10 CFR 50.36a(a)(2)
TS 5.6.3

Progress Energy

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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

2004 ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Ladies and Gentlemen:

Attached is the Annual Radioactive Effluent Release Report for the period of January 1, 2004, through December 31, 2004, for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. This report is submitted in accordance with 10 CFR 50.36a(a)(2) and the HBRSEP, Unit No. 2, Technical Specifications Section 5.6.3.

If you have any questions concerning this report, please contact me at 843-857-1253.

Sincerely,

C. T. Baucom
Supervisor - Licensing/Regulatory Programs

RAC/rac

Attachment

c: Dr. W. D. Travers, NRC, Region II
Mr. C. P. Patel, NRC, NRR (w/o Attachment)
NRC Resident Inspector

IE48

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

EFFLUENT AND WASTE DISPOSAL

ANNUAL REPORT

January 1, 2004 - December 31, 2004

PROGRESS ENERGY CAROLINAS

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

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I. EXECUTIVE SUMMARY

A. 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 H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, 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, HBRSEP and Progress Energy Carolinas Inc., minimize health risk and 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 reactor coolant water. The types of radioactive material released are noble gases, iodines and particulates, and tritium.

The noble gas fission products in the reactor coolant water are released as a gas when the coolant is depressurized. These gases are collected by a system designed for collection and storage for radioactive decay prior to release to the environment.

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

3. Noble Gas

Some of the fission products released in airborne effluents are radioactive isotopes of noble gases, such as krypton, argon, and xenon. Noble gases are by nature inert and do not concentrate in humans or other organisms. Noble gases contribute to human radiation exposure as external exposure.

4. Iodines and Particulates

Annual releases of iodines, and those particulates with half-lives greater than eight days were 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 particulates 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 reactor coolant. Tritium is a weak beta particle emitter and contributes very little radiation exposure to the human body, and when tritium is inhaled or ingested it 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 controls include 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 provides 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 below the regulatory limits, i.e., typically at less than 50 percent of the regulatory limit, to ensure that the limits are not exceeded. If a monitor alarms, a release to the environment from a tank is automatically suspended. Additionally, releases are sampled and analyzed in the laboratory prior to discharge to the environment. The sampling and analysis done in the laboratory provides a more sensitive and precise method of determining pre-effluent composition than in-plant monitoring instruments.

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

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

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 (i.e., water) and meteorological (i.e., 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 fish consumption, and direct exposure from the lake at the shoreline and 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 by 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 HBRSEP, Unit No. 2, 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, 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, field irrigation, and usage factors.

8. Results

The Radioactive Effluent Release Report is a detailed listing of the radioactivity released from the HBRSEP, Unit No. 2, during the period from January 1, 2004 through December 31, 2004.

During the period of January 1, 2004 through December 31, 2004, the estimated maximum individual offsite dose due to radioactivity released in effluents was:

Liquid Effluents:

- Total Body Dose 0.000663 millirem
- Critical Organ Dose 0.000722 millirem, Liver

Gaseous Effluents:

- Beta Air Dose 0.00165 millirad
- Gamma Air Dose 0.00396 millirad
- Critical Organ Dose 0.08160 millirem, Lung

B. Significant Variances

The following are explanations of significant variances in this Annual Report:

1. The 10 CFR 50, Appendix I, doses were calculated using the Canberra Effluent Management System (EMS[1]). The EMS Software provides day-by-day dose estimates that are conservative because all releases are assigned to the limiting receptor, using the continuous ground level dispersion factors calculated from 1978 meteorology.

2. After 523 days of continuous operation, HBRSEP Unit No. 2 was removed from service on April 19, 2004 for a refueling outage. Power Operation was resumed on May 28, 2004. Continued good fuel and reactor coolant system integrity, kept gaseous and liquid effluent totals relatively low in 2004. Some of the gaseous and liquid release parameters for this reporting period are summarized below:

[1] EMS, Effluent Management Software is a product of Canberra Nuclear Industries used for determining curies and dose released from routine radioactive effluent releases.

GASEOUS EFFLUENTS

	Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Fission & Act. Gas	Ci	4.78E-02	1.62E-01	2.67E-02	3.30E-02
I-131	Ci	<LLD	1.04E-08	<LLD	<LLD
Part. >8 Day Half-Lives	Ci	1.20E-06	3.99E-06	5.88E-09	3.26E-07
Tritium	Ci	1.37E+00	2.07E+00	1.26E+00	1.23E+00

LIQUID EFFLUENTS

	Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Fission & Act. Products	Ci	2.46E-03	3.54E-03	3.21E-03	5.71E-04
Tritium	Ci	3.38E+02	1.66E+02	2.39E+00	7.56E+01
Dilution Volume	Liters	2.82E+11	2.18E+11	2.91E+11	2.89E+11
Waste Volume	Liters	9.82E+06	2.70E+06	1.55E+05	3.83E+05

C. Regulatory Compliance

1. When projected on a day-by-day basis utilizing conservative meteorological conditions, the dose commitment from gaseous and liquid effluents is a small fraction of the 10 CFR 50, Appendix I, limits. The direct radiation assessment to the most likely exposed member of the public is reported in the Annual Radiological Environmental Operating Report. During 2004 the results of the direct radiation assessment demonstrated no measurable effect above background for plant operations.

2. There were no changes to the waste solidification Process Control Program (PCP) during this reporting period. See page 36.

