REFERENCE:
10CFR50.36a(a)(2)

WNP-2 SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY THROUGH DECEMBER 1989

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. Two liquid batch releases occurred during the third calendar quarter and one batch release occurred during the fourth calendar quarter. The total time period for the batch releases was 6.2 hours, with the maximum, minimum and average time periods for a release being 2.4, 1.8 and 2.1 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 July through December 1989 was 8.62E+04 cubic feet per second.

LADTAP II computer runs were performed to determine the calculated dose to an adult (maximum age group). The third quarter calculated dose to an adult was 1.1E-05 mrem to the whole body and 2.5E-05 mrem to the maximum organ. The fourth quarter calculated dose for the adult age group was 6.4E-07 mrem whole body and 1.8E-06 mrem for the maximum organ. No abnormal liquid releases occurred during this reporting period.

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 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: July - December 1989

	Unit	3rd Quarter	4th Quarter	Est. Total Error* %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.0E-04	5.4E-04	2.2 E+01
2. Average diluted concentration during period	uCi/ml	2.0E-09	1.3E-09	
3. Percent of MPC limit	%	5.2E-02	5.3E-03	
B. Tritium				
1. Total release	Ci	8.4E-02	5.0E-02	2.2 E+01
2. Average diluted concentration during period	uCi/ml	4.2E-07	1.3E-07	
3. Percent of MPC limit	%	1.4E-02	4.2E-03	
C. Dissolved and entrained gases				
1. Total release	Ci	6.6E-05	1.9E-04	2.2 E+01
2. Average diluted concentration during period	uCi/ml	3.3E-10	4.8E-10	
3. Percent of MPC limit	%	1.7E-04	2.3E-04	
D. Gross alpha radioactivity				
1. Total release	Ci	1.5E-04	1.3E-04	2.3 E+01
E. Volume of waste (prior to dilution)	liters	1.1E+05	5.9E+04	1.5 E+01
F. Volume of dilution water used during period	liters	2.0E+08	4.0E+08	1.5 E+01

*At 95% confidence level

Table 2-2

WNP-2 LIQUID EFFLUENTS - SOURCE TERMS

Report Period: July - December 1989 BATCH MODE

Nuclides Released	Unit	3rd Quarter	4th Quarter
Strontium-89	Ci	5.8E-07	<3.5E-07
Strontium-90	Ci	4.1E-07	<2.3E-07
Cesium-134	Ci	<4.2E-06	<1.5E-06
Cesium-137	Ci	<4.4E-06	<1.5E-06
Iodine-131	Ci	2.9E-05	6.0E-06
Cobalt-58	Ci	7.5E-06	<1.6E-06
Cobalt-60	Ci	1.8E-04	1.5E-05
Iron-59	Ci	<8.3E-06	<2.0E-06
Zinc-65	Ci	1.1E-04	5.3E-06
Manganese-54	Ci	1.7E-05	2.5E-06
Chromium-51	Ci	5.3E-05	4.9E-04
Zirconium-Niobium-95	Ci	<7.1E-06	<2.1E-06
Molybdenum-99	Ci	<3.1E-05	<8.2E-06
Technetium-99m	Ci	<3.6E-06	<1.6E-06
Barium-Lanthanum-140	Ci	<1.6E-05	<4.8E-06
Cerium-141	Ci	<4.5E-06	<4.2E-06

TABLE 2-2 (Continued)

Cerium-144	Ci	<2.5E-05	<1.6E-05
Iron-55	Ci	6.5E-06	1.7E-05
Others			
Silver - 110m	Ci	<1.8E-05	3.7E-06
Total for Period (Above)	Ci	4.0E-04	5.4E-04

Xenon-133	Ci	1.4E-05	6.0E-06
Xenon-135	Ci	5.2E-05	1.8E-04

Tritium	Ci	8.4E-02	5.0E-02

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 used in Table 3-4 is the most restrictive value based on the quarterly dose evaluations. The fission and activation gases (air dose) calculation is based on quarterly limits of ten (10) millirads for beta and five (5) millirads for gamma.

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 as identified by the latest Land Use Census (LUC) were used to determine the most restrictive value for each quarter to be used in Table 3-4.

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 NRC 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:
3rd Qtr.	7.0 E-02	0.7	8.3 E-02	1.7
4th Qtr.	1.3 E-01	1.3	2.2 E-01	4.4

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	3.3 E-02	0.4
4th Qtr.	1.5 E-01	2.0

Location 2: Beyond Site Boundary; 3.5 and 3.4 miles E respectively (ground and inhalation pathways) at the location having the highest X/Q values for mixed mode release.

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	1.5 E-01	1.5	1.4 E-01	2.8
4th Qtr.	2.0 E-01	2.0	3.4 E-02	6.7

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	1.0 E-02	0.1
4th Qtr.	1.9 E-02	0.3

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	4.2 E-02	0.4	2.7 E-02	0.5
4th Qtr.	5.5 E-02	0.5	4.0 E-02	1.8

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	4.1 E-02	0.5
4th Qtr.	4.2 E-02	0.6

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	2.5 E-02	0.3	1.6 E-02	0.3
4th Qtr.	3.0 E-02	0.3	4.5 E-02	0.9

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	7.9 E-02	1.1
4th Qtr.	2.9 E-02	0.4

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	1.0 E-01	1.0	6.6 E-02	1.3
4th Qtr.	1.4 E-01	1.4	2.1 E-01	4.2

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	3.6 E-02	0.5
4th Qtr.	3.6 E-02	0.5

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	2.8 E-03	0.03	1.6 E-03	0.03
4th Qtr.	1.4 E-02	0.1	2.4 E-02	0.5

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	1.1 E-03	0.01
4th Qtr.	6.0 E-03	0.1

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

Air Dose (mrad)	Beta	% Tech. Spec	Gamma	% Tech. Spec:
3rd Qtr.	4.4 E-02	0.4	2.9 E-02	0.6
4th Qtr.	6.9 E-02	0.7	8.6 E-02	1.7

Highest Organ Dose	mrem	% Tech. Spec.
3rd Qtr.	4.2 E-02	0.6
4th Qtr.	2.5 E-02	0.3

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 third and fourth quarters of 1989.

There were two reportable Problem Evaluation Requests (PERs) which are included in this report:

PER 289-0836: Technical Specification Table 4.3.7.12-1 requires daily channel checks to be performed. Channel checks are required to be compared when two or more independent sources of information are present. The Radwaste Building gaseous exhaust flows from three different fans are summed to form a single signal and sent to two plant computers. The daily surveillances, which defined the channel check as comparing channel computer readings or fan amperage readings and a channel reading, had recorded only one of the computer readings. This recording of one reading was deemed incorrect. The plant procedure was deviated to require both readings.

PER 289-0925: A Radwaste Building gaseous sample lines flow sensor failed. A Limiting Condition for Operation (LCO) was entered requiring flow estimation for that line on a four hour basis, as required by Technical Specification 3.3.7.12.b, action statement 113. One flow reading was missed at the required time, flow estimation continued and the missed reading was logged. No changes in flow were noted from the prior to the post event readings.

Table 3-1

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

Report Period
July - December 1989

CONTINUOUS MODE

Nuclides Released	Unit	3rd Quarter	4th Quarter
1. Fission gases			
Krypton-85	Ci	<2.5 E+02	<1.8 E+02
Krypton-85m	Ci	2.7 E+01	2.2 E+02
Krypton-87	Ci	1.2 E+01	1.3 E+02
Krypton-88	Ci	3.5 E+01	3.8 E+02
Xenon-133	Ci	1.3 E+03	9.0 E+02
Xenon-133m	Ci	5.7 E+01	3.9 E+01
Xenon-135	Ci	8.9 E+02	3.3 E+01
Xenon-135m	Ci	3.3 E+02	4.9 E+00
Xenon-138	Ci	4.0 E+00	4.1 E+00
OTHERS			
Xenon-131m	Ci	4.1 E+01	<2.7 E+01
Argon-41	Ci	1.3 E-01	7.6 E+00
Total for period	Ci	2.7 E+03	1.7 E+03

Table 3-1 (Continued)

2. Iodines

Iodine-131	Ci	1.4 E-02	4.6 E-03
Iodine-132	Ci	1.9 E-02	<2.9 E-05
Iodine-133	Ci	1.2 E-02	3.7 E-03
Iodine-134	Ci	4.1 E-03	<2.0 E-04
Iodine-135	Ci	1.7 E-02	<6.1 E-04
Total for period	Ci	6.6 E-02	8.3 E-03

Table 3-1 (Continued)

3. Particulates

Strontium-89	Ci	2.4 E-04	1.6 E-05
Strontium-90	Ci	8.7 E-07	<1.8 E-07
Cesium-134	Ci	1.3 E-05	<6.7 E-05
Cesium-137	Ci	1.5 E-05	<8.8 E-05
Barium-Lanthanum-140	Ci	<5.2 E-04	9.5 E-04
Molybdenum-99	Ci	<1.5 E-03	<7.9 E-04
Cerium-141	Ci	<2.2E-044	<8.8 E-05
Cerium-144	Ci	<8.4 E-04	<3.3 E-04
Cobalt-58	Ci	<1.6 E-04	<8.1 E-05
Cobalt-60	Ci	8.0 E-05	1.2 E-04
Iron-59	Ci	<3.6 E-04	<1.6 E-04
Manganese-54	Ci	2.2 E-05	<7.5 E-05
Zinc-65	Ci	2.6 E-05	9.2 E-05
Others			
Chromium-51	Ci	<1.3 E-03	9.9 E-05
Total for period	Ci	4.0 E-04	1.3 E-03
Others with T½ <8 days			
Barium-139	Ci	3.3 E-03	4.3 E-02
Cesium-138	Ci	2.8 E-04	<2.5 E-05
Sodium-24	Ci	6.1 E-06	<4.7 E-05
Rubidium-88	Ci	1.0 E-04	7.6 E-04
Technetium-99m	Ci	5.9 E-06	3.3 E-05
Neptunium-239	Ci	1.9 E-06	2.9 E-03
Strontium-91m	Ci	<1.1 E-05	7.7 E-06
Tellurium-132	Ci	<6.4 E-06	4.9 E-06
Total with T½ <8 days	Ci	3.7 E-03	4.7 E-02

Table 3-1 (Continued)

4. Tritium	Ci	2.8 E-01	5.4 E-01
Total building release	Ci	2.7 E+03	1.7 E+03

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
July - December 1989

CONTINUOUS MODE

Nuclides Released	Unit	3rd Quarter	4th Quarter
1. Fission gases			
Krypton-85	Ci	<5.3 E-01	<1.7 E+00
Krypton-85m	Ci	<6.7 E-01	<6.6 E-01
Krypton-87	Ci	<1.1 E+00	<1.1 E+00
Krypton-88	Ci	<2.1 E+00	<2.2 E+00
Xenon-133	Ci	2.7 E+00	8.8 E+00
Xenon-133m	Ci	<4.4 E+00	<4.3 E+00
Xenon-135	Ci	2.7 E+00	9.0 E+00
Xenon-135m	Ci	2.9 E+00	1.1 E+01
Xenon-138	Ci	6.4 E+00	1.1 E+01
Total for period	Ci	1.5 E+01	4.0 E+01
2. Iodines			
Iodine-131	Ci	9.6 E-04	5.6 E-03
Iodine-132	Ci	<2.9 E-05	5.1 E-04
Iodine-133	Ci	2.1 E-03	9.2 E-03
Iodine-135	Ci	6.4 E-04	4.4 E-03
Total for period	Ci	3.7 E-03	2.0 E-02

