

EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

1/1/86 - 6/30/86

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON SEG PLANT - UNIT 2

FACILITY OPERATING LICENSE NO. DPR-23

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I. INTRODUCTION

This Effluent and Waste Disposal Report is submitted per Technical Specification 6.9.1.d to the H. B. Robinson Steam Electric Plant - Unit 2 Facility Operating License No. DPR-23. The data in this report covers the period from January 1 to June 30, 1986, and is the first semiannual report under the full implementation of the Radiological Effluent Technical Specifications (RETS).

The summations of gaseous and liquid effluents are in accordance with the tables in Regulatory Guide 1.21 (Rev. 1, 6/74) Appendix B. The summations of the solid waste shipments are slightly different but similar to Regulatory Guide 1.21 due to additional reporting requirements by the operating license and 10CFR Part 61.

The values reported for the activity of nuclides released are the actual measured activities. If no activity for a nuclide was detected for a quarter, the reader is referred to the respective Lower Limit of Detection (LLD) Table for that radionuclide. The total of activity released is a total of only the nuclides that had measured activity.

Compliance with 10CFR50, Appendix I for maximum individual doses is demonstrated by using average meteorology and the methods in the Offsite Dose Calculation Manual.

The meteorological data for this report period is on file in the format of Regulatory Guide 1.21 and is available to the NRC upon request. This data will be sent 60 days after January 1, 1987, with the second semiannual Effluent and Waste Disposal Report for 1986.

There have been no changes to the NRC (May 16, 1986) approved Process Control Program (PCP) and no changes to the radioactive waste systems (liquid, gaseous, or solid) during this report period.

The land use census, conducted May 6, 1986, revealed no new or additional locations that require sampling.

The Radioactive Liquid and Gaseous Effluent Monitoring Instrumentation listed in Tables 3.5-6 and 3.5-7 of the Technical Specifications Amendment No. 85 have not exceeded any of their continuous inoperability requirements.

Revision 1 and Revision 2 of the Offsite Dose Calculation Manual (ODCM) were reviewed and approved by the Plant Nuclear Safety Committee (PNSC) on November 20, 1985 and March 6, 1986, respectively. These changes do not reduce the accuracy or reliability of the dose calculations or setpoint determinations.

II. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Fission and Activation Gases:

10CFR20 Limits (Instantaneous Release Rate)

Total Body ≤ 500 mrem/yr

Skin ≤ 3000 mrem/yr

10CFR50 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, 133, Tritium, and Particulates ≥ 8 day half-lives:

10CFR50 Limits (Instantaneous Release Rate)

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

10CFR50 Appendix I

For Calendar Quarter ≤ 7.5 mrem

For Calendar Year ≤ 15 mrem

3. Liquids:

Concentrations are specified in 10CFR20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2E-4$ μ Ci/ml total activity.

10CFR50 Appendix I

For Calendar Quarter

Total Body ≤ 1.5 mrem

Any Organ ≤ 5 mrem

For Calendar Year

Total Body ≤ 3 mrem

Any Organ ≤ 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 radiogas is determined by the fraction of that radiogas in the isotopic analysis for that period.

- b. Iodines - The activity released as iodine-131, 133, and 135 is based on the charcoal cartridge and particulate filter activities and the total vent 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 vent flow.
- d. Tritium - The activity released as tritium is based on weekly grab sample analysis and total vent 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 batch releases are included in the iodine determination from the continuous Auxiliary Building release.
- c. Particulates - The particulates from batch releases are included in the particulate determination from the continuous 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, strontium, Iron-55, and alpha) are comprised of the sum of the individual radionuclide activities in each batch released to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent.
- b. Tritium & Alpha - The measured tritium and alpha concentrations in a 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, vent flow rates, vent 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, chemical yield factors, 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

1. Batch Releases

A. Number of Batch Releases	<u>1.10E+02</u>
B. Total Time Period for Batch Releases	<u>7.40E+04Min</u>
C. Maximum Time Period for a Batch Release	<u>4.32E+03Min</u>
D. Average Time Period for Batch Releases	<u>6.73E+02Min</u>
E. Minimum Time Period for a Batch Release	<u>2.00E+01Min</u>