3. There were no changes to the Radioactive Waste Systems (i.e., liquid, gaseous, or solid) during this reporting period. See page 36.

4. There were no reportable instrumentation inoperability events during this reporting period. See page 36.

5. There were no outside liquid holdup tanks that exceeded the 10 curie limit during this reporting period. See page 36.

6. There were no Waste Gas Decay Tanks that exceeded the 1.9E+04 curie limit during this reporting period. See page 36.

7. There were 3 revisions to the ODCM during this reporting period. See page 34.

II. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Fission and Activation Gases:

10 CFR 20 Limits (Instantaneous Release Rate)
Total Body Dose ≤500 mrem/yr
Skin Dose ≤3000 mrem/yr
10 CFR 50, Appendix I
For Calendar Quarter
Gamma Dose ≤5 mrad
Beta Dose ≤10 mrad
For Calendar Year
Gamma Dose ≤10 mrad
Beta Dose ≤20 mrad

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

10 CFR 20 Limits (Instantaneous Release Rate)
Dose from Inhalation (only) to a child to any organ ≤1500 mrem/yr
10 CFR 50, Appendix I (Organ Doses)
For Calendar Quarter ≤7.5 mrem
For Calendar Year ≤15 mrem

3. Liquids:

Concentrations are specified in 10 CFR 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.00E-04 μCi/ml total activity.

10 CFR 50, 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

B. Measurements and Approximations of Total Radioactivity

1. Continuous Gaseous Releases

a) Fission and Activation Gases - The total activity released is determined from the net count rate of the gaseous monitor, its calibration factor, and the total exhaust flow. The activity of radioactive gas is determined by the fraction of that radioactive gas in the isotopic analysis for that period.

b) Iodines - The activity released as Iodine-131, 133, and 135 is based on isotopic analysis of the charcoal cartridge and particulate filter, and the total exhaust flow.

c) Particulates - The activity released via particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters and the total exhaust flow.

d) Tritium - The activity released as tritium is based on weekly grab sample analysis and total exhaust flow.

2. Batch Gaseous Releases

a) Fission and Activation Gases - The activity released is based on the volume released and the activity of the individual nuclides obtained from an isotopic analysis of the grab sample taken prior to the release.

b) Iodines - The iodines from mixed mode batch releases are included in the iodine determination from the mixed mode continuous Reactor Auxiliary Building release.

c) Particulates - The particulates from mixed mode batch releases are included in the particulate determination from the mixed mode continuous Reactor Auxiliary Building release.

d) Tritium - The activity released as tritium is based on the grab sample analysis of each batch and the batch volume.

3. Liquid Releases

a) Fission and Activation Products - The total release values (not including tritium, gases, and alpha) are comprised of the sum of the individual radionuclide activities in each release to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent.

b) Tritium and Alpha - The measured tritium and alpha concentrations in a monthly composite sample are used to calculate the total release and average diluted concentration during each period.

c) Strontium-89, 90, and Iron-55 - The total release values are measured quarterly from composite samples.

C. Estimated Total Errors

1. Estimated total errors for gaseous effluents are based on uncertainties in counting equipment calibration, counting statistics, exhaust flow rates, exhaust sample flow rates, non-steady release 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, non-steady release flow rate, sampling and mixing losses, and volume determinations.

3. Estimated total errors for solid waste are based on uncertainties in equipment calibration, dose rate measurements, geometry, and volume determinations.

III. GASEOUS EFFLUENTS

A. Batch Releases

	Jan - June 2004	July - Dec 2004
Number of batch releases	7.1E+01	4.7E+01
Total time period for batch releases	3.95E+04 min	4.17E+04 min
Maximum time period for a batch release	2.76E+03 min	1.31E+04 min
Average time period for a batch release	5.56E+02 min	8.87E+02 min
Minimum time period for a batch release	2.30E+01 min	1.40E+01 min

B. Abnormal Releases

	Jan - June 2004	July - Dec 2004
Number of releases	0.00E+00	0.00E+00
Total activity released	0.00E+00 Ci	0.00E+00 Ci

C. Data Tables

The following tables provide the details of gaseous releases:

Table III-A Summation of All Releases
Table III-B Ground Level and Mixed Mode Releases
Table III-C Typical Lower Limits of Detection for Gaseous Effluents

TABLE III-A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Gases				
1. Total release	Ci	4.78E-02	1.62E-01	3.63E+01
2. Average release rate for period	µCi/sec	6.08E-03	2.06E-02	
B. Iodines				
1. Total Iodine-131	Ci	<LLD	1.04E-08	1.74E+01
2. Average release rate for period	µCi/sec	<LLD	1.32E-09	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	1.20E-06	3.99E-06	1.05E+01
2. Average release rate for period	µCi/sec	1.53E-07	5.08E-07	
3. Gross alpha radioactivity	Ci	<LLD	<LLD	
D. Tritium				
1. Total release	Ci	1.37E+00	2.07E+00	2.31E+01
2. Average release rate for period	µCi/sec	1.74E-01	2.63E-01	
E. Percent of 10 CFR 50, Appendix I				
1. Quarterly limit				
Gamma air	%	2.24E-02	2.94E-02	
Beta air	%	3.97E-03	7.65E-03	
Organ: Lung	%	2.51E-01	3.80E-01	
2. Annual limit				
Gamma air	%	1.12E-02*	2.59E-02*	
Beta air	%	1.99E-03*	5.81E-03*	
Organ: Lung	%	1.26E-01*	3.16E-01*	

