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WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

161-02233-WFC/GEC
August 29, 1989

Docket Nos. STN 50-528/529/530

Document Control Desk
U. S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D. C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Semiannual Radioactive Effluent Release Report
File: 89-A-056-026

Pursuant to 10 CFR 50.36a(a)(2), and in accordance with Technical Specification 6.9.1.8 for PVNGS Units 1, 2, and 3, attached please find the Semiannual Radioactive Effluent Release Report for the Palo Verde Nuclear Generating Station for the six month period ending June 30, 1989. As reflected in the report, releases and resulting doses from PVNGS for the initial six months of 1989 constituted only small fractions of the Technical Specification limits.

If you have any questions, please contact Mr. A. C. Rogers of my staff at (602) 371-4041.

Sincerely,

WFC/GEC/jle

Attachment

cc: G. W. Knighton (all w/attachment)
M. J. Davis
T. L. Chan
J. B. Martin
T. J. Polich

IE49
1/1

PALO VERDE NUCLEAR GENERATING STATION
UNITS 1, 2 AND 3

SEMI-ANNUAL RADIOACTIVE
EFFLUENT RELEASE REPORT
JANUARY 1, 1989 THROUGH JUNE 30, 1989

USNRC Dockets STN-50-528, STN-50-529 and STN-50-530

GENERAL 1

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List of Tables

INTRODUCTION

This report summarizes meteorological data and doses from radioactive effluents for the Palo Verde Nuclear Generating Station (PVNGS) for the period January through June 1989. The data presented meet the reporting requirements of Regulatory Guide 1.21 of the U.S. Nuclear Regulatory Commission (Revision 1, June 1974) as well as the PVNGS Radiological Environmental Technical Specifications (RETS).

The report is organized into three parts. Appendix A presents the effluent and waste disposal source term data. Appendix B presents a summary of onsite meteorological data for the report period. Appendix C presents the radiological doses from gaseous radioactive effluents.

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APPENDIX A

SOURCE TERMS AND

EFFLUENT AND WASTE DISPOSAL REPORTS

Supplemental Information

1.0 REGULATORY LIMITS

1.1 Liquid Releases

a. PVNGS Technical Specification 3.11.1.1

The concentration of radioactive material discharged from secondary system liquid waste to the onsite evaporation ponds shall be limited to the Lower Limit of Detectability (LLD) defined as 5×10^{-7} µCi/ml for the principal gamma emitters or 1×10^{-6} µCi/ml for I-131.

b. PVNGS Technical Specification 3.11.1.2

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited:

- During any calendar quarter to less than or equal to 1.5 mrems to the total body and to less than or equal to 5 mrems to any organ, and
- During any calendar year to less than or equal to 3 mrems to the total body and to less than or equal to 10 mrems to any organ.

1.2 Gaseous Releases

a. PVNGS Technical Specification 3.11.2.1

The dose rate due to radioactive materials released in gaseous effluents from the site shall be limited to the following:

- For noble gases: Less than or equal to 500 mrems/yr to the total body and less than or equal to 3000 mrems/yr to the skin, and
- For I-131 and I-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

b. PVNGS Technical Specification 3.11.2.2

The air dose due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- During any calendar quarter: Less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation and,

- During any calendar year: Less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

c. PVNGS Technical Specification 3.11.2.3

The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, Tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- During any calendar quarter: Less than or equal to 7.5 mrems to any organ and,

- During any calendar year: Less than or equal to 15 mrems to any organ.

d. PVNGS Technical Specification 3.11.2.4

The GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases, from each reactor unit, from the site when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. The VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases, from each reactor unit, to areas at and beyond the SITE BOUNDARY when averaged over 31 days would exceed 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

1.3 Total Dose

a. PVNGS Technical Specification 3.11.4

The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

2.0 MAXIMUM PERMISSIBLE CONCENTRATIONS

Air: Release Concentrations are limited to dose rate limits described in 1.2a. of this report.

3.0 AVERAGE ENERGY

The average energy ($\bar{E}$) of the radionuclide mixture in releases of fission and activation gases is not applicable to PVNGS.

