



Kewaunee Nuclear Power Plant
Operated by Nuclear Management Company, LLC

April 26, 2005

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10 CFR 50.36a(a)(2)

U.S. Nuclear Regulatory Commission
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Kewaunee Nuclear Power Plant
Docket 50-305
License No. DPR-43

Radioactive Effluent Release Report January - December 2004

Enclosed please find a copy of the Kewaunee Nuclear Power Plant Radioactive Effluent Release Report for January through December 2004. This report is submitted to meet the requirements of Technical Specification 6.9.b.2 and 10 CFR 50.36a(a)(2).

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Site Vice President, Kewaunee Nuclear Power Plant
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Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Kewaunee, USNRC
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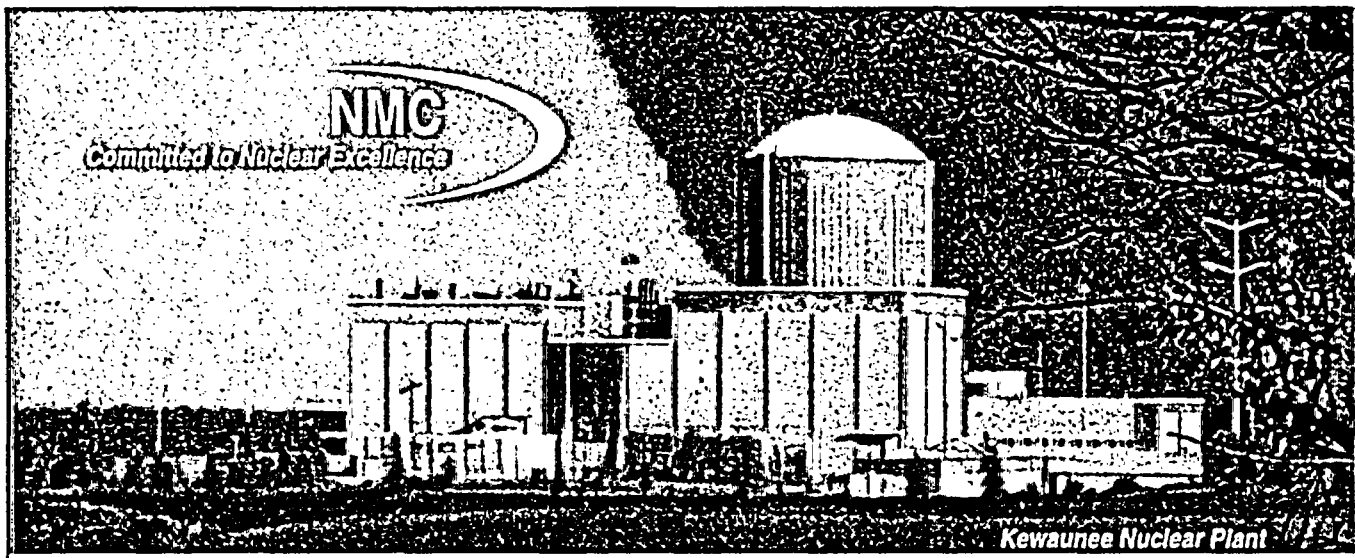
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ENCLOSURE 1

**KEWAUNEE NUCLEAR POWER PLANT
RADIOACTIVE EFFLUENT RELEASE REPORT
JANUARY - DECEMBER 2004**

KEWAUNEE NUCLEAR POWER PLANT

RADIOACTIVE EFFLUENT RELEASE REPORT



January - December 2004

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET 50-305

KEWAUNEE NUCLEAR POWER PLANT

**ANNUAL RADIOACTIVE
EFFLUENT RELEASE REPORT**

January 1 - December 31, 2004

Nuclear Management Company, LLC
April 12, 2005

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0.0 SUMMARY

During 2004 all solid, liquid, and gaseous radioactive effluents from the Kewaunee Nuclear Plant were well below regulatory limits. For individual effluent streams, the quarterly limit most closely approached was:

| | | | |
|-----------------|---|----------------------|---------------------------|
| <u>GASEOUS:</u> | Ingestion Pathway-Organ | Liver | |
| | Quarterly Limit (mRems) | 7.5 | |
| | Actual Dose (mRems) | 0.0003632 | (4 th Quarter) |
| | % of Specification | 0.004843 | |
| <u>LIQUID:</u> | Ingestion Pathway-Organ | GI-LLI | |
| | Quarterly Limit (mRems) | 5 | |
| | Actual Dose (mRems) | 0.004948 | (4 th Quarter) |
| | % of Limit | 0.10 | |
| <u>SOLID:</u> | No upper limit for solid radioactive waste applies. | | |
| | Cubic Meters Shipped | 146.2 m ³ | (5162 ft ³) |

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 January 1 - December 31, 2004. 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 Process Control Program and the Offsite Dose Calculation Manual, and addresses the cumulative meteorological data. Values indicated as 0 (zero) in this report refer to actual values less than the detection limits. A table of these less than (LLD) values is identified in sections 2.1 and 3.1.

1.1 Effluent Dose Limits

Specifications are set to ensure 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 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 | 5.61E-08 |
| Kr-88 | 1.02E-07 |
| Xe-133 | 6.68E-08 |
| Xe-133m | 2.75E-07 |
| Xe-135 | 2.99E-08 |
| Xe-138 | 1.13E-07 |

b. Particulate emissions:

| | |
|--------|----------|
| Mn-54 | 1.11E-13 |
| Fe-59 | 2.27E-13 |
| Co-58 | 2.28E-13 |
| Co-60 | 3.57E-13 |
| Zn-65 | 1.68E-13 |
| Mo-99 | 2.73E-13 |
| Cs-134 | 4.69E-13 |
| Cs-137 | 1.68E-13 |
| Ce-141 | 2.08E-13 |
| Ce-144 | 1.24E-12 |

c. Other identifiable gamma emitters:

| | |
|---------|----------|
| Ar-41 | 3.97E-10 |
| Kr-85 | 8.63E-05 |
| Kr-85m | 4.62E-08 |
| Kr-89 | 2.04E-06 |
| Xe-127 | 4.20E-08 |
| Xe-131m | 1.82E-06 |
| Xe-135m | 1.90E-08 |
| Xe-137 | 2.88E-07 |
| I-131 | 1.32E-13 |

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 2004.

| | |
|--|---------|
| Number of batch releases..... | 48 |
| Total time for all batch releases (min)..... | 20114.0 |
| Maximum time for a batch release (min)..... | 2623.0 |
| Average time for a batch release (min)..... | 419.0 |
| Minimum time for a batch release (min)..... | 7.0 |

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 the calculated doses this year from gaseous effluents.

Table 2.1
Annual Radioactive Effluent Release Report 2004
Gaseous Effluents - Summation of all Releases

| Fission and Activation Gases | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|--------------------------------------|-------------|-------------|-------------|-------------|
| Total Activity Released (Ci) | 5.424E-003 | 1.960E-003 | 4.583E-003 | 8.538E-002 |
| Average Release Rate (μ Ci/sec) | 6.899E-004 | 2.492E-004 | 5.830E-004 | 1.086E-002 |

Iodines

| | | | | |
|--------------------------------------|------------|------------|------------|------------|
| Total Activity Released (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Average Release Rate (μ Ci/sec) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Particulates

| | | | | |
|--------------------------------------|------------|------------|------------|------------|
| Total Activity Released (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Average Release Rate (μ Ci/sec) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Gross Alpha Released (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Tritium

| | | | | |
|--------------------------------------|------------|------------|------------|------------|
| Total Activity Released (Ci) | 2.379E+000 | 7.132E-001 | 1.113E+000 | 1.719E+001 |
| Average Release Rate (μ Ci/sec) | 3.025E-001 | 9.071E-002 | 1.416E-001 | 2.187E+000 |

Table 2.2
Annual Radioactive Effluent Release Report 2004
Gaseous Effluents

| | Nuclides Released (Ci) | | | |
|----------------------|------------------------|-------------|-------------|-------------|
| | Continuous Mode | | | |
| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
| Fission Gases | | | | |
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Iodines | | | | |
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Particulates | | | | |
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.2(cont)
Annual Radioactive Effluent Release Report 2004
Gaseous Effluents

Nuclides Released (Ci)
Batch Mode

Fission Gases

| | | | | |
|---------|------------|------------|------------|------------|
| Ar-41 | 2.192E-003 | 0.000E+000 | 0.000E+000 | 5.538E-003 |
| Kr-85m | 0.000E+000 | 0.000E+000 | 0.000E+000 | 6.376E-004 |
| Kr-87 | 0.000E+000 | 0.000E+000 | 0.000E+000 | 2.254E-004 |
| Kr-88 | 0.000E+000 | 0.000E+000 | 0.000E+000 | 9.418E-004 |
| Xe-133 | 3.219E-003 | 1.956E-003 | 4.551E-003 | 7.412E-002 |
| Xe-133m | 0.000E+000 | 0.000E+000 | 0.000E+000 | 6.649E-004 |
| Xe-135 | 1.308E-005 | 3.472E-006 | 3.270E-005 | 3.256E-003 |
| Total | 5.424E-003 | 1.960E-003 | 4.583E-003 | 8.538E-002 |

Iodines

| | | | | |
|-------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
|-------|------------|------------|------------|------------|

Particulates

| | | | | |
|-------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
|-------|------------|------------|------------|------------|

Table 2.3A
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Ar-41 | 2.192E-003 | 0.000E+000 | 0.000E+000 | 2.192E-003 |
| Xe-133 | 1.480E-003 | 0.000E+000 | 1.739E-003 | 3.219E-003 |
| Xe-135 | 0.000E+000 | 0.000E+000 | 1.308E-005 | 1.308E-005 |
| Total | 3.673E-003 | 0.000E+000 | 1.752E-003 | 5.424E-003 |

Particulates (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Total of all Releases

| Summary | January | February | March | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 3.673E-003 | 0.000E+000 | 1.752E-003 | 5.424E-003 |
| 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) | 1.534E+000 | 8.372E-001 | 7.164E-003 | 2.379E+000 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Xe-133 | 2.479E-004 | 3.627E-004 | 1.346E-003 | 1.956E-003 |
| Xe-135 | 0.000E+000 | 3.472E-006 | 0.000E+000 | 3.472E-006 |
| Total | 2.479E-004 | 3.662E-004 | 1.346E-003 | 1.960E-003 |

Particulates (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Total of all Releases

| Summary | April | May | June | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 2.479E-004 | 3.662E-004 | 1.346E-003 | 1.960E-003 |
| 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) | 4.341E-001 | 2.741E-001 | 4.976E-003 | 7.132E-001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3A (con't)
Annual Radioactive Effluent Release Report 2004
3rd Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

| Isotope | July | August | September | Total |
|---------|------------|------------|------------|------------|
| Xe-133 | 0.000E+000 | 0.000E+000 | 4.551E-003 | 4.551E-003 |
| Xe-135 | 0.000E+000 | 0.000E+000 | 3.270E-005 | 3.270E-005 |
| Total | 0.000E+000 | 0.000E+000 | 4.583E-003 | 4.583E-003 |

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)
Annual Radioactive Effluent Release Report 2004
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 | 4.583E-003 | 4.583E-003 |
| 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) | 5.882E-001 | 0.000E+000 | 5.251E-001 | 1.113E+000 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3A (Con't)
Annual Radioactive Effluent Release Report 2004
4th Quarter Gaseous Release
Total of all Releases

Noble Gasses (Curies)

| Isotope | October | November | December | Total |
|---------|------------|------------|------------|------------|
| Ar-41 | 5.538E-003 | 0.000E+000 | 0.000E+000 | 5.538E-003 |
| Kr-85m | 6.376E-004 | 0.000E+000 | 0.000E+000 | 6.376E-004 |
| Kr-87 | 2.254E-004 | 0.000E+000 | 0.000E+000 | 2.254E-004 |
| Kr-88 | 9.418E-004 | 0.000E+000 | 0.000E+000 | 9.418E-004 |
| Xe-133 | 7.412E-002 | 0.000E+000 | 0.000E+000 | 7.412E-002 |
| Xe-133m | 6.649E-004 | 0.000E+000 | 0.000E+000 | 6.649E-004 |
| Xe-135 | 3.256E-003 | 0.000E+000 | 0.000E+000 | 3.256E-003 |
| Total | 8.538E-002 | 0.000E+000 | 0.000E+000 | 8.538E-002 |

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 2.3A (Con't)
Annual Radioactive Effluent Release Report 2004
4th Quarter Gaseous Release
Total of all Releases

| Summary | October | November | December | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 8.538E-002 | 0.000E+000 | 0.000E+000 | 8.538E-002 |
| 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) | 6.432E-001 | 1.563E+001 | 9.180E-001 | 1.719E+001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Particulates (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Continuous Mode Only

| Summary | January | February | March | <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) | 6.982E-001 | 8.372E-001 | 4.969E-003 | 1.540E+000 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Particulates (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Continuous Mode Only

| Summary | April | May | June | <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) | 4.341E-001 | 2.741E-001 | 4.026E-003 | 7.122E-001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B (con't)
Annual Radioactive Effluent Release Report 2004
3rd Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (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)
Annual Radioactive Effluent Release Report 2004
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) | 5.882E-001 | 0.000E+000 | 5.249E-001 | 1.113E+000 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3B (Con't)
Annual Radioactive Effluent Release Report 2004
4th Quarter Gaseous Release
Continuous Mode Only

