DOCKET 50-305

KEWAUNEE NUCLEAR POWER PLANT

SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

July 1 - December 31, 1992

Wisconsin Public Service Corporation
Green Bay, Wisconsin
April 14, 1993
Rev A

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2.0 GASEOUS EFFLUENTS

2.1 Lower Limits of Deteotion (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 (μCi/cc)
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 (μCi/cc)
a. Gaseous emissions:	
Kr-87	2.63 E-8
Kr-88	4.27 E-8
Xe-133	3.24 E-8
Xe-133m	8.75 E-8
Xe-135	1.22 E-8
Xe-138	5.91 E-8
b. Particulate emissions:	
Mn-54	5.65 E-14
Fe-59	7.42 E-14
Co-58	5.99 E-14
Co-60	1.39 E-13
Zn-65	8.29 E-14
Mo-99	3.12 E-14
Cs-134	5.11 E-14
Cs-137	5.52 E-14
Ce-141	3.85 E-14
Ce-144	1.93 E-13

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 liguid batch release radioanalyses, as listed in Table 8.3 of the Kewaunee Technical Specifications, are:

Analysis	LLD (μCi/ml)
Principal Gamma Emitters	1.00 E-06
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

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

Isotope	3rd Qtr	4th Qtr	Average a priori LLD (μCi/ml)
Mn-54	1.21 E-7	8.54 E-8	1.03 E-7
Fe-59	2.66 E-7	1.88 E-7	2.27 E-7
Co-58	8.39 E-8	8.39 E-8	8.39 E-8
Co-60	1.24 E-7	1.12 E-7	1.18 E-7
Zn-65	2.12 E-7	2.12 E-7	2.12 E-7
Mo-99	5.73 E-8	4.68 E-8	5.21 E-8
Cs-134	1.36 E-7	9.62 E-8	1.16 E-7
Cs-137	8.34 E-8	8.34 E-8	8.34 E-8
Ce-141	7.95 E-8	1.12 E-7	9.58 E-8
Ce-144	3.62 E-7	3.62 E-7	3.62 E-7
I-131	7.75 E-8	9.50 E-8	8.63 E-8
H-3	4.28 E-6	3.73 E-6	4.01 E-6
Sr-89	2.67 E-9	4.33 E-9	3.50 E-9
Sr-90	3.67 E-9	3.33 E-9	3.50 E-9
Gross Alpha	4.33 E-9	3.00 E-9	3.67 E-9

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 (μCi/ml)
Principal Gamma Emitters	5.00 E-07
Iodine 131	1.00 E-06
Tritium	1.00 E-05
Gross Alpha	5.00 E-07
Strontium 89, 90	5.00 E-08
Iron 55	1.00 E-06

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

Isotope	3rd Qtr	4th Qtr	Average a priori LLD (μCi/ml)
Mn-54	3.18 E-8	2.46 E-8	2.82 E-8
Fe-59	6.27 E-8	7.68 E-8	6.98 E-8
Co-58	3.96 E-8	2.80 E-8	3.38 E-8
Co-60	4.93 E-8	4.93 E-8	4.93 E-8
Zn-65	7.06 E-8	8.65 E-8	7.86 E-8
Mo-99	2.36 E-8	2.42 E-8	2.39 E-8
Cs-134	2.78 E-8	3.69 E-8	3.24 E-8
Cs-137	2.78 E-8	3.11 E-8	2.95 E-8
Ce-141	3.38 E-8	3.51 E-8	3.45 E-8
Ce-144	1.96 E-7	1.60 E-7	1.78 E-7
I-131	2.05 E-8	3.54 E-8	2.80 E-8
H-3	4.28 E-6	3.73 E-6	4.01 E-6
Sr-89	2.50 E-9	4.83 E-9	3.67 E-9
Sr-90	1.50 E-9	2.67 E-9	2.08 E-9
Gross Alpha	2.00 E-9	2.17 E-9	2.08 E-9
Fe-55	5.00 E-8	4.50 E-8	4.75 E-8

TABLE 3.1
Semiannual Radioactive Effluent Release Report 1992
Liquid Effluents - Summation of all Releases

	3rd Quarter	4th Quarter	Total
Fission and Activation Products			
Total Release Excluding H3 and Dissolved Gases (Ci)	8.897E-003	2.416E-003	1.131E-002
Average Concentration (μCi/ml)	4.336E-011	1.722E-011	
Tritium			
Total Release (Ci)	1.091E+002	5.129E+001	1.604E+002
Average Concentration (μCi/ml)	5.316E-007	3.655E-007	
% of Tech. Spec. Limit(3.0E-3 μCi/ml)	1.772E-002	1.218E-002	
Dissolved Gases			
Total Release (Ci)	0.000E+000	5.006E-005	5.006E-005
Average Concentration (μCi/ml)	0.000E+000	3.567E-013	
% of Tech. Spec. Limit(2.0E-4 μCi/ml)	0.000E+000	1.784E-007	
Gross Alpha Activity			
Total Release (Ci)	0.000E+000	0.000E+000	0.000E+000
Volume of Waste Released			
Batch (liters)	5.285E+005	5.059E+005	1.034E+006
Continuous (liters)	2.921E+007	3.981E+007	6.902E+007
Total (liters)	2.974E+007	4.032E+007	7.005E+007
Volume of Dilution Water			
Batch (liters)	8.957E+009	5.146E+009	1.410E+010
Continuous (liters)	1.962E+011	1.352E+011	3.314E+011
Total (liters)	2.052E+011	1.403E+011	3.455E+011

