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WISCONSIN PUBLIC SERVICE CORPORATION

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March 1, 1994

10 CFR 50.36a(a)(2)

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Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Radioactive Effluent Release Report July - December, 1993

Enclosed please find a copy of the Kewaunee Nuclear Power Plant Radioactive Effluent Release Report for July through December, 1993. This report is submitted to meet the requirements of Technical Specification 6.9.b.2.

The November and December, 1993, proportional composites for Gross Alpha, Strontium 89, and Strontium 90 were not available at the time that this report was written. A supplemental report shall be submitted when these values become available.

Sincerely,

A handwritten signature in cursive script, appearing to read "C. A. Schrock".

C. A. Schrock
Manager - Nuclear Engineering

BJD/cjt

Enc.

cc - US NRC Senior Resident Inspector
US NRC Region III

LIC\NRC\EFFLUENT.WP

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50-305

KEWAUNEE

WPP

RADIOACTIVE EFFLUENT RELEASE REPORT (7/92.- 12/93)

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KEWAUNEE NUCLEAR POWER PLANT

**RADIOACTIVE
EFFLUENT RELEASE REPORT
JULY - DECEMBER 1993**

**WISCONSIN PUBLIC SERVICE CORPORATION
WISCONSIN POWER & LIGHT COMPANY
MADISON GAS & ELECTRIC COMPANY**

KEWAUNEE NUCLEAR POWER PLANT

**RADIOACTIVE
EFFLUENT RELEASE REPORT
JULY - DECEMBER 1993**

**WISCONSIN PUBLIC SERVICE CORPORATION
WISCONSIN POWER & LIGHT COMPANY
MADISON GAS & ELECTRIC COMPANY**

DOCKET 50-305

KEWAUNEE NUCLEAR POWER PLANT

**SEMIANNUAL RADIOACTIVE
EFFLUENT RELEASE REPORT**

July 1 - December 31, 1993

Wisconsin Public Service Corporation
Green Bay, Wisconsin
February 18, 1994

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Appendix A Meteorological Data

1.0 INTRODUCTION

This report is being submitted in accordance with the requirements of Kewaunee Technical Specifications, Section 6.9.b.2 and the Offsite Dose Calculation Manual, Section 3/4.7. It includes data from all effluent releases made from July 1 - December 31, 1993. The report contains summaries of the gaseous and liquid releases made to the environment including the quantity, characterization, time duration and calculated radiation dose at the site boundary resulting from these releases. The report also includes a summation of solid waste disposal, revisions to the Offsite Dose Calculation Manual, and addresses the cumulative meteorological data.

1.1 Effluent Dose Limits

Specifications are set to insure that offsite doses are maintained as low as reasonably achievable while still allowing for practical and dependable operation of the Kewaunee Plant.

The Kewaunee Offsite Dose Calculation Manual (ODCM) describes the methodology and parameters used in:

1. The calculation of radioactive liquid and gaseous effluent monitoring instrumentation alarm/trip setpoints.
2. The calculation of radioactive liquid and gaseous concentrations, dose rates and cumulative quarterly and annual doses. The ODCM methodology is acceptable for use in demonstrating compliance with 10 CFR 20.106; 10 CFR 50, Appendix I; and 40 CFR 190.

2.0 GASEOUS EFFLUENTS

2.1 Lower Limits of Detection (LLD) for Gaseous Effluents

Gaseous radioactive effluents are released in both the continuous mode and the batch mode. The auxiliary building stack is sampled continuously for particulates, halogens and Strontium by an "off-line" sample train. This stack is also grab-sampled daily for gaseous gamma emitters. Batch releases are sampled prior to release for principal gaseous and particulate gamma emitters, halogens and tritium.

*** The November and December proportional composites for Gross Alpha, Strontium 89 and Strontium 90 were not available at the time this report was written. When these values are available, applicable revisions shall be submitted.

The LLD's for gaseous radioanalyses, as listed in Table 4.4 of the Kewaunee ODCM, are:

Analysis	LLD ($\mu\text{Ci/ml}$)
Gaseous Gamma Emitters	1.00 E-04
Iodine 131	3.00 E-12
Particulate Gamma Emitters	1.00 E-11
Particulate Gross Alpha	1.00 E-11
Strontium 89, 90	1.00 E-11
Noble Gases, Gross Beta or Gamma	1.00 E-06

The nominal "a priori" LLD values are shown below.

Isotope	a priori LLD ($\mu\text{Ci/ml}$)
a. Gaseous emissions:	
Kr-87	2.45 E-8
Kr-88	2.60 E-8
Xe-133	1.83 E-8
Xe-133m	6.04 E-8
Xe-135	9.20 E-9
Xe-138	4.21 E-8
b. Particulate emissions:	
Mn-54	5.23 E-14
Fe-59	9.23 E-14
Co-58	3.61 E-14
Co-60	1.45 E-13
Zn-65	5.96 E-14
Mo-99	1.81 E-14
Cs-134	4.71 E-14
Cs-137	4.23 E-14
Ce-141	2.59 E-14
Ce-144	1.25 E-13

c. Other identifiable gamma emitters:

Ar-41	1.71 E-8
Kr-85	2.94 E-6
Kr-85m	8.18 E-9
Kr-89	3.51 E-7
Xe-127	8.79 E-9
Xe-131m	3.44 E-7
Xe-135m	1.68 E-8
Xe-137	3.93 E-7
I-131	5.34 E-14

d. Composite particulate samples:

Sr-89	1	E-14
Sr-90	1	E-14
Gross Alpha	1.00	E-14

These "a priori" LLDs represent the capabilities of the counting systems in use, not an after the fact "a posteriori" limit for a particular measurement.

2.2 Gaseous Batch Release Statistics

The following is a summation of all gaseous batch releases made during the second half of 1993.

Number of batch releases.....	7
Total time for all batch releases (sec).....	3.392E+005
Maximum time for a batch release (sec).....	1.277E+005
Average time for a batch release (sec).....	4.845E+004
Minimum time for a batch release (sec).....	1.680E+003

2.3 Gaseous Effluent Data

The following table 2.1 presents a quarterly summation of the total activity released and average release rates of four categories of gaseous effluents. Table 2.2 lists the quarterly sums of individual gaseous radionuclides released by continuous and batch modes. Table 2.3 is essentially the same data, but is presented as monthly summations. Table 2.4 presents the dose limits for gaseous effluents and for the 3rd and 4th quarters, and the calculated doses this year from gaseous effluents.

