Instantaneous Release Rate

Inhalation dose (only) to a child to any organ ≤1500 mrem/yr

10CFR20 Limits

Annual Average Concentrations as specified in 10CFR20, Appendix B, Table 2, Column 1. This is based on 50 mrem/yr.

10CFR50, Appendix I (Organ Doses)

For Calendar Quarter ≤7.5 mrem (Used for calculating percent of applicable limit.)

For Calendar Year ≤15 mrem

C. Liquids:

ODCM Operational Requirements

Maximum Instantaneous Release Rate is ten times the concentrations specified in 10CFR20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases.

ODCM Operational Requirements

For dissolved or entrained noble gases, the concentration shall be limited to 2.00E-04 μCi/ml total activity.

10CFR20

The annual average concentrations to be less than the concentrations specified in 10CFR20, Appendix B, Table 2, Column 2.(Used for calculating percent of applicable limit.) This is based on 50 mrem/yr.

10CFR50, Appendix I

For Calendar Quarter

Total Body Dose ≤1.5 mrem

Any Organ Dose ≤5 mrem

For Calendar Year

Total Body Dose ≤3 mrem

Any Organ Dose ≤10 mrem

D. Average Energy (E):

None applicable at HNP. HNP determines doses and dose rate based on actual releases, not on an average energy value.

II. Measurements and Approximations of Total Radioactivity

A. Continuous Gaseous Releases

1. Fission and activation gases

The total activity released is determined from the net activity of gaseous monitors times the total stack flow. The activity of each radionuclide is determined by the fraction of that radioactive gas in the isotopic analysis for that sampling period. If no activity is detected for the sampling period the mix is based on historical data.

2. Iodines

The activity released as iodine-131, 133, and 135 is based on isotopic analysis of the charcoal cartridge plus the particulate filter times the total vent flow for each sample period (typically weekly).

3. Particulates

The activity released as particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters times the total vent flow for each sample period (minimum weekly or more frequently if plant conditions requires it).

4. Tritium

The activity released as tritium is based on grab sample analysis using liquid scintillation times total stack flow.

B. Batch Gaseous Releases

1. Fission and activation gases

The activity released is based on the volume released times the activity of the individual nuclides obtained from an isotopic analysis of the grab sample taken prior to the release.

2. Iodines

The iodine activity released from Waste Gas Decay Tank (WGDT) batch releases is included in the iodine determination from the continuous releases.

3. Particulates

The particulate activity released from Waste Gas Decay Tank (WGDT) batch releases is included in the particulate determination from the continuous releases.

4. Tritium

The activity released as tritium is based on the grab sample analysis using liquid scintillation of each batch times the batch volume.

C. Liquid Releases

1. Fission and Activation Products

The total activity released (excluding tritium, strontium, iron-55, alpha, and nickel-63) is comprised of the sum of the products of the individual radionuclide concentrations in each batch (identified using gamma spectroscopy) times the volume of the batch.

2. Alpha and Tritium

The alpha activity released is the monthly composite alpha concentration times the volume released for the month.

The tritium activity released is the concentration of tritium in each batch release times the volume of the batch release.

3. Strontium-89, 90, Iron-55, and Nickel-63

Analyses are performed on quarterly composite samples times the volume released during the quarter to calculate the activity released.

D. Estimated Total Errors

1. Estimated total errors for gaseous effluents are based on uncertainties in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, chemical yield factors, and sample losses for such items as charcoal cartridges.

2. Estimated total errors for liquid effluents are based on uncertainties in counting equipment calibration, counting statistics, sampling, and volume determinations.

III. Batch Releases (2000)

A. Liquid Batch Releases

	Jan - June 2000	July - Dec 2000
Number of batch releases	3.30 E+01	1.60 E+01
Total time period for batch releases	2.47 E+04 minutes	1.18 E+04 minutes
Maximum time of a batch release	8.66 E+02 minutes	1.21 E+03 minutes
Average time for a batch release	7.49 E+02 minutes	7.39 E+02 minutes
Minimum Time for a batch release	6.20 E+02 minutes	1.86 E+02 minutes
Average stream flow during periods of release*	3.37 E+03 cfs	1.23 E+03 cfs

* Measured at Cape Fear River in Lillington, N.C.

B. Gaseous Batch Releases

	Jan - June 2000	July - Dec 2000
Number of batch releases	4.00 E+00	2.00 E+00
Total time period for batch releases	4.13 E+03 minutes	1.26 E+03 minutes
Maximum time of a batch release	3.01 E+03 minutes	8.12 E+02 minutes
Average time for a batch release	1.03 E+03 minutes	6.30 E+02 minutes
Minimum Time for a batch release	1.22 E+02 minutes	4.47 E+02 minutes

C. Abnormal Releases

a. Liquid

One abnormal liquid release was made during 2000. On April 20, 2000 a contaminated red rubber hose was used to drain a section of Emergency Service Water header to the Unit 2 Yard Drainage Sump which discharges to the storm drain system. The ESW drain water was sampled and analyzed to effluent LLD with no activity detected. An investigation (AR-18862) was performed and presented to the PNSC. Based on the evaluation, the results are as follows:

Curies Released: 6.62 E-05

Offsite Dose (mrem):

Bone	Liver	Tot Body	Thyroid	Kidney	Lung	GI-LLI
7.24E-07	4.77E-06	2.98E-06	5.95E-09	1.05E-06	2.45E-07	7.03E-04

b. Gaseous

No abnormal gaseous releases were made during 2000.

Appendix 2: Effluent and Waste Disposal Report
Enclosure 1 : LOWER LIMITS OF DETECTION (LLDs)

1. LLDs for Gaseous Effluents

Nuclide	µCi/cc
Gross Alpha	2.51 E-15
H-3	4.96 E-09
Ar-41	1.18 E-08
Kr-85	3.32 E-06
Kr-85m	9.02 E-09
Kr-87	2.65 E-08
Kr-88	3.29 E-08
Xe-131m	2.25 E-07
Xe-133	1.32 E-08
Xe-133m	6.21 E-08
Xe-135	8.26 E-09
Xe-135m	1.60 E-08
Xe-138	9.64 E-08
I-131	2.47 E-13
I-133	1.13 E-13
I-135	2.11 E-12
Cr-51	1.05 E-12
Mn-54	1.08 E-13
Co-58	1.05 E-13
Fe-59	2.60 E-13
Co-60	1.79 E-13
Zn-65	7.95 E-13
Sr-89	3.92 E-15
Sr-90	1.52 E-15
Nb-95	9.89 E-14
Zr-95	6.02 E-13
Mo-99	2.18 E-12
Cs-134	4.10 E-13
Cs-137	2.66 E-13
Ba-140	9.33 E-13
La-140	2.76 E-13
Ce-141	1.58 E-13
Ce-144	4.99 E-13

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 1 : LOWER LIMITS OF DETECTION (LLDs)