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE III-A
(Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Gases				
1. Total release	Ci	2.67E-02	3.30E-02	3.63E+01
2. Average release rate for period	µCi/sec	3.36E-03	4.15E-03	
B. Iodines				
1. Total Iodine-131	Ci	<LLD	<LLD	1.74E+01
2. Average release rate for period	µCi/sec	<LLD	<LLD	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	5.88E-09	3.26E-07	1.05E+01
2. Average release rate for period	µCi/sec	7.39E-10	4.10E-08	
3. Gross alpha radioactivity	Ci	<LLD	<LLD	
D. Tritium				
1. Total release	Ci	1.26E+00	1.23E+00	2.31E+01
2. Average release rate for period	µCi/sec	1.58E-01	1.55E-01	
E. Percent of 10 CFR 50, Appendix I				
1. Quarterly limit				
Gamma air	%	1.25E-02	1.50E-02	
Beta air	%	2.22E-03	2.68E-03	
Organ: Lung	%	2.30E-01	2.27E-01	
2. Annual limit				
Gamma air	%	3.21E-02*	3.96E-02*	
Beta air	%	6.91E-03*	8.26E-03*	
Organ: Lung	%	4.31E-01*	5.44E-01*	

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE III-B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
GASEOUS EFFLUENTS - GROUND LEVEL AND MIXED MODE RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
1. Fission Gases					
Ar-41	Ci	<LLD	<LLD	4.70E-02	5.78E-02
Xe-131m	Ci	<LLD	<LLD	5.03E-05	2.33E-04
Xe-133	Ci	<LLD	8.59E-02	7.90E-04	1.75E-02
Xe-133m	Ci	<LLD	<LLD	<LLD	1.51E-04
Xe-135	Ci	<LLD	<LLD	<LLD	8.42E-05
Total for Period	Ci	<LLD	8.59E-02	4.78E-02	7.57E-02
2. Iodines[1]					
I-131	Ci	<LLD	<LLD	<LLD	1.04E-08
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	<LLD	1.04E-08
3. Particulates[1]					
Co-58	Ci	<LLD	1.37E-06	<LLD	6.77E-07
Co-60	Ci	1.17E-07	1.77E-07	1.08E-06	1.02E-06
Nb-95	Ci	<LLD	<LLD	<LLD	4.38E-07
Cs-137	Ci	<LLD	<LLD	<LLD	3.13E-07
Total for Period	Ci	1.17E-07	1.55E-06	1.08E-06	2.45E-06

[1]Mixed mode continuous accountability includes mixed mode batch accountability (excludes tritium).

TABLE III-B
(Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
GASEOUS EFFLUENTS - GROUND LEVEL AND MIXED MODE RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Ar-41	Ci	<LLD	<LLD	2.62E-02	3.14E-02
Xe-133	Ci	2.98E-08	<LLD	4.77E-04	1.54E-03
Xe-133m	Ci	<LLD	<LLD	<LLD	2.01E-05
Xe-135	Ci	<LLD	<LLD	<LLD	2.69E-05
Total for Period	Ci	2.98E-08	<LLD	2.67E-02	3.30E-02
2. Iodines[1]					
I-131	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	<LLD	<LLD
3. Particulates[1]					
Co-60	Ci	<LLD	<LLD	5.88E-09	3.20E-07
Cs-137	Ci	<LLD	<LLD	<LLD	5.50E-09
Total for Period	Ci	<LLD	<LLD	5.88E-09	3.26E-07

[1]Mixed mode continuous accountability includes mixed mode batch accountability (excludes tritium).

TABLE III-C
TYPICAL LOWER LIMITS OF DETECTION FOR GASEOUS EFFLUENTS

Nuclide	LLD (μCi/cc)
H-3	2.00 E-09
Ar-41	6.24 E-08
Mn-54	2.01 E-14
Co-58	1.17 E-14
Fe-59	3.02 E-14
Co-60	1.95 E-14
Zn-65	3.74 E-14
Br-82	4.15 E-13
Kr-85	8.21 E-06
Kr-85m	2.43 E-08
Kr-87	6.29 E-08
Kr-88	9.18 E-08
Sr-89	3.10 E-15
Sr-90	1.73 E-15
Mo-99	3.69 E-13
I-131	4.84 E-14
Xe-131m	6.59 E-07
I-133	1.81 E-12
Xe-133	3.35 E-08
Xe-133m	1.54 E-07
Cs-134	1.41 E-14
I-135	5.66 E-11
Xe-135	2.11 E-08
Xe-135m	4.82 E-07
Cs-137	2.73 E-14
Xe-138	1.45 E-06
Ba-140	5.43 E-14
La-140	3.18 E-14
Ce-141	1.09 E-14
Ce-144	5.55 E-14
Gross Alpha	2.34 E-15

IV. LIQUID EFFLUENTS

A. Batch Releases

	Jan - June 2004	July - Dec 2004
Number of batch releases	7.2E+01	2.0E+01
Total time period for batch releases	1.27E+04 min	3.55E+03 min
Maximum time period for a batch release	2.81E+02 min	2.49E+02 min
Average time period for a batch release	1.77E+02 min	1.77E+02 min
Minimum time period for a batch release	7.20E+01 min	2.00E+01 min
Average stream flow during release periods	5.04E+05 gpm	5.78E+05 gpm