Table 2.1
Semiannual Radioactive Effluent Release Report 1993
Gaseous Effluents - Summation of all Releases

Fission and Activation Gases	3rd Quarter	4th Quarter
Total Activity Released (Ci)	4.614E-004	0.000E+000
Average Release Rate (μ Ci/sec)	5.869E-005	0.000E+000
Iodines		
Total Activity Released (Ci)	0.000E+000	3.249E-007
Average Release Rate (μ Ci/sec)	0.000E+000	4.132E-008
Particulates		
Total Activity Released (Ci)	0.000E+000	6.435E-007
Average Release Rate (μ Ci/sec)	0.000E+000	8.184E-008
Gross Alpha Released (Ci)	6.917E-004	3.226E-004
Tritium		
Total Activity Released (Ci)	8.211E-001	4.756E-001
Average Release Rate (μ Ci/sec)	1.044E-001	6.050E-002

Table 2.2
Semiannual Radioactive Effluent Release Report 1993
Gaseous Effluents

Nuclides Released (Ci)

	Continuous Mode		Batch Mode	
	3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
Fission Gases				
Xe-133	0.000E+000	0.000E+000	4.484E-004	0.000E+000
Xe-133m	0.000E+000	0.000E+000	8.220E-006	0.000E+000
Xe-135	0.000E+000	0.000E+000	4.750E-006	0.000E+000
Total	0.000E+000	0.000E+000	4.614E-004	0.000E+000
Iodines				
I-133	0.000E+000	3.249E-007	0.000E+000	0.000E+000
Total	0.000E+000	3.249E-007	0.000E+000	0.000E+000
Particulates				
Co-60	0.000E+000	6.435E-007	0.000E+000	0.000E+000
Sr-89	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Sr-90	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total	0.000E+000	6.435E-007	0.000E+000	0.000E+000

Table 2.3A
Semiannual Radicactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Total of all Releases

Noble Gases (Curies)

Isotope	July	August	September	Total
Xe-133	0.000E+000	0.000E+000	4.484E-004	4.484E-004
Xe-133m	0.000E+000	0.000E+000	8.220E-006	8.220E-006
Xe-135	0.000E+000	0.000E+000	4.750E-006	4.750E-006
Total	0.000E+000	0.000E+000	4.614E-004	4.614E-004

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3A (Con't)
Semiannual Radioactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Total of all Releases

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	4.614E-004	4.614E-004
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	0.000E+000	8.211E-001	0.000E+000	8.211E-001
Total Particulate Gross Alpha (Ci)	1.746E-004	2.959E-004	2.213E-004	6.917E-004

Table 2.3A (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Total of all Releases

Noble Gases (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	October	November	December	Total
Co-60	0.000E+000	3.701E-007	2.733E-007	6.435E-007
Total	0.000E+000	3.701E-007	2.733E-007	6.435E-007

Halogens (Curies)

Isotope	October	November	December	Total
I-133	3.249E-007	0.000E+000	0.000E+000	3.249E-007
Total	3.249E-007	0.000E+000	0.000E+000	3.249E-007

Table 2.3A (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Total of all Releases

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	3.249E-007	0.000E+000	0.000E+000	3.249E-007
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	3.701E-007	2.733E-007	6.435E-007
Total Tritium (Ci)	5.076E-003	0.000E+000	4.706E-001	4.756E-001
Total Particulate Gross Alpha (Ci)	1.699E-004	3.197E-005	1.208E-004	3.226E-004

Table 2.3B
Semiannual Radioactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Continuous Mode Only

Noble Gases (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3B (Con't)
Semiannual Radioactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Continuous Mode Only

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	0.000E+000	8.211E-001	0.000E+000	8.211E-001
Total Particulate Gross Alpha (Ci)	1.483E-007	3.764E-007	2.257E-007	7.504E-007

Table 2.3B (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Continuous Mode Only

Noble Gases (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	October	November	December	Total
Co-60	0.000E+000	3.701E-007	2.733E-007	6.435E-007
Total	0.000E+000	3.701E-007	2.733E-007	6.435E-007

Halogens (Curies)

Isotope	October	November	December	Total
I-133	3.249E-007	0.000E+000	0.000E+000	3.249E-007
Total	3.249E-007	0.000E+000	0.000E+000	3.249E-007

Table 2.3B (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Continuous Mode Only

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	3.249E-007	0.000E+000	0.000E+000	3.249E-007
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	3.701E-007	2.733E-007	6.435E-007
Total Tritium (Ci)	0.000E+000	0.000E+000	4.706E-001	4.706E-001
Total Particulate Gross Alpha (Ci)	4.691E-007	4.529E-007	1.315E-007	1.053E-006

Table 2.3C
Semiannual Radioactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Batch Mode Only

Noble Gases (Curies)

Isotope	July	August	September	Total
Xe-133	0.000E+000	0.000E+000	4.484E-004	4.484E-004
Xe-133m	0.000E+000	0.000E+000	8.220E-006	8.220E-006
Xe-135	0.000E+000	0.000E+000	4.750E-006	4.750E-006
Total	0.000E+000	0.000E+000	4.614E-004	4.614E-004

Particulates (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	July	August	September	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Semiannual Radioactive Effluent Release Report 1993
3rd Quarter Gaseous Release
Batch Mode Only

Summary	July	August	September	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	4.614E-004	4.614E-004
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Alpha (Ci)	1.744E-004	2.955E-004	2.210E-004	6.910E-004

Table 2.3C (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Batch Mode Only

Noble Gases (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Particulates (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Halogens (Curies)

Isotope	October	November	December	Total
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 2.3C (Con't)
Semiannual Radioactive Effluent Release Report 1993
4th Quarter Gaseous Release
Batch Mode Only

Summary	October	November	December	<u>Total</u>
Total Noble Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Halogens (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Particulate Gross Beta-Gamma Half-Lives>8 Days (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Total Tritium (Ci)	5.076E-003	0.000E+000	0.000E+000	5.076E-003
Total Particulate Gross Alpha (Ci)	1.694E-004	3.152E-005	1.206E-004	3.215E-004

Table 2.4
Semiannual Radioactive Effluent Release Report 1993
Dose From Gaseous Effluents

The offsite dose limits from radioactive materials in gaseous effluents are specified in Section 3/4.4 of the Kewaunee ODCM and can be summarized as follows:

	Whole Body Gamma	Skin Beta	Organ
Quarterly	5.0 mRad	10.0 mRad	7.5 mRem
Annual	10.0 mRad	20.0 mRad	15.0 mRem

The total release of gaseous effluents during the second six months of 1993 was within limits. The following offsite doses were calculated using equations 2.7, 2.8, and 2.11 from the Kewaunee ODCM. Calculated offsite doses versus quarterly limits are shown below:

	3rd Quarter	4th Quarter
1. Gamma-Whole Body		
Limit (mRads)	5.000E+000	5.000E+000
Actual Dose (mRads)	1.941E-008	0.000E+000
% of Limit	3.883E-007	0.000E+000
2. Beta-Skin		
Limit (mRads)	1.000E+001	1.000E+001
Actual Dose (mRads)	5.646E-008	0.000E+000
% of Limit	5.646E-007	0.000E+000
3. Ingestion Pathway-Organ		
Limit (mRems)	7.500E+000	7.500E+000
Actual Dose (mRems)	1.735E-005	1.280E-005
% of Limit	2.313E-004	1.707E-004
Organ of Interest	Liver	Thyroid

Table 2.4 (Con't)
Semiannual Radioactive Effluent Release Report 1993
Dose From Gaseous Effluents