4.0 MEASUREMENT AND APPROXIMATIONS OF TOTAL RADIOACTIVITY IN GASEOUS EFFLUENTS

For continuous releases, sampling is in accordance with PVNGS Technical Specification Table 4.11-2 (Units 1, 2 and 3). Particulate and iodine radionuclides are sampled continuously at the three exhaust points. The particulate filters and charcoal cartridges are exchanged for analysis four times per month. Noble gas and tritium are sampled at least once per 31 days. The hourly average Radiation Monitoring System (RMS) effluent monitor readings are used, when available, to account for increases and decreases in noble gas concentrations between noble gas grab samples. The tritium concentration is assumed constant between sampling periods.

For batch releases, sampling is also in accordance with PVNGS Technical Specification Table 4.11-2 (Units 1, 2 and 3). For containment purges, the noble gas concentration is adjusted to account for decreases or increases in concentration during the purge using RMS readings. The volume of air released during the purge is determined using the exhaust fan rated flow rate. For Waste Gas Decay Tank releases, the volume released is corrected to standard pressure.

The Lower Limit of Detection (LLD) of a measurement system is defined in Table 4.11-2 of the PVNGS Technical Specifications (Units 1, 2 and 3). An average LLD for each radionuclide is provided in Table A1.

5.0 BATCH RELEASES

5.1 Gaseous

	Unit 1*	Unit 2*	Unit 3*
• Number of batch releases:	51	37	57
• Total time period for batch releases:	3219.42	1063.68	4575.80
• Maximum time period for a batch release:	168.00	151.88	168.00
• Average time period for a batch release:	63.13	28.75	80.28
• Minimum time period for a batch release:	0.58	0.06	0.17

* All times are in hours

5.2 Liquid

None

6.0 ABNORMAL RELEASES

Unit 3 had two (2) unplanned releases involving main steam exhausting to the atmosphere. A total of 2.31E+00 curies was released; this is included in Tables A8 and A9. The corresponding meteorological data is included in Appendix B.

7.0 OFFSITE DOSE CALCULATION MANUAL (ODCM) AND PROCESS CONTROL PROGRAM (PCP) REVISIONS

There were no revisions to the ODCM or the PCP. There were no major changes to the radwaste systems.

8.0 EFFLUENTS AND SOLID WASTES

8.1 Gaseous Effluents

The gaseous effluents for the first and second quarters are included in Tables A2 through A10. Included in these tables are summaries of the effluents and estimated total error.

8.2 Liquid Effluents

There were no liquid effluents from the PVNGS site.

8.3 Solid Waste

Solid waste shipments are summarized in Table A12.

9.0 MISCELLANEOUS INFORMATION

Releases made to the evaporation pond have been limited at the tank to the concentrations specified in PVNGS Technical Specification 3.11.1.1. In addition, PVNGS has imposed a limit of 3×10^{-3} µCi/ml for tritium in tanks released to the evaporation pond. This is the maximum permissible concentration for unrestricted areas for tritium in water from 10CFR20 Appendix B. The evaporation ponds were monitored in accordance with PVNGS Technical Specification 3.12.1 (Units 1, 2 and 3). During this report period, the analyses showed tritium concentrations in water to be less than or equal to 1.2×10^{-6} µCi/ml.

The results of the fourth quarter 1988 Strontium-89 and Strontium-90 analyses for continuous mode releases, which were not available at the time the July-December, 1988 Semi-Annual Report was written, were determined to be less than the Lower Limit of Detection. The gaseous effluent and dose summaries are therefore correct as reported in the July-December, 1988 Semi-Annual Report.

