DOCKET 50-305

KEWAUNEE NUCLEAR POWER PLANT

SEMIANNUAL RADIOACTIVE

EFFLUENT RELEASE REPORT

JULY - DECEMBER 1990

WISCONSIN PUBLIC SERVICE CORPORATION
GREEN BAY, WISCONSIN
APRIL 1991

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

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

Isotope	a priori LLD (uCi/ml)
a. Gaseous emissions:	
Kr-87	2.77 E-8
Kr-88	2.92 E-8
Xe-133	3.29 E-8
Xe-133m	7.78 E-8
Xe-135	8.49 E-9
Xe-138	4.10 E-8

TABLE 2.1
Semiannual Radioactive Effluent Report 1990
Gaseous Effluents-Summation of all Releases

	3rd Quarter	4th Quarter
Fission and Activation Gases		
Total Activity Released (Ci)	1.35 E-2	1.44 E-1
Average Release Rate (uCi/Sec)	1.70 E-3	1.81 E-2
Iodines		
Total Activity Released (Ci)	-0-	-0-
Average Release Rate (uCi/Sec)	-0-	-0-
Particulates		
Total Activity Released (Ci)	1.13 E-3	5.61 E-4
Average Release Rate (uCi/Sec)	1.42 E-4	7.06 E-5
Gross Alpha Released (Ci)	6.35 E-4	2.94 E-4
Tritium		
Total Activity Released (Ci)	2.95 E-1	5.57 E-1
Average Release Rate (uCi/Sec)	3.71 E-2	7.01 E-2

TABLE 2.2
Semiannual Radioactive Effluent Report 1990
Gaseous Effluents

Nuclides Released (Ci)	Continuous Mode		Batch Mode	
	3rd Qtr	4th Qtr	3rd Qtr	4th Qtr
Fission Gases				
Kr-85	-	2.90 E-2	1.35 E-2	-
Xe-133	-	1.15 E-1	-	-
Xe-133m	-	-	-	-
Xe-135	-	-	-	-
Unidentified	-	-	-	-
Total for Period	-	1.44 E-1	1.35 E-2	-
Particulates				
Co-60	6.30 E-7	1.05 E-6	-	-
Cs-137	1.96 E-7	5.08 E-7	-	-
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Unidentified	-	-	1.13 E-3	5.59 E-4
Total for Period	8.26 E-7	1.56 E-6	1.13 E-3	5.59 E-4
Iodines				
I-131	-	-	-	-
I-132	-	-	-	-
I-133	-	-	-	-
Total for Period	-	-	-	-

TABLE 2.3A (con't)
Semiannual Radioactive Effluent Report 1990
4th Quarter Gaseous Release
Total of all Releases

Noble Gases (Curies)

Isotope	October	November	December	Total
Kr-85	2.90 E-2	-	-	2.90 E-2
Xe-133	1.15 E-1	-	-	1.15 E-1
Xe-133m	-	-	-	-
Xe-135	-	-	-	-
Unidentified	-	-	-	-
Total	1.44 E-1	-	-	1.44 E-1

Particulates (Curies)

Isotope	October	November	December	Total
Co-60	-	2.06 E-7	8.41 E-7	1.05 E-6
Cs-137	7.40 E-8	2.11 E-7	2.23 E-7	5.08 E-7
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Unidentified	2.00 E-4	8.20 E-5	2.77 E-4	5.59 E-4
Total	2.00 E-4	8.24 E-5	2.78 E-4	5.61 E-4

Halogens (Curies)

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

TABLE 2.3A (con't)
Semiannual Radioactive Effluent Report 1990
4th Quarter Gaseous Release
Total of all Releases

Summary

	October	November	December	Total
Total Noble Gases (Ci)	1.44 E-1	-	-	1.44 E-1
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	2.00 E-4	8.24 E-5	2.78 E-4	5.60 E-4
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	7.40 E-8	4.17 E-7	1.06 E-6	1.55 E-6
Total Tritium (Ci)	3.73 E-1	1.84 E-1	-	5.57 E-1
Total Particulate Gross Alpha (Ci)	1.08 E-4	4.51 E-5	1.41 E-4	2.94 E-4
Maximum Noble Gas Release Rate (uCi/Sec)	1.48 E+0	$\leq$9.31 E-1	$\leq$9.14 E-1	-

TABLE 2.3B (con't)
Semiannual Radioactive Effluent Report 1990
4th Quarter Gaseous Release
Continuous Mode Only

Noble Gases (Curies)

Isotope	October	November	December	Total
Kr-85	2.90 E-2	-	-	2.90 E-2
Xe-133	1.15 E-1	-	-	1.15 E-1
Xe-133m	-	-	-	-
Xe-135	-	-	-	-
Unidentified	-	-	-	-
Total	1.44 E-1	-	-	1.44 E-1

Particulates (Curies)

Isotope	October	November	December	Total
Co-60	-	2.06 E-7	8.41 E-7	1.05 E-6
Cs-137	7.40 E-8	2.11 E-7	2.23 E-7	5.08 E-7
Sr-89	-	-	-	-
Sr-90	-	-	-	-
Unidentified	-	-	-	-
Total	7.40 E-8	4.17 E-7	1.06 E-6	1.56 E-6

Halogens (Curies)

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

TABLE 2.3B (con't)
Semiannual Radioactive Effluent Report 1990
4th Quarter Gaseous Release
Continuous Mode Only