In addition, the cumulative annual offsite doses for the period July 1 - December 31, 1993 versus the ODCM annual limits were:

	Annual
1. Gamma-Whole Body	
Limit (mRads)	1.000E+001
Actual Dose (mRads)	1.925E-004
% of Limit	1.925E-003
2. Beta-Skin	
Limit (mRads)	2.000E+001
Actual Dose (mRads)	9.392E-005
% of Limit	4.696E-004
3. Ingestion Pathway-Organ	
Limit (mRems)	1.500E+001
Actual Dose (mRems)	2.782E-004
% of Limit	1.855E-003
Organ of Interest	Liver

3.0 LIQUID EFFLUENTS

3.1 Lower Limits of Detection (LLD) for Liquid Effluents

Liquid radioactive effluents are released as both batch releases and continuous releases. Each batch is sampled prior to release and analyzed for gamma emitters and tritium. A fraction of each sample is retained for a monthly proportional composite which is then analyzed for Gross Alpha, Strontium 89, Strontium 90 and Iron 55.

*** The December proportional composites for Gross Alpha, Strontium 89, Strontium 90 and Iron 55 were not available at the time that this report was written. When these values are available, applicable revisions shall be submitted.

The LLD's for liquid batch release radioanalyses, as listed in Table 4.3 of the Kewaunee Offsite Dose Calculation Manual (ODCM), are:

Analysis	LLD ($\mu\text{Ci/ml}$)
Principal Gamma Emitters	1.00 E-06
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

The actual obtained "a priori" LLD values for batch releases are shown below.

Isotope	3rd Qtr	4th Qtr	Average a priori LLD ($\mu\text{Ci/ml}$)
Mn-54	2.05E-7	8.57E-10	1.03E-7
Fe-59	4.46E-7	1.86E-9	2.24E-7
Co-58	2.02E-7	8.44E-10	1.01E-7
Co-60	3.05E-7	1.11E-7	2.08E-7
Zn-65	5.01E-7	2.10E-9	2.52E-7
Mo-99	1.44E-7	1.52E-7	1.48E-7
Cs-134	1.89E-7	6.88E-10	9.48E-8
Cs-137	2.01E-7	8.45E-8	1.43E-7
Ce-141	1.88E-7	1.21E-7	1.55E-7
Ce-144	6.17E-7	2.58E-9	3.10E-7
I-131	1.55E-7	5.52E-10	7.78E-8
H-3	3.78E-6	4.09E-6	3.94E-6
Sr-89	1.61E-8	2.00E-8	1.81E-8
Sr-90	8.65E-9	1.05E-8	9.58E-9
Gross Alpha	7.10E-9	6.95E-9	7.03E-9
Fe-55			

Continuous liquid releases are grab sampled weekly and analyzed for principal gamma emitters. A fraction of each weekly sample is retained for a monthly proportional composite which is then analyzed for Tritium, Gross Alpha, Strontium 89, Strontium 90 and Iron 55.

The LLD's for liquid continuous release radioanalyses, as listed in Table 4.3 of the Kewaunee Offsite Dose Calculation Manual (ODCM), are:

Analysis	LLD ($\mu\text{Ci/ml}$)
Principal Gamma Emitters	5.00 E-07
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

The actual obtained "a priori" LLD values for continuous releases are shown below.

Isotope	3rd Qtr	4th Qtr	Average a priori LLD ($\mu\text{Ci/ml}$)
Mn-54	5.06E-8	2.16E-8	3.61E-8
Fe-59	8.56E-8	3.11E-10	4.30E-8
Co-58	5.27E-8	2.33E-7	1.43E-7
Co-60	6.11E-8	4.18E-8	5.15E-8
Zn-65	8.34E-8	4.95E-8	6.65E-8
Mo-99	4.40E-8	4.87E-8	4.64E-8
Cs-134	4.72E-8	3.51E-8	4.12E-8
Cs-137	6.27E-8	5.26E-8	5.77E-8
Ce-141	5.91E-8	3.39E-7	1.99E-7
Ce-144	1.85E-7	2.20E-7	2.03E-7
I-131	2.81E-8	3.56E-8	3.19E-8
H-3	3.78E-6	4.09E-6	3.94E-6
Sr-89	8.57E-9	1.09E-8	9.71E-9
Sr-90	6.90E-9	6.55E-9	6.73E-9
Gross Alpha	2.22E-8	5.53E-9	1.38E-8
Fe-55	8.00E-7	7.60E-7	7.80E-7

3.2 Liquid Batch Release Statistics

The following is a summation of all liquid batch releases made during the second half of 1993.

<u>Release Type</u>	<u>Number</u>	<u>Gallons Released</u>
A SGBT Monitor Tk.	6	54744.0
B SGBT Monitor Tk.	6	57904.0
A Waste Condensate	60	55163.0
B Waste Condensate	59	54450.0
A CVC Monitor	6	38395.0
B CVC Monitor	6	34580.0

Total time for all batch releases..... 13434.0 Min.
Maximum time for a batch release..... 690.0 Min.
Minimum time for a batch release..... 1.0 Min.
Average time for a batch release..... 93.9 Min.

3.3 Liquid Effluent Data

The following Table 3.1 presents a quarterly summation of the total activity released and average concentration for all liquid effluents. It also presents the gross alpha activity released, volume of waste released and volume of dilution water used. Tables 3.2 and 3.3 are monthly summations of the same information in Table 3.1. Table 3.2 contains the quantity of the individual isotopes released to the unrestricted area for batch releases. Table 3.3 presents a monthly summation of gross radioactivity, tritium, gross alpha and isotopic activity for the secondary blowdown and leakage releases. It also presents the monthly total volume for these releases and dilution volumes. Table 3.4 presents the doses from liquid effluents for the 3rd and 4th quarter and the calculated doses this year from liquid effluents.

TABLE 3.1
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Summation of all Releases

	3rd Quarter	4th Quarter	Total
Fission and Activation Products			
Total Release Excluding H3 and Dissolved Gases (Ci)	2.300E-002	6.942E-003	2.994E-002
Average Concentration (μ Ci/ml)	1.098E-010	4.905E-011	
Tritium			
Total Release (Ci)	4.625E+001	9.026E+001	1.365E+002
Average Concentration (μ Ci/ml)	2.207E-007	6.377E-007	
% of Limit			
Limit(3.0E-3 μ Ci/ml)	7.356E-003	2.126E-002	
Dissolved Gases			
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000
Average Concentration (μ Ci/ml)	0.000E+000	0.000E+000	
% of Limit			
Limit(2.0E-4 μ Ci/ml)	0.000E+000	0.000E+000	
Gross Alpha Activity			
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000
Volume of Waste Released			
Batch (liters)	5.172E+005	6.004E+005	1.118E+006
Continuous (liters)	4.036E+007	3.463E+007	7.499E+007
Total (liters)	4.088E+007	3.523E+007	7.611E+007
Volume of Dilution Water			
Batch (liters)	8.979E+009	7.438E+009	1.642E+010
Continuous (liters)	2.006E+011	1.341E+011	3.347E+011
Total (liters)	2.096E+011	1.415E+011	3.511E+011

