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August 28, 1991
G02-91-158

Docket No. 50-397

U.S. Nuclear Regulatory Commission
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Gentlemen:

Subject: NUCLEAR PLANT NO. 2, OPERATING LICENSE NPF-21
SEMI-ANNUAL EFFLUENT REPORT
JANUARY 1, 1991 - JUNE 30, 1991

In accordance with Title 10 of the Code of Federal Regulations, Part 50.36a(a)(2), and section 6.9.1.11 of the WNP-2 Technical Specifications the subject report is herewith being submitted.

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

Very truly yours,

J. W. Baker
WNP-2 Plant Manager

TEC/bk
Attachments

cc: JB Martin - NRC RV
NS Reynolds - Winston & Strawn
PL Eng - NRC
DL Williams - BPA/399
NRC Site Inspector - 901A
D Sherman - American Nuclear Insurers
TS Strong - DSHS
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10CFR50.36a(a)(2)

WNP-2 SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JANUARY THROUGH JUNE 1991

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

LICENSE NO. NPF-21

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1.0 INTRODUCTION

This report is submitted in compliance with 10CFR50.36a(a)(2) and 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 26 batch releases occurred during the second calendar quarter. The total time period for the batch releases was 49.3 hours, with the maximum, minimum and average time periods for a release being 2.8, 0.3 and 1.9 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 1991 was 1.59E+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 1.3E-03 mrem whole body and 2.2E-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. 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 1991

	Unit	1st Quarter	2nd Quarter	Est Total Error* %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	NA	2.5E-02	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	4.9E-08	
3. Percent of MPC limit	%	NA	7.6E-02	
B. Tritium				
1. Total release	Ci	NA	8.5E-01	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	1.7E-06	
3. Percent of MPC limit	%	NA	5.7E-02	
C. Dissolved and entrained gases				
1. Total release	Ci	NA	<1.1E-04	2.2E+01
2. Average diluted concentration during period	uCi/ml	NA	NA	
3. Percent of MPC limit	%	NA	NA	
D. Gross alpha radioactivity				
1. Total release	Ci	NA	3.2E-09	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	5.0E+08	1.5E+01

* At 95% confidence level

Table 2-2

WNP-2 LIQUID EFFLUENTS - SOURCE TERMS

Report Period: January - June 1991 BATCH MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
Strontium-89	Ci	* NA	8.8E-06
Strontium-90	Ci	NA	5.6E-06
Cesium-134	Ci	NA	2.5E-04
Cesium-137	Ci	NA	4.2E-04
Iodine-131	Ci	NA	<7.7E-05
Cobalt-58	Ci	NA	6.0E-04
Cobalt-60	Ci	NA	6.7E-03
Iron-59	Ci	NA	2.9E-04
Zinc-65	Ci	NA	5.4E-03
Manganese-54	Ci	NA	5.8E-04
Chromium-51	Ci	NA	9.5E-03
Zirconium-Niobium-95	Ci	NA	2.0E-04
Molybdenum-99	Ci	NA	<8.4E-04
Technetium-99m	Ci	NA	<3.1E-05
Barium-Lanthanum-140	Ci	NA	<2.8E-04
Cerium-141	Ci	NA	1.2E-04
Cerium-144	Ci	NA	<3.3E-04
Iron-55	Ci	NA	2.7E-04

Table 2-2 (continued)

Nuclides Released	Unit	1st Quarter	2nd Quarter
Others			
Silver-110M	Ci	NA	2.1E-04
Total for period (above)	Ci	NA	2.5E-02
Xenon-133	Ci	NA	<5.4E-05
Xenon-135	Ci	NA	<5.9E-05
Tritium	Ci	NA	8.5E-01

* There were no liquid releases during the first quarter of 1991.

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 both are analyzed using gamma spectroscopy.

The percent of Technical Specification limit for fission and activation gases (air dose) was determined for locations 1 through 7 and were based on quarterly limits of ten (10) millirads for beta and five (5) millirads for gamma. Locations 3 through 7 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 7 listed below were used to determine the most restrictive value to be used in Table 3-4 for each quarter.