Table 3-2 (Continued)

3. Particulates

Strontium-89	Ci	1.1 E-03	5.0 E-04
Strontium-90	Ci	2.2 E-05	<4.5 E-07
Cesium-134	Ci	<2.2 E-04	<1.1 E-04
Cesium-137	Ci	<2.7 E-04	1.2 E-05
Barium-Lanthanum-140	Ci	1.8 E-04	3.6 E-03
Molybdenum-99	Ci	<2.4 E-03	<1.8 E-03
Cerium-141	Ci	<3.9 E-04	<2.2 E-04
Cerium-144	Ci	<1.6 E-03	<2.4 E-04
Cobalt-58	Ci	<2.3 E-04	<1.3 E-04
Cobalt-60	Ci	<4.3 E-04	<2.0 E-04
Iron-59	Ci	<6.0 E-04	<3.4 E-04
Manganese-54	Ci	<2.5 E-04	<1.4 E-04
Zinc-65	Ci	<6.4 E-04	<3.5 E-04
Others			
Total for period	Ci	1.3 E-03	4.1 E-03
Others with T½ <8 days			
Strontium-91	Ci	<3.3 E-05	3.4 E-04
Strontium-92	Ci	<2.1 E-05	3.6 E-03
Rubidium-89	Ci	<4.3 E-05	1.2 E-04
Cesium-138	Ci	<2.5 E-05	4.7 E-01
Barium-139	Ci	<5.3 E-05	2.2 E-01
Total with T½ <8 days	Ci	NA	6.9 E-01
4. Tritium	Ci	5.0 E+00	5.2 E+00
Total building release	Ci	2.0 E+01	4.5 E+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
July - December 1989

CONTINUOUS MODE

Nuclides Released	Unit	3rd Quarter	4th Quarter
1. Fission gases			
Krypton-85	Ci	<7.4 E+01	<7.7 E+01
Krypton-85m	Ci	<9.4 E-01	<9.8 E-01
Krypton-87	Ci	<5.1 E-01	<5.4 E-01
Krypton-88	Ci	<1.3 E+00	<1.4 E+00
Xenon-133	Ci	<1.3 E+00	7.6 E+00
Xenon-133m	Ci	<1.5 E+00	<1.6 E+00
Xenon-135	Ci	1.1 E+00	7.8 E+00
Xenon-135m	Ci	8.7 E-01	5.5 E+00
Xenon-138	Ci	<9.4 E-01	<9.8 E-01
Total for period	Ci	2.0 E+00	2.1 E+01
2. Iodines			
Iodine-131	Ci	1.2 E-03	3.0 E-03
Iodine-132	Ci	1.9 E-04	1.0 E-03
Iodine-133	Ci	6.2 E-04	5.3 E-03
Iodine-134	Ci	8.1 E-05	<6.0 E-05
Iodine-135	Ci	7.2 E-05	5.2 E-03
Total for period	Ci	2.2 E-03	1.5 E-02

Table 3-3 (Continued)

3. Particulates

Strontium-89	Ci	2.8 E-05	1.7 E-07
Strontium-90	Ci	<1.1 E-05	<5.7 E-08
Cesium-134	Ci	<1.5 E-05	<8.7 E-06
Cesium-137	Ci	<1.9 E-05	<1.0 E-05
Barium-Lanthanum-140	Ci	<6.6 E-05	<3.7 E-05
Molybdenum-99	Ci	<1.6 E-04	<1.1 E-04
Cerium-141	Ci	<2.9 E-05	<1.5 E-05
Cerium-144	Ci	<1.1 E-04	<6.0 E-05
Cobalt-58	Ci	<1.7 E-05	<8.0 E-06
Cobalt-60	Ci	<3.0 E-05	<1.4 E-05
Iron-59	Ci	<4.1 E-05	<2.2 E-05
Manganese-54	Ci	<1.7 E-05	<9.2 E-06
Zinc-65	Ci	<4.6 E-05	<2.3 E-05
Others			
Total for period	Ci	2.8 E-05	1.7 E-07

4. Tritium	Ci	5.3 E-01	1.0 E-01

Total building release	Ci	2.5 E+00	2.1 E+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
July - December 1989

	Unit	3rd Quarter	4th Quarter	Est. Total Error %*
A. Fission & activation gases				
1. Total release	Ci	2.7 E+03	1.8 E+03	3.6 E+01
2. Average release rate for period	uCi/sec	3.4 E+02	2.3 E+02	
3. Percent of Tech. Spec. limit	%	1.3 E+00	4.2 E+00	
B. Iodines				
1. Total iodine (131, 133)	Ci	7.2 E-02	4.3 E-02	3.6 E+01
2. Average release rate for period	uCi/sec	9.1 E-03	5.4 E-03	
3. Percent of Tech. Spec. limit	%	1.1 E+00	5.6 E-01	
C. Particulates				
1. Particulates	Ci	1.7 E-03	5.4 E-03	3.6 E+01
2. Average release rate for period	uCi/sec	2.1 E-04	6.8 E-04	
3. Percent of Tech. Spec. limit	%	1.1 E+00	5.6 E-01	
4. Gross alpha radioactivity	Ci	3.1 E-06	1.5 E-06	
D. Tritium				
1. Total releases	Ci	5.8 E+00	5.8 E+00	3.6 E+01
2. Average release rate for period	uCi/sec	7.3 E-01	7.3 E-01	
3. Percent of Tech. Spec. limit	%	1.1 E+00	5.6 E-01	

* At 95% confidence level

Table 3-5

WNP-2 GASEOUS EFFLUENTS
BATCH RELEASES

July - December 1989

Type	Number	Total Time (hrs)	Maximum Time (hrs)	Minimum Time (hrs)	Mean Time (hrs)
Purge	6	44.3	24.6	0.9	7.4
Vent	22	32.3	3.0	0.3	1.5

4.0 SOLID WASTE

A total volume of 6,674.8 ft^3 (189.03 m^3) of solid waste was transported in 14 shipments during the July through December 1989 reporting period. The total activity of the waste shipped was 786.0 Ci; 396 Ci contained in dewatered spent resins, 390 Ci were contained in Dry Active Waste (DAW).

A. Dewatered Spent Resin

Dewatered resins accounted for 2,970.0 ft^3 (84.11 m^3) of the radioactive wastes shipped during the reporting period. The burial containers were ES-190 and ES-142 liners provided by NUPAC Services, Inc. The total activity of the resins shipped during the reporting period was 396 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 or LN 14-170 casks.

The counting error associated with the total activity has been found to be less than 1.0% at one standard deviation in previous effluent reports and to decrease with increasing activity. The statistical counting error is assumed to be 1% 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 was 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 3,704.8 ft^3 (104.92 m^3) of DAW was shipped in 36 Container Products Corporation B-25 steel boxes, 1 NUPAC Services ES-190 carbon steel liner, and 1 Container Products Corporation Type A box. The total activity of the DAW shipped was 390 Ci. The values for the activities shipped were determined by using dose rate-to-curie conversion factors. The conversion factors were based on a 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. The process of updating scaling factors is being initiated. 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 provided 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 would be 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 referenced 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. As an alternative, approved High Integrity Containers (HIC's) could be 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.

Encapsulation of the Lower Drain Head pipe removed during the R-4 refueling outage was performed per a POC approved procedure. Test specimens were subjected to destructive testing to ensure proper compression strength of the Encapsulation Media (concrete). The Encapsulation was performed within a Type A container manufactured specifically for this one task by Container Products Incorporated.

SCALING FACTORS

TABLE 4-1 - REQUIRED NUCLIDES

RATIO	DAW	RWCU POWDER RESIN	CFD POWDER RESIN	EDR/FDR POWDERED 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	4.27-E2	7.74E-3	2.4E-2	4.53E-2	2.4E-2	1.5E-2+++	1.2E0+
Fe-55/Co-60	7.06-E1	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-2	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 not present in enough concentration to make determination of Scaling Factor. In these cases the Scaling Factors were obtained from the "Updated Scaling Factors in Low-Level Radwaste" EPRI NP-5077 Final March 1987.

++ The report from SAIC showed the H-3 concentration in RWCU and EDR/FDR powdered resin greater than Reactor Coolant concentration. The resin mix used in the waste streams are similar. The reactor coolant and condensate H-3 concentration are approximately the same. The Scaling Factor for CFD is 4.30-1 which is more representative of H-3 retention on the two waste streams.

+++ The report from SAIC 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 report from SAIC 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

July - December 1989

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	84.11 396	20
b. Dry active waste, contaminated equip., etc.	m^3 Ci	104.92 390	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 Zn-65	41.7	165
2 Co-60	20.5	81.3
3 Co-134	7.6	30.1
4 Cs-137	7.0	27.8
5 Cr-51	6.6	26.3
6 Fe-55*	5.6	22.2
7 Co-58	3.1	12.4
8 Mn-54	2.8	10.9
9 Nb-95	2.3	8.91
10 Zr-95	1.4	5.56

*Indicates scaled nuclide

b. Dry Active Wastes (DAW)

Nuclide	%	Ci
1 Co-60	41.8	163
2 Fe-55*	33.3	130.
3 Zn-65	18.0	70.3
4 Ni-63*	2.7	10.4
5 Mn-54	1.6	6.24
6 Nb-95	0.813	3.17
7 Co-58	0.462	1.80
8 Zr-95	0.40	1.56
9 Cr-51	0.338	1.32
10 Sb-125	0.20	0.781

c. Irradiated Components - None

d. Other - Absorbed Liquids - None

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
22	Flat bed trailer (5) 10-142 Cask (1) 14-170 Cask (16)	US Ecology Richland, WA

B. IRRADIATED FUEL SHIPMENTS (Disposition)

None

*Indicates scaled nuclide

5.0 METEOROLOGY

The meteorological data contained in Tables 5-1 through 5-10 were obtained from the WNP-2 meteorological tower located 2500 ft. west of WNP-2. Data were recovered from 33 ft. and 245 ft. levels. The meteorological data is a composite file from both manual and automated data recovery systems.

The first three quarters of 1989 were drier than normal with above average precipitation arriving in the fourth quarter. The 1989 dispersion conditions were better than historical dispersion conditions. Early February saw the most severe cold Arctic outbreak since 1916. The meteorological system functioned normally through the period. Rapid warming brought a high percentage of Category A Pasquill-Gifford dispersion conditions for the remainder of the 1st Quarter. The automated annual data recovery system continued to function at greater than 90% joint data recovery for the joint frequency parameters.