2. LLDs for Liquid Effluents

Nuclide	µCi/ml
Gross Alpha	7.89 E-08
Cr-51	2.50 E-07
Mn-54	4.91 E-08
Fe-55	2.48 E-08
Co-57	2.79 E-08
Co-58	4.81 E-08
Fe-59	4.12 E-08
Co-60	2.78 E-08
Ni-63	3.14 E-08
Zn-65	4.65 E-08
Sr-89	2.62 E-08
Sr-90	1.39 E-08
Nb-95	4.02 E-08
Zr-95	8.10 E-08
Mo-99	3.47 E-07
Tc-99m	2.69 E-08
Ru-106	3.80 E-07
Sb-124	7.02 E-08
Sb-125	8.82 E-08
Sb-126	2.96 E-08
I-131	2.73 E-08
I-133	5.61 E-08
Te-132	2.81 E-08
Xe-133	6.54 E-08
Xe-133m	2.25 E-07
Xe-135	2.36 E-08
Cs-134	2.02 E-08
Cs-137	1.70 E-08
Ba-140	4.77 E-08
La-140	3.49 E-08
Ce-141	4.11 E-08
Ce-144	1.68 E-07

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 2 : Effluents Released

Table 1A : GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Quarter 1	Quarter 2	Est. Total Error %
A.	Fission and activation gases				
1.	Total release	Ci	4.48 E+00	2.99 E+00	5.27 E+01
2.	Average release rate for period	µCi/sec	5.69 E-01	3.80 E-01	
3.	Percent of ODCM Operational Requirement limit	%	9.09 E-03	6.29 E-03	
B.	Iodines				
1.	Total iodine-131	Ci	< LLD	< LLD	3.04 E+01
2.	Average release rate for period	µCi/sec	< LLD	< LLD	
3.	Percent of ODCM Operational Requirement limit*	%	3.42 E-01	1.52 E-01	
C.	Particulates				
1.	Particulates with half-lives >8 days	Ci	2.13 E-05	3.84 E-05	3.38 E+01
2.	Average release rate for period	µCi/sec	2.71 E-06	4.88 E-06	
3.	Percent of ODCM Operational Requirement limit*	%	3.42 E-01	1.52 E-01	
4.	Gross alpha radioactivity	Ci	< LLD	< LLD	
D.	Tritium				
1.	Total release	Ci	1.89 E+01	8.24 E+00	5.22 E+01
2.	Average release rate for period	µCi/sec	2.40 E+00	1.05 E+00	
3.	Percent of ODCM Operational Requirement limit*	%	3.42 E-01	1.52 E-01	

* The Percent of ODCM Operational Requirement limits applies to Iodines, Particulates and Tritium combined, and is calculated using ODCM methodology and parameters. The quarterly ODCM Operational Requirement limit is 7.5 millirem. The most critical organ for both quarters was the lung.

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 2 : Effluents Released

Table 1A : GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Quarter 3	Quarter 4	Est. Total Error %
A.	Fission and activation gases				
1.	Total release	Ci	1.71 E+00	8.60 E+00	5.27 E+01
2.	Average release rate for period	µCi/sec	2.16 E-01	1.08 E+00	
3.	Percent of ODCM Operational Requirement limit	%	3.53 E-03	1.75 E-02	
B.	Iodines				
1.	Total iodine-131	Ci	< LLD	< LLD	3.04 E+01
2.	Average release rate for period	µCi/sec	< LLD	< LLD	
3.	Percent of ODCM Operational Requirement limit*	%	2.51 E-01	1.42 E-01	
C.	Particulates				
1.	Particulates with half-lives >8 days	Ci	5.35 E-06	< LLD	3.38 E+01
2.	Average release rate for period	µCi/sec	6.73 E-07	< LLD	
3.	Percent of ODCM Operational Requirement limit*	%	2.51 E-01	1.42 E-01	
4.	Gross alpha radioactivity	Ci	< LLD	< LLD	
D.	Tritium				
1.	Total release	Ci	1.40 E+01	7.90 E+00	5.22 E+01
2.	Average release rate for period	µCi/sec	1.76 E+00	9.94 E-01	
3.	Percent of ODCM Operational Requirement limit*	%	2.51 E-01	1.42 E-01	

* The Percent of ODCM Operational Requirement limit applies to Iodines, Particulates and Tritium combined, and is calculated using ODCM methodology and parameters. The quarterly ODCM Operational Requirement limit is 7.5 millirem. The most critical organ for both quarters was the lung.

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 2 : Effluents Released

Table 1B : GASEOUS EFFLUENTS - ELEVATED RELEASES

All releases at Shearon Harris Nuclear Power Plant are made as ground releases.

Appendix 2 (Continued): Effluent and Waste Disposal Report

Enclosure 2 : Effluents Released

Table 1C : GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
1. Fission gases					
xenon-131m	Ci	< LLD	< LLD	Note 2	< LLD
xenon-133	Ci	4.48 E+00	2.89 E+00	Note 2	3.41 E-05
xenon-133m	Ci	< LLD	< LLD	Note 2	< LLD
xenon-135	Ci	< LLD	6.39 E-02	Note 2	< LLD
xenon-135m	Ci	< LLD	< LLD	Note 2	< LLD
xenon-138	Ci	< LLD	< LLD	Note 2	< LLD
argon-41	Ci	< LLD	< LLD	Note 2	< LLD
krypton-85	Ci	< LLD	< LLD	Note 2	2.96 E-02
krypton-85m	Ci	< LLD	< LLD	Note 2	< LLD
krypton-87	Ci	< LLD	< LLD	Note 2	< LLD
krypton-88	Ci	< LLD	< LLD	Note 2	< LLD
Total for period	Ci	4.48 E+00	2.96 E+00	Note 2	2.96 E-02
2. Iodines					Note 1
iodine-131	Ci	< LLD	< LLD	Note 2	< LLD
iodine-133	Ci	< LLD	< LLD	Note 2	< LLD
iodine-135	Ci	< LLD	< LLD	Note 2	< LLD
Total for period	Ci	< LLD	< LLD	Note 2	< LLD
3. Particulates					Note 1
chromium-51	Ci	< LLD	< LLD	Note 2	1.51 E-06
manganese-54	Ci	< LLD	< LLD	Note 2	< LLD
cobalt-58	Ci	< LLD	< LLD	Note 2	8.17 E-07
iron-59	Ci	< LLD	< LLD	Note 2	< LLD
cobalt-60	Ci	2.13 E-05	3.56 E-05	Note 2	< LLD
zinc-65	Ci	< LLD	< LLD	Note 2	< LLD
strontium-89	Ci	< LLD	< LLD	Note 2	< LLD
strontium-90	Ci	< LLD	< LLD	Note 2	< LLD
niobium-95	Ci	< LLD	< LLD	Note 2	4.04 E-07
zirconium-95	Ci	< LLD	< LLD	Note 2	< LLD
molybdenum-99	Ci	< LLD	< LLD	Note 2	< LLD
cesium-134	Ci	< LLD	< LLD	Note 2	< LLD
cesium-137	Ci	< LLD	< LLD	Note 2	< LLD
barium-140	Ci	< LLD	< LLD	Note 2	< LLD
lanthanum-140	Ci	< LLD	< LLD	Note 2	< LLD
cerium-141	Ci	< LLD	< LLD	Note 2	< LLD
cerium-144	Ci	< LLD	< LLD	Note 2	< LLD
Total for period	Ci	2.13 E-05	3.56 E-05	Note 2	2.74 E-06

Note 1 -The particulate and iodine activities released from Waste Gas Decay Tank and Containment Purge batch releases are included in the determinations from the continuous releases. Those detectable particulate radionuclides in this column are due to the refueling outage that were not released via the stacks

Note 2 - No Batch Gaseous Releases were made during the First Quarter.

