U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report:	50-344/92-29
License:	NPF-1
Licensee:	Portland General Electric Company 121 SW Salmon Street Portland, Oregon 97204
Facility:	Trojan Nuclear Plant
Inspection location:	Rainier, Oregon
Inspection duration:	October 5 - 9, 1992

Prepared by:

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Approved by:

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Facilities Radiological Protection Branch

Summary:

Areas Inspected: Routine, announced inspection of plant chemistry related areas, including radiological confirmatory measurements, quality assurance audits, organization and management controls, and facility tours. Inspection Procedure 84750 was used.

Results: The confirmatory measurement results showed that the licensee's ability to sample and measure radioactivity was generally good. Weaknesses were identified in the laboratory Quality Control program. Two examples of procedure violations were identified. The violations involved the use of radioactive standards for which the National Institute of Standards and Technology traceability had expired to perform daily checks and efficiency calibrations on intrinsic germanium detectors (Section 2).

DETAILS

1. Persons Contacted

Licensee

A. Barber, Engineer, Quality Assurance
B. Hugo, Engineer, Nuclear Compliance
T. Meek, Manager, Personnel Protection
D. Nordstrom, General Manager, Nuclear Oversight
G. Rich, Manager, Chemistry
W. Robinson, Vice President, Trojan Nuclear Plant
T. Walt, General Manager, Technical Functions
J. Westvold, Supervisor, Quality Audits
P. Yundt, Manager, Special Projects

Others

R. Barr, Senior Resident Inspector, NRC
A. Bless, Reactor Safety Manager, Oregon Department of Energy

The individuals listed above attended the exit meeting on October 9, 1992. The inspectors met and held discussions with additional members of the licensee's staff during the inspection.

2. Confirmatory Measurements (84750)

a. Audits

The inspectors reviewed Quality Assurance Audit AP-664, "Nuclear Quality Assurance Audit of the Chemistry Department," performed during the period June 17-27, 1991. The auditors concluded that the chemistry department satisfactorily implemented the elements of a Quality Assurance Program (PGE-8010). However, several deficiencies were noted that required additional management attention, including: continued weaknesses with the nonradiological measurement Quality Control (QC) Program, deficient procurement practices, and lack of responsiveness to external concerns.

The depth and scope of the reviewed audit were adequate. The licensee's QA oversight met its objective in identifying chemistry deficiencies.

b. Organization and Management Controls

The Chemistry staff consisted of fourteen Chemistry Technicians who reported to a Laboratory Supervisor. The staff also included a clerk, a contract procedure writer, and four Chemistry Specialists. The Chemistry Manager reported to the Personnel Protection Manager, who in turn reported to the Plant General Manager. At the time of the inspection, a second Laboratory Supervisor position was vacant. The licensee stated that they had selected a candidate and hoped to have the individual on-site by November 1992.

The licensee's chemistry staffing appeared to be consistent with the facility's Technical Specifications (TSs) Section 6.2, "Organizational Requirements." No violations or deviations were identified.

c. Confirmatory Measurements and Radiochemical Analysis

The regional mobile laboratory was brought on-site to perform measurements and intercomparisons of gamma emitting radionuclides with the licensee's counting laboratory. Several types of samples routinely evaluated by the licensee for TSs surveillances were analyzed by both laboratories. The sample results were compared using the criteria outlined in NRC Inspection Procedure 84750 (see Attachment 1).

(1) Sampling

The inspector reviewed procedure CM 6, "Sampling Techniques," and accompanied a licensee chemistry technician during sample collection and preparation.

The inspector observed a chemistry technician (CT) sample the South Treated Waste Monitor Tank and obtain a reactor coolant sample. The CT appeared to follow the sampling guidance and the radiological precautions outlined in CM 6. To ensure that a representative sample had been obtained, the CT purged the sample lines prior to collecting any samples.

(2) Gamma Analysis Results

The following samples were analyzed by the licensee and the Region V mobile laboratory:

- Containment Atmosphere (charcoal filter)
- Treated Waste Monitor Tank (1 liter liquid marinelli)
- Waste Gas Decay Tank (33 cubic centimeter Gas Sphere)
- Reactor Coolant (1 liter liquid marinelli)
- Clean Waste Receiver Tank (47mm paper filter)
- Reactor Coolant (47mm paper filter)

The results of the gamma radionuclide analysis are outlined in Tables 1-5. A summary of the results is as follows:

(a) Containment Atmosphere

While the licensee's results of the containment atmosphere were slightly higher than the NRC's, they were within the agreement range. No disagreements were found in the 12 comparisons performed.