Tables 5-1 through 5-8 list the joint frequency distribution at the 33 ft. and 245 ft. levels for 1989 by quarters. Additionally, this report includes Tables 5-11 through 5-12 which list the joint frequency distribution for all of 1989. The tabulated stability classes, A-G, are denoted by numerals 1-7 respectively. Numerals 1-7 were used for the wind sub- fields as is noted at the top of each sensor level reported. The 16 compass sectors in Tables 5-1 through 5-8 pertain to the direction the wind is coming from. Tables 5-9 and 5-10 are representative Joint Frequency Tables for vents and purges during 1989.

Calibrations performed in 1989 produced no values exceeding WNP-2 FSAR meteorological equipment tolerances. Therefore, no correction has been made to the raw data. The NRC Delta Temperature Stability Classification scheme was primarily utilized in the production of the joint frequency tables. Lightning strikes produced little damage during the year with the improved grounding and current protection devices.

TABLE 5-1

1ST QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	1.	3.	1.
1	2	32.	13.	7.	5.	4.	2.	3.	11.	15.	15.	10.	16.	15.	13.	27.	37.
1	3	20.	11.	6.	1.	1.	0.	1.	26.	32.	18.	3.	6.	2.	16.	23.	24.
1	4	7.	12.	5.	0.	0.	0.	3.	8.	18.	32.	11.	9.	0.	2.	2.	8.
1	5	0.	7.	0.	0.	0.	0.	0.	0.	2.	32.	17.	4.	2.	0.	0.	1.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	8.	1.	1.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.
2	2	1.	2.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.	2.	0.	0.	3.
2	3	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	2.	0.
2	4	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	0.	0.	0.	0.	1.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
3	2	4.	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	3.	0.	2.
3	3	1.	0.	0.	0.	0.	0.	1.	2.	0.	1.	0.	0.	0.	0.	1.	1.
3	4	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
3	5	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
4	2	6.	4.	1.	1.	0.	1.	1.	1.	5.	5.	3.	7.	4.	9.	10.	9.
4	3	5.	0.	7.	1.	0.	1.	5.	11.	10.	6.	3.	2.	4.	5.	2.	8.
4	4	7.	6.	2.	0.	0.	0.	0.	0.	2.	1.	1.	4.	8.	2.	1.	3.
4	5	13.	7.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	3.	0.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.	2.	1.	1.
5	2	17.	20.	4.	6.	2.	3.	2.	5.	17.	20.	17.	15.	20.	18.	28.	40.
5	3	16.	9.	14.	2.	1.	2.	9.	23.	28.	12.	9.	10.	10.	24.	82.	41.
5	4	4.	5.	0.	0.	0.	0.	0.	4.	6.	9.	3.	4.	5.	8.	15.	27.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	4.	0.	0.	0.	0.	2.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	1.	0.	1.	0.	0.
6	2	11.	9.	3.	1.	0.	0.	0.	4.	7.	9.	9.	7.	19.	13.	24.	20.
6	3	6.	2.	2.	1.	0.	1.	1.	6.	26.	4.	9.	3.	4.	4.	12.	18.
6	4	0.	0.	0.	0.	0.	0.	0.	3.	2.	4.	1.	1.	0.	0.	0.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.
7	2	5.	0.	0.	0.	0.	0.	0.	3.	5.	3.	4.	6.	4.	9.	20.	5.
7	3	0.	0.	0.	0.	0.	0.	0.	1.	8.	1.	4.	1.	1.	4.	1.	3.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 1847 MISSING = 0 CALM = 12 VARIABLE = 24

[illegible]

TABLE 5-2 1ST QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	1.	1.	0.	0.	0.	0.	0.	1.	1.	1.	1.	0.	0.	0.	2.
1	2	22.	18.	5.	9.	4.	3.	4.	12.	9.	6.	13.	12.	6.	11.	12.	21.
1	3	13.	7.	8.	3.	2.	1.	5.	26.	14.	13.	4.	6.	8.	9.	24.	29.
1	4	3.	7.	2.	1.	0.	1.	6.	18.	27.	19.	8.	3.	2.	8.	19.	14.
1	5	3.	16.	0.	0.	0.	0.	0.	2.	8.	27.	12.	4.	1.	3.	1.	1.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	28.	7.	6.	0.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	8.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	0.	0.	1.	1.	1.	0.	0.	1.	1.	0.	1.	0.	0.	0.	2.	2.
2	3	1.	2.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	2.	0.
2	4	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	1.	0.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	2.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	2.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	1.	1.
3	3	0.	2.	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	2.	1.	2.
3	4	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.	1.	0.	0.	0.	1.	0.
3	5	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
3	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
4	2	2.	4.	4.	1.	1.	4.	1.	0.	6.	4.	9.	2.	0.	2.	0.	3.
4	3	1.	7.	6.	2.	0.	1.	7.	14.	2.	6.	5.	2.	1.	4.	1.	7.
4	4	3.	1.	1.	0.	0.	1.	2.	8.	9.	2.	1.	0.	1.	3.	4.	3.
4	5	27.	5.	0.	0.	0.	0.	6.	1.	4.	1.	0.	1.	1.	0.	1.	1.
4	6	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	0.	0.	0.	0.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.	2.	0.	2.	2.
5	2	13.	8.	4.	3.	7.	2.	3.	5.	9.	12.	12.	7.	11.	18.	11.	8.
5	3	18.	18.	8.	4.	2.	7.	15.	27.	25.	13.	9.	2.	7.	28.	54.	21.
5	4	10.	4.	1.	1.	0.	8.	9.	16.	9.	12.	4.	3.	4.	41.	53.	14.
5	5	0.	0.	0.	0.	0.	0.	1.	6.	5.	10.	1.	2.	0.	4.	2.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	1.	0.	3.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	1.	2.	0.	0.	0.	0.	0.	0.	1.	1.	3.	0.	0.	1.	0.	0.
6	2	9.	7.	2.	4.	2.	2.	6.	10.	5.	4.	5.	8.	4.	7.	8.	3.
6	3	3.	4.	3.	5.	0.	1.	5.	18.	5.	7.	5.	7.	2.	4.	8.	10.
6	4	2.	0.	1.	2.	0.	3.	0.	10.	7.	1.	5.	1.	1.	8.	12.	3.
6	5	0.	0.	0.	0.	0.	0.	0.	2.	1.	6.	1.	0.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	0.	1.	0.
7	2	5.	4.	1.	1.	1.	2.	3.	1.	3.	5.	2.	1.	4.	3.	3.	3.
7	3	1.	0.	1.	1.	1.	1.	4.	3.	7.	5.	3.	1.	0.	0.	1.	2.
7	4	1.	0.	0.	0.	0.	0.	0.	2.	2.	0.	0.	0.	0.	5.	2.	1.
7	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 1837 MISSING = 0 CALM = 32 VARIABLE = 14

[illegible]

TABLE 5-3 2ND QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	2	15.	4.	6.	1.	3.	6.	6.	9.	8.	8.	12.	13.	18.	16.	17.	16.
1	3	26.	25.	20.	5.	4.	9.	16.	34.	37.	32.	25.	31.	27.	22.	31.	38.
1	4	9.	17.	15.	0.	0.	1.	2.	10.	26.	18.	12.	8.	12.	11.	33.	4.
1	5	2.	2.	2.	0.	0.	0.	0.	0.	0.	1.	7.	4.	3.	2.	11.	0.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	1.	0.	0.	0.	0.	0.	2.	2.	1.	3.	3.	2.	1.	0.	0.	1.
2	3	2.	1.	1.	2.	1.	0.	1.	2.	6.	5.	2.	2.	3.	2.	7.	3.
2	4	2.	1.	0.	0.	0.	0.	0.	1.	4.	3.	4.	1.	1.	1.	2.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.	0.	0.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	1.	0.	0.	0.	0.	1.	0.	2.	0.	0.	2.	0.	0.	0.	0.
3	3	4.	0.	3.	0.	4.	4.	1.	6.	2.	2.	4.	3.	1.	4.	4.	5.
3	4	0.	0.	1.	0.	2.	1.	0.	4.	1.	2.	3.	3.	1.	3.	4.	2.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	2.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	2	4.	4.	2.	0.	1.	1.	3.	1.	3.	4.	3.	4.	6.	3.	5.	6.
4	3	10.	4.	4.	0.	0.	4.	5.	14.	7.	12.	10.	10.	11.	9.	12.	6.
4	4	3.	0.	3.	0.	0.	0.	1.	4.	16.	12.	6.	10.	5.	11.	14.	6.
4	5	1.	0.	0.	0.	0.	0.	0.	0.	0.	2.	6.	2.	2.	0.	6.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
5	2	3.	3.	3.	0.	2.	0.	3.	7.	8.	5.	8.	8.	8.	7.	10.	7.
5	3	3.	4.	4.	1.	0.	0.	2.	7.	12.	16.	10.	6.	8.	18.	19.	15.
5	4	0.	0.	2.	0.	0.	0.	0.	0.	6.	9.	8.	9.	5.	12.	18.	1.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	0.	2.	1.	1.	4.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	2	11.	5.	2.	0.	1.	0.	4.	10.	8.	5.	3.	4.	4.	4.	9.	12.
6	3	1.	0.	4.	0.	0.	1.	1.	7.	5.	3.	2.	2.	5.	6.	10.	12.
6	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	4.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	2	11.	2.	2.	0.	0.	1.	2.	5.	6.	1.	3.	2.	3.	2.	5.	10.
[illegible]	3	5.	0.	3.	0.	0.	0.	1.	12.	6.	3.	1.	0.	1.	2.	4.	6.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.
7	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 1738 MISSING = 0 CALM = 0 VARIABLE = 40

[illegible]