2. Abnormal Releases

1. Number of Releases	<u>0</u>
2. Total Activity Released	<u>0 Ci</u>

TABLE 1A
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	<u>UNITS</u>	<u>1ST QUARTER</u>	<u>2ND QUARTER</u>
A. Fission and Activation Gases:			
1. Total Release	Ci	3.03E+02	7.21E+01
2. Estimated Total Error	%	1.10E+02	1.10E+02
3. Average Release Rate for Period	µCi/sec	1.93E+01	4.61E00
4. Percent of 10CFR50 Appendix I			
<u>Quarterly Limit</u>			
Gamma Air	%	5.86E00	1.07E-01
Beta Air	%	8.34E00	3.59E00
<u>Yearly Limit</u>			
Gamma Air	%	2.93E00	2.99E00
Beta Air	%	4.17E00	5.96E00
B. Iodines, Particulates, and Tritium:			
<u>Iodines</u>			
1. Total Iodine - 131	Ci	4.19E-03	7.22E-05
2. Estimated Total Error	%	1.10E+02	1.10E+02
3. Average Release Rate	µCi/sec	2.68E-04	4.62E-06
<u>Particulates</u>			
1. Particulates with Half-Lives >8 days	Ci	1.76E-04	3.21E-06
2. Estimated Total Error	%	1.00E+02	1.00E+02
3. Average Release Rate for Period	µCi/sec	1.12E-05	2.05E-07
4. Gross Alpha Radioactivity	Ci	<LLD	<LLD
<u>Tritium</u>			
1. Total Release	Ci	2.15E00	6.81E-01
2. Estimated Total Error	%	9.00E+01	9.00E+01
3. Average Release Rate for Period	µCi/sec	1.37E-01	4.36E-02
Percent of 10CFR50 Appendix I			
<u>Quarterly Limit</u>			
Organ Thyroid	%	5.16E+01	3.11E-01
<u>Yearly Limit</u>			
Organ Thyroid	%	2.58E+01	2.60E+01 *

*Cumulative total for the year-to-date.

TABLE 1B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1986

GASEOUS EFFLUENTS - ELEVATED RELEASES

All releases at H. B. Robinson are made as ground releases.

TABLE 1C
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 GASEOUS EFFLUENTS GROUND LEVEL RELEASES

	UNITS	CONTINUOUS MODE		BATCH MODE	
		1st QUARTER	2nd QUARTER	1st QUARTER	2nd QUARTER
1. FISSION GASES					
Ar-41	Ci	<LLD	<LLD	2.27E-02	7.34E-02
Kr-85	Ci	<LLD	7.15E+01	3.12E-01	6.57E-03
Kr-85m	Ci	<LLD	<LLD	3.72E-02	6.64E-05
Kr-87	Ci	<LLD	<LLD	4.41E-03	<LLD
Kr-88	Ci	<LLD	<LLD	2.45E-02	<LLD
Xe-131m	Ci	<LLD	<LLD	1.84E00	1.75E-03
Xe-133	Ci	1.36E+02	3.16E-01	1.58E+02	1.67E-01
Xe-133m	Ci	<LLD	<LLD	9.08E-01	1.92E-03
Xe-135	Ci	3.69E00	<LLD	1.12E00	5.36E-03
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	1.40E+02	7.19E+01	1.63E+02	2.57E-01
2. IODINES₁					
I-131	Ci	4.19E-03	7.22E-05		
I-133	Ci	5.81E-05	8.55E-05		
I-135	Ci	<LLD	<LLD		
Total for Period	Ci	4.25E-03	1.58E-04		
3. PARTICULATES₁					
H-3	Ci	6.22E-02	4.35E-01	2.08E00	2.46E-01
Cr-51	Ci	1.58E-05	<LLD		
Mn-54	Ci	<LLD	1.31E-07		
Co-58	Ci	3.15E-05	1.61E-06		
Fe-59	Ci	<LLD	<LLD		
Co-60	Ci	4.93E-05	1.04E-06		
Zn-65	Ci	<LLD	<LLD		
Sr-89	Ci	<LLD	2.59E-08		
Sr-90	Ci	<LLD	9.29E-09		
Nb-95	Ci	1.70E-06	<LLD		
Mo-99	Ci	<LLD	<LLD		
Ru-103	Ci	<LLD	2.04E-07		
Cs-134	Ci	2.64E-05	<LLD		
Cs-137	Ci	5.05E-05	1.86E-07		
Ba/La-140	Ci	<LLD	<LLD		
Ce-141	Ci	<LLD	<LLD		
Ce-144	Ci	<LLD	<LLD		
Gross Alpha	Ci	<LLD	<LLD		
Total for Period	Ci	6.24E-02	4.35E-01	2.08E00	2.46E-01

₁Continuous Accountability includes Batch Accountability (excludes H-3).