B. Abnormal Releases

	Jan - June 2004	July - Dec 2004
Number of releases	0.00E+00	0.00E+00
Total activity released	0.00E+00 Ci	0.00E+00 Ci

C. Data Tables

The following tables provide the details of liquid releases:

Table IV-A Summation of All Releases
Table IV-B Continuous Mode and Batch Mode Releases
Table IV-C Typical Lower Limits of Detection for Liquid Effluents

TABLE IV-A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and Activation Products				
1. Total release (not including tritium, gases, alpha)	Ci	2.46E-03	3.54E-03	1.07E+01
2. Average diluted concentration during period	µCi/ml	8.71E-12	1.62E-11	
B. Tritium				
1. Total release	Ci	3.38E+02	1.66E+02	9.20E+00
2. Average diluted concentration during period	µCi/ml	1.20E-06	7.61E-07	
C. Dissolved and entrained gases				
1. Total release	Ci	2.95E-03	2.38E-02	9.60E+00
2. Average diluted concentration during period	µCi/ml	1.05E-11	1.09E-10	
3. Percent of applicable limit	%	5.25E-06	5.45E-05	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	1.83E+01
E. Volume of waste released prior to dilution	Liters	9.82E+06	2.70E+06	
F. Volume of dilution water used during period	Liters	2.82E+11	2.18E+11	
G. Percent of 10 CFR 50, Appendix I				
1. Quarterly Limit				
Organ: Liver	%	6.43E-03	7.91E-03	
Total body	%	2.13E-02	2.25E-02	
2. Annual Limit				
Organ: Liver	%	3.22E-03*	7.17E-03*	
Total body	%	1.07E-02*	2.19E-02*	

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE IV-A
(Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and Activation Products				
1. Total release (not including tritium, gases, alpha)	Ci	3.21E-03	5.71E-04	1.07E+01
2. Average diluted concentration during period	µCi/ml	1.10E-11	1.97E-12	
B. Tritium				
1. Total release	Ci	2.39E+00	7.56E+01	9.20E+00
2. Average diluted concentration during period	µCi/ml	8.22E-09	2.61E-07	
C. Dissolved and entrained gases				
1. Total release	Ci	<LLD	9.28E-05	9.60E+00
2. Average diluted concentration during period	µCi/ml	<LLD	3.21E-13	
3. Percent of applicable limit	%	NA	1.61E-07	
D. Gross alpha radioactivity				
1. Total release	Ci	<LLD	<LLD	1.83E+01
E. Volume of waste released prior to dilution	Liters	1.55E+05	3.83E+05	
F. Volume of dilution water used during period	Liters	2.91E+11	2.89E+11	
G. Percent of 10 CFR 50, Appendix I				
1. Quarterly Limit				
Organ: GI-LLI	%	1.08E-05	NA	
Organ: Liver	%	NA	9.64E-05	
Total body	%	1.75E-05	2.92E-04	
2. Annual Limit				
Organ: Liver	%	7.17E-03*	7.22E-03*	
Total body	%	2.20E-02*	2.21E-02*	

*Cumulative total for the year-to-date using the methodology in the ODCM.

TABLE IV-B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
LIQUID EFFLUENTS - CONTINUOUS MODE AND BATCH MODE RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
H-3	Ci	1.29E-02	0.00E+00	3.38E+02	1.66E+02
F-18	Ci	3.22E-04	2.47E-05	0.00E+00	0.00E+00
Cr-51	Ci	0.00E+00	0.00E+00	1.30E-05	8.88E-06
Fe-55	Ci	0.00E+00	0.00E+00	2.25E-05	2.68E-05
Co-58	Ci	0.00E+00	0.00E+00	3.85E-06	2.35E-04
Co-60	Ci	0.00E+00	0.00E+00	4.75E-04	1.79E-03
Ag-110m	Ci	0.00E+00	0.00E+00	3.37E-05	0.00E+00
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	5.06E-04
Sb-125	Ci	0.00E+00	0.00E+00	1.55E-03	8.96E-04
Te-123m	Ci	0.00E+00	0.00E+00	0.00E+00	3.85E-07
Cs-137	Ci	0.00E+00	0.00E+00	4.05E-05	4.67E-05
Total for Period	Ci	3.22E-04	2.47E-05	2.14E-03	3.51E-03
Xe-131m	Ci	0.00E+00	0.00E+00	1.07E-05	1.99E-05
Xe-133	Ci	0.00E+00	0.00E+00	2.94E-03	2.33E-02
Xe-133m	Ci	0.00E+00	0.00E+00	3.41E-06	3.25E-04
Xe-135	Ci	0.00E+00	0.00E+00	0.00E+00	1.51E-04
Xe-135m	Ci	0.00E+00	0.00E+00	0.00E+00	5.00E-06
Total for Period	Ci	0.00E+00	0.00E+00	2.95E-03	2.38E-02

TABLE IV-B
(Continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT - 2004
LIQUID EFFLUENTS - CONTINUOUS MODE AND BATCH MODE RELEASES

