Georgia Power Company
333 Piedmont Avenue
Atlanta, Georgia 30308
Telephone 404 526 3195

Mailing Address:
40 Inverness Center Parkway
Post Office Box 1295
Birmingham, Alabama 35201
Telephone 205 868 5581

W. G. Hairston, III
Senior Vice President
Nuclear Operations

HL-1477

February 27, 1991

U. S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Washington, DC 20555

PLANT HATCH - UNITS 1, 2
NRC DOCKETS 50-321, 50-366
OPERATING LICENSES DPR-57, NPF-5
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Gentlemen:

In accordance with the provisions of Plant Hatch Technical Specifications Section 6.9.1.8 and 6.9.1.9, Georgia Power Company (GPC) is providing six copies of the Plant Hatch Units 1 and 2 Semiannual Radioactive Effluent Release Report. This report covers the period of July 1, 1990 through December 31, 1990.

Should you have any questions please advise.

Sincerely,

W. G. Hairston, III

WGH,III/DMH:kcd

Enclosure

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1/1

9103010221 901231
PDR ADOCK 05000321
R PDR

cc: Georgia Power Company
Mr. H. L. Sumner, General Manager - Plant Hatch
Mr. J. D. Heidt, Manager Engineering and Licensing - Hatch
Dr. W. R. Woodall, Manager Environmental Affairs
Mr. C. L. Whatley, Manager Nuclear Insurance and Risk Management
NORMS

U. S. Nuclear Regulatory Commission, Washington, DC
Mr. K. N. Jabbour, Licensing Project Manager - Hatch

U. S. Nuclear Regulatory Commission, Region II
Mr. S. D. Ebneter, Regional Administrator
Mr. L. D. Wert, Senior Resident Inspector - Hatch

American Nuclear Insurers
Mr. M. Marugg

State of Georgia
Mr. J. Setser, DNR

GEORGIA POWER COMPANY

PLANT E. I. HATCH

UNITS NO. 1 & 2

SEMIANNUAL RADIOACTIVE

EFFLUENT RELEASE REPORT

July 1, 1990 - December 31, 1990

PLANT E. I. HATCH

SEMIANNUAL RADIOACTIVE

EFFLUENT RELEASE REPORT

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PLANT E. I. HATCH

SEMIANNUAL RADIOACTIVE

EFFLUENT RELEASE REPORT

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RADIOACTIVE EFFLUENT RELEASE REPORT

1 LIQUID EFFLUENTS

1.1. REGULATORY LIMITS

1. The Technical Specifications presented in this section are for Unit 1. Requirements for Unit 2 are the same as Unit 1; however, the Technical Specification numbers are not the same.

TECHNICAL SPECIFICATIONS

3.14.1 The radioactive liquid effluent monitoring instrumentation channels shown in table 3.14.1-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.15.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the OFFSITE DOSE CALCULATION MANUAL (ODCM). (Technical Specification Table 3.14.1-1 is included in this section as Table 1-1).

3.15.1.1 The concentration of radioactive material released at any time from the site to UNRESTRICTED AREAS (figure 3.15-1) shall be limited to the concentrations specified in 10 CFR Part 20, 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 2.0E-04 uCi/ml total activity.

3.15.1.2 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, from the site (figure 3.15-1) shall be limited to:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ.

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

3.15.1.3 The liquid radwaste treatment system, as described in the ODCM, shall be used to reduce the radioactive materials in liquid wastes prior to their discharge when the projected doses due to the liquid effluent per Unit from the site (figure 3.15-1) when projected over the calendar quarter would exceed 0.18 mrem to the total body or 0.62 mrem to any organ.

3.15.1.4[a] The contents within any outside temporary tank shall be limited to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

(a) An outside temporary tank is not surrounded by liners, dikes, or walls that are capable of holding the tank contents and not having tank overflows and drains connected to the liquid radwaste treatment system.

6.9.1.9 states in part: "The Radioactive Effluent Release Report shall include (on a quarterly basis) unplanned releases from the site to unrestricted areas of radioactive materials in gaseous and liquid effluents that were in excess of 1 Ci, excluding dissolved and entrained gases and tritium for liquid effluents, or those in excess of 150 Ci of noble gases or 0.02 Ci of radioiodines for gaseous releases".

TABLE 1-1
TECHNICAL SPECIFICATION
TABLE 3.14.1-1 (SHEET 1 of 2)

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Instrument	Minimum Channels OPERABLE	Applicability	ACTION
1. Gross Radioactivity Monitors Providing Automatic Termination of Release			
Liquid Radwaste Effluent Line	1	(a)	100
2. Gross Radioactivity Monitors not Providing Automatic Termination of Release			
Service Water System Effluent Line	1	(b)	101
3. Flowrate Measurement Devices**			
Liquid Radwaste Effluent Line	1	(a)	102
Discharge Canal	1	(b) (a)	102
4. Service Water System to Closed Cooling Water System Differential Pressure	1	At all times	103

**Pump curves may be utilized to estimate flow; in such cases, ACTION statement 102 is not required.

(a) Whenever the radwaste discharge valves are not locked closed.

(b) Whenever the service water system pressure is below the closed cooling water system pressure or differential pressure indication is not available.

TABLE 1-1 (CONTINUED)
TECHNICAL SPECIFICATION
TABLE 3.14.1-1 (SHEET 2 of 2)

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

TABLE NOTATIONS

ACTION 100 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may be continued, provided that prior to initiating a release:

a. At least two independent samples are analyzed in accordance with Specification 4.15.1.1.1.

b. At least two technically qualified individuals independently verify the release rate calculations and discharge valving.

Otherwise, suspend release of radioactive effluents via this pathway. If the channel remains inoperable for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 101 - With the numbers of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue, provided that once per shift grab samples are collected and analyzed for gross radioactivity (beta or gamma) at a Lower Limit of Detection of at least 10^{-7} uCi/ml. If the channel remains inoperable for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 102 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue, provided the flowrate is estimated at least once per 4 hours during actual releases. If the channel remains inoperable for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 103 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, assure that the service water system effluent system monitor is OPERABLE.

1.2 MAXIMUM PERMISSIBLE CONCENTRATIONS

The MPC values used in determining allowable liquid radwaste release rates and concentrations for principal gamma emitters, I-131, tritium, Sr-89, Sr-90 and Fe-55 are taken from 10CFR Part 20, Appendix B, Table II, Column 2.

For dissolved or entrained noble gases in liquid radwaste, the MPC is taken from Technical Specification 3.15.1.1 (Unit 1) and 3.11.1.1 (Unit 2) as 2.0E-04 uCi/ml.

For gross alpha in liquid radwaste, the MPC is taken from 10CFR Part 20, Appendix B, Note 2.b as 3.0E-08 uCi/ml.

Further, for all the above radionuclides or categories of radioactivity, the overall MPC fraction is determined in accordance with 10 CFR Part 20, Appendix B, Note 1.

The method whereby the MPC fraction is used to determine release rates and liquid radwaste effluent radiation monitor setpoints is described in Section 1.3 of this report.

1.3 MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

Prior to release of any tank containing liquid radwaste, and following the required recirculation, samples are collected and analyzed in accordance with Technical Specification Tables 4.15.1-1 (Unit 1) and 4.11.1-1 (Unit 2). A sample from each tank planned for release is analyzed for principal gamma emitters, I-131, and dissolved and entrained noble gases by gamma spectrometry. Monthly and quarterly composites are prepared for analysis by extracting aliquots from each sample taken from tanks which are released. Liquid radwaste sample analyses are performed as follows:

	Measurement	Frequency	Method
1.	Gamma Isotopic	Each Batch	Gamma spectroscopy with computerized data reduction
2.	Dissolved or Entrained Noble Gases	Each Batch	Gamma spectroscopy with computerized data reduction

Measurement	Frequency	Method
3. Tritium	Monthly Composite	Distillation and liquid scintillation counting
4. Gross Alpha	Monthly Composite	Gas flow proportional counting
5. Sr-89 and Sr-90	Quarterly Composite	Chemical separation and gas flow proportional counting
6. Fe-55	Quarterly Composite	Chemical separation and low energy photon detector.

Gamma isotopic measurements are performed in-house in the radiochemistry lab using germanium spectrometry. Three germanium detectors are available: a 20% efficient and two 15% efficient intrinsic germanium detectors, with 2.0 FWHM resolution and housed in 4 inch-thick lead shields. A one-liter liquid radwaste sample is poured into a Marinelli beaker in preparation for a 3000 second count. A peak search of the resulting gamma ray spectrum is performed by the computer system. Energy and net count data for all significant peaks are determined, and quantitative reduction or LLD calculations are performed for the nuclides specified in Table Notation e of Technical Specification Tables 4.15.1-1 (Unit 1) and 4.11.1-1 (Unit 2): Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144. The quantitative calculations include corrections for counting time, decay time, sample volume, sample geometry, detector efficiency, baseline counts, and branching ratio. LLD calculations, including the above corrections, are made based on the counts in two standard deviations of the baseline count at the location on the spectrum where a peak for that radionuclide would be located if present.

The radionuclide concentrations determined by gamma spectroscopic analysis of a sample taken from a tank planned for release and the most current sample analysis results available for tritium, gross alpha, Sr-89, Sr-90, and Fe-55 are used along with the corresponding MPC values to determine an MPC fraction for the tank planned for release. This MPC fraction is then used, with appropriate safety factors, along with the expected dilution stream flow to calculate a maximum permissible release rate and a liquid effluent monitor setpoint. The monitor setpoint is calculated to assure that the limits of Technical Specifications 3.15.1.1 (Unit 1) or 3.11.1.1 (Unit 2) are not exceeded.

A monitor reading in excess of the calculated setpoint therefore results in an automatic termination of the liquid radwaste discharge. Liquid effluent discharge is also automatically terminated if the dilution stream flow rate falls below the dilution flow rate used in the setpoint calculations and established as a setpoint on the dilution stream flow monitor.

Radionuclide concentrations, safety factors, dilution stream flow rate, and liquid effluent radiation monitor calibration factor are entered into the computer and a prerelease printout is generated. If the release is not permissible appropriate warnings will be included on the prerelease printout. If the release is permissible it is approved by the Chemistry Foreman on duty. The pertinent information is transferred manually from the prerelease printout to a one-page release permit which is forwarded to Radwaste Operations. When the release is completed the release permit is returned from Radwaste Operations with actual release data included. These data are input to the computer and a post release printout is generated. The post release printout contains actual release rates, actual release concentrations and quantities, actual dilution flow, and calculated doses to an individual.

1.4 LIQUID EFFLUENT RELEASE DATA

Regulatory Guide 1.21 Tables 2A and 2B are found in this report as Table 1-2a for Unit 1, Table 1-2b for Unit 2 and Table 1-2c for the site; and Table 1-3a for Unit 1, 1-3b for Unit 2, and Table 1-3c for the site.

The values for the four categories of Tables 1-2a and 1-2b, and 1-2c are calculated and the Tables completed as follows:

1. Fission and activation products - The total release values(not including tritium, gases, and alpha) are comprised of the sum of the measured individual radionuclide activities. This sum is for each batch released to the river for the respective

quarter. Percent of applicable limit is determined from a mixed nuclide MPC fraction calculation. The average concentration for each nuclide over all released batches is divided by the corresponding individual MPC value. The sum over all nuclides of the C/MPC ratios times 100 is the percent of applicable limit for effluent releases during the quarter.

2. Tritium - The measured tritium concentrations in the monthly composite samples are used to calculate the total release and average diluted concentration during each period. Average diluted concentration divided by the MPC limit, 3.0E-03 uCi/ml, is converted to percent to give the percent of applicable limit.