Appendix 2 (Continued): Effluent and Waste Disposal Report

Enclosure 2 : Effluents Released

Table 1C : GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission gases					
xenon-131m	Ci	< LLD	< LLD	< LLD	Note 2
xenon-133	Ci	1.69 E+00	8.59 E+00	< LLD	Note 2
xenon-133m	Ci	< LLD	< LLD	< LLD	Note 2
xenon-135	Ci	< LLD	< LLD	< LLD	Note 2
xenon-135m	Ci	< LLD	< LLD	< LLD	Note 2
xenon-138	Ci	< LLD	< LLD	< LLD	Note 2
argon-41	Ci	< LLD	< LLD	< LLD	Note 2
krypton-85	Ci	< LLD	< LLD	2.63 E-02	Note 2
krypton-85m	Ci	< LLD	< LLD	< LLD	Note 2
krypton-87	Ci	< LLD	< LLD	< LLD	Note 2
krypton-88	Ci	< LLD	< LLD	< LLD	Note 2
Total for period	Ci	1.69 E+00	8.59 E+00	2.63 E-02	Note 2
2. Iodines					
iodine-131	Ci	< LLD	< LLD	Note 1	Note 2
iodine-133	Ci	< LLD	< LLD	Note 1	Note 2
iodine-135	Ci	< LLD	< LLD	Note 1	Note 2
Total for period	Ci	< LLD	< LLD	Note 1	Note 2
3. Particulates					
chromium-51	Ci	< LLD	< LLD	Note 1	Note 2
manganese-54	Ci	< LLD	< LLD	Note 1	Note 2
cobalt-58	Ci	< LLD	< LLD	Note 1	Note 2
iron-59	Ci	< LLD	< LLD	Note 1	Note 2
cobalt-60	Ci	5.35 E-06	< LLD	Note 1	Note 2
zinc-65	Ci	< LLD	< LLD	Note 1	Note 2
strontium-89	Ci	< LLD	< LLD	Note 1	Note 2
strontium-90	Ci	< LLD	< LLD	Note 1	Note 2
niobium-95	Ci	<LLD	<LLD	Note 1	Note 2
zirconium-95	Ci	<LLD	<LLD	Note 1	Note 2
molybdenum-99	Ci	< LLD	< LLD	Note 1	Note 2
cesium-134	Ci	< LLD	< LLD	Note 1	Note 2
cesium-137	Ci	< LLD	< LLD	Note 1	Note 2
barium-140	Ci	< LLD	< LLD	Note 1	Note 2
lanthanum-140	Ci	< LLD	< LLD	Note 1	Note 2
cerium-141	Ci	< LLD	< LLD	Note 1	Note 2
cerium-144	Ci	< LLD	< LLD	Note 1	Note 2
Total for period	Ci	5.35 E-06	< LLD	Note 1	Note 2

Note 1 - The Particulate and Iodine activities released from Waste Gas Decay Tank batch releases are included in the determinations from the continuous releases.
Note 2 - No Batch Gaseous Releases were made during the Fourth Quarter.

Table 2A : LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES (FIRST SIX MONTHS)

		Unit	Quarter 1	Quarter 2	Est. Total Error %
A.	Fission and Activation products				
1.	Total release (not including tritium, gases, alpha)	Ci	8.70 E-03	1.83 E-02	3.28 E+01
2.	Average diluted concentration during period	µCi/ml	1.18 E-09	2.62 E-09	
3.	Percent of applicable limit	%	2.47 E-01	2.51 E-01	
B.	Tritium				
1.	Total release	Ci	1.98 E+02	1.08 E+02	5.43 E+01
2.	Average diluted concentration during period	µCi/ml	2.68 E-05	1.55 E-05	
3.	Percent of applicable limit	%	2.68 E+00	1.55 E+00	
C.	Dissolved and entrained gases				
1.	Total release	Ci	< LLD	< LLD	3.28 E+01
2.	Average diluted concentration during period	µCi/ml	< LLD	< LLD	
3.	Percent of applicable limit	%	0.00	0.00	
D.	Gross alpha radioactivity				
1.	Total release	Ci	< LLD	< LLD	3.28 E+01
E.	Volume of waste released (prior to dilution)	liters	8.75 E+05	1.55 E+06	2.00 E+01
F.	Volume of dilution water used during period	liters	7.39 E+09	6.99 E+09	2.00 E+01

Table 2A : LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES (SECOND SIX MONTHS)

		Unit	Quarter 3	Quarter 4	Est. Total Error %
A.	Fission and Activation products				
1.	Total release (not including tritium, gases, alpha)	Ci	1.34 E-02	4.20 E-03	3.28 E+01
2.	Average diluted concentration during period	µCi/ml	1.87 E-09	5.77 E-10	
3.	Percent of applicable limit	%	1.13 E-01	6.63 E-03	
B.	Tritium				
1.	Total release	Ci	5.50 E+01	6.63 E+00	5.43 E+01
2.	Average diluted concentration during period	µCi/ml	7.64 E-06	9.11 E-07	
3.	Percent of applicable limit	%	7.60 E-01	9.00 E-02	
C.	Dissolved and entrained gases				
1.	Total release	Ci	< LLD	< LLD	3.28 E+01
2.	Average diluted concentration during period	µCi/ml	< LLD	< LLD	
3.	Percent of applicable limit	%	0.00	0.00	
D.	Gross alpha radioactivity				
1.	Total release	Ci	< LLD	< LLD	3.28 E+01
E.	Volume of waste released (prior to dilution)	liters	8.29 E+05	2.90 E+05	2.00 E+01
F.	Volume of dilution water used during period	liters	7.20 E+09	7.29 E+09	2.00 E+01