TABLE 5-4 2ND QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	2	6.	5.	7.	0.	2.	4.	2.	5.	9.	6.	12.	12.	6.	11.	9.	8.
1	3	18.	23.	17.	15.	11.	12.	15.	18.	27.	32.	22.	15.	13.	18.	14.	19.
1	4	4.	10.	16.	10.	33.	8.	8.	6.	13.	18.	21.	22.	11.	9.	9.	5.
1	5	6.	0.	0.	5.	9.	4.	2.	4.	9.	1.	2.	12.	11.	4.	6.	10.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	4.	2.	1.	1.	2.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	1.	0.	0.	0.	0.	0.	0.	2.	1.	4.	1.	0.	0.	0.	0.	0.
2	3	0.	3.	0.	1.	0.	4.	0.	3.	0.	1.	2.	2.	0.	2.	3.	3.
2	4	0.	0.	1.	1.	3.	0.	1.	1.	1.	2.	3.	0.	4.	0.	2.	2.
2	5	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	1.	0.	2.	0.	1.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	0.	0.	0.	0.	1.	0.
3	3	2.	2.	0.	1.	1.	0.	2.	3.	1.	1.	1.	1.	0.	0.	3.	2.
3	4	4.	1.	1.	0.	0.	4.	1.	2.	3.	1.	2.	2.	5.	1.	2.	3.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	2.	2.	0.	1.	1.	2.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	2	3.	1.	0.	3.	0.	0.	1.	1.	3.	3.	1.	2.	0.	2.	2.	2.
4	3	1.	5.	3.	2.	5.	3.	5.	4.	4.	4.	5.	1.	12.	7.	3.	5.
4	4	3.	4.	3.	2.	1.	8.	2.	8.	8.	8.	8.	5.	9.	4.	10.	12.
4	5	2.	0.	0.	0.	1.	0.	1.	0.	6.	4.	5.	5.	7.	5.	8.	1.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	5.	4.	0.	0.	0.	2.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
5	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	2	1.	1.	2.	0.	0.	2.	1.	0.	6.	1.	2.	1.	1.	3.	1.	8.
5	3	6.	6.	8.	3.	1.	1.	0.	3.	7.	7.	7.	6.	11.	5.	7.	14.
5	4	5.	6.	2.	3.	0.	1.	1.	2.	12.	10.	9.	12.	10.	9.	5.	2.
5	5	4.	0.	0.	2.	0.	0.	0.	3.	3.	8.	12.	6.	6.	7.	2.	5.
5	6	0.	0.	0.	0.	0.	0.	0.	1.	0.	3.	4.	0.	1.	1.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.	0.
6	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	2	0.	2.	1.	0.	2.	0.	0.	1.	2.	4.	6.	3.	4.	3.	1.	1.
6	3	8.	6.	9.	5.	8.	3.	0.	2.	4.	7.	2.	4.	3.	5.	5.	7.
6	4	4.	1.	3.	3.	2.	0.	0.	0.	0.	3.	2.	2.	5.	3.	2.	1.
6	5	4.	0.	0.	0.	1.	0.	0.	0.	0.	0.	1.	0.	3.	3.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	2	1.	3.	3.	0.	3.	1.	0.	2.	1.	5.	4.	1.	1.	1.	1.	1.
[illegible]	3	0.	6.	3.	8.	6.	2.	0.	3.	5.	7.	3.	2.	1.	1.	2.	1.
[illegible]	4	3.	2.	1.	0.	1.	1.	0.	0.	2.	2.	2.	0.	3.	2.	2.	1.
7	5	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 1609 MISSING = 148 CALM = 0 VARIABLE = 21

[illegible]

TABLE 5-5 3RD QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	0.	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.	1.	2.	0.	0.
1	2	20.	15.	3.	3.	4.	5.	5.	12.	15.	16.	8.	15.	11.	15.	18.	15.
1	3	59.	38.	8.	0.	2.	4.	8.	23.	45.	23.	13.	12.	15.	11.	15.	23.
1	4	14.	5.	0.	0.	0.	0.	0.	3.	27.	32.	16.	6.	3.	2.	3.	0.
1	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	3.	2.	1.	0.	1.	2.	0.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	1.	1.	2.	0.	1.	0.	2.	2.	1.	0.	0.	1.	0.	1.	0.	0.
2	3	4.	3.	2.	2.	1.	2.	1.	6.	9.	1.	0.	3.	1.	2.	4.	6.
2	4	2.	0.	0.	0.	1.	0.	0.	2.	1.	4.	0.	1.	1.	1.	3.	1.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	0.	1.	0.	0.	0.	0.	3.	3.	2.	1.	0.	2.	0.	1.	2.
3	3	4.	3.	1.	1.	0.	1.	4.	4.	7.	4.	2.	2.	3.	0.	1.	5.
3	4	1.	0.	0.	0.	0.	0.	0.	2.	4.	5.	3.	2.	1.	1.	2.	0.
3	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.
4	2	6.	5.	2.	1.	3.	1.	2.	1.	7.	1.	1.	2.	1.	1.	3.	6.
4	3	10.	12.	4.	4.	1.	3.	10.	26.	22.	5.	6.	6.	4.	10.	11.	20.
4	4	8.	3.	1.	0.	1.	0.	3.	5.	6.	8.	3.	1.	3.	17.	30.	4.
4	5	0.	1.	2.	0.	0.	0.	0.	0.	1.	0.	2.	0.	1.	3.	5.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.	1.	0.	0.
5	2	8.	9.	3.	1.	0.	6.	5.	4.	10.	6.	3.	4.	8.	6.	10.	12.
5	3	10.	2.	3.	0.	2.	1.	4.	28.	12.	9.	3.	5.	7.	12.	25.	19.
5	4	0.	0.	0.	0.	0.	0.	0.	4.	1.	2.	2.	1.	1.	10.	10.	1.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	3.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	1.	0.	1.	0.	0.	0.	0.	0.	2.	0.	1.	0.	0.	0.	0.	0.
6	2	21.	15.	4.	2.	2.	4.	10.	14.	7.	5.	6.	4.	3.	4.	11.	8.
6	3	4.	7.	10.	4.	1.	1.	6.	19.	30.	11.	7.	5.	6.	6.	18.	15.
6	4	0.	0.	0.	0.	0.	0.	0.	0.	11.	3.	4.	2.	1.	3.	3.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	1.	0.	0.	0.	1.	0.	1.	1.	0.	1.	0.	0.	0.	1.	1.
7	2	29.	45.	21.	5.	5.	3.	7.	10.	15.	2.	3.	3.	12.	9.	4.	30.
7	3	11.	12.	9.	1.	0.	0.	5.	14.	23.	2.	2.	1.	0.	5.	12.	11.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.	0.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 1976 MISSING = 0 CALM = 15 VARIABLE = 79

[illegible]

TABLE 5-6 3RD QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	0.	0.	0.	0.	0.	1.	0.	1.	2.	0.	0.	0.	0.	1.	1.	0.
1	2	16.	9.	2.	3.	0.	4.	10.	8.	10.	16.	15.	7.	11.	11.	10.	9.
1	3	33.	34.	16.	5.	6.	5.	19.	13.	18.	38.	22.	18.	16.	13.	17.	30.
1	4	3.	15.	10.	0.	0.	0.	1.	3.	10.	23.	34.	12.	7.	7.	6.	8.
1	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	9.	9.	4.	3.	2.	1.	2.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	2.	1.	0.	0.	2.	0.
1	7	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
2	2	0.	0.	1.	1.	0.	0.	0.	1.	1.	2.	0.	2.	0.	0.	1.	1.
2	3	3.	1.	2.	1.	2.	1.	2.	3.	2.	4.	0.	2.	1.	0.	2.	3.
2	4	2.	3.	1.	0.	1.	0.	0.	1.	5.	3.	3.	1.	3.	3.	4.	3.
2	5	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.	1.	0.	1.	1.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	1.	0.	0.	0.	0.	1.	0.	1.	1.	1.	3.	2.	1.	2.	0.
3	3	3.	3.	0.	1.	1.	0.	3.	2.	4.	5.	3.	4.	1.	1.	1.	3.
3	4	1.	2.	0.	0.	0.	0.	0.	2.	2.	4.	4.	2.	3.	1.	0.	2.
3	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	2.	2.	1.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	1.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	2	1.	3.	0.	1.	3.	1.	0.	0.	5.	0.	0.	0.	4.	2.	1.	4.
4	3	8.	7.	7.	7.	5.	2.	5.	11.	10.	16.	9.	2.	4.	7.	11.	10.
4	4	8.	11.	4.	0.	1.	0.	2.	9.	6.	3.	12.	8.	3.	2.	8.	8.
4	5	6.	3.	2.	1.	0.	0.	1.	0.	0.	4.	3.	4.	1.	4.	24.	14.
4	6	0.	0.	0.	2.	0.	0.	0.	0.	0.	1.	2.	0.	0.	2.	4.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	2.	2.	0.	0.	0.	0.	0.	0.	0.
5	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
5	2	1.	6.	2.	2.	2.	3.	2.	7.	4.	0.	3.	3.	2.	3.	2.	8.
5	3	14.	6.	1.	0.	2.	4.	1.	10.	12.	8.	2.	6.	3.	13.	22.	6.
5	4	4.	5.	1.	0.	0.	1.	0.	3.	12.	9.	11.	4.	5.	5.	10.	19.
5	5	2.	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.	1.	4.	13.	9.
5	6	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	3.	1.
5	7	3.	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.	0.	0.	0.	0.	1.
6	1	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.	0.
6	2	4.	3.	6.	5.	1.	3.	4.	8.	9.	5.	2.	3.	2.	2.	4.	8.
6	3	13.	4.	4.	5.	3.	4.	2.	9.	21.	20.	7.	5.	4.	10.	7.	15.
6	4	4.	1.	3.	1.	0.	0.	0.	1.	7.	21.	4.	4.	6.	5.	6.	16.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	2.	7.	3.	1.	5.	1.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
7	1	1.	0.	0.	0.	1.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	2	4.	11.	10.	10.	2.	6.	10.	5.	4.	3.	4.	5.	6.	12.	6.	5.
7	3	20.	22.	18.	6.	8.	3.	4.	9.	10.	12.	8.	9.	3.	5.	10.	16.
[illegible]	4	4.	1.	3.	1.	1.	0.	0.	0.	1.	8.	2.	2.	0.	9.	4.	7.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	6.	0.	0.	1.	4.	0.	0.	1.	0.

TOTAL NUMBER OF HOURS
USED = 2035 MISSING = 0 CALM = 0 VARIABLE = 35

[illegible]

TABLE 5-7

4TH QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	2	8.	5.	5.	0.	0.	2.	3.	8.	10.	7.	10.	6.	9.	6.	6.	12.
1	3	22.	11.	1.	0.	0.	1.	5.	17.	15.	5.	3.	2.	3.	5.	16.	18.
1	4	1.	4.	0.	0.	0.	0.	2.	7.	9.	7.	3.	0.	0.	3.	0.	0.
1	5	0.	3.	0.	0.	0.	0.	0.	0.	2.	1.	0.	1.	0.	1.	0.	0.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	1.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
2	3	1.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	1.	0.	0.	1.	3.
2	4	1.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	2.
3	3	2.	0.	0.	0.	1.	0.	2.	1.	2.	0.	0.	0.	0.	0.	1.	2.
3	4	0.	0.	0.	0.	0.	0.	1.	0.	1.	2.	4.	2.	0.	0.	0.	0.
3	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	1.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
4	2	3.	2.	1.	0.	0.	0.	2.	1.	2.	4.	4.	3.	2.	6.	11.	11.
4	3	5.	2.	2.	1.	0.	0.	3.	20.	14.	7.	2.	2.	1.	3.	27.	16.
4	4	4.	1.	0.	0.	0.	0.	2.	6.	18.	10.	5.	3.	2.	1.	1.	0.
4	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.	8.	3.	0.	0.	2.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.	0.	0.	0.	0.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	1.	0.	0.	0.	0.	1.	0.	0.	0.	2.	1.	0.	1.	0.	0.	0.
5	2	36.	12.	11.	1.	3.	1.	10.	14.	26.	28.	32.	29.	29.	36.	42.	40.
5	3	18.	5.	6.	5.	1.	3.	16.	79.	82.	26.	13.	8.	14.	30.	26.	21.
5	4	5.	1.	1.	0.	0.	0.	1.	9.	20.	19.	9.	9.	3.	4.	8.	2.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.	4.	1.	0.	0.	1.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
6	2	20.	9.	4.	3.	0.	2.	3.	8.	8.	13.	14.	13.	11.	28.	30.	31.
6	3	2.	4.	9.	1.	0.	0.	1.	15.	38.	22.	7.	7.	6.	12.	19.	13.
6	4	0.	0.	0.	0.	0.	0.	0.	4.	6.	1.	6.	0.	0.	1.	0.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	1.	0.	2.	2.
7	2	30.	26.	4.	0.	0.	2.	0.	6.	11.	12.	10.	12.	13.	19.	35.	34.
7	3	10.	7.	2.	1.	0.	0.	0.	7.	15.	4.	5.	6.	6.	4.	13.	18.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	0.	0.	0.	0.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 2073 MISSING = 0 CALM = 1 VARIABLE = 46