TABLE 3.2A
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Batch Releases

	July	August	September	<u>Total</u>
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)	7.468E-003	2.159E-003	1.156E-003	1.078E-002
Avg. Conc. (μ Ci/ml)	2.143E-009	7.820E-010	4.229E-010	
Tritium				
Total Release (Ci)	1.353E+001	1.082E+001	2.190E+001	4.625E+001
Avg. Conc. (μ Ci/ml)	3.884E-006	3.919E-006	8.008E-006	
Dissolved Gases				
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	2.014E+005	1.603E+005	1.555E+005	5.172E+005
Volume of Dilution Water				
(liters)	3.484E+009	2.760E+009	2.735E+009	8.979E+009

TABLE 3.2A (Con't)
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Batch Releases

Isotope (Ci)	July	August	September	<u>Total</u>
H-3	1.353E+001	1.082E+001	2.190E+001	4.625E+001
Mn-54	5.588E-005	0.000E+000	0.000E+000	5.588E-005
Fe-55	1.228E-003	9.777E-004	8.710E-004	3.077E-003
Co-58	4.083E-003	6.984E-004	1.357E-004	4.917E-003
Co-60	1.233E-003	2.494E-004	4.379E-005	1.526E-003
Zr-95	0.000E+000	3.095E-006	0.000E+000	3.095E-006
Nb-95	0.000E+000	1.210E-005	0.000E+000	1.210E-005
Ag-110m	8.683E-004	2.179E-004	1.059E-004	1.192E-003
Total	1.354E+001	1.082E+001	2.190E+001	4.626E+001

TABLE 3.2B
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Batch Releases

	October	November	December	<u>Total</u>
Gross Radioactivity				
Total Release				
Excluding H3 and Dissolved Gases (Ci)	1.326E-003	2.338E-003	3.277E-003	6.942E-003
Avg. Conc. (μ Ci/ml)	3.774E-010	1.852E-009	1.231E-009	
Tritium				
Total Release				
(Ci)	3.316E+001	1.760E+001	3.950E+001	9.026E+001
Avg. Conc. (μ Ci/ml)	9.435E-006	1.394E-005	1.484E-005	
Dissolved Gases				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	1.850E+005	1.635E+005	2.519E+005	6.004E+005
Volume of Dilution Water				
(liters)	3.514E+009	1.263E+009	2.661E+009	7.438E+009

TABLE 3.2B (Con't)
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Batch Releases

Isotope (Ci)	October	November	December	<u>Total</u>
H-3	3.316E+001	1.760E+001	3.950E+001	9.026E+001
Mn-54	0.000E+000	8.491E-006	0.000E+000	8.491E-006
Fe-55	1.091E-003	1.798E-003	2.771E-003	5.661E-003
Co-58	8.272E-005	1.282E-004	4.131E-005	2.523E-004
Co-60	5.611E-005	2.253E-004	7.771E-005	3.592E-004
Nb-95	0.000E+000	1.506E-005	0.000E+000	1.506E-005
Zr-97	0.000E+000	0.000E+000	2.310E-005	2.310E-005
Ag-110m	9.617E-005	1.630E-004	3.633E-004	6.225E-004
Total	3.316E+001	1.760E+001	3.950E+001	9.026E+001

TABLE 3.3A
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Continuous Releases

	July	August	September	<u>Total</u>
Gross Radioactivity				
Total Release				
Excluding H3 and Dissolved Gases (Ci)	5.743E-003	6.477E-003	0.000E+000	1.222E-002
Avg. Conc. (μ Ci/ml)	8.497E-011	9.582E-011	0.000E+000	
Tritium				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Dissolved Gases				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	8.908E+006	1.283E+007	1.862E+007	4.036E+007
Volume of Dilution Water				
(liters)	6.759E+010	6.759E+010	6.541E+010	2.006E+011

TABLE 3.3A (Con't)
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Continuous Releases

Isotope (Ci)	July	August	September	<u>Total</u>
Fe-55	5.633E-003	6.477E-003	0.000E+000	1.211E-002
Co-58	1.097E-004	0.000E+000	0.000E+000	1.097E-004
Total	5.743E-003	6.477E-003	0.000E+000	1.222E-002

TABLE 3.3B
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Continuous Releases

	October	November	December	<u>Total</u>
Gross Radioactivity				
Total Release				
Excluding H3 and Dissolved Gases (Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Tritium				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Dissolved Gases				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Gross Alpha Activity				
Total Release				
(Ci)	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Avg. Conc. (μ Ci/ml)	0.000E+000	0.000E+000	0.000E+000	
Volume of Waste Released				
(liters)	8.768E+006	1.287E+007	1.300E+007	3.463E+007
Volume of Dilution Water				
(liters)	6.759E+010	3.271E+010	3.380E+010	1.341E+011

TABLE 3.3B (Con't)
Semiannual Radioactive Effluent Release Report 1993
Liquid Effluents - Continuous Releases

Isotope (Ci)	October	November	December	<u>Total</u>
Total	0.000E+000	0.000E+000	0.000E+000	0.000E+000

Table 3.4
Semiannual Radioactive Effluent Report 1993
Dose From Liquid Effluents

The dose to a member of the public from total liquid radioactive release for each quarter was well below the ODCM limits of 1.5 mRem to the body and less than or equal to 5 mRem to any organ.

Instantaneous release concentrations are limited by the individual radionuclide concentrations established in 10 CFR 20, Appendix B, for unrestricted areas. During the report period, none of the isotopes released exceed the concentrations specified in Appendix B. The following offsite doses were calculated using equation 1.5 from the Kewaunee ODCM.

Organ 3rd Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	2.070E-004	1.5	0.01
Bone	1.106E-004	5.0	0.00
Liver	2.564E-004	5.0	0.01
Thyroid	1.680E-004	5.0	0.00
Kidney	1.688E-004	5.0	0.00
Lung	2.106E-004	5.0	0.00
GI-LLI	6.084E-004	5.0	0.01

Organ 4th Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	5.524E-004	1.5	0.04
Bone	7.459E-005	5.0	0.00
Liver	5.899E-004	5.0	0.01
Thyroid	5.352E-004	5.0	0.01
Kidney	5.355E-004	5.0	0.01
Lung	5.639E-004	5.0	0.01
GI-LLI	1.117E-003	5.0	0.02

Organ	Calculated Dose This Year Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	2.910E-003	3.0	0.10
Bone	4.584E-003	10.0	0.05
Liver	2.394E-003	10.0	0.02
Thyroid	4.158E-003	10.0	0.04
Kidney	1.766E-003	10.0	0.02
Lung	1.900E-003	10.0	0.02
GI-LLI	5.876E-002	10.0	0.59

4.0 UNPLANNED RELEASES

No unplanned releases were made from the Kewaunee Plant during the report period.