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 2 : Effluents Released

Table 2B : LIQUID EFFLUENTS

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
chromium-51	Ci	< LLD	< LLD	< LLD	2.13 E-04
manganese-54	Ci	< LLD	< LLD	< LLD	3.99 E-05
iron-55	Ci	< LLD	< LLD	5.43 E-04	4.65 E-04
cobalt-57	Ci	< LLD	< LLD	< LLD	< LLD
cobalt-58	Ci	< LLD	< LLD	6.43 E-05	8.53 E-03
iron-59	Ci	< LLD	< LLD	< LLD	3.87 E-07
cobalt-60	Ci	< LLD	< LLD	5.00 E-03	3.28 E-03
nickel-63	Ci	< LLD	< LLD	5.11 E-04	1.23 E-03
strontium-89	Ci	< LLD	< LLD	< LLD	< LLD
strontium-90	Ci	< LLD	< LLD	< LLD	< LLD
zirconium-95	Ci	< LLD	< LLD	< LLD	2.25 E-05
zirconium-97	Ci	< LLD	< LLD	< LLD	8.00 E-07
niobium-95	Ci	< LLD	< LLD	< LLD	6.32 E-05
niobium-97	Ci	< LLD	< LLD	< LLD	9.41 E-07
technicium-99m	Ci	< LLD	< LLD	< LLD	1.01 E-07
ruthenium-106	Ci	< LLD	< LLD	<LLD	< LLD
antimony-124	Ci	< LLD	< LLD	< LLD	1.58 E-05
antimony-125	Ci	< LLD	< LLD	2.49 E-03	4.41 E-03
antimony-126	Ci	< LLD	< LLD	<LLD	< LLD
tellurium-132	Ci	< LLD	< LLD	<LLD	< LLD
iodine-131	Ci	< LLD	< LLD	9.57 E-05	1.11 E-05
iodine-133	Ci	< LLD	< LLD	< LLD	< LLD
cesium-134	Ci	< LLD	< LLD	< LLD	< LLD
cesium-137	Ci	< LLD	< LLD	< LLD	1.23 E-05
barium-139	Ci	< LLD	< LLD	< LLD	< LLD
barium-140	Ci	< LLD	< LLD	<LLD	< LLD
lanthanum-140	Ci	< LLD	< LLD	< LLD	< LLD
cerium-141	Ci	< LLD	< LLD	< LLD	< LLD
cerium-144	Ci	< LLD	< LLD	< LLD	< LLD
TOTAL	Ci	< LLD	< LLD	8.70 E-03	1.83 E-02
xenon-133	Ci	< LLD	< LLD	< LLD	< LLD
xenon-133m	Ci	< LLD	< LLD	< LLD	< LLD
xenon-135	Ci	< LLD	< LLD	< LLD	< LLD
TOTAL	Ci	< LLD	< LLD	< LLD	< LLD
Tritium	Ci	4.17 E-02	6.91 E-02	1.98 E+02	1.08 E+02

Table 2B : LIQUID EFFLUENTS

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
chromium-51	Ci	< LLD	< LLD	1.08 E-04	< LLD
manganese-54	Ci	< LLD	< LLD	3.18 E-05	4.34 E-05
iron-55	Ci	< LLD	< LLD	1.50 E-03	5.25 E-04
cobalt-57	Ci	< LLD	< LLD	< LLD	< LLD
cobalt-58	Ci	< LLD	< LLD	2.18 E-03	4.83 E-04
iron-59	Ci	< LLD	< LLD	< LLD	< LLD
cobalt-60	Ci	< LLD	< LLD	2.07 E-03	2.02 E-03
nickel-63	Ci	< LLD	< LLD	1.19 E-03	4.18 E-04
zinc-65	Ci	< LLD	< LLD	< LLD	< LLD
strontium-89	Ci	< LLD	< LLD	< LLD	< LLD
strontium-90	Ci	< LLD	< LLD	< LLD	< LLD
zirconium-95	Ci	< LLD	< LLD	< LLD	< LLD
niobium-95	Ci	< LLD	< LLD	2.78 E-05	2.80 E-05
technicium-99m	Ci	< LLD	< LLD	< LLD	< LLD
molybdenum-99	Ci	< LLD	< LLD	< LLD	< LLD
ruthenium-106	Ci	< LLD	< LLD	< LLD	< LLD
antimony-124	Ci	< LLD	< LLD	<LLD	< LLD
antimony-125	Ci	< LLD	< LLD	6.29 E-03	6.84 E-04
antimony-126	Ci	< LLD	< LLD	<LLD	< LLD
tellurium-132	Ci	< LLD	< LLD	< LLD	< LLD
iodine-131	Ci	< LLD	< LLD	< LLD	< LLD
iodine-133	Ci	< LLD	< LLD	< LLD	< LLD
cesium-134	Ci	< LLD	< LLD	< LLD	< LLD
cesium-137	Ci	< LLD	< LLD	3.94 E-05	< LLD
barium-139	Ci	< LLD	< LLD	< LLD	< LLD
barium-140	Ci	< LLD	< LLD	< LLD	< LLD
lanthanum-140	Ci	< LLD	< LLD	< LLD	< LLD
cerium-141	Ci	< LLD	< LLD	< LLD	< LLD
cerium-144	Ci	< LLD	< LLD	< LLD	< LLD
TOTAL	Ci	< LLD	< LLD	1.34 E-02	4.20 E-03
xenon-133	Ci	< LLD	< LLD	< LLD	< LLD
xenon-133m	Ci	< LLD	< LLD	< LLD	< LLD
xenon-135	Ci	< LLD	< LLD	< LLD	< LLD
TOTAL	Ci	< LLD	< LLD	< LLD	< LLD
tritium	Ci	1.66 E-01	1.24 E-01	5.50 E+01	6.63 E+00

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 3 : Solid Waste Disposal

Table 3 : SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

NOTE: Values reported in Table 3 section 1.A.a. refer to radioactive solid waste materials processed and buried during 2000.

Values reported in Table 3 section 1.A.b. refer to radioactive solid waste materials previously processed and returned to HNP from 1995 through 1998. These materials have been reported on previous Regulatory Guide 1.21 reports during calendar years 1995 though 1998. These materials are included in this annual report as they have further decayed in-storage and have been shipped for burial during 2000.

Table 3 includes Harris Environmental Energy Center (HEEC) solid radioactive wastes processed and commingled with HNP solid radioactive wastes.

1. Solid Waste Shipped for Burial or Disposal (WASTE CLASS A)

A. Type of Waste

a. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed and buried during 2000.

Number of Shipments	12
Activity Shipped	1.87 E+01 Ci
Estimated Total Error	96%
Quantity Shipped	3.55 E+01 m^3
Solidification Agent	N/A
Container Type	NRC-Approved Package
Shipment Form	Dewatered, Compacted

b. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed during 1995 through 1999 and buried during 2000.

Number of Shipments	3
Activity Shipped	4.83 E+01 Ci
Estimated Total Error	96%
Quantity Shipped	5.09 E+00 m^3
Solidification Agent	N/A
Container Type	NRC-Approved Package
Shipment Form	Dewatered, Compacted

c. Irradiated Components, Control Rods, etc.

No waste of this type was shipped during this Report Period.

d. Other (Describe)

No waste of this type was shipped during this Report Period.

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 3 : Solid Waste Disposal

Table 3 : SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

1. Solid Waste Shipped for Burial or Disposal (WASTE CLASS A)

B. Estimate of Major Nuclide Composition (by type of Waste)

a. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed and buried during 2000.

Nuclide	Percent Composition	Total Activity Ci
H-3	9.96E-02	7.82E-04
C-14	7.01E-02	5.50E-04
Cr-51	6.62E+00	5.20E-02
Mn-54	1.93E+00	1.52E-02
Fe-55	3.40E+01	2.67E-01
Co-58	7.71E+00	6.05E-02
Co-60	1.34E+01	1.05E-01
Ni-63	4.84E+00	3.80E-02
Sr-90	6.70E-06	5.26E-08
Zr-95	1.21E+01	9.49E-02
Nb-95	1.48E+01	1.16E-01
Cs-134	8.19E-01	6.43E-03
Cs-137	3.61E+00	2.84E-02
Co-57	5.84E-05	4.59E-07
Sb-125	4.45E-02	3.49E-04

b. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed during 1995 through 1999 and buried during 2000.