TYPICAL LOWER LIMIT OF DETECTION TABLE FOR GASEOUS EFFLUENTS

<u>Nuclide</u>	<u>LLD ($\mu\text{Ci/cc}$)</u>
H-3	1.00E-06
Ar-41	2.00E-06
Cr-51	1.40E-13
Mn-54	1.00E-11
Co-58	1.00E-11
Fe-59	1.00E-11
Co-60	1.00E-11
Zn-65	1.00E-11
Kr-85	8.90E-05
Kr-87	1.00E-04
Kr-88	1.00E-04
Sr-89	1.00E-11
Sr-90	1.00E-11
Nb-95	3.70E-14
Mo-99	1.00E-11
Ru-103	3.00E-13
I-131	1.00E-12
I-133	1.00E-10
Xe-133	1.00E-04
Xe-133m	1.00E-04
Cs-134	1.00E-11
Xe-135	1.00E-04
Xe-135m	9.30E-05
Cs-137	1.00E-11
Xe-138	1.00E-04
Ba/La-140	1.00E-13
Ce-141	1.00E-11
Ce-144	1.00E-11
Gross Alpha	1.00E-11

IV. LIQUID EFFLUENTS

1. Batch Releases

A. Number of Batch Releases	<u>1.38E+02</u>
B. Total Time Period for Batch Releases	<u>3.05E+04Min</u>
C. Maximum Time Period for a Batch Release	<u>9.00E+02Min</u>
D. Average Time Period for Batch Releases	<u>2.21E+02Min</u>
E. Minimum Time Period for a Batch Release	<u>3.00E+01Min</u>
F. Average Stream Flow During Release Periods	<u>2.09E+05GPM</u>

2. Abnormal Releases

A. Number of Releases	<u>0</u>
B. Total Activity Released	<u>0 Ci</u>

TABLE 2A
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1986
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	1st QUARTER	2nd QUARTER
A. <u>FISSION AND ACTIVATION PRODUCTS</u>			
1. Total Releases	Ci	1.36E-01	2.08E-02
2. Total Estimated Error	%	1.00E+02	1.00E+02
3. Average Diluted Concentration	µCi/ml	6.57E-09	2.50E-09
B. <u>TRITIUM</u>			
1. Total Release	Ci	4.04E+01	1.71E+01
2. Estimated Total Error	%	4.00E+01	4.00E+01
3. Average Diluted Concentration	µCi/ml	1.95E-06	2.06E-06
C. <u>DISSOLVED AND ENTRAINED GASES</u>			
1. Total Release	Ci	9.75E-03	<LLD
2. Estimated Total Error	%	1.00E+02	1.00E+02
3. Average Diluted Concentration	µCi/ml	4.70E-10	<LLD
D. <u>GROSS ALPHA RADIOACTIVITY</u>			
1. Total Release	Ci	<LLD	<LLD
2. Estimated Total Error	%	1.00E+02	1.00E+02
E. <u>VOLUME OF WASTE RELEASED</u>			
	Liters	1.84E+07	8.97E+05
F. <u>VOLUME OF DILUTION WATER</u>			
	Liters	2.07E+10	8.33E+09
G. <u>PERCENT OF 10CFR50 APPENDIX I</u>			
<u>Quarterly Limit</u>			
Organ Liver	%	5.59E00	7.37E-01
Total Body	%	1.33E+01	1.79E00
<u>Yearly Limit</u>			
Organ Liver	%	2.80E00	3.17E00 *
Total Body	%	6.66E00	7.55E00 *

*Cumulative total for the year-to-date.

TABLE 2B
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 LIQUID EFFLUENTS

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		1st QUARTER	2nd QUARTER	1st QUARTER	2nd QUARTER
H-3	Ci	<LLD	<LLD	4.04E+01	1.71E+01
Na-24	Ci	<LLD	<LLD	1.15E-04	<LLD
Cr-51	Ci	<LLD	<LLD	3.97E-03	5.02E-04
Mn-54	Ci	<LLD	<LLD	6.54E-04	2.33E-04
Fe-55	Ci	<LLD	<LLD	3.34E-03	<LLD
Fe-59	Ci	<LLD	<LLD	1.96E-05	1.20E-05
Co-57	Ci			1.32E-04	1.59E-05
Co-58	Ci	2.67E-03	<LLD	5.99E-02	9.82E-03
Co-60	Ci	<LLD	<LLD	3.63E-02	4.03E-03
Zn-65	Ci	<LLD	<LLD	2.70E-05	1.74E-05
Sr-89	Ci	<LLD	<LLD	2.60E-05	3.74E-06
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Sr-92	Ci			3.00E-04	1.57E-04
Zr-95	Ci	<LLD	<LLD	1.41E-04	4.32E-05
Nb-95	Ci	<LLD	<LLD	6.23E-04	1.89E-04
Nb-97	Ci	<LLD	<LLD	3.36E-04	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci			7.09E-04	1.48E-04
Sb-124	Ci			1.26E-02	2.23E-04
I-131	Ci	6.71E-06	<LLD	5.90E-04	2.30E-05
Cs-134	Ci	<LLD	<LLD	3.79E-03	2.00E-03
Cs-137	Ci	<LLD	<LLD	9.62E-03	3.38E-03
Ba/La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	2.68E-03	<LLD	4.05E+01	1.71E+01
Xe-133	Ci	1.40E-05	<LLD	9.68E-03	<LLD
Xe-133m	Ci	<LLD	<LLD	7.56E-06	<LLD
Xe-135	Ci	<LLD	<LLD	5.75E-05	<LLD
Total	Ci	1.40E-05	<LLD	9.75E-03	<LLD

TYPICAL LOWER LIMIT OF DETECTION TABLE FOR LIQUID EFFLUENTS

<u>NUCLIDE</u>	<u>LLD ($\mu\text{Ci/ml}$)</u>
H-3	1.00E-05
Na-24	2.10E-07
Cr-51	7.10E-06
Mn-54	5.00E-07
Fe-55	1.00E-06
Co-58	5.00E-07
Fe-59	5.00E-07
Co-60	5.00E-07
Zn-65	5.00E-07
Sr-89	5.00E-08
Sr-90	5.00E-08
Nb-95	1.10E-07
Zr-95	2.00E-07
Nb-97	3.00E-07
Mo-99	5.00E-07
Tc-99m	6.60E-08
I-131	1.00E-06
Xe-133	1.00E-05
Xe-133m	1.00E-05
Cs-134	5.00E-07
Xe-135	1.00E-05
Cs-137	5.00E-07
Ba/La-140	2.40E-07
Ce-141	5.00E-07
Ce-144	5.00E-07
Gross Alpha	1.00E-07

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
REPORT TIME PERIOD JANUARY 1 TO JUNE 30 YEAR 1986

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

WASTE CLASS A

1. Type of waste	Unit	6-month Period	Est. Total Error %	Solid Agent	Cont. Type	Form	No. Ship.
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	1.78E+02 7.33E+01	6.50E+01	cement	HIC,STP	Dewatered Solidified	19
b. Dry compressible waste, contaminated equip, etc.	m ³ Ci	1.28E+02 2.20E+01	6.50E+01	NA	STP	Compacted Uncompacted	7
c. Irradiated components, control rods, etc.	m ³ Ci	0.00E00 0.00E00	NA	NA	NA	NA	NA
d. Other (describe)	m ³ Ci	0.00E00 0.00E00	NA	NA	NA	NA	NA

2. Estimate of major nuclide composition (by type of waste) 3. Solid Waste Disposition

	Nuclide		Ci
a.	Co-58	13.35%	9.78E00
	Co-60	32.33%	2.37E+01
	Cr-51	1.58%	1.17E00
	Cs-134	2.37%	1.74E00
	Cs-137	3.99%	2.92E00
	Sb-124	1.45%	1.06E00
	Fe-55	22.31%	1.63E+01
	Ni-63	8.04%	5.89E00
	H-3	11.81%	8.65E00
	Others*	2.77%	2.03E00
b.	Co-53	4.78%	1.05E00
	Co-60	4.26%	9.39E-01
	Cs-134	6.18%	1.36E00
	Cs-137	7.59%	1.68E00
	Fe-55	68.21%	1.50E+01
	Ni-63	3.57%	7.87E-01
	H-3	4.06%	8.95E-01
	Others **	1.35%	2.98E-01

Number of Shipments *** 24
Mode of Transportation Sole Use Vehicle
Destination Barnwell, S.C.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments 0
Mode of Transportation NA
Destination NA

* Others include: Ag-110m, Co-57, Mn-54, I-131, Nb-95, Sb-125, Sr-89, Pu-241, C-14, Te-125m, Xe-131m, Fe-59, Cs-136, Sr-90, Cm-242, Xe-133, Zr-95, Zn-65, Sn-113, Tc-99, Ce-141, Ce-144, Pu-238, Pu-239, Am-241, Cm-244, I-129.

** Others include: Ag-110m, Co-57, Cr-51, Mn-54, I-131, Nb-95, Sb-124, Sb-125, Sr-89, C-14, Te-125m, Xe-131m, Fe-59, Sn-113, Zr-95.

*** The sum of the number of shipments in Section 1 does not equal the number of shipments in Section 3, due to two mixed waste shipments.

VI. CHANGES TO ODCM

<u>PAGE NO.</u>	<u>COMMENTS FOR CHANGES IN ODCM REV. 1</u>
Page i	Repagination of Section 3.3 and added the existing Section 6.5 to the Table of Contents.
Page ii	Repagination of Tables 3.2-1, 3.2-2, 3.2-3, and 3.2-4.
Page iv	Repagination of Figures 4-1 and 4-2.
Page 1-1	The ODCM based on NUREG-0472, Revision 3, Draft 6, has been changed to NUREG-0472, Revision 3, Draft 7, as per guidance received from the NRC October 4, 1984. Monitor setpoints have been changed from standing orders (Standing Order Number 4) to the Plant Operating Procedures (OMM-014). Subsequently, the ODCM reflects this change in Section 1.0.
Page 2-1 and Page 3-1	Editorial change, "procedure" to "methodology" in first sentence.
Page 2-2	In response to EG&G/NRC comment dated October, 1983, the value of $1.0E-7$ $\mu\text{Ci/ml}$ for an unknown mix has been changed to the most conservative MPC of the radionuclides to this path and "visible" to RMS-18, RM-19, and RMS-37. The worst case assumption is that I-131 is the only nuclide being discharged. This is appropriate according to Footnote 3a of 10CFR20, Appendix B.
Page 2-3	Steam generator blowdown flow rates have increased, and an additional potential release pathway has been added (Condensate Polisher Liquid Waste) as a result of the Steam Generator Replacement outage. This also changed the liquid discharge allocation fractions.
Page 2-4	Additional clarification has been added to define the term Ci (added non-gamma emitters) in Section 2.1.2.1. This compliments the Nuclear Data Effluent Management software programs and 10CFR20. Added Condensate Polisher Liquid Waste Monitor (RMS-37) to Section 2.1.2.
Page 2-5 and Page 2-14	Flow rates of Steam Generator Blowdown and Condensate Polisher Liquid Waste have been added to Section 2.1.2.3 and 2.2.1, respectively. See page 2-3 for justification.
Page 2-6	Corrected minor typographical error. Allocation has been changed for Steam Generator Blowdown and new fraction added for Condensate Polisher Liquid Waste. See Page 2-3 for justification.
Page 2-11	Methodology to base monitor setpoint on I-131 was included in Section 2.2.1. See page 2-2 for justification.

Page 2-16- (1) Page 2-12 requires no change in response to EG&G's/NRC
Page 2-18 comments. Concentrations are to be compared to 10CFR20. In
Section 2.2, it is both implied and understood that pre and
post-release concentrations must be compared to 10CFR20,
Appendix B, Table II, and Column 2 in order to determine
whether HBR is in compliance. Furthermore, this is stated on
page 3-13 in the pre-release section. For the sake of clarity,
it is also added in the post-release section (page 2-16).

(2) Equation (2.3-1) the correction factor for the transit time
for radionuclide decay ($e^{-\lambda_i t_p}$) has been removed to be
compatible with the Nuclear Data software. This is more
conservative, simpler, and follows the guidance of NUREG-0133
instead of Reg. Guide 1.109.

Page 2-20 In response to EG&G comments, the 31 day dose projection
methodology was clarified.

Page 2-24 Table 2.3-2 "Values of $e^{-\lambda_i t_p}$ for liquid dose calculations"
has been deleted. See page 2-16 for justification.

Page 3-3 and The typo has been deleted in paragraph 3.1.1.5 as per EG&G/NRC
Page 3-4 comments. The fuel handling building flow rate has been added
in Section 3.1.1.4, since it is a potential release pathway.

Page 3-6 ΔP has been changed to ΔP_c . T^C has been changed to T_t . $0^\circ C =$
 $273^\circ K$ has been added as per EG&G/NRC comments.

Correction for K° has been provided in the respective
procedures used for calculation of the flow rates from
containment and from the gas decay tanks.

Page 3-7 Formula for "C" has been changed for clarity as per EG&G/NRC
comments to:
 $C = C_i (\mu Ci/cc) \times \text{monitor efficiency (cpm}/\mu Ci/cc) = \text{cpm}$

Page 3-10 Table 3.1-1, "Gaseous Source Terms," Condenser Vacuum Pump Vent
had two typographical errors: $Xe - 133 = 1.8E + 1 Ci/yr$, not
 $1.8E-1 Ci/yr$ and $Xe-135 = 2.0E + 1 Ci/yr$, not $2.0E-1 Ci/yr$

Page 3-2 and Sample analysis has been added in Section 3.1.1.1 (page 3-2)
3-13 and page 3-13 to be used as source terms in monitor setpoint
calculations and dose rate calculations. Typo "n" has been
corrected to "in". These changes were in response to EG&G/NRC
comments.

Page 3-14 and Section 3.2.2 has been revised to cover the inhalation
3-15 pathway only. This is in response to EG&G/NRC comments and is
consistent with Technical Specifications.

- Page 3-16 The response to EG&G/NRC relative to Table 3.2-1 is that, as indicated by the footnote, the source was determined by the GALE code.
- Page 3-19 The F_i values listed in Table 3.2-4 are not necessarily meant to be exhaustive but representative of the radionuclides usually observed in releases and usually expected based on Source Terms. Should other radionuclides be observed, the data from Reg. Guide 1.109 will be used to establish dose factors for these radionuclides.
- Page 3-21 In response to EG&G/NRC editorial changes have been made as follows "for purposes of this document, only long-term \bar{X}/Q values will be used since this is a more conservative approach than using short-term \bar{X}/Q values for dose estimation. Should the calculated dose exceed 10CFR50 limits, recalculation of dose may be performed using short-term \bar{X}/Q values for batch releases."
- Page 3-22 D_a has been revised to D_g as per EG&G/NRC comments.
- Page 3-23 In response to EG&G/NRC, statement has been included which describes how dose projections will be performed and when the gaseous radwaste treatment system will be operated.
- Page 3-24, 3-25, 3-26, & 3-27 In response to EG&G/NRC, a plus ("+") has been inserted in Equation 3.3-8 and has been expanded to include milk and meat pathways, and the new terms have been defined.
- Page 3-28 In response to EG&G/NRC, it is preferred to leave the grazing period as based on NUREG-C133 in the text of the ODCM.
- Page 3-29 & 3-30 In response to EG&G/NRC, statement has been rewritten to include how dose projections will be performed and when the gaseous radwaste treatment system will be operated.
- Page 4-2, 4-3, & 4-9 Editorial added the compass degrees to the first seven sample stations and relocated sample Station 7 one mile further out because the existing location is no longer available for our use. Station 7 also relocated on map on page 4-9.
- Station 11 was corrected to third power pole from the Old Camden Road lead of fourth pole. Distance and sector are still the same.
- Page 4-4 Station 15. Typo 1.0 mile, not 10 miles.

- Page 4-6 In response to EG&G/NRC, H-3 analysis is performed monthly rather than quarterly since H-3 levels are usually much higher than the LLD, and the Plant wishes to monitor H-3 more closely in both surface and ground water. In addition, an editorial change was made in Section b, groundwater. Each unit has more than one well, and only one well is generally used at a time. Sampling will be performed only on the operating well.
- Page 4-7 In response to EG&G/NRC, the frequency for sampling fish has been changed to semiannually. Also, the control location for fish has two ponds to choose from due to drainage of May Lake for dam repairs which resulted in a major fish kill. Food products (leafy vegetables) location numbers were changed. Auburndale Plantation's Milk and a milk control station were added.
- Page 4-8 Changed Footnote 8 due to Land-Use census.
- Page 6-1, 6-2, & 6-3 In response to EG&G/NRC comments, the following changes were made: 6.2.(1) Actual doses will be utilized rather than assuming the dose to be < 1 mrem/yr since the actual dose data will be readily available; 6.2.(4) The intent in this section is not to be conservative but to make an approximation of the real dose to a MEMBER OF THE PUBLIC as realistically as possible.
- Also added headers to 6.1 and 6.2 for consistency.
- Some of the verbiage from 6-1 carried over to 6-2 as a result of adding headers to page 6-1 and, likewise, with page 6-2 to page 6-3.
- Page A-4 Title had typo (sec/cm³); changed to (sec/m³).
- Page A-5 Title had typo (sec/cm³); changed to (sec/m³).
- Page A-7 Title had typo (sec/cm³); changed to (sec/m³).
- Page A-8 Title had typo (sec/cm³); changed to (sec/m³).
- Page A-21 Title had typo (m²⁻); changed to (m⁻²).
- Page B-11 R_{i_m} has been changed to R_{i_B} , and F_m has been changed to F_f as per EG&G/NRC comments.
- Page B-12 F_m has been changed to F_f as per EG&G/NRC comments.

Page B-13 . A plus ("+") has been inserted in Equation B.2-7 as per EG&G/NRC comments.

Page D-1 Added Condensate Polisher Liquid Waste Monitor. See page 2-3 for additional justification.

JUSTIFICATION FOR CHANGE IN ODCM REVISION 2

Prior to implementing the Gaseous portion of the Radiological Effluent Technical Specification, the setpoint Section (3.1) of the ODCM was upgraded and additional clarification made as follows:

- A. All batch releases are to be sampled and analyzed for setpoint source term calculations.
- B. All continuous releases have the following source term setpoint options:
 - 1. Using a conservative Gale Code distribution.
 - 2. Using detectable nuclide distribution from the sample analysis.
 - 3. Using the calculated LLD values for Xe-133 and Kr-85.
- C. The R-14 setpoint calculations (monitors Plant vent and isolates releases from Waste Gas Decay Tanks) in Revision 1 of the ODCM did not take into account dilution (60,000 cfm) from the Plant vent. Therefore, a revision was made to calculate R-14 setpoint using the weighted average concentration based on maximum flow rates.
- D. The monitors RMS-11 and RMS-12 (particulate and noble gas monitors) provide isolation for CV Pressure Reliefs and Purges. These monitors can sample from the Containment Vessel or the Plant Vent. The ODCM was revised to calculate weighted average concentrations for RMS-11, RMS-12, and RMS-14 setpoint determinations based on their respective source terms and flow rate.
- E. The concept of PDRR (Projected Dose Rate Ratio) was incorporated in the calculation of setpoints and release rates. This is consistent with algorithm used in vendor software.
- F. The statistical variance in the background count rate on gaseous effluent monitors was included in the high/trip alarm setpoints to prevent inadvertent high/trip alarms due to the random counts on the monitors.
- G. Ten R_i tables were added to the ODCM (all age groups) for grass-cow-milk, grass-cow-meat, and vegetation pathways consistent with the guidance in NUREG-0133 and vendor software.
- H. The algorithm for converting the monitor setpoint from $\mu\text{Ci}/\text{cc}$ to cpm was revised to accept non-linear monitor efficiency relationships.

<u>PAGE NO.</u>	<u>COMMENTS FOR CHANGES IN ODCM REVISION 2</u>
Title Page	Changed Revision 1 to Revision 2 and changed date.
i	Added Section 3.4 to Table of Contents.
ii	Added ingestion dose R factors to List of Tables 3.4-1 through 3.4-10. (See justification G.)
3-1	Minor editorial changes; added RMS-20 in Section 3.1.1 as an additional potential release pathway, reference to use of Gale Code when determining high-alarm setpoint for gas monitors RMS-14, RMS-15, RMS-20; removed batch release of containment purge via the Plant Vent, batch release for containment pressure relief via the Plant Vent, and batch release of Waste Gas Decay Tanks via the Plant Vent. (See justifications A, B, C, & D.)
3-2	Removed 3.1.1.1a determination of source term since Gale Code is used for source term in calculating the rate in Section 3.1.1 for average X/Q values for batch ground releases and for batch mixed mode releases in Section 3.1.1.2. (See justifications A & B.)
3-3	Maximum concentration calculation modified to include Engineering safety factor 0.5.
3-4	Revised airflow in fuel handling building from 10,800 CFM to 10,200 CFM as referenced in the system description; added definition of SF in Equation 3.1-4. Modified Equation 3.1-6. (See justifications F.)
3-5	Added definition of statistical variance; modified Equations 3.1-4 and 3.1-6; minor editorial change; added four additional operational conditions when determining high alarm setpoint with prior sample analysis and maximum acceptable flow rate; and added Equation 3.1-7. (See justification parts A, E, & F.)
3-6 & 3-7	Revised Ci definition. (See justifications C & D.)
3-8	Maximum flow rates (f) for all pathways were re-evaluated and upgraded; revised Section 3.1.2.2 to include calculation of skin dose rate and monitor setpoints. (See justifications C & D.)

- 3-9 Defined (\bar{X}/Q) values in Equation 3.1-8 for continuous mixed mode release and continuous ground release. (See justifications A and B.)
- 3-10 Defined Equations 3.1-10 and 3.1-11 to determine projected dose rate ratio for total body and skin; defined Equation 3.1-12 and 3.1-13 to determine the maximum monitor setpoint concentration for total body and skin; replaced Section 3.1.2.3, "Determine the monitor alarm setpoint based on the skin dose rate," with Section 3.1.2.2.e, "Determine the maximum monitor setpoint for total body and skin." (See justification E.)
- 3-11 Provided Plant specific values for T_m as used in Equations 3.1-12 and 3.1-13; added Section 3.1.2.2.e, "Determine the maximum monitor setpoint for total body and skin" and included term for monitor statistical variance. (See justification F.)
- Page 3-12 Defined terms in Equations 3.1-14 and 3.1-15. (See justification F and H.)
- Page 3-13 Gaseous source terms, - changed Xe-135 value from 2.0E+1 to 2.0E+0. . . Typo. Footnote 1 - deleted reference to RMS-20. . . Plant vent release. . . values are used to determine the monitor alarm setpoints for the Plant vent gas monitor. Footnote 3 - added to values for gas decay tanks - "these values are used to determine the monitor alarm setpoint for the fuel handling basement exhaust monitor (RMS-20)."
- Page 3-17 Editorial change.
- Added "and tritium" to heading of section describing dose rate equation - consistent with Technical Specifications.
- Page 3-26 Added projected dose from this release "DB" to 31 day dose projection in Equation 3.3-7.
- Page 3-27 Corrected typo.
- Page 3-32 Added projected dose from this release "DB" to 31 day dose projection in Equation 3.3-11.
- Page 3-34-
Page 3-52 Added reference to Reg. Guide 1.109 to tables. (See justification G.)
- Page 3-53 Added ingestion dose R factors grass-cow-milk pathway (infant). (See justification G.)

- Page 3-54 Added ingestion dose R factors grass-cow-milk pathway (child). (See justification G.)
- Page 3-55 Added ingestion dose R factors grass-cow-milk pathway (teen). (See justification G.)
- Page 3-56 Added ingestion dose R factors grass-cow-milk pathway (adult). (See justification G.)
- Page 3-57 Added ingestion dose R factors grass-cow-meat pathway (child). (See justification G.)
- Page 3-58 Added ingestion dose R factors grass-cow-meat pathway (teen). (See justification G.)
- Page 3-59 Added ingestion dose R factors grass-cow-meat pathway (adult). (See justification G.)
- Page 3-60 Added ingestion dose R factors vegetation pathway (child). (See justification G.)
- Page 3-61 Added ingestion dose R factors vegetation pathway (teen). (See justification G.)
- Page 3-62 Added ingestion dose R factors vegetation pathway (adult). (See justification G.)
- Page 4-1 Editorial change.
- Page 5-1 Added that results of environmental sample analyses comparison program would be included in the annual radiological environmental operating report. Deleted "the results will be provided to the NRC upon request."
- Page B-6 Editorial change of Appendix B.2 Title by adding "Following Reg. Guide 1.109 Methodology" for calculation of R_i . (Justification: added reference.)
- Added (in description) to include reference to 1.109. (Justification: added reference.)
- Page B-18 Added "calculation of R_i following NUREG-0133 methodology." (See justification G.)
- Page B-19 Added grass-cow-milk pathway. (See justification G.)
- Page B-20 Added grass-cow-meat pathway. (See justification G.)

- Page B-21 Added vegetation pathway.
 (See justification G.)
- Page B-22 Provided documentation of maximum flow rate of CV pressure
 relief as provided by CD&L Nuclear Fuels Section.
 (See justification D.)
- Page 2-20 Equation 2.3-8, added "projected dose for the current release
 to the total projected dose for previous releases." Define
 term "DB". (Justification: DB definition was inadvertently
 omitted.)
- Page 3-63- Added section 3.4 describing the setpoint methodology for
Page 3-65 RMS-11. (See justification D.)