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August 28, 1990
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Gentlemen:

Subject: NUCLEAR PLANT NO. 2, OPERATING LICENSE NPF-21
SEMI-ANNUAL EFFLUENT REPORT
JANUARY 1, 1990 - JUNE 30, 1990

In accordance with the Tile 10 of the Code of Federal Regulations, Part 50.36a (a)(2), the subject report is herewith being submitted.

Should you have any question, please contact Mr. R. G. Graybeal, Manager, WNP-2 Health Physics Chemistry.

Very truly yours,

J. W. Baker
WNP-2 Plant Manager

bk

cc: JB Martin - NRC
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WNP-2 SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

REPORTING PERIOD

JANUARY THROUGH JUNE 1990

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

LICENSE NO. NPF-21

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1.0 INTRODUCTION

This report is submitted in compliance with Technical Specification 6.9.1.11. It includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from WNP-2 during the previous six months of operation, with data summarized on a quarterly basis.

2.0 LIQUID EFFLUENTS

The radwaste liquid effluents were released in "batch mode" during the reporting period. No liquid releases occurred during the first calendar quarter and 23 batch releases occurred during the second calendar quarter. The total time period for the batch releases was 76.6 hours, with the maximum, minimum and average time periods for a release being 13, 1.63 and 3.33 hours respectively. The volume of dilution water considered is assumed to be the total volume of recirculating cooling tower blowdown flow for the period. The average flow rate of the Columbia River during January through June 1990 was 1.53E+05 cubic feet per second.

Computer runs, using LADTAP II, were performed to verify compliance with Technical Specification limits. There were no liquid releases during the first quarter. The second quarter calculated dose for the maximum individual (adult age group) was 3.5E-03 mrem whole body and 5.0E-03 mrem for the maximum organ. No abnormal liquid releases occurred during this reporting period.

The liquid batch releases were recirculated prior to sampling. A representative sample was obtained and analyzed for each batch release. A composite of the batch samples for each quarter was analyzed for strontium and iron analyses. The methods used for measuring the total radioactivity were gamma spectroscopy, liquid scintillation and proportional counting. Table 2-1 provides a summation of all liquid releases during this reporting period.

The percent of MPC limit in Table 2-1 is based on the total of the MPC fractions using the nuclides in Table 2-2 and the concentrations listed in 10CFR20, Appendix B, Table 2, Column 2.

Estimated total errors are listed in Table 2-1, and are propagated from individual error estimates of sample activity, sample volume, tank volume, and tank homogeneity. The estimated total errors were calculated by obtaining the square root of the sum of the squares of the individual error contributions and multiplying by 1.96 for a 95% confidence level.

Table 2-1

WNP-2 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
Report Period: January - June 1990

	Unit	1st Quarter	2nd Quarter	Est. Total Error* %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	** NA	1.5E-02	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	4.5E-08	
3. Percent of MPC limit	%	NA	1.4E+00	
B. Tritium				
1. Total release	Ci	NA	6.7E-01	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	2.0E-06	
3. Percent of MPC limit	%	NA	6.8E-02	
C. Dissolved and entrained gases				
1. Total release	Ci	NA	7.4E-03	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	2.2E-08	
3. Percent of MPC limit	%	NA	1.1E-02	
D. Gross alpha radioactivity				
1. Total release	Ci	NA	1.4E-10	2.3E+01
E. Volume of waste (prior to dilution)	liters	NA	1.4E+06	1.5E+01
F. Volume of dilution water used during period	liters	NA	3.3E+08	1.5E+01

* At 95% confidence level

Table 2-2

WNP-2 LIQUID EFFLUENTS - SOURCE TERMS

Report Period: January - June 1990 BATCH MODE

Nuclides Released	Unit	1st ** Quarter	2nd Quarter
Strontium-89	Ci	NA	1.3E-04
Strontium-90	Ci	NA	5.2E-05
Cesium-134	Ci	NA	1.3E-03
Cesium-137	Ci	NA	1.2E-03
Iodine-131	Ci	NA	1.2E-03
Cobalt-58	Ci	NA	2.6E-04
Cobalt-60	Ci	NA	5.1E-03
Iron-59	Ci	NA	1.3E-04
Zinc-65	Ci	NA	3.0E-03
Manganese-54	Ci	NA	3.6E-04
Chromium-51	Ci	NA	2.1E-03
Zirconium-Niobium-95	Ci	NA	1.1E-04
Molybdenum-99	Ci	NA	<2.8E-04
Technetium-99m	Ci	NA	<2.2E-05
Barium-Lanthanum-140	Ci	NA	<1.3E-04
Cerium-141	Ci	NA	7.6E-05
Cerium-144	Ci	NA	<2.0E-04
Iron-55	Ci	NA	1.2E-04
Total for Period (above	Ci	NA	1.5E-02