Nuclide	Percent Composition	Total Activity Ci
H-3	9.52E-02	4.60E-02
C-14	5.07E-02	2.45E-02
Mn-54	6.44E-02	3.11E-02
Fe-55	5.90E+01	2.85E+01
Co-58	1.53E-07	7.40E-08
Co-60	2.85E+01	1.38E+01
Ni-63	1.19E+01	5.77E+00
Sr-90	1.42E-03	6.87E-04
Cs-134	1.14E-04	5.50E-05
Cs-137	1.12E-01	5.41E-02
Pu-238	4.77E-04	2.31E-04
Pu-239	3.58E-04	1.73E-04
Pu-241	1.81E-01	8.76E-02
Am-241	3.79E-04	1.83E-04
Cm-242	5.29E-06	2.55E-06
Cm-243	2.54E-03	1.23E-03

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 3 : Solid Waste Disposal

Table 3 : SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

1. Solid Waste Shipped for Burial or Disposal (WASTE CLASS A)

C. Solid Waste Disposal

Number of Shipments *	15
Mode of Transportation	Truck
Destination	Envirocare Facility, Utah
Destination	Barnwell Facility, South Carolina

* Seven type 1.A.a shipments were made from the GTS/Duratek processing facility in Oak Ridge, Tennessee. Two type 1.A.a shipments were made from Manufacturing Sciences Corporation in Oak Ridge, Tennessee. Three type 1.A.a shipments were made from the Studsvik facility in Oak Ridge, Tennessee. Three 1.A.b shipments were make from the Harris Nuclear Power Station, New Hill, North Carolina.

2. Solid Waste Shipped for Burial or Disposal (WASTE CLASS B)

A. Type of Waste

a. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed and buried during 2000.

Number of Shipments	1
Activity Shipped	9.69 E+00 Ci
Estimated Total Error	96%
Quantity Shipped	1.28 E-01 m^3
Solidification Agent	N/A
Container Type	NRC-Approved Package
Shipment Form	Dewatered, Compacted

b. Irradiated Components, Control Rods, etc.

No waste of this type was shipped during this Report Period.

c. Other (Describe)

No waste of this type was shipped during this Report Period.

Appendix 2 (Continued): Effluent and Waste Disposal Report
Enclosure 3 : Solid Waste Disposal

Table 3 : SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

B. Estimate of Major Nuclide Composition (by type of Waste)

a. Dry Compressible Waste (DAW), Contaminated Equipment, etc.
Note: Waste processed and buried during 2000.

Nuclide	Percent Composition	Total Activity Ci
H-3	4.64E-06	4.49E-07
C-14	5.89E-04	5.71E-05
Mn-54	5.70E-02	5.52E-03
Fe-55	2.65E+00	2.57E-01
Co-57	6.25E-03	6.06E-04
Co-58	1.74E-04	1.68E-05
Co-60	6.22E+01	6.02E+00
Ni-63	3.29E+01	3.18E+00
Sr-90	3.23E-02	3.13E-03
Sb-125	4.89E-01	4.74E-02
Cs-134	1.33E+00	1.28E-01
Cs-137	3.43E-01	3.32E-02
Ce-144	2.49E-02	2.41E-03
Pu-238	5.42E-04	5.25E-05
Pu-239	3.96E-04	3.84E-05
Pu-241	4.90E-02	4.75E-03
Am-241	4.46E-04	4.32E-05
Cm-242	8.60E-07	8.34E-08
Cm-243	6.70E-04	6.49E-05
Tc-99	1.64E-04	1.59E-05
I-129	1.47E-04	5.44E-05

C. Solid Waste Disposal

Number of Shipments *	1
Mode of Transportation	Truck
Destination	Barnwell Facility, South Carolina

* One, type 2.A.a shipment was made from the Studsvik facility in Oak Ridge, Tennessee.

3. Solid Waste Shipped for Burial or Disposal (WASTE CLASS C)

No waste of this type was shipped during this Report Period.

4. Irradiated Fuel Shipments (Disposition)

No irradiated fuel was shipped during this Report Period.

Appendix 3: Changes to the Offsite Dose Calculation Manual (ODCM)
ODCM Operational Requirement 6.14.c

During 2000, there were no ODCM revisions.

Appendix 4 : Changes to the Environmental Monitoring Program

Enclosure 1 : Environmental Monitoring Program
Offsite Dose Calculation Manual
Operational Requirement 3.12.1.c

As a result of the annual land-use census, which was performed during August and September, 2000, no changes were required to the Environmental Monitoring Program.

Enclosure 2 : Land Use Census
Offsite Dose Calculation Manual
Operational Requirements 3.12.2.a and 3.12.2.b

The land-use census that was completed in September, 2000 resulted in no changes to the Environmental Monitoring Program.

Appendix 5 : Additional ODCM Operational Requirements

Enclosure 1 : Inoperability of Liquid Effluent Monitors
ODCM Operational Requirement 3.3.3.10, Action b

Monitors Out-of-Service > 30 Days During this Report Period

Radioactivity Monitors Providing Alarms and Automatic Termination of Release

The instruments listed in ODCM Operational Requirement 3.3.3.10 were reviewed for operability during 2000 per the Condition Reporting Process. None were inoperable for greater than 30 continuous days during this report period.

Enclosure 2 : Inoperability of Gaseous Effluent Monitors
ODCM Operational Requirement 3.3.3.11
(Radiation Gas Monitors)

Monitors Out-of-Service > 30 Days During this Report Period

Radioactivity Monitors Providing Alarms and Automatic Termination of Release

The instruments listed in ODCM Operational Requirement 3.3.3.11 were reviewed for operability during 2000 per the Condition Reporting Process. None were inoperable for greater than 30 continuous days during this report period.

Enclosure 3 : Unprotected Outdoor Tanks Exceeding Limits
ODCM Operational Requirement 3.11.1.4, Action a

No unprotected outdoor tank exceeded the ODCM Operational Requirement limit during this report period.

Enclosure 4 : Gas Storage Tanks Exceeding Limits
ODCM Operational Requirement 3.11.2.6, Action a

No gas storage tank exceeded the ODCM Operational Requirement limit during this report period.

Appendix 6 : Major Modifications to Radwaste System
ODCM Operational Requirement F.3

No major modifications were made to the Radwaste System during this report period.

Appendix 7 : Meteorological Data
ODCM Operational Requirement F.2

As allowed by the Footnote to Operational Requirement F.2, the annual summary of meteorological data will be retained electronically on file at corporate headquarters. This data will be provided to the NRC upon request.