		Continuous Mode		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci	0.00E+00	0.00E+00	2.39E+00	7.56E+01
Fe-55	Ci	0.00E+00	0.00E+00	2.64E-05	1.36E-12
Co-58	Ci	0.00E+00	0.00E+00	4.02E-05	3.87E-05
Co-60	Ci	0.00E+00	0.00E+00	6.01E-04	3.04E-04
Ag-110m	Ci	0.00E+00	0.00E+00	0.00E+00	4.32E-06
Sb-124	Ci	0.00E+00	0.00E+00	5.00E-04	1.70E-05
Sb-125	Ci	0.00E+00	0.00E+00	2.04E-03	1.98E-04
Cs-137	Ci	0.00E+00	0.00E+00	2.20E-06	9.05E-06
Total for Period	Ci	<LLD	<LLD	1.42E-03	1.39E-03
Xe-133	Ci	0.00E+00	0.00E+00	0.00E+00	8.98E-05
Xe-135	Ci	0.00E+00	0.00E+00	0.00E+00	3.07E-06
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	9.28E-05

TABLE IV-C
TYPICAL LOWER LIMITS OF DETECTION FOR LIQUID EFFLUENTS

Nuclide	LLD (μCi/ml)
H-3	3.79 E-06
Cr-51	1.86 E-07
Mn-54	2.73 E-08
Fe-55	7.96 E-08
Co-57	2.37 E-08
Co-58	3.21 E-08
Fe-59	4.03 E-08
Co-60	2.96 E-08
Zn-65	5.89 E-08
Sr-89	3.02 E-08
Sr-90	1.20 E-08
Nb-95	3.47 E-08
Zr-95	3.76 E-08
Mo-99	2.62 E-07
Tc-99m	3.32 E-08
Ag-110m	3.40 E-08
Sn-113	3.67 E-08
Sb-122	4.43 E-08
Te-123m	2.84 E-08
Sb-124	9.32 E-08
Sb-125	8.10 E-08
Xe-127	3.92 E-07
I-131	3.38 E-08
Xe-131m	1.17 E-06
Te-132	2.44 E-08
Xe-133	9.53 E-08
Xe-133m	2.77 E-07
Cs-134	2.37 E-08
Xe-135	1.45 E-07
Cs-137	3.39 E-08
Ba-140	5.04 E-08
La-140	3.72 E-08
Ce-141	3.56 E-08
Ce-144	2.07 E-07
Gross Alpha	5.01 E-08

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
Report Time Period: January 1, 2004, through December 31, 2004

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

Waste Class A

1.	Type of Waste	Unit	Period Total	Est. Total Error (%)	Solid. Agent	Cont. Type	Form	No. Ship.
a)	Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	7.69E+00 1.03E+01	1.00E+00 2.07E+01	N/A	HIC	Normal	2
b)	Dry compressible waste, contaminated equipment, etc.	m^3 Ci	5.62E+02 9.23E-01	1.00E+00 2.07E+01	N/A	STP	Normal	9
c)	Irradiated components, control rods, etc.	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A
d)	Other:	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A

STP = Strong Tight Package
HIC = High Integrity Container

2. Estimate of major nuclide composition (by type of waste)

		%	Ci
a.	Ni-63	3.67E+01	3.77E+00
	Fe-55	2.58E+01	2.65E+00
	Co-60	2.08E+01	2.14E+00
	H-3	4.68E+00	4.81E-01
	Sb-125	3.78E+00	3.89E-01
	C-14	3.20E+00	3.29E-01
	Mn-54	2.18E+00	2.24E-01
	Co-58	1.72E+00	1.77E-01
	Cs-137	3.26E-01	3.35E-02
	Zn-65	2.96E-01	3.04E-02
	Co-57	1.92E-01	1.98E-02
	Ag-110m	1.05E-01	1.08E-02
	Others*	2.26E-01	2.32E-02
b.	Co-58	2.83E+01	2.62E-01
	Fe-55	1.58E+01	1.46E-01
	Nb-95	1.39E+01	1.28E-01
	Co-60	1.20E+01	1.11E-01
	Zr-95	1.06E+01	9.78E-02
	Ni-63	8.07E+00	7.46E-02
	C-14	4.58E+00	4.23E-02
	Cr-51	2.43E+00	2.24E-02
	H-3	2.01E+00	1.86E-02
	Ag-110m	5.21E-01	4.81E-03
	Mn-54	4.60E-01	4.24E-03
	Sn-113	4.01E-01	3.70E-03
	Others**	8.87E-01	8.19E-03
c.	N/A	N/A	N/A
d.	N/A	N/A	N/A

3. Solid Waste Disposition

Number of Shipments:	11
Mode of Transportation	Highway - Exclusive Use
Destination	Barnwell, Duratek

* Others include: Sr-89, Sr-90, Tc-99, Sn-113, Te-123m, Sb-124, I-129, Ce-144, Pu-238, Pu-241, Cm-243
** Others include: Co-57, Fe-59, Sr-90, Tc-99, Te-123m, Sb-124, Sb-125, I-129, Cs-137, Ce-144, Pu-238, Pu-239, Am-241, Pu-241, Cm-242, Cm-243

Total Curie Quantity and Principle Radionuclides were determined by estimate.