TABLE A1

PVNGS UNITS 1, 2, AND 3

GASEOUS EFFLUENTS - AVERAGE LOWER LIMIT OF DETECTION

NUCLIDE	µCi/cc CONTINUOUS	BATCH
ARGON 41	1.70E-08	1.70E-08
KRYPTON 85	5.50E-06	5.50E-06
KRYPTON 85m	2.10E-08	2.10E-08
KRYPTON 87	4.90E-08	4.90E-08
KRYPTON 88	9.10E-08	9.10E-08
XENON 131m	3.90E-07	3.90E-07
XENON 133	6.00E-08	6.00E-08
XENON 133m	1.10E-07	1.10E-07
XENON 135	2.40E-08	2.40E-08
XENON 135m	5.10E-07	5.10E-07
XENON 138	2.30E-06	2.30E-06
IODINE 131	3.70E-14	1.50E-11
IODINE 132	2.20E-14	1.60E-12
IODINE 133	2.60E-14	1.00E-11
IODINE 134	3.80E-14	3.20E-12
IODINE 135	9.60E-14	3.80E-11
ANTIMONY 122	3.50E-14	1.40E-12
ANTIMONY 124	7.70E-14	3.60E-12
BARIUM 140	1.10E-13	4.30E-11
BROMINE 82	1.90E-14	9.60E-13
CERIUM 141	3.30E-14	1.30E-11
CERIUM 144	1.40E-13	5.80E-11
CESIUM 134	1.60E-14	6.30E-12
CESIUM 137	2.40E-14	9.60E-12
CESIUM 138	1.20E-13	3.80E-12
COBALT 57	1.70E-14	7.10E-13
COBALT 58	2.60E-14	1.00E-11
COBALT 60	3.00E-14	1.20E-11
IRON 59	3.50E-14	1.40E-11
LANTHANUM 140	3.00E-14	1.20E-11
MANGANESE 54	2.70E-14	1.10E-11
MOLYBDENUM 99	2.30E-13	9.20E-11
NIOBIUM 95	2.40E-14	9.80E-13
RUBIDIUM 88	1.20E-12	3.00E-11
RUTHENIUM 103	2.20E-14	1.50E-12
STRONTIUM 89	2.10E-15	*
STRONTIUM 90	5.60E-16	*
TRITIUM	5.00E-07	5.00E-07
ZINC 65	5.90E-14	2.30E-11
GROSS ALPHA	6.00E-15	*

* Not required for batch releases.

Table A2
PVNGS UNIT 1 1989
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	QUARTER #1	QUARTER #2	EST. TOTAL ERROR %*
A. Fission & activation gases				
1. Total release	Ci	5.71E+02	1.47E+01	5.88E+01
2. Average release rate for period	µCi/sec	7.26E+01	1.88E+00	
3. Percent of technical specification limit	%	NA**	NA**	
B. Iodines				
1. Total Iodine-131	Ci	5.12E-04	9.29E-05	5.23E+01
2. Average release rate for period	µCi/sec	6.51E-05	1.18E-05	
3. Percent of technical specification limit	%	NA**	NA**	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	1.33E-05	8.02E-05	5.23E+01
2. Average release rate for period	µCi/sec	1.69E-06	1.02E-05	
3. Percent of technical specification limit	%	NA**	NA**	
4. Gross Alpha radio-activity	Ci	< LLD	< LLD	
D. Tritium				
1. Total release	Ci	1.15E+02	2.46E+01	4.22E+01
2. Average release rate for period	µCi/sec	1.46E+01	3.13E+00	
3. Percent of technical specification limit	%	NA**	NA**	

*Estimated total error methodology is presented in Table A11.
**See Table A4 for percent of technical specification limits.

Table A3
PVNGS UNIT 1 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
1. Fission gases					
Argon-41	Ci	< LLD	< LLD	1.59E-01	< LLD
Krypton-85	Ci	< LLD	< LLD	6.81E+00	1.33E+01
Krypton-85m	Ci	4.75E+00	< LLD	1.75E-01	< LLD
Krypton-87	Ci	2.37E+00	< LLD	< LLD	< LLD
Krypton-88	Ci	1.06E+01	< LLD	5.79E-03	< LLD
Xenon-131m	Ci	< LLD	< LLD	1.36E+00	2.22E-01
Xenon-133	Ci	4.30E+02	< LLD	6.12E+01	1.20E+00
Xenon-133m	Ci	< LLD	< LLD	3.55E-01	< LLD
Xenon-135	Ci	5.22E+01	< LLD	2.91E-01	< LLD
Xenon-135m	Ci	< LLD	< LLD	< LLD	< LLD
Xenon-138	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	5.00E+02	< LLD	7.03E+01	1.47E+01
2. Iodines					
Iodine-131	Ci	4.64E-04	7.66E-05	4.80E-05	1.62E-05
Iodine-132	Ci	< LLD	< LLD	5.79E-06	< LLD
Iodine-133	Ci	1.90E-04	< LLD	2.96E-05	< LLD
Iodine-134	Ci	< LLD	< LLD	8.19E-07	< LLD
Iodine-135	Ci	< LLD	< LLD	1.66E-05	< LLD
Total for period	Ci	6.54E-04	7.66E-05	1.01E-04	1.62E-05
3. Particulates					
Antimony-124	Ci	2.06E-06	3.76E-06	< LLD	3.57E-06
Barium-140	Ci	< LLD	< LLD	< LLD	< LLD
Bromine-82	Ci	< LLD	< LLD	9.61E-06	< LLD