The January-June, 1991 Semi-Annual Effluent Release Report described an unplanned release which occurred on April 25, 1991. Offsite doses attributable to this release were well below the established Technical Specification limits.

As corrective action, WPSC stated in this report that valves WG-301 and WG-302 were scheduled to be replaced during 1992. Also, a new vent line was to be added between valves WG-301 and WG-300 to allow local leak rate testing with the Waste Gas Decay Tanks isolated.

The valves were to be replaced with like-for-like replacements. However, after receipt inspection, the replacement valves failed to pass the seat leakage tests. WPSC is continuing to evaluate options associated with these valves and will continue to provide status updates in the Effluent Release Reports until resolution of this incident and completion of corrective actions.

5.0 METEOROLOGICAL DATA

Meteorological data for the 3rd Quarter and 4th Quarter of 1993 is retained on file at the Kewaunee Nuclear Power Plant. The data on file includes a continuous strip chart recording and a 15-minute interval listing of wind speed, wind direction and atmospheric stability. This is more conservative than the requirements of ODCM Section 3/4.7. See Appendix A for missing meteorological data times and joint frequency distribution tables.

6.0 SOLID WASTE DISPOSAL

Table 6.1 is a summation of solid wastes shipped for the second half of 1993. Presented are the types of wastes, major nuclide composition, disposition of the wastes and shipping containers used.

The containers utilized have the following volumes:

High Integrity Container (HIC)	158 ft3
LSA Box (B-25)	98 ft3
DOT-17H Drum	7.5 ft3

A composite sample from the 1993 dewatered resin shipments was analyzed by a contractor for transuranic nuclides. The results showed an average transuranic concentration of 1.62 E-3 nanocuries/gram, well within the disposal site limit of 10 nanocuries/gram.

Table 6.1 contains the radionuclide content (curies) and percent abundance for each type of waste. Isotopes denoted by an asterisk (*) in Table 6.1 are correlated values.

Table 6.1
Semiannual Radioactive Effluent Report 1993
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal
 (Not Irradiated Fuel - Cu.M is actual waste volume not burial volume)

1. Type of Waste	July-December	
	Unit	
a. Dewatered resin	Cu.M	None
Container: HIC	Ci	None
b. Dewatered filter media	Cu.M	None
Container: HIC	Ci	None

2. Estimate of Major Nuclide by Composition (By Type of Waste)	<u>%</u>	<u>Ci</u>
a. None		
b. None		

3. Solid Waste Disposition

a. Date of Shipment Mode of Transportation Destination
 None.

b. Irradiated Fuel Shipments

No irradiated fuel shipments were made from the Kewaunee Nuclear Power Plant during the last six months of 1993.

7.0 PROGRAM REVISIONS

In accordance with Technical Specifications 6.18.b.3 and 6.19.a, revisions to the Offsite Dose Calculation Manual and radioactive waste treatment systems are listed below.

7.1 Offsite Dose Calculation Manual

The Offsite Dose Calculation Manual (ODCM) has not been revised during this report period.

7.2 Major Changes to the Radioactive Liquid, Gaseous and Solid Waste Treatment Systems

Major changes to the radioactive liquid, gaseous or solid waste systems are submitted in the annual Updated Final Safety Analysis Report consistent with Technical Specification 6.19.

8.0 REPORTABLE OCCURRENCES

None.

Appendix A

Meteorological Data

July 1, 1993 to December 31, 1993

Missing Data Totals:

Ththird Quarter 1993: 2 hours

Fourth Quarter 1993: * 912 hours

* Note: The electronic copy of meteorological data is not available for October 1, 1993 through November 5, 1993. The data was collected and is available from the instrument chart recorder. This precludes meteorological data for the batch release 93-027.

Date Time	10 m	Delta T	10 m Wind	60 m Wind
	Wind Speed M0308G	M0304G	Direction M0309G	Direction M0302G
01JUL93:23:30	X	X	X	X
30JUL93:13:30	X	X	X	X
All of October 1993	X	X	X	X
01NOV93:00:30	X	X	X	X
01NOV93:01:30	X	X	X	X
01NOV93:02:30	X	X	X	X
01NOV93:03:30	X	X	X	X
01NOV93:04:30	X	X	X	X
01NOV93:05:30	X	X	X	X
01NOV93:06:30	X	X	X	X
01NOV93:07:30	X	X	X	X
01NOV93:08:30	X	X	X	X
01NOV93:09:30	X	X	X	X
01NOV93:10:30	X	X	X	X
01NOV93:11:30	X	X	X	X
01NOV93:12:30	X	X	X	X
01NOV93:13:30	X	X	X	X
01NOV93:14:30	X	X	X	X
01NOV93:15:30	X	X	X	X
01NOV93:16:30	X	X	X	X
01NOV93:17:30	X	X	X	X
01NOV93:18:30	X	X	X	X
01NOV93:19:30	X	X	X	X
01NOV93:20:30	X	X	X	X
01NOV93:21:30	X	X	X	X
01NOV93:22:30	X	X	X	X
01NOV93:23:30	X	X	X	X
02NOV93:00:30	X	X	X	X
02NOV93:01:30	X	X	X	X
02NOV93:02:30	X	X	X	X
02NOV93:03:30	X	X	X	X
02NOV93:04:30	X	X	X	X
02NOV93:05:30	X	X	X	X
02NOV93:06:30	X	X	X	X
02NOV93:07:30	X	X	X	X
02NOV93:08:30	X	X	X	X
02NOV93:09:30	X	X	X	X
02NOV93:10:30	X	X	X	X
02NOV93:11:30	X	X	X	X
02NOV93:12:30	X	X	X	X
02NOV93:13:30	X	X	X	X
02NOV93:14:30	X	X	X	X
02NOV93:15:30	X	X	X	X
02NOV93:16:30	X	X	X	X
02NOV93:17:30	X	X	X	X
02NOV93:18:30	X	X	X	X
02NOV93:19:30	X	X	X	X
02NOV93:20:30	X	X	X	X
02NOV93:21:30	X	X	X	X