[illegible]

TABLE 5-8 4TH QUARTER 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	2	8.	3.	3.	0.	0.	1.	3.	10.	5.	7.	5.	4.	7.	5.	5.	11.
1	3	21.	5.	1.	1.	0.	1.	8.	19.	11.	8.	3.	4.	5.	7.	9.	26.
1	4	3.	0.	0.	0.	0.	0.	4.	8.	10.	6.	1.	0.	3.	2.	4.	0.
1	5	4.	1.	0.	0.	0.	0.	0.	1.	4.	3.	2.	0.	0.	0.	0.	0.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	1.
2	3	1.	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.	2.	2.
2	4	1.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.
2	5	1.	0.	0.	0.	0.	0.	1.	0.	0.	2.	1.	0.	0.	0.	0.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	2.	1.
3	3	1.	0.	1.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.	2.	2.
3	4	0.	0.	0.	0.	1.	0.	1.	0.	1.	3.	0.	0.	0.	0.	0.	0.
3	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	5.	1.	0.	0.	0.	0.
3	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.
3	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
4	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	2	6.	1.	3.	0.	0.	0.	0.	0.	3.	0.	4.	3.	3.	3.	10.	3.
4	3	6.	0.	1.	1.	0.	0.	2.	9.	13.	7.	2.	3.	0.	9.	16.	10.
4	4	1.	1.	0.	0.	0.	0.	1.	7.	15.	13.	5.	2.	0.	2.	14.	4.
4	5	4.	0.	0.	0.	0.	0.	1.	2.	2.	15.	7.	3.	1.	3.	0.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.	7.	1.	0.	0.	1.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	2.	1.	0.	0.	0.	0.
5	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	1.	1.	0.	0.
5	2	20.	18.	10.	1.	2.	3.	4.	11.	22.	28.	16.	23.	19.	25.	29.	28.
5	3	12.	4.	9.	4.	1.	2.	7.	51.	55.	23.	14.	9.	13.	24.	35.	35.
5	4	7.	1.	1.	0.	0.	0.	5.	38.	41.	26.	12.	4.	5.	13.	10.	1.
5	5	4.	0.	0.	0.	0.	0.	0.	2.	3.	23.	13.	8.	3.	7.	4.	1.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.	8.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	0.	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.	1.	1.	0.
6	2	10.	7.	6.	2.	5.	2.	4.	10.	10.	9.	9.	10.	14.	10.	13.	14.
6	3	11.	9.	7.	2.	1.	1.	6.	7.	13.	14.	10.	7.	11.	12.	14.	21.
6	4	0.	0.	1.	0.	0.	0.	2.	10.	17.	11.	4.	2.	5.	13.	4.	6.
6	5	0.	0.	0.	0.	0.	0.	0.	2.	2.	4.	7.	0.	1.	6.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	2.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	1.	0.	0.
7	2	12.	8.	7.	2.	4.	3.	5.	9.	8.	7.	7.	5.	11.	5.	8.	8.
7	3	12.	6.	8.	3.	1.	0.	6.	19.	20.	7.	9.	8.	5.	8.	19.	30.
7	4	0.	0.	0.	0.	0.	0.	0.	1.	3.	2.	5.	3.	4.	10.	23.	6.
7	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	3.	1.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 2083 MISSING = 0 CALM = 16 VARIABLE = 21

TABLE 5-9 VENTS & PURGES 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.	2.	2.	0.	3.	3.	1.
1	2	28.	12.	9.	2.	2.	2.	3.	13.	19.	18.	11.	17.	21.	15.	27.	31.
1	3	25.	22.	13.	0.	1.	1.	4.	35.	40.	24.	4.	9.	9.	16.	21.	33.
1	4	14.	24.	18.	0.	0.	1.	4.	8.	25.	37.	13.	9.	3.	5.	8.	8.
1	5	2.	9.	2.	0.	0.	0.	0.	0.	2.	32.	16.	5.	3.	1.	2.	0.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	7.	1.	1.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.
2	2	1.	2.	0.	0.	0.	0.	0.	3.	0.	1.	1.	0.	2.	0.	0.	1.
2	3	1.	2.	0.	0.	0.	0.	0.	0.	1.	1.	0.	1.	0.	1.	4.	1.
2	4	1.	1.	0.	0.	0.	0.	0.	1.	1.	2.	3.	1.	0.	0.	1.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
3	2	3.	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	3.	0.	2.
3	3	2.	0.	0.	0.	0.	0.	2.	3.	2.	1.	0.	2.	1.	2.	1.	2.
3	4	1.	0.	1.	0.	0.	0.	0.	1.	1.	1.	3.	3.	1.	0.	1.	0.
3	5	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.
4	2	6.	4.	1.	1.	0.	1.	1.	1.	6.	6.	2.	9.	4.	6.	7.	9.
4	3	8.	1.	5.	1.	0.	1.	3.	17.	16.	7.	5.	4.	6.	2.	7.	15.
4	4	3.	3.	3.	0.	0.	0.	0.	2.	7.	8.	4.	4.	4.	6.	6.	3.
4	5	8.	6.	0.	0.	0.	0.	0.	0.	1.	5.	5.	1.	2.	3.	0.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	2.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	1.	3.	1.	1.
5	2	17.	19.	6.	5.	2.	2.	2.	4.	18.	22.	24.	16.	26.	27.	23.	39.
5	3	19.	8.	15.	1.	1.	2.	7.	51.	49.	13.	11.	8.	3.	21.	81.	39.
5	4	2.	4.	2.	0.	0.	0.	1.	6.	13.	15.	4.	8.	4.	8.	17.	20.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	13.	0.	2.	0.	0.	2.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.	1.	0.	1.	0.	0.
6	2	13.	8.	3.	2.	0.	2.	2.	7.	11.	12.	13.	9.	17.	13.	28.	24.
6	3	3.	4.	7.	0.	1.	1.	4.	10.	33.	7.	10.	4.	11.	1.	15.	26.
6	4	0.	0.	0.	0.	0.	0.	0.	4.	9.	8.	6.	2.	0.	3.	3.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	3.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	1.	0.
7	2	10.	8.	1.	1.	2.	0.	0.	7.	9.	2.	5.	8.	7.	9.	21.	12.
7	3	6.	3.	5.	0.	0.	0.	2.	7.	16.	4.	3.	1.	1.	9.	5.	10.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.	0.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 2343 MISSING = 0 CALM = 17 VARIABLE = 36

[illegible]

TABLE 5-10 VENTS & PURGES 1989 JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	1.	1.	0.	0.	0.	0.	1.	1.	1.	1.	1.	0.	0.	0.	0.
1	2	20.	19.	5.	7.	3.	4.	5.	13.	16.	10.	14.	13.	10.	12.	14.	16.
1	3	20.	22.	12.	5.	6.	0.	7.	29.	13.	16.	9.	10.	13.	13.	19.	26.
1	4	7.	17.	12.	6.	15.	3.	6.	16.	25.	27.	20.	8.	5.	4.	15.	9.
1	5	9.	16.	0.	5.	9.	1.	0.	2.	9.	27.	12.	6.	4.	2.	0.	3.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	28.	6.	7.	1.	0.	0.	1.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	7.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	2	0.	0.	1.	1.	1.	0.	0.	1.	1.	2.	1.	0.	0.	0.	0.	2.
2	3	1.	4.	1.	0.	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.	2.	1.
2	4	0.	1.	0.	1.	1.	0.	0.	1.	1.	1.	3.	0.	2.	1.	0.	0.
2	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.	1.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	2.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.
3	3	0.	2.	1.	0.	0.	0.	1.	2.	0.	0.	1.	1.	1.	2.	0.	2.
3	4	2.	2.	0.	0.	0.	0.	1.	1.	2.	2.	1.	0.	3.	1.	1.	1.
3	5	0.	2.	0.	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	1.	0.	0.
3	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
4	2	4.	4.	4.	2.	1.	3.	0.	0.	6.	4.	5.	2.	1.	4.	0.	4.
4	3	2.	12.	4.	1.	1.	0.	1.	11.	9.	6.	4.	2.	6.	5.	4.	11.
4	4	6.	5.	3.	0.	1.	0.	0.	8.	10.	7.	7.	3.	2.	4.	3.	7.
4	5	17.	5.	0.	0.	1.	0.	0.	1.	5.	4.	5.	2.	4.	2.	0.	4.
4	6	0.	0.	0.	0.	0.	0.	0.	5.	0.	4.	3.	4.	0.	0.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
5	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.	2.	1.	2.	1.
5	2	12.	8.	5.	0.	6.	2.	2.	7.	13.	14.	15.	7.	12.	18.	12.	9.
5	3	24.	21.	11.	4.	2.	4.	4.	35.	41.	16.	6.	3.	8.	25.	59.	31.
5	4	12.	9.	3.	2.	0.	2.	5.	21.	24.	15.	5.	5.	5.	33.	40.	10.
5	5	3.	0.	0.	2.	0.	0.	1.	5.	8.	17.	3.	4.	3.	7.	2.	4.
5	6	0.	0.	0.	0.	0.	0.	0.	1.	0.	5.	4.	0.	2.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.	0.	0.	0.
6	1	1.	2.	0.	0.	0.	0.	0.	0.	1.	1.	2.	0.	0.	1.	0.	0.
6	2	9.	7.	3.	3.	2.	1.	9.	11.	7.	6.	6.	9.	6.	6.	8.	4.
6	3	6.	8.	11.	7.	3.	4.	6.	17.	11.	11.	3.	8.	3.	9.	7.	12.
6	4	6.	2.	4.	0.	1.	1.	0.	11.	12.	11.	5.	3.	9.	3.	13.	5.
6	5	1.	0.	0.	0.	1.	0.	0.	1.	1.	7.	3.	6.	1.	1.	4.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	0.	1.	0.
7	2	6.	7.	1.	1.	3.	2.	4.	2.	4.	5.	3.	1.	4.	8.	4.	4.
7	3	2.	10.	5.	5.	2.	1.	3.	4.	10.	12.	8.	2.	1.	1.	2.	6.
7	4	6.	1.	1.	0.	1.	1.	0.	2.	4.	6.	2.	0.	1.	8.	5.	5.
7	5	2.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.
7	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 2346 MISSING = 0 CALM = 30 VARIABLE = 20