Noble Gasses (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 2.3B (Con't)
Annual Radioactive Effluent Release Report 2004
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) | 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) | 4.120E-001 | 1.563E+001 | 8.926E-001 | 1.694E+001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Ar-41 | 2.192E-003 | 0.000E+000 | 0.000E+000 | 2.192E-003 |
| Xe-133 | 1.480E-003 | 0.000E+000 | 1.739E-003 | 3.219E-003 |
| Xe-135 | 0.000E+000 | 0.000E+000 | 1.308E-005 | 1.308E-005 |
| Total | 3.673E-003 | 0.000E+000 | 1.752E-003 | 5.424E-003 |

Particulates (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | January | February | March | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2004
1st Quarter Gaseous Release
Batch Mode Only

| Summary | January | February | March | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 3.673E-003 | 0.000E+000 | 1.752E-003 | 5.424E-003 |
| 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) | 8.362E-001 | 0.000E+000 | 2.196E-003 | 8.384E-001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Xe-133 | 2.479E-004 | 3.627E-004 | 1.346E-003 | 1.956E-003 |
| Xe-135 | 0.000E+000 | 3.472E-006 | 0.000E+000 | 3.472E-006 |
| Total | 2.479E-004 | 3.662E-004 | 1.346E-003 | 1.960E-003 |

Particulates (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Halogens (Curies)

| Isotope | April | May | June | Total |
|---------|------------|------------|------------|------------|
| Total | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2004
2nd Quarter Gaseous Release
Batch Mode Only

| Summary | April | May | June | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 2.479E-004 | 3.662E-004 | 1.346E-003 | 1.960E-003 |
| 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) | 6.887E-005 | 4.298E-006 | 9.504E-004 | 1.024E-003 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C (con't)
Annual Radioactive Effluent Release Report 2004
3rd Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

| Isotope | July | August | September | Total |
|---------|------------|------------|------------|------------|
| Xe-133 | 0.000E+000 | 0.000E+000 | 4.551E-003 | 4.551E-003 |
| Xe-135 | 0.000E+000 | 0.000E+000 | 3.270E-005 | 3.270E-005 |
| Total | 0.000E+000 | 0.000E+000 | 4.583E-003 | 4.583E-003 |

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)
Annual Radioactive Effluent Release Report 2004
3rd Quarter Gaseous Release
Batch Mode Only

| Summary | July | August | September | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 0.000E+000 | 0.000E+000 | 4.583E-003 | 4.583E-003 |
| 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) | 3.386E-005 | 0.000E+000 | 1.953E-004 | 2.292E-004 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.3C (Con't)
Annual Radioactive Effluent Release Report 2004
4th Quarter Gaseous Release
Batch Mode Only

Noble Gasses (Curies)

| Isotope | October | November | December | Total |
|---------|------------|------------|------------|------------|
| Ar-41 | 5.538E-003 | 0.000E+000 | 0.000E+000 | 5.538E-003 |
| Kr-85m | 6.376E-004 | 0.000E+000 | 0.000E+000 | 6.376E-004 |
| Kr-87 | 2.254E-004 | 0.000E+000 | 0.000E+000 | 2.254E-004 |
| Kr-88 | 9.418E-004 | 0.000E+000 | 0.000E+000 | 9.418E-004 |
| Xe-133 | 7.412E-002 | 0.000E+000 | 0.000E+000 | 7.412E-002 |
| Xe-133m | 6.649E-004 | 0.000E+000 | 0.000E+000 | 6.649E-004 |
| Xe-135 | 3.256E-003 | 0.000E+000 | 0.000E+000 | 3.256E-003 |
| Total | 8.538E-002 | 0.000E+000 | 0.000E+000 | 8.538E-002 |

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)
Annual Radioactive Effluent Release Report 2004
4th Quarter Gaseous Release
Batch Mode Only

| Summary | October | November | December | <u>Total</u> |
|---|------------|------------|------------|--------------|
| Total Noble Gases (Ci) | 8.538E-002 | 0.000E+000 | 0.000E+000 | 8.538E-002 |
| 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) | 2.313E-001 | 1.513E-004 | 2.545E-002 | 2.569E-001 |
| Total Particulate Gross Alpha (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |

Table 2.4
Annual Radioactive Effluent Release Report 2004
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:

| Limit | 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 each quarter of 2004 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:

| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr |
|-----------------------------------|------------|------------|------------|------------|
| 1. Gamma-Whole Body | | | | |
| Specification (mRads) | 5.000E+000 | 5.000E+000 | 5.000E+000 | 5.000E+000 |
| Actual Dose (mRads) | 2.459E-006 | 7.957E-008 | 1.905E-007 | 1.148E-005 |
| % of Specification | 4.918E-005 | 1.591E-006 | 3.810E-006 | 2.297E-004 |
| 2. Beta-Skin | | | | |
| Specification (mRads) | 1.000E+001 | 1.000E+001 | 1.000E+001 | 1.000E+001 |
| Actual Dose (mRads) | 1.210E-006 | 2.354E-007 | 5.545E-007 | 1.270E-005 |
| % of Specification | 1.210E-005 | 2.354E-006 | 5.545E-006 | 1.270E-004 |
| 3. Ingestion Pathway-Organ | | | | |
| Specification (mRems) | 7.500E+000 | 7.500E+000 | 7.500E+000 | 7.500E+000 |
| Actual Dose (mRems) | 5.025E-005 | 1.507E-005 | 2.352E-005 | 3.632E-004 |
| % of Specification | 6.700E-004 | 2.009E-004 | 3.136E-004 | 4.843E-003 |
| | Liver | Liver | Liver | Liver |

Table 2.4 (Con't)
Annual Radioactive Effluent Release Report 2004
Dose From Gaseous Effluents

In addition, the cumulative annual offsite doses for the period January 1 - December 31, 2004 versus the ODCM annual limits were:

| | Annual |
|----------------------------|------------|
| 1. Gamma-Whole Body | |
| Specification (mRads) | 1.000E+001 |
| Actual Dose (mRads) | 1.421E-005 |
| % of Specification | 1.421E-004 |
| 2. Beta-Skin | |
| Specification (mRads) | 2.000E+001 |
| Actual Dose (mRads) | 1.470E-005 |
| % of Specification | 7.352E-005 |
| 3. Ingestion Pathway-Organ | |
| Specification (mRems) | 1.500E+001 |
| Actual Dose (mRems) | 4.520E-004 |
| % of Specification | 3.014E-003 |
| 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 LLD's for liquid batch release radioanalyses, as listed in Table 4.3 of the Kewaunee Nuclear Power Plant Off-Site Dose Calculation Manual, are:

| <u>Analysis</u> | <u>LLD ($\mu\text{Ci/ml}$)</u> |
|--------------------------|---|
| 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 | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Average a priori LLD ($\mu\text{Ci/ml}$) |
|-------------|-------------|-------------|-------------|-------------|--|
| Mn-54 | 7.64E-10 | 7.64E-08 | 7.64E-10 | 7.75E-08 | 3.89E-08 |
| Fe-59 | 1.70E-09 | 1.69E-09 | 1.69E-07 | 1.72E-09 | 4.35E-08 |
| Co-58 | 7.50E-10 | 7.50E-10 | 7.50E-10 | 7.61E-10 | 7.53E-10 |
| Co-60 | 1.12E-07 | 1.12E-09 | 1.12E-09 | 1.62E-07 | 6.91E-08 |
| Zn-65 | 1.91E-09 | 1.91E-09 | 1.90E-09 | 1.94E-09 | 1.91E-09 |
| Mo-99 | 5.40E-09 | 5.96E-07 | 5.39E-09 | 7.73E-07 | 3.45E-07 |
| Cs-134 | 5.95E-10 | 5.95E-10 | 1.01E-07 | 6.03E-10 | 2.57E-08 |
| Cs-137 | 7.38E-10 | 7.94E-08 | 7.37E-10 | 7.47E-08 | 3.89E-08 |
| Ce-141 | 4.07E-08 | 4.07E-08 | 5.75E-08 | 6.57E-08 | 5.11E-08 |
| Ce-144 | 5.47E-07 | 4.09E-07 | 2.58E-07 | 3.49E-07 | 3.91E-07 |
| I-131 | 7.21E-08 | 4.51E-10 | 4.51E-10 | 4.57E-08 | 2.97E-08 |
| H-3 | 3.10E-06 | 2.95E-06 | 3.47E-06 | 3.53E-06 | 3.26E-06 |
| Sr-89 | 9.30E-09 | 1.10E-08 | 1.30E-08 | 1.40E-08 | 1.18E-08 |
| Sr-90 | 6.70E-09 | 8.00E-09 | 6.40E-09 | 1.20E-08 | 8.28E-09 |
| Gross Alpha | 4.90E-09 | 5.30E-09 | 5.20E-09 | 1.10E-08 | 6.60E-09 |
| Fe-55 | 9.60E-07 | 8.10E-07 | 8.30E-07 | 8.40E-07 | 8.60E-07 |

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 Nuclear Power Plant Off-Site Dose Calculation Manual, 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 | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Average a priori LLD ($\mu\text{Ci/ml}$) |
|-------------|-------------|-------------|-------------|-------------|--|
| Mn-54 | 1.27E-08 | 1.27E-10 | 3.60E-08 | 1.29E-08 | 1.54E-08 |
| Fe-59 | 3.99E-08 | 7.59E-08 | 2.82E-08 | 2.87E-10 | 3.61E-08 |
| Co-58 | 2.50E-08 | 3.54E-08 | 1.38E-08 | 1.40E-08 | 2.20E-08 |
| Co-60 | 1.68E-08 | 1.87E-08 | 2.38E-08 | 3.43E-08 | 2.34E-08 |
| Zn-65 | 3.52E-08 | 3.18E-10 | 3.18E-10 | 3.24E-10 | 9.04E-09 |
| Mo-99 | 2.67E-07 | 2.23E-07 | 1.96E-07 | 2.05E-07 | 2.23E-07 |
| Cs-134 | 3.56E-08 | 7.01E-08 | 3.08E-08 | 6.08E-08 | 4.93E-08 |
| Cs-137 | 4.73E-08 | 1.23E-10 | 1.22E-10 | 4.35E-08 | 2.28E-08 |
| Ce-141 | 3.28E-08 | 5.66E-08 | 2.79E-08 | 2.87E-08 | 3.65E-08 |
| Ce-144 | 8.07E-08 | 3.05E-10 | 1.87E-07 | 1.40E-07 | 1.02E-07 |
| I-131 | 1.06E-08 | 1.30E-08 | 3.93E-08 | 1.52E-08 | 1.95E-08 |
| H-3 | 3.10E-06 | 2.95E-06 | 3.47E-06 | 3.53E-06 | 3.26E-06 |
| Sr-89 | 1.20E-08 | 1.15E-08 | 1.30E-08 | 1.15E-08 | 1.20E-08 |
| Sr-90 | 8.15E-09 | 9.10E-09 | 7.60E-09 | 9.00E-09 | 8.46E-09 |
| Gross Alpha | 5.70E-09 | 5.60E-09 | 5.65E-09 | 7.05E-09 | 6.00E-09 |
| Fe-55 | 7.60E-07 | 7.75E-07 | 8.50E-07 | 7.75E-07 | 7.90E-07 |

3.2 Liquid Batch Release Statistics

The following is a summation of all liquid batch releases made during 2004.

| <u>Release Type</u> | <u>Number</u> | <u>Gallons Released</u> |
|---------------------|---------------|-------------------------|
| A SGBT Monitor Tk. | 8 | 73089.0 |
| B SGBT Monitor Tk. | 11 | 98389.0 |
| A CVC Monitor | 13 | 85925.0 |
| B CVC Monitor | 13 | 81550.0 |
| Both WCTs | 10 | 17565.0 |

Total time for all batch releases..... 24353.0 Min.

Maximum time for a batch release.....1205.0 Min.

Minimum time for a batch release.....55.0 Min.

Average time for a batch release.....442.8 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 each quarter and the calculated doses this year from liquid effluents.