TABLE 3.2B
Semiannual Radioactive Effluent Release Report 1992
Liquid Effluents - Batch Releases

	October	November	December	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)	1.772E-004	1.547E-003	6.761E-004	2.401E-003
Avg. Conc. (μCi/ml)	1.812E-010	5.027E-010	6.206E-010	
Tritium				
Total Release (Ci)	2.911E+000	4.559E+001	2.794E+000	5.129E+001
Avg. Conc. (μCi/ml)	2.976E-006	1.481E-005	2.565E-006	
Dissolved Gases				
Total Release (Ci)	2.640E-005	2.366E-005	0.000E+000	5.006E-005
Avg. Conc. (μCi/ml)	2.699E-011	7.685E-012	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)	7.175E+004	3.358E+005	9.837E+004	5.059E+005
Volume of Dilution Water				
(liters)	9.781E+008	3.078E+009	1.089E+009	5.146E+009

TABLE 3.2B (Con't)
Semiannual Radioactive Effluent Release Report 1992
Liquid Effluents - Batch Releases

Isotope (Ci)	October	November	December	Total
H-3	2.911E+000	4.559E+001	2.794E+000	5.129E+001
Fe-55	2.942E-005	1.411E-004	4.131E-005	2.118E-004
Co-57	0.000E+000	0.000E+000	1.236E-005	1.236E-005
Co-58	1.208E-004	1.099E-003	4.236E-004	1.644E-003
Co-60	2.696E-005	3.070E-004	1.988E-004	5.328E-004
Xe-133	2.078E-005	2.366E-005	0.000E+000	4.444E-005
Xe-135	5.622E-006	0.000E+000	0.000E+000	5.622E-006
Total	2.912E+000	4.559E+001	2.795E+000	5.129E+001

TABLE 3.3B
Semiannual Radioactive Effluent Release Report 1992
Liquid Effluents - Continuous Releases

	October	November	December	Total
Gross Radioactivity				
Total Release Excluding H3 and Dissolved Gases (Ci)	0.000E+000	1.539E-005	0.000E+000	1.539E-005
Avg. Conc. (μCi/ml)	0.000E+000	4.552E-013	0.000E+000	
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)	8.436E+006	1.681E+007	1.456E+007	3.981E+007
Volume of Dilution Water				
(liters)	6.759E+010	3.380E+010	3.380E+010	1.352E+011

TABLE 3.3B (Con't)
Semiannual Radioactive Effluent Release Report 1992
Liquid Effluents - Continuous Releases

Isotope (Ci)	October	November	December	Total
Fe-55	0.000E+000	0.000E+000	0.000E+000	0.000E+000
Co-60	0.000E+000	6.822E-006	0.000E+000	6.822E-006
Sb-125	0.000E+000	8.564E-006	0.000E+000	8.564E-006
Total	0.000E+000	1.539E-005	0.000E+000	1.539E-005

Table 3.4
Semiannual Radioactive Effluent Report 1992
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 mRem to the body and less than or equal to 5 mRem to any organ.

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

Organ 3rd Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	6.121E-004	1.5	0.04
Bone	1.206E-004	5.0	0.00
Liver	5.820E-004	5.0	0.01
Thyroid	5.598E-004	5.0	0.01
Kidney	5.599E-004	5.0	0.01
Lung	5.660E-004	5.0	0.01
GI-LLI	1.822E-003	5.0	0.04

Organ 4th Qtr Dose	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	3.761E-004	1.5	0.03
Bone	2.868E-006	5.0	0.00
Liver	3.701E-004	5.0	0.01
Thyroid	3.620E-004	5.0	0.01
Kidney	3.620E-004	5.0	0.01
Lung	3.631E-004	5.0	0.01
GI-LLI	4.829E-004	5.0	0.01

Calculated Dose This Year

Organ	Dose Total mRem	Quarterly Limit mRem	Percent of Limit
Total Body	2.169E-003	3.0	0.07
Bone	5.437E-004	10.0	0.01
Liver	2.268E-003	10.0	0.02
Thyroid	1.831E-003	10.0	0.02
Kidney	1.855E-003	10.0	0.02
Lung	1.983E-003	10.0	0.02
GI-LLI	7.720E-002	10.0	0.77