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	2.0E-02	0.20	1.1E-02	0.22
2nd Qtr.	3.7E-03	0.04	5.1E-03	0.10

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	5.9E-02	0.79
2nd Qtr.	1.3E-02	0.17

Location 2: Beyond Site Boundary; 4.0 miles ESE and 3.2 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.	1.3E-03	0.01	8.0E-04	0.02
2nd Qtr.	3.0E-04	0.00	3.0E-03	0.06

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	4.3E-03	0.06
2nd Qtr.	2.6E-03	0.03

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	1.8E-03	0.02	1.2E-03	0.02
2nd Qtr.	2.0E-04	0.00	1.6E-04	0.00

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	1.2E-02	0.16
2nd Qtr.	7.0E-03	0.09

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	9.1E-04	0.01	5.9E-04	0.01
2nd Qtr.	1.2E-04	0.00	1.0E-04	0.00

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	3.4E-03	0.05
2nd Qtr.	1.1E-02	0.15

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	1.4E-03	0.01	1.1E-03	0.02
2nd Qtr.	2.2E-04	0.00	2.9E-04	0.01

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	8.8E-03	0.12
2nd Qtr.	7.6E-03	0.10

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	4.6E-04	0.00	3.5E-04	0.01
2nd Qtr.	6.5E-04	0.00	5.3E-05	0.00

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	1.3E-03	0.02
2nd Qtr.	4.8E-04	0.01

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
1st Qtr.	9.6E-04	0.01	7.0E-04	0.01
2nd Qtr.	6.8E-05	0.00	5.9E-05	0.00

Highest Organ Dose	mrem	% Tech. Spec.
1st Qtr.	5.4E-03	0.07
2nd Qtr.	4.0E-03	0.05

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 1991.

There were two reportable occurrences for inclusion into this Semiannual Radioactive Effluent Release Report.

1. A PER, 291-432, was issued to correct a non-sampling condition; a temporary air flow cart was set up with improper valve settings which resulted in no noble gas, iodine or particulate collection for a 6-1/2 hour period. The reactor had been shut down for 39 days, no dose consequence to station personnel, equipment or general public was incurred.

2. A NRC inspection report 91-09 closed an Iron-55 analysis problem. A report, IR 89-15-03, opened an issue when the analytical cross check disagreed for Fe-55 results on liquid sampling. Evaluation of the

test found a standard lower in activity than was labeled. The liquid release calculations were overly conservative for the third quarter of 1990. The semi-annual reported value was a factor of 1.48 too high; the amended value for Fe-55 results should be 1.01 E-05 Ci. There was no dose consequence to the public.

The above mentioned occurrences had no adverse effect on plant emissions or the health and safety of the public or plant personnel.

Table 3-1

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

Report Period
January - June 1991

		CONTINUOUS MODE	
Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<4.2E+00	<3.6E+01
Krypton-85m	Ci	2.3E-01	2.1E-02
Krypton-87	Ci	<5.6E-01	<4.4E-01
Krypton-88	Ci	<8.9E-01	<5.2E-01
Xenon-133	Ci	2.7E+00	<6.7E-01
Xenon-133m	Ci	<2.0E+00	<1.1E+00
Xenon-135	Ci	4.0E+00	1.9E+00
Xenon-135m	Ci	3.6E+00	7.2E-01
Xenon-138	Ci	1.2E+01	1.6E+00
OTHERS			
Xenon-137	Ci	1.6E+01	<2.2E+00
Argon-41	Ci	4.8E+00	4.8E-01
Total for period (above)	Ci	4.3E+01	4.7E+00

Table 3-1 (continued)

2. Iodines

Nuclides Released	Unit	1st Quarter	2nd Quarter
Iodine-131	Ci	1.1E-03	1.0E-03
Iodine-133	Ci	4.9E-03	3.5E-03
Iodine-135	Ci	1.6E-04	<7.0E-05
Total for period (above)	Ci	6.2E-03	4.5E-03

3. Particulates

Nuclides Released	Unit	1st Quarter	2nd Quarter
Strontium-89	Ci	5.5E-04	7.1E-04
Strontium-90	Ci	3.8E-06	1.1E-05
Cesium-134	Ci	<2.9E-05	1.4E-05
Cesium-137	Ci	<3.1E-05	7.1E-05
Barium-Lanthanum-140	Ci	1.0E-02	1.4E-04
Molybdenum-99	Ci	<1.9E-04	<1.6E-04
Cerium-141	Ci	<2.0E-05	<1.7E-05
Cerium-144	Ci	<9.3E-05	<8.1E-05
Cobalt-58	Ci	<2.4E-05	1.9E-05
Cobalt-60	Ci	3.3E-04	1.5E-03
Iron-59	Ci	<8.7E-05	<7.6E-05
Manganese-54	Ci	<2.3E-05	<2.0E-05
Zinc-65	Ci	5.9E-04	7.2E-04