TABLE 2-2 (Continued)

Nuclides Released	Unit	1st ** Quarter	2nd Quarter
Xenon-133	Ci	NA	6.4E-03
Xenon-135	Ci	NA	1.0E-03
Tritium	Ci	NA	6.7E-01

** There were no liquid releases during the first quarter of 1990.

NOTE: Less than (<) values are not included in the Total For Period values.

3.0 GASEOUS EFFLUENTS

The gaseous radwaste effluents from WNP-2 were released from three (3) release points:

1. Main Plant Vent - mixed mode release
2. Turbine Building - ground level release
3. Radwaste Building - ground level release

The gaseous source terms from each release point are listed in Tables 3-1, 3-2, and 3-3. Table 3-4 provides a summation of the total activity released, the average release rate, the percent of Technical Specification limit, gross alpha radioactivity and the estimated total error associated with the measurements of radioactivity in the gaseous effluents.

Radioactivity measurements for gaseous effluent releases are performed for fission and activation gases by collecting the samples on charcoal traps and analyzing them using gamma spectroscopy. Tritium is sampled by freeze trapping and analyzed by liquid scintillation counting. Particulates and iodines are sampled using particulate filters and charcoal cartridges and are analyzed using gamma spectroscopy.

The percent of Technical Specification limit for fission and activation gases (air dose) was determined for locations 1 through 8 and were based on quarterly limits of ten (10) millirads for beta and five (5) millirads for gamma. Locations 3 through 8 were used to determine the most restrictive value to be used in Table 3-4, Section A.3.

The percent of Technical Specification limit calculations for iodines, particulates with half-lives greater than eight (8) days and tritium are based on the quarterly limit of 7.5 mrem to any organ. Locations 3 through 8 listed below were used to determine the most restrictive value to be used in Table 3-4 for each quarter. The nearest milk sampling location was changed during the second quarter from 6.4 miles SE, to 7.2 miles ESE. Please refer to Section 9 of this report for new or deleted locations for dose assessment and/or environmental monitoring locations.

Total error estimates are propagated from individual error estimates of sample volume, sample activity and effluent flow rate measurements. The overriding uncertainty in all cases is in the measurement of the effluent and sample volumes. The estimated error was determined to be 36% at the 95% confidence level.

Calculations were performed for releases using the GASPAR II computer program and parameters as outlined in the ODCM. Quarterly doses were determined at the following locations:

Location 1: Site Boundary; 1.2 miles (ground and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	9.7E-02	0.97	1.8E-01	3.60
2nd Qtr.	2.0E-02	0.18	1.6E-02	0.32

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	2.4E-01	3.20
2nd Qtr	8.0E-02	1.07

Location 2: Beyond Site boundary: 4.0 miles SE and 3.6 miles ESE respectively (ground and inhalation pathways) at locations having the highest X/Q values for mixed mode release.

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	1.5E-02	0.15	2.6E-02	0.52
2nd Qtr.	1.1E-02	0.11	5.2E-03	0.10

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	3.1E-02	0.41
2nd Qtr	1.7E-03	0.23

Location 3: 4.8 miles SE (ground, vegetables and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	4.5E-03	0.05	4.6E-03	0.09
2nd Qtr.	4.7E-03	0.05	2.3E-03	0.05

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	9.7E-02	1.29
2nd Qtr	7.0E-02	0.93

Location 4: 6.4 miles SE (ground, vegetables, meat, cow milk, and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	2.9E-03	0.03	3.1E-03	0.06
2nd Qtr.	3.0E-03	0.03	1.4E-03	0.03

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	5.6E-02	0.56
2nd Qtr	1.2E-01	1.60

Location 5: 4.2 miles ESE (ground, vegetables and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	5.0E-03	0.05	3.9E-03	0.08
2nd Qtr.	9.1E-03	0.09	3.9E-03	0.08