Summary

	October	November	December	Total
Total Noble Gases (Ci)	1.44 E-1	-	-	1.44 E-1
Total Halogens (Ci)	-	-	-	-
Total Particulate Gross Beta-Gamma (Ci)	7.40 E-8	4.17 E-7	1.06 E-6	1.55 E-6
Total Particulate Gross Beta-Gamma Half-Lives >8 Days (Ci)	7.40 E-8	4.17 E-7	1.06 E-6	1.55 E-6
Total Tritium (Ci)	3.73 E-1	1.84 E-1	-	5.57 E-1
Total Particulate Gross Alpha (Ci)	2.20 E-8	1.09 E-7	1.44 E-6	1.57 E-6
Maximum Noble Gas Release Rate (uCi/Sec)	1.33 E+0	$\leq$7.99 E-1	$\leq$7.87 E-1	-

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 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

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

Isotope	a priori LLD (uCi/ml)
Mn-54	1.17 E-7
Fe-59	1.82 E-7
Co-58	8.11 E-8
Co-60	1.20 E-7
Zn-65	2.05 E-7
Mo-99	7.10 E-8
Cs-134	1.32 E-7
Cs-137	1.40 E-7
Ce-141	1.43 E-7
Ce-144	4.26 E-7
I-131	7.48 E-8
H-3	3.79 E-6
Sr-89	2 E-8
Sr-90	1 E-8
Gross Alpha	3 E-9
Fe-55	5 E-8

TABLE 3.1
Semiannual Radioactive Effluent Report 1990
Liquid Effluents - Summation of all Releases

	3rd Qtr	4th Qtr	Total
Fission and Activation Products			
Total Release (Excluding H3 and Dissolved Gases) (Ci)	1.36 E-2	1.57 E-2	2.93 E-2
Average Concentration (uCi/ml)	1.81 E-9	3.20 E-9	
Tritium			
Total Release (Ci)	7.67 E+1	1.32 E+2	2.09 E+2
Average Concentration (uCi/ml)	1.04 E-5	2.69 E-5	
Percent of Tech Spec Limit (3.0 E-3 uCi/ml) (%)	3.47 E-1	8.97 E-1	
Dissolved Gases			
Total Release (Ci)	-0-	-0-	-0-
Average Concentration (uCi/ml)	-0-	-0-	
Percent of Tech Spec Limit (2.0 E-4 uCi/ml) (%)	-0-	-0-	
Gross Alpha Activity			
Total Release (Ci)	$\leq$2.36 E-4	$\leq$6.47 E-5	$\leq$3.01 E-4
Volume of Waste Released (Batch Releases)			
(Liters)	4.48 E+5	5.21 E+5	9.69 E+5
Volume of Dilution Water (Batch Releases)			
(Liters)	7.37 E+9	4.90 E+9	1.23 E+10

TABLE 3.2B
Semiannual Radioactive Effluent Report 1990
Liquid Effluents - Batch Releases

Liquid Releases	October	November	December	Total
Gross Radioactivity				
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	1.65 E-3	1.11 E-2	2.98 E-3	1.57 E-2
Average Concentration (uCi/ml)	7.67 E-10	1.20 E-8	1.63 E-9	
Tritium				
Total Release (Ci)	6.18 E+1	7.15 E+0	6.26 E+1	1.32 E+2
Average Concentration (uCi/ml)	2.87 E-5	7.75 E-6	3.42 E-5	
Dissolved Noble Gases				
Total Release (Ci)	-0-	-0-	-0-	-0-
Average Concentration (uCi/ml)	-0-	-0-	-0-	
Gross Alpha Activity				
Total Release (Ci)	$\leq$3.89 E-7	$\leq$4.51 E-7	$\leq$8.56 E-7	$\leq$1.70 E-6
Average Concentration (uCi/ml)	$\leq$1.81 E-13	$\leq$4.89 E-13	$\leq$4.68 E-13	
Volume of Waste Released				
(Liters)	1.94 E+5	1.13 E+5	2.14 E+5	5.21 E+5
Volume of Dilution Water				
(Liters)	2.15 E+9	9.23 E+8	1.83 E+9	4.90 E+9

TABLE 3.2B (con't)
Semiannual Radioactive Effluent Report 1990
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	1.44 E-4	1.55 E-3	7.70 E-4	2.46 E-3
Co-58	7.02 E-4	1.02 E-3	3.19 E-4	2.04 E-3
Co-60	5.28 E-4	4.53 E-3	9.86 E-4	6.04 E-3
Mn-54	2.06 E-5	2.35 E-4	4.04 E-5	2.96 E-4
Ag-110m	2.24 E-4	3.36 E-3	8.46 E-4	4.43 E-3
Sb-125	-0-	3.29 E-4	-0-	3.29 E-4
Nb-95	2.03 E-5	-0-	-0-	2.03 E-5
Sn-113	-0-	8.88 E-5	2.30 E-5	1.12 E-4
Zr-97	1.49 E-5	2.73 E-5	-0-	4.22 E-5

TABLE 3.3B
Semiannual Radioactive Effluent Report 1990
Liquid Effluents - Continuous Releases

Liquid Releases	October	November	December	Total
Gross Radioactivity				
Total Release (Excluding Tritium and Dissolved Gases) (Ci)	-0-	-0-	-0-	-0-
Average Concentration (uCi/ml)	-0-	-0-	-0-	
Tritium				
Total Release (Ci)	6.95 E-2	3.15 E-2	-0-	1.01 E-1
Gross Alpha Activity				
Total Release (Ci)	$\leq$2.08 E-5	$\leq$1.61 E-5	$\leq$2.61 E-5	$\leq$6.30 E-5
Volume of Continuous Release				
(Liters)	1.04 E+7	1.13 E+7	1.10 E+7	3.27 E+7
Volume of Dilution Flow				
(Liters)	5.33 E+10	4.57 E+10	3.37 E+10	1.33 E+11
Isotopes Released				
(Curies)				
Sr-89	-0-	-0-	-0-	-0-
Sr-90	-0-	-0-	-0-	-0-
Fe-55	-0-	-0-	-0-	-0-