Table 3-1 (continued)

3. Particulates (continued)

Nuclides Released	Unit	1st Quarter	2nd Quarter
OTHERS			
Chromium-51	Ci	7.7E-04	9.4E-05
Total for period (above)	Ci	1.2E-02	3.3E-03
OTHERS with T 1/2 <8 days			
Sodium-24	Ci	3.0E-05	<3.4E-05
Strontium-91	Ci	6.2E-05	5.3E-06
Technetium-99m	Ci	7.4E-05	1.4E-06
Tellurium-132	Ci	5.0E-04	<4.2E-04
Barium-139	Ci	2.6E-02	2.6E-03
Neptunium-239	Ci	4.9E-05	<9.0E-05
Total with T 1/2 < 8 days	Ci	2.7E-02	2.6E-03

4. Tritium

Tritium	Ci	9.0E-01	7.1E-01

Total building release	Ci	4.4E+01	5.5E+00

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 1991

CONTINUOUS MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<1.0E+02	<2.5E+02
Krypton-85m	Ci	<3.7E-01	<2.3E+00
Krypton-87	Ci	<2.3E+00	<1.7E+00
Krypton-88	Ci	<3.2E+00	<2.8E+00
Xenon-133	Ci	3.1E+00	<2.4E+00
Xenon-133m	Ci	<6.0E+00	<5.7E+00
Xenon-135	Ci	3.6E+00	1.5E-01
Xenon-135m	Ci	8.4E+00	<3.9E+00
Xenon-138	Ci	1.5E+01	4.1E-01
Total for period (above)	Ci	3.0E+01	5.6E-01

2. Iodines

Nuclides Released	Unit	1st Quarter	2nd Quarter
Iodine-131	Ci	1.4E-03	1.4E-03
Iodine-132	Ci	3.3E-03	1.1E-03
Iodine-133	Ci	8.8E-03	2.3E-03
Iodine-135	Ci	1.5E-02	2.2E-03
Total for period (above)	Ci	2.9E-02	6.9E-03

Table 3-2 (continued)

3. Particulates

Nuclides Released	Unit	1st Quarter	2nd Quarter
Strontium-89	Ci	2.7E-03	7.9E-04
Strontium-90	Ci	7.1E-06	2.3E-05
Cesium-134	Ci	<9.5E-04	<6.8E-04
Cesium-137	Ci	<1.1E-03	<6.9E-04
Barium-Lanthanum-140	Ci	4.6E-03	1.0E-03
Molybdenum-99	Ci	<1.7E-02	<6.6E-03
Cerium-141	Ci	<1.3E-03	<6.0E-04
Cerium-144	Ci	<4.2E-03	<1.6E-03
Cobalt-58	Ci	<1.4E-03	<7.3E-04
Cobalt-60	Ci	<1.4E-03	2.3E-05
Iron-59	Ci	<2.7E-03	<2.2E-03
Manganese-54	Ci	<9.0E-04	<6.6E-04
Zinc-65	Ci	<2.4E-03	<1.7E-03
Total for period (above)	Ci	7.3E-03	1.9E-03

Table 3-2 (continued)

Nuclides Released	Unit	1st Quarter	2nd Quarter
OTHERS with T 1/2 < 8 days			
Strontium-91	Ci	1.2E-03	1.2E-04
Tellurium-132	Ci	1.1E-05	<7.3E-04
Barium-139	Ci	8.9E-01	1.2E-01
Rubidium-89	Ci	8.3E-04	<1.2E-03
Strontium-92	Ci	4.2E-02	<8.6E-05
Cesium-138	Ci	1.9E+00	2.4E-01
Total with T 1/2 < 8 days	Ci	2.8E+00	3.6E-01

4. Tritium

Tritium	Ci	3.9E+00	2.6E+00

Total building release	Ci	3.4E+01	3.2E+00

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 1991

CONTINUOUS MODE

Nuclides Released	Unit	1st Quarter	2nd Quarter
1. Fission gases			
Krypton-85	Ci	<1.8E+01	<1.3E+02
Krypton-85m	Ci	<2.5E-01	<5.5E-01
Krypton-87	Ci	<4.3E-01	<4.8E-01
Krypton-88	Ci	<1.4E+00	<7.5E-01
Xenon-133	Ci	6.9E+00	2.3E-01
Xenon-133m	Ci	<4.0E+00	<2.4E+00
Xenon-135	Ci	1.7E+00	3.1E+00
Xenon-135m	Ci	5.7E+00	1.6E+00
Xenon-138	Ci	<7.9E-01	<1.6E+00
Total for period (above)	Ci	1.4E+01	5.0E+00