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
Report Time Period: January 1, 2004, through December 31, 2004

B. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

Waste Class B

1.	Type of Waste	Unit	Period Total	Est. Total Error (%)	Solid. Agent	Cont. Type	Form	No. Ship.
a)	Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	3.85E+00 3.16E+01	1.00E+00 2.07E+01	N/A	HIC	Normal	1
b)	Dry compressible waste, contaminated equipment, etc.	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A
c)	Irradiated components, control rods, etc.	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A
d)	Other:	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A

HIC = High Integrity Container

2. Estimate of major nuclide composition (by type of waste)

		%	Ci
a.	Ni-63	3.67E+01	1.16E+01
	Fe-55	2.81E+01	8.88E+00
	Co-60	2.15E+01	6.80E+00
	H-3	4.37E+00	1.38E+00
	Sb-125	3.45E+00	1.09E+00
	C-14	3.29E+00	1.04E+00
	Mn-54	1.45E+00	4.57E-01
	Co-58	3.39E-01	1.07E-01
	Ag-110m	2.37E-01	7.49E-02
	Cs-137	1.95E-01	6.17E-02
	Co-57	1.81E-01	5.71E-02
	Ce-144	7.56E-02	2.39E-02
	Others*	8.81E-02	2.78E-02
b.	N/A	N/A	N/A
c.	N/A	N/A	N/A
d.	N/A	N/A	N/A

* Others include: Sr-90, Tc-99, Sn-113, I-129, Pu-238, Pu-241, Cm-243

3. Solid Waste Disposition

Number of Shipments: 1
Mode of Transportation: Highway - Exclusive Use
Destination: Barnwell

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
Report Time Period: January 1, 2004, through December 31, 2004

C. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

Waste Class C

1.	Type of Waste	Unit	Period Total	Est. Total Error (%)	Solid. Agent	Cont. Type	Form	No. Ship.
a)	Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	3.85E+00 1.50E+01	1.00E+00 2.07E+01	None	HIC	Normal	1
b)	Dry compressible waste, contaminated equipment, etc.	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A
c)	Irradiated components, control rods, etc.	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A
d)	Other:	m^3 Ci	N/A	N/A	N/A	N/A	N/A	N/A

HIC = High Integrity Container

2. Estimate of major nuclide composition (by type of waste)

		%	Ci
a.	Co-60	3.40E+01	5.11E+00
	Fe-55	2.95E+01	4.44E+00
	Ni-63	1.87E+01	2.81E+00
	C-14	1.12E+01	1.69E+00
	Co-58	3.51E+00	5.28E-01
	Ag-110m	7.78E-01	1.17E-01
	Sb-125	6.72E-01	1.01E-01
	Mn-54	5.97E-01	8.97E-02
	Nb-95	2.37E-01	3.56E-02
	Zr-95	2.06E-01	3.09E-02
	Co-57	8.78E-02	1.32E-02
	Sn-113	8.25E-02	1.24E-02
	Others*	3.83E-01	5.75E-02
b.	N/A	N/A	N/A
c.	N/A	N/A	N/A
d.	N/A	N/A	N/A

3. Solid Waste Disposition

Number of Shipments: 1
Mode of Transportation: Highway - Exclusive Use
Destination: Barnwell

* Others include: H-3, Cr-51, Fe-59, Ni-59, Sr-90, Tc-99, Te-123m, Sb-124, I-129, Cs-137, Ce-144, Pu-238, Pu-239, Am-241, Pu-241, Cm-242, Cm-243

Total Curie Quantity and Principle Radionuclides were determined by estimate.

D. IRRADIATED FUEL SHIPMENTS
Number of Shipments: 1
Mode of Transportation: Exclusive Use – Rail
Destination: Shearon Harris Nuclear Power Plant

VI. 40 CFR 190 DOSE CONFORMANCE

The direct radiation assessment to the most likely exposed member of the public is reported in the Annual Radiological Environmental Operating Report. The results of the assessment demonstrate no measurable affect above background from plant operations. Since no 10 CFR 50, Appendix I, limits have been exceeded and the evaluation of the Independent Spent Fuel Storage Installation indicates only a small fraction of the total dose to the environs, this demonstrates conformance with 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operation."

VII. METEOROLOGICAL DATA

A. Continuous Release Diffusion Analysis

Table VII-A presents the number and frequency of wind direction occurrences by wind speed class as recorded at the onsite meteorological system during continuous release, for the period January 1, 2004, through December 31, 2004.

The frequencies are presented as a percent of total occurrences for each stability class, as well as a summary for all classes for the lower (11 meter) sensor elevation.

Pertinent information available from the tables is as follows:

1. Stability

Percent occurrence Pasquill Stability categories based on lower level (11 meter) wind distribution:

A	B	C	D	E	F	G
4.75	5.84	7.18	41.52	23.96	8.81	7.94

2. Wind Speed — 11 Meter

Average Speed (mph)	4.26
Percent Calm	7.27
Percent Less than 3.5 mph	48.06

3. Wind Direction — 11 Meter

Prevailing	S
Percent Occurrence	13.21

TABLE VII-A JOINT OCCURRENCE FREQUENCIES FOR LOWNDDEG AND LOWNDSPD - CONTINUOUS RELEASES

Atmospheric Stability Class A

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.00	0.00	0.01	0.03	0.02	0.07	0.03	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.22
3.35	0.18	0.10	0.06	0.06	0.05	0.05	0.13	0.36	0.29	0.47	0.44	0.34	0.28	0.12	0.03	0.02	2.98
5.59	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.31	0.30	0.02	0.01	0.03	0.12	0.23	0.15	1.46
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.09
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.42	0.10	0.07	0.09	0.07	0.12	0.16	0.38	0.62	0.77	0.47	0.37	0.31	0.23	0.33	0.22	4.75