TABLE 3.1
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Summation of all Releases

| | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr |
|---|------------|------------|------------|------------|
| Fission and Activation Products | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | 2.929E-004 | 7.071E-003 | 3.298E-004 | 1.652E-002 |
| Average Concentration (µCi/ml) | 3.538E-012 | 3.865E-011 | 1.559E-012 | 1.546E-010 |
| Tritium | | | | |
| Total Release (Ci) | 1.802E+002 | 2.898E+001 | 2.262E+002 | 3.442E+001 |
| Average Concentration (µCi/ml) | 2.177E-006 | 1.584E-007 | 1.069E-006 | 3.222E-007 |
| % of Tech. Spec. Limit(3.0E-3 µCi/ml) | 7.256E-002 | 5.280E-003 | 3.564E-002 | 1.074E-002 |
| Dissolved Gases | | | | |
| Total Release (Ci) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Average Concentration (µCi/ml) | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| % of Tech. Spec. Limit(2.0E-4 µCi/ml) | 0.000E+000 | 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 |
| Volume of Waste Released | | | | |
| Batch (liters) | 2.561E+005 | 1.377E+005 | 4.132E+005 | 5.425E+005 |
| Continuous (liters) | 2.426E+007 | 2.041E+007 | 1.739E+007 | 2.294E+007 |
| Total (liters) | 2.452E+007 | 2.055E+007 | 1.780E+007 | 2.348E+007 |
| Volume of Dilution Water | | | | |
| Batch (liters) | 5.015E+009 | 2.481E+009 | 1.094E+010 | 6.344E+009 |
| Continuous (liters) | 7.776E+010 | 1.805E+011 | 2.006E+011 | 1.005E+011 |
| Total (liters) | 8.278E+010 | 1.829E+011 | 2.115E+011 | 1.068E+011 |

TABLE 3.2A
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| | January | February | March | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 1.696E-005 | 1.183E-004 | 8.557E-005 | 2.209E-004 |
| Avg. Conc. (µCi/ml) | | | | |
| | 2.042E-011 | 3.019E-011 | 3.239E-010 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 5.782E+001 | 1.171E+002 | 5.320E+000 | 1.802E+002 |
| Avg. Conc. (µCi/ml) | | | | |
| | 6.962E-005 | 2.986E-005 | 2.014E-005 | |
| Dissolved Gases | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 5.801E+004 | 1.649E+005 | 3.325E+004 | 2.561E+005 |
| Volume of Dilution Water | | | | |
| (liters) | 8.305E+008 | 3.920E+009 | 2.642E+008 | 5.015E+009 |

TABLE 3.2A (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| Isotope (Ci) | January | February | March | Total |
|--------------|------------|------------|------------|------------|
| H-3 | 5.782E+001 | 1.171E+002 | 5.320E+000 | 1.802E+002 |
| Fe-55 | 1.682E-005 | 4.781E-005 | 9.643E-006 | 7.428E-005 |
| Co-58 | 0.000E+000 | 2.595E-005 | 0.000E+000 | 2.595E-005 |
| Sr-90 | 1.392E-007 | 3.957E-007 | 7.980E-008 | 6.147E-007 |
| Ag-110m | 0.000E+000 | 1.501E-005 | 1.933E-005 | 3.434E-005 |
| Sb-125 | 0.000E+000 | 2.918E-005 | 5.653E-005 | 8.570E-005 |
| Total | 5.782E+001 | 1.171E+002 | 5.320E+000 | 1.802E+002 |

TABLE 3.2B
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| | April | May | June | <u>Total</u> |
|--|------------|------------|------------|--------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 1.428E-006 | 2.325E-005 | 8.147E-005 | 1.062E-004 |
| Avg. Conc. (µCi/ml) | | | | |
| | 1.722E-012 | 2.517E-011 | 1.119E-010 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 2.387E+001 | 3.051E+000 | 2.063E+000 | 2.898E+001 |
| Avg. Conc. (µCi/ml) | | | | |
| | 2.879E-005 | 3.303E-006 | 2.832E-006 | |
| Dissolved Gases | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 6.207E+004 | 3.447E+004 | 4.115E+004 | 1.377E+005 |
| Volume of Dilution Water | | | | |
| (liters) | 8.290E+008 | 9.236E+008 | 7.283E+008 | 2.481E+009 |

TABLE 3.2B (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| Isotope (Ci) | April | May | June | Total |
|--------------|------------|------------|------------|------------|
| H-3 | 2.387E+001 | 3.051E+000 | 2.063E+000 | 2.898E+001 |
| Fe-55 | 1.241E-006 | 6.895E-007 | 8.231E-007 | 2.754E-006 |
| Sr-89 | 6.828E-008 | 3.792E-008 | 4.527E-008 | 1.515E-007 |
| Sr-90 | 1.179E-007 | 6.550E-008 | 7.819E-008 | 2.616E-007 |
| Sb-125 | 0.000E+000 | 2.246E-005 | 8.052E-005 | 1.030E-004 |
| Total | 2.387E+001 | 3.051E+000 | 2.063E+000 | 2.898E+001 |

TABLE 3.2C
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| | July | August | September | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 8.164E-005 | 2.708E-007 | 1.336E-004 | 2.155E-004 |
| Avg. Conc. (µCi/ml) | | | | |
| | 2.862E-011 | 1.431E-012 | 1.691E-011 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 7.067E+001 | 4.561E-005 | 1.555E+002 | 2.262E+002 |
| Avg. Conc. (µCi/ml) | | | | |
| | 2.477E-005 | 2.410E-010 | 1.968E-005 | |
| Dissolved Gases | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 1.095E+005 | 6.889E+003 | 2.968E+005 | 4.132E+005 |
| Volume of Dilution Water | | | | |
| (liters) | 2.853E+009 | 1.893E+008 | 7.901E+009 | 1.094E+010 |

TABLE 3.2C (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| Isotope (Ci) | July | August | September | Total |
|--------------|------------|------------|------------|------------|
| H-3 | 7.067E+001 | 4.561E-005 | 1.555E+002 | 2.262E+002 |
| Fe-55 | 3.286E-006 | 2.067E-007 | 8.903E-006 | 1.240E-005 |
| Sr-89 | 9.858E-007 | 6.200E-008 | 2.671E-006 | 3.719E-006 |
| Sr-90 | 3.286E-008 | 2.067E-009 | 8.903E-008 | 1.240E-007 |
| Ag-110m | 0.000E+000 | 0.000E+000 | 1.187E-005 | 1.187E-005 |
| Sb-125 | 7.733E-005 | 0.000E+000 | 1.100E-004 | 1.874E-004 |
| Total | 7.067E+001 | 4.588E-005 | 1.555E+002 | 2.262E+002 |

TABLE 3.2D
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| | October | November | December | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 6.128E-003 | 8.211E-003 | 1.344E-003 | 1.568E-002 |
| Avg. Conc. (µCi/ml) | | | | |
| | 3.703E-009 | 2.286E-009 | 1.225E-009 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 7.328E+000 | 2.245E+001 | 4.637E+000 | 3.442E+001 |
| Avg. Conc. (µCi/ml) | | | | |
| | 4.428E-006 | 6.251E-006 | 4.227E-006 | |
| Dissolved Gases | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 1.357E+005 | 3.044E+005 | 1.024E+005 | 5.425E+005 |
| Volume of Dilution Water | | | | |
| (liters) | 1.655E+009 | 3.592E+009 | 1.097E+009 | 6.344E+009 |

TABLE 3.2D (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Batch Releases

| Isotope (Ci) | October | November | December | Total |
|--------------|------------|------------|------------|------------|
| H-3 | 7.328E+000 | 2.245E+001 | 4.637E+000 | 3.442E+001 |
| Cr-51 | 0.000E+000 | 1.640E-003 | 0.000E+000 | 1.640E-003 |
| Mn-54 | 8.539E-005 | 8.200E-005 | 1.826E-005 | 1.856E-004 |
| Fe-55 | 1.493E-004 | 3.348E-004 | 1.127E-004 | 5.968E-004 |
| Co-58 | 2.599E-004 | 2.774E-003 | 8.348E-004 | 3.869E-003 |
| Fe-59 | 0.000E+000 | 2.918E-004 | 0.000E+000 | 2.918E-004 |
| Co-60 | 1.360E-003 | 1.232E-003 | 1.490E-004 | 2.741E-003 |
| Sr-90 | 2.850E-007 | 6.392E-007 | 2.151E-007 | 1.139E-006 |
| Nb-95 | 0.000E+000 | 1.024E-004 | 2.013E-005 | 1.226E-004 |
| Ag-110m | 2.460E-003 | 1.755E-003 | 2.086E-004 | 4.424E-003 |
| Sb-125 | 1.813E-003 | 0.000E+000 | 0.000E+000 | 1.813E-003 |
| Total | 7.334E+000 | 2.246E+001 | 4.639E+000 | 3.443E+001 |

TABLE 3.3A
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| | January | February | March | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 2.055E-005 | 2.906E-005 | 2.237E-005 | 7.197E-005 |
| Avg. Conc. (µCi/ml) | | | | |
| | 1.663E-012 | 9.191E-013 | 6.618E-013 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 7.149E+006 | 8.938E+006 | 8.175E+006 | 2.426E+007 |
| Volume of Dilution Water | | | | |
| (liters) | 1.235E+010 | 3.162E+010 | 3.380E+010 | 7.776E+010 |

TABLE 3.3A (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| Isotope (Ci) | January | February | March | Total |
|--------------|------------|------------|------------|------------|
| Sr-89 | 1.545E-005 | 2.246E-005 | 1.662E-005 | 5.453E-005 |
| Sr-90 | 5.091E-006 | 6.600E-006 | 5.743E-006 | 1.743E-005 |
| Total | 2.055E-005 | 2.906E-005 | 2.237E-005 | 7.197E-005 |

TABLE 3.3B
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| | April | May | June | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 2.057E-003 | 2.899E-003 | 2.009E-003 | 6.965E-003 |
| Avg. Conc. (µCi/ml) | | | | |
| | 4.334E-011 | 4.289E-011 | 3.071E-011 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 5.824E+006 | 8.602E+006 | 5.988E+006 | 2.041E+007 |
| Volume of Dilution Water | | | | |
| (liters) | 4.746E+010 | 6.759E+010 | 6.541E+010 | 1.805E+011 |

TABLE 3.3B (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| Isotope (Ci) | April | May | June | Total |
|--------------|------------|------------|------------|------------|
| Fe-55 | 2.038E-003 | 2.872E-003 | 1.990E-003 | 6.899E-003 |
| Sr-89 | 1.747E-005 | 2.474E-005 | 1.715E-005 | 5.935E-005 |
| Sr-90 | 1.165E-006 | 2.790E-006 | 2.014E-006 | 5.969E-006 |
| Total | 2.057E-003 | 2.899E-003 | 2.009E-003 | 6.965E-003 |

TABLE 3.3C
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| | July | August | September | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 3.191E-005 | 5.506E-005 | 2.739E-005 | 1.144E-004 |
| Avg. Conc. (μCi/ml) | | | | |
| | 4.720E-013 | 8.146E-013 | 4.187E-013 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 2.538E-004 | 5.845E-004 | 4.852E-005 | 8.868E-004 |
| Avg. Conc. (μCi/ml) | | | | |
| | 3.755E-012 | 8.647E-012 | 7.418E-013 | |
| Dissolved Gases | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (μCi/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. (μCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 4.734E+006 | 5.486E+006 | 7.166E+006 | 1.739E+007 |
| Volume of Dilution Water | | | | |
| (liters) | 6.759E+010 | 6.759E+010 | 6.541E+010 | 2.006E+011 |

TABLE 3.3C (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| Isotope (Ci) | July | August | September | Total |
|--------------|------------|------------|------------|------------|
| H-3 | 2.538E-004 | 5.845E-004 | 4.852E-005 | 8.868E-004 |
| Fe-55 | 1.596E-005 | 3.675E-005 | 3.051E-006 | 5.576E-005 |
| Sr-89 | 1.407E-005 | 1.616E-005 | 2.147E-005 | 5.171E-005 |
| Sr-90 | 1.873E-006 | 2.147E-006 | 2.863E-006 | 6.883E-006 |
| Total | 2.857E-004 | 6.396E-004 | 7.591E-005 | 1.001E-003 |

TABLE 3.3D
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| | October | November | December | Total |
|--|------------|------------|------------|------------|
| Gross Radioactivity | | | | |
| Total Release Excluding H3 and Dissolved Gases (Ci) | | | | |
| | 1.601E-005 | 2.729E-004 | 5.487E-004 | 8.376E-004 |
| Avg. Conc. (µCi/ml) | | | | |
| | 4.708E-013 | 8.343E-012 | 1.624E-011 | |
| Tritium | | | | |
| Total Release (Ci) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | 0.000E+000 |
| Avg. Conc. (µCi/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. (µCi/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. (µCi/ml) | | | | |
| | 0.000E+000 | 0.000E+000 | 0.000E+000 | |
| Volume of Waste Released | | | | |
| (liters) | 4.212E+006 | 9.643E+006 | 9.085E+006 | 2.294E+007 |
| Volume of Dilution Water | | | | |
| (liters) | 3.399E+010 | 3.271E+010 | 3.380E+010 | 1.005E+011 |