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	7.6E-02	1.01
2nd Qtr	1.1E-01	1.47

Location 6: 4.3 miles NE (ground and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	1.2E-03	0.01	1.2E-03	0.02
2nd Qtr.	1.2E-03	0.01	6.0E-04	0.01

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	8.1E-03	0.11
2nd Qtr	3.9E-03	0.05

Location 7: 4.1 miles ENE (ground, vegetables and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
1st Qtr.	5.5E-03	0.06	7.1E-03	0.14
2nd Qtr.	7.9E-03	0.08	3.3E-03	0.07

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr	8.7E-02	1.16
2nd Qtr	6.5E-02	0.87

Location 8: 7.2 miles ESE (ground, cow milk and inhalation pathways)

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec
2nd Qtr.	3.5E-03	0.04	1.4E-03	0.03

Highest Organ Dose	mrem	% Tech. Spec.
2nd Qtr	1.2E-01	1.60

In addition to the reactor site, WNP-2 has a permanent laundry facility located approximately 0.75 miles from the site. Its ventilation system contains HEPA filters on the discharge and is continuously monitored for particulates. Also near this location is a backup chemistry laboratory within the Emergency Operations Facility (EOF). The radiochemical hood within the chemistry lab contains HEPA filters and is monitored for radioactive releases when in operation. Gamma spectrometry indicated no radioactive material present other than that attributable to natural background.

There were no abnormal releases of gaseous effluent during the first and second quarters of 1990.

Table 3-1

WNP-2 GASEOUS EFFLUENTS
SOURCE TERMS - MIXED MODE RELEASES
MAIN PLANT VENT

Report Period
January - June 1990

CONTINUOUS MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<4.2E+01	<4.1E+01
Krypton-85m	Ci	2.6E+01	5.2E+00
Krypton-87	Ci	3.2E+00	<5.2E-01
Krypton-88	Ci	1.4E+01	2.1E+00
Xenon-133	Ci	6.3E+01	3.2E+02
Xenon-133m	Ci	<2.4E+00	5.9E+00
Xenon-135	Ci	6.5E+00	4.3E+01
Xenon-135m	Ci	1.3E+01	2.4E+00
Xenon-138	Ci	2.2E+01	4.6E+00
Argon-41	Ci	3.1E+00	2.1E-01
Total for period above	Ci	1.5E+02	3.8E+02

Table 3-1 (Continued

2. Iodines

Nuclides Released	Unit	1st Quarter	2nd Quarter
Iodine-131	Ci	1.5E-02	3.0E-02
Iodine-133	Ci	1.5E-02	3.5E-03
Iodine-135	Ci	1.2E-03	<3.8E-05
Total for period above	Ci	3.1E-02	3.4E-02

3. Particulates

Strontium-89	Ci	4.1E-05	1.7E-04
Strontium-90	Ci	8.1E-07	<4.7E-06
Cesium-134	Ci	1.2E-05	6.4E-05
Cesium-137	Ci	1.4E-05	8.1E-05
Barium-Lanthanum-140	Ci	8.0E-04	1.6E-04
Molybdenum-99	Ci	<1.5E-04	<3.7E-05
Cerium-141	Ci	<1.3E-05	<3.7E-06
Cerium-144	Ci	<4.9E-05	<2.2E-05
Cobalt-58	Ci	<1.0E-05	4.3E-05
Cobalt-60	Ci	1.6E-04	9.6E-04
Iron-59	Ci	<2.6E-05	<6.4E-06
Manganese-54	Ci	<9.2E-06	9.6E-05
Zinc-65	Ci	1.6E-04	5.9E-04
Others			
Chromium-51	Ci	6.3E-04	3.3E-04
Total for period (above)	Ci	1.8E-03	2.5E-03

Table 3-1 (Continued)

3. Particulates (continued)

Nuclides Released	Unit	1st Quarter	2nd Quarter
Others with T-1/2 <8 days			
Sodium-24	Ci	9.5E-05	<4.3E-06
Bromine-82	Ci	6.6E-05	<9.8E-06
Strontium-91	Ci	1.3E-03	1.0E-05
Technetium-99m	Ci	9.2E-04	2.8E-05
Tellurium-132	Ci	3.4E-05	4.3E-06
Cesium-138	Ci	8.3E-02	<4.0E-06
Barium-139	Ci	3.1E+00	<9.5E-06
Neptunium-239	Ci	1.2E-03	7.0E-06
Total with T 1/2 < 8 days	Ci	3.2E+00	4.9E-05

4. Tritium

Tritium	Ci	1.0E+00	7.7E-01
Total building release	Ci	1.5E+02	3.8E+02

Note: Less than (<) values are not included in the Total For Period Values.