(b) Treated Waste Monitor Tank

No disagreements were found in the 12 comparisons performed.

(c) Waste Gas Decay Tank

No disagreements were found in the 10 comparisons performed.

(d) Reactor Coolant

No disagreements were found in the 45 comparisons performed.

(e) Clean Waste Receiver Tank

Three disagreements were identified out of 15 comparisons. The disagreements involved the lack of identification of manganese-54 and iodine-131 on a 47mm filter geometry. The disagreements were not considered a great concern because the Technical Specification Lower Limit of Detection, for this particular sample, was 3 to 4 orders of magnitude higher than the sample activity. A second sample containing higher levels of activity was analyzed.

(f) Reactor Coolant

This sample was counted to verify the licensee's ability to accurately detect radionuclides using a 47mm filter geometry (see section 2.c(2)(e)). No disagreements were found in 33 comparisons performed. The results of this sample were better in comparison to the Clean Waste Receiver Tank sample, supporting the conclusion that low activities and poor counting statistics caused the disagreements encountered in the preceding sample.

In summary, three disagreements occurred out of the 127 comparisons performed. Overall, the licensee's ability to sample and measure radionuclides was effective in meeting the licensee's safety objectives. No violations or deviations were identified.

d. Laboratory Quality Control

(1) Germanium Detector Calibrations and Daily Quality Control

The inspectors evaluated the licensee's Laboratory Quality Control program by review of procedures, efficiency calibration and daily efficiency check records, and interviews with personnel. The inspectors reviewed the IG detectors calibration records for 1992, and noted the following

deficiencies:

- American National Standards Institute, (ANSI) N42.14 1978, requires using 20,000 counts under each peak used for the efficiency calibration. Chemistry Laboratory Instrument Procedure, CL-153, "Calibration Check and Efficiency Calibration of Germanium Gamma Detectors," references ANSI N42.14 1978, but suggests using only 10,000 counts under each peak used for the efficiency calibration.

- While CL-153 recommends having 10,000 counts under peak areas used for the calibration, peak search calibration records showed instances where peak areas contained less than 10,000 counts.

- Several peak search calibration records were not signed or approved by Chemistry Supervision.

In addition, the inspectors noted the following conditions:

(a) Observed Conditions

The inspectors reviewed detector efficiency calibration records and noted that four efficiency geometries on the Radiation Protection (RP) IG detector had been performed using radioactive standards for which the National Institute of Standards and Technology traceability had expired. The radioactive standards expired on January 1, 1992 and had been used to calibrate the RP detector on February 3, 1992.

The inspectors reviewed daily calibration check records and noted that the chemistry department had been using another expired radioactive standard. The expired radioactive standard had been used to perform the daily calibration checks on the detectors since its expiration date of January 1, 1992.

(b) NRC Requirements

TS 6.8.1 requires that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide (RG) 1.33, November 1972.

RG 1.33, Appendix A, Section J states in part:

> "Chemical and radiochemical control procedures should be written to prescribe the nature and frequency of sampling analysis, ..." "These procedures should specify the laboratory instructions and calibration of laboratory equipment."

Chemistry Manual CM 4, "Laboratory Quality Control," Revision 2, dated January 31, 1992, requires that "All standards used for calibration shall be traceable to the National Institute of Standards and Technology (NIST), American Chemical Society Certification, natural physical constants, or their equivalents."

Chemistry Laboratory Instrument procedure CL-153, "Calibration Check and Efficiency Calibration," Revision 5, dated June 3, 1991, requires that, "The efficiency calibration and calibration check are performed by counting a N.I.S.T. traceable radionuclide standard on a germanium detector ..."

(c) NRC Conclusion

The inspectors concluded that the use of radioactive standards for which the N.I.S.T. traceability had expired, failed to implement CM 4 and CL-153 and constituted a violation of TS 6.8.1 (50-344/92-29-01).

(2) Interlaboratory Quarterly Cross-Checks

The inspectors reviewed Interlaboratory Quarterly Cross Checks (IQCC) performed since the last inspection. Records indicated that chemistry results were very good. However, the inspectors noted that the 1991 fourth quarter IQCC records were missing. The licensee indicated that the IQCC was not a procedural requirement. During review of chemistry procedures, the inspectors found no requirements for performing IQCC.