Atmospheric Stability Class B

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.02	0.00	0.06	0.03	0.14	0.14	0.13	0.07	0.02	0.02	0.09	0.07	0.06	0.01	0.00	0.00	0.87
3.35	0.35	0.34	0.20	0.13	0.07	0.05	0.18	0.30	0.34	0.44	0.57	0.37	0.45	0.20	0.07	0.09	4.15
5.59	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.07	0.07	0.01	0.01	0.05	0.06	0.14	0.77
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.05
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.57	0.34	0.26	0.16	0.21	0.19	0.30	0.37	0.52	0.54	0.73	0.45	0.53	0.26	0.15	0.26	5.84

Atmospheric Stability Class C

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.56	0.02	0.08	0.18	0.13	0.21	0.21	0.22	0.05	0.07	0.06	0.08	0.13	0.14	0.05	0.05	0.02	1.69
3.35	0.58	0.55	0.36	0.22	0.06	0.03	0.14	0.30	0.36	0.58	0.54	0.36	0.26	0.16	0.10	0.13	4.75
5.59	0.20	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.05	0.02	0.00	0.01	0.07	0.10	0.06	0.65
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.07	0.08
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.80	0.68	0.54	0.35	0.27	0.25	0.36	0.35	0.53	0.69	0.64	0.49	0.41	0.28	0.27	0.28	7.18

Atmospheric Stability Class D

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.01	0.03	0.04	0.03	0.02	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.28
1.56	0.66	1.84	1.95	1.35	0.99	0.96	1.10	1.39	0.76	0.73	0.84	0.84	0.57	0.31	0.20	0.20	14.70
3.35	4.13	3.30	1.45	1.06	0.41	0.06	0.14	2.44	2.44	1.69	1.15	0.57	0.61	0.51	0.45	0.68	21.09
5.59	1.31	0.36	0.02	0.00	0.00	0.00	0.00	0.30	0.84	0.47	0.16	0.06	0.00	0.03	0.27	0.98	4.80
8.27	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.21	0.03	0.00	0.00	0.00	0.00	0.10	0.20	0.61
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	6.15	5.55	3.45	2.44	1.42	1.03	1.26	4.17	4.26	2.94	2.17	1.49	1.19	0.87	1.03	2.10	41.52

Atmospheric Stability Class E

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.07	0.08	0.07	0.04	0.02	0.01	0.02	0.12	0.22	0.16	0.09	0.08	0.07	0.04	0.05	0.05	1.20
1.56	0.78	0.91	0.82	0.50	0.20	0.12	0.28	1.38	2.52	1.85	1.01	0.94	0.82	0.47	0.53	0.56	13.68
3.35	0.54	0.14	0.02	0.05	0.00	0.02	0.02	0.88	1.81	1.38	0.55	0.15	0.16	0.30	0.55	1.15	7.72
5.59	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.08	0.40	0.08	0.01	0.00	0.00	0.03	0.07	0.54	1.24
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.40	1.14	0.91	0.59	0.22	0.15	0.33	2.47	5.00	3.48	1.66	1.18	1.05	0.85	1.20	2.33	23.96

Atmospheric Stability Class F

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.04	0.05	0.02	0.01	0.00	0.01	0.01	0.17	0.30	0.24	0.21	0.14	0.09	0.07	0.16	0.12	1.66
1.56	0.15	0.18	0.08	0.05	0.00	0.05	0.03	0.63	1.11	0.88	0.78	0.53	0.33	0.25	0.58	0.45	6.07
3.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.06	0.03	0.00	0.00	0.01	0.28	0.54	1.02
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.06
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.19	0.22	0.10	0.06	0.00	0.06	0.04	0.84	1.47	1.17	1.03	0.67	0.42	0.32	1.05	1.16	8.81

Atmospheric Stability Class G

Max (M/S)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.34	0.12	0.05	0.01	0.00	0.01	0.04	0.14	0.28	0.43	0.28	0.30	0.31	0.18	0.31	0.96	0.69	4.13
1.56	0.10	0.05	0.01	0.00	0.01	0.03	0.12	0.25	0.37	0.25	0.26	0.27	0.15	0.27	0.83	0.60	3.56
3.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.05	0.19	0.26
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.23	0.10	0.03	0.00	0.03	0.08	0.25	0.53	0.81	0.53	0.57	0.58	0.33	0.59	1.84	1.47	7.94

Frequency	9.76	8.14	5.36	3.70	2.21	1.87	2.71	9.11	13.21	10.11	7.27	5.23	4.23	3.40	5.86	7.83	100.00

CHANGES TO ODCM, PCP, AND RADIOACTIVE WASTE SYSTEMS

TABLE OF CONTENTS
Enclosure 1

I. CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

There were 3 revisions to the ODCM during this reporting period. A summary of the revisions are shown below. A complete copy of the updated ODCM is being submitted in a separate letter.

ODCM Rev 23
Description of Changes

1. Equations 2.5-8, 3.5-7, & 3.5-11 show the quarterly projected dose equations for liquid & gaseous releases. The incorrect constant 31 has been replaced with 92 in all three equations.

2. Table 2.6-1 specifies Radioactive Liquid Effluent Monitoring Instrumentation.
   a. The numbering sequence in the table for Steam Generator Blowdown Effluent Line (continued) was incorrect. The number was corrected to 2.c
   b. Section 4 of this table list the required tanks that have tank level indicating device requirements. This section was clarified to change temporary tanks to outside temporary tanks. This change is consistent with TRM 3.19.