02NOV93:22:30	X	X	X	X
02NOV93:23:30	X	X	X	X
03NOV93:00:30	X	X	X	X
03NOV93:01:30	X	X	X	X
03NOV93:02:30	X	X	X	X
03NOV93:03:30	X	X	X	X
03NOV93:04:30	X	X	X	X
03NOV93:05:30	X	X	X	X
03NOV93:06:30	X	X	X	X
03NOV93:07:30	X	X	X	X
03NOV93:08:30	X	X	X	X
03NOV93:09:30	X	X	X	X
03NOV93:10:30	X	X	X	X
03NOV93:11:30	X	X	X	X
03NOV93:12:30	X	X	X	X
03NOV93:13:30	X	X	X	X
03NOV93:14:30	X	X	X	X
03NOV93:15:30	X	X	X	X
03NOV93:16:30	X	X	X	X
03NOV93:17:30	X	X	X	X
03NOV93:18:30	X	X	X	X
03NOV93:19:30	X	X	X	X
03NOV93:20:30	X	X	X	X
03NOV93:21:30	X	X	X	X
03NOV93:22:30	X	X	X	X
03NOV93:23:30	X	X	X	X
04NOV93:00:30	X	X	X	X
04NOV93:01:30	X	X	X	X
04NOV93:02:30	X	X	X	X
04NOV93:03:30	X	X	X	X
04NOV93:04:30	X	X	X	X
04NOV93:05:30	X	X	X	X
04NOV93:06:30	X	X	X	X
04NOV93:07:30	X	X	X	X
04NOV93:08:30	X	X	X	X
04NOV93:09:30	X	X	X	X
04NOV93:10:30	X	X	X	X
04NOV93:11:30	X	X	X	X
04NOV93:12:30	X	X	X	X
04NOV93:13:30	X	X	X	X
04NOV93:14:30	X	X	X	X
04NOV93:15:30	X	X	X	X
04NOV93:16:30	X	X	X	X
04NOV93:17:30	X	X	X	X
04NOV93:18:30	X	X	X	X
04NOV93:19:30	X	X	X	X
04NOV93:20:30	X	X	X	X
04NOV93:21:30	X	X	X	X
04NOV93:22:30	X	X	X	X
04NOV93:23:30	X	X	X	X
05NOV93:00:30	X	X	X	X
05NOV93:01:30	X	X	X	X
05NOV93:02:30	X	X	X	X
05NOV93:03:30	X	X	X	X

05NOV93:04:30	X	X	X	X
05NOV93:05:30	X	X	X	X
05NOV93:06:30	X	X	X	X
05NOV93:07:30	X	X	X	X
05NOV93:08:30	X	X	X	X
05NOV93:09:30	X	X	X	X
05NOV93:10:30	X	X	X	X
30DEC93:13:30	X	X	X	X
30DEC93:14:30	X	X	X	X
30DEC93:15:30	X	X	X	X
30DEC93:16:30	X	X	X	X
30DEC93:17:30	X	X	X	X
30DEC93:18:30	X	X	X	X
30DEC93:19:30	X	X	X	X
30DEC93:20:30	X	X	X	X
30DEC93:21:30	X	X	X	X
30DEC93:22:30	X	X	X	X
30DEC93:23:30	X	X	X	X
31DEC93:00:30	X	X	X	X
31DEC93:01:30	X	X	X	X
31DEC93:02:30	X	X	X	X
31DEC93:03:30	X	X	X	X
31DEC93:04:30	X	X	X	X
31DEC93:05:30	X	X	X	X
31DEC93:06:30	X	X	X	X
31DEC93:07:30	X	X	X	X
31DEC93:08:30	X	X	X	X
31DEC93:09:30	X	X	X	X
31DEC93:10:30	X	X	X	X
31DEC93:11:30	X	X	X	X
31DEC93:12:30	X	X	X	X
31DEC93:13:30	X	X	X	X
31DEC93:14:30	X	X	X	X
31DEC93:15:30	X	X	X	X
31DEC93:16:30	X	X	X	X
31DEC93:17:30	X	X	X	X
31DEC93:18:30	X	X	X	X
31DEC93:19:30	X	X	X	X
31DEC93:20:30	X	X	X	X
31DEC93:21:30	X	X	X	X
31DEC93:22:30	X	X	X	X
31DEC93:23:30	X	X	X	X

RELEASE SUMMARY - PERMIT = 9323

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	1	0	0	0	0	1
NNE	0	0	1	1	0	0	0	2
NE	0	1	2	0	0	0	0	3
ENE	0	0	4	0	0	0	0	4
E	0	1	11	0	0	0	0	12
ESE	0	6	0	0	0	0	0	6
SE	0	1	0	0	0	0	0	1
TOTAL	0	9	19	1	0	0	0	29

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	0	1	0	0	0	1
NNE	0	0	1	0	0	0	0	1
NE	1	0	0	0	0	0	0	1
E	0	0	1	0	0	0	0	1
TOTAL	1	0	2	1	0	0	0	4

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	0	1	0	0	0	1
NNE	0	0	2	1	0	0	0	3
E	0	0	2	0	0	0	0	2
ESE	0	0	1	0	0	0	0	1
SE	0	1	0	0	0	0	0	1
TOTAL	0	1	5	2	0	0	0	8

RELEASE SUMMARY - PERMIT = 9323

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	1	0	0	0	0	1
NE	0	0	1	2	0	0	0	3
E	0	0	3	0	0	0	0	3
TOTAL	0	0	5	2	0	0	0	7

STABILITY CLASS G	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	1	0	0	0	0	1
TOTAL	0	0	1	0	0	0	0	1

RELEASE SUMMARY - PERMIT = 9324

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
NNE	0	0	0	1	0	0	0	1
NE	0	0	0	1	0	0	0	1
ENE	0	0	3	0	0	0	0	3
TOTAL	0	0	3	2	0	0	0	5

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	1	0	0	0	0	1
NNE	0	0	1	0	0	0	0	1
TOTAL	0	0	2	0	0	0	0	2

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
ENE	0	0	1	0	0	0	0	1
TOTAL	0	0	1	0	0	0	0	1

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	3	7	0	0	0	0	10
NNE	0	0	5	0	0	0	0	5
NE	0	0	2	0	0	0	0	2
ENE	0	0	2	0	0	0	0	2
SE	0	1	0	0	0	0	0	1
TOTAL	0	4	16	0	0	0	0	20

RELEASE SUMMARY - PERMIT = 9324

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	3	0	0	0	0	3
NNE	0	0	1	0	0	0	0	1
NE	0	0	2	0	0	0	0	2
ENE	0	0	2	0	0	0	0	2
E	0	1	0	0	0	0	0	1
ESE	0	1	0	0	0	0	0	1
SE	0	0	1	0	0	0	0	1
SSE	0	0	1	0	0	0	0	1
TOTAL	0	2	10	0	0	0	0	12

STABILITY CLASS F	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
E	0	2	1	0	0	0	0	3
ESE	0	2	0	0	0	0	0	2
SE	0	0	1	0	0	0	0	1
NNW	0	0	1	0	0	0	0	1
TOTAL	0	4	3	0	0	0	0	7

STABILITY CLASS G	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
ENE	0	0	1	0	0	0	0	1
ESE	0	1	0	0	0	0	0	1
SE	0	0	1	0	0	0	0	1
SSE	0	0	3	0	0	0	0	3
TOTAL	0	1	5	0	0	0	0	6

RELEASE SUMMARY - PERMIT = 9325

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
W	0	0	0	1	1	0	0	2
NW	0	0	0	1	0	0	0	1
NNW	0	0	0	1	0	0	0	1
TOTAL	0	0	0	3	1	0	0	4

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
NW	0	0	0	2	3	0	0	5
NNW	0	0	0	2	0	0	0	2
TOTAL	0	0	0	4	3	0	0	7

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
W	0	0	0	0	1	0	0	1
NW	0	0	0	0	2	0	0	2
NNW	0	0	0	1	1	0	0	2
TOTAL	0	0	0	1	4	0	0	5

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
W	0	0	0	1	2	0	0	3
WNW	0	0	1	0	0	0	0	1
NW	0	0	6	8	2	0	0	16
NNW	0	0	5	3	1	0	0	9
TOTAL	0	0	12	12	5	0	0	29

RELEASE SUMMARY - PERMIT = 9326

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
SE	0	1	0	0	0	0	0	1
TOTAL	0	1	0	0	0	0	0	1

STABILITY CLASS F	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
SE	0	2	1	0	0	0	0	3
SSW	0	1	0	0	0	0	0	1
TOTAL	0	3	1	0	0	0	0	4

RELEASE SUMMARY - PERMIT = 9327

The electronic meteorological data is currently not available for this period.