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 1: Population Doses Due to Effluent Releases

1. Integrated Population Dose Due to Liquid Effluents (man-rem)

A. 50 mile Ingestion Zone

	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI	Skin
SPORT FISH	2.87 E-02	2.26 E-02	1.97 E-02	1.47 E-02	1.65 E-02	1.54 E-02	2.53 E-02	0.00 E+00
COM FISH	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
SPORT INVERT	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
COM INVERT	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
DRINKING WATER	2.50 E-02	1.46 E+00	1.46 E+00	1.45 E+00	1.45 E+00	1.45 E+00	1.47 E+00	0.00 E+00
SHORELINE	3.12 E-02	3.12 E-02	3.12 E-02	3.12 E-02	3.12 E-02	3.12 E-02	3.12 E-02	3.66 E-02
SWIMMING	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	0.00 E+00
BOATING	8.37 E-05	8.37 E-05	8.37 E-05	8.37 E-05	8.37 E-05	8.37 E-05	8.37 E-05	0.00 E+00
IRRI VEG	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
IRRI LEAFY VEG	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
IRRI MILK	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
IRRI MEAT	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
ALL PATHWAYS	8.51 E-02	1.51 E+00	1.51 E+00	1.50 E+00	1.50 E+00	1.50 E+00	1.53 E+00	3.66 E-02

B. Tritium (Hydrosphere)

	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
Total	0.00 E+00	4.92 E-03	4.92 E-03	4.92 E-03	4.92 E-03	4.92 E-03	4.92 E-03

2. Integrated Population Dose Due to Gaseous Effluents (man-rem)

50 mile Ingestion Zone

	T. Body	GI-LLI	Bone	Liver	Kidney	Thyroid	Lung	Skin
PLUME	4.44 E-03	4.44 E-03	4.44 E-03	4.44 E-03	4.44 E-03	4.44 E-03	4.76 E-03	1.53 E-02
GROUND PLANE	1.24 E-03	1.24 E-03	1.24 E-03	1.24 E-03	1.24 E-03	1.24 E-03	1.24 E-03	1.46 E-03
INHALATION	1.17 E-01	1.17 E-01	4.59 E-09	1.17 E-01	1.17 E-01	1.17 E-01	1.17 E-01	1.17 E-01
VEGETATION	3.30 E-02	3.30 E-02	1.65 E-11	3.29 E-02	3.29 E-02	3.29 E-02	3.29 E-02	3.29 E-02
COW MILK	7.94 E-03	7.94 E-03	6.36 E-13	7.94 E-03	7.94 E-03	7.94 E-03	7.94 E-03	7.94 E-03
MEAT & POULTRY	1.45 E-02	1.45 E-02	1.81 E-10	1.45 E-02	1.45 E-02	1.45 E-02	1.45 E-02	1.45 E-02
TOTAL	1.78 E-01	1.78 E-01	5.68 E-03	1.78 E-01	1.78 E-01	1.78 E-01	1.78 E-01	1.89 E-01

Appendix 8: Assessment of Radiation Doses

Enclosure 2: Doses to General Public Due to Activities Inside Site Boundary

1. Individual Dose Due to Liquid Effluents (mrem/yr.)

ADULT	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**GI-LLI**	**Skin**
FISH	1.47 E-02	1.32 E-02	1.20 E-02	8.84 E-03	9.88 E-03	9.24 E-03	1.61 E-02	
DRINKING	2.20 E-06	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	1.66 E-04	1.69 E-04	
SHORELINE	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.82 E-03
BOATING	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	
TOTAL	1.80 E-02	1.67 E-02	1.55 E-02	1.23 E-02	1.34 E-02	1.27 E-02	1.96 E-02	3.82 E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	10.0	1.0	48.00	
DRINKING	10.0	59.2	24.00	
SHORELINE	12.0	1.0	24.00	
BOATING	100.0	1.0	24.00	

TEEN	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	1.61 E-02	1.19 E-02	9.51 E-03	7.14 E-03	8.28 E-03	7.65 E-03	1.25 E-02	
DRINKING	3.00 E-06	1.68 E-04	1.68 E-04	1.67 E-04	1.67 E-04	1.67 E-04	1.70 E-04	
SHORELINE	2.71 E-03	2.71 E-03	2.71 E-03	2.71 E-03	2.71 E-03	2.71 E-03	2.71 E-03	3.18 E-03
BOATING	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	
TOTAL	1.89 E-02	1.49 E-02	1.25 E-02	1.01 E-02	1.12 E-02	1.06 E-02	1.55 E-02	3.18 E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	8.0	1.0	48.00	
DRINKING	10.0	59.2	24.00	
SHORELINE	10.0	1.0	24.00	
BOATING	100.0	1.0	24.00	

CHILD	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	2.43 E-02	1.19 E-02	8.97 E-03	6.84 E-03	7.98 E-03	7.32 E-03	8.99E-03	
DRINKING	9.10 E-06	3.21 E-04	3.22 E-04	3.21 E-04	3.20 E-04	3.21 E-04	3.23E-04	
SHORELINE	1.36 E-03	1.36 E-03	1.36 E-03	1.36 E-03	1.36 E-03	1.36 E-03	1.36E-03	1.59 E-03
BOATING	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55 E-05	7.55E-05	
TOTAL	2.58 E-02	1.37 E-02	1.07 E-02	8.60 E-03	9.74 E-03	9.08 E-03	1.07E-02	1.59 E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	4.0	1.0	48.00	
DRINKING	10.0	59.2	24.00	
SHORELINE	5.0	1.0	24.00	
BOATING	100.0	1.0	24.00	

Appendix 8: Assessment of Radiation Doses

Enclosure 2: Doses to General Public Due to Activities Inside Site Boundary (Continued)

2. Individual Dose Due to Gaseous Effluents (mrem/yr.)

ADULT	**T. Body**	**GI-LLI**	**Bone**	**Liver**	**Kidney**	**Thyroid**	**Lung**	**Skin**
PLUME	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.53 E-04	4.10 E-04
GROUND PLANE	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.25 E-04
INHALATION	2.44 E-03	2.44 E-03	3.08 E-11	2.44 E-03	2.44 E-03	2.44 E-03	2.45 E-03	2.44 E-03
TOTAL	2.69 E-03	2.69 E-03	2.53 E-04	2.69 E-03	2.69 E-03	2.69 E-03	2.71 E-03	2.98 E-03
TEEN								
PLUME	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.53 E-04	4.10 E-04
GROUND PLANE	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.25 E-04
INHALATION	2.45 E-03	2.45 E-03	4.06 E-11	2.45 E-03	2.45 E-03	2.45 E-03	2.47 E-03	2.45 E-03
TOTAL	2.70 E-03	2.70 E-03	2.53 E-04	2.70 E-03	2.70 E-03	2.70 E-03	2.73 E-03	2.99 E-03
CHILD								
PLUME	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.46 E-04	1.53 E-04	4.10 E-04
GROUND PLANE	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.07 E-04	1.25 E-04
INHALATION	2.17 E-03	2.17 E-03	5.14 E-11	2.17 E-03	2.17 E-03	2.17 E-03	2.18 E-03	2.17 E-03
TOTAL	2.42 E-03	2.42 E-03	2.53 E-04	2.42 E-03	2.42 E-03	2.42 E-03	2.44 E-03	2.71 E-03

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 3: Doses to Most Likely Exposed Member of the Public