2. Iodines

Nuclides Released	Unit	1st Quarter	2nd Quarter
Iodine-131	Ci	3.1E-04	1.7E-04
Iodine-132	Ci	3.5E-04	<4.7E-05
Iodine-133	Ci	1.2E-03	2.5E-04
Iodine-135	Ci	3.3E-04	4.1E-05
Total for period (above)	Ci	2.2E-03	4.7E-04

Table 3-3 (continued)

3. Particulates

Nuclides Released	Unit	1st Quarter	2nd Quarter
Strontium-89	Ci	2.1E-07	7.5E-06
Strontium-90	Ci	<1.2E-05	<4.9E-07
Cesium-134	Ci	<2.5E-05	<2.3E-05
Cesium-137	Ci	<2.0E-05	<2.3E-05
Barium-Lanthanum-140	Ci	<6.4E-05	<6.3E-05
Molybdenum-99	Ci	<2.5E-05	<2.7E-04
Cerium-141	Ci	<2.2E-05	<1.9E-05
Cerium-144	Ci	<8.2E-05	<7.3E-05
Cobalt-58	Ci	<1.8E-05	<2.0E-05
Cobalt-60	Ci	<4.0E-05	<4.5E-05
Iron-59	Ci	<5.5E-05	<6.8E-05
Manganese-54	Ci	<1.9E-05	<2.1E-05
Zinc-65	Ci	<4.6E-05	<6.0E-05
Total for period (above)	Ci	2.1E-07	7.5E-06

4. Tritium

Tritium	Ci	2.4E-01	7.4E-02
Total building release	Ci	1.5E+01	5.1E+00

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

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Table 3-4

WNP-2 GASEOUS EFFLUENTS
SUMMATION OF ALL RELEASES

Report Period
January - June 1991

	Unit	1st Quarter	2nd Quarter	Est Total Error %*
A. Fission and activation gases				
1. Total release	Ci	8.8E+01	1.0E+01	3.6E+01
2. Average release rate for period	uCi/sec	1.1E+01	1.3E+00	
3. Percent of Tech. Spec. limit	%	2.4E-02	5.8E-03	
B. Iodines				
1. Total iodine release	Ci	3.7E-02	1.2E-02	3.6E+01
2. Average release rate for period	uCi/sec	4.7E-03	1.5E-03	
3. Percent of Tech. Spec. limit	%	1.6E-01	1.5E-01	
C. Particulates				
1. Particulates	Ci	2.0E-02	5.2E-03	3.6E+01
2. Average release rate for period	uCi/sec	2.5E-03	6.6E-04	
3. Percent of Tech. Spec. limit	%	1.6E-01	1.5E-01	
4. Gross alpha radioactivity	Ci	1.7E-04	5.8E-04	
D. Tritium				
1. Total release	Ci	5.0E+00	3.4E+00	3.6E+01
2. Average release rate for period	uCi/sec	6.5E-01	4.4E-01	
3. Percent of Tech. Spec. limit	%	1.6E-01	1.5E-01	

* At 95% confidence level

Table 3-5

WNP-2 GASEOUS EFFLUENTS
BATCH RELEASE

Report Period
January - June 1991

Type	Number	Total Time (hrs)	Maximum Time (hrs)	Minimum Time (hrs)	Mean Time (hrs)
Purge	6	15.4	7.5	0.6	2.6
Vent	8	8.2	1.8	0.5	1.0

4.0 SOLID RADWASTE WASTE

A total volume of 1,482.8 ft^3 (42.0 m^3) of solid waste was transported in 7 shipments during the January through June 1991 reporting period. The total activity of the waste shipped was 1049.4 Ci; 1045.4 Ci contained in dewatered spent resins and 4.6 Ci contained in DAW.

A. Dewatered Spent Resin

Dewatered resins accounted for 1,312.6 ft^3 (37.2 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 1,045.4 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 NUPAC 10-142, U.S. Ecology 14D-2.0 casks, on flatbed trucks.