3. Dissolved and entrained gases - Concentrations of dissolved and entrained gases in liquid effluents are measured by germanium spectroscopy on a one liter sample from each liquid radwaste batch. The average concentration of dissolved or entrained noble gases for all released batches is divided by the MPC value stated in Technical Specifications 3.15.1.1 and 3.11.1.1 (2.0E-04 uCi/ml) to determine the MPC fraction. The result x100 is the percent of applicable limit for noble gases in liquid effluent releases during the quarter. Radioisotopes of iodine in any form are also determined during the isotopic analysis for each batch; therefore, a separate analysis for possible gaseous forms is not performed because it would not provide additional information.

4. Gross alpha radioactivity - The measured gross alpha concentrations in the monthly composite samples are used to calculate the total release of alpha radioactivity.

Other data pertinent to batch releases of radioactive liquid effluent from both units are as follows:

Number of batch releases:	558
Total time period for batch releases:	62,641 minutes
Maximum time period for a batch release:	244.0 minutes
Average time period for batch releases:	112.3 minutes
Minimum time period for a batch release:	1.0 minutes
Average stream flow during periods of release of liquid effluent into a flowing stream:	2,932 CFS

1.5 RADIOLOGICAL IMPACT ON MAN DUE TO LIQUID RELEASES

Doses to an individual, due to radioactivity in liquid effluent, were calculated in accordance with Technical Specifications 3/4.15.1.2 (Unit 1) and 3/4.11.1.2 (Unit 2) using the methodology presented in the Plant Edwin I. Hatch Offsite Dose Calculation Manual. As required by the above Technical Specifications, doses were calculated separately for Unit 1 and Unit 2. Results are presented in Table 1-4a for Unit 1 and Table 1-4b for Unit 2.

TABLE 1-2a
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A. Fission and activation products				
1. Total release	Ci	3.82E-02	2.08E-02	4.70E+01
2. Average diluted concentration during period	uCi/ml	3.16E-08	2.62E-08	
3. % of applicable limit	%	1.32E+00	9.20E-01	
B. Tritium				
1. Total release	Ci	4.38E+00	3.50E+00	3.70E+01
2. Average diluted concentration during period	uCi/ml	3.62E-06	4.42E-06	
3. % of applicable limit	%	1.21E-01	1.47E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	2.07E-02	4.04E-03	1.00E+02
2. Average diluted concentration during period	uCi/ml	1.71E-08	5.09E-09	
3. % of applicable limit	%	8.57E-03	2.55E-03	
D. Gross Alpha radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	1.20E+02
E. Volume of waste (prior to dilution)	liters	4.94E+06	3.58E+06	1.00E+01
F. Volume of dilution water used	liters	1.21E+09	7.92E+08	1.60E+02

TABLE 1-2b
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A. Fission and activation products				
1. Total release	Ci	5.01E-03	1.60E-02	4.70E+01
2. Average diluted concentration during period	uCi/ml	6.04E-09	3.35E-08	
3. % of applicable limit	%	2.77E-01	2.93E-01	
B. Tritium				
1. Total release	Ci	2.06E+00	1.62E+00	3.70E+01
2. Average diluted concentration during period	uCi/ml	2.48E-06	3.41E-06	
3. % of applicable limit	%	8.27E-02	1.14E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	3.53E-03	6.01E-04	1.00E+02
2. Average diluted concentration during period	uCi/ml	4.25E-09	1.26E-09	
3. % of applicable limit	%	2.13E-03	6.31E-04	
D. Gross Alpha radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	1.20E+02
E. Volume of waste (prior to dilution)	liters	3.71E+06	1.94E+06	1.00E+01
F. Volume of dilution water used	liters	8.30E+08	4.76E+08	1.60E+02

TABLE 1-2c
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A. Fission and activation products				
1. Total release	Ci	4.33E-02	3.67E-02	4.70E+01
2. Average diluted concentration during period	uCi/ml	2.12E-08	2.90E-08	
3. % of applicable limit	%	8.93E-01	6.85E-01	
B. Tritium				
1. Total release	Ci	6.44E+00	5.12E+00	3.70E+01
2. Average diluted concentration during period	uCi/ml	3.16E-06	4.04E-06	
3. % of applicable limit	%	1.05E-01	1.35E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	2.43E-02	4.64E-03	1.00E+02
2. Average diluted concentration during period	uCi/ml	1.19E-08	3.66E-09	
3. % of applicable limit	%	5.95E-03	1.83E-03	
D. Gross Alpha radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	1.20E+02
E. Volume of waste (prior to dilution)	liters	8.65E+06	5.51E+06	1.00E+01
F. Volume of dilution water used	liters	2.04E+09	1.27E+09	1.60E+02

TABLE 1-3a*
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS

		Continuous Mode**		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci			4.38E+00	3.50E+00
Fission and activation products:					
Na-24	Ci			7.47E-04	6.66E-04
Cr-51	Ci			3.43E-05	3.23E-04
Mn-54	Ci			5.99E-04	3.56E-04
Mn-56	Ci			2.73E-05	0.00E+00
Fe-59	Ci			1.02E-05	1.13E-05
Co-58	Ci			1.02E-04	3.42E-04
Co-60	Ci			3.81E-03	2.53E-03
Zn-65	Ci			5.47E-03	3.11E-03
As-76	Ci			9.68E-05	3.39E-05
Sr-89	Ci			3.61E-04	2.25E-04
Sr-91	Ci			5.89E-05	0.00E+00
Sr-92	Ci			7.30E-06	0.00E+00
Y-91m	Ci			6.34E-05	0.00E+00
Nb-95	Ci			0.00E+00	1.74E-06
Nb-97	Ci			8.85E-05	0.00E+00
Mo-99	Ci			4.48E-05	0.00E+00
Tc-99m	Ci			1.82E-04	9.57E-05
Sb-125	Ci			3.43E-06	0.00E+00
I-131	Ci			2.11E-03	1.54E-03
I-132	Ci			5.44E-04	2.05E-06
I-133	Ci			6.54E-03	1.32E-03
I-134	Ci			4.61E-05	2.82E-04
I-135	Ci			4.72E-03	1.09E-04
Cs-134	Ci			2.41E-03	1.74E-03
Cs-137	Ci			9.36E-03	7.72E-03
Ba-140	Ci			3.72E-05	0.00E+00
La-140	Ci			1.25E-05	1.01E-04
Ce-141	Ci			0.00E+00	6.36E-06
Ce-144	Ci			1.13E-05	0.00E+00
Np-239	Ci			7.42E-04	2.65E-04
Total	Ci			3.82E-02	2.08E-02
Dissolved and entrained gases:					
Xe-133m	Ci			0.00E+00	3.47E-06
Xe-133	Ci			2.12E-03	8.62E-04
Xe-135m	Ci			7.87E-03	2.33E-04
Xe-135	Ci			1.08E-02	2.94E-03
Ar-41	Ci			8.05E-07	0.00E+00
Total	Ci			2.07E-02	4.04E-03
Gr-Alpha	Ci			0.00E+00	0.00E+00

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 1-5 for typical lower limits of detection for liquid sample analyses.

**There are no continuous mode radioactive liquid release pathways at Plant Hatch.

TABLE 1-3b*
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS

		Continuous Mode**		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci			2.06E+00	1.62E+00
Fission and activation products:					
Na-24	Ci			3.26E-04	3.93E-04
Cr-51	Ci			1.74E-05	5.00E-05
Mn-54	Ci			4.92E-05	1.90E-05
Mn-56	Ci			5.74E-07	7.51E-07
Co-58	Ci			2.16E-05	2.73E-05
Co-60	Ci			3.00E-04	1.83E-04
Zn-65	Ci			2.25E-04	1.91E-04
As-76	Ci			1.77E-05	2.22E-05
Y-91m	Ci			9.17E-06	9.57E-06
Nb-95	Ci			1.43E-06	0.00E+00
Nb-97	Ci			2.40E-05	6.38E-04
Tc-99m	Ci			2.60E-05	1.27E-05
I-131	Ci			2.36E-04	8.78E-05
I-132	Ci			1.01E-04	0.00E+00
I-133	Ci			1.21E-03	2.05E-04
I-134	Ci			8.75E-07	1.93E-06
I-135	Ci			5.75E-04	0.00E+00
Cs-134	Ci			4.30E-04	2.74E-03
Cs-137	Ci			1.44E-03	1.14E-02
Cs-138	Ci			0.00E+00	1.12E-05
Total	Ci			5.01E-03	1.60E-02
Dissolved and entrained gases:					
Kr-85	Ci			6.51E-05	0.00E+00
Xe-133	Ci			2.61E-04	1.46E-04
Xe-135m	Ci			9.69E-04	1.09E-04
Xe-135	Ci			2.24E-03	3.46E-04
Total	Ci			3.53E-03	6.01E-04
Gr-Alpha	Ci			0.00E+00	0.00E+00

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 1-5 for typical lower limits of detection for liquid sample analyses.

**There are no continuous mode radioactive liquid release pathways at Plant Hatch.

TABLE 1-3c*
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
LIQUID EFFLUENTS

		Continuous Mode**		Batch Mode	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
H-3	Ci			6.44E+00	5.12E+00
Fission and activation products:					
Na-24	Ci			1.07E-03	1.06E-03
Cr-51	Ci			5.17E-05	3.73E-04
Mn-54	Ci			6.48E-04	3.75E-04
Mn-56	Ci			2.79E-05	7.51E-07
Fe-59	Ci			1.02E-05	1.13E-05
Co-58	Ci			1.24E-04	3.69E-04
Co-60	Ci			4.11E-03	2.72E-03
Zn-65	Ci			5.70E-03	3.30E-03
As-76	Ci			1.14E-04	5.60E-05
Sr-89	Ci			3.61E-04	2.25E-04
Sr-91	Ci			5.89E-05	0.00E+00
Sr-92	Ci			7.30E-06	0.00E+00
Y-91m	Ci			7.26E-05	9.57E-06
Nb-95	Ci			1.43E-06	1.74E-06
Nb-97	Ci			1.12E-04	6.38E-04
Mo-99	Ci			4.48E-05	0.00E+00
Tc-99m	Ci			2.08E-04	1.08E-04
Sb-125	Ci			3.43E-06	0.00E+00
I-131	Ci			2.35E-03	1.63E-03
I-132	Ci			6.46E-04	2.05E-06
I-133	Ci			7.75E-03	1.52E-03
I-134	Ci			4.70E-05	2.83E-04
I-135	Ci			5.29E-03	1.09E-04
Cs-134	Ci			2.84E-03	4.48E-03
Cs-137	Ci			1.08E-02	1.91E-02
Cs-138	Ci			0.00E+00	1.12E-05
Ba-140	Ci			3.72E-05	0.00E+00
La-140	Ci			1.25E-05	1.01E-04
Ce-141	Ci			0.00E+00	6.36E-06
Ce-144	Ci			1.13E-05	0.00E+00
Np-239	Ci			7.42E-04	2.65E-04
Total	Ci			4.33E-02	3.67E-02
Dissolved and entrained gases:					
Kr-85	Ci			6.51E-05	0.00E+00
Xe-133m	Ci			0.00E+00	3.47E-06
Xe-133	Ci			2.38E-03	1.01E-03
Xe-135m	Ci			8.84E-03	3.42E-04
Xe-135	Ci			1.30E-02	3.28E-03
Ar-41	Ci			8.05E-07	0.00E+00
Total	Ci			2.43E-02	4.64E-03
Gr-Alpha	Ci			0.00E+00	0.00E+00

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 1-5 for typical lower limits of detection for liquid sample analyses.