[illegible]

TABLE 5-11 1989 ANNUAL JOINT FREQUENCY DISTRIBUTION FOR THE 33 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	2.	0.	1.	0.	0.	0.	0.	1.	1.	0.	2.	2.	1.	3.	3.	1.
1	2	75.	37.	21.	9.	11.	15.	17.	40.	48.	46.	40.	50.	53.	50.	68.	80.
1	3	127.	85.	35.	6.	7.	14.	30.	100.	129.	78.	44.	51.	47.	54.	85.	103.
1	4	31.	38.	20.	0.	0.	1.	7.	28.	80.	89.	42.	23.	15.	18.	38.	12.
1	5	2.	12.	2.	0.	0.	0.	0.	0.	5.	37.	26.	10.	5.	4.	13.	1.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	8.	1.	1.	0.	0.	0.
1	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.
2	2	4.	3.	2.	1.	1.	0.	4.	5.	2.	4.	4.	3.	3.	2.	0.	5.
2	3	8.	4.	3.	4.	2.	2.	2.	9.	17.	6.	2.	6.	4.	4.	14.	12.
2	4	5.	1.	0.	0.	1.	0.	1.	4.	7.	9.	4.	2.	2.	2.	6.	1.
2	5	0.	0.	0.	0.	0.	0.	0.	1.	0.	2.	1.	0.	0.	1.	1.	0.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	1	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
3	2	4.	1.	2.	0.	0.	0.	1.	3.	5.	2.	2.	2.	3.	3.	3.	6.
3	3	11.	3.	4.	1.	5.	5.	8.	13.	11.	7.	6.	5.	4.	4.	7.	13.
3	4	1.	0.	2.	0.	2.	1.	1.	6.	6.	9.	10.	8.	3.	4.	6.	2.
3	5	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.	2.	0.	1.	0.	4.	0.
3	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	1.	1.	1.
4	2	19.	15.	6.	2.	4.	3.	8.	4.	17.	14.	11.	16.	13.	19.	29.	32.
4	3	30.	18.	17.	6.	1.	8.	23.	71.	53.	30.	21.	20.	20.	27.	52.	50.
4	4	22.	10.	6.	0.	1.	0.	6.	15.	42.	31.	15.	18.	18.	31.	46.	13.
4	5	14.	8.	2.	0.	0.	0.	0.	0.	1.	18.	16.	5.	5.	6.	13.	0.
4	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	0.	0.	0.	2.	0.	0.
4	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	1	2.	1.	0.	0.	0.	1.	0.	1.	0.	3.	4.	0.	2.	3.	1.	2.
5	2	64.	44.	21.	8.	7.	10.	20.	30.	61.	59.	60.	56.	65.	67.	90.	99.
5	3	47.	20.	27.	8.	4.	6.	31.	137.	134.	63.	35.	29.	39.	84.	152.	96.
5	4	9.	6.	3.	0.	0.	0.	1.	17.	33.	39.	22.	23.	14.	34.	51.	31.
5	5	0.	0.	0.	0.	0.	0.	0.	0.	1.	23.	4.	3.	1.	4.	10.	0.
5	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	0.	0.	0.	0.
5	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	1	1.	0.	1.	0.	0.	0.	0.	0.	2.	0.	4.	1.	0.	2.	1.	1.
6	2	63.	38.	13.	6.	3.	6.	17.	36.	30.	32.	32.	28.	37.	49.	74.	71.
6	3	13.	13.	25.	6.	1.	3.	9.	47.	99.	40.	25.	17.	21.	28.	59.	58.
6	4	0.	0.	0.	0.	0.	0.	0.	7.	19.	9.	11.	4.	1.	5.	7.	0.
6	5	0.	0.	0.	0.	0.	0.	0.	0.	2.	0.	0.	3.	0.	0.	0.	0.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	1	3.	1.	0.	0.	0.	1.	1.	1.	1.	0.	2.	1.	1.	1.	4.	3.
7	2	75.	73.	27.	5.	5.	6.	9.	24.	37.	18.	20.	23.	32.	39.	64.	79.
7	3	26.	19.	14.	2.	0.	0.	6.	34.	52.	10.	12.	8.	8.	15.	30.	38.
[illegible]	4	0.	0.	0.	0.	0.	0.	0.	3.	0.	1.	2.	0.	0.	0.	1.	0.
[illegible]	5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

TOTAL NUMBER OF HOURS
USED = 7634 MISSING = 0 CALM = 28 VARIABLE = 189

TABLE 5-12 1989 ANNUAL JOINT FREQUENCY DISTRIBUTION FOR THE 245 FT LEVEL
CALCULATED FROM HOURLY AVERAGES FROM TAPE

MAXIMUM WIND SPEEDS FOR EACH CATEGORY IN MPH ARE:
1 - 0.6 2 - 3.0 3 - 7.0 4 - 12.0 5 - 18.0 6 - 24.0

NUMBERS GIVEN ARE HOURS

STAB CLASS	WIND CAT	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
1	1	1.	1.	1.	0.	0.	1.	1.	1.	3.	1.	1.	1.	0.	1.	1.	2.
1	2	52.	35.	17.	12.	6.	12.	19.	35.	33.	35.	45.	35.	30.	38.	36.	49.
1	3	85.	69.	42.	24.	19.	19.	47.	76.	70.	91.	51.	43.	42.	47.	64.	104.
1	4	13.	32.	28.	11.	33.	9.	19.	35.	60.	66.	64.	37.	23.	26.	38.	27.
1	5	13.	17.	0.	5.	9.	4.	2.	7.	22.	40.	25.	20.	15.	9.	8.	13.
1	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	32.	9.	12.	2.	2.	3.	2.
1	7	1.	0.	0.	0.	0.	0.	0.	0.	0.	7.	9.	0.	0.	0.	0.	0.
2	1	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
2	2	1.	0.	2.	2.	1.	0.	0.	4.	3.	6.	2.	2.	1.	0.	3.	4.
2	3	5.	6.	3.	2.	2.	5.	2.	6.	4.	5.	2.	5.	1.	2.	9.	8.
2	4	3.	3.	2.	1.	4.	0.	1.	4.	8.	5.	6.	1.	7.	4.	6.	5.
2	5	1.	0.	0.	0.	0.	1.	1.	1.	1.	2.	3.	1.	1.	2.	3.	2.
2	6	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
2	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	0.	0.	0.	0.
3	1	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	2	0.	3.	0.	0.	0.	0.	1.	3.	3.	3.	1.	3.	2.	1.	6.	2.
3	3	6.	7.	2.	2.	2.	0.	6.	6.	6.	6.	4.	5.	1.	3.	7.	9.
3	4	5.	3.	1.	0.	1.	4.	3.	4.	7.	9.	7.	4.	8.	2.	3.	5.
3	5	0.	2.	0.	0.	0.	0.	0.	0.	2.	3.	10.	3.	2.	3.	2.	2.
3	6	0.	0.	0.	0.	0.	0.	0.	0.	2.	2.	0.	0.	0.	0.	1.	1.
[illegible]	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
[illegible]	1	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
4	2	12.	9.	7.	5.	4.	5.	2.	1[illegible]	17.	7.	14.	7.	7.	9.	13.	12.
4	3	16.	19.	17.	12.	10.	6.	19.	38.	29.	33.	21.	8.	17.	27.	31.	32.
4	4	15.	17.	8.	2.	2.	9.	7.	32.	38.	26.	26.	15.	13.	11.	36.	27.
4	5	39.	8.	2.	1.	1.	0.	9.	3.	12.	24.	15.	13.	10.	12.	33.	16.
4	6	0.	0.	0.	2.	0.	0.	0.	5.	2.	10.	14.	5.	0.	2.	5.	2.
4	7	0.	0.	0.	0.	0.	0.	0.	2.	2.	3.	3.	1.	0.	0.	0.	0.
5	1	1.	1.	0.	0.	0.	0.	0.	0.	0.	3.	0.	1.	3.	2.	2.	2.
5	2	35.	33.	18.	6.	11.	10.	10.	23.	41.	41.	33.	34.	33.	49.	43.	52.
5	3	50.	34.	26.	11.	6.	14.	23.	91.	99.	51.	32.	23.	34.	70.	118.	76.
5	4	26.	16.	5.	4.	0.	10.	15.	59.	74.	57.	36.	23.	24.	68.	78.	36.
5	5	10.	0.	0.	2.	0.	0.	1.	12.	12.	42.	27.	17.	10.	22.	21.	15.
5	6	1.	0.	0.	0.	0.	0.	0.	2.	0.	12.	12.	0.	2.	1.	3.	1.
5	7	3.	0.	0.	0.	0.	0.	1.	1.	0.	1.	3.	0.	0.	0.	0.	1.
6	1	1.	3.	0.	0.	0.	0.	1.	1.	1.	2.	3.	1.	0.	2.	1.	0.
6	2	23.	19.	15.	11.	10.	7.	14.	29.	26.	22.	22.	24.	24.	22.	26.	26.
6	3	35.	23.	23.	17.	12.	9.	13.	36.	43.	48.	24.	23.	20.	31.	34.	53.
6	4	10.	2.	8.	6.	2.	3.	2.	21.	31.	36.	15.	9.	17.	29.	24.	26.
6	5	4.	0.	0.	0.	1.	0.	0.	4.	3.	13.	11.	7.	7.	10.	5.	1.
6	6	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
6	7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
7	1	4.	0.	0.	0.	1.	1.	1.	0.	0.	1.	1.	3.	0.	1.	1.	0.
7	2	22.	26.	21.	13.	10.	12.	18.	17.	16.	20.	17.	12.	22.	21.	18.	17.
7	3	33.	34.	30.	18.	16.	6.	14.	34.	42.	31.	23.	20.	9.	14.	32.	49.
[illegible]	4	8.	3.	4.	1.	2.	1.	0.	3.	8.	12.	9.	5.	7.	26.	31.	15.
[illegible]	5	2.	0.	0.	0.	0.	0.	0.	0.	0.	2.	1.	0.	4.	6.	0.	0.
	6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	7	0.	0.	0.	0.	0.	0.	0.	6.	0.	0.	1.	4.	0.	0.	1.	0.

TOTAL NUMBER OF HOURS
USED = 7564 MISSING = 148 CALM = 48 VARIABLE = 91

6.0 DOSE ASSESSMENT - IMPACT ON MAN

Liquid Effluents - The doses to the maximum individual from WNP-2 liquid effluents were calculated using the LADTAP II computer code and the site specific input parameters.

Table 6-1 lists the doses to the maximum individual by calendar quarters respectively.

The doses by calendar quarters to the average exposed individual are listed in Table 6-2. The 50-mile population doses by calendar quarters are listed in Table 6-3. Table 6-4 provides annual dosages to the average individual and 50-mile population doses from liquid effluents. All doses were calculated using the LADTAP II computer code.