Table 3-2

WNP-2 GASEOUS EFFLUENTS
SOURCE TERMS - GROUND LEVEL RELEASES
TURBINE BUILDING

Report Period
January - June 1990

CONTINUOUS MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<9.2E+01	<1.6E+02
Krypton-85m	Ci	<7.0E-01	<9.9E-01
Krypton-87	Ci	<9.8E-01	<1.2E-00
Krypton-88	Ci	<1.4E+00	<2.4E+00
Xenon-133	Ci	6.5E+00	1.1E+01
Xenon-133m	Ci	<3.3E+00	<4.8E+00
Xenon-135	Ci	1.8E+01	7.0E+00
Xenon-135m	Ci	2.4E+01	8.7E+00
Xenon-138	Ci	3.7E+01	1.6E+01
Total for period (above)	Ci	8.6E+01	4.3E+01
2. Iodines			
Iodine-131	Ci	1.9E-02	6.0E-03
Iodine-132	Ci	1.5E-02	1.2E-02
Iodine-133	Ci	5.1E-02	1.2E-02
Iodine-134	Ci	1.6E-03	<5.7E-05
Iodine-135	Ci	4.0E-02	1.8E-02
Total for period (above)	Ci	1.3E-01	4.8E-02

Table 3-2 (Continued

3. Particulates

Nuclides Released	Unit	1st Quarter	2nd Quarter
Strontium-89	Ci	1.8E-03	3.8E-03
Strontium-90	Ci	1.3E-05	<4.6E-06
Cesium-134	Ci	<1.9E-04	<5.1E-05
Cesium-137	Ci	1.9E-05	<7.3E-05
Barium-Lanthanum-140	Ci	9.2E-03	1.0E-03
Molybdenum-99	Ci	<3.0E-03	<8.2E-04
Cerium-141	Ci	7.8E-05	3.2E-06
Cerium-144	Ci	<1.1E-03	<2.9E-04
Cobalt-58	Ci	<2.1E-04	<5.9E-05
Cobalt-60	Ci	1.7E-05	<9.5E-05
Iron-59	Ci	<3.9E-04	<1.6E-04
Manganese-54	Ci	<1.8E-04	<7.0E-05
Zinc-65	Ci	<3.6E-04	<1.5E-04
Total for period (above)	Ci	1.1E-02	4.8E-03

Table 3-2 (Continued)

3. Particulates (continued)

Nuclides Released	Unit	1st Quarter	2nd Quarter
Others with T-1/2 <8 days			
Strontium-91	Ci	7.5E-02	7.6E-04
Strontium-92	Ci	7.5E-02	7.8E-02
Cesium-138	Ci	5.8E-01	1.4E+00
Barium-139	Ci	1.0E+00	3.0E-01
Yttrium-92	Ci	<4.1E-04	3.1E-04
Technetium-99m	Ci	<5.1E-05	2.6E-05
	Ci		
	Ci		
	Ci		
Total with T 1/2 < 8 days	Ci	1.7E+00	1.8E+00

4. Tritium

Tritium	Ci	7.1E+00	6.3E-00
Total building release	Ci	9.3E+01	4.9E+01

Note: Less than (<) values are not included in the Total For Period Values.

Table 3-3

WNP-2 GASEOUS EFFLUENTS
SOURCE TERMS - GROUND LEVEL RELEASES
RADWASTE BUILDING

Report Period
January - June 1990

CONTINUOUS MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<2.5E+01	<2.6E+01
Krypton-85m	Ci	<1.9E-01	<1.9E-01
Krypton-87	Ci	<8.4E-02	<7.6E-02
Krypton-88	Ci	<1.5E-01	<1.7E-02
Xenon-133	Ci	3.6E+00	7.4E+00
Xenon-133m	Ci	<4.8E-01	<5.6E-01
Xenon-135	Ci	7.3E+00	3.7E+00
Xenon-135m	Ci	7.7E+00	2.4E+00
Xenon-138	Ci	<1.4E-01	<1.5E-01
Total for period (above)	Ci	1.9E+01	1.4E+01
2. Iodines			
Iodine-131	Ci	6.1E-03	4.0E-03
Iodine-132	Ci	7.2E-03	4.4E-04
Iodine-133	Ci	1.4E-02	7.6E-03
Iodine-134	Ci	5.7E-04	<9.8E-05
Iodine-135	Ci	1.0E-02	2.4E-03
Total for period (above)	Ci	3.8E-02	1.4E-02