1. Individual Dose Due to Liquid Effluents (mrem/yr.)

ADULT	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	3.09 E-02	2.77 E-02	2.51 E-02	1.86 E-02	2.07 E-02	1.94 E-02	3.38 E-02	
DRINKING	1.61 E-04	1.21 E-02	1.21 E-02	1.21 E-02	1.21 E-02	1.21 E-02	1.23 E-02	
SHORELINE	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.26 E-03	3.82 E-03
SWIMMING	1.81 E-04	1.81 E-04	1.81 E-04	1.81 E-04	1.81 E-04	1.81 E-04	1.81 E-04	
BOATING	2.08 E-04	2.08 E-04	2.08 E-04	2.08 E-04	2.08 E-04	2.08 E-04	2.08 E-04	
TOTAL	3.47 E-02	4.35 E-02	4.09 E-02	3.43 E-02	3.65 E-02	3.51 E-02	4.97 E-02	3.82 E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	21.0	1.0	48.00	
DRINKING	730.0	59.2	24.00	
SHORELINE	12.0	1.0	24.00	
SWIMMING	120.0	1.0	24.00	
BOATING	275.0	1.0	24.00	

TEEN	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	3.22 E-02	2.38 E-02	1.90 E-02	1.43 E-02	1.66 E-02	1.53 E-02	2.49 E-02	
DRINKING	1.53 E-04	8.55 E-03	8.56 E-03	8.54 E-03	8.54 E-03	8.54 E-03	8.67 E-03	
SHORELINE	1.82 E-02	1.82 E-02	1.82 E-02	1.82 E-02	1.82 E-02	1.82 E-02	1.82 E-02	2.13 E-02
SWIMMING	2.72 E-04	2.72 E-04	2.72 E-04	2.72 E-04	2.72 E-04	2.72 E-04	2.72 E-04	
BOATING	3.02 E-04	3.02 E-04	3.02 E-04	3.02 E-04	3.02 E-04	3.02 E-04	3.02 E-04	
TOTAL	5.11 E-02	5.11 E-02	4.63 E-02	4.16 E-02	4.39 E-02	4.26 E-02	5.23 E-02	2.13 E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	16.0	1.0	48.00	
DRINKING	510.0	59.2	24.00	
SHORELINE	67.0	1.0	24.00	
SWIMMING	180.0	1.0	24.00	
BOATING	400.0	1.0	24.00	

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 3: Doses to Most Likely Exposed Member of the Public

1. Individual Dose Due to Liquid Effluents (mrem/yr.)

CHILD	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	4.20 E-02	2.05 E-02	1.55 E-02	1.18 E-02	1.38 E-02	1.26 E-02	1.55 E-02	
DRINKING	4.64 E-04	1.64 E-02	1.64 E-02	1.63 E-02	1.63 E-02	1.64 E-02	1.65 E-02	
SHORELINE	3.80 E-03	3.80 E-03	3.80 E-03	3.80 E-03	3.80 E-03	3.80 E-03	3.80 E-03	4.45 E-03
SWIMMING	9.06 E-05	9.06 E-05	9.06 E-05	9.06 E-05	9.06 E-05	9.06 E-05	9.06 E-05	
BOATING	1.13 E-04	1.13 E-04	1.13 E-04	1.13 E-04	1.13 E-04	1.13 E-04	1.13 E-04	
TOTAL	4.65 E-02	4.09 E-02	3.59 E-02	3.21 E-02	3.41 E-02	3.30 E-02	3.60 E-02	4.45 E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	6.9	1.0	48.00	
DRINKING	510.0	59.2	24.00	
SHORELINE	14.0	1.0	24.00	
SWIMMING	60.0	1.0	24.00	
BOATING	150.0	1.0	24.00	

INFANT	**Bone**	**Liver**	**T. Body**	**Thyroid**	**Kidney**	**Lung**	**Gi-LLI**	**Skin**
FISH	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	
DRINKING	3.61 E-04	1.61 E-02	1.61 E-02	1.60 E-02	1.60 E-02	1.61 E-02	1.61 E-02	
SHORELINE	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
TOTAL	3.61 E-04	1.61 E-02	1.61 E-02	1.60 E-02	1.60 E-02	1.61 E-02	1.61 E-02	0.00 E+00

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.3
FISH	0.0	1.0	48.00	
DRINKING	330.0	59.2	24.00	

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 3: Doses to Most Likely Exposed Member of the Public

2. Individual Dose Due to Gaseous Effluents (mrem/yr.)

A. Maximum Hypothetical Individual - Exposure from Noble Gases, Particulates, Iodines, and Tritium

ADULT	**T. Body**	**GI-LLI**	**Bone**	**Liver**	**Kidney**	**Thyroid**	**Lung**	**Skin**
PLUME	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.10 E-03	2.94 E-03
GROUND PLANE	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	6.18 E-04
INHALATION	1.75 E-02	1.76 E-02	1.14 E-10	1.75 E-02	1.75 E-02	1.75 E-02	1.76 E-02	1.75 E-02
VEGETATION	2.98 E-02	2.99 E-02	8.77 E-12	2.98 E-02	2.98 E-02	2.98 E-02	2.98 E-02	2.98 E-02
COW MILK	7.05 E-03	7.06 E-03	5.33 E-13	7.05 E-03	7.05 E-03	7.05 E-03	7.05 E-03	7.05 E-03
MEAT & POULTRY	3.01 E-03	3.02 E-03	5.36 E-11	3.00 E-03	3.00 E-03	3.00 E-03	3.00 E-03	3.00 E-03
TOTAL	5.89 E-02	5.91 E-02	1.57 E-03	5.89 E-02	5.89 E-02	5.89 E-02	5.91 E-02	6.10 E-02
TEEN								
PLUME	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.10 E-03	2.94 E-03
GROUND PLANE	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	6.18 E-04
INHALATION	1.77 E-02	1.77 E-02	1.51 E-10	1.77 E-02	1.77 E-02	1.77 E-02	1.78 E-02	1.77 E-02
VEGETATION	3.50 E-02	3.51 E-02	1.26 E-11	3.50 E-02	3.50 E-02	3.50 E-02	3.50 E-02	3.50 E-02
COW MILK	9.19 E-03	9.19 E-03	9.09 E-13	9.19 E-03	9.19 E-03	9.19 E-03	9.19 E-03	9.19 E-03
MEAT & POULTRY	1.79 E-03	1.80 E-03	4.19 E-11	1.79 E-03	1.79 E-03	1.79 E-03	1.79 E-03	1.79 E-03
TOTAL	6.52 E-02	6.54 E-02	1.57 E-03	6.52 E-02	6.52 E-02	6.52 E-02	6.54 E-02	6.72 E-02
CHILD								
PLUME	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.10 E-03	2.94 E-03
GROUND PLANE	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	6.18 E-04
INHALATION	1.56 E-02	1.56 E-02	1.91 E-10	1.56 E-02	1.56 E-02	1.56 E-02	1.57 E-02	1.56 E-02
VEGETATION	5.47 E-02	5.47 E-02	2.74 E-11	5.47 E-02	5.47 E-02	5.47 E-02	5.47 E-02	5.47 E-02
COW MILK	1.45 E-02	1.45 E-02	2.05 E-12	1.45 E-02	1.45 E-02	1.45 E-02	1.45 E-02	1.45 E-02
MEAT & POULTRY	2.17 E-03	2.17 E-03	7.23 E-11	2.17 E-03	2.16 E-03	2.16 E-03	2.16 E-03	2.16 E-03
TOTAL	8.85 E-02	8.85 E-02	1.57 E-03	8.85 E-02	8.85 E-02	8.85 E-02	8.87 E-02	9.05 E-02
INFANT								
PLUME	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.04 E-03	1.10 E-03	2.94 E-03
GROUND PLANE	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	5.26 E-04	6.18 E-04
INHALATION	8.98 E-03	8.98 E-03	1.27 E-10	8.98 E-03	8.98 E-03	8.98 E-03	9.04 E-03	8.98 E-03
COW MILK	2.20 E-02	2.20 E-02	3.83 E-12	2.20 E-02	2.20 E-02	2.20 E-02	2.20 E-02	2.20 E-02
TOTAL	3.26 E-02	3.26 E-02	1.57 E-03	3.26 E-02	3.26 E-02	3.26 E-02	3.27 E-02	3.45 E-02