An evaluation of the nearest orchard (approximately 3 miles downstream) using Columbia River water for its irrigation showed an adult total body dose value of 3.0E-05 mrem/yr, thyroid dose of 4.0E-06 mrem/yr., and an organ dose value of 1.1E-04 mrem/yr. The population doses at this location showed a total body value of 9.6E-05 person-rem, thyroid dose of 5.8E-06 person-rem, and an organ value of 2.5E-04 person-rem.

Gaseous Effluents - The NRC computer code GASPAR II was used to calculate doses at and beyond the site boundary. Table 6-5 furnishes a summary of quarterly air and organ doses. It also provides the annual total body and skin doses at and beyond the site boundary. Table 6-6 lists the annual 50-mile dose using values obtained from the ALARA annual integrated population dose summary (person-rem). Table 6-6 also provides the annual individual doses associated with each pathway. These values were obtained by dividing the ALARA integrated dose (person-rem) by the 50-mile population (252,356 year 1987) and converting to mrem. The GASPAR II runs utilized quarterly and annual meteorological data and site specific input parameters pertaining to food productions.

6.1 Exposure to "A Member of the Public"

The WNP-2 Visitor Center was evaluated for assessment of radiation doses to "Members of the Public", due to their activities within the site boundary. The ODCM assumes an eight (8) hour per year occupancy by "A Member of the Public" at the Visitor Center. The dose assessment resulted in an annual calculated whole body dose of 2.6E-04 mrem. The annual thyroid dose was 2.9E-03 mrem and the maximum dose to any other organ was 3.7E-04 mrem. The air dose contribution was as follows; Beta air dose was 2.2E-03 mrad and the Gamma air dose was 3.5E-03 mrad. The direct radiation contribution from TLD results calculated to an average of 1.4E-01 mrem per eight hour period.

The annual assessment of radiation doses to the likely most exposed "Member of the Public" to show conformance with 40CFR Part 190 is assumed to be located in the Taylor Flats vicinity (6.4 miles in a Southeasterly direction). The NRC Gaspar II computer code with annual source terms and XOQDOQ meteorological data was used to obtain the dose assessment from gaseous effluents. It is assumed there is no dose contribution from liquid effluents at this location. The assessment of the maximum age group resulted in annual calculated total body dose of 6.4E-03 mrem. The annual thyroid dose was 1.2E-01 mrem and the maximum dose to any other organ was 7.4E-03 mrem. Exposure pathways were ground, vegetables, meat, cow milk and inhalation. The air dose contribution was as follows: Beta air dose was 6.2E-02 mrad/yr and the Gamma air dose was 5.1E-02 mrad/yr.

An annual assessment of radiation doses to a "Member of the Public" was also made at a location in the vicinity of 4.8 miles southeast. This location receives irrigation water from the Columbia River as mentioned in paragraph 6.0 above. The annual GASPAR II computer run resulted in a child total body dose of 8.0 E-03 mrem. The annual child age group thyroid dose was 1.1 E-01 mrem and the maximum dose to any other organ for the child age group was 1.1 E-02 mrem. The annual Beta air dose was 1.1E-01 mrad and the Gamma air dose was 1.0E-01 mrad. The annual dose contribution due to liquid releases using vegetation from the irrigated food pathway and the child age group of the NRC LADTAP II computer run showed a total body dose of 8.7 E-05 mrem. The annual thyroid dose was 9.8 E-06 mrem and the maximum dose to any other organ was 1.6 E-04 mrem.

The direct radiation contribution showed no significant amount above normal background. The 1989 annual average TLD summary was 92 mrem per year.

Table 6-1

MAXIMUM INDIVIDUAL DOSES FROM WNP-2 LIQUID EFFLUENTS

1ST AND 2ND QUARTERS 1989

First Quarter 1989				
Pathway	Total Body (mrem/qtr)	1989 Cumulative Total Body (mrem/yr)	Max. Organ. (mrem/qtr)	1989 Cumulative Max. Organ. (mrem/yr)
Fishing	No liquid batch releases occurred during the First Quarter of 1989.			
Drinking				
Shoreline				
Swimming				
Boating				
Vegetables				
Leafy Veg.				
Milk				
Meat				
Total				

Second Quarter 1989				
Pathway	Total Body (mrem/qtr)	1989 Cumulative Total Body (mrem/yr)	Max. Organ. (mrem/qtr)	1989 Cumulative Max. Organ. (mrem/yr)
Fishing	1.7E-03	1.7E-03	4.2E-03	4.2E-03
Drinking	3.1E-06	3.1E-06	1.0E-05	1.0E-05
Shoreline	3.3E-05	3.3E-05	3.9E-05	3.9E-05
Swimming	6.4E-08	6.4E-08	6.4E-08	6.4E-08
Boating	1.8E-06	1.8E-06	1.8E-06	1.8E-06
Vegetables	1.2E-05	1.2E-05	4.4E-05	4.4E-05
Leafy Veg.	4.3E-06	4.3E-06	1.8E-05	1.8E-05
Milk	1.0E-05	1.0E-05	2.1E-05	2.1E-05
Meat	2.4E-06	2.4E-06	8.7E-06	8.7E-06
Total	1.8E-03	1.8E-03	4.3E-03	4.3E-03

Table 6-1

MAXIMUM INDIVIDUAL DOSES FROM WNP-2 LIQUID EFFLUENTS(1)

3RD AND 4TH QUARTERS 1989

Third Quarter 1989				
Pathway	Total Body (mrem/qtr)	1989 Cumulative Total Body (mrem/yr)	Max. Organ. (mrem/qtr)	1989 Cumulative Max. Organ. (mrem/yr)
Fishing	1.0E-05	1.7E-03	2.3E-05	4.2E-03
Drinking	6.2E-08	3.2E-06	5.3E-07	1.0E-05
Shoreline	3.2E-07	3.3E-05	3.7E-07	3.9E-05
Swimming	5.7E-10	6.5E-08	5.7E-10	6.5E-08
Boating	1.6E-08	1.8E-06	1.6E-08	1.8E-06
Vegetables	1.2E-07	1.2E-05	4.2E-07	4.4E-05
Leafy Veg.	3.7E-07	4.7E-06	3.3E-07	1.8E-05
Milk	8.3E-08	1.0E-05	2.9E-07	2.1E-05
Meat	2.2E-08	2.4E-06	7.1E-08	8.8E-06
Total	1.1E-05	1.8E-03	2.5E-05	4.3E-03

Fourth Quarter 1989				
Pathway	Total Body (mrem/qtr)	1989 Cumulative Total Body (mrem/yr)	Max. Organ. (mrem/qtr)	1989 Cumulative Max. Organ. (mrem/yr)
Fishing	5.4E-07	1.7E-03	1.4E-06	4.2E-03
Drinking	2.9E-08	3.2E-06	1.3E-07	1.1E-05
Shoreline	2.8E-08	3.3E-05	3.1E-08	3.9E-05
Swimming	7.0E-11	6.5E-08	7.0E-11	6.5E-08
Boating	2.0E-09	1.8E-06	2.0E-09	1.8E-06
Vegetables	2.5E-08	1.2E-05	6.9E-08	4.4E-05
Leafy Veg.	4.6E-09	4.7E-06	7.1E-08	1.8E-05
Milk	9.4E-09	1.0E-05	6.4E-08	2.1E-05
Meat	3.3E-09	2.4E-06	9.1E-09	8.8E-06
Total	6.4E-07	1.8E-03	1.8E-06	4.3E-03

(1) Age Group - Adult: Maximum individual resides at Richland and fishes near the WNP-2 outfall area.

Table 6-2

AVERAGE INDIVIDUAL DOSES FROM WNP-2 LIQUID EFFLUENTS

1ST AND 2ND QUARTERS 1989

	Total per 1st Quarter		Total per 2nd Quarter	
Pathway	Total Body (mrem)	Max. Organ (mrem)	Total Body (mrem)	Max. Organ (mrem)
Fish	No liquid batch		2.3E-05	5.5E-05
Drinking Water			1.6E-06	5.2E-06
Shoreline	releases occurred		2.5E-06	3.0E-06
Swimming			1.4E-08	1.4E-08
Boating	during the first		3.5E-09	3.5E-09
Vegetables(a)			1.0E-07	2.7E-07
Leafy vegetables(a)	quarter of 1989		2.2E-06	7.4E-06
Milk(a)			8.1E-07	1.6E-06
Meat(a)			4.2E-07	1.2E-06
Total			3.1E-05	7.4E-05

3RD AND 4TH QUARTERS 1989

	Total per 3rd Quarter		Total per 4th Quarter	
Pathway	Total Body (mrem)	Max. Organ (mrem)	Total Body (mrem)	Max. Organ (mrem)
Fish	1.4E-07	3.0E-07	7.0E-09	1.8E-08
Drinking Water	3.2E-08	2.7E-08	1.4E-08	6.4E-08
Shoreline	2.4E-08	2.8E-08	2.0E-09	2.4E-09
Swimming	1.3E-10	1.3E-10	1.6E-11	1.6E-11
Boating	3.2E-11	3.2E-11	3.9E-12	3.9E-12
Vegetables(a)	1.1E-09	2.7E-09	2.1E-10	4.1E-10
Leafy vegetables(a)	1.9E-08	1.5E-07	2.3E-09	3.3E-08
Milk(a)	6.8E-09	1.9E-08	6.9E-10	4.3E-09
Meat(a)	3.8E-09	9.7E-09	5.3E-10	1.3E-09
Total	2.3E-07	5.4E-07	2.7E-08	1.2E-07

(a) Values are obtained by dividing the total population ALARA dose by the total population served from irrigated production and converted to mrem.