Table 3-3 (Continued

Nuclides Released	Unit	1st Quarter	2nd Quarter
3. Particulates			
Strontium-89	Ci	5.1E-05	2.7E-05
Strontium-90	Ci	1.3E-05	<4.4E-06
Cesium-134	Ci	<7.1E-06	<1.8E-06
Cesium-137	Ci	<9.0E-06	<2.4E-06
Barium-Lanthanum-140	Ci	<3.5E-05	<7.4E-06
Molybdenum-99	Ci	<6.6E-05	<2.2E-05
Cerium-141	Ci	<1.8E-05	<3.0E-06
Cerium-144	Ci	<7.0E-05	<1.3E-05
Cobalt-58	Ci	<9.7E-06	<1.6E-06
Cobalt-60	Ci	<1.0E-05	<3.0E-06
Iron-59	Ci	<1.8E-05	<4.6E-06
Manganese-54	Ci	<9.4E-06	<1.5E-06
Zinc-65	Ci	<2.5E-05	<4.5E-06
Others			
	Ci		
	Ci		
	Ci		
Total for period (above)	Ci	6.4E-05	2.7E-05
4. Tritium			
Tritium	Ci	1.1E+00	1.8E-01
Total building release	Ci	2.0E+01	1.4E+01

Note: Less than (<) values are not included in the Total For Period Values.

Table 3-4

WNP-2 GASEOUS EFFLUENTS
SUMMATION OF ALL RELEASES

Report Period
January - June 1990

	Unit	1st Quarter	2nd Quarter	Est. Total Error %*
A. Fission and activation gases				
1. Total release	Ci	2.5E+02	4.4E+02	3.6E+01
2. Average release rate per period.	uCi/sec	3.3E+01	5.6E+01	
3. Percent of Technical Specification limit	%	1.4E-01	9.0E-02	
B. Iodines				
1. Total iodine	Ci	2.0E-01	9.6E-02	3.6E+01
2. Average release rate for period	uCi/sec	2.5E-02	1.2E-02	
3. Percent of Technical Specification limit	%	1.3E+00	1.6E+00	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	1.3E-02	7.3E-03	3.6E+01
2. Average release rate for period	uCi/sec	1.7E-03	9.3E-04	
3. Percent of Technical Specification limit	%	1.3E+00	1.6E+00	
4. Gross alpha radioactivity	Ci	3.3E-11	1.7E-11	
D. Tritium				
1. Total release	Ci	9.2E+00	7.3E-00	3.6E+01
2. Average release rate for period	uCi/sec	1.2E+00	9.2E-01	
3. Percent of Technical Specification limit	%	1.3E+00	1.6E+00	

* At 95% confidence level

Table 3-5

WNP-2 GASEOUS EFFLUENTS
BATCH RELEASES

Report Period
January - June 1990

Type	Number	Total Time (hrs)	Maximum Time (hrs)	Minimum Time (hrs)	Mean Time (hrs)
Purge	4	46.0	16.4	4.6	11.5
Vent	17	17.5	2.0	0.7	1.0

4.0 SOLID WASTE

A total volume of 10,593 ft^3 (300 m^3) of solid waste was transported in 32 shipments during the January through June, 1990 reporting period. The total activity of the waste shipped was 635.7 Ci; 576 Ci contained in dewatered spent resins, 59.7 Ci were contained in Dry Active Waste (DAW).

A. Dewatered Spent Resin

Dewatered resins accounted for 4,131 ft^3 (117 m^3) of the radioactive wastes shipped during the reporting period. The burial containers were ES-190 and EA-142 liners provided by NUPAC Services, Inc. The total activity of the resins shipped during the reporting period was 576 Ci. The principle nuclides and their percent contribution to the total activity are listed in Table 4-3. The solid wastes were shipped to the U.S. Ecology, Hanford burial site using flat bed trailers and NUPAC 10-142, LN-14-170, or USEcology 14-D2.0 casks.