3. Table 2.8-1 specifies the Radioactive Liquid Waste Sampling & Analysis Program.
   a. The release pathways Condensate Polisher Waste Water Discharge & Settling Ponds have been added to the Continuous Releases section. This is consistent with NUREG-0472.
   b. Note g has been added explaining that normal sampling is performed by a composite sampler in lieu of the daily grab sample. This is consistent with NUREG-0472.
   c. The sampling frequency for tritium & gross alpha on continuous releases was changed from Monthly to Daily. This is consistent with NUREG-0472.

4. Table 3.12-1 specifies the Radioactive Gaseous Waste Sampling & Analysis Program. A requirement for tritium sampling of Waste Gas Decay Tanks has been added. Tritium is present in the Waste Gas Decay Tanks and is not otherwise accounted for.

5. Section 4.4 specifies the land use census requirements. This section was clarified to state that a land use census may be conducted by any one of the listed methods. This is not a change in methodology as the wording already stated 'or'.

6. Figure 4-1 and 4-2 are maps that display the Radiological sampling locations. Table 4.5-1 describes the sample points.
   a. Sample Point 40 for was used for two different samples. Sample point 40 for ground water has been renumbered to sample point 64.
   b. Sample Point 43 on the map 4-1 has been removed as sample point 43 was deleted as a sample in a previous rev of the ODCM.
   c. Sample Point locations 5, 6, & 56 were moved on the map 4-1 to more accurately reflect the actual locations of these sample points.

7. Section 5.6.3 lists the required ratios for inter-laboratory comparison samples. The required ratio for a resolution of <4 was blank. The required ratios were obtained from NRC inspection guidance 83502.01

8. Figure D-1 is a functional schematic of the Liquid Waste Process Stream. This figure has been modified to correct the monitor tank flow path and add the flow integrator.

9. Figure D-2 is a functional schematic of the Gaseous Waste Process. This figure has been modified to add the Upper Fuel Handling Building as a release pathway through the Plant Vent.

ODCM Rev 24
Description of Changes

1. Note 10 on table 4.5-1 was added to TLD sample points 56. This note states that the sample point was used for ISFSI monitoring. This note was also clarified. These changes did not result in any changes in monitoring for the ISFSI.

2. TLD sample point 13 on table 4.5-1 had a street name incorrectly spelled. The street name has been corrected from Sampit Road to Sandpit Road.

3. Note 9 on page 4-21 for sample point 62 has been deleted. The footnote for note 9 only references sample points 50 and 51.

4. Figure 4-1 which shows Radiological Sample Locations Near Site was changed to make minor editorial improvements. No sample points changes or frequencies are being made.

    a. Sample point 3 was redrawn on the map such that it more clearly visible.
    b. A note has been added stating which sample points are not shown on the map. This change was made to make this map consistent with figure 4-2 which already makes a similar statement.
    c. The note on the map which discusses which sample points include air sampling and TLD's has been expanded to include 2 points which were not previously listed. These points were already listed further on down the page. This change was made for clarification and consistency only.
    d. Minor drawing changes were made to the map to more accurately reflect the surrounding areas. None of these minor changes involve any sample points.

5. Figure 4-2 which shows Radiological Sample Distant Locations was changed to make minor editorial improvements and clarifications.

    a. Sample point 57 was deleted from the map. No samples are specified within the ODCM for this point. This sample point is only used for non-ODCM sample requirements.
    b. The note which specifies which sample points are not shown on the map has been clarified.
    c. Sample point 7 was deleted from the map picture. This sample point is actually present just east of the present map picture. The sample frequency and specifications for this sample point have not changed.

6. Update Rated Thermal Power (RTP) definition from 2300 to 2339 MWt. Per TS & FSAR.

ODCM Rev 25
Description of Change

There was only one change to the ODCM in revision 25. The definition of Dose Equivalent Iodine was changed to reference Table 2.1 of Federal Guidance Report 11. This change was performed IAW NRC Safety Evaluation for Amendment 201 to renewed Facility Operating License No. DPR-23 Docket 50-261.

II. CHANGES TO THE RADIOACTIVE WASTE SYSTEMS

There were no changes to the Radioactive Waste Systems during this reporting period.

III. CHANGES TO THE PROCESS CONTROL PROGRAM (PCP)

There were no changes to the Process Control Program during this reporting period.

IV. CHANGES TO THE LAND USE CENSUS

The Land Use Census is performed every 24 months and was performed in 2004. The results of the 2004 Land Use Census and average meteorological data for the last 10 years identified no changes that require an ODCM change. The next Land Use Census will be performed in 2006.

V. INSTRUMENT INOPERABILITY

There were no reportable instrumentation inoperability events during this reporting period.

VI. LIQUID HOLDUP TANK CURIE LIMIT

There were no outside liquid holdup tanks that exceeded the ten curie limit during this reporting period.

VII. WASTE GAS DECAY TANK CURIE LIMIT

There were no waste gas decay tanks with a curie content that exceeded the 1.90E+04 curie limit during this reporting period.

CORRECTIONS TO PREVIOUS REPORTS

TABLE OF CONTENTS
Enclosure 2

I. DISCUSSION

There are no corrections to previous reports.