The counting error associated with the total activity has consistently been found to be less than 3.0% at one standard deviation for previous reporting periods. The statistical counting error is assumed to be 3% for the purpose of this error evaluation.

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 is assumed to be less than or equal to 25%.

B. Dry Active Waste (DAW)

A total of 170.2 ft^3 (4.8 m^3) of DAW was shipped in 1 NUPAC Services ES-190 encapsulation liner. The total activity of the DAW shipped was 4.6 Ci. The value of the activity shipped was determined by using computerized dose rate-to-curie conversion factors. The conversion factors were based on a nuclide distribution taken from analysis of contamination found in the major DAW production areas. This distribution is updated annually in conjunction with offsite analyses of hard-to-measure nuclides. A meaningful counting error cannot be generated for DAW; however, the total error may be assumed to be less than or equal to 25% since DAW would be subjected to similar error contributions as spent resin.

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 or when triggered by an order of magnitude change in corrosion to fission product ratios (Co-60/Cs-137) in the resin waste streams as compared to the previous offsite anlaysis.

C-14, Ni-63, Fe-55

The ratio of each of these nuclides to Co-60 is determined by outside laboratory analysis of each waste stream. The resulting scaling factors are applied to the measured Co-60 concentration for a particular batch or container of radwaste to arrive at the C-14, Ni-63 and Fe-55 concentrations.

H-3, Tc-99, I-129, Sr-90

The ratio of each of these nuclides to Cs-137 is determined by outside laboratory analysis of each waste stream. The resulting scaling factors are applied to the measured Cs-137 concentration for a particular batch or container of radwaste to arrive at the H-3, Tc-99, I-129 and Sr-90 concentrations.

Transuranics

The ratio of hard to measure TRU nuclides to Ce-144 is determined by outside laboratory analyis of each waste stream as recommended by the AIF report, "Methodologies for Classification of Low Level Radioactive Waste for Nuclear Power Plants." These nuclides will be reported if Ce-144 is detected and the TRU nuclides have been detected by outside laboratory analyses. TRU nuclides include Pu-239, Pu-238, Pu-241, Am-241, Cm-242 and Cm-244.

Outside laboratory LLD's must be at least 1 nCi/g for TRU, 35 nCi/g for PU-241 or 200 nCi/g for Cf-242.

SCALING FACTORS

TABLE 4-1 - REQUIRED NUCLIDES

RATIO	DAW	RWCU POWDER RESIN	CFD POWDER RESIN	EDR/FDR POWDERED RESIN	EDR/FDR BEAD RESIN
H-3/CS-137	1.97EO*	1.88E-6*	6.34E-2*	1.07E-4*	1.27E-2*
C-14/Co-60	2.25E-3*	8.63E-6	1.32EO	2.61E-4	3.20E-3
Tc-99/Cs-137	3.11E-1*	1.37E-6*	8.76E-3*	9.82E-6*	2.97E-3*
I-129/Cs-137	4.02E-1*	1.44E-5*	1.24E-2*	8.04E-6*	2.41E-3*

* Scaling factor based on LLD value.

TABLE 4-2 - CONDITIONAL NUCLIDES

Ni-63/Co-60	NOTE 1	5.12E-3	3.32E-2	1.84E-1	NOTE 1
Fe-55/Co-60	2.36E-1	9.83E-2	2.23E-1	2.46E-1	NOTE 1
Sr-90/Cs-137	NOTE 1	1.30E-2	1.92E-1	2.81E-3	4.84E-2
Pu-239,240/Ce-144	NOTE 1	9.65E-2	NOTE 1	2.60E-3	NOTE 1
Pu-238/Ce-144	NOTE 1	4.70E-2	NOTE 1	7.03E-3	NOTE 1
Pu-241/Ce-144	NOTE 1	5.50EO	NOTE 1	2.14E-1	NOTE 1
Am-241/Ce-144	NOTE 1	8.29E-3	2.56E-4	NOTE 1	NOTE 1
Cm-242/Ce-144	NOTE 1	9.25E-3	7.80E-3	2.75E-2	NOTE 1
Cm-243,244/Ce-144	NOTE 1	1.13E-2	4.08E-4	NOTE 1	NOTE 1

NOTE 1: Isotope not identified by offsite laboratory analyses.