TABLE 3.3D (Con't)
Annual Radioactive Effluent Release Report 2004
Liquid Effluents - Continuous Releases

| Isotope (Ci) | October | November | December | Total |
|--------------|------------|------------|------------|------------|
| Fe-55 | 0.000E+000 | 2.153E-004 | 5.125E-004 | 7.278E-004 |
| Co-58 | 0.000E+000 | 2.025E-005 | 0.000E+000 | 2.025E-005 |
| Sr-89 | 1.601E-005 | 3.733E-005 | 3.616E-005 | 8.950E-005 |
| Total | 1.601E-005 | 2.729E-004 | 5.487E-004 | 8.376E-004 |

Table 3.4
Annual Radioactive Effluent Report 2004
Dose From Liquid Effluents

The dose to a member of the public from total liquid radioactive releases for each quarter was below the ODCM limits of 1.5 mrem to the total body and less than or equal to 5 mrem to any organ. Additionally, the dose to a member of the public from total liquid radioactive releases for the year was below the ODCM limits of 3 mrem to the total body and less than or equal to 10 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 1st Qtr Dose | Dose Total mRem | Quarterly Limit mRem | Percent of Limit |
|-----------------------|-----------------------|----------------------------|---------------------|
| Total Body | 1.311E-003 | 1.5 | 0.09 |
| Bone | 8.562E-006 | 5.0 | 0.00 |
| Liver | 1.310E-003 | 5.0 | 0.03 |
| Thyroid | 1.309E-003 | 5.0 | 0.03 |
| Kidney | 1.309E-003 | 5.0 | 0.03 |
| Lung | 1.309E-003 | 5.0 | 0.03 |
| GI-LLI | 1.311E-003 | 5.0 | 0.03 |

| Organ 2nd Qtr Dose | Dose Total mRem | Quarterly Limit mRem | Percent of Limit |
|-----------------------|-----------------------|----------------------------|---------------------|
| Total Body | 1.925E-004 | 1.5 | 0.01 |
| Bone | 2.318E-006 | 5.0 | 0.00 |
| Liver | 1.920E-004 | 5.0 | 0.00 |
| Thyroid | 1.919E-004 | 5.0 | 0.00 |
| Kidney | 1.919E-004 | 5.0 | 0.00 |
| Lung | 1.920E-004 | 5.0 | 0.00 |
| GI-LLI | 1.921E-004 | 5.0 | 0.00 |

Table 3.4 (Con't)
Annual Radioactive Effluent Report 2004
Dose From Liquid Effluents

| Organ 3rd Qtr Dose | Dose Total mRem | Quarterly Limit mRem | Percent of Limit |
|-----------------------|-----------------------|----------------------------|---------------------|
| Total Body | 8.325E-004 | 1.5 | 0.06 |
| Bone | 5.674E-005 | 5.0 | 0.00 |
| Liver | 8.220E-004 | 5.0 | 0.02 |
| Thyroid | 8.216E-004 | 5.0 | 0.02 |
| Kidney | 8.216E-004 | 5.0 | 0.02 |
| Lung | 8.218E-004 | 5.0 | 0.02 |
| GI-LLI | 8.254E-004 | 5.0 | 0.02 |

| Organ 4th Qtr Dose | Dose Total mRem | Quarterly Limit mRem | Percent of Limit |
|-----------------------|-----------------------|----------------------------|---------------------|
| Total Body | 3.196E-004 | 1.5 | 0.02 |
| Bone | 8.940E-005 | 5.0 | 0.00 |
| Liver | 3.212E-004 | 5.0 | 0.01 |
| Thyroid | 2.501E-004 | 5.0 | 0.01 |
| Kidney | 2.562E-004 | 5.0 | 0.01 |
| Lung | 2.622E-004 | 5.0 | 0.01 |
| GI-LLI | 4.948E-003 | 5.0 | 0.10 |

| Calculated Dose This Year | | | |
|---------------------------|-----------------------|----------------------------|---------------------|
| Organ | Dose Total mRem | Quarterly Limit mRem | Percent of Limit |
| Total Body | 2.656E-003 | 3.0 | 0.09 |
| Bone | 1.570E-004 | 10.0 | 0.00 |
| Liver | 2.645E-003 | 10.0 | 0.03 |
| Thyroid | 2.573E-003 | 10.0 | 0.03 |
| Kidney | 2.579E-003 | 10.0 | 0.03 |
| Lung | 2.585E-003 | 10.0 | 0.03 |
| GI-LLI | 7.277E-003 | 10.0 | 0.07 |

4.0 UNPLANNED RELEASES

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

5.0 METEOROLOGICAL DATA

Meteorological data for 2004 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 and the joint frequency distribution tables.

6.0 SOLID WASTE DISPOSAL

Table 6.1 is a summation of solid wastes shipped during 2004. Presented are the types of wastes, major nuclide composition, disposition of the wastes and shipping containers used.

The containers utilized at Kewaunee Nuclear Power Plant have the following volumes:

| | |
|--------------------------------|-----------------------|
| High Integrity Container (HIC) | 158 ft ³ |
| High Integrity Container (HIC) | 120.3 ft ³ |
| LSA Box (B-25) | 98 ft ³ |
| Compactor Box (CPC 50) | 50 ft ³ |
| 55 Gal Steel Drum | 7.5 ft ³ |

Table 6.1 contains the radionuclide content (curies) and percent abundance for each type of waste.

Table 6.1
Annual Radioactive Effluent Report 2004
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal
 (Not Irradiated Fuel - m³ is actual waste volume not burial volume)

| 1. Type of Waste | Unit | Quantity |
|---|----------------|----------|
| a. Resin | m ³ | None |
| Container: HIC | Ci | None |
| b. Dewatered filter media | m ³ | None |
| Container: HIC | Ci | None |
| c. DAW (Compactible) | m ³ | 1.62E+01 |
| Container: CPC 50 | Ci | 1.01E-01 |
| d. DAW (Non-Compactible) | m ³ | 1.30E+02 |
| Container: Meets Requirements of 49 CFR 173.24,173.24A and 173.410 | Ci | 2.07E+01 |

Average Transuranics shipped (all shipments): 1.68E-01 nCi/g

2. Estimate of Major Nuclide by Composition
 (By Type of Waste)

| | <u>%</u> | <u>Ci</u> |
|---------------------------|----------|-----------|
| a. Resin | None | None |
| b. Dewatered filter media | None | None |
| c. DAW (Compactible) | 100% | 1.01E-01 |
| Cr-51 | 1.08E-03 | 1.09E-04 |
| Mn-54 | 2.10E-02 | 2.11E-03 |
| Co-58 | 5.42E-02 | 5.46E-03 |
| Co-60 | 4.80E-01 | 4.83E-02 |
| Zr-95 | 1.20E-02 | 1.21E-03 |
| Nb-95 | 8.61E-03 | 8.67E-04 |
| Ag-110m | 3.03E-03 | 3.05E-04 |
| Cs-137 | 2.72E-03 | 2.74E-04 |
| Sb-125 | 4.17E-02 | 4.20E-03 |
| Fe-55 | 1.77E-01 | 1.78E-02 |
| Fe-59 | 1.47E-04 | 1.48E-05 |
| H-3 | 1.10E-02 | 1.11E-03 |
| Ni-63 | 1.88E-01 | 1.89E-02 |

| | | | |
|----|-----------------------|----------|----------|
| d. | DAW (Non-Compactible) | 100% | 2.07E+01 |
| | Cr-51 | 9.41E-03 | 1.95E-01 |
| | Mn-54 | 1.38E-02 | 2.85E-01 |
| | Co-57 | 1.47E-03 | 3.05E-02 |
| | Co-58 | 3.99E-01 | 8.27E+00 |
| | Co-60 | 1.23E-01 | 2.55E+00 |
| | Zr-95 | 6.09E-03 | 1.26E-01 |
| | Nb-95 | 2.64E-02 | 5.48E-01 |
| | Ag-110m | 3.96E-04 | 8.21E-03 |
| | Cs-134 | 1.68E-04 | 3.49E-03 |
| | Cs-137 | 3.63E-04 | 7.51E-03 |
| | Sb-124 | 1.38E-04 | 2.86E-03 |
| | Sb-125 | 1.96E-03 | 4.07E-02 |
| | Fe-55 | 2.55E-01 | 5.28E+00 |
| | Fe-59 | 4.48E-03 | 9.28E-02 |
| | C-14 | 8.86E-03 | 1.84E-01 |
| | Tc-99 | 6.10E-03 | 1.26E-01 |
| | Nb-94 | 4.10E-05 | 8.51E-04 |
| | TRU | 8.37E-04 | 1.73E-02 |
| | Pu-241 | 7.94E-04 | 1.65E-02 |
| | Am-241 | 2.74E-05 | 5.68E-04 |
| | H-3 | 7.70E-06 | 1.60E-04 |
| | Ni-63 | 1.37E-01 | 2.84E+00 |
| | Sr-90 | 6.58E-04 | 1.36E-02 |
| | Zn-65 | 8.61E-04 | 1.79E-02 |
| | Ag-108m | 1.74E-03 | 3.61E-02 |
| | Ba-140 | 1.56E-03 | 3.24E-02 |
| | Ce-141 | 3.10E-04 | 6.44E-03 |
| | Cm-242 | 1.03E-06 | 2.14E-05 |
| | Cm-243 | 3.60E-06 | 7.46E-05 |
| | Pu-239 | 2.69E-06 | 5.57E-05 |
| | Ru-103 | 2.14E-04 | 4.43E-03 |
| | W-187 | 2.96E-04 | 6.13E-03 |

3. Solid Waste Disposition

| a. | Date of Shipment | Mode of Transportation | Destination |
|-----------|-------------------------|------------------------------------|--|
| | 06/02/04 | R&R Trucking (Van) | RACE LLC Memphis, TN |
| | 06/09/04 | R&R Trucking (Flatbed) | RACE LLC Memphis, TN |
| | 09/16/04 | R&R Trucking (Flatbed) | RACE LLC Memphis, TN |
| | 11/15/04 | Perkins Specialized Transportation | Envirocare of Utah Clive Disposal Site Clive, UT |
| | 12/13/04 | Hittman Transportation (Flatbed) | Envirocare of Utah Clive Disposal Site Clive, UT |
| | 12/17/04 | RACE Logistics LLC (Flatbed) | RACE LLC Memphis, TN |

B. Irradiated Fuel Shipments

None.

7.0 PROGRAM REVISIONS

In accordance with Technical Specifications 6.18.b.3 and 6.19.a, the revisions to the Process Control Program, 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

Kewaunee Nuclear Power Plant

2004 Meteorological Data

Missing Data

First Quarter: 5.75 hours
Second Quarter: 222.50 hours
Third Quarter: 123.50 hours
Fourth Quarter: 37.00 hours

Note: A total of 388.75 hours of data is missing or otherwise unavailable. This represents the availability of 95.6 % of the data for the year. Continuous strip chart indication for 2004 data is available onsite.

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FIRST QUARTER 2004

Total Hours Missing = 5.75

Total Hours = 2184

Stability Class A

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|--------|-------|-------|------|-------|
| N | 0 | 0 | 2.25 | 16.75 | 12.5 | 1.25 | 0 | 32.75 |
| NNE | 0 | 0 | 0.25 | 5 | 10.25 | 1.5 | 0 | 17 |
| NE | 0 | 0.25 | 2.25 | 24.5 | 9 | 1.75 | 0 | 37.75 |
| ENE | 0 | 0.5 | 0 | 17.75 | 19.5 | 5 | 0 | 42.75 |
| E | 0 | 0.25 | 0.75 | 4.25 | 20.25 | 19 | 0.25 | 44.75 |
| ESE | 0 | 0.25 | 0.25 | 8.25 | 3.75 | 0 | 0 | 12.5 |
| SE | 0 | 0.75 | 1.25 | 6 | 7.75 | 0 | 0 | 15.75 |
| SSE | 0 | 0.25 | 0.75 | 11 | 16.75 | 6.5 | 3.5 | 38.75 |
| S | 0 | 0 | 2.25 | 13.25 | 12.5 | 10.25 | 1.75 | 40 |
| SSW | 0 | 0 | 6 | 2.75 | 2.5 | 0 | 0 | 11.25 |
| SW | 0 | 0 | 2.5 | 1.5 | 3.25 | 0 | 0 | 7.25 |
| WSW | 0 | 0 | 1.5 | 3.25 | 13.25 | 0 | 0 | 18 |
| W | 0 | 1.5 | 8.25 | 13.5 | 17.75 | 5.75 | 1.75 | 48.5 |
| WNW | 0 | 0.25 | 6.5 | 17.25 | 31.75 | 6 | 0.25 | 62 |
| NW | 0 | 0.25 | 10.75 | 23.25 | 8.75 | 2.5 | 0 | 45.5 |
| NNW | 0 | 0 | 6.5 | 14.5 | 3 | 3.5 | 0 | 27.5 |
| TOTAL | 0 | 4.25 | 52 | 182.75 | 192.5 | 63 | 7.5 | 502 |

