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March 2, 1987

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Docket 50-305
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Kewaunee Nuclear Power Plant
Semiannual Effluent Release Report July-December 1986

Enclosed please find a copy of the Kewaunee Nuclear Power Plant Semiannual Effluent Release Report for July through December 1986, submitted per Technical Specification 6.9.3.b.

Sincerely,

D. C. Hintz
Vice President - Nuclear Power

LAS/jms

Enc.

cc - Mr. Robert Nelson, US NRC
US NRC, Region III

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KEWAUNEE NUCLEAR POWER PLANT

SEMIANNUAL

EFFLUENT RELEASE REPORT

JULY - DECEMBER 1986

WISCONSIN PUBLIC SERVICE CORPORATION
GREEN BAY, WISCONSIN
FEBRUARY 1987

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TABLE OF CONTENTS

1.0 INTRODUCTION

This report is being submitted in accordance with the requirements of Kewaunee Technical Specifications, Section 6.9.3.b. It includes data from all effluent releases made from July through December 1986. 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.

1.1 Technical Specification 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) is used in conjunction with Section 7 of the Technical Specifications. The 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 8.4 of the Kewaunee Technical Specifications, are:

Analysis	LLD (uCi/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

2.2 Gaseous Batch Release Statistics

The following is a summation of all gaseous batch releases made during the second half of 1986.

Number of batch releases 10

Total time for all batch releases (Sec) . . 2.52 E+5

Maximum time for one batch release (Sec) . . 4.62 E+4

Average time for a batch release (Sec) . . . 2.52 E+4

Minimum time for a batch release (Sec) . . . 1.35 E+3

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 for the 3rd and 4th quarters, and the calculated doses this year from gaseous effluents.

TABLE 2.1
Semiannual Effluent Report 1986
Gaseous Effluents-Summation of all Releases

	3rd Quarter	4th Quarter
Fission and Activation Gases		
Total Activity Released (Ci)	<2.167 E+1	<2.581 E+1
Average Release Rate (uCi/Sec)	<2.73 E+0	<3.25 E+0
Iodines		
Total Activity Released (Ci)	1.85 E-6	-
Average Release Rate (uCi/Sec)	2.33 E-7	-
Particulates		
Total Activity Released (Ci)	<1.45 E-3	<8.49 E-4
Average Release Rate (uCi/Sec)	<1.82 E-4	<1.07 E-4
Gross Alpha Released (Ci)	<2.95 E-4	<1.80 E-4
Tritium		
Total Activity Released (Ci)	<3.20 E+0	4.40 E+1
Average Release Rate (uCi/Sec)	<4.03 E-1	5.53 E+0

TABLE 2.2
Semiannual Effluent Report 1986
Gaseous Effluents-Elevated Release

Nuclides Released (Ci)	Continuous Mode		Batch Mode	
	3rd Qtr	4th Qtr	3rd Qtr	4th Qtr
Fission Gases				
Ar-41	4.42 E+0	-	8.76 E-1	-
Kr-85	5.73 E+0	1.535 E+1	-	-
Unidentified	≤1.064 E+1	≤1.05 E+1	≤7.39 E-3	≤7.42 E-3
Total for Period	≤2.079 E+1	≤2.58 E+1	≤8.83 E-1	≤7.42 E-3
Iodines				
I-131	-	-	-	-
I-132	-	-	-	-
I-133	1.85 E-6	-	-	-
Total for Period	1.85 E-6	-	-	-
Particulates				
Mn-54	2.77 E-6	-	-	-
Fe-55	-	-	-	-
Co-58	1.44 E-7	1.38 E-7	-	-
Co-60	1.48 E-6	4.00 E-6	-	-
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	2.40 E-6	3.47 E-6	-	1.42 E-7
Unidentified	≤7.16 E-6	≤6.60 E-6	1.44 E-3	8.35 E-4
Total for Period	≤1.40 E-5	≤1.42 E-5	1.44 E-3	8.35 E-4

TABLE 2.3A
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Total of all Releases

Noble Gases (Curies)

Isotope	July	August	September	Total
Ar-41	-	-	5.30 E+0	5.30 E+0
Kr-85	-	5.73 E+0	-	5.73 E+0
Unidentified	≤3.27 E+0	≤3.93 E+0	≤3.44 E+0	≤1.064 E+1
Total	≤3.27 E+0	≤9.66 E+0	≤8.74 E+0	≤2.167 E+1

Particulates (Curies)

Isotope	July	August	September	Total
Mn-54	-	-	2.77 E-6	2.77 E-6
Fe-55	-	-	-	-
Co-58	-	1.44 E-7	-	1.44 E-7
Co-60	-	-	1.48 E-6	1.48 E-6
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	3.48 E-7	1.79 E-6	2.58 E-7	2.40 E-6
Unidentified	≤5.87 E-4	≤5.08 E-4	≤3.47 E-4	≤1.44 E-3
Total	≤5.88 E-4	≤5.10 E-4	≤3.52 E-4	≤1.45 E-3