Table A3 (Continued)
PVNGS UNIT 1 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
3. Particulates (continued)					
Cerium-141	Ci	< LLD	< LLD	< LLD	< LLD
Cerium-144	Ci	< LLD	< LLD	< LLD	< LLD
Cesium-134	Ci	< LLD	< LLD	9.31E-08	< LLD
Cesium-137	Ci	5.87E-06	1.03E-06	3.08E-08	4.64E-07
Cesium-138	Ci	< LLD	< LLD	1.65E-05	< LLD
Cobalt-57	Ci	< LLD	9.50E-07	< LLD	< LLD
Cobalt-58	Ci	< LLD	7.48E-06	< LLD	1.52E-05
Cobalt-60	Ci	5.04E-06	1.10E-05	1.69E-07	2.25E-05
Iron-59	Ci	< LLD	< LLD	< LLD	< LLD
Lanthanum-140	Ci	< LLD	< LLD	< LLD	< LLD
Manganese-54	Ci	< LLD	< LLD	< LLD	6.54E-07
Molybdenum-99	Ci	< LLD	< LLD	< LLD	< LLD
Niobium-95	Ci	< LLD	< LLD	< LLD	3.19E-06
Rubidium-88	Ci	< LLD	< LLD	2.11E-03	< LLD
Ruthenium-103	Ci	< LLD	8.99E-06	< LLD	1.41E-06
Strontium-89	Ci	< LLD	**	*	*
Strontium-90	Ci	< LLD	**	*	*
Tritium	Ci	1.84E+01	< LLD	9.69E+01	2.46E+01
Zinc-65	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	1.84E+01	3.31E-05	9.69E+01	2.46E+01

*Not applicable
**Analysis not yet completed. Additional information will be included in the next Semi-Annual report.

Table A4
PVNGS UNIT 1
RADIATION DOSES AT AND BEYOND THE SITE BOUNDARY(1) FOR 1989

	Unit	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Year to Date
Gamma Air Dose	mrad	1.29E-01	1.94E-04	NA	NA	1.29E-01
T.S. 3.11.2.2 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% T.S. Limit	%	2.58E+00	3.88E-03	NA	NA	1.29E+00
Beta Air Dose	mrad	2.05E-01	7.73E-03	NA	NA	2.12E-01
T.S. 3.11.2.2 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% T.S. Limit	%	2.05E+00	7.73E-02	NA	NA	1.06E+00
Maximum Organ Dose (neglecting skin)	mrem	(3) 4.23E-01	(2)(3) 8.99E-02	NA	NA	(2)(3) 5.13E-01
T.S. 3.11.2.3 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% T.S. Limit	%	5.64E+00	1.20E+00	NA	NA	3.42E+00

(1) Calculations are based on parameters and methodologies of the ODCM using historical meteorology.

(2) Does not include 2nd quarter Sr-89, 90 results.

(3) Highest organ dose is to child's thyroid.

Table A5
PVNGS UNIT 2 1989
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	QUARTER #1	QUARTER #2	EST. TOTAL ERROR%*
A. Fission & activation gases				
1. Total release	Ci	8.25E+01	4.98E+00	3.97E+01
2. Average release rate for period	µCi/sec	1.05E+01	6.33E-01	
3. Percent of technical specification limit	%	NA**	NA**	
B. Iodines				
1. Total Iodine-131	Ci	1.78E-03	4.41E-05	2.93E+01
2. Average release rate for period	µCi/sec	2.26E-04	5.61E-06	
3. Percent of technical specification limit	%	NA**	NA**	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	< LLD	2.37E-05	2.93E+01
2. Average release rate for period	µCi/sec	NA	3.01E-06	
3. Percent of technical specification limit	%	NA**	NA**	
4. Gross Alpha radio-activity	Ci	< LLD	< LLD	
D. Tritium				
1. Total release	Ci	7.09E+01	1.40E+02	4.22E+01
2. Average release rate for period	µCi/sec	9.02E+00	1.78E+01	
3. Percent of technical specification limit	%	NA**	NA**	

*Estimated total error methodology is presented in Table A11.
**See Table A7 for percent of technical specification limits.