Stability Class B

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|------|-------|-------|-------|------|--------|
| N | 0 | 0.25 | 1 | 11.75 | 6 | 0 | 0 | 19 |
| NNE | 0 | 0 | 0 | 2 | 4.5 | 0.5 | 0 | 7 |
| NE | 0 | 0 | 0 | 0 | 0 | 0.25 | 0 | 0.25 |
| ENE | 0 | 0 | 0 | 1 | 4.75 | 0 | 0 | 5.75 |
| E | 0 | 0 | 0 | 2 | 4.5 | 0 | 0 | 6.5 |
| ESE | 0 | 0 | 1.5 | 0.25 | 1.75 | 0 | 0 | 3.5 |
| SE | 0 | 0 | 1.25 | 1.5 | 0.5 | 0 | 0 | 3.25 |
| SSE | 0 | 0 | 0.25 | 3 | 16.5 | 1.25 | 0 | 21 |
| S | 0 | 0 | 1.75 | 1 | 0.25 | 0 | 0.75 | 3.75 |
| SSW | 0 | 0 | 3.25 | 2.5 | 0.25 | 0 | 0 | 6 |
| SW | 0 | 0 | 3.25 | 0 | 2 | 0 | 0 | 5.25 |
| WSW | 0 | 0 | 0 | 0.25 | 2.25 | 0 | 0 | 2.5 |
| W | 0 | 0 | 0.75 | 5.25 | 4.75 | 2.25 | 0 | 13 |
| WNW | 0 | 0 | 0.75 | 4.5 | 5.75 | 0.5 | 0 | 11.5 |
| NW | 0 | 0 | 0.75 | 3.25 | 4 | 0.25 | 0 | 8.25 |
| NNW | 0 | 0 | 2.5 | 7.25 | 6.25 | 0.75 | 0 | 16.75 |
| TOTAL | 0 | 0.25 | 17 | 45.5 | 64 | 5.75 | 0.75 | 133.25 |

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Stability Class C

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|-------|-------|-------|-----|-------|
| | CALM | | | | | | | |
| N | 0 | 0 | 2.5 | 10.75 | 5.25 | 1.5 | 0 | 20 |
| NNE | 0 | 0.25 | 0 | 7 | 9.5 | 0 | 0 | 16.75 |
| NE | 0 | 0.25 | 0 | 2.5 | 0 | 0 | 0 | 2.75 |
| ENE | 0 | 0 | 0 | 2.75 | 0.75 | 0 | 0 | 3.5 |
| E | 0 | 0 | 0 | 3.5 | 0 | 0 | 0 | 3.5 |
| ESE | 0 | 1 | 1 | 3.25 | 0 | 0 | 0 | 5.25 |
| SE | 0 | 0 | 2.25 | 0.5 | 0.5 | 0 | 0 | 3.25 |
| SSE | 0 | 0 | 0.25 | 5.25 | 3.5 | 0.25 | 0 | 9.25 |
| S | 0 | 0.25 | 2 | 3.25 | 0 | 0.25 | 0 | 5.75 |
| SSW | 0 | 0 | 3.25 | 2.5 | 0.75 | 0.25 | 0 | 6.75 |
| SW | 0 | 0 | 3.25 | 0.75 | 2.75 | 0 | 0 | 6.75 |
| WSW | 0 | 0 | 1.25 | 0.75 | 2.5 | 1.25 | 0 | 5.75 |
| W | 0 | 0 | 4 | 8.25 | 3 | 2.25 | 0 | 17.5 |
| WNW | 0 | 0.5 | 2 | 6.5 | 6.75 | 0.25 | 0 | 16 |
| NW | 0 | 0 | 1.75 | 5 | 0.75 | 0 | 0 | 7.5 |
| NNW | 0 | 0 | 4.25 | 9 | 6.75 | 5.25 | 0 | 25.25 |
| TOTAL | 0 | 2.25 | 27.75 | 71.5 | 42.75 | 11.25 | 0 | 155.5 |

Stability Class D

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|-------|--------|-------|-------|-----|-------|
| | CALM | | | | | | | |
| N | 0 | 0.25 | 6.5 | 34 | 6 | 2 | 0 | 48.75 |
| NNE | 0 | 0 | 1.5 | 12.5 | 4.5 | 0.5 | 1.5 | 20.5 |
| NE | 0 | 0.25 | 1.25 | 2 | 2.5 | 0.25 | 0 | 6.25 |
| ENE | 0 | 0.25 | 0.25 | 2.5 | 7.75 | 0 | 0 | 10.75 |
| E | 0 | 1.25 | 2.75 | 1 | 2.5 | 0 | 0 | 7.5 |
| ESE | 0 | 4.25 | 3.5 | 1.5 | 3.75 | 1.25 | 0 | 14.25 |
| SE | 0 | 1.25 | 2.5 | 3.75 | 0.25 | 0 | 0 | 7.75 |
| SSE | 0 | 1 | 4 | 17.5 | 10.75 | 0 | 0 | 33.25 |
| S | 0 | 0.25 | 7.5 | 9.5 | 3.25 | 2.25 | 0 | 22.75 |
| SSW | 0 | 0 | 10 | 33 | 6.25 | 0 | 0 | 49.25 |
| SW | 0 | 1.25 | 9.75 | 12.5 | 9.25 | 5.75 | 0 | 38.5 |
| WSW | 0 | 0.75 | 10.5 | 7.75 | 10.5 | 6 | 0 | 35.5 |
| W | 0 | 0.5 | 11.5 | 27.25 | 28.5 | 6.75 | 0 | 74.5 |
| WNW | 0 | 0.25 | 12.75 | 20 | 30.75 | 4.75 | 0 | 68.5 |
| NW | 0 | 0.25 | 9.25 | 21.75 | 15.75 | 2.25 | 0 | 49.25 |
| NNW | 0 | 0 | 12 | 36.25 | 21.25 | 3.25 | 0 | 72.75 |
| TOTAL | 0 | 11.75 | 105.5 | 242.75 | 163.5 | 35 | 1.5 | 560 |

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Stability Class E

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|-------|-------|-------|-----|--------|
| N | 0.25 | 1.5 | 4.5 | 16.5 | 1.5 | 0.75 | 0 | 25 |
| NNE | 0 | 1.25 | 1.25 | 12.5 | 0 | 0 | 0 | 15 |
| NE | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 3 |
| ENE | 0 | 1 | 0.5 | 4.5 | 0 | 0 | 0 | 6 |
| E | 0 | 1 | 0.75 | 4 | 0 | 0 | 0 | 5.75 |
| ESE | 0 | 1.25 | 1.75 | 2.5 | 0 | 0 | 0 | 5.5 |
| SE | 0 | 1 | 2.5 | 4 | 3 | 0 | 0 | 10.5 |
| SSE | 0 | 1.25 | 4.75 | 8 | 4.5 | 3 | 0 | 21.5 |
| S | 0 | 0.5 | 9.75 | 7 | 5 | 2 | 0.5 | 24.75 |
| SSW | 0 | 0.5 | 13.25 | 15.25 | 0 | 0 | 0 | 29 |
| SW | 0 | 1.25 | 10.5 | 11.75 | 6.25 | 0 | 0 | 29.75 |
| WSW | 0 | 2.25 | 10.5 | 13.5 | 22.5 | 4 | 0 | 52.75 |
| W | 0 | 1 | 9.25 | 31 | 12.5 | 1.75 | 0 | 55.5 |
| WNW | 0 | 1.5 | 15.25 | 28.5 | 7 | 1 | 0 | 53.25 |
| NW | 0 | 1.5 | 7.25 | 10.75 | 1.25 | 0 | 0 | 20.75 |
| NNW | 0 | 1.25 | 18.25 | 15.25 | 5 | 0 | 0 | 39.75 |
| TOTAL | 0.25 | 19 | 111 | 186 | 68.5 | 12.5 | 0.5 | 397.75 |

Stability Class F

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|-------|-------|-------|-----|-------|
| N | 0 | 1 | 1.75 | 1.75 | 0 | 0 | 0 | 4.5 |
| NNE | 0 | 0.5 | 2.25 | 0.25 | 0 | 0 | 0 | 3 |
| NE | 0 | 0 | 0.75 | 0 | 0 | 0 | 0 | 0.75 |
| ENE | 0 | 0 | 0.5 | 0 | 0 | 0 | 0 | 0.5 |
| E | 0 | 0.5 | 0.75 | 0 | 0 | 0 | 0 | 1.25 |
| ESE | 0 | 0.5 | 0.25 | 0.25 | 0 | 0 | 0 | 1 |
| SE | 0 | 0.5 | 3.75 | 0.75 | 0 | 0 | 0 | 5 |
| SSE | 0 | 0.25 | 3.75 | 1.5 | 1.5 | 0.5 | 0 | 7.5 |
| S | 0 | 1 | 6 | 5 | 0 | 0 | 0 | 12 |
| SSW | 0 | 1.5 | 10.25 | 2 | 0 | 0 | 0 | 13.75 |
| SW | 0 | 4.75 | 8 | 7.75 | 0 | 0 | 0 | 20.5 |
| WSW | 0 | 4 | 10 | 7.25 | 2.25 | 0 | 0 | 23.5 |
| W | 0 | 3.25 | 8 | 5.25 | 0.5 | 0 | 0 | 17 |
| WNW | 0 | 0.75 | 9.25 | 21.5 | 0 | 0 | 0 | 31.5 |
| NW | 0 | 1.5 | 11.25 | 8.25 | 0 | 0 | 0 | 21 |
| NNW | 0 | 6.5 | 5 | 10.75 | 0 | 0 | 0 | 22.25 |
| TOTAL | 0 | 26.5 | 81.5 | 72.25 | 4.25 | 0.5 | 0 | 185 |

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Stability Class G

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|-------|------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 2.25 | 6.75 | 2.5 | 0 | 0 | 0 | 11.5 |
| NNE | 0 | 0.25 | 0.75 | 0 | 0 | 0 | 0 | 1 |
| NE | 0 | 0.25 | 3 | 0 | 0 | 0 | 0 | 3.25 |
| ENE | 0 | 0.75 | 0 | 0.25 | 0 | 0 | 0 | 1 |
| E | 0 | 0 | 0.75 | 0 | 0 | 0 | 0 | 0.75 |
| ESE | 0 | 0.75 | 0 | 0 | 0 | 0 | 0 | 0.75 |
| SE | 0 | 0 | 0.5 | 0 | 0 | 0 | 0 | 0.5 |
| SSE | 0 | 0.75 | 8 | 3.75 | 0 | 0 | 0 | 12.5 |
| S | 0 | 1.25 | 10 | 4 | 0 | 0 | 0 | 15.25 |
| SSW | 0 | 2.75 | 22.5 | 0 | 0 | 0 | 0 | 25.25 |
| SW | 0 | 2.25 | 16.5 | 7 | 0 | 0 | 0 | 25.75 |
| WSW | 0 | 2.75 | 16.25 | 6.75 | 0 | 0 | 0 | 25.75 |
| W | 0 | 1 | 27.5 | 15.5 | 0 | 0 | 0 | 44 |
| WNW | 0 | 1.25 | 17.25 | 6 | 0 | 0 | 0 | 24.5 |
| NW | 0 | 2.75 | 22.75 | 2 | 0 | 0 | 0 | 27.5 |
| NNW | 0 | 6.25 | 19 | 0.25 | 0 | 0 | 0 | 25.5 |
| TOTAL | 0 | 25.25 | 171.5 | 48 | 0 | 0 | 0 | 244.75 |

2nd QUARTER 2004

Total Hours Missing = 222.5

Total Hours = 2184

Stability Class A

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|--------|--------|-------|------|--------|
| | CALM | | | | | | | |
| N | 0.5 | 0.5 | 6 | 19.75 | 3.5 | 0.75 | 0.25 | 31.25 |
| NNE | 0 | 0.5 | 1.75 | 32.5 | 45.5 | 2 | 0 | 82.25 |
| NE | 0 | 0 | 4.5 | 60.5 | 17.25 | 0 | 0 | 82.25 |
| ENE | 0 | 0 | 5 | 8 | 0.5 | 0 | 0 | 13.5 |
| E | 0 | 0 | 8.25 | 6.25 | 0 | 0 | 0 | 14.5 |
| ESE | 0 | 0 | 14 | 10.75 | 2.25 | 0 | 0 | 27 |
| SE | 0 | 0.25 | 9 | 7.5 | 0.5 | 0 | 0 | 17.25 |
| SSE | 0 | 0 | 8.5 | 8.25 | 9.5 | 1.5 | 1.75 | 29.5 |
| S | 0 | 0 | 2.5 | 11.25 | 5.75 | 0 | 0 | 19.5 |
| SSW | 0 | 0.25 | 4.25 | 7 | 0 | 0 | 0 | 11.5 |
| SW | 0 | 0 | 4 | 17 | 3.75 | 1.75 | 0.5 | 27 |
| WSW | 0 | 0 | 1.75 | 7.75 | 4.5 | 0.75 | 0 | 14.75 |
| W | 0 | 0 | 3.75 | 7.75 | 1.75 | 0 | 0 | 13.25 |
| WNW | 0 | 0 | 8.25 | 10 | 6.75 | 1.75 | 0 | 26.75 |
| NW | 0 | 0.25 | 11.5 | 12 | 3 | 1.5 | 0 | 28.25 |
| NNW | 0 | 0.25 | 11.75 | 13 | 3.75 | 4 | 0.5 | 33.25 |
| TOTAL | 0.5 | 2 | 104.75 | 239.25 | 108.25 | 14 | 3 | 471.75 |