RELEASE SUMMARY - PERMIT = 9328

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	0	5	1	0	0	6
SSW	0	0	0	18	4	0	0	22
WSW	0	0	6	2	1	0	0	9
W	0	0	3	5	0	0	0	8
WNW	0	0	3	0	0	0	0	3
TOTAL	0	0	12	30	6	0	0	48

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	0	1	0	0	0	1
SSW	0	0	2	1	0	0	0	3
TOTAL	0	0	2	2	0	0	0	4

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	1	0	0	0	0	1
SSW	0	0	0	4	0	0	0	4
SW	0	0	0	1	0	0	0	1
TOTAL	0	0	1	5	0	0	0	6

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	1	0	0	0	0	1
SSW	0	0	6	12	1	0	0	19
SW	0	0	0	5	1	0	0	6
WSW	0	0	1	0	0	0	0	1
TOTAL	0	0	8	17	2	0	0	27

RELEASE SUMMARY - PERMIT = 9328

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	1	2	0	0	0	3
SSW	0	0	8	4	0	0	0	12
SW	0	0	2	0	0	0	0	2
TOTAL	0	0	11	6	0	0	0	17

STABILITY CLASS F	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
S	0	0	1	0	0	0	0	1
SSW	0	1	26	0	0	0	0	27
SW	0	0	8	0	0	0	0	8
TOTAL	0	1	35	0	0	0	0	36

STABILITY CLASS G	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
SSW	0	0	3	0	0	0	0	3
TOTAL	0	0	3	0	0	0	0	3

RELEASE SUMMARY - PERMIT = 9329

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	0	0	1	0	0	1
NNE	0	0	0	0	4	0	0	4
TOTAL	0	0	0	0	5	0	0	5

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
NNE	0	0	0	0	2	0	0	2
TOTAL	0	0	0	0	2	0	0	2

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	0	0	1	0	0	1
NNE	0	0	0	0	1	0	0	1
TOTAL	0	0	0	0	2	0	0	2

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
N	0	0	0	0	1	0	0	1
NNE	0	0	0	2	9	3	0	14
TOTAL	0	0	0	2	10	3	0	15

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION(FROM)								
NNE	0	0	0	10	3	1	0	14
NE	0	0	0	5	2	0	0	7
TOTAL	0	0	0	15	5	1	0	21

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	1	6	9	1	0	0	17
NNE	0	2	12	6	2	0	0	22
NE	0	1	26	1	0	0	0	28
ENE	0	2	24	2	0	0	0	28
E	0	3	7	2	0	0	0	12
ESE	0	5	11	0	0	0	0	16
SE	0	0	7	5	2	0	0	14
SSE	0	1	6	5	2	2	0	16
S	0	1	4	2	6	2	0	15
SSW	0	2	3	6	3	1	0	15
SW	0	2	6	10	3	3	0	24
WSW	0	0	8	15	7	0	0	30
W	0	0	21	23	18	3	0	65
WNW	0	1	15	33	8	0	0	57
NW	0	2	5	20	3	0	0	30
NNW	0	0	1	3	1	0	0	5
TOTAL	0	23	162	142	56	11	0	394

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	1	0	0	0	0	1
NNE	0	0	3	1	1	0	0	5
NE	0	1	1	0	0	0	0	2
ENE	0	0	2	0	0	0	0	2
E	0	1	3	1	0	0	0	5
ESE	0	1	1	0	0	0	0	2
SE	0	2	0	2	0	0	0	4
SSE	0	0	0	1	2	0	0	3
S	0	1	3	2	0	0	0	6
SW	0	1	1	0	0	0	0	2
WSW	0	1	3	0	2	1	0	7
W	0	0	2	2	2	0	0	6
WNW	0	0	2	3	0	0	0	5
NW	0	0	0	2	2	0	0	4
NNW	0	0	2	1	0	0	0	3
TOTAL	0	8	24	15	9	1	0	57

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	2	2	2	0	0	6
NNE	0	0	3	1	0	0	0	4
NE	0	0	6	0	0	0	0	6
ENE	0	0	1	0	0	0	0	1
E	0	0	5	1	0	0	0	6
ESE	0	2	1	0	0	0	0	3
SE	0	1	1	1	1	0	0	4
SSE	0	0	3	4	2	0	1	10
S	0	0	0	1	0	0	0	1
SSW	0	0	2	0	0	0	0	2
SW	0	0	1	2	1	0	0	4
WSW	0	0	1	2	2	2	0	7
W	0	0	1	1	1	0	0	3
WNW	0	0	1	1	2	0	0	4
NW	0	0	3	1	2	0	0	6
NNW	0	0	0	1	0	0	0	1
TOTAL	0	3	31	18	13	2	1	68

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	7	16	6	0	0	29
NNE	0	1	20	1	1	0	0	23
NE	0	2	14	0	0	0	0	16
ENE	0	5	6	0	0	0	0	11
E	0	8	9	3	0	0	0	20
ESE	0	2	8	0	1	0	0	11
SE	0	6	17	1	3	0	0	27
SSE	0	1	5	11	8	3	3	31
S	0	4	14	20	3	0	0	41
SSW	0	1	6	4	1	0	0	12
SW	0	2	4	6	3	2	0	17
WSW	0	1	9	9	2	5	0	26
W	0	1	10	8	10	2	0	31
WNW	0	0	4	9	2	0	0	15
NW	0	0	8	14	1	0	0	23
NNW	0	0	7	6	3	0	0	16
TOTAL	0	34	148	108	44	12	3	349

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	2	3	1	0	0	6
NNE	0	2	15	6	0	0	0	23
NE	0	1	8	2	0	0	0	11
ENE	0	4	8	0	0	0	0	12
E	0	8	9	1	0	0	0	18
ESE	0	8	11	1	0	0	0	20
SE	0	4	12	5	0	0	0	21
SSE	0	4	27	8	10	2	0	51
S	0	8	40	33	3	0	0	84
SSW	0	4	22	3	2	0	0	31
SW	0	3	9	5	4	1	0	22
WSW	0	2	15	9	4	2	0	32
W	0	1	16	26	9	1	0	53
WNW	0	3	19	10	3	0	0	35
NW	0	0	12	13	5	0	0	30
NNW	0	2	11	4	0	0	0	17
TOTAL	0	54	236	129	41	6	0	466