Table A6
PVNGS UNIT 2 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
1. Fission gases					
Argon-41	Ci	< LLD	< LLD	6.25E-02	< LLD
Krypton-85	Ci	< LLD	< LLD	< LLD	3.09E+00
Krypton-85m	Ci	5.88E-02	< LLD	< LLD	< LLD
Krypton-87	Ci	< LLD	< LLD	< LLD	< LLD
Krypton-88	Ci	< LLD	< LLD	< LLD	< LLD
Xenon-131m	Ci	< LLD	< LLD	1.66E-01	2.35E-02
Xenon-133	Ci	6.15E+01	1.76E+00	1.25E+01	1.02E-01
Xenon-133m	Ci	< LLD	< LLD	4.44E-02	< LLD
Xenon-135	Ci	8.10E+00	< LLD	1.89E-02	< LLD
Xenon-135m	Ci	< LLD	< LLD	< LLD	< LLD
Xenon-138	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	6.97E+01	1.76E+00	1.28E+01	3.22E+00
2. Iodines					
Iodine-131	Ci	1.76E-03	4.41E-05	1.76E-05	< LLD
Iodine-132	Ci	< LLD	< LLD	< LLD	< LLD
Iodine-133	Ci	2.66E-05	< LLD	< LLD	< LLD
Iodine-134	Ci	< LLD	< LLD	< LLD	< LLD
Iodine-135	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	1.79E-03	4.41E-05	1.76E-05	< LLD
3. Particulates					
Antimony-124	Ci	< LLD	2.37E-05	< LLD	< LLD
Barium-140	Ci	< LLD	< LLD	< LLD	< LLD
Rubidium-82	Ci	< LLD	< LLD	4.92E-06	< LLD

Table A6 (Continued)
PVNGS UNIT 2 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
3. Particulates (continued)					
Cerium-141	Ci	< LLD	< LLD	< LLD	< LLD
Cerium-144	Ci	< LLD	< LLD	< LLD	< LLD
Cesium-134	Ci	< LLD	< LLD	< LLD	< LLD
Cesium-137	Ci	< LLD	< LLD	< LLD	< LLD
Cesium-138	Ci	< LLD	< LLD	< LLD	< LLD
Cobalt-57	Ci	< LLD	< LLD	< LLD	< LLD
Cobalt-58	Ci	< LLD	< LLD	< LLD	< LLD
Cobalt-60	Ci	< LLD	< LLD	< LLD	< LLD
Iron-59	Ci	< LLD	< LLD	< LLD	< LLD
Lanthanum-140	Ci	< LLD	< LLD	< LLD	< LLD
Manganese-54	Ci	< LLD	< LLD	< LLD	< LLD
Molybdenum-99	Ci	< LLD	< LLD	< LLD	< LLD
Niobium-95	Ci	< LLD	< LLD	< LLD	< LLD
Rubidium-88	Ci	< LLD	< LLD	3.05E-05	< LLD
Ruthenium-103	Ci	< LLD	< LLD	< LLD	< LLD
Strontium-89	Ci	< LLD	**	*	*
Strontium-90	Ci	< LLD	**	*	*
Tritium	Ci	< LLD	< LLD	7.09E+01	1.40E+02
Zinc-65	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	< LLD	2.37E-05	7.09E+01	1.40E+02

*Not applicable
**Analysis not yet completed. Additional information will be included in the next Semi-Annual report.