The counting error associated with the total activity was 1.64%. Other parameters considered in estimating the total error of the activity shipped included the error in measuring the absolute volume, the weight of the waste in the liners, the representativeness of the sample taken, the homogeneity of the nuclide distribution within a batch or liner and the geometry error in the gamma spectroscopy analysis. The gamma spectroscopy calibration error is approximately 5%. The best estimate of the total error in the activity of spent resin shipped was assumed to be less than or equal to 20%.

B. Dry Active Waste (DAW)

A total of 6462 ft^3 (183 m^3) of DAW was shipped in 62 Container Products Corporation, B-25 steel boxes, 4 NUPAC Services ES-190 carbon steel liners, and 1 NUPAC Services EA-50 Ferralium HIC. The total activity of the DAW shipped was 59.7 Ci. The values for the activities shipped were determined by using dose rate-to-curie conversion factors. The conversion factors were based on nuclide distribution taken from analysis of contamination found in each of the major DAW production areas. The nuclide distribution is updated monthly. Short-lived nuclides were eliminated based on decay of the DAW prior to shipment. A meaningful counting error cannot be generated for the DAW; however, the total error may be assumed to be less than or equal to 20%, since DAW would be subjected to similar error contributions as the spent resins.

4.1 Scaling Factor Methodology

Scaling factors are based on outside laboratory (SAIC) analysis of hard-to-measure nuclides. Scaling factors are updated on an annual basis. For those waste streams where the scaling or the scaled

nuclide concentration is not sufficient to provide a viable scaling factor, the final EPRI Report "Updated Scaling Factors in Low Level Radwaste", NP-5077, March 1987 has been used as a basis for the determination of a scaling factor.

H-3

Sampling of individual waste streams was performed with analyses performed by an outside lab. The H-3 concentration was measured per gram of waste material. This value was compared to the Reactor Coolant System H-3 concentration. The scaling factor is derived from the ratio of the H-3 concentration in the waste stream to RCS H-3 concentration.

C-14, Tc-99, I-129

Sampling of the individual waste stream was performed with analysis by off-site lab to determine isotopic concentration. Ratios were developed between the scaled nuclide to the scaling nuclide concentration determined by analysis. In those cases where the scaling nuclide is not available in large enough quantities to develop reliable (viable) scaling factors, the recommendations made in Section 3 of the referenced EPRI report will be followed.

TRU, Sr-90, Ni-63

TRU nuclides are scaled to Ce-144, as recommended by the AIF report "Methodolgies for Classification of Low Level Radioactive Waste from Nuclear Power Plants". These nuclides are not considered to be present if the scaled values are less than: 1 nCi/g for TRU, 35 nCi/g for Pu-241 or 200 nCi/g for Cf-242. TRU nuclides will be reported if the scaling nuclide (Ce-144) is reliably detected and Cs-137 is also present.

Sampling of individual waste streams has been performed with analyses by an outside laboratory. Cs-137 and Sr-90 concentrations were measured in each waste stream except waste oil. The ratio of Cs-137 to Sr-90 has been determined and is used as the scaling factor for Sr-90 from Cs-137. For waste oil, the values from the referrenced EPRI Report will be used for scaling factors. Co-60 and Ni-63 concentrations were measured in each of the sampled waste streams. The ratio of Co-60 to Ni-63 has been determined and is used as the scaling factor for Ni-63 from Co-60.

Table 4-1 lists scaling factors by waste stream for those nuclides that are required to be reported. Table 4-2 lists scaling factors for the conditional nuclides that are reported only when the scaling nuclide is found to be present.

4.2 Process Control Program

The Process Control Program (PCP) used to control solidification at WNP-2 will be provided by the vendor waste processor, Pacific Nuclear Inc. in accordance with Contract C-20452, and will be subjected to POC review prior to any solidification of radwaste. Normally approved High Integrity Containers (HIC's) are used for the transport of wastes requiring stabilization. Other portions of the radwaste program are controlled by the WNP-2 procedures PPM 1.12.1, "Radwaste Management Program", PPM 1.12.2, "Radwaste Process Control Program", and 1.12.3, "Contract (Vendor) Waste Processing". There were no significant changes during the reporting period.