**There are no continuous mode radioactive liquid release pathways at Plant Hatch.

TABLE 1-4a
E. I. HATCH NUCLEAR PLANT - Unit 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
INDIVIDUAL DOSES DUE TO LIQUID RELEASES

Cumulative Doses per Quarter

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Bone	5.0	mrem	4.18E-02	8.37E-01	2.95E-02	5.89E-01
Liver	5.0	mrem	6.75E-02	1.35E+00	4.52E-02	9.04E-01
TBody	1.5	mrem	4.70E-02	3.13E+00	3.12E-02	2.08E+00
Thyroid	5.0	mrem	5.66E-02	1.13E+00	8.86E-03	1.77E-01
Kidney	5.0	mrem	2.47E-02	4.94E-01	1.55E-02	3.10E-01
Lung	5.0	mrem	8.64E-03	1.73E-01	4.95E-03	9.90E-02
GILLI	5.0	mrem	7.30E-03	1.46E-01	2.78E-03	5.55E-02

Cumulative Doses This Year

Organ	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Bone	10.0	mrem	2.54E-01	2.54E+00
Liver	10.0	mrem	4.30E-01	4.30E+00
TBody	3.0	mrem	2.99E-01	9.97E+00
Thyroid	10.0	mrem	1.36E-01	1.36E+00
Kidney	10.0	mrem	1.60E-01	1.60E+00
Lung	10.0	mrem	5.26E-02	5.26E-01
GILLI	10.0	mrem	5.92E-02	5.92E-01

TABLE 1-4b
E. I. HATCH NUCLEAR PLANT - Unit 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
INDIVIDUAL DOSES DUE TO LIQUID RELEASES

Cumulative Doses per Quarter

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Bone	5.0	mrem	8.38E-03	1.68E-01	5.10E-02	1.02E+00
Liver	5.0	mrem	1.60E-02	3.20E-01	7.80E-02	1.56E+00
TBody	1.5	mrem	1.19E-02	7.91E-01	5.42E-02	3.61E+00
Thyroid	5.0	mrem	1.22E-02	2.44E-01	6.79E-04	1.36E-02
Kidney	5.0	mrem	7.09E-03	1.42E-01	2.62E-02	5.24E-01
Lung	5.0	mrem	3.93E-03	7.85E-02	8.70E-03	1.74E-01
GILLI	5.0	mrem	3.10E-03	6.20E-02	1.64E-03	3.27E-02

Cumulative Doses This Year

Organ	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Bone	10.0	mrem	8.52E-02	8.52E-01
Liver	10.0	mrem	1.38E-01	1.38E+00
TBody	3.0	mrem	9.75E-02	3.25E+00
Thyroid	10.0	mrem	2.71E-02	2.71E-01
Kidney	10.0	mrem	5.04E-02	5.04E-01
Lung	10.0	mrem	1.96E-02	1.96E-01
GILLI	10.0	mrem	1.46E-02	1.46E-01

TABLE 1-5
LOWER LIMITS OF DETECTION - LIQUID SAMPLE ANALYSES

The values in this table represent apriori lower limits of detection (LLD) which are typically achieved in laboratory analyses of liquid radwaste samples.

RADIONUCLIDE	LLD	UNITS
Mn-54	5.38E-08	uCi/ml
Fe-59	7.78E-08	
Co-58	4.67E-08	
Co-60	4.78E-08	
Zn-65	1.31E-07	
Mo-99	5.10E-07*	
Cs-134	7.18E-08	
Cs-137	6.05E-08	
Ce-141	1.41E-07	
Ce-144	6.30E-07*	
I-131	6.51E-08	
Xe-135	8.45E-08	
Fe-55	2.00E-06	
Sr-89	5.00E-08	
Sr-90	5.00E-08	
H-3	1.00E-05	

*In accordance with Technical Specification Tables 4.15.2-1 (Unit 1) and 4.11.1-1 (Unit 2), Table Notation b, the permissible Lower Limit of Detection may be increased inversely proportional to the magnitude of the gamma yield. However, the LLD determined in this manner must not exceed 10 percent of the Maximum Permissible Concentration (MPC) value specified in 10CFR20, Appendix B, Table II (Column 2).

2 GASEOUS EFFLUENTS

2.1 REGULATORY LIMITS

The Technical Specifications presented in this section are for Unit 1. Requirements for Unit 2 are the same as for Unit 1; however, the Technical Specification numbers are not the same.

TECHNICAL SPECIFICATIONS

3.14.2 The radioactive gaseous effluent monitoring instrumentation channels shown in table 3.14.2-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Specification 3.15.2.1(a) are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the ODCM. Technical Specification Table 3.14.2-1 is included in this section as Table 2-1.)

3.15.2.1 The dose rate at any time in the UNRESTRICTED AREAS (figure 3.15-1) due to radioactive materials released in gaseous effluents from the site shall be limited to the following values:

a. The dose rate limit for noble gases shall be less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin.

b. The dose rate limit for I-131, I-133, tritium, and for all radioactive materials in particulate form and radionuclides other than noble gases with half-lives greater than 8 days shall be less than or equal to 1500 mrem/year to any organ.

3.15.2.2 The air dose in UNRESTRICTED AREAS (figure 3.15-1) due to noble gases released in gaseous effluents from each reactor unit shall be limited to the following:

a. During any calendar quarter, to less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation.

b. During any calendar year, to less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

3.15.2.3 The dose to any organ of a MEMBER OF THE PUBLIC from I-131, I-133, tritium , and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to UNRESTRICTED AREAS (figure 3.15-1) from each reactor unit shall be limited to the following:

a. During any calendar quarter to less than or equal to 7.5 mrem to any organ.

b. During any calendar year to less than or equal to 15 mrem to any organ.

3.15.2.4 The GASEOUS RADWASTE TREATMENT SYSTEM as described in the ODCM shall be in operation. (This Technical Specification applies whenever the main condenser air ejector system is in operation.)

4.15.2.4 GASEOUS RADWASTE TREATMENT SYSTEM operability shall be demonstrated by administrative controls which assure that the offgas treatment system is not bypassed.

3.15.2.5 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem.

(With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Specifications 3.15.1.2(a), 3.15.1.2(b), 3.15.2.2.(a), 3.15.2.2(b), 3.15.2.3(a), or 3.15.2.3(b), calculations shall be made including direct radiation contributions from the reactor units and from outside storage tanks to determine whether the above limits of Specification 3.15.2.5 have been exceeded.

3.15.2.6 The concentration of hydrogen downstream of the recombiners in the main condenser offgas treatment system shall be limited to less than or equal to 4 percent by volume.

3.15.2.7 The gross gamma radioactivity rate of the noble gases Xe-133, Xe-135, Xe-138, Kr-85m, Kr-87, and Kr-88 measured at the main condenser evacuation system pretreatment monitor station shall be limited to less than or equal to 240,000 uCi/second.

6.9.1.9 states in part:

"The Radioactive Effluent Release Report shall include (on a quarterly basis) unplanned releases from the site to unrestricted areas of radioactive materials in gaseous and liquid effluents that were in excess of 1 Ci, excluding dissolved and entrained gases and tritium for liquid effluents, or those in excess of 150 Ci of noble gases or 0.02 Ci of radioiodines for gaseous releases."

TABLE 3.14.2-1 (SHEET 1 OF 4)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Instrument	Minimum Channels OPERABLE	Applicability	Parameter	ACTION
1. Main Condenser Offgas Treatment System Explosive Gas Monitoring System				
Hydrogen Monitor	(1)	**	% Hydrogen	106
2. Reactor Building Vent Stack Monitoring System				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Rate Measurement +	105
b. Iodine Sampler Cartridge	(1)	*	Verify Presence of Cartridge	107
c. Particulate Sampler Filter	(1)	*	Verify Presence of Filter	107
d. Effluent System Flowrate Measurement Device	(1)	*	System Flowrate Measurement	104
e. Sampler Flowrate Measurement Device	(1)	*	Sampler Flowrate Measurement	104
3. Recombiner Building Ventilation Monitoring System				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Rate Measurement +	105
b. Iodine Sampler Cartridge	(1)	*	Verify Presence of Cartridge	107
c. Particulate Sampler Filter	(1)	*	Verify Presence of Filter	107
d. Sampler Flowrate Measurement Device	(1)	*	Sampler Flowrate Measurement	104

TABLE 2-1

TABLE 3.14.2-1 (SHEET 2 OF 4)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Instrument	Minimum Channels OPERABLE	Applicability	Parameter	ACTION
4. Main Stack Monitoring System				
a. Noble Gas Activity Monitor	(1)	*	Radioactivity Rate Measurement +	105
b. Iodine Sampler Cartridge	(1)	*	Verify Presence of Cartridge	107
c. Particulate Sampler Filter	(1)	*	Verify Presence of Filter	107
d. Effluent System Flowrate Measuring Devices	(1)	*	System Flowrate Measurement	104
e. Sampler Flowrate Measuring Device	(1)	*	Sampler Flowrate Measurement	104
5. Condenser Offgas Pretreatment Monitor				
Noble Gas Activity Monitor	(1)	***	Radioactivity Rate Measurement	108

TABLE 2-1 (CONT'D)

TABLE 3.14.2-1 (SHEET 3 OF 4)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Table Notations

+Monitor must be capable of responding to a Lower Limit of Detection of 1×10^{-4} μCi/ml.

*During releases via this pathway.

**During main condenser offgas treatment system operation.

***During operation of the main condenser air ejector.

ACTION 104 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue, provided the flowrate is estimated at least once per 4 hours.

If the number of channels OPERABLE remains less than required by the Minimum Channels OPERABLE requirement for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 105 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue, provided grab samples are taken daily and analyzed daily for gross activity within 24 hours. With the number of main stack monitoring system channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, without delay suspend drywell purge.

If the number of channels OPERABLE remains less than required by the Minimum Channels OPERABLE requirement for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 106 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, operation of the main condenser offgas treatment system may continue provided:

(a) Gas samples are collected once per 4 hours and analyzed within the ensuing 4 hours, or

(b) Using a temporary hydrogen analyzer installed in the offgas system line downstream of the recombiner, hydrogen concentration readings are taken and logged every 4 hours.

TABLE 3.14.2-1 (SHEET 4 OF 4)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Table Notations (Continued)

If the number of channels OPERABLE remains less than required by the Minimum Channels OPERABLE requirement for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 107 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue, provided samples are continuously collected with auxiliary sampling equipment for periods on the order of 7 days and analyzed within 48 hours after the end of the sampling period.

If the number of channels OPERABLE remains less than required by the Minimum Channels OPERABLE requirement for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

ACTION 108 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, release to the environment may continue for up to 72 hours provided:

a. The offgas system is not bypassed, and

b. The offgas post-treatment monitor (D11-K615) or the main stack monitor (D11-K600) is OPERABLE.

Otherwise, be in at least HOT STANDBY within 12 hours.

If the number of channels OPERABLE remains less than required by the Minimum Channels OPERABLE requirement for over 30 days, an explanation of the circumstances shall be included in the next semi-annual effluent release report.