No violations or deviations were identified.

e. Lower Limit of Detection (LLD)

The licensee was required to meet LLD values for radioactive liquid and gaseous effluent analyses. The specific limits for radioactive liquid analyses were found in TS Table 4.11-1. Radioactive gaseous effluent limits were found in TS Table 4.11-2.

The LLD was defined in the TSs as "the smallest concentration of radioactive material in a sample that will yield a net count above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a real signal." The TSs specified that the LLD must be calculated based on the standard deviation of the background counting rate of a blank sample.

The inspector examined the licensee's LLD related records and identified several areas that merited attention. For example:

- The licensee determined the a priori LLD for I-131 by gamma

analysis as required by the TSs; however, the LLD achieved was 1.04×10^{12} μCi/cc which is slightly higher than the TSs requirement of 1×10^{12} μCi/cc.

- The licensee routinely did not meet TSs required LLDs for I-131 analysis in gaseous effluents during containment pressure relief operations. The licensee stated that because the radiation monitor used during containment pressure relief was also used to meet other TSs requirements, pressure relief operations were routinely terminated prior to obtaining the required sample volume necessary to meet the 1×10^{12} μCi/cc TSs requirement.

- An internal Trojan memo identified the difficulty in meeting the required LLDs during containment pressure relief and suggested corrective actions. The licensee did not provide documentation showing that appropriate corrective actions had been implemented. This issue was left as an unresolved item pending further review. (URI 50-344/92-29-02).

One violation and one unresolved item were identified.

3. Facility Tours

While touring the Chemistry Hot Laboratory, the inspectors observed the following:

a. All personnel observed were wearing proper dosimetry and eye protection.

b. Contamination monitoring equipment calibration was current.

c. Housekeeping appeared to be satisfactory.

No violations or deviations were observed.

4. Exit Interview

The inspectors met with members of licensee management at the conclusion of the inspection on October 9, 1992. The scope and findings of the inspection were summarized. The licensee acknowledged the inspectors' observations.

ATTACHMENT 1

Criteria For Accepting The Licensee's Measurements

1. Comparison

   a. Divide each NRC result by its associated uncertaint, to obtain the resolution. The uncertainty is defined as the relative standard deviation, one sigma, of the NRC results as calculated from the counting statistics.

   b. Divide each licensee result by the corresponding NRC result to obtain the ratio.

   c. The licensee's measurement is in agreement if the value of the ratio falls within the limits shown in the following table for the corresponding resolution.

2. Criteria

Resolution	Ratio
< 4	------
4 - 7	0.50 - 2.00
8 - 15	0.60 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18

TABLE 1

U.S. NUCLEAR REGULATORY COMMISSION

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Trojan Plant

October 5-9, 1992

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Containment Atmosphere								
Chem.	Br-82	1.17E-03	7.10E-05	1.50E-03	1.26E-04	1.28	16.5	A
Det #1	I-131	3.41E-02	1.50E-04	3.56E-02	3.30E-04	1.05	227.0	A
	I-133	4.53E-02	1.90E-04	4.70E-02	4.10E-04	1.04	238.5	A
	I-135	9.65E-03	3.17E-04	9.05E-03	5.79E-04	0.94	30.4	A
Containment Atmosphere								
Chem.	Br-82	1.17E-03	7.10E-05	1.47E-03	6.60E-05	1.25	16.5	A
Det #2	I-131	3.41E-02	1.50E-04	3.53E-02	1.90E-04	1.04	227.0	A
	I-133	4.53E-02	1.90E-04	4.67E-02	2.50E-04	1.03	238.5	A
	I-135	9.65E-03	3.17E-04	9.28E-03	3.30E-04	0.96	30.4	A
Containment Atmosphere								
RP	Br-82	1.17E-03	7.10E-05	1.38E-03	6.90E-05	1.18	16.5	A
Det #1	I-131	3.41E-02	1.50E-04	3.54E-02	1.90E-04	1.04	227.0	A
	I-133	4.53E-02	1.90E-04	4.57E-02	2.40E-04	1.01	238.5	A
	I-135	9.65E-03	3.17E-04	9.51E-03	3.38E-04	0.99	30.4	A
Treated Waste Monitor Tank								
Chem.	Co-60	1.82E-06	9.70E-08	2.21E-06	1.28E-07	1.21	18.8	A
Det #1	Cs-134	2.53E-07	4.06E-08	2.68E-07	4.59E-08	1.06	6.2	A
	Sb-125	5.75E-06	2.04E-07	5.62E-06	2.58E-07	0.98	28.2	A
	Cs-137	9.29E-07	5.95E-08	1.05E-06	8.60E-08	1.13	15.6	A
Treated Waste Monitor Tank								
Chem.	Co-60	1.82E-06	9.70E-08	1.61E-06	6.90E-08	0.88	18.8	A
Det #2	Cs-134	2.53E-07	4.06E-08	2.07E-07	3.41E-08	0.82	6.2	A
	Sb-125	5.75E-06	2.04E-07	6.45E-06	1.90E-07	1.12	28.2	A
	Cs-137	9.29E-07	5.95E-08	9.23E-07	4.60E-08	0.99	15.6	A
Treated Waste Monitor Tank								
RP	Co-60	1.82E-06	9.70E-08	1.49E-06	6.00E-08	0.82	18.8	A
Det #1	Cs-134	2.53E-07	4.06E-08	2.01E-07	2.18E-08	0.80	6.2	A
	Sb-125	5.75E-06	2.04E-07	5.90E-06	1.53E-07	1.03	28.2	A
	Cs-137	9.29E-07	5.95E-08	9.40E-07	3.93E-08	1.01	15.6	A