Table 4-3
WNP-2 SOLID WASTE SHIPMENTS

January - June 1991

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	37.2 1045.4	25
b. Dry active waste, contaminated equip., etc.	m^3 Ci	4.8 4.6	25
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 Zn-65	35.9	374
2 Co-60	28.5	297
3 Cr-51	17.2	179
4 Cs-137	4.2	43.4
5 Cs-134	4.0	42.1
6 Co-58	3.4	35.0
7 Fe-55*	2.9	30.3
8 Mn-54	2.4	24.8
9 Ni-63*	0.3	2.82
10 C-14*	0.1	1.52

b. Dry Active Waste (DAW)

Nuclide	%	Ci
1 Co-60	73.4	3.38
2 Fe-55	17.0	0.784
3 Zn-65	6.2	0.285
4 Sb-125	2.3	0.107
5 Mn-54	1.1	0.052

*Indicates scaled nuclide

c. Irradiated Components - None

d. Other - Absorbed Liquids - None

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
7	10-142 Cask (1) 14D-2.0 Cask (2) Flatbed (4)	US Ecology Richland, WA

B. IRRADIATED FUEL SHIPMENTS (Disposition)

None

*Indicates scaled nuclide

5.0 METEOROLOGY

The meteorological data for the first half of calendar year 1991 will be included in the Semiannual Effluent Report due 60 days after January 1, 1992, and will include data covering the full calendar year 1991. An extended outage of the main meteorological tower occurred during the 2nd Quarter 1991, as a result of in-plant electrical/computer work scheduled during refueling.

6.0 DOSE ASSESSMENT - IMPACT ON MAN

The dose impact on man for the Calendar Year 1991 will be included in the Semiannual Effluent Report due 60 days after January 1, 1992.

7.0 REVISIONS TO THE ODCM

During this reporting period, no admendments to the Offsite Dose Calculation Manual (ODCM) have been approved and implemented. During this period, the Plant Operations Committee (POC) reviewed and recommended approval of an amendment to the ODCM for the relocation of the Radiological Effluent Technical Specifications (RETS) per NRC Generic Letter 89-01, dated January 31, 1989. As discussed below, this ODCM amendment cannot be implemented until the WNP-2 response to Generic Letter 89-01 is approved by the NRC.

7.1 The amendment requests that those Technical Specifications addressing radiological effluent and radiological environmental monitoring be relocated to the ODCM. The guidelines provided in the Generic Letter have been followed without exception.

7.1.1 Specific procedural details contained in the relocated Technical Specifications, including the limiting conditions for operation, their applicability, remedial actions, surveillance requirements, and bases are included in the ODCM.

7.1.2 The revisions for annual radiological environmental reporting and semiannual radioactive effluent release reporting are being simplified, deleting specified details of the reports' content. These changes are consistent with the staff's guidance in Generic Letter 89-01.

7.1.3 In accordance with Technical Specification Section 6.14.2.b, POC approved the ODCM, incorporating the applicable Technical Specification changes. POC further concurred that the changes to the ODCM will become effective and implemented following NRC approval.

7.2 These changes do not affect safe Plant operation or the release of radioactive material to the environment.

7.2.1 These changes will not reduce the accuracy or reliability of dose calculations or setpoint determinations.

7.3 The relocation of RETS to the ODCM in accordance with Generic Letter 89-01 was reviewed and approved during POC Meeting 91-04 held on January 23, 1991.

7.4 The complete package pertaining to this revision of the ODCM was sent to the NRC staff for review under written correspondence G02-91-124, dated June 28, 1991, Docket No. 50-397.

7.4.1 A complete, legible copy of the entire ODCM will be provided as per Generic Letter 89-01 after NRC approval.

8.0 REVISIONS TO THE PROCESS CONTROL PROGRAM (PCP)

No changes were made to the Process Control Program (PPM 1.12.2) during this reporting period other than the enhancements to the scaling methodology described in Section 4.1.

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

9.1 Locations where GASPAR II dose calucations were performed for the first and/or second quarters of 1991:

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

9.1.5 4.1 miles east northeast (ENE) for the highest organ dose using ground, inhalation and vegetable pathways.

9.1.6 Dose assessments at the 7.2 miles east southeast were not performed during this reporting period as they were completed at 6.4 miles southeast which is in reasonable proximity for the cow milk pathway.

9.2 During Janaury 1991, a milk cow was moved from Station 63 to Station 40. Both sampling stations are located 6.4 miles SE; therefore, the cow milk calculations were not affected.

9.3 No environmental monitoring locations were deleted during this reporting period other than the cow milk being moved from Station 63 to Station 40.

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.