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS F	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	1	2	1	0	0	0	4
NNE	0	3	4	1	0	0	0	8
NE	0	3	4	0	0	0	0	7
ENE	0	0	5	1	0	0	0	6
E	0	2	8	5	0	0	0	15
ESE	0	4	3	3	0	0	0	10
SE	0	5	15	3	1	0	0	24
SSE	0	7	24	17	8	0	0	56
S	0	8	46	8	6	0	0	68
SSW	0	6	20	0	1	0	0	27
SW	0	5	9	8	0	0	0	22
WSW	0	5	16	5	0	0	0	26
W	0	1	10	9	5	0	0	25
WNW	0	2	14	5	0	0	0	21
NW	0	2	11	0	0	0	0	13
NNW	0	2	9	0	0	0	0	11
TOTAL	0	56	200	66	21	0	0	343

KNPP METEOROLOGICAL DATA
 JULY 1993 - SEPTEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS G	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
NNE	0	2	6	0	0	0	0	8
NE	0	0	2	1	0	0	0	3
ENE	0	0	2	0	0	0	0	2
E	0	4	1	0	0	0	0	5
ESE	0	3	4	1	0	0	0	8
SE	0	3	15	3	0	0	0	21
SSE	0	4	46	31	2	0	0	83
S	2	15	24	12	3	0	0	56
SSW	0	22	20	3	0	0	0	45
SW	0	14	25	3	1	0	0	43
WSW	0	21	66	5	0	0	0	92
W	0	5	65	30	1	0	0	101
WNW	0	19	19	1	0	0	0	39
NW	0	4	9	0	0	0	0	13
NNW	0	2	9	1	0	0	0	12
TOTAL	2	118	313	91	7	0	0	531

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS A	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	2	18	7	1	0	28
NNE	0	0	2	2	10	10	0	24
NE	0	0	1	0	2	9	0	12
ENE	0	0	0	0	3	4	0	7
E	0	0	3	3	7	1	0	14
ESE	0	0	0	5	6	8	0	19
SE	0	1	0	5	4	2	0	12
SSE	0	0	2	8	4	6	0	20
S	0	0	12	20	24	1	0	57
SSW	0	0	9	7	11	0	0	27
SW	0	0	4	20	11	3	0	38
WSW	0	1	12	16	11	0	0	40
W	0	0	15	23	11	2	3	54
WNW	0	0	12	19	5	10	0	46
NW	0	0	8	18	7	3	0	36
NNW	0	0	3	0	1	7	0	11
TOTAL	0	2	85	164	124	67	3	445

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS B	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	1	1	4	0	0	6
NNE	0	0	0	0	3	1	0	4
ESE	0	0	0	1	2	2	0	5
SE	0	0	0	0	1	1	0	2
SSE	0	0	0	0	1	1	0	2
S	0	0	4	6	6	0	0	16
SSW	0	1	0	4	1	0	0	6
SW	0	0	4	1	0	1	0	6
WSW	0	0	1	4	2	1	0	8
W	0	1	4	2	4	0	0	11
WNW	0	0	4	1	4	1	0	10
NW	0	0	2	1	10	0	0	13
NNW	0	0	0	0	0	2	0	2
TOTAL	0	2	20	21	38	10	0	91

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS C	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
NNE	0	0	0	0	2	2	0	4
E	0	0	0	1	0	0	0	1
ESE	0	0	0	1	5	0	0	6
SE	0	0	1	0	0	1	0	2
SSE	0	0	0	0	0	2	0	2
S	0	0	3	10	0	7	0	20
SSW	0	0	5	3	2	0	0	10
SW	0	0	4	1	2	1	0	8
WSW	0	2	1	10	1	1	0	15
W	0	0	3	6	5	0	1	15
WNW	0	0	0	4	5	0	0	9
NW	0	1	1	0	0	0	0	2
NNW	0	0	1	0	4	1	0	6
TOTAL	0	3	19	36	26	15	1	100

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS D	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	1	2	7	0	0	10
NNE	0	0	0	2	9	2	0	13
NE	0	0	0	0	0	1	0	1
ENE	0	0	1	0	0	0	0	1
E	0	0	1	0	0	0	0	1
ESE	0	0	1	1	1	0	0	3
SE	0	0	0	0	1	0	0	1
SSE	0	0	0	0	2	1	2	5
S	0	0	5	12	19	1	0	37
SSW	0	6	18	13	2	0	0	39
SW	0	2	8	4	7	0	0	21
WSW	0	3	8	8	8	3	1	31
W	0	2	6	16	21	2	0	47
WNW	0	0	24	24	26	7	0	81
NW	0	1	5	6	10	2	0	24
NNW	0	1	4	5	3	5	0	18
TOTAL	0	15	82	93	116	24	3	333

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS E	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
N	0	0	0	0	2	0	0	2
NNE	0	0	0	6	5	0	0	11
NE	0	0	1	3	0	0	0	4
ENE	0	0	0	3	0	0	0	3
E	0	0	2	1	0	0	0	3
SSE	0	0	2	0	4	2	0	8
S	0	0	10	2	1	0	0	13
SSW	0	1	17	13	1	0	0	32
SW	0	5	8	6	8	2	0	29
WSW	0	9	16	1	0	0	0	26
W	0	0	20	12	3	0	0	35
WNW	0	3	15	6	2	0	0	26
NW	0	2	10	4	0	0	0	16
NNW	0	0	5	3	0	2	0	10
TOTAL	0	20	106	60	26	6	0	218

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS F	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
E	0	0	2	0	0	0	0	2
ESE	0	0	2	0	4	0	0	6
SE	0	0	2	0	2	0	0	4
SSE	0	0	1	0	0	0	0	1
S	0	1	1	0	0	0	0	2
SSW	0	1	15	1	0	0	0	17
SW	0	0	14	1	1	0	0	16
WSW	0	1	13	0	3	0	0	17
W	0	0	5	5	2	0	0	12
WNW	0	0	2	3	0	0	0	5
NW	0	2	5	0	0	0	0	7
NNW	0	1	2	7	2	1	0	13
TOTAL	0	6	64	17	14	1	0	102

KNPP METEOROLOGICAL DATA
 OCTOBER 1993 - DECEMBER 1993
 WIND SPEED HOURLY AVERAGE VS DIRECTION

STABILITY CLASS G	CALM	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
WIND DIRECTION (FROM)								
ENE	0	0	0	1	0	0	0	1
E	0	0	1	0	0	0	0	1
ESE	0	0	0	0	2	0	0	2
SSE	0	0	3	0	0	0	0	3
SSW	0	0	5	0	0	0	0	5
SW	0	0	10	2	1	0	0	13
WSW	0	0	6	2	0	0	0	8
W	0	0	2	3	0	0	0	5
WNW	0	0	1	0	0	0	0	1
NW	0	0	1	0	0	0	0	1
NNW	0	0	6	2	0	0	0	8
TOTAL	0	0	35	10	3	0	0	48