Halogens (Curies)

Isotope	July	August	September	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	9.16 E-7	-	9.31 E-7	1.85 E-6
Total	9.16 E-7	-	9.31 E-7	1.85 E-6

TABLE 2.3A (con't)
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Total of all Releases

Summary

	July	August	September	Total
Total Noble Gases (Ci)	≤3.27 E+0	≤9.66 E+0	≤8.74 E+0	≤2.167 E+1
Total Halogens (Ci)	9.16 E-7	-	9.31 E-7	1.85 E-6
Total Particulate Gross Beta-Gamma (Ci)	≤5.88 E-4	≤5.10 E-4	≤3.52 E-4	≤1.45 E-3
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	3.48 E-7	1.93 E-6	4.51 E-6	6.79 E-6
Total Tritium (Ci)	≤2.73 E-1	2.64 E+0	2.85 E-1	≤3.20 E+0
Total Particulate Gross Alpha (Ci)	≤1.18 E-4	≤1.07 E-4	≤6.97 E-5	≤2.95 E-4
Maximum Noble Gas Release Rate (uCi/Sec)	≤3.19 E+0	≤6.67 E+1	3.80 E+2	-

TABLE 2.3A (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Total of all Releases

Noble Gases (Curies)

Isotope	October	November	December	Total
Ar-41	-	-	-	-
Kr-85	1.535 E+1	-	-	1.535 E+1
Unidentified	<4.85 E+0	<3.37 E+0	<2.24 E+0	<1.046 E+1
Total	<2.02 E+1	<3.37 E+0	<2.24 E+0	<2.581 E+1

Particulates (Curies)

Isotope	October	November	December	Total
Mn-54	-	-	-	-
Fe-55	-	-	-	-
Co-58	-	-	1.38 E-7	1.38 E-7
Co-60	4.00 E-6	-	-	4.00 E-6
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	2.15 E-6	1.05 E-6	4.17 E-7	3.47 E-6
Unidentified	<4.05 E-4	<2.00 E-4	<2.37 E-4	<8.41 E-4
Total	<4.11 E-4	<2.00 E-4	<2.38 E-4	<8.49 E-4

Halogens (Curies)

Isotope	October	November	December	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	-	-	-	-
Total	-	-	-	-

TABLE 2.3A (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Total of all Releases

Summary

	October	November	December	Total
Total Noble Gases (Ci)	≤2.02 E+1	≤3.37 E+0	≤2.24 E+0	≤2.581 E+1
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	≤4.11 E-4	≤2.00 E-4	≤2.38 E-4	≤8.49 E-4
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	6.15 E-6	1.05 E-6	5.55 E-7	7.76 E-6
Total Tritium (Ci)	≤4.91 E+0	≤3.67 E+0	3.53 E+1	4.40 E+1
Total Particulate Gross Alpha (Ci)	≤8.67 E-5	≤4.45 E-5	≤4.81 E-5	≤1.80 E-4
Maximum Noble Gas Release Rate (uCi/Sec)	≤1.78 E+2	≤2.24 E+0	≤1.88 E+0	-

TABLE 2.3B
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Continuous Mode Only

Noble Gases (Curies)

Isotope	July	August	September	Total
Ar-41	-	-	4.42 E+0	4.42 E+0
Kr-85	-	5.73 E+0	-	5.73 E+0
Unidentified	<3.27 E+0	<3.93 E+0	<3.44 E+0	<1.064 E+1
Total	≤3.27 E+0	≤9.66 E+0	≤7.86 E+0	≤2.079 E+1

Particulates (Curies)

Isotope	July	August	September	Total
Mn-54	-	-	2.77 E-6	2.77 E-6
Fe-55	-	-	-	-
Co-58	-	1.44 E-7	-	1.44 E-7
Co-60	-	-	1.48 E-6	1.48 E-6
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	3.48 E-7	1.79 E-6	2.58 E-7	2.40 E-6
Unidentified	<3.47 E-6	<1.60 E-6	<2.09 E-6	<7.16 E-6
Total	≤3.82 E-6	≤3.53 E-6	≤6.60 E-6	≤1.40 E-5

Halogens (Curies)

Isotope	July	August	September	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	9.16 E-7	-	9.31 E-7	1.85 E-6
Total	9.16 E-7	-	9.31 E-7	1.85 E-6

TABLE 2.3B (con't)
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Continuous Mode Only

Summary

	July	August	September	Total
Total Noble Gases (Ci)	≤3.27 E+0	≤9.66 E+0	≤7.86 E+0	≤2.079 E+1
Total Halogens (Ci)	9.16 E-7	-	9.31 E-7	1.85 E-6
Total Particulate Gross Beta-Gamma (Ci)	≤3.82 E-6	≤3.53 E-6	≤6.60 E-6	≤1.40 E-5
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	3.48 E-7	1.93 E-6	4.51 E-6	6.79 E-6
Total Tritium (Ci)	≤2.66 E-1	2.63 E+0	2.81 E-1	≤3.18 E+0
Total Particulate Gross Alpha (Ci)	≤1.69 E-6	≤1.17 E-6	≤1.10 E-6	≤3.96 E-6
Maximum Noble Gas Release Rate (uCi/Sec)	≤2.93 E+0	6.64 E+1	3.21 E+1	-

TABLE 2.3B (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Continuous Mode Only

Noble Gases (Curies)

Isotope	October	November	December	Total
Ar-41	-	-	-	-
Kr-85	1.535 E+1	-	-	1.535 E+1
Unidentified	<4.85 E+0	<3.37 E+0	<2.24 E+0	<1.05 E+1
Total	<2.02 E+1	<3.37 E+0	<2.24 E+0	<2.58 E+1

Particulates (Curies)

Isotope	October	November	December	Total
Mn-54	-	-	-	-
Fe-55	-	-	-	-
Co-58	-	-	1.38 E-7	1.38 E-7
Co-60	4.00 E-6	-	-	4.00 E-6
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	2.15 E-6	9.07 E-7	4.17 E-7	3.47 E-6
Unidentified	<3.09 E-6	<1.76 E-6	<1.75 E-6	<6.60 E-6
Total	<9.24 E-6	<2.67 E-6	<2.31 E-6	<1.42 E-5

Halogens (Curies)

Isotope	October	November	December	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	-	-	-	-
Total	-	-	-	-

TABLE 2.3B (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Continuous Mode Only

Summary

	October	November	December	Total
Total Noble Gases (Ci)	≤2.02 E+1	≤3.37 E+0	≤2.24 E+0	≤2.58 E+1
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	≤9.24 E-6	≤2.67 E-6	≤2.31 E-6	≤1.42 E-5
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	6.15 E-6	9.07 E-7	5.55 E-7	7.61 E-6
Total Tritium (Ci)	4.90 E+0	3.66 E+0	3.53 E+1	4.39 E+1
Total Particulate Gross Alpha (Ci)	≤1.88 E-6	≤1.00 E-6	≤8.63 E-7	≤3.74 E-6
Maximum Noble Gas Release Rate (uCi/Sec)	1.78 E+2	1.97 E+0	1.59 E+0	-

TABLE 2.3C
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Batch Mode Only

Noble Gases (Curies)

Isotope	July	August	September	Total
Ar-41	-	-	8.76 E-1	8.76 E-1
Kr-85	-	-	-	-
Unidentified	<2.57 E-3	<2.61 E-3	<2.21 E-3	<7.39 E-3
Total	<2.57 E-3	<2.61 E-3	<8.78 E-1	<8.83 E-1

Particulates (Curies)

Isotope	July	August	September	Total
Mn-54	-	-	-	-
Fe-55	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	-	-	-	-
Unidentified	5.84 E-4	5.06 E-4	3.45 E-4	1.44 E-3
Total	5.84 E-4	5.06 E-4	3.45 E-4	1.44 E-3

Halogens (Curies)

Isotope	July	August	September	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	-	-	-	-
Total	-	-	-	-

TABLE 2.3C (con't)
Semiannual Effluent Report 1986
3rd Quarter Gaseous Release
Batch Mode Only

Summary

	July	August	September	Total
Total Noble Gases (Ci)	≤2.57 E-3	≤2.61 E-3	≤8.78 E-1	≤8.83 E-1
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	5.84 E-4	5.06 E-4	3.45 E-4	1.44 E-3
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	-	-	-	-
Total Tritium (Ci)	≤7.11 E-3	8.12 E-3	4.01 E-3	≤1.92 E-2
Total Particulate Gross Alpha (Ci)	1.16 E-4	1.06 E-4	6.86 E-5	2.91 E-4
Maximum Noble Gas Release Rate (uCi/Sec)	≤2.61 E-1	≤3.02 E-1	3.48 E+2	-

TABLE 2.3C (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Batch Mode Only

Noble Gases (Curies)

Isotope	October	November	December	Total
Ar-41	-	-	-	-
Kr-85	-	-	-	-
Unidentified	<2.18 E-3	<2.70 E-3	<2.54 E-3	<7.42 E-3
Total	<2.18 E-3	<2.70 E-3	<2.54 E-3	<7.42 E-3

Particulates (Curies)

Isotope	October	November	December	Total
Mn-54	-	-	-	-
Fe-55	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Cs-137	-	1.42 E-7	-	1.42 E-7
Unidentified	4.02 E-4	1.97 E-4	2.36 E-4	8.35 E-4
Total	4.02 E-4	1.97 E-4	2.36 E-4	8.35 E-4

Halogens (Curies)

Isotope	October	November	December	Total
I-131	-	-	-	-
I-132	-	-	-	-
I-133	-	-	-	-
Total	-	-	-	-

TABLE 2.3C (con't)
Semiannual Effluent Report 1986
4th Quarter Gaseous Release
Batch Mode Only

Summary

	October	November	December	Total
Total Noble Gases (Ci)	≤2.18 E-3	≤2.70 E-3	≤2.54 E-3	≤7.42 E-3
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	4.02 E-4	1.97 E-4	2.36 E-4	8.35 E-4
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	-	1.42 E-7	-	1.42 E-7
Total Tritium (Ci)	≤5.89 E-3	≤1.13 E-2	4.04 E-2	≤5.76 E-2
Total Particulate Gross Alpha (Ci)	8.48 E-5	4.35 E-5	4.72 E-5	1.76 E-4
Maximum Noble Gas Release Rate (uCi/Sec)	≤2.52 E-1	≤2.70 E-1	≤2.90 E-1	-

TABLE 2.4
Semiannual Effluent Report 1986
Dose From Gaseous Effluents

The offsite dose limits from radioactive materials in gaseous effluents are specified in Section 7 of the Kewaunee Technical Specifications and can be summarized as follows:

	Whole Body Gamma	Skin Beta	Organ
Quarterly	5 mRad	10 mRad	7.5 mRem
Annual	10 mRad	20 mRad	15.0 mRem

The total release of gaseous effluents during the second six months of 1986 was well within Technical Specification 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 Technical Specification limits are shown below:

	3rd Qtr	4th Qtr
1. Gamma-Whole Body		
Specification (mRads)	5.00 E+0	5.00 E+0
Actual Dose (mRads)	1.20 E-1	6.44 E-4
% of Specification	2.40 E+0	1.28 E-2
2. Beta-Skin		
Specification (mRads)	1.00 E+1	1.00 E+1
Actual Dose (mRads)	6.96 E-2	7.30 E-2
% of Specification	6.96 E-1	7.30 E-1
3. Ingestion Pathways-Organ		
Specification (mRem)	7.50 E+0	7.50 E+0
Actual Dose (mRem)	6.90 E-4	5.38 E-3
% of Specification	9.20 E-3	7.17 E-2

In addition, the cumulative annual offsite doses through the end of December versus the annual Technical Specification limits were:

	Annual
1. Gamma-Whole Body	
Specification (mRads)	1.00 E+1
Actual Dose (mRads)	1.22 E-1
% of Specification	1.22 E+0
2. Beta-Skin	
Specification (mRads)	2.00 E+1
Actual Dose (mRads)	1.44 E-1
% of Specification	7.20 E-1
3. Ingestion Pathways-Organ	
Specification (mRem)	1.50 E+1
Actual Dose (mRem)	1.34 E-2
% of Specification	8.93 E-2

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 for Gross Alpha, Strontium 89, Strontium 90 and Iron 55.

The LLD's for liquid batch release radioanalyses, as listed in Table 8.3 of the Kewaunee Technical Specifications, are:

Analysis	LLD (uCi/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

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 8.3 of the Kewaunee Technical Specifications, are:

Analysis	LLD (uCi/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

NOTE: Table 3.3A for the month of September includes the activity data resulting from the S/G Moisture Carryover Test.

3.2 Liquid Batch Release Statistics

The following is a summation of all liquid batch releases made during the second half of 1986.

Number of batch releases and gallonage:

Laundry	102	90,494.8 Gal.
Boron Recycle	16	89,345.7 Gal.
Miscellaneous Sources	20	183,452.6 Gal.

Total time for all batch releases . . . . 15,126 Min.

Maximum time for one batch release . . . . 780 Min.

Minimum time for one batch release . . . . . 18 Min.

Average time for a batch release . . . . 109.6 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 Effluent Report 1986
Liquid Effluents - Summation of all Releases

	3rd Qtr	4th Qtr	Total
Fission and Activation Products			
Total Release (Excluding H3 and Dissolved Gases) (Ci)	1.24 E-1	5.19 E-2	1.76 E-1
Average Concentration (uCi/ml)	2.72 E-9	5.17 E-9	
Tritium			
Total Release (Ci)	1.04 E+2	1.08 E+2	2.12 E+2
Average Concentration (uCi/ml)	1.03 E-5	1.08 E-5	
Percent of Tech Spec Limit (3.0 E-3 uCi/ml) (%)	3.43 E-1	3.60 E-1	
Dissolved Gases			
Total Release (Ci)	5.06 E-5	-0-	5.06 E-5
Average Concentration (uCi/ml)	5.02 E-12	-0-	
Percent of Tech Spec Limit (2.0 E-4 uCi/ml) (%)	2.51 E-6	-0-	
Gross Alpha Activity			
Total Release (Ci)	<8.96 E-3	<6.55 E-3	<1.55 E-2
Volume of Waste Released (Batch Releases)			
(Liters)	6.67 E+5	7.08 E+5	1.38 E+6
Volume of Dilution Water (Batch Releases)			
(Liters)	1.01 E+10	1.00 E+10	2.01 E+10

TABLE 3.2A
Semiannual Effluent Report 1986
Liquid Effluents - Batch Releases

Liquid Releases	July	August	September
Gross Radioactivity			
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	8.02 E-3	1.20 E-2	2.60 E-3
Average Concentration (uCi/ml)	3.41 E-9	2.53 E-9	8.70 E-10
Tritium			
Total Release (Ci)	6.82 E+0	6.97 E+1	2.79 E+1
Average Concentration (uCi/ml)	2.90 E-6	1.47 E-5	9.33 E-6
Dissolved Noble Gases			
Total Release (Ci)	5.06 E-5	-0-	-0-
Average Concentration (uCi/ml)	2.15 E-11	-0-	-0-
Gross Alpha Activity			
Total Release (Ci)	$\leq$5.22 E-5	$\leq$6.54 E-5	$\leq$3.77 E-5
Average Concentration (uCi/ml)	$\leq$2.22 E-11	$\leq$1.38 E-11	$\leq$1.26 E-11
Volume of Waste Released			
(Liters)	2.00 E+5	2.92 E+5	1.75 E+5
Volume of Dilution Water			
(Liters)	2.35 E+9	4.74 E+9	2.99 E+9

TABLE 3.2A (con't)
Semiannual Effluent Report 1986
Liquid Effluents - Batch Releases

Isotopes Released (Curies)	July	August	September
Sr-89	-0-	-0-	-0-
Sr-90	-0-	-0-	-0-
Fe-55	1.36 E-3	4.61 E-3	1.09 E-3
Co-60	2.33 E-3	1.58 E-3	5.01 E-4
Co-58	3.00 E-3	2.35 E-3	7.94 E-4
Mn-54	5.75 E-5	3.31 E-5	4.59 E-6
Co-57	-0-	-0-	-0-
Ag-110m	2.62 E-4	3.15 E-3	9.08 E-5
Sb-124	9.84 E-5	-0-	-0-
La-140	-0-	-0-	-0-
Cs-137	4.13 E-4	7.55 E-5	1.15 E-6
Sn-113	-0-	-0-	5.17 E-5
Nb-95	1.49 E-4	-0-	-0-
Zr-95	4.05 E-5	-0-	-0-
Sb-125	2.57 E-4	1.35 E-4	7.05 E-5
Xe-133	5.06 E-5	-0-	-0-
I-132	-0-	3.44 E-5	-0-
I-134	-0-	-0-	-0-
I-133	-0-	-0-	-0-

TABLE 3.2B
Semiannual Effluent Report 1986
Liquid Effluents - Batch Releases

Liquid Releases	October	November	December	Total
Gross Radioactivity				
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	4.25 E-2	4.63 E-3	4.65 E-3	7.44 E-2
Average Concentration (uCi/ml)	6.69 E-9	2.39 E-9	2.69 E-9	
Tritium				
Total Release (Ci)	5.95 E+1	4.00 E+1	8.20 E+0	2.12 E+2
Average Concentration (uCi/ml)	9.37 E-6	2.06 E-5	4.74 E-6	
Dissolved Noble Gases				
Total Release (Ci)	-0-	-0-	-0-	5.06 E-5
Average Concentration (uCi/ml)	-0-	-0-	-0-	
Gross Alpha Activity				
Total Release (Ci)	$\leq$7.46 E-5	$\leq$5.13 E-5	$\leq$3.07 E-5	$\leq$3.12 E-4
Average Concentration (uCi/ml)	$\leq$1.17 E-11	$\leq$2.64 E-11	$\leq$1.77 E-11	
Volume of Waste Released				
(Liters)	3.17 E+5	2.24 E+5	1.67 E+5	1.38 E+6
Volume of Dilution Water				
(Liters)	6.35 E+9	1.94 E+9	1.73 E+9	2.01 E+10

TABLE 3.2B (con't)
Semiannual Effluent Report 1986
Liquid Effluents - Batch Releases

Isotopes Released (Curies)	October	November	December	Total
Sr-89	-0-	-0-	-0-	-0-
Sr-90	-0-	-0-	-0-	-0-
Fe-55	1.08 E-2	3.20 E-3	2.68 E-3	2.37 E-2
Co-60	5.72 E-3	6.24 E-4	9.35 E-4	1.17 E-2
Co-58	3.56 E-3	3.62 E-4	5.57 E-4	1.06 E-2
Mn-54	2.78 E-4	-0-	-0-	3.73 E-4
Co-57	-0-	-0-	1.32 E-5	1.32 E-5
Ag-110m	1.98 E-2	3.93 E-4	2.63 E-4	2.40 E-2
Sb-124	-0-	-0-	-0-	9.84 E-5
La-140	1.53 E-5	-0-	-0-	1.53 E-5
Cs-137	-0-	-0-	1.01 E-4	5.91 E-4
Sn-113	1.80 E-4	5.45 E-5	-0-	2.86 E-4
Nb-95	-0-	-0-	2.86 E-5	1.78 E-4
Zr-95	-0-	-0-	-0-	4.05 E-5
Sb-125	7.72 E-4	-0-	3.39 E-5	1.27 E-3
Xe-133	-0-	-0-	-0-	5.06 E-5
I-132	-0-	-0-	-0-	3.44 E-5
I-134	1.40 E-3	-0-	-0-	1.40 E-3
I-133	-0-	-0-	3.64 E-5	3.64 E-5

TABLE 3.3A
Semiannual Effluent Report 1986
Liquid Effluents - Continuous Releases

Liquid Releases	July	August	September
Gross Radioactivity			
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	-0-	-0-	1.01 E-1
Average Concentration (uCi/ml)	-0-	-0-	1.36 E-9
Tritium			
Total Release (Ci)	-0-	-0-	-0-
Gross Alpha Activity			
Total Release (Ci)	<2.11 E-3	<2.65 E-3	<4.04 E-3
Volume of Continuous Release			
(Liters)	8.08 E+6	1.01 E+7	9.40 E+6
Volume of Dilution Flow			
(Liters)	6.12 E+10	7.61 E+10	7.40 E+10
Isotopes Released			
(Curies)			
Sr-89	-0-	-0-	-0-
Sr-90	-0-	-0-	-0-
Fe-55	-0-	-0-	-0-
Na-24	-0-	-0-	1.01 E-1
Co-58	-0-	-0-	-0-
Co-60	-0-	-0-	-0-

TABLE 3.3B
Semiannual Effluent Report 1986
Liquid Effluents - Continuous Releases

Liquid Releases	October	November	December	Total
Gross Radioactivity				
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	6.39 E-5	-0-	8.68 E-5	1.01 E-1
Average Concentration (uCi/ml)	1.05 E-12	-0-	2.75 E-12	
Tritium				
Total Release (Ci)	-0-	-0-	-0-	-0-
Gross Alpha Activity				
Total Release (Ci)	$\leq$3.32 E-3	$\leq$1.67 E-3	$\leq$1.40 E-3	$\leq$1.52 E-2
Volume of Continuous Release				
(Liters)	7.83 E+6	7.33 E+6	7.60 E+6	5.03 E+7
Volume of Dilution Flow				
(Liters)	6.08 E+10	3.60 E+10	3.16 E+10	3.40 E+11
Isotopes Released				
(Curies)				
Sr-89	-0-	-0-	-0-	-0-
Sr-90	-0-	-0-	-0-	-0-
Fe-55	-0-	-0-	-0-	-0-
Na-24	-0-	-0-	-0-	1.01 E-1
Co-58	6.39 E-5	-0-	4.25 E-5	1.06 E-4
Co-60	-0-	-0-	4.43 E-5	4.43 E-5

TABLE 3.4
Semiannual Effluent Report 1986
Dose From Liquid Effluents

The dose to a member of the public from total liquid radioactive release for each quarter was well below the Technical Specification limits of 1.5 mRems to the body and less than or equal to 5 mRems 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 exceeded the concentrations specified in Appendix B. The following offsite doses were calculated using equation 1.5 from the Kewaunee ODCM.

3rd Quarter Dose

	Total Body	Bone	Liver	Thyroid	Kidney	Lung	GI LLI
Dose Total (mRem)	2.72 E-3	2.53 E-3	3.68 E-3	8.47 E-4	1.79 E-3	1.15 E-3	3.76 E-3
Quarterly Dose Limit (mRem)	1.5	5.0	5.0	5.0	5.0	5.0	5.0
Percent of Quarterly Limit (%)	0.18	0.05	0.07	0.02	0.04	0.02	0.08

4th Quarter Dose

	Total Body	Bone	Liver	Thyroid	Kidney	Lung	GI LLI
Dose Total (mRem)	1.41 E-3	9.37 E-4	1.83 E-3	5.79 E-4	9.66 E-4	7.27 E-4	2.27 E-3
Quarterly Dose Limit (mRem)	1.5	5.0	5.0	5.0	5.0	5.0	5.0
Percent of Quarterly Limit (%)	0.09	0.02	0.04	0.01	0.02	0.01	0.05

TABLE 3.4 (con't)
Semiannual Effluent Report 1986
Dose From Liquid Effluents

Calculated Doses This Year

	Total Body	Bone	Liver	Thyroid	Kidney	Lung	GI LLI
Dose Total (mRem)	4.77 E-1	6.02 E-1	6.71 E-1	5.16 E-3	2.20 E-1	7.64 E-2	3.27 E-1
Yearly Dose Limit (mRem)	3	10	10	10	10	10	10
Percent of Yearly Limit (%)	15.9	6.02	6.71	0.05	2.2	0.76	3.27

4.0 UNPLANNED RELEASES

An unplanned release of Argon-41 gas through the auxiliary building ventilation stack occurred on September 26, 1986. The unplanned gaseous release resulted from inadvertent connection of two compressed gas cylinders containing 95% Argon and 5% Hydrogen to the plant's Hydrogen supply system. The Argon gas then was introduced into the reactor coolant system whereupon it became activated. Upon identification of the problem, efforts were taken to rid the gas from the system by transferring it to a waste gas decay tank. It was during this transfer that some gaseous leakage occurred from the waste gas system to the auxiliary building of the plant, and then to the environment.

The total amount of gaseous radioactive material released to the environment was 5.30 Curies of Argon-41. No Technical Specification limits were exceeded during the unplanned release. Meterological data during the release is available per paragraph 5.0 of this report. Appropriate activity release values have been incorporated into Tables 2.1, 2.2 and 2.3A. Offsite dose contributions resulting from this unplanned release have also been incorporated into the dose totals as reported in Table 2.4.

This unplanned release is further documented in Licensee Event Report No. 86-012-00, Docket 50-305, License DPR-43 which was submitted to the NRC on October 24, 1986, in accordance with the requirements of 10 CFR 50.73.

There were no unplanned liquid releases nor any other unplanned gaseous releases during the second half of 1986.

5.0 METEOROLOGICAL DATA

Meteorological data for the second six months of 1986 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 Technical Specification 6.9.3.b (1)(b).

6.0 SOLID WASTE DISPOSAL

Table 6.1 is a summation of solid wastes shipped for the second half of 1986. Presented are the types of wastes, major nuclide composition, disposition of the wastes and shipping containers used. The volume of the containers employed is 158 ft^3 - High Integrity Container (HIC); 7.5 ft^3 - DOT 17H drums; and 98 ft^3 - LSA boxes. No irradiated fuel shipments were made during the report period.

A composite sample from the 1986 dewatered resin shipments was analyzed by a contractor for transuranic nuclides. The results showed an average transuranic concentration of 1.722 E-2 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 rad waste type. The following radionuclides are included in Table 6.1 as a reporting requirement of 10 CFR 20.311, 10 CFR 61, and Barnwell burial site criteria on radioactive shipment manifests:

C-14
Nb-94
TRU
Cm-242
Ni-63
Ni-59
Sr-90
Tc-99 LLD value 3.0 E-5 uCi/g
I-129 LLD value 1.7 E-5 uCi/g
H-3 LLD value 3.2 E-5 uCi/g

Isotopes denoted by an asterisk (*) in Table 6.1 are correlated values.

TABLE 6.1
Semiannual Effluent Report 1986
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not Irradiated Fuel)

1. Type of Waste	Unit	July - December 1986
a. Dewatered resin	Cu.M	8.95 E+0
Container: HIC	Ci	1.26 E+2
b. Dry compressible contaminated waste	Cu.M	3.24 E+1
Container: DOT 17H Drums	Ci	3.58 E+0
c. Non-compressible contaminated scrap	Cu.M	8.33 E+0
Container: LSA Boxes	Ci	5.24 E-1
d. Contaminated filter elements solidifed in concrete	Cu.M	3.19 E+0
Container: DOT 17H Drums (cement), and HIC	Ci	2.76 E+0
e. Contaminated sludge solidified in concrete	Cu.M	2.12 E-1
Container: DOT 17H Drums	Ci	2.54 E-1

2. Estimate of Major Nuclide by Composition (By Type of Waste)	Ci	%
a. Mn-54	2.53 E+0	2.01 E+0
Co-57	2.00 E-1	1.59 E-1
Co-58	2.82 E+1	2.24 E+1
Co-60	5.04 E+1	4.00 E+1
Nb-95	8.41 E-1	6.67 E-1
Ag-110m	2.49 E+0	1.98 E+0
Cs-137	1.52 E-1	1.21 E-1
Sb-125	5.51 E+0	4.38 E+0
Sb-124	1.91 E+1	1.52 E+1
Sn-113	7.65 E-1	6.07 E-1
C-14	5.04 E-1	4.00 E-1
Ni-59	1.74 E-1	1.38 E-1
* Nb-94	2.28 E-4	1.81 E-4
TRU	2.88 E-5	2.29 E-5
Pu-241	2.61 E-3	2.07 E-3
Cm-242	1.82 E-5	1.44 E-5
* Ni-63	1.51 E+1	1.20 E+1
* Sr-90	7.93 E-4	6.29 E-4

TABLE 6.1 (con't)
Semiannual Effluent Report 1986
Solid Waste and Irradiated Fuel Shipments

		Ci	%
b.	Cr-51	5.84 E-3	1.63 E-1
	Mn-54	1.68 E-1	4.68 E+0
	Co-57	7.82 E-3	2.18 E-1
	Co-58	6.08 E-1	1.70 E+1
	Co-60	1.93 E+0	5.38 E+1
	Nb-95	5.98 E-2	1.67 E+0
	Cs-137	1.28 E-1	3.57 E+0
	Sn-113	5.77 E-2	1.61 E+0
	Fe-59	6.94 E-3	1.94 E-1
	C-14	1.93 E-2	5.38 E-1
*	Ni-59	6.65 E-3	1.86 E-1
	Nb-94	9.30 E-4	2.60 E-2
	TRU	7.59 E-5	2.12 E-3
	Pu-241	6.87 E-3	1.92 E-1
	Cm-242	4.80 E-5	1.34 E-3
*	Ni-63	5.79 E-1	1.62 E+1
*	Sr-90	6.65 E-4	1.86 E-2
c.	Cr-51	2.41 E-2	4.61 E+0
	Mn-54	1.28 E-2	2.44 E+0
	Co-57	6.22 E-4	1.19 E-1
	Co-58	2.10 E-1	4.01 E+1
	Co-60	9.84 E-2	1.88 E+1
	Nb-95	1.24 E-1	2.36 E+1
	Cs-137	5.99 E-3	1.14 E+0
	Sn-113	9.31 E-3	1.78 E+0
	Fe-59	6.33 E-3	1.21 E+0
	C-14	9.84 E-4	1.88 E-1
*	Ni-59	3.39 E-4	6.48 E-2
	Nb-94	2.39 E-4	4.56 E-2
	TRU	1.41 E-5	2.70 E-3
	Pu-241	1.28 E-3	2.44 E-1
	Cm-242	8.93 E-6	1.70 E-3
*	Ni-63	2.95 E-2	5.64 E+0
*	Sr-90	3.11 E-5	5.95 E-3

TABLE 6.1 (con't)
Semiannual Effluent Report 1986
Solid Waste and Irradiated Fuel Shipments

		Ci	%
d.	Cr-51	5.19 E-2	1.88 E+0
	Mn-54	7.82 E-2	2.83 E+0
	Co-57	4.24 E-3	1.54 E-1
	Co-58	1.10 E+0	4.00 E+1
	Co-60	1.01 E+0	3.66 E+1
	Nb-95	1.03 E-1	3.71 E+0
	Ag-110m	3.94 E-2	1.43 E+0
	Cs-137	1.15 E-3	4.17 E-2
	Sb-125	2.00 E-2	7.25 E-1
	Sb-124	8.63 E-3	3.13 E-1
	Sn-113	1.88 E-2	6.81 E-1
	Fe-59	5.38 E-3	1.95 E-1
	C-14	1.01 E-2	3.66 E-1
*	Ni-59	3.48 E-3	1.26 E-1
	Nb-94	9.14 E-5	3.31 E-3
	TRU	1.89 E-5	6.86 E-4
	Pu-241	1.71 E-3	6.21 E-2
	Cm-242	1.20 E-5	4.34 E-4
*	Ni-63	3.03 E-1	1.10 E+1
*	Sr-90	5.98 E-6	2.17 E-4
e.	Co-58	2.45 E-3	9.65 E-1
	Co-60	1.91 E-1	7.54 E+1
	C-14	1.91 E-3	7.54 E-1
*	Ni-59	6.59 E-4	2.60 E-1
	Nb-94	6.10 E-6	2.40 E-3
	TRU	1.18 E-6	4.66 E-4
	Pu-241	1.07 E-4	4.22 E-2
	Cm-242	7.47 E-7	2.94 E-4
*	Ni-63	5.73 E-2	2.26 E+1

TABLE 6.1 (con't)
Semiannual Effluent Report 1986
Solid Waste and Irradiated Fuel Shipments

3. Solid Waste Disposition

a.

Date of Shipment	Mode of Transportation	Destination
08/21/86	Chem-Nuclear CNS 14-195H Cask	Barnwell South Carolina
10/16/86	Chem-Nuclear CNS 14-195H Cask	Barnwell South Carolina
11/05/86	Chem-Nuclear CNS 14-195H Cask	Barnwell South Carolina
11/18/86	Chem-Nuclear Shielded Van	Barnwell South Carolina
11/20/86	Chem-Nuclear Shielded Van	Barnwell South Carolina

b. Irradiated Fuel Shipments

No irradiated fuel shipments were made from the Kewaunee Nuclear Power Plant during the second six months of 1986.

7.0 PROGRAM REVISIONS

In accordance with Technical Specifications 6.9.3.b (1)(e), 6.17.2.a, 6.18.2.a and 6.19.1.a, the revisions to the Process Control Program, Offsite Dose Calculation Manual and radioactive waste systems are listed below.

7.1 Process Control Program

The Kewaunee Nuclear Power Plant Process Control Program has not been revised during this report period.

7.2 Offsite Dose Calculation Manual

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

7.3 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.