SCALING FACTORS

Table 4-1 - Required Nuclides

Ratio	DAW	RWCU POWDER RESIN	CFD POWDER RESIN	EDR/FDR POWDER RESIN	EDR/FDR BEAD RESIN	SLUDGE	OIL
H-3/Rx Coolant	4.5E-1	4.3E-1++	4.30E-1	4.30E-1++	2.22E-1	3.10E-1	4.0E-5+
C-14/Co-60	6.21E-4	6.4E-5	6.2E-4++++	1.64E-4	2.90E-2	8.81E-5	1.3E-2+
Tc-99/Cs-137	4.6E-4+	1.1E-4+	9.3E-5+	9.3E-5+	9.3E-5+	9.3E-5+	4.2E-5+
I-129/Cs-137	2.6E-4+	1.0E-5+	3.9E-5+	3.9E-5+	3.9E-5+	3.9E-5+	6.3E-5+

Table 4-2 - Conditional Nuclides

Ni-63/Co-60	4.27E-2	7.74E-3	2.4E-2	4.53E-2	2.4E-2	1.5E-2+++	1.2E0+
Fe-55/Co-60	7.06E-1	2.6E-1	3.4E-1	3.06E-1	1.06E-1	4.10E-1	1.5E0+
Sr-90/Cs-137	2.6E-3+	1.2E-2+	1.6E-2+	5.00E-3	5.91E-3	2.67E-5	3.3E-1+
Pu-239/Ce-144	4.5E-3+	5.8E-3+	9.7E-3+	9.7E-3+	9.7E-3+	8.7E-4+	1.1E-2+
Pu-238/Pu-239	1.5E0+	8.0E-1+	1.7E0+	1.7E0+	1.7E0+	1.7E0+	1.6E0+
Pu-241/Pu-239	1.1E2+	9.4E1+	9.6E1+	9.6E1+	9.6E1+	9.1E1+	1.2E2+
Am-241/Pu-239	9.1E-1+	3.9E-1+	6.6E-1+	6.6E-1+	6.6E-1+	1.7E0+	4.7E-1+
Cm-242/Pu-239	9.5E-1+	7.0E-1+	9.7E-1+	9.7E-1+	9.7E-1+	5.7E-1+	3.1E-1+
Cm-244/Pu-239	7.2E-1+	3.0E-1+	7.6E-1+	7.6E-1+	7.6E-1+	7.8E-1+	2.9E-1+

\+ Scaling or scaled nuclide was not present in enough concentration to make determination of scaling factor. In these cases the scaling factor was obtained from the "Updated Scaling Factors in Low-Level Radwaste" EPRI NP-5077 Final March 1987.

++ Outside laboratory (SAIC) analysis of the H-3 concentration in RWCU & EDR/FDR resins identified H-3 concentrations higher than those indicated for reactor coolant. This is not consistent with the data presented in the EPRI reports and has no logical basis since H-3 is not concentrated in resin and is a function only of the amount of interstitial water trapped in the resin. The water content of dewatered powdered resin was identified as 55% in EPRI NP-4037 and would be expected to be even less for the drying system in use at WNP-2 which utilizes a humidity gauge to define the drying cycle end point. For these reasons the H-3/RX coolant ratio reported for CFD powdered resin will be used for all three powdered resin waste streams. The CFD H-3/RX coolant ratio of 0.43 is consistent with the EPRI reports and the drying system in use at WNP-2.

+++ Independent laboratory analysis showed the Ni-63 concentration of sludges at 4.03E-3 uCi/gm which compares to the Co-60 concentration of 3.52E-2 uCi/gm. This comparison would yield a Scaling Factor of 1.14E-1. The above mentioned EPRI Report recommends a Scaling Factor of 1.5E-2. Because of the long period of time between the generation of the waste and the counting of the sample (approximately 1 year) the EPRI Number is considered more accurate.

++++ The independent laboratory analysis showed the C-14 concentration in CFD of 3.62E-3 uCi/gm which compares to the Co-60 concentration of 5.96E-3 uCi/gm. This comparison would yield a Scaling Factor of 6.07E-1. The above mentioned EPRI report recommends a Scaling Factor of 6.2E-4. It is felt that there was cross contamination of the sample at the lab resulting in high concentration of C-14. The recommended EPRI number will be used.