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Stability Class B

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|------|-------|-------|------|-------|
| | CALM | | | | | | | |
| N | 0 | 0.25 | 1.25 | 1.25 | 0 | 1 | 0 | 3.75 |
| NNE | 0 | 0.25 | 2.25 | 8.25 | 10.75 | 1.25 | 0 | 22.75 |
| NE | 0 | 0 | 2.5 | 7.25 | 1 | 0.25 | 0 | 11 |
| ENE | 0 | 0 | 1 | 0.75 | 0 | 0 | 0 | 1.75 |
| E | 0 | 0 | 1.25 | 0.5 | 0 | 0 | 0 | 1.75 |
| ESE | 0 | 0 | 0.75 | 0 | 1.75 | 0.75 | 0 | 3.25 |
| SE | 0 | 0 | 2 | 2.5 | 0 | 0 | 0 | 4.5 |
| SSE | 0 | 0 | 1.5 | 2 | 0.75 | 0.25 | 0 | 4.5 |
| S | 0 | 0 | 0.25 | 9 | 2.5 | 0 | 0 | 11.75 |
| SSW | 0 | 0 | 0 | 2.75 | 0 | 0 | 0 | 2.75 |
| SW | 0 | 0 | 0 | 0.5 | 0 | 0.5 | 0.25 | 1.25 |
| WSW | 0 | 0 | 1.25 | 0.25 | 0 | 0 | 0 | 1.5 |
| W | 0 | 0.25 | 0.25 | 0.25 | 0 | 0 | 0 | 0.75 |
| WNW | 0 | 0 | 1.75 | 2 | 1.75 | 0.25 | 0 | 5.75 |
| NW | 0 | 0.25 | 1.5 | 1.5 | 0.25 | 1.5 | 0 | 5 |
| NNW | 0 | 0.25 | 1.25 | 2.75 | 1 | 0 | 0 | 5.25 |
| TOTAL | 0 | 1.25 | 18.75 | 41.5 | 19.75 | 5.75 | 0.25 | 87.25 |

Stability Class C

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|------|-------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 1 | 2.75 | 0.75 | 1.75 | 1 | 0 | 7.25 |
| NNE | 0 | 0 | 2.25 | 14 | 15.25 | 2.5 | 0 | 34 |
| NE | 0 | 0.25 | 1 | 10.25 | 2.75 | 0 | 0 | 14.25 |
| ENE | 0 | 0 | 1.25 | 3.5 | 0.25 | 0 | 0 | 5 |
| E | 0 | 0 | 2.25 | 3 | 1.25 | 0 | 0 | 6.5 |
| ESE | 0 | 0 | 0.5 | 0 | 0 | 0 | 0 | 0.5 |
| SE | 0 | 0 | 2 | 4.75 | 0 | 0 | 0 | 6.75 |
| SSE | 0 | 0 | 1 | 2 | 0.25 | 0.5 | 0 | 3.75 |
| S | 0 | 0 | 0.25 | 4 | 0.5 | 0 | 0 | 4.75 |
| SSW | 0 | 0 | 0.25 | 4.25 | 0 | 0 | 0 | 4.5 |
| SW | 0 | 0 | 0.25 | 0.5 | 0 | 0.75 | 0 | 1.5 |
| WSW | 0 | 0 | 0.75 | 0.5 | 0.25 | 0 | 0 | 1.5 |
| W | 0 | 0 | 1 | 0.25 | 0.5 | 0.5 | 0 | 2.25 |
| WNW | 0 | 0.25 | 0.25 | 0.5 | 0.5 | 0 | 0 | 1.5 |
| NW | 0 | 0 | 1.75 | 1.25 | 2 | 0 | 0 | 5 |
| NNW | 0 | 0 | 1.5 | 3.25 | 0 | 0 | 0 | 4.75 |
| TOTAL | 0 | 1.5 | 19 | 52.75 | 25.25 | 5.25 | 0 | 103.75 |

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Stability Class D

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|--------|------|--------|--------|-------|-------|-----|--------|
| N | CALM 0 | 0.25 | 5.5 | 4.25 | 3.25 | 1.75 | 0 | 15 |
| NNE | 0 | 0.75 | 11.75 | 34 | 21.25 | 1.75 | 0 | 69.5 |
| NE | 0 | 0 | 9.5 | 26.5 | 3.5 | 0 | 0 | 39.5 |
| ENE | 0 | 1 | 6.25 | 10.75 | 3.25 | 0 | 0 | 21.25 |
| E | 0 | 1.25 | 10.25 | 4.25 | 0 | 0 | 0 | 15.75 |
| ESE | 0 | 1 | 6.75 | 4 | 0 | 0.25 | 0 | 12 |
| SE | 0 | 0.75 | 5.25 | 3.25 | 2.5 | 0 | 0 | 11.75 |
| SSE | 0 | 0.75 | 9.25 | 16 | 3.25 | 2.25 | 0 | 31.5 |
| S | 0 | 0.5 | 8 | 13 | 3.75 | 0 | 0 | 25.25 |
| SSW | 0 | 0.5 | 8.75 | 18.5 | 0 | 0 | 0 | 27.75 |
| SW | 0 | 0.5 | 2.25 | 1.5 | 0.25 | 2.5 | 0 | 7 |
| WSW | 0 | 0.25 | 6.5 | 3.75 | 1 | 1.5 | 0 | 13 |
| W | 0 | 0.25 | 5 | 2 | 0.75 | 1 | 0 | 9 |
| WNW | 0 | 0.25 | 6 | 8.5 | 2.25 | 0 | 0 | 17 |
| NW | 0 | 0.25 | 7.75 | 0.25 | 0.75 | 0 | 0 | 9 |
| NNW | 0 | 0 | 7 | 12.25 | 1.75 | 0 | 0 | 21 |
| TOTAL | 0 | 8.25 | 115.75 | 162.75 | 47.5 | 11 | 0 | 345.25 |

Stability Class E

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|----------|-------|-------|-------|-------|-------|------|-------|
| N | CALM 0.5 | 1.75 | 13.5 | 5.75 | 0.25 | 0 | 0 | 21.75 |
| NNE | 0 | 0.5 | 15.5 | 28 | 8 | 0 | 0 | 52 |
| NE | 0 | 3 | 19.75 | 16.5 | 1.75 | 0 | 0 | 41 |
| ENE | 0 | 1.25 | 16.25 | 5 | 0 | 0 | 0 | 22.5 |
| E | 0 | 1 | 19.5 | 5.25 | 0.25 | 0 | 0 | 26 |
| ESE | 0 | 4.25 | 11.75 | 2.25 | 0 | 0.25 | 0.25 | 18.75 |
| SE | 0 | 3.75 | 13 | 3.25 | 1.25 | 1.25 | 0.75 | 23.25 |
| SSE | 0 | 4 | 16.25 | 9.25 | 6.75 | 2 | 0 | 38.25 |
| S | 0 | 2.5 | 29.25 | 21.25 | 4 | 0 | 0 | 57 |
| SSW | 0 | 2.5 | 17.25 | 5.75 | 1.25 | 0 | 0 | 26.75 |
| SW | 0 | 4.25 | 3.75 | 2 | 0.25 | 5.5 | 4 | 19.75 |
| WSW | 0 | 2.75 | 4.75 | 2.25 | 0.75 | 0 | 2 | 12.5 |
| W | 0 | 3 | 4.75 | 3.75 | 0 | 0.25 | 0.25 | 12 |
| WNW | 0 | 1.75 | 5.5 | 4.75 | 0 | 0 | 0 | 12 |
| NW | 0 | 4.25 | 5.75 | 0.5 | 0 | 0 | 0 | 10.5 |
| NNW | 0 | 1.25 | 17.5 | 10 | 0.25 | 0 | 0 | 29 |
| TOTAL | 0.5 | 41.75 | 214 | 125.5 | 24.75 | 9.25 | 7.25 | 423 |

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Stability Class F

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|-------|-------|-------|-------|-----|-------|
| N | 0 | 1 | 8.75 | 1.5 | 0.5 | 0 | 0 | 11.75 |
| NNE | 0 | 1 | 6 | 3 | 1 | 0.25 | 0 | 11.25 |
| NE | 0 | 2.25 | 11 | 9.5 | 1.25 | 0 | 0 | 24 |
| ENE | 0 | 1 | 7 | 1.25 | 0 | 0 | 0 | 9.25 |
| E | 0 | 1.25 | 5.25 | 0.25 | 0 | 0 | 0 | 6.75 |
| ESE | 0 | 0.75 | 5.5 | 0.75 | 0 | 0 | 0 | 7 |
| SE | 0 | 0.75 | 8 | 0.5 | 1 | 0.5 | 0 | 10.75 |
| SSE | 0 | 0.5 | 8.75 | 4.25 | 3.5 | 0 | 0 | 17 |
| S | 0 | 1.75 | 14.75 | 3.5 | 2 | 0.25 | 0 | 22.25 |
| SSW | 0 | 2.5 | 6.25 | 0.5 | 0 | 0 | 0 | 9.25 |
| SW | 0 | 0.25 | 9.25 | 2.25 | 0 | 1.25 | 3 | 16 |
| WSW | 0 | 0.75 | 7.75 | 2.5 | 0.75 | 0 | 0 | 11.75 |
| W | 0 | 4 | 4.25 | 5.25 | 0 | 0 | 0 | 13.5 |
| WNW | 0 | 2.5 | 6.25 | 2.5 | 0 | 0 | 0 | 11.25 |
| NW | 0 | 2.25 | 5.25 | 0.5 | 0.25 | 0 | 0 | 8.25 |
| NNW | 0 | 1.75 | 14 | 1.25 | 0 | 0 | 0 | 17 |
| TOTAL | 0 | 24.25 | 128 | 39.25 | 10.25 | 2.25 | 3 | 207 |

Stability Class G

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|--------|-------|-------|-------|------|-------|
| N | 6.5 | 5.25 | 3 | 0.5 | 0 | 0 | 0 | 15.25 |
| NNE | 0 | 3 | 1.25 | 0.5 | 0.25 | 0 | 0 | 5 |
| NE | 0 | 1.5 | 8 | 3.75 | 0 | 0 | 0 | 13.25 |
| ENE | 0 | 0.5 | 3.5 | 1 | 0.25 | 0 | 0 | 5.25 |
| E | 0 | 0.75 | 4.5 | 1.25 | 0 | 0 | 0 | 6.5 |
| ESE | 0 | 2 | 8 | 1 | 0.5 | 0 | 0 | 11.5 |
| SE | 0 | 1.75 | 12.75 | 2.5 | 0.75 | 0 | 0 | 17.75 |
| SSE | 0 | 3.5 | 18 | 25 | 8 | 0 | 0.25 | 54.75 |
| S | 0 | 4 | 21.5 | 13 | 0.5 | 0 | 0 | 39 |
| SSW | 0 | 7.25 | 7 | 3 | 0.25 | 0.5 | 0 | 18 |
| SW | 0 | 5 | 22.25 | 2 | 0 | 0 | 0 | 29.25 |
| WSW | 0 | 4.75 | 20.25 | 2.25 | 0 | 0 | 0 | 27.25 |
| W | 0 | 7 | 20.75 | 2.25 | 0 | 0 | 0 | 30 |
| WNW | 0 | 1.25 | 17.5 | 2 | 0 | 0 | 0 | 20.75 |
| NW | 0 | 3.5 | 13.25 | 0 | 0 | 0 | 0 | 16.75 |
| NNW | 0 | 3.75 | 9.25 | 0.25 | 0 | 0 | 0 | 13.25 |
| TOTAL | 6.5 | 54.75 | 190.75 | 60.25 | 10.5 | 0.5 | 0.25 | 323.5 |

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3rd QUARTER 2004

Total Hours Missing = 123.5

Total Hours = 2208

Stability Class A

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|--------|-------|-------|-----|-------|
| N | 0 | 1.75 | 12.5 | 3.75 | 0 | 0 | 0 | 18 |
| NNE | 0 | 2.5 | 9.75 | 9.75 | 2.25 | 0 | 0 | 24.25 |
| NE | 0 | 0.25 | 10.5 | 37.25 | 42.25 | 4.75 | 0 | 95 |
| ENE | 0 | 0.25 | 4.5 | 43.25 | 2 | 0 | 0 | 50 |
| E | 0 | 0.5 | 3.75 | 25.75 | 2.5 | 0 | 0 | 32.5 |
| ESE | 0 | 0.25 | 4 | 13.25 | 0 | 0 | 0 | 17.5 |
| SE | 0 | 0.5 | 3 | 9.5 | 0 | 0 | 0 | 13 |
| SSE | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 4 |
| S | 0 | 0.25 | 4.5 | 0.75 | 0 | 0 | 0 | 5.5 |
| SSW | 0 | 0.5 | 12.75 | 4 | 1.75 | 0 | 0 | 19 |
| SW | 0 | 0.75 | 8.25 | 6 | 6.75 | 0 | 0 | 21.75 |
| WSW | 0 | 0.5 | 3.25 | 2.25 | 0.25 | 0 | 0 | 6.25 |
| W | 0 | 0.25 | 3 | 0.75 | 0 | 0 | 0 | 4 |
| WNW | 0 | 1 | 9.5 | 4.75 | 0 | 0 | 0 | 15.25 |
| NW | 0 | 1.5 | 7.25 | 0 | 0 | 0 | 0 | 8.75 |
| NNW | 0 | 1.75 | 4.75 | 0.25 | 0 | 0 | 0 | 6.75 |
| TOTAL | 0 | 12.5 | 104.25 | 162.25 | 57.75 | 4.75 | 0 | 341.5 |

Stability Class B

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|-------|-------|-------|-----|-------|
| N | 0 | 0 | 3.75 | 3.25 | 0 | 0 | 0 | 7 |
| NNE | 0 | 0 | 5.75 | 2.75 | 0 | 0 | 0 | 8.5 |
| NE | 0 | 0 | 1.5 | 7.5 | 2.75 | 0 | 0 | 11.75 |
| ENE | 0 | 0 | 2.5 | 4 | 0 | 0 | 0 | 6.5 |
| E | 0 | 0 | 1 | 1.75 | 0 | 0 | 0 | 2.75 |
| ESE | 0 | 0 | 0.25 | 0.75 | 0 | 0 | 0 | 1 |
| SE | 0 | 0.25 | 1 | 2.5 | 0.75 | 0 | 0 | 4.5 |
| SSE | 0 | 0 | 1.5 | 0.75 | 0 | 0 | 0 | 2.25 |
| S | 0 | 0 | 1.25 | 0 | 0 | 0 | 0 | 1.25 |
| SSW | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0.25 |
| SW | 0 | 0 | 1.25 | 0.25 | 0 | 0 | 0 | 1.5 |
| WSW | 0 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0.25 |
| W | 0 | 0 | 1.5 | 0.25 | 0 | 0 | 0 | 1.75 |
| WNW | 0 | 0.5 | 5.25 | 3 | 0 | 0 | 0 | 8.75 |
| NW | 0 | 0.5 | 8.5 | 0 | 0 | 0 | 0 | 9 |
| NNW | 0 | 0.75 | 2 | 0 | 0 | 0 | 0 | 2.75 |
| TOTAL | 0 | 2.25 | 37.25 | 26.75 | 3.5 | 0 | 0 | 69.75 |

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Stability Class C

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|------|-------|-------|-----|-------|
| | CALM | | | | | | | |
| N | 0 | 0 | 2.75 | 0.25 | 0 | 0 | 0 | 3 |
| NNE | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| NE | 0 | 0 | 2.75 | 8 | 2.25 | 0 | 0 | 13 |
| ENE | 0 | 0 | 0 | 4.75 | 0.25 | 0 | 0 | 5 |
| E | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 3 |
| ESE | 0 | 0.25 | 0.75 | 1.25 | 0 | 0 | 0 | 2.25 |
| SE | 0 | 0 | 1.75 | 0.75 | 0.75 | 0 | 0 | 3.25 |
| SSE | 0 | 0 | 1.25 | 0.25 | 1.75 | 0 | 0 | 3.25 |
| S | 0 | 0 | 1 | 0.25 | 0 | 0 | 0 | 1.25 |
| SSW | 0 | 0 | 1.5 | 0.25 | 0 | 0 | 0 | 1.75 |
| SW | 0 | 0.25 | 0.25 | 0.5 | 0 | 0 | 0 | 1 |
| WSW | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0.25 |
| W | 0 | 0 | 0.5 | 0.75 | 0 | 0 | 0 | 1.25 |
| WNW | 0 | 0.25 | 7 | 1.5 | 0 | 0 | 0 | 8.75 |
| NW | 0 | 1 | 2.25 | 0 | 0 | 0 | 0 | 3.25 |
| NNW | 0 | 0.5 | 1.75 | 0 | 0 | 0 | 0 | 2.25 |
| TOTAL | 0 | 2.25 | 25.75 | 22.5 | 5 | 0 | 0 | 55.5 |

Stability Class D

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|-------|--------|-------|-------|-----|-------|
| | CALM | | | | | | | |
| N | 0 | 1.5 | 5.75 | 0.25 | 0 | 0 | 0 | 7.5 |
| NNE | 0 | 2 | 14.75 | 5 | 0 | 0 | 0 | 21.75 |
| NE | 0 | 1 | 13 | 25.5 | 16.25 | 0.25 | 0 | 56 |
| ENE | 0 | 0.25 | 3.5 | 31 | 2 | 0 | 0 | 36.75 |
| E | 0 | 0 | 2 | 12.25 | 0 | 0 | 0 | 14.25 |
| ESE | 0 | 0.25 | 12.5 | 10.25 | 0.25 | 0 | 0 | 23.25 |
| SE | 0 | 0.25 | 4.75 | 4.75 | 0.5 | 0 | 0 | 10.25 |
| SSE | 0 | 0 | 12.25 | 25.75 | 3.75 | 0 | 0 | 41.75 |
| S | 0 | 0 | 3.75 | 2 | 0 | 0 | 0 | 5.75 |
| SSW | 0 | 0.75 | 3.75 | 0.5 | 0 | 0 | 0 | 5 |
| SW | 0 | 1.25 | 2.5 | 1.25 | 0 | 0 | 0 | 5 |
| WSW | 0 | 0.5 | 2.25 | 0 | 0 | 0 | 0 | 2.75 |
| W | 0 | 1 | 3.25 | 2.25 | 0 | 0 | 0 | 6.5 |
| WNW | 0 | 2 | 9 | 5 | 0 | 0 | 0 | 16 |
| NW | 0 | 1.5 | 4.75 | 1.75 | 0 | 0 | 0 | 8 |
| NNW | 0 | 1.5 | 4.75 | 0.75 | 0 | 0 | 0 | 7 |
| TOTAL | 0 | 13.75 | 102.5 | 128.25 | 22.75 | 0.25 | 0 | 267.5 |

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Stability Class E

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|--------|--------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 2 | 3.5 | 0 | 0 | 0 | 0 | 5.5 |
| NNE | 0 | 3.75 | 6 | 4.5 | 0.25 | 0 | 0 | 14.5 |
| NE | 0 | 1.75 | 8.25 | 44.75 | 15.5 | 0.25 | 0 | 70.5 |
| ENE | 0 | 1 | 10 | 16.25 | 0 | 0 | 0 | 27.25 |
| E | 0 | 1.75 | 13 | 14.75 | 1.25 | 0 | 0 | 30.75 |
| ESE | 0 | 3.5 | 32.25 | 12 | 1 | 0 | 0 | 48.75 |
| SE | 0 | 6 | 53 | 17.25 | 4 | 0 | 0 | 80.25 |
| SSE | 0 | 3.5 | 46 | 43.25 | 4.75 | 0 | 0 | 97.5 |
| S | 0 | 2.5 | 7 | 2 | 0.25 | 0 | 0 | 11.75 |
| SSW | 0 | 1.25 | 13.25 | 1.5 | 0 | 0 | 0 | 16 |
| SW | 0 | 0 | 6 | 0.5 | 0 | 0 | 0 | 6.5 |
| WSW | 0 | 0.75 | 2.75 | 0.25 | 0.25 | 0 | 0 | 4 |
| W | 0 | 0.25 | 9.75 | 1 | 0 | 0 | 0 | 11 |
| WNW | 0 | 0 | 6.25 | 0.25 | 0 | 0 | 0 | 6.5 |
| NW | 0 | 0.5 | 4 | 0 | 0 | 0 | 0 | 4.5 |
| NNW | 0 | 0.75 | 1.75 | 0 | 0 | 0 | 0 | 2.5 |
| TOTAL | 0 | 29.25 | 222.75 | 158.25 | 27.25 | 0.25 | 0 | 437.75 |

Stability Class F

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|-------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 5.5 | 3 | 0 | 0 | 0 | 0 | 8.5 |
| NNE | 0 | 2.75 | 8.5 | 1 | 0 | 0 | 0 | 12.25 |
| NE | 0 | 2 | 17.75 | 4.75 | 0 | 0 | 0 | 24.5 |
| ENE | 0 | 2 | 11.5 | 14.75 | 0 | 0 | 0 | 28.25 |
| E | 0 | 2 | 10.25 | 0 | 0 | 0 | 0 | 12.25 |
| ESE | 0 | 2.75 | 31.75 | 9.5 | 0.75 | 0 | 0 | 44.75 |
| SE | 0 | 2.75 | 62.5 | 23.75 | 4.5 | 0 | 0 | 93.5 |
| SSE | 0 | 2.25 | 40 | 11.75 | 6 | 1.5 | 0 | 61.5 |
| S | 0 | 2 | 4.25 | 0.75 | 0 | 0 | 0 | 7 |
| SSW | 0 | 1.75 | 2.25 | 0 | 0 | 0 | 0 | 4 |
| SW | 0 | 0.5 | 4.25 | 0 | 0 | 0 | 0 | 4.75 |
| WSW | 0 | 0 | 1.5 | 0 | 0 | 0 | 0 | 1.5 |
| W | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0.25 |
| WNW | 0 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0.25 |
| NW | 0 | 0.75 | 0.5 | 0 | 0 | 0 | 0 | 1.25 |
| NNW | 0 | 0.75 | 0.5 | 0 | 0 | 0 | 0 | 1.25 |
| TOTAL | 0 | 28 | 198.75 | 66.25 | 11.25 | 1.5 | 0 | 305.75 |

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Stability Class G

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|-------|-------|-------|-------|-----|--------|
| N | 0.5 | 9.75 | 5 | 0 | 0 | 0.25 | 0 | 15.5 |
| NNE | 0 | 13.5 | 16 | 0.5 | 0 | 0 | 0 | 30 |
| NE | 0 | 13.25 | 29.5 | 2 | 0 | 0 | 0 | 44.75 |
| ENE | 0 | 7 | 19.25 | 3.25 | 0 | 0 | 0 | 29.5 |
| E | 0 | 6 | 17.75 | 0.5 | 0 | 0 | 0 | 24.25 |
| ESE | 0 | 11.5 | 51.5 | 4 | 0 | 0 | 0 | 67 |
| SE | 0 | 27 | 86 | 50 | 3.25 | 0 | 0 | 166.25 |
| SSE | 0 | 18.5 | 42.5 | 27.25 | 6.5 | 0 | 0 | 94.75 |
| S | 0.25 | 13 | 8 | 0 | 0 | 0 | 0 | 21.25 |
| SSW | 0 | 13 | 5 | 0.25 | 0 | 0 | 0 | 18.25 |
| SW | 0.25 | 11 | 5 | 0 | 0 | 0 | 0 | 16.25 |
| WSW | 0.25 | 7.25 | 4.75 | 0 | 0 | 0 | 0 | 12.25 |
| W | 0 | 9 | 2.5 | 0 | 0 | 0 | 0 | 11.5 |
| WNW | 0.5 | 9.75 | 1.25 | 0 | 0 | 0 | 0 | 11.5 |
| NW | 4 | 14.75 | 7 | 0 | 0 | 0 | 0 | 25.75 |
| NNW | 1.25 | 13.25 | 3.5 | 0 | 0 | 0 | 0 | 18 |
| TOTAL | 7 | 197.5 | 304.5 | 87.75 | 9.75 | 0.25 | 0 | 606.75 |

4th QUARTER 2004

Total Hours Missing = 37.00

Total Hours = 2208

Stability Class A

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|-------|-------|-------|------|-------|
| N | 0 | 0.75 | 13 | 8.25 | 8.5 | 4.25 | 0 | 34.75 |
| NNE | 0 | 0 | 6 | 16.25 | 5.5 | 0 | 0 | 27.75 |
| NE | 0 | 0 | 0.75 | 7.25 | 11 | 0.75 | 0 | 19.75 |
| ENE | 0 | 0.75 | 2.5 | 10 | 31.5 | 7.5 | 0 | 52.25 |
| E | 0 | 0.25 | 3.75 | 5 | 36.5 | 16.25 | 0 | 61.75 |
| ESE | 0 | 0.25 | 4.5 | 10 | 12.75 | 8.25 | 0 | 35.75 |
| SE | 0 | 0 | 3 | 5.75 | 24.75 | 11 | 0.75 | 45.25 |
| SSE | 0 | 0 | 16.5 | 10.75 | 7.25 | 8.75 | 6.75 | 50 |
| S | 0 | 0.75 | 11.5 | 2 | 0.5 | 1.5 | 0 | 16.25 |
| SSW | 0 | 0.75 | 6.5 | 11.75 | 6 | 0 | 0 | 25 |
| SW | 0 | 2.25 | 6.75 | 6.75 | 2.5 | 0.75 | 0 | 19 |
| WSW | 0 | 1.75 | 5.75 | 9.75 | 5.5 | 0 | 0 | 22.75 |
| W | 0 | 1.5 | 7 | 19.5 | 12.5 | 1.5 | 0 | 42 |
| WNW | 0 | 0.5 | 11.5 | 23.5 | 12.5 | 0.75 | 0 | 48.75 |
| NW | 0 | 0 | 16 | 8.75 | 5 | 0.5 | 0 | 30.25 |
| NNW | 0 | 1 | 15.75 | 8.75 | 8.75 | 2 | 0 | 36.25 |
| TOTAL | 0 | 10.5 | 130.75 | 164 | 191 | 63.75 | 7.5 | 567.5 |

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Stability Class B

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 0 | 0.5 | 0.25 | 0.25 | 1.75 | 0 | 2.75 |
| NNE | 0 | 0 | 2.25 | 2.5 | 1.5 | 0 | 0 | 6.25 |
| NE | 0 | 0 | 1.75 | 0.75 | 0.75 | 0.75 | 0 | 4 |
| ENE | 0 | 0.25 | 1.75 | 4 | 1.5 | 0 | 0 | 7.5 |
| E | 0 | 0.25 | 0.25 | 0 | 5 | 4 | 0 | 9.5 |
| ESE | 0 | 0 | 0 | 1.75 | 0 | 0 | 0 | 1.75 |
| SE | 0 | 0.25 | 1 | 3.75 | 2.25 | 0 | 0 | 7.25 |
| SSE | 0 | 0 | 9.25 | 4.5 | 2.25 | 0 | 1 | 17 |
| S | 0 | 0 | 2.25 | 2.75 | 0.25 | 0 | 0 | 5.25 |
| SSW | 0 | 0 | 1.25 | 5.5 | 1.75 | 0 | 0 | 8.5 |
| SW | 0 | 0.25 | 1.25 | 4.5 | 1.75 | 0 | 0 | 7.75 |
| WSW | 0 | 0.25 | 1.75 | 4.25 | 0.25 | 0 | 0 | 6.5 |
| W | 0 | 0 | 2.5 | 7.75 | 4.75 | 0.25 | 0 | 15.25 |
| WNW | 0 | 0 | 2.25 | 8.75 | 2 | 0 | 0 | 13 |
| NW | 0 | 0.25 | 5 | 3.5 | 1.25 | 0 | 0 | 10 |
| NNW | 0 | 0 | 0.75 | 2 | 9.25 | 1.5 | 0 | 13.5 |
| TOTAL | 0 | 1.5 | 33.75 | 56.5 | 34.75 | 8.25 | 1 | 135.75 |

Stability Class C

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|------|-------|-------|-------|------|--------|
| | CALM | | | | | | | |
| N | 0 | 0 | 0 | 1.25 | 1.25 | 0 | 0 | 2.5 |
| NNE | 0 | 0 | 1.5 | 4.75 | 1 | 0 | 0 | 7.25 |
| NE | 0 | 0 | 1 | 1.75 | 0.5 | 0.5 | 0 | 3.75 |
| ENE | 0 | 0 | 1.25 | 3 | 2 | 0 | 0 | 6.25 |
| E | 0 | 0 | 0.5 | 5.75 | 4 | 1.5 | 0 | 11.75 |
| ESE | 0 | 0 | 0.25 | 1.5 | 1.25 | 0 | 0 | 3 |
| SE | 0 | 0 | 2 | 5.75 | 3.25 | 0 | 0 | 11 |
| SSE | 0 | 0 | 9.5 | 4.5 | 1.25 | 0 | 1.25 | 16.5 |
| S | 0 | 0.25 | 1.25 | 3.25 | 0.5 | 0 | 0 | 5.25 |
| SSW | 0 | 0 | 3.75 | 7 | 1.5 | 0 | 0 | 12.25 |
| SW | 0 | 0 | 0.75 | 5 | 1.5 | 0 | 0 | 7.25 |
| WSW | 0 | 0.5 | 0.5 | 6 | 2.5 | 0.25 | 0 | 9.75 |
| W | 0 | 0 | 2.5 | 3.5 | 2.5 | 0 | 0 | 8.5 |
| WNW | 0 | 0 | 3.25 | 5.25 | 0.5 | 0 | 0 | 9 |
| NW | 0 | 0.5 | 4 | 0.5 | 0.5 | 0.5 | 0 | 6 |
| NNW | 0 | 0.5 | 1 | 4.5 | 5.25 | 0 | 0 | 11.25 |
| TOTAL | 0 | 1.75 | 33 | 63.25 | 29.25 | 2.75 | 1.25 | 131.25 |

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Stability Class D

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|--------|-------|-------|-----|-------|
| N | 0 | 1.25 | 7.25 | 15.5 | 5 | 0 | 0 | 29 |
| NNE | 0 | 0.5 | 5 | 20.75 | 9.25 | 0 | 0 | 35.5 |
| NE | 0 | 0 | 12.25 | 1.75 | 2.5 | 1 | 0 | 17.5 |
| ENE | 0 | 0.25 | 10 | 11.75 | 7.75 | 0 | 0 | 29.75 |
| E | 0 | 1 | 1.75 | 9.25 | 11 | 1.75 | 0 | 24.75 |
| ESE | 0.25 | 1 | 4.75 | 7.25 | 5.25 | 1 | 0 | 19.5 |
| SE | 0 | 0.25 | 10.25 | 14 | 3.75 | 1.25 | 0 | 29.5 |
| SSE | 0 | 0.25 | 23.25 | 24.5 | 2.5 | 2.75 | 0.5 | 53.75 |
| S | 0 | 0.5 | 9.25 | 7.5 | 0 | 0 | 0 | 17.25 |
| SSW | 0 | 0 | 11 | 10.5 | 0.25 | 0 | 0 | 21.75 |
| SW | 0 | 0.25 | 12.25 | 8 | 9.75 | 0 | 0 | 30.25 |
| WSW | 0 | 0 | 5 | 10.25 | 6 | 1 | 0 | 22.25 |
| W | 0 | 0.75 | 11.5 | 12.75 | 10.25 | 0.5 | 0 | 35.75 |
| WNW | 0 | 1 | 19.5 | 27.5 | 1 | 0 | 0 | 49 |
| NW | 0 | 0.25 | 13.75 | 15.25 | 9.75 | 0 | 0 | 39 |
| NNW | 0 | 0.5 | 5.5 | 15.75 | 1.75 | 0 | 0 | 23.5 |
| TOTAL | 0.25 | 7.75 | 162.25 | 212.25 | 85.75 | 9.25 | 0.5 | 478 |

Stability Class E

| Wind Direction | CALM | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|-------|-------|-------|-------|-----|--------|
| N | 0.25 | 2.5 | 6.5 | 7.25 | 0 | 0 | 0 | 16.5 |
| NNE | 0 | 1 | 4.25 | 15.75 | 1.5 | 0 | 0 | 22.5 |
| NE | 0 | 3.25 | 15.25 | 6 | 1 | 0 | 0 | 25.5 |
| ENE | 0 | 4.75 | 8.5 | 7.5 | 1 | 0 | 0 | 21.75 |
| E | 0.25 | 2 | 4.75 | 1.25 | 0.5 | 0 | 0 | 8.75 |
| ESE | 0 | 3.75 | 1.25 | 1 | 0 | 0 | 0 | 6 |
| SE | 0.25 | 1 | 22.25 | 10.5 | 0 | 0 | 0 | 34 |
| SSE | 0 | 2.75 | 25.75 | 21.5 | 3.5 | 2.25 | 0 | 55.75 |
| S | 0 | 1.75 | 6.5 | 9.5 | 1.5 | 2.5 | 0 | 21.75 |
| SSW | 0 | 5.75 | 27.5 | 11 | 1.5 | 0 | 0 | 45.75 |
| SW | 0 | 4.25 | 10.5 | 12 | 8.25 | 0.75 | 0 | 35.75 |
| WSW | 0 | 3.5 | 8.25 | 4 | 4.25 | 1.25 | 0 | 21.25 |
| W | 0 | 1.25 | 6 | 7 | 5.25 | 0 | 0 | 19.5 |
| WNW | 0 | 0.25 | 14.5 | 1.25 | 0 | 0 | 0 | 16 |
| NW | 0 | 3 | 17.25 | 11.75 | 0 | 0 | 0 | 32 |
| NNW | 0 | 4.25 | 13.5 | 4.25 | 0 | 0 | 0 | 22 |
| TOTAL | 0.75 | 45 | 192.5 | 131.5 | 28.25 | 6.75 | 0 | 404.75 |

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Stability Class F

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|-------|--------|------|-------|-------|-----|--------|
| | CALM | | | | | | | |
| N | 0 | 2.5 | 5 | 0.5 | 0 | 0 | 0 | 8 |
| NNE | 0 | 3 | 6.5 | 0.25 | 0 | 0 | 0 | 9.75 |
| NE | 0 | 1.25 | 8.5 | 1 | 0 | 0 | 0 | 10.75 |
| ENE | 0 | 2 | 6.5 | 0 | 0 | 0 | 0 | 8.5 |
| E | 0 | 2.25 | 4 | 0 | 0 | 0 | 0 | 6.25 |
| ESE | 0 | 2.75 | 0.75 | 0 | 0 | 0 | 0 | 3.5 |
| SE | 0 | 3.75 | 7.5 | 3.25 | 0 | 0 | 0 | 14.5 |
| SSE | 0 | 4.25 | 12.25 | 5.75 | 0 | 0 | 0 | 22.25 |
| S | 0 | 2.25 | 9 | 1 | 0 | 0 | 0 | 12.25 |
| SSW | 0 | 2.5 | 7.25 | 3.5 | 0 | 0 | 0 | 13.25 |
| SW | 0 | 0.75 | 10.25 | 1.25 | 2.25 | 0 | 0 | 14.5 |
| WSW | 0 | 1.75 | 8.75 | 4 | 0 | 0 | 0 | 14.5 |
| W | 0 | 2 | 7 | 6.75 | 0 | 0 | 0 | 15.75 |
| WNW | 0 | 1.5 | 17 | 1 | 0 | 0 | 0 | 19.5 |
| NW | 0 | 6 | 5.75 | 0 | 0 | 0 | 0 | 11.75 |
| NNW | 0 | 4.25 | 4.75 | 1.25 | 0 | 0 | 0 | 10.25 |
| TOTAL | 0 | 42.75 | 120.75 | 29.5 | 2.25 | 0 | 0 | 195.25 |

Stability Class G

| Wind Direction | | 1-3 | 4-7 | 8-12 | 13-18 | 19-24 | >24 | TOTAL |
|----------------|------|------|--------|-------|-------|-------|-----|-------|
| | CALM | | | | | | | |
| N | 0 | 1 | 8.5 | 0 | 0 | 0 | 0 | 9.5 |
| NNE | 0 | 5 | 23 | 0 | 0 | 0 | 0 | 28 |
| NE | 0 | 2.5 | 30.75 | 0 | 0 | 0 | 0 | 33.25 |
| ENE | 0 | 2.25 | 21.25 | 0 | 0 | 0 | 0 | 23.5 |
| E | 0 | 1.25 | 1.25 | 0 | 0 | 0 | 0 | 2.5 |
| ESE | 0 | 1.5 | 1.5 | 0.75 | 0 | 0 | 0 | 3.75 |
| SE | 0 | 4 | 5.75 | 8.5 | 0 | 0 | 0 | 18.25 |
| SSE | 0 | 8 | 7.25 | 0.5 | 3.25 | 0 | 0 | 19 |
| S | 0 | 5.5 | 5 | 0 | 0 | 0 | 0 | 10.5 |
| SSW | 0 | 4.5 | 7.25 | 1.25 | 0 | 0 | 0 | 13 |
| SW | 0 | 5.75 | 8 | 3 | 0.75 | 0 | 0 | 17.5 |
| WSW | 0 | 5.75 | 11 | 0 | 0 | 0 | 0 | 16.75 |
| W | 0 | 6.25 | 11 | 0 | 0 | 0 | 0 | 17.25 |
| WNW | 0 | 10 | 4.75 | 0 | 0 | 0 | 0 | 14.75 |
| NW | 0 | 10 | 6.25 | 0 | 0 | 0 | 0 | 16.25 |
| NNW | 0 | 7.25 | 6.25 | 1.25 | 0 | 0 | 0 | 14.75 |
| TOTAL | 0 | 80.5 | 158.75 | 15.25 | 4 | 0 | 0 | 258.5 |