Appendix 8: Assessment of Radiation Doses

Enclosure 3: Doses to Most Likely Exposed Member of the Public

2. Individual Dose Due to Gaseous Effluents (mrem/yr.)

B. Maximum Real Individual - Exposure from Noble Gases, Particulates, Iodines, and Tritium

ADULT	**T. Body**	**GI-LLI**	**Bone**	**Liver**	**Kidney**	**Thyroid**	**Lung**	**Skin**
PLUME	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.35 E-04	6.42 E-04
GROUND PLANE	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.78 E-04
INHALATION	3.76 E-03	3.76 E-03	7.94 E-10	3.76 E-03	3.76 E-03	3.76 E-03	3.78 E-03	3.76 E-03
VEGETATION	6.40 E-03	6.41 E-03	2.25 E-11	6.39 E-03	6.39 E-03	6.39 E-03	6.39 E-03	6.39 E-03
TOTAL	1.05 E-02	1.06 E-02	3.75 E-04	1.05 E-02	1.05 E-02	1.05 E-02	1.06 E-02	1.10 E-02
TEEN								
PLUME	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.35 E-04	6.42 E-04
GROUND PLANE	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.78 E-04
INHALATION	3.79 E-03	3.79 E-03	1.05 E-09	3.79 E-03	3.79 E-03	3.79 E-03	3.81 E-03	3.79 E-03
VEGETATION	7.52 E-03	7.53 E-03	3.21 E-11	7.51 E-03	7.51 E-03	7.51 E-03	7.51 E-03	7.51 E-03
TOTAL	1.17 E-02	1.17 E-02	3.75 E-04	1.17 E-02	1.17 E-02	1.17 E-02	1.17 E-02	1.21 E-02
CHILD								
PLUME	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.35 E-04	6.42 E-04
GROUND PLANE	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.78 E-04
INHALATION	3.35 E-03	3.35 E-03	1.32 E-09	3.35 E-03	3.35 E-03	3.35 E-03	3.37 E-03	3.35 E-03
VEGETATION	1.17 E-02	1.17 E-02	7.01 E-11	1.17 E-02	1.17 E-02	1.17 E-02	1.17 E-02	1.17 E-02
TOTAL	1.54 E-02	1.54 E-02	3.75 E-04	1.54 E-02	1.54 E-02	1.54 E-02	1.55 E-02	1.59 E-02
INFANT								
PLUME	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.24 E-04	2.35 E-04	6.42 E-04
GROUND PLANE	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.51 E-04	1.78 E-04
INHALATION	1.93 E-03	1.93 E-03	8.84 E-10	1.93 E-03	1.93 E-03	1.93 E-03	1.94 E-03	1.93 E-03
TOTAL	2.31 E-03	2.31 E-03	3.75 E-04	2.31 E-03	2.31 E-03	2.31 E-03	2.33 E-03	2.75 E-03

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 3: Doses to Most Likely Exposed Member of the Public

3. Annual Air Dose (mrad)

A. Maximum Hypothetical Individual:	Beta = 5.26 E-03	Gamma = 1.78 E-03
B. Maximum Real Individual:	Beta = 1.15 E-03	Gamma = 3.83 E-04

4. Doses Due to Direct Radiation from the Harris Plant

On-going environmental TLD dose measurements show that the offsite Direct Radiation Dose is negligible.

Annual Radioactive Effluent Release Report
January 1, 2000 to December 31, 2000

Appendix 8: Assessment of Radiation Doses

Enclosure 4 : Major Assumptions Used to Calculate Radiation Doses

1. Doses Due to Liquid Effluents

A. Dilution Factors

Location	Value	Exposure Pathways
Harris Lake	1.00 E+00	Shoreline, Swimming, Boating, Fish Consumption
Cape Fear River	5.92 E+01*	Shoreline, Drinking Water
Cape Fear River/ Raven Rock Park	5.92 E+01*	Boating

* The dilution of 5.92 E+01 is calculated using the average flow of the Buckhorn Creek (measured at the gauging station at Corinth, N.C.) which is the blowdown of Harris Lake (38.9 CFS) and the average flow of the Cape Fear River (2300 CFS) as measured at the gauging station at Lillington, N.C. The above information was provided by the United States Geological Service for 2000.

B. Populations Affected

Location	Value	Exposure Pathways
Harris Lake	1.10 E+05 person-hours	Shoreline, Swimming, Boating
Harnett County	4.52 E+04 persons	Drinking Water
Dunn Intake	1.67 E+04 persons	Drinking Water
Fayetteville Area	1.40 E+05 persons	Drinking Water
Fuquay-Varina	2.68 E+03 persons	Drinking Water
Holly Springs	2.27 E+02 persons	Drinking Water
Harris Lake/ Cape Fear River	7.84 E+03 person-hours	Fishing
Cape Fear River/ Raven Rock Park	5.00 E+04 person-hours	Boating
Raven Rock Park	4.40 E+05 person-hours	Shoreline

C. The doses from liquid effluents for "Activities Inside the Site Boundary" use the Cape Fear River as the Drinking Water supply year round and Harris Lake on site using the following assumptions:

Pathway	Fish	Shoreline	Boating	Drinking Water
Usage	kg/yr	hr/yr	hr/yr	l/yr
Adult	10	12	100	10
Teen	8	10	100	10
Child	4	5	100	10

Appendix 8: Assessment of Radiation Doses

Enclosure 4 : Major Assumptions Used to Calculate Radiation Doses

2. Doses Due to Gaseous Effluents

A. The 50 mile Ingestion Zone population is 1.68 E+06 persons.

B. The Maximum Real Individual is located at 3058 meters in the NNE sector.
This is based on the 2000 land use census with applicable pathways.

C. The Maximum Hypothetical Individual is located on the site boundary at 2140 meters in the SSW sector.

D. The dose calculations for the Inside the Site Boundary is in the SE sector at 1219 meters.
The number hours per year used for this calculation is 876 hours based on the following assumptions:

Activity	Boating	Swimming	Fishing*	Other**
Hours/year	100	100	480	196

* 80 fishing trips/year times 6 hours/day equals 480 hours/year.
** 98 days/year times 2 hours/day for hiking, bird watching, & etc. equals 196 hours.

E. Concurrent meteorology for batch and continuous releases was used for all radiological dose calculations.
The doses from each mode were summed to obtain the annual dose.