TABLE 2

U.S. NUCLEAR REGULATORY COMMISSION

CONFIRMATORY MEASUREMENTS PROGRAM

Trojan Plant

October 5-9, 1992

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Waste Gas Decay Tank								
Chem. Det #1	Kr-85m	1.16E-05	3.69E-06	8.38E-06	2.08E-06	0.72	3.1	A
	Xe-131m	2.81E-04	9.63E-05	1.81E-04	4.14E-05	0.64	2.9	A
	Xe-133	1.77E-02	8.00E-05	1.70E-02	5.00E-05	0.96	221.5	A
	Xe-133m	3.20E-04	4.24E-05	3.27E-04	1.86E-05	1.02	7.5	A
	Xe-135	1.12E-03	1.50E-05	1.04E-03	8.00E-06	0.93	74.3	A
Waste Gas Decay Tank								
Chem Det #2	Kr-85m	1.16E-05	3.69E-06	7.39E-06	1.25E-06	0.64	3.1	A
	Xe-131m	2.81E-04	9.63E-05	2.39E-04	3.23E-05	0.85	2.9	A
	Xe-133	1.77E-02	8.00E-05	1.66E-02	3.00E-05	0.93	221.5	A
	Xe-133m	3.20E-04	4.24E-05	2.88E-04	1.15E-05	0.90	7.5	A
	Xe-135	1.12E-03	1.50E-05	1.06E-03	5.00E-06	0.95	74.3	A
Reactor Coolant								
Chem. Det #1	Ar-41	3.58E-02	1.71E-03	3.15E-02	1.62E-03	0.88	21.0	A
	Rb-88	1.41E-01	2.52E-02	1.58E-01	2.75E-02	1.12	5.6	A
	Rb-89	9.77E-02	8.54E-03	8.91E-02	1.08E-02	0.91	11.4	A
	Nb-95m	1.60E-02	2.65E-03	1.39E-02	2.64E-03	0.87	6.0	A
	Nb-97	3.22E-03	9.42E-04	2.58E-03	1.13E-03	0.80	3.4	A
	I-131	6.36E-03	9.77E-04	7.01E-03	1.06E-03	1.10	6.5	A
	I-132	1.28E-01	1.80E-03	1.31E-01	1.90E-03	1.03	71.0	A
	I-133	9.99E-02	1.54E-03	9.59E-02	1.53E-03	0.96	64.9	A
	I-134	3.03E-01	3.70E-03	3.06E-01	5.10E-03	1.01	82.0	A
	I-135	1.92E-01	6.70E-03	1.91E-01	6.40E-03	1.00	28.7	A
	Cs-138	3.20E-01	6.20E-03	3.30E-01	6.00E-03	1.03	51.6	A
	Kr-85m	1.22E-02	8.90E-04	1.11E-02	8.50E-04	0.92	13.7	A
	Xe-133	8.78E-02	2.78E-03	8.68E-02	3.55E-03	0.99	31.6	A
	Xe-135	1.22E-01	1.30E-03	1.16E-01	1.30E-03	0.94	94.2	A
	Xe-135m	1.11E-01	4.90E-03	9.51E-02	4.54E-03	0.86	22.6	A