Table A7
PVNGS UNIT 2
RADIATION DOSES AT AND BEYOND THE SITE BOUNDARY(1) FOR 1989

	Unit	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Year to Date
Gamma Air Dose	mrad	1.20E-02	2.01E-04	NA	NA	1.22E-02
T.S. 3.11.2.2 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% T.S. Limit	%	2.40E-01	4.02E-03	NA	NA	1.22E-01
Beta Air Dose	mrad	2.78E-02	2.26E-03	NA	NA	3.01E-02
T.S. 3.11.2.2 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% T.S. Limit	%	2.78E-01	2.26E-02	NA	NA	1.51E-01
Maximum Organ Dose		(3)	(2)(3)			(2)(3)
(neglecting skin)	mrem	2.89E-01	5.02E-01	NA	NA	7.91E-01
T.S. 3.11.2.3 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% T.S. Limit	%	3.85E+00	6.69E+00	NA	NA	5.27E+00

(1) Calculations are based on parameters and methodologies of the ODCM using historical meteorology.

(2) Does not include 2nd quarter Sr-89, 90 results.

(3) Highest organ dose is to child's thyroid.

Table A8
PVNGS UNIT 3 1989
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	UNIT	QUARTER #1	QUARTER #2	EST. TOTAL ERROR%*
A. Fission & activation gases				
1. Total release	Ci	6.60E+02	LLD	3.97 E+01
2. Average release rate for period	µCi/sec	8.48E+01	NA	
3. Percent of technical specification limit	%	NA**	NA**	
B. Iodines				
1. Total Iodine-131	Ci	5.93E-03	6.95E-05	2.93E+01
2. Average release rate for period	µCi/sec	7.62E-04	8.84E-06	
3. Percent of technical specification limit	%	NA**	NA**	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	4.37E-05	5.39E-05	2.93E+01
2. Average release rate for period	µCi/sec	5.62E-06	6.86E-06	
3. Percent of technical specification limit	%	NA**	NA**	
4. Gross Alpha radio-activity	Ci	8.12E-12	3.66E-11	
D. Tritium				
1. Total release	Ci	7.86E+01	6.22E+01	4.22E+01
2. Average release rate for period	µCi/sec	1.01E+01	7.91E+00	
3. Percent of technical specification limit	%	NA**	NA**	

*Estimated total error methodology is presented in Table A11.
**See Table A10 for percent of technical specification limits.

Table A9
PVNGS UNIT 3 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
1. Fission gases					
Argon-41	Ci	5.64E-01	< LLD	1.26E-01	< LLD
Krypton-85	Ci	< LLD	< LLD	2.11E+00	< LLD
Krypton-85m	Ci	1.22E-01	< LLD	2.13E-02	< LLD
Krypton-87	Ci	4.66E-02	< LLD	3.67E-03	< LLD
Krypton-88	Ci	1.53E-01	< LLD	2.59E-02	< LLD
Xenon-131m	Ci	< LLD	< LLD	3.94E+00	< LLD
Xenon-133	Ci	2.61E+02	< LLD	3.78E+02	< LLD
Xenon-133m	Ci	6.09E-02	< LLD	2.77E+00	< LLD
Xenon-135	Ci	9.43E+00	< LLD	1.45E+00	< LLD
Xenon-135m	Ci	< LLD	< LLD	< LLD	< LLD
Xenon-138	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	2.71E+02	< LLD	3.88E+02	< LLD
2. Iodines					
Iodine-131	Ci	5.03E-03	5.47E-05	9.02E-04	1.48E-05
Iodine-132	Ci	4.12E-06	< LLD	< LLD	< LLD
Iodine-133	Ci	7.21E-04	< LLD	1.43E-04	< LLD
Iodine-134	Ci	< LLD	< LLD	< LLD	< LLD
Iodine-135	Ci	3.03E-05	< LLD	5.39E-06	< LLD
Total for period	Ci	5.79E-03	5.47E-05	1.05E-03	1.48E-05
3. Particulates					
Antimony-122	Ci	7.28E-06	< LLD	1.45E-06	< LLD
Antimony-124	Ci	8.97E-06	4.97E-06	2.19E-06	< LLD
Barium-140	Ci	< LLD	< LLD	< LLD	< LLD
Bromine-82	Ci	< LLD	< LLD	1.22E-04	< LLD