2.2 MEASUREMENT AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

Waste gas release at Plant Hatch is confined to four paths: main stack (also called the offgas vent), Unit 1 reactor building vent; Unit 2 reactor building vent, and the recombiner building vent. Each of these four paths is continuously monitored for gaseous radioactivity. Each is equipped with an integrating-type sample collection device for collecting particulates and iodines. Sample collection is in accordance with Technical Specification Tables 4.15.2-1 (Unit 1) and 4.11.2-1 (Unit 2). Unless required more frequently under certain circumstances specified in Table Notations to the above mentioned tables, samples are collected as follows:

1. Noble gas samples are collected by grab sampling monthly.

2. Tritium samples are collected by grab sampling monthly.

3. Radioiodine samples are collected by pulling the sample stream through a charcoal cartridge over a 7-day period.

4. Particulates are collected by pulling the sample stream through a particulate filter over a 7-day period.

5. The 7-day particulate filters above are analyzed for gross alpha activity.

6. Quarterly composite samples are prepared from the particulate filters collected over the previous quarter and the quarterly composite sample is analyzed for Sr-89 and Sr-90.

Sample analyses results and release flow rates from the four release points form the basis for calculating released quantities of radionuclide-specific radioactivity, dose rates associated with gaseous releases, and cumulative doses for the current quarter and year. This task is normally performed with computer assistance.

The noble gas grab sample analysis results are used along with maximum expected release flow rates from each of the four vents to calculate monitor setpoints for the gaseous effluent monitors serving the four release points, to assure that the limits of Technical Specifications 3.15.2.1.a (Unit 1) or 3.11.2.1.a (Unit 2) are not exceeded. Calculation of monitor setpoints is described in the Plant Hatch ODCM.

With each release period released radioactivity, dose rates, and cumulative doses are calculated. Cumulative dose results are tabulated along with percent of Technical Specification limits (3.15.2.2 and 3.15.2.3 (Unit 1); 3.11.2.2 and 3.11.2.3 (Unit 2) for each release, for the current quarter and year.

After each calendar quarter (13 weeks) a summary of waste gas releases from the four vents is compiled for preparation of the Semiannual Effluent Release Report required by Technical Specifications 6.9.1.8 and 6.9.1.9 and described in NRC Regulatory Guide 1.21.

The methods for determining released quantities of radioactivity, dose rates and cumulative doses are as follows:

1. FISSION AND ACTIVATION GAS

The radionuclide-specific released radioactivity is determined from sample analyses results collected as described above and average release flow rates over the period represented by the collected sample.

Instantaneous dose rates due to noble gases and due to radioiodines, tritium, and particulates are calculated (with computer assistance). Calculated dose rates are compared to the dose rate limits specified in 3.15.2.1.a (Unit 1) and 3.11.2.1.a (Unit 2) for noble gases; and 3.15.2.1.b (Unit 1) and 3.11.2.1.b (Unit 2) for radioiodine, tritium, and particulates. Dose rate calculation methodology is presented in the Plant Hatch ODCM.

Beta and gamma air doses due to noble gases are calculated for the location in the unrestricted area with the potential for the highest exposure due to gaseous releases. Air doses are calculated for each release period and cumulative totals are kept for each unit for the current calendar quarter and year. Cumulative air doses are compared to the dose limits specified in Technical Specifications 3.15.2.2 (Unit 1) and 3.11.2.2 (Unit 2). Current percent of technical specification limits are shown on the printout for each release period. Air dose calculation methodology is presented in the Plant Hatch ODCM.

2. RADIOIODINE, TRITIUM, AND PARTICULATE RELEASES

Released quantities of radioiodines are determined from the weekly samples and release flow rates for the four release points. Radioiodine concentrations are determined by gamma spectroscopy.

Released quantities of particulates are determined from the weekly (filter) samples and release flow rates for the four release points. Gamma spectroscopy is used to quantify concentrations of principal gamma emitters.

After each calendar quarter the particulate filters from each vent are combined, fused, and strontium separation is performed. Since sample flows and vent flows are almost constant over each quarterly period the filters from each vent can be dissolved together. Decay corrections are made back to the middle of the quarterly collection period. Where significant Sr-89 or Sr-90 is not detected, LLD's are calculated. Strontium concentrations are input to the composite file of the computer to be used in release, dose rate and individual dose calculations.

Tritium samples are obtained monthly from each vent by passing the sample stream through a cold trap. The grams of water vapor/cubic foot gas is measured upstream of the cold trap in order to alleviate the difficulties in determining water vapor collection efficiencies. The tritium samples are analyzed by an independent laboratory and results are furnished in uCi/ml of water. The tritium concentration in water is converted to tritium concentration in air and this value is input into the composite file of the computer to be used in release, dose rate, and individual dose calculations.

Dose rates due to radioiodine, tritium, and particulates are calculated for a hypothetical child, exposed to the inhalation pathway, at the location in the unrestricted area where the potential dose rate is expected to be the highest. Dose rates are calculated for each release point, for each release period, and the total dose rate from all four release points are compared to the dose rate limits specified in Technical Specifications 3.15.2.1.b (Unit 1) or 3.11.2.1.b (Unit 2).

Individual doses due to radioiodine, tritium, and particulates are calculated for the critical receptor, which is described in the Plant Hatch ODCM. Individual doses are calculated for each release period and cumulative totals are kept for each unit for the current calendar quarter and year. Cumulative individual doses are compared to the dose limits specified in Technical Specifications 3.15.2.3 (Unit 1) and 3.11.2.3 (Unit 2). Current percent of technical specification limits are shown on the printout for each release period.

3. GROSS ALPHA RELEASE

The gross alpha release is computed each month by counting the particulate filters each week for gross alpha activity in a scintillation counter. The four or five weeks' numbers are then recorded on a data sheet and the activity is summed at the end of the month. This concentration is input to the composite file of the computer and is used for release calculations.

4. ERROR ESTIMATES

Regulatory Guide 1.21 requires that estimated total error in analysis techniques be reported. These estimates are required for the total fission and activation gas release, total I-131 release, total particulates with half-lives greater than 8-day release, and total tritium release.

"The total or maximum error associated with the effluent measurement will include the cumulative errors resulting from the total operation of sampling and measurement. Because it may be very difficult to assign error terms for each parameter affecting the final measurement, detailed statistical evaluation of error are not suggested. The objective should be to obtain an overall estimate of the error associated with measurements of radioactive materials released in liquid and gaseous effluents and solid waste."

Estimated errors are based on errors 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.

(1) Fission and Activation Total Release was calculated from sample analysis results and release point flow rates.

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rates	10%
Non-Steady Release Rates	20%
	100%

(2) I-131 Release was calculated from each weekly sample:

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rates	10%
Vent Sample Flow Rates	10%
Non-Steady Release Rates	10%
Losses From Charcoal Cartridge	10%
	110%

(3) Particulates with half-lives greater than 8 days release was calculated from sample analysis results and release point flow rates.

Statistical Error at LLD concentration	60%
Counting Equipment Calibration	10%
Vent Flow Rates	10%
Vent Sample Flow Rates	10%
Non-Steady Release Rates	10%
	100%

(4) Total Tritium Release was dominated by the reactor building vent tritium release; hence, the larger statistical errors of the off-gas vent and recombiner building vent tritium releases do not affect the error in the total tritium release:

Water Vapor in Sample Stream Determination	20%
Vent Flow Rates	10%
Counting Calibration and Statistics	10%
Non-Steady Release	50%
	90%

2.3 GASEOUS EFFLUENT RELEASE DATA

Regulatory Guide 1.21 Tables 1A, 1B, and 1C are found in this report as Tables 2-2a-c, 2-3a-c, and 2-4a-c. Data are presented on a quarterly basis as required by Regulatory Guide 1.21.

To complete Tables 2-2a-c, total release for each of the four categories (fission and activation gases; iodines; particulates; and tritium) was divided by the number of seconds in the quarter to obtain a release rate in uCi/second for each category.

However, the applicable Technical Specification limits are not in terms of release rate in uCi/second but in terms of dose rate in mrem/year, as presented in Technical Specifications 3.15.2.1 (Unit 1) and 3.11.2.1 (Unit 2). Noble gases are limited as specified in 3.15.2.1.a and 3.11.2.1.a. The other three categories (tritium, radioiodines, and particulates) are limited as a group as specified in 3.15.2.1.b and 3.11.2.1.b. Further the limits specified in Technical Specifications 3.15.2.1 and 3.11.2.1 are site limits, not unit limits. Dose rates due to noble gas releases and due to radioiodine, tritium, and particulates are presented in Table 2-5 along with percent of technical specification limits.

Gross alpha radioactivity is reported in Tables 2-2a, 2-2b, and 2-2c as curies released in each quarter.

Limits for cumulative beta and gamma air doses, due to noble gases, are specified in Technical Specifications 3.15.2.2 (Unit 1) and 3.11.2.2 (Unit 2). These limits are unit limits. Cumulative air doses are presented in Tables 2-6a and 2-6b, along with percent of technical specification limits.

Limits for cumulative individual doses, due to radioiodine, tritium, and particulates, are specified in Technical Specifications 3.15.2.3 (Unit 1) and 3.11.2.3 (Unit 2). These limits are also unit limits. Cumulative individual doses are presented in Tables 2-7a and 2-7b, with percent of technical specification limits.

2.4 RADIOLOGICAL IMPACT DUE TO GASEOUS RELEASES

Dose rates due to noble gas releases were calculated for the site in accordance with Technical Specifications 3/4.15.2.1.a (Unit 1) and 3/4.11.2.1.a (Unit 2). Results are presented in Table 2-5. Dose rates due to radioiodine, tritium, and particulates in gaseous releases were calculated in accordance with Technical Specifications 3/4.15.2.1.b (Unit 1) and 3/4.11.2.1.b (Unit 2). These results are also in Table 2-5.

Cumulative air doses due to noble gas releases were calculated for each unit in accordance with Technical Specification 3/4.15.2.2 (Unit 1) and 3/4.11.2.2 (Unit 2). These results are presented in Tables 2-6a and 2-6b.

Cumulative doses to an individual due to radioiodine, tritium , and particulates were calculated for each unit in accordance with Technical Specifications 3/4.15.2.3 (Unit 1) and 3/4.11.2.3 (Unit 2). These results are presented in Tables 2-7a and 2-7b.

Dose rates and doses were calculated using the methodology presented in the Plant Hatch Offsite Dose Calculation Manual.

TABLE 2-2a
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A.	Fission and Activation Gases				
	1. Total Release	Ci	5.03E+01	5.07E+01	1.00E+02
	2. Average Release Rate For Period	uCi/sec	6.40E+00	6.52E+00	
	*3. % of Tech Spec Limit	%			
B.	Iodines				
	1. Total Iodine-131	Ci	1.83E-04	8.02E-04	1.10E+02
	2. Average Release Rate For Period	uCi/sec	2.32E-05	1.03E-04	
	*3. % of Tech Spec Limit	%			
C.	Particulates				
	1. Particulates with half-lives > 8 days	Ci	2.56E-04	2.35E-04	1.00E+02
	2. Average Release Rate For Period	uCi/sec	3.26E-05	3.02E-05	
	*3. % of Tech Spec Limit	%			
	4. Gross Alpha Radioactivity	Ci	5.61E-06	3.99E-06	
D.	Tritium				
	1. Total	Ci	3.81E+00	2.84E+00	9.00E+01
	2. Average Release Rate For Period	uCi/sec	4.85E-01	3.66E-01	
	*3. % of Tech Spec Limit	%			

*Technical Specification limits are in terms of dose rate (mrem/yr) and dose (mrem). See Tables 2-5, 2-6a, 2-6b, 2-7a, and 2-7b.

TABLE 2-2b
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A.	Fission and Activation Gases				
	1. Total Release	Ci	3.17E+01	4.24E+01	1.00E+02
	2. Average Release Rate For Period	uCi/sec	4.03E+00	5.46E+00	
	*3. % of Tech Spec Limit	%			
B.	Iodines				
	1. Total Iodine-131	Ci	1.82E-04	1.32E-03	1.10E+02
	2. Average Release Rate For Period	uCi/sec	2.32E-05	1.69E-04	
	*3. % of Tech Spec Limit	%			
C.	Particulates				
	1. Particulates with half-lives > 8 days	Ci	1.40E-04	1.69E-04	1.00E+02
	2. Average Release Rate For Period	uCi/sec	1.78E-05	2.17E-05	
	*3. % of Tech Spec Limit	%			
	4. Gross Alpha Radioactivity	Ci	2.91E-06	3.42E-06	
D.	Tritium				
	1. Total	Ci	5.68E+00	7.24E+00	9.00E+01
	2. Average Release Rate For Period	uCi/sec	7.22E-01	9.31E-01	
	*3. % of Tech Spec Limit	%			

*Technical Specification limits are in terms of dose rate (mrem/yr) and dose (mrem). See Tables 2-5, 2-6a, 2-6b, 2-7a, and 2-7b.

TABLE 2-2c
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

		Unit	Quarter 3	Quarter 4	Est. Total Error (%)
A.	Fission and Activation Gases				
	1. Total Release	Ci	8.20E+01	9.32E+01	1.00E+02
	2. Average Release Rate For Period	uCi/sec	1.04E+01	1.20E+01	
	*3. % of Tech Spec Limit	%			
B.	Iodines				
	1. Total Iodine-131	Ci	3.65E-04	2.12E-03	1.10E+02
	2. Average Release Rate For Period	uCi/sec	4.64E-05	2.72E-04	
	*3. % of Tech Spec Limit	%			
C.	Particulates				
	1. Particulates with half-lives > 8 days	Ci	3.96E-04	4.03E-04	1.00E+02
	2. Average Release Rate For Period	uCi/sec	5.04E-05	5.19E-05	
	*3. % of Tech Spec Limit	%			
	4. Gross Alpha Radioactivity	Ci	8.52E-06	7.42E-06	
D.	Tritium				
	1. Total	Ci	9.49E+00	1.01E+01	9.00E+01
	2. Average Release Rate For Period	uCi/sec	1.21E+00	1.30E+00	
	*3. % of Tech Spec Limit	%			

*Technical Specification limits are in terms of dose rate (mrem/yr) and dose (mrem). See Tables 2-5, 2-6a, 2-6b, 2-7a, and 2-7b.

TABLE 2-3a
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - ELEVATED RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Kr-85m	Ci	8.31E-02	0.00E+00		
Kr-87	Ci	4.91E-01	6.38E-01		
Xe-133	Ci	5.56E-02	3.14E-01		
Xe-135m	Ci	4.49E+00	5.81E+00		
Xe-135	Ci	8.22E-01	8.74E-01		
Xe-138	Ci	1.68E+01	2.05E+01		
Total For Period	Ci	2.28E+01	2.81E+01		
2.Iodines					
I-131	Ci	9.27E-05	7.15E-04		
I-133	Ci	5.23E-04	3.11E-03		
I-135	Ci	7.86E-04	4.42E-03		
Total For Period	Ci	40E-03	8.25E-03		
3. Particulates					
Co-60	Ci	0.00E+00	1.13E-07		
Zn-65	Ci	0.00E+00	3.50E-07		
Sr-89	Ci	1.53E-05	1.65E-08		
Sr-90	Ci	1.15E-07	0.00E+00		
Nb-95	Ci	4.64E-08	0.00E+00		
Cs-137	Ci	2.75E-07	1.19E-06		
Ba-140	Ci	3.50E-05	5.43E-05		
La-140	Ci	7.54E-05	8.25E-05		
Ce-141	Ci	9.61E-08	0.00E+00		
Total For Period	Ci	1.26E-04	1.38E-04		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

TABLE 2-3b
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - ELEVATED RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Kr-85m	Ci	8.31E-02	0.00E+00		
Kr-87	Ci	4.91E-01	8.82E-01		
Xe-133	Ci	5.56E-02	4.34E-01		
Xe-135m	Ci	4.49E+00	6.68E+00		
Xe-135	Ci	8.22E-01	1.02E+00		
Xe-138	Ci	1.68E+01	2.39E+01		
Total For Period	Ci	2.28E+01	3.29E+01		
2.Iodines					
I-131	Ci	9.27E-05	1.25E-03		
I-133	Ci	5.23E-04	7.03E-03		
I-135	Ci	7.86E-04	1.10E-02		
Total For Period	Ci	1.40E-03	1.93E-02		
3. Particulates					
Co-60	Ci	0.00E+00	3.40E-07		
Zn-65	Ci	0.00E+00	5.91E-07		
Sr-89	Ci	1.53E-05	1.85E-08		
Sr-90	Ci	1.15E-07	0.00E+00		
Nb-95	Ci	4.64E-08	0.00E+00		
Cs-137	Ci	2.75E-07	1.25E-06		
Ba-140	Ci	3.50E-05	6.10E-05		
La-140	Ci	7.54E-05	9.42E-05		
Ce-141	Ci	9.61E-08	0.00E+00		
Total For Period	Ci	1.26E-04	1.57E-04		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

TABLE 2-3c
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - ELEVATED RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Kr-85m	Ci	1.66E-01	0.00E+00		
Kr-87	Ci	9.81E-01	1.52E+00		
Xe-133	Ci	1.11E-01	7.48E-01		
Xe-135m	Ci	8.99E+00	1.25E+01		
Xe-135	Ci	1.64E+00	1.89E+00		
Xe-138	Ci	3.36E+01	4.44E+01		
Total For Period	Ci	4.55E+01	6.10E+01		
2.Iodines					
I-131	Ci	1.85E-04	1.97E-03		
I-133	Ci	1.05E-03	1.01E-02		
I-135	Ci	1.57E-03	1.55E-02		
Total For Period	Ci	2.80E-03	2.76E-02		
3. Particulates					
Co-60	Ci	0.00E+00	4.54E-07		
Zn-65	Ci	0.00E+00	9.41E-07		
Sr-89	Ci	3.05E-05	3.50E-08		
Sr-90	Ci	2.31E-07	0.00E+00		
Nb-95	Ci	9.28E-08	0.00E+00		
Cs-137	Ci	5.51E-07	2.44E-06		
Ba-140	Ci	6.99E-05	1.15E-04		
La-140	Ci	1.51E-04	1.77E-04		
Ce-141	Ci	1.92E-07	0.00E+00		
Total For Period	Ci	2.52E-04	2.96E-04		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

TABLE 2-4a
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Kr-85m	Ci	1.31E+00	0.00E+00		
Kr-87	Ci	1.29E-02	0.00E+00		
Xe-133	Ci	1.84E+00	2.26E+01		
Xe-135m	Ci	4.60E-02	0.00E+00		
Xe-135	Ci	2.41E+01	7.45E-03		
Xe-138	Ci	1.84E-01	0.00E+00		
Total For Period	Ci	2.75E+01	2.26E+01		
2.Iodines					
I-131	Ci	9.01E-05	8.61E-05		
I-133	Ci	6.62E-04	5.99E-04		
I-135	Ci	2.16E-04	0.00E+00		
Total For Period	Ci	9.68E-04	6.85E-04		
3. Particulates					
Cr-51	Ci	1.26E-05	0.00E+00		
Mn-54	Ci	7.56E-06	6.27E-06		
Co-58	Ci	2.33E-06	2.79E-06		
Co-60	Ci	6.76E-05	4.39E-05		
Zn-65	Ci	1.27E-05	2.59E-05		
Sr-89	Ci	7.86E-06	1.23E-05		
Sr-90	Ci	0.00E+00	8.27E-09		
Cs-137	Ci	0.00E+00	1.10E-06		
Ba-140	Ci	1.05E-05	0.00E+00		
La-140	Ci	8.77E-06	3.70E-06		
Total For Period	Ci	1.30E-04	9.61E-05		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

TABLE 2-4b
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Xe-135	Ci	8.97E+00	9.51E+00		
Total For Period	Ci	8.97E+00	9.51E+00		
2.Iodines					
I-131	Ci	8.95E-05	6.41E-05		
I-133	Ci	4.96E-04	4.02E-04		
I-135	Ci	2.47E-04	0.00E+00		
Total For Period	Ci	8.32E-04	4.66E-04		
3. Particulates					
Mn-54	Ci	3.86E-07	0.00E+00		
Zn-65	Ci	8.29E-07	0.00E+00		
Sr-89	Ci	1.13E-05	1.12E-05		
Cs-137	Ci	3.43E-07	2.55E-07		
Ba-140	Ci	1.07E-06	0.00E+00		
Total For Period	Ci	1.39E-05	1.15E-05		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

TABLE 2-4c
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES*

		Continuous Mode		Batch Mode**	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission Gases					
Kr-85m	Ci	1.31E+00	0.00E+00		
Kr-87	Ci	1.29E-02	0.00E+00		
Xe-133	Ci	1.84E+00	2.26E+01		
Xe-135m	Ci	4.60E-02	0.00E+00		
Xe-135	Ci	3.31E+01	9.52E+00		
Xe-138	Ci	1.84E-01	0.00E+00		
Total For Period	Ci	3.65E+01	3.22E+01		
2.Iodines					
I-131	Ci	1.80E-04	1.50E-04		
I-133	Ci	1.16E-03	1.00E-03		
I-135	Ci	4.63E-04	0.00E+00		
Total For Period	Ci	1.80E-03	1.15E-03		
3. Particulates					
Cr-51	Ci	1.26E-05	0.00E+00		
Mn-54	Ci	7.94E-06	6.27E-06		
Co-58	Ci	2.35E-06	2.79E-06		
Co-60	Ci	6.76E-05	4.39E-05		
Zn-65	Ci	1.35E-05	2.59E-05		
Sr-89	Ci	1.92E-05	2.36E-05		
Sr-90	Ci	0.00E+00	8.27E-09		
Cs-137	Ci	3.43E-07	1.35E-06		
Ba-140	Ci	1.16E-05	0.00E+00		
La-140	Ci	8.77E-06	3.70E-06		
Total For Period	Ci	1.44E-04	1.08E-04		

*Zeroes in this table indicate that no radioactivity was present above detectable levels. See Table 2-8 for typical lower limits of detection for gaseous sample analyses.

**There are no batch mode radioactive gaseous release pathways at Plant Hatch.

Table 2-5
E. I. HATCH NUCLEAR PLANT - SITE
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
GASEOUS EFFLUENTS - DOSE RATES

Dose Rates Due to Noble Gases

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
TBody	500	mrem/yr	7.09E-02	1.42E-02	2.97E-02	5.95E-03
Skin	3000	mrem/yr	1.53E-01	5.09E-03	6.34E-02	2.11E-03

Dose Rates Due to Radioiodine, Tritium, and Particulates

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Bone	1500	mrem/yr	4.41E-05	2.94E-06	4.57E-05	3.05E-06
Liver	1500	mrem/yr	1.08E-02	7.20E-04	1.19E-02	7.96E-04
TBody	1500	mrem/yr	1.08E-02	7.19E-04	1.19E-02	7.95E-04
Thyroid	1500	mrem/yr	1.86E-02	1.24E-03	1.91E-02	1.27E-03
Kidney	1500	mrem/yr	1.08E-02	7.21E-04	1.20E-02	7.98E-04
Lung	1500	mrem/yr	1.14E-02	7.58E-04	1.23E-02	8.23E-04
GILLI	1500	mrem/yr	1.08E-02	7.19E-04	1.19E-02	7.95E-04

TABLE 2-6a
E. I. HATCH NUCLEAR PLANT - UNIT 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
AIR DOSES DUE TO NOBLE GAS RELEASES

Cumulative Doses per Quarter

Type of Radiation	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Gamma	5.0	mrad	1.38E-02	2.76E-01	2.60E-03	5.20E-02
Beta	10.0	mrad	1.73E-02	1.73E-01	6.45E-03	6.45E-02

Cumulative Doses This Year

Type of Radiation	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Gamma	10.0	mrad	8.67E-02	8.67E-01
Beta	20.0	mrad	1.48E-01	7.39E-01

TABLE 2-6b
E. I. HATCH NUCLEAR PLANT - UNIT 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
AIR DOSES DUE TO NOBLE GAS RELEASES

Cumulative Doses per Quarter

Type of Radiation	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Gamma	5.0	mrad	4.96E-03	9.92E-02	5.41E-03	1.08E-01
Beta	10.0	mrad	5.97E-03	5.97E-02	6.38E-03	6.38E-02

Cumulative Doses This Year

Type of Radiation	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Gamma	10.0	mrad	6.18E-02	6.18E-01
Beta	20.0	mrad	1.50E-01	7.52E-01

TABLE 2-7a
E. I. HATCH NUCLEAR PLANT - Unit 1
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
INDIVIDUAL DOSES DUE TO RADIOIODINE, TRITIUM,
AND PARTICULATES IN GASEOUS RELEASES

Cumulative Doses per Quarter

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Bone	7.5	mrem	5.97E-04	7.95E-03	4.84E-04	6.45E-03
Liver	7.5	mrem	2.34E-03	3.12E-02	1.77E-03	2.36E-02
TBody	7.5	mrem	2.35E-03	3.13E-02	1.76E-03	2.35E-02
Thyroid	7.5	mrem	4.45E-03	5.93E-02	5.17E-03	6.90E-02
Kidney	7.5	mrem	2.33E-03	3.10E-02	1.76E-03	2.34E-02
Lung	7.5	mrem	2.37E-03	3.15E-02	1.76E-03	2.35E-02
GILLI	7.5	mrem	2.37E-03	3.15E-02	1.77E-03	2.35E-02

Cumulative Doses This Year

Organ	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Bone	15.0	mrem	2.76E-03	1.84E-02
Liver	15.0	mrem	8.37E-03	5.58E-02
TBody	15.0	mrem	8.23E-03	5.49E-02
Thyroid	15.0	mrem	3.87E-02	2.58E-01
Kidney	15.0	mrem	8.22E-03	5.48E-02
Lung	15.0	mrem	8.11E-03	5.41E-02
GILLI	15.0	mrem	8.11E-03	5.41E-02

TABLE 2-7b
E. I. HATCH NUCLEAR PLANT - Unit 2
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT 1990
INDIVIDUAL DOSES DUE TO RADIOIODINE, TRITIUM,
AND PARTICULATES IN GASEOUS RELEASES

Cumulative Doses per Quarter

Organ	Tech Spec Limit	Unit	Quarter 3	% of Tech Spec Limit	Quarter 4	% of Tech Spec Limit
Bone	7.5	mrem	1.71E-04	2.29E-03	1.51E-04	2.01E-03
Liver	7.5	mrem	2.82E-03	3.76E-02	3.70E-03	4.94E-02
TBody	7.5	mrem	2.82E-03	3.76E-02	3.70E-03	4.93E-02
Thyroid	7.5	mrem	4.83E-03	6.44E-02	7.94E-03	1.06E-01
Kidney	7.5	mrem	2.82E-03	3.77E-02	3.71E-03	4.95E-02
Lung	7.5	mrem	2.81E-03	3.75E-02	3.69E-03	4.92E-02
GILLI	7.5	mrem	2.82E-03	3.76E-02	3.69E-03	4.92E-02

Cumulative Doses This Year

Organ	Tech Spec Limit	Unit	Quarters 1,2,3,& 4	% of Tech Spec Limit
Bone	15.0	mrem	7.53E-04	5.02E-03
Liver	15.0	mrem	1.39E-02	9.28E-02
TBody	15.0	mrem	1.39E-02	9.28E-02
Thyroid	15.0	mrem	3.02E-02	2.01E-01
Kidney	15.0	mrem	1.39E-02	9.30E-02
Lung	15.0	mrem	1.39E-02	9.24E-02
GILLI	15.0	mrem	1.39E-02	9.26E-02

TABLE 2-8
LOWER LIMITS OF DETECTION - GASEOUS SAMPLE ANALYSES

The values in this table represent apriori lower limits of detection (LLD) which are typically achieved in laboratory analyses of gaseous radwaste samples.

RADIONUCLIDE	LLD	UNITS
Kr-87	1.31E-07	uCi/ml
Kr-88	2.10E-07	
Xe-133	1.62E-07	
Xe-133m	6.07E-08	
Xe-135	5.77E-08	
Xe-138	2.85E-06	
I-131	4.37E-14	
I-133	6.16E-13	
Mn-54	2.78E-14	
Fe-59	4.62E-14	
Co-58	2.46E-14	
Co-60	2.88E-14	
Zn-65	7.51E-14	
Mo-99	6.02E-13	
Cs-134	3.64E-14	
Cs-137	2.88E-14	
Ce-141	4.94E-14	
Ce-144	2.02E-13	
Sr-89	1.00E-11	
Sr-90	1.00E-11	
H-3	1.00E-0[illegible]	

3. SOLID WASTE

3.1 REGULATORY REQUIREMENTS

The Technical Specifications presented in this section are for Unit 1. Requirements for Unit 2 are the same as for Unit 1; however, the Technical Specification numbers are not the same.

TECHNICAL SPECIFICATIONS

3.15.3.1 The solid radwaste system shall be used in accordance with the PROCESS CONTROL PROGRAM to provide for the SOLIDIFICATION of wet solid wastes and for the SOLIDIFICATION and packaging of other radioactive wastes, as required, to ensure the meeting of the requirements of 10 CFR Part 20 and of 10 CFR Part 71 prior to shipment of radioactive wastes from the site.

6.9.1.9 states in part:

The Radioactive Effluent Release Report shall include the following information for each type of solid waste shipped offsite during the report period:

a. Container volume

b. Total curie quantity (specify whether determined by measurement or estimate)

c. Principal radionuclides (specify whether determined by measurement or estimate)

d. Type of waste, e.g., spent resin, compacted dry waste, evaporator bottoms

e. Type of container, e.g., LSA, type A, type B, large quantity

f. Solidification agent, e.g., cement.

3.2 SOLID WASTE DATA

Regulatory Guide 1.21 Table 3 is found in this report as Table 3-1a, and 3-1b,

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1990
July 1, 1990 - December 31, 1990
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
FOR UNITS I AND II

TABLE 3-1A

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fue.)

1. Type of waste	UNIT	6 month period	Est. Total ERROR%
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	1.67 E 2	
	Ci	5.64 E 2	1.0 E 1
b. Dry compressible waste, contaminated equip. etc.	m^3	6.99 E 2	
	Ci	2.64 E 0	2.0 E 1
c. Irradiated components, control rods,	m^3	1.14 E 1	
	Ci	2.57 E 4	2.0 E 1
d. Control Rod Drive Filters	m^3	E	
	Ci	E	E
e. Other (describe) equip. etc. Torus Filters	m^3	1.72 E 1	
	Ci	9.99 E 0	2.0 E 1

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

	ISOTOPE	PERCENT	CURIES
a.	Co-60	17.86	100.74
	Cs-137	4.78	26.97
	Zn-65	42.07	237.32
	Fe-55	10.75	60.64
	Other Isotopes	24.55	138.49
b.	Co-60	26.79	0.79
	Cs-137	6.55	0.17
	Zn-65	51.19	1.36
	Fe-55	4.17	0.11
	Other Isotopes	11.30	0.30
c.	Co-60	59.38	15,260
	Fe-55	35.21	9,050
	Ni-63	5.41	1,390
	Other Isotopes	<.01	<1
d.	NA		
	NA		
	NA		
	NA		
e.	Mn-54	1.50	0.15
	Zn-65	6.11	0.61
	Co-60	58.56	5.85
	Fe-55	29.33	2.93
	Other Isotopes	4.50	0.45

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
62	Tractor & Trailer Cask & Van	Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
NA	NA	NA

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1990
July 1, 1990 - December 31, 1990
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
FOR UNITS I AND II

TABLE 3-1B

TYPE OF WASTE	CURIE QUANTITY / DETERMINED	PRINCIPLE NUCLIDES / DETERMINATION	BURIAL CONTAINER DESCRIPTION	NUMBER OF CONTAINERS SHIPPED	VOLUME OF EACH CONTAINER CUBIC FEET (ft 3)	TYPE SHIPMENT / CONTAINER	SOLIDIFICATION AGENT
Dewatered Resins (CPS, Spent Resins)	219.26 measured	Co-60, Cs-137 Zn-65, Fe-55 measured	Poly-HIC NuPac E1-210	29	202.1	NRC Type A LSA	NA
Dewatered Resins (CUPS)	344.90 measured	Cr-51, Zn-65 Co-60, Fe-55 Cs-137 measured	Poly HIC NuPac E1-142	2	132.4	NRC Type B LSA	NA
Dry Compressible Waste	1.68 estimated	Co-60, Cs-137 Zn-65, Fe-55 measured	B-25 Boxes (metal)	218	96	LSA strong tight	NA
U-I Torus Filters	9.99 estimated	Mn-54, Zn-65 Co-60, Fe-55 estimated	Poly-HIC E1-210	3	202.1	LSA NRC Type A	NA
Irradiated Hardware	25,704.56 estimated	Co-60, Fe-55 Ni-63 estimated	Steel Containers TN-RAM CNSI-355	10	57.4, 7.46 22.4	Radioactive Material N.O.S. Type B	NA
Dry Compressible Waste (SEG to Barnwell)	0.96 estimated	Co-60, Cs-137 Zn-65, Fe-55 estimated	Steel Containers	Unknown	Unknown	Unknown	NA

CPS=Condensate Phase Separator
SEG=Scientific Ecology Group
HIC=High Integrity Container
LSA=Low Specific Activity
CUPS=Clean Up Phase Separator

4. SUPPLEMENTARY INFORMATION FOR THE PLANT HATCH SEMIANNUAL RADIOLOGICAL EFFLUENT RELEASE REPORT FOR THE FIRST SIX MONTHS OF 1990.

The purpose of this section is to acknowledge the failure to meet the lower limit of detection (LLD) requirement for Sr-89 when analyzing two liquid composite samples representing the second quarter 1990, and to discuss the potential impact on liquid effluent values reported in the HNP Semiannual Radiological Effluent Release Report for the first six months of 1990.

The lower limit of detection for Sr-89 in liquid effluent samples specified in Technical Specification Table 4.15.1-1 (Unit 1) and Table 4.11.1-1 (Unit 2) is 5E-8 uCi/ml. In both instances in which the required lower limit of detection was not achieved, the primary cause was inadequate sample size.

For the Unit 1 liquid effluent sample composited during the second quarter 1990, results of analysis for Sr-89 were reported as less than 7E-8 uCi/ml. Positive composite sample results are normally reported to two significant figures. Therefore, Sr-89 could potentially have been present in Unit 1 liquid effluent at a concentration of 6.9E-8 uCi/ml. During the second quarter 1990, 4.78E6 liters of liquid effluent were released from Unit 1. Therefore, 3.3E-4 curies of Sr-89 potentially may have been released in Unit 1 liquid effluent during the second quarter 1990. This amount of radioactivity would not have affected the "fission and activation products" total which was reported as 1.35E-1 curies in Table 1-2a of the Semiannual Radiological Effluent Release Report for the first six months of 1990. While the "% of applicable limit" would be slightly increased, it would remain less than one-third of one percent. Doses to an individual, reported in Table 1-4a of the aforementioned report, would not be increased due to this amount of Sr-89 in Unit 1 liquid effluent.

For the Unit 2 liquid effluent sample composited during the second quarter 1990, results of analysis for Sr-89 were reported as less than 6E-8 uCi/ml. Therefore, Sr-89 could have been present in Unit 2 liquid effluent at a concentration of 5.9E-8 uCi/ml. During the second quarter 1990, 2.43E6 liters of liquid effluent were released from Unit 2, potentially resulting in a release of 1.43E-4 curies of Sr-89. This amount of radioactivity would have increased the "fission and activation products" total, presented in Table 1-2b of the Semiannual Radiological Effluent Release Report for the first six months of 1990, from 1.13E-2 curies to 1.14E-2 curies, which would be an increase of less than one percent. Although the "% of applicable limit" would be increased slightly, it would remain approximately one-fourth of one percent. Doses to an individual, reported in Table 1-4b of the report mentioned above, would not be increased due to this amount of Sr-89 in Unit 2 liquid effluent.

In summary, although Sr-89 may have been present in liquid effluents released from Plant Hatch during the second quarter 1990, the effect on reported quantities of radioactivity released would have been minimal. Potential doses to an individual resulting from Sr-89 in liquid effluents would have been too small to affect reported doses.

5. METEOROLOGY

In accordance with Technical Specification 6.9.1.9, the annual summary of meteorological data collected at Plant Hatch over 1990 is presented in this section.

5.1 1990 Meteorological Data

Attachment 1 Joint Frequency Tables of Wind Speed and Wind Direction 10m vs Delta Temperature 60-10m.

Attachment 2 Joint Frequency Tables of Wind Speed and Wind Direction 60m vs Delta Temperature 60-10m.

Attachment 3 Joint Frequency Tables of Wind Speed and Wind Direction 100m vs Delta Temperature 100-10m.

ATTACHMENT 1. JOINT FREQUENCY TABLES OF WIND SPEED AND WIND DIRECTION 10m
VS DELTA TEMPERATURE 60-10m
JANUARY 1, 1990 THROUGH DECEMBER 31, 1990

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	[illegible]	55	9	0	0	0	64
NNE	6	28	1	0	0	0	35
NE	6	117	9	0	0	0	132
ENE	10	107	5	0	0	0	122
E	4	76	3	1	0	0	84
ESE	6	44	3	0	0	0	53
SE	13	53	4	0	0	0	75
SSE	9	43	18	0	0	0	70
S	8	68	17	1	0	0	94
SSW	9	64	22	0	0	0	95
SW	10	75	14	0	0	0	99
WSW	6	87	11	6	0	0	104
W	8	113	27	2	0	0	150
WNW	8	70	17	0	0	0	95
NW	7	63	17	0	0	0	87
NNW	3	32	4	0	0	0	39
TOTAL	115	1100	181	4	0	0	1400

PERIODS OF CALM(HOURS): 4
VARIABLE DIRECTION 575
HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:SP010M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	13	0	0	0	0	19
NNE	3	15	0	0	0	0	18
NE	2	18	2	0	0	0	22
ENE	4	35	4	0	0	0	43
E	4	22	0	0	0	0	26
ESE	7	13	0	0	0	0	20
SE	1	13	3	0	0	0	17
SSE	4	15	3	0	0	0	22
S	5	21	5	1	0	0	32
SSW	2	10	15	0	0	0	27
SW	6	8	4	0	0	0	18
WSW	7	17	2	0	0	0	26
W	4	20	7	0	0	0	31
WNW	3	23	4	0	0	0	30
NW	3	20	7	0	0	0	30
NNW	2	19	1	0	0	0	22
TOTAL	63	282	57	1	0	0	403

PERIODS OF CALM(HOURS): 4
*VARIABLE DIRECTION 211
HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 98010101-98123124

STABILITY CLASS: C DT/DZ

ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

	WIND SPEED(MPH)						
WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	15	2	0	0	0	23
NNE	8	6	0	0	0	0	14
NE	6	23	1	0	0	0	30
ENE	9	23	1	0	0	0	33
E	3	11	1	0	0	0	15
ESE	3	8	1	0	0	0	12
SE	5	15	0	0	0	0	20
SSE	3	9	0	0	0	0	12
S	5	14	6	0	0	0	25
SSW	5	10	3	0	0	0	18
SW	4	13	2	0	0	0	19
WSW	4	12	1	1	0	0	18
W	7	18	1	0	0	0	26
WNW	3	17	2	0	0	0	22
NW	5	16	1	0	0	0	22
NNW	4	24	2	0	0	0	30
TOTAL	88	234	21	1	0	0	333

PERIODS OF CALM(HOURS): 4

VARIABLE DIRECTION 214

HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	21	42	3	0	0	0	66
NNE	21	31	5	0	0	0	57
NE	41	171	15	0	0	0	227
ENE	43	109	4	0	0	0	156
E	41	57	2	0	0	0	100
ESE	35	51	2	0	0	0	88
SE	29	58	7	0	0	0	94
SSE	19	74	16	0	0	0	109
S	23	70	17	0	0	0	110
SSW	18	52	18	2	0	0	90
SW	27	53	6	2	0	0	88
WSW	26	34	3	1	0	0	63
W	13	53	16	1	0	0	83
WNW	22	44	23	1	0	0	90
NW	28	53	15	1	0	0	102
NNW	23	79	8	0	0	0	110
TOTAL	430	1036	165	8	0	0	1639

PERIODS OF CALM(HOURS): 4
VARIABLE DIRECTION 1004
HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124

STABILITY CLASS: E DT-DZ

ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	21	18	5	0	0	0	44
NNE	28	14	2	0	0	0	44
NE	102	106	6	0	0	0	214
ENE	119	60	2	0	0	0	181
E	95	12	0	0	0	0	107
ESE	112	49	0	0	0	0	161
SE	129	176	1	0	0	0	306
SSE	75	99	10	0	0	0	184
S	101	104	10	0	0	0	215
SSW	140	104	11	1	0	0	256
SW	145	76	13	0	0	0	234
WSW	75	42	7	1	0	0	125
W	48	53	10	0	0	0	111
WNW	46	47	5	1	0	0	99
NW	47	81	22	5	0	0	155
NNW	17	63	5	1	0	0	86
TOTAL	1306	1104	103	9	0	0	2522

PERIODS OF CALM(HOURS): 4

VARIABLE DIRECTION 1599

HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124

STABILITY CLASS: F DT DZ

ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	16	10	0	0	0	0	26
NNE	20	5	0	0	0	0	25
NE	48	8	1	0	0	0	57
ENE	95	13	0	0	0	0	108
E	99	4	0	0	0	0	103
ESE	80	13	1	0	0	0	94
SE	74	9	2	0	0	0	85
SSE	49	16	1	0	0	0	66
S	66	16	0	0	0	0	82
SSW	59	15	3	0	0	0	77
SW	87	7	3	0	0	0	97
WSW	74	5	2	0	0	0	81
W	66	9	1	0	0	0	76
WNW	40	7	0	0	0	0	47
NW	23	18	2	0	0	0	43
NNW	12	25	2	0	0	0	39
TOTAL	903	180	18	0	0	0	1106

PERIODS OF CALM (HOURS): 4

VARIABLE DIRECTION 625

HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: 6 DT-DZ
ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

	WIND SPEED (MPH)						
WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	25	3	0	0	0	0	28
NNE	24	1	1	0	1	0	27
NE	36	1	0	0	0	0	37
ENE	46	3	0	0	0	0	49
E	38	1	0	0	0	0	39
ESE	37	0	0	0	0	0	37
SE	45	4	0	0	0	0	49
SSE	46	3	0	0	0	0	49
S	98	6	0	0	0	0	104
SSW	135	8	2	0	0	0	145
SW	202	3	1	0	0	0	206
WSW	179	2	1	0	0	0	182
W	132	5	0	0	0	0	137
WNW	44	2	1	0	0	0	47
NW	32	6	0	0	0	0	38
NNW	17	4	0	0	0	0	21
TOTAL	1136	52	6	0	1	0	1195

PERIODS OF CALM HOURS: 4
VARIABLE DIRECTION 561
HOURS OF MISSING DATA: 156

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: ALL DT DZ
ELEVATION: SPEED:SPD10M DIRECTION:DIR10M LAPSE:DT60-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	97	156	19	0	0	0	272
NNE	110	100	9	0	1	0	220
NE	241	444	34	0	0	0	719
ENE	326	350	16	0	0	0	692
E	284	183	6	1	0	0	474
ESE	280	178	7	0	0	0	465
SE	296	333	17	0	0	0	646
SSE	205	259	48	0	0	0	512
S	306	293	55	2	0	0	662
SSW	368	263	74	3	0	0	708
SW	481	235	43	2	0	0	761
WSW	371	199	32	3	0	0	605
W	278	271	62	3	0	0	614
WNW	166	210	52	2	0	0	430
NW	145	262	64	6	0	0	477
NNW	78	246	22	1	0	0	347
TOTAL	4032	3982	560	23	1	0	8604

PERIODS OF CALM HOURS): 4
VARIABLE DIRECTION 4789
HOURS OF MISSING DATA: 156

ATTACHMENT 2. JOINT FREQUENCY TABLES OF WIND SPEED AND WIND DIRECTION 60m VS DELTA TEMPERATURE 60-10m
JANUARY 1, 1990 THROUGH DECEMBER 31, 1990

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	25	16	2	0	0	43
NNE	2	17	10	2	0	0	31
NE	2	50	78	7	0	0	137
ENE	2	65	69	6	0	0	142
E	5	40	33	4	0	0	82
ESE	1	27	25	4	0	0	57
SE	1	29	28	1	0	0	59
SSE	2	27	24	16	2	0	71
S	4	28	25	7	4	0	68
SSW	5	40	29	22	0	0	96
SW	5	33	42	21	2	0	103
WSW	2	33	56	27	2	0	120
W	2	55	75	34	1	0	167
WNW	1	43	39	15	1	0	99
NW	3	31	20	10	0	0	64
NNW	3	30	15	2	0	0	50
TOTAL	40	573	584	180	12	0	1389

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 200
HOURS OF MISSING DATA: 300

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 98010101-98123124

STABILITY CLASS: 8 D1/D2

ELEVATION: SPEED:SP060M DIRECTION:DIR60M LAPSE:DT60-

	WIND SPEED(MPH)						
WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	6	3	0	0	0	11
NNE	2	5	6	2	0	0	15
NE	1	15	12	4	1	0	33
ENE	3	17	20	4	0	0	44
E	1	7	10	2	0	0	20
ESE	2	7	3	1	0	0	13
SE	2	5	7	1	0	0	15
SSE	3	11	6	4	0	0	24
S	1	6	10	3	1	0	21
SSW	3	9	3	14	2	0	31
SW	3	7	8	5	0	0	23
WSW	2	8	11	4	1	0	26
W	3	18	3	6	3	0	32
WNW	3	12	11	2	1	0	29
NW	4	13	2	5	2	0	32
NNW	0	14	4	0	0	0	18
TOTAL	35	165	130	57	11	0	393

PERIODS OF CALM(HOURS): 0

VARIABLE DIRECTION 88

HOURS OF MISSING DATA: 388

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	13	6	1	0	0	23
NNE	4	6	1	0	0	0	11
NE	3	12	14	4	0	0	33
ENE	2	15	11	2	0	0	30
E	0	17	6	0	1	0	24
ESE	1	4	5	1	0	0	11
SE	2	7	5	0	0	0	14
SSE	3	4	3	1	0	0	11
S	1	6	12	2	2	0	23
SSW	1	11	4	5	0	0	21
SW	4	7	3	1	0	0	15
WSW	1	9	9	3	2	0	24
W	2	12	12	1	3	0	30
WNW	2	8	6	3	0	0	19
NW	2	17	3	0	0	0	22
NNW	2	12	6	1	0	0	21
TOTAL	33	168	106	25	8	0	332

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 92
HOURS OF MISSING DATA: 300

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	9	21	25	7	0	0	62
NNE	7	32	14	3	1	0	57
NE	2	56	121	36	0	0	221
ENE	6	58	70	10	0	0	144
E	11	63	40	10	0	0	124
ESE	3	32	46	6	0	0	93
SE	6	24	35	3	2	0	70
SSE	8	34	42	14	2	0	100
S	5	27	51	19	3	0	105
SSW	7	19	28	23	3	0	80
SW	5	24	44	11	1	0	85
WSW	3	25	27	9	5	2	77
W	2	28	46	26	9	1	112
WNW	11	35	29	24	5	0	104
NW	9	34	36	12	0	0	91
NNW	3	44	33	1	0	0	87
TOTAL	121	556	687	214	31	3	1612

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 227
HOURS OF MISSING DATA: 388

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

WIND SPEED(MPH)

WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	17	24	3	1	0	48
NNE	8	12	19	4	0	0	43
NE	6	35	123	33	0	0	197
ENE	1	63	88	7	0	0	159
E	2	45	81	8	0	0	136
ESE	8	47	115	4	0	0	174
SE	5	101	159	4	0	0	269
SSE	6	68	110	20	0	0	204
S	5	48	145	34	1	0	233
SSW	4	37	149	32	1	0	223
SW	10	26	103	14	0	0	153
WSW	3	43	95	22	3	1	172
W	5	32	67	26	3	0	133
WNW	3	23	57	24	4	1	112
NW	0	13	77	33	0	0	123
NNW	2	21	47	6	0	0	76
TOTAL	78	636	1465	269	13	2	2461

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 25
HOURS OF MISSING DATA: 300

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 90010101-90123124

STABILITY CLASS: F DT/DZ

ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	4	10	4	0	0	20
NNE	1	6	15	3	0	0	25
NE	1	7	32	13	0	0	53
ENE	1	10	62	1	0	0	74
E	0	20	56	2	0	0	78
ESE	3	27	56	3	0	0	89
SE	5	54	36	0	0	0	95
SSE	2	30	83	5	0	0	120
S	6	27	53	7	0	0	93
SSW	1	14	38	4	0	0	57
SW	2	15	42	4	0	0	63
WSW	0	22	52	3	0	0	77
W	2	10	52	17	1	0	82
WNW	5	10	35	2	1	0	53
NW	2	13	28	5	0	0	48
NNW	1	10	36	6	0	0	53
TOTAL	34	273	631	73	2	0	1085

PERIODS OF CALM(HOURS): 0

VARIABLE DIRECTION 18

HOURS OF MISSING DATA: 388

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:SP160M DIRECTION:DIR60M LAPSE:DT60-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	13-24	>24	TOTAL
N	4	20	20	1	0	0	45
NNE	6	39	17	1	0	1	64
NE	3	26	32	9	0	0	75
ENE	12	22	42	2	0	0	78
E	7	17	23	0	0	0	53
ESE	6	25	22	1	0	0	54
SE	13	36	19	0	0	0	68
SSE	7	24	35	4	0	0	70
S	10	32	45	10	0	0	97
SSW	3	22	35	6	0	0	72
SW	9	26	46	9	0	0	90
WSW	3	38	71	13	0	0	131
W	4	35	44	10	0	0	93
WNW	5	26	26	4	0	0	61
NW	6	26	31	0	0	0	63
NNW	8	22	42	2	0	0	74
TOTAL	117	436	556	73	0	1	1133

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 40
HOURS OF MISSING DATA: 300

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: ALL DT DZ
ELEVATION: SPEED:SPD60M DIRECTION:DIR60M LAPSE:DT60-

	WIND SPEED(MPH)						
WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	23	106	104	13	1	0	252
NNE	30	117	82	15	1	1	246
NE	29	201	412	106	1	0	749
ENE	27	250	362	32	0	0	671
E	26	209	255	26	1	0	517
ESE	30	169	272	20	0	0	491
SE	34	256	259	3	2	0	590
SSE	31	133	303	64	4	0	600
S	32	174	346	82	11	0	645
SSW	30	152	236	106	6	0	530
SW	38	138	294	65	3	0	538
WSW	25	178	321	87	13	3	627
W	20	190	304	120	20	1	655
WNW	30	157	203	74	12	1	477
NW	26	152	203	60	2	0	443
NNW	25	153	183	13	0	0	379
TOTAL	456	2880	4213	902	77	6	8460

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 732
HOURS OF MISSING DATA: 300

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND SPEED(MPH)

WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	3	0	2	0	0	12
NNE	1	8	5	0	0	0	14
NE	0	18	28	14	1	0	61
ENE	0	26	29	13	2	0	78
E	1	28	28	6	1	0	56
ESE	1	10	15	5	0	0	31
SE	1	14	19	4	0	0	38
SSE	6	8	15	6	3	0	32
S	2	10	18	3	1	0	34
SSW	1	12	11	9	6	0	39
SW	0	6	23	11	7	0	47
WSW	2	2	28	23	7	4	71
W	1	8	18	32	14	2	75
WNW	2	6	14	8	5	1	36
NW	0	4	10	10	2	0	26
NNW	0	5	6	2	0	0	13
TOTAL	13	17	267	153	49	7	655

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 44
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	4	6	1	0	0	12
[illegible]	1	1	3	0	0	0	5
[illegible]	0	7	10	2	1	0	20
[illegible]	0	7	10	4	0	0	21
E	2	3	8	2	0	0	15
ESE	0	5	1	2	0	0	8
SE	0	6	4	1	0	0	11
SSE	0	6	4	4	3	0	17
S	0	3	6	2	1	1	13
SSW	0	3	6	1	0	0	10
SW	0	3	9	7	3	0	22
WSW	1	5	4	4	0	0	14
W	0	4	19	12	2	0	37
[illegible]	1	5	10	8	1	0	25
NW	0	5	7	5	0	0	17
[illegible]	0	4	8	0	0	0	12
TOTAL	6	71	123	55	11	1	267

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 22
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:SP10M DIRECTION:DI10M LAPSE:DT10-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	5	7	3	0	0	15
NNE	0	4	4	0	0	0	8
NE	2	9	22	7	0	0	40
ENE	2	6	13	5	0	0	26
E	0	4	12	2	1	0	19
ESE	0	5	0	3	0	0	8
SE	1	2	6	0	0	0	9
SSE	1	6	6	2	2	0	17
S	0	7	5	4	1	0	17
SSW	0	6	8	7	0	0	21
SW	1	9	8	5	0	0	23
WSW	0	6	9	7	0	0	22
W	0	6	15	3	0	1	25
WNW	0	11	11	5	2	0	29
NW	0	14	9	6	3	0	32
NNW	1	4	5	2	0	0	12
TOTAL	8	104	140	61	9	1	323

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 31
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: D D1/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	27	24	14	0	0	69
NNE	5	32	12	4	0	0	53
NE	3	31	69	74	1	0	178
ENE	3	33	73	34	0	0	143
E	3	24	44	36	1	0	108
ESE	6	28	29	23	1	0	79
SE	4	23	33	5	0	0	65
SSE	4	23	28	23	8	0	86
S	8	24	23	36	8	1	100
SSW	5	22	16	27	13	1	84
SW	5	22	11	28	6	0	84
WSW	5	27	29	21	5	2	89
W	7	33	49	44	12	6	151
WNW	1	38	37	33	13	1	123
NW	8	35	35	22	3	0	103
NNW	7	34	34	15	0	0	90
TOTAL	78	448	572	431	71	11	1611

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 171
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	26	16	2	0	46
NNE	5	9	16	12	1	0	43
NE	2	16	59	46	2	0	125
ENE	3	19	78	62	2	0	156
E	0	9	32	45	1	0	87
ESE	5	14	64	63	0	0	146
SE	7	60	118	14	3	0	202
SSE	2	23	52	93	10	0	180
S	1	16	52	103	16	0	188
SSW	2	6	43	100	14	0	165
SW	3	6	44	82	4	0	139
WSW	3	6	48	86	6	0	149
W	3	12	25	46	8	1	95
WNW	0	7	25	39	4	1	76
NW	0	3	27	56	13	0	99
NNW	2	5	27	29	0	0	63
TOTAL	38	213	728	892	86	2	1959

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 37
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	3	16	4	0	25
NNE	2	1	5	9	2	1	20
NE	0	3	4	14	4	0	25
ENE	2	3	14	27	0	0	46
E	0	5	17	51	1	0	74
ESE	2	3	28	42	0	0	75
SE	7	38	24	3	1	0	73
SSE	1	6	19	50	12	0	88
S	1	8	21	44	3	0	77
SSW	0	3	16	27	4	0	50
SW	2	3	17	26	6	0	54
WSW	1	1	17	27	7	0	53
W	1	3	12	26	14	0	56
WNW	1	6	18	23	7	0	55
NW	1	4	16	21	0	0	42
NNW	0	4	12	22	2	0	40
TOTAL	21	93	243	428	67	1	853

PERIODS OF SALM(HOURS): 1
VARIABLE DIRECTION 8
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 90010101-90123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DT100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	10	23	11	0	0	46
NNE	3	7	8	5	0	0	23
NE	1	4	8	7	2	0	22
ENE	3	9	14	22	1	0	49
E	2	16	19	18	3	0	58
ESE	0	10	19	16	0	0	45
SE	6	19	11	5	0	0	41
SSE	1	5	10	16	5	0	37
S	1	9	19	29	9	0	67
SSW	1	5	20	23	4	1	54
SW	5	11	24	22	7	0	69
WSW	0	13	30	26	6	0	75
W	3	10	16	25	9	0	63
WNW	2	6	12	10	7	0	37
NW	1	1	10	7	1	0	20
NNW	1	3	11	13	0	0	28
TOTAL	32	138	254	255	54	1	734

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 11
HOURS OF MISSING DATA: 2358

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 98010101-98123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:SP100M DIRECTION:DI100M LAPSE:DT100-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	8	52	89	63	6	0	225
NNE	17	62	53	30	3	1	166
NE	2	88	200	164	11	0	471
ENE	13	183	221	167	5	0	519
E	8	81	160	160	8	0	417
ESE	14	67	156	154	1	0	392
SE	26	162	215	32	4	0	439
SSE	9	77	134	194	43	0	457
S	13	77	150	221	39	2	502
SSW	9	57	120	194	41	2	423
SW	16	60	156	173	33	0	438
WSW	12	60	165	199	31	6	473
W	15	76	154	188	53	10	502
WNW	7	73	127	126	39	3	381
NW	10	66	114	127	22	0	339
NNW	11	59	103	83	2	0	258
TOTAL	196	1233	2327	2275	347	24	6402

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 324
HOURS OF MISSING DATA: 2358