TARLE 3

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Trojan Plant

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SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Reactor Coolant								
Chem.	Ar-41	3.58E-02	1.71E-03	3.21E-02	1.37E-03	0.89	21.0	A
Det #2	Rb-88	1.41E-01	2.52E-02	1.65E-01	2.20E-02	1.17	5.6	A
	Rb-89	9.77E-02	8.54E-03	8.99E-02	6.10E-03	0.92	11.4	A
	Nb-95m	1.60E-02	2.65E-03	8.80E-03	1.81E-03	0.55	6.0	A
	Nb-97	3.22E-03	9.42E-04	2.86E-03	7.31E-04	0.89	3.4	A
	I-131	6.36E-03	9.77E-04	9.90E-03	9.58E-04	1.56	6.5	A
	I-132	1.28E-01	1.80E-03	1.32E-01	1.30E-03	1.03	71.0	A
	I-133	9.99E-02	1.54E-03	1.02E-01	1.10E-03	1.02	64.9	A
	I-134	3.03E-01	3.70E-03	2.99E-01	3.50E-03	0.99	82.0	A
	I-135	1.92E-01	6.70E-03	2.06E-01	4.50E-03	1.07	28.7	A
	Cs-138	3.20E-01	6.20E-03	3.37E-01	3.70E-03	1.05	51.6	A
	Kr-85m	1.22E-02	8.90E-04	9.78E-03	7.37E-04	0.80	13.7	A
	Xe-133	8.78E-02	2.78E-03	8.96E-02	2.05E-03	1.02	31.6	A
	Xe-135	1.22E-01	1.30E-03	1.22E-01	1.00E-03	0.99	94.2	A
	Xe-135m	1.11E-01	4.90E-03	1.11E-01	3.40E-03	1.00	22.6	A
Reactor Coolant								
RP	Ar-41	3.58E-02	1.71E-03	3.30E-02	1.06E-03	0.92	21.0	A
Det #1	Rb-88	1.41E-01	2.52E-02	1.54E-01	1.76E-02	1.09	5.6	A
	Rb-89	9.77E-02	8.54E-03	7.88E-02	5.07E-03	0.81	11.4	A
	Nb-95m	1.60E-02	2.65E-03	1.02E-02	1.51E-03	0.64	6.0	A
	Nb-97	3.22E-03	9.42E-04	1.91E-03	4.86E-04	0.59	3.4	A
	I-131	6.36E-03	9.77E-04	8.38E-03	7.34E-04	1.32	6.5	A
	I-132	1.28E-01	1.80E-03	1.20E-01	1.10E-03	0.94	71.0	A
	I-133	9.99E-02	1.54E-03	9.52E-02	8.40E-04	0.95	64.9	A
	I-134	3.03E-01	3.70E-03	2.83E-01	2.90E-03	0.93	82.0	A
	I-135	1.92E-01	6.70E-03	1.98E-01	3.60E-03	1.03	28.7	A
	Cs-138	3.20E-01	6.20E-03	3.22E-01	3.20E-03	1.00	51.6	A
	Kr-85m	1.22E-02	8.90E-04	1.06E-02	5.80E-04	0.88	13.7	A
	Xe-133	8.78E-02	2.78E-03	8.39E-02	2.10E-03	0.96	31.6	A
	Xe-135	1.22E-01	1.30E-03	1.14E-01	8.00E-04	0.93	94.2	A
	Xe-135m	1.11E-01	4.90E-03	1.13E-01	2.90E-03	1.01	22.6	A

TABLE 4

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Trojan Plant

October 5-9, 1992

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Clean Waste Receiver Tank								
Chem.	Mn-54	1.96E-07	2.84E-08	0.00E-0	0.00E-0	0.00	6.9	D
Det #1	Co-58	2.41E-07	2.64E-08	2.39E-07	4.84E-08	0.99	9.1	A
	Co-60	2.99E-06	6.90E-08	2.51E-06	1.36E-07	0.84	43.3	A
	I-131	6.47E-08	1.14E-08	0.00E-0	0.00E-0	0.00	5.7	D
	Cs-137	1.12E-07	2.11E-08	9.49E-08	4.48E-08	0.85	5.3	A
Clean Waste Receiver Tank								
Chem.	Mn-54	1.96E-07	2.84E-08	2.07E-07	3.68E-08	1.06	6.9	A
Det #2	Co-58	2.41E-07	2.64E-08	2.45E-07	3.46E-08	1.02	9.1	A
	Co-60	2.99E-06	6.90E-08	2.57E-06	8.00E-08	0.86	43.3	A
	I-131	6.47E-08	1.14E-08	0.00E-0	0.00E-0	0.00	5.7	D
	Cs-137	1.12E-07	2.11E-08	9.50E-08	1.88E-08	0.85	5.3	A
Clean Waste Receiver Tank								
RP	Mn-54	1.96E-07	2.84E-08	1.62E-07	2.96E-08	0.82	6.9	A
Det #1	Co-58	2.41E-07	2.64E-08	1.87E-07	2.87E-08	0.78	9.1	A
	Co-60	2.99E-06	6.90E-08	2.34E-06	6.90E-08	0.78	43.3	A
	I-131	6.47E-08	1.14E-08	6.85E-08	1.75E-08	1.06	5.7	A
	Cs-137	1.12E-07	2.11E-08	9.04E-08	2.00E-08	0.81	5.3	A

TABLE 5

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Trojan Plant

October 5-9, 1992

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
Reactor Coolant								
Chem.	Cr-51	1.45E-04	2.20E-06	1.40E-04	4.00E-06	0.97	66.0	A
Det #1	Mn-54	2.19E-06	1.46E-07	1.78E-06	2.17E-07	0.81	15.0	A
	Co-58	2.51E-04	9.00E-07	2.27E-04	1.30E-06	0.90	279.0	A
	Fe-59	1.83E-06	2.92E-07	2.09E-06	3.72E-07	1.14	6.3	A
	Co-60	5.02E-06	2.26E-07	4.68E-06	2.68E-07	0.93	22.2	A
	Sn-117m	6.68E-07	8.79E-08	7.71E-07	1.91E-07	1.16	7.6	A
	Np-239	1.36E-05	3.60E-07	1.33E-05	6.20E-07	0.97	37.8	A
	Ru-103	5.62E-06	2.82E-07	5.05E-06	4.89E-07	0.90	19.9	A
	I-131	1.80E-05	2.90E-07	1.67E-05	4.90E-07	0.93	62.1	A
	Te-132	8.29E-06	1.88E-07	7.60E-06	2.64E-07	0.92	44.1	A
	I-133	4.99E-05	8.30E-07	4.49E-05	7.90E-07	0.90	60.1	A
Reactor Coolant								
Chem.	Cr-51	1.45E-04	2.20E-06	1.34E-04	2.10E-06	0.92	66.0	A
Det #2	Mn-54	2.19E-06	1.46E-07	2.04E-06	1.41E-07	0.93	15.0	A
	Co-58	2.51E-04	9.00E-07	2.34E-04	8.00E-07	0.93	279.0	A
	Fe-59	1.83E-06	2.92E-07	1.88E-06	2.61E-07	1.03	6.3	A
	Co-60	5.02E-06	2.26E-07	4.21E-06	1.76E-07	0.84	22.2	A
	Sn-117m	6.68E-07	8.79E-08	6.62E-07	1.11E-07	0.99	7.6	A
	Np-239	1.36E-05	3.60E-07	1.22E-05	3.30E-07	0.90	37.8	A
	Ru-103	5.62E-06	2.82E-07	4.97E-06	2.53E-07	0.88	19.9	A
	I-131	1.80E-05	2.90E-07	1.67E-05	3.00E-07	0.93	62.1	A
	Te-132	8.29E-06	1.88E-07	7.56E-06	2.05E-07	0.91	44.1	A
	I-133	4.99E-05	8.30E-07	4.39E-05	4.40E-07	0.88	60.1	A
Reactor Coolant								
RP	Cr-51	1.45E-04	2.20E-06	1.39E-04	2.30E-06	0.95	66.0	A
Det #1	Mn-54	2.19E-06	1.46E-07	2.28E-06	1.29E-07	1.04	15.0	A
	Co-58	2.51E-04	9.00E-07	2.27E-04	8.00E-07	0.91	279.0	A
	Fe-59	1.83E-06	2.92E-07	2.16E-06	2.30E-07	1.18	6.3	A
	Co-60	5.02E-06	2.26E-07	4.59E-06	1.61E-07	0.92	22.2	A
	Sn-117m	6.68E-07	8.79E-08	6.10E-07	1.02E-07	0.91	7.6	A
	Np-239	1.36E-05	3.60E-07	1.22E-05	3.40E-07	0.89	37.8	A
	Ru-103	5.62E-06	2.82E-07	5.07E-06	2.38E-07	0.90	19.9	A
	I-131	1.80E-05	2.90E-07	1.71E-05	2.60E-07	0.95	62.1	A
	Te-132	8.29E-06	1.88E-07	8.03E-06	1.94E-07	0.97	44.1	A
	I-133	4.99E-05	8.30E-07	4.30E-05	4.10E-07	0.86	60.1	A