Table 4-3
WNP-2 SOLID WASTE SHIPMENTS

January - June 1990

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

1. Type of Waste

Waste Stream	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	117 576	20
b. Dry active waste, contaminated equip., etc.	m^3 Ci	183 59.7	20
c. Irradiated components, control rods, etc.	m^3 Ci	No Shipment	
d. Other, (absorbed aqueous liquid)	m^3 Ci	No Shipment	

2. Estimate of major nuclide composition (by type of waste):

a. Dewatered Spent Resins

Nuclide	%	Ci
1 Cr-51	32.3	186
2 Zn-65	27.3	157
3 Co-60	17.4	100
4 CS-137	5.2	29.7
5 CS-134	5.0	29.0
6 Fe-55*	4.7	27.0
7 CO-58	2.7	15.6
8 Mn-54	1.8	10.3
9 I-131	1.2	6.95
10 La-140	0.6	3.25

*Indicates scaled nuclide

b. Dry Active Wastes (DAW)

Nuclide	%	Ci
1 Co-60	43.4	25.9
2 Fe-55*	30.5	18.2
3 Zn-65	14.2	8.45
4 Cr-51	2.7	1.63
5 Ni-63*	1.9	1.11
6 Sb-125	1.7	1.04
7 Nb-95	1.7	1.04
8 Mn-54	1.4	0.823
9 Zr-95	0.7	0.414
10 Co-58	0.6	0.333

c. Irradiated Components - None

d. Other - Absorbed Liquids - None

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
32	Flat bed trailer (6) 10-142 Cask (2) 14-170 Cask (13) 14-D2.0 Cask (11)	US Ecology Richland, WA

B. IRRADIATED FUEL SHIPMENTS (Disposition)

None

*Indicates scaled nuclide

Note: The top ten radionuclides are listed in descending curie quantities.

5.0 METEOROLOGICAL DATA

The meteorological data for the first half of calendar year 1990 will be included in the Semiannual Effluent Report due 60 days after January 1, 1991 and will include data covering the full calendar year 1990. An extended outage of the main meteorological tower occurred during the 1st Quarter 1990. A discussion of its effect on the yearly data collection will be included with the data in the above report.

6.0 DOSE ASSESSMENT - IMPACT ON MAN

The dose impact on man for the calendar year 1990 will be included in the Semiannual Effluent Report due 60 days after January 1, 1991.

7.0 REVISIONS TO THE ODCM

No amendments were made to the WNP-2 Offsite Dose Calculations Manual (ODCM) during this reporting period.

8.0 REVISIONS TO THE PROCESS CONTROL PROGRAM (PCP)

No changes were made to the Process Control Program (PCP) during this reporting period which required POC approval.

9.0 NEW OR DELETED LOCATIONS FOR DOSE ASSESSMENTS AND/OR ENVIRONMENTAL MONITORING LOCATIONS

9.1 Locations where GASPAR II dose calculations were performed for the first and/or second quarters of 1990:

9.1.1 4.8 miles southeast (SE) for the highest organ dose using ground, inhalation and vegetation pathways.

9.1.2 6.4 miles southeast (SE) for the highest organ dose using ground, vegetables, cow milk inhalation and meat pathways.

9.1.3 4.2 miles east southeast (ESE) for the highest organ dose using ground, inhalation and vegetable pathways.

9.1.4 7.2 miles east southeast (ESE) for the highest organ dose using ground, inhalation and cow milk pathways.

9.1.5 4.3 miles northeast (NE) for the highest organ dose using ground and inhalation pathways.

9.1.6 4.1 miles east northeast (ENE) for the highest organ dose using ground, inhalation and vegetable pathways.

9.2 A new milk sampling location was established during the second quarter at 10.9 miles southeast (SE). This location was the only available milk sampling site in the region, other than the ones already sampled. Since this location is not within the 9.9 miles required by the Technical Specifications, this deviation from the Technical Specifications requirements will be reported in the annual "Radiological Environmental Monitoring Program" (REMP) report until a closer milk sampling site is located.

9.3 Milk sampling was discontinued at 6.4 miles southeast (SE) due to the unavailability of milk samples there.

10.0 MAJOR CHANGES TO RADIOACTIVE LIQUID, GASEOUS AND SOLID WASTE TREATMENT SYSTEMS

No major changes were made to the radioactive waste systems (liquid, gaseous, or solid) during this reporting period.