Table 6-3

50-MILE POPULATION DOSES FROM WNP-2 LIQUID EFFLUENTS

1ST AND 2ND QUARTERS 1989

Pathway	Total per 1st Quarter Total Body. (person-rem)	Total per 1st Quarter Max. Organ (person-rem)	Total per 2nd Quarter Total Body (person-rem)	Total per 2nd Quarter Max. Organ (person-rem)
Fish	No liquid batch		5.2E-05	1.0E-04
Drinking water			1.3E-04	3.4E-04
Shoreline	releases occurred		4.4E-04	5.2E-04
Swimming			2.5E-06	2.5E-06
Boating	during the first		6.2E-07	6.2E-07
Vegetables			1.0E-06	2.7E-06
Leafy vegetables	quarter of 1989.		2.2E-05	7.4E-05
Milk			7.8E-06	1.5E-05
Meat			4.2E-06	1.2E-05
Total			6.6E-04	1.1E-03

3RD AND 4TH QUARTERS 1989

Pathway	Total per 3rd Quarter Total Body (person-rem)	Total per 3rd Quarter Max. Organ (person-rem)	Total per 4th Quarter Total Body (person-rem)	Total per 4th Quarter Max. Organ (person-rem)
Fish	3.3E-07	6.7E-07	1.7E-08	3.4E-08
Drinking water	2.5E-06	2.2E-05	1.1E-06	5.3E-06
Shoreline	4.2E-06	4.9E-06	3.6E-07	4.2E-07
Swimming	2.2E-08	2.2E-08	2.7E-09	2.7E-09
Boating	5.6E-09	5.6E-09	6.9E-10	6.9E-10
Vegetables	1.1E-08	2.7E-08	2.1E-09	4.1E-09
Leafy vegetables	1.9E-07	1.5E-06	2.3E-08	3.3E-07
Milk	6.4E-08	1.9E-07	6.6E-09	4.1E-08
Meat	3.8E-08	9.8E-08	5.4E-09	1.3E-08
Total	7.4E-06	2.9E-05	1.5E-06	6.1E-06

Table 6-4

ANNUAL LADTAP II RESULTS FOR 1989

A. AVERAGE INDIVIDUAL DOSES FROM WNP-2 LIQUID EFFLUENTS

	1989	
Pathway	Total Body. (mrem)	Max. Organ (mrem)
Fish	2.3E-05	4.6E-05
Drinking water	1.7E-06	5.4E-06
Shoreline	2.6E-06	3.0E-06
Swimming	1.4E-08	1.4E-08
Boating	3.6E-09	3.6E-09
Vegetables(a)	1.1E-07	2.8E-07
Leafy vegetables(a)	2.3E-06	7.6E-06
Milk(a)	8.3E-07	1.6E-06
Meat(a)	4.3E-07	1.2E-06
Total	3.1E-05	6.5E-05

B. 50-MILE POPULATION DOSES FROM WNP-2 LIQUID EFFLUENTS

	1989	
Pathway	Total Body. (person-rem)	Max. Organ (person-rem)
Fish	5.3E-05	1.0E-04
Drinking water	1.4E-04	3.5E-04
Shoreline	4.5E-04	5.3E-04
Swimming	2.5E-06	2.5E-06
Boating	6.4E-07	6.4E-07
Vegetables	1.1E-06	2.8E-06
Leafy vegetables	2.3E-05	7.6E-05
Milk	7.9E-06	1.5E-05
Meat	4.3E-06	1.2E-05
Total	6.8E-04	1.1E-03

(a) Values are obtained by dividing the total population ALARA dose by the total population served from irrigated production and converted to mrem.

Table 6-5

SUMMARY OF DOSES FROM WNP-2 GASEOUS EFFLUENTS

1989

Location: 1.2 miles site boundary
Reporting Period: Calendar Quarters Plus Annual Cumulative, 1989

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Cumulative
Beta air dose (mrad)*	2.7E-03	1.4E-02	7.0E-02	1.3E-01	2.2E-01
Gamma air dose (mrad)*	4.6E-03	1.1E-02	8.3E-02	2.2E-01	3.2E-01

Location: Beyond Site Boundary 4.2 miles ESE
Reporting Period Calendar Quarters Plus Annual Cummulative, 1989

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Cumulative
Beta air dose (mrad)*	8.1E-03	1.5E-02	1.0E-01	1.4E-01	2.6E-01
Gamma air dose (mrad)*	9.6E-03	1.0E-02	6.6E-02	2.1E-01	3.0E-01

Location: Site Boundary
Reporting Period: Annual

Annual Total Body Dose (mrem) = 2.4E-02
Annual Skin Dose (mrem) = 2.7E-02

Location: Beyond Site Boundary
Reporting Period: Annual

Annual Total Body Dose (mrem) = 8.0E-03
Annual Skin Dose (mrem) = 7.4E-03

Location: The typical sampling location having the highest annual cumulative organ dose based on Land Use Census. 6.4 miles S.E. (ground, vegetables, meat, cow milk and inhalation pathways).
Reporting Period: Calendar Quarters Plus Annual Cumulative, 1989

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Cumulative
Maximum organ dose (mrem)**	3.0E-03	4.2E-02	7.9E-02	2.9E-02	1.5E-01

* Technical Specification 3.11.2.2.
** Technical Specification 3.11.2.3.

TABLE 6-6

50-MILE POPULATION DOSES FROM 1989 GASEOUS EFFLUENTS

Exposure Pathway	Total Body (Person-Rem)	Max. Organ (Person-Rem)
Plume	1.1 E+00	3.4 E+00
Ground	3.0 E-02	3.5 E-02
Inhalation	1.6 E-02	6.1 E-01
Vegetables	1.6 E-02	1.7 E-02
Milk	8.1 E-03	1.6 E-01
Meat	4.1 E-03	1.2 E-02
Total	1.2 E+00	4.2 E+00

AVERAGE INDIVIDUAL DOSES FROM 1989 GASEOUS EFFLUENTS[a]

Exposure Pathway	Total Body (mrem)	Max. Organ (mrem)
Plume	4.4 E-03	1.3 E-02
Ground	1.2 E-04	1.4 E-04
Inhalation	6.3 E-05	2.4 E-03
Vegetables	6.3 E-05	6.7 E-05
Milk	3.2 E-05	6.3 E-04
Meat	1.6 E-05	4.8 E-05
Total	4.7 E-03	1.6 E-02

[a] The 50 mile population doses divided by the population within 50 miles of the Plant by direction and radii interval and converted to mrem.

7.0 REVISIONS TO THE ODCM

During this reporting period, Amendment No. 7 was made to the Offsite Dose Calculation Manual (ODCM).

7.1 This rationale is intended to provide a concise explanation of the changes made to the WNP-2 Offsite Dose Calculation Manual (ODCM) for Amendment Number 7.

1. Page iii; this change was necessary so the list of tables would coincide with the sequence of the respective age groups for those tables within the text.

2. Page 2; this change is made to clarify that the NRC approved computer code LADTAP II can be used to evaluate dose analyses for liquid radioactive effluent.

3. Page 3; changed the average release rate from 2690 gpm (6.0 cFs) to 808 gpm (1.8 cFs) to correspond to actual operating average and to clarify the concern in Item 2 of the Technical Evaluation Report by the NRC review. This is consistent with the 1.8 cFs value used to obtain the "applicable factor" used in the F_{ℓ} factor for equation five (5) on page six (6).

4. Page 8; Aij is changed to Ai_{τ} to be the same terms as is used in NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants." The near field area is clarified with the statement "within one quarter-mile of the release point" as per NUREG-0133.

5. Page 9; the reference to Radiological Programs Calculation Log 88-3 is made to comply with the intent of NUREG-0133, Section 4.3.1 as recommended by the NRC Reviewer in Item 9 of the Technical Evaluation Report.

6. Page 29; Aij is changed to Ai_{τ} for same reasons as stated in four (4) above.

7. Page 33, Sections 3.0 and 3.1; the additional statement to Section 3.0 is made to provide the means for the use of the NRC approved computer code GASPAR II, to perform dose analyses for gaseous radioactive effluents to the atmosphere. It also provides for the use of the GASPAR II subroutine PARTS which can be used to determine dose factors used for Appendix I of 10 CFR 50 compliance. This additional statement to Section 3.1 is to clarify that for gaseous effluent dose calculations, the site boundary will be considered as 1.2 miles in all geographical directions.

8. Page 34; an error on the meter range was noted and is corrected to $10-10^7$ cpm from $10-10^6$ cpm. The main plant air ventilation was changed from 98,000 cFm to 80,000 cFm based on the actual operating results of the building's HVAC system being balanced.

9. Pages 35 and 36; an error being noted on the meter range is corrected from $10-10^6$ cpm to $10-10^7$ cpm.

   The paragraph in 3.3, page 36 was changed to relate with the wording of the Technical Specifications.

10. Page 38; "at or beyond" has been changed to "at and beyond" to be consistent with the wording in the Technical Specifications.

11. Page 39; W_g and W_M definitions have been changed to be consistent with the Technical Specifications wording of "at and beyond." A statement pertaining to the method of evaluating meteorological data was added.

    Tables 3-2 and 3-3 have been reworded to indicate the typical locations where GASPAR II dose determinations will be calculated based on the current Land Use Census (LUC) with identifying pathways at these locations and typical long term X/Q and D/Q values.

12. Page 40; the term subsequent has been clarified to mean "Subsequent Meteorological" reports.

13. Pages 41, 42, 43 and 44; wording has been changed to be consistent with Technical Specifications.

14. Pages 50, 52 and 53; this change is necessary to correct the wording as the fraction being available for deposition and not the amount being present. Reg. Guide 1.109-26.

15. Pages 56 and 59; "and beyond" was added to the definition of X/Qj to be consistent with Technical Specifications wording.

16. Page 61, Table 3-2; this change reflects the typical locations with their associated pathways, where dose determinations will be calculated based on the current Land Use Census (LUC).

17. Page 62, Table 3-3; this change provides the long term meteorological data for those typical locations where dose calculations will be performed. This meteorological data may be used in the absence of current year data.

18. Pages 63a-67, Tables 3-4 and 3-5; NP-239 has been added to these tables.

19. Page 70, the F_L and F_g values are those referenced in Table E-15 of NRC Regulatory Guide 1.109, Revision 1, and will be the values used in the necessary R_i^V calculations.

20. Page 86; this change was made to clearly identify reference number 10.

21. Pages 88 and 89, Table 3-16 and Table 3-17 respectively; these tables are provided as informational data and provide "typical" locations where dose comparisons have previously been made. They were not actually "special" locations. The change was made to indicate them as "typical" locations and not necessarily within the site boundary.

22. Pages 94 and 95; these changes were made to eliminate the differences in the wording and requirements as stated in the ODCM and in Technical Specifications. This change should provide for better clarification in conducting and evaluating Land Use Census results.

23. Pages 98, 99 and 100; Table 5-1 has been changed to eliminate the differences in the wording between the ODCM and the Technical Specifications.

24. Page 111; this statement has been added to clarify that the NRC computer codes LADTAP II and GASPAR II as described in NUREG/CR-4013 and NUREG/CR-4653 respectively will be for those dose determinations provided in the Semiannual Radioactive Effluent Report.

7.2 These changes do not reduce the accuracy or reliability of dose calculations or setpoint determinations.

7.3 Amendment Number 7 to the ODCM was reviewed and approved during POC meeting 89-50 dated December 13, 1989.

7.4 This section consists of Attachment 1 which is a complete revised copy of the WNP-2 "Offsite Dose Calculation Manual" (ODCM). Attachment 1 is sent only to the Nuclear Regulatory Commission (NRC).

8.0 REVISIONS TO THE PROCESS CONTROL PROGRAM (PCP)

No changes were made to the Process Control Program (PCP) (PPM 1.12.2) during this reporting period which required POC approval.

POC (89-14) approved PPM 11.2.23.18 TP for the encapsulation of the Lower Drain Head pipe which was removed during refueling outage R-4 (April 1989).

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

9.1 No new locations were identified by the 1989 Land Use Census (LUC) which require the performance of dose calculations.

9.2 No additional environmental monitoring locations were identified during this reporting period.

9.3 No sampling locations were deleted during this reporting period.

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.