Table A9 (Continued)
PVNGS UNIT 3 1989
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter #1	CONTINUOUS MODE Quarter #2	BATCH MODE Quarter #1	BATCH MODE Quarter #2
3. Particulates (continued)					
Cerium-141	Ci	< LLD	< LLD	< LLD	< LLD
Cerium-144	Ci	< LLD	< LLD	< LLD	< LLD
Cesium-134	Ci	6.05E-08	< LLD	1.17E-06	< LLD
Cesium-137	Ci	2.80E-06	< LLD	8.89E-07	< LLD
Cesium-138	Ci	2.22E-03	< LLD	6.00E-06	< LLD
Cobalt-57	Ci	< LLD	< LLD	< LLD	< LLD
Cobalt-58	Ci	2.67E-05	3.95E-05	7.84E-07	< LLD
Cobalt-60	Ci	< LLD	8.29E-06	< LLD	< LLD
Iron-59	Ci	< LLD	< LLD	< LLD	< LLD
Lanthanum-140	Ci	< LLD	< LLD	< LLD	< LLD
Manganese-54	Ci	< LLD	1.13E-06	< LLD	< LLD
Molybdenum-99	Ci	< LLD	< LLD	< LLD	< LLD
Niobium-95	Ci	< LLD	< LLD	< LLD	< LLD
Rubidium-88	Ci	3.56E-03	< LLD	1.46E-02	< LLD
Ruthenium-103	Ci	< LLD	< LLD	< LLD	< LLD
Strontium-89	Ci	1.04E-07	**	*	*
Strontium-90	Ci	3.48E-09	**	*	*
Tritium	Ci	2.00E+01	< LLD	5.86E+01	6.22E+01
Zinc-65	Ci	< LLD	< LLD	< LLD	< LLD
Total for period	Ci	2.00E+01	5.39E-05	5.86E+01	6.22E+01

*Not applicable
**Analysis not yet completed. Additional information will be included in the next Semi-Annual report.

Table A10
PVNGS UNIT 3
RADIATION DOSES AT AND BEYOND THE SITE BOUNDARY(1) FOR 1989

	Unit	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Year to Date
Gamma Air Dose	mrad	7.28E-02	0.00E+00	NA	NA	7.28E-02
T.S. 3.11.2.2 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% T.S. Limit	%	1.46E+00	0.00E+00	NA	NA	7.28E-01
Beta Air Dose	mrad	2.02E-01	0.00E+00	NA	NA	2.02E-01
T.S. 3.11.2.2 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% T.S. Limit	%	2.02E+00	0.00E+00	NA	NA	1.01E+00
Maximum Organ Dose		(3)	(2)(3)			(2)(3)
(neglecting skin)	mrem	4.00E-01	2.24E-01	NA	NA	6.24E-01
T.S. 3.11.2.3 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% T.S. Limit	%	5.33E+00	2.99E+00	NA	NA	4.16E+00

(1) Calculations are based on parameters and methodologies of the ODCM using historical meteorology.

(2) Does not include 2nd quarter Sr-89, 90 results.

(3) Highest organ dose is to child's thyroid.

Table A11
Estimation Methodology of Total Percent Error

The estimated total error is calculated as follows:

$$\text{Total Percent Error} = (E_1^2 + E_2^2 + E_3^2, \ldots, E_n^2)^{1/2}$$

Where E_n = Percent error associated with each contributing parameter.

Parameters contributing to errors in the measurement of gaseous effluents are process flow rates, sample collection, analytical counting and tank volumes.

Table A12

Solid Waste Summary for January - June 1989

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

1. Type of Waste	Unit	6-Month Period	Estimated Total Error %
a. Spent resin, filter sludges, evaporator bottoms, etc.	M^3	3.21E+02	
	Ci	4.01E+02	+/-2.50E+01
b. Dry compressible waste, contaminated equipment, etc.	M^3	1.11E+02	
	Ci	6.29E+00	+/-2.50E+01
c. Irradiated components, control rods, etc.	M^3	0.00E+00	
	Ci	0.00E+00	NA
d. Other	M^3	0.00E+00	
	Ci	0.00E+00	NA

NOTE Volume and curies for dry compressible waste, contaminated equipment, include PVNGS waste shipped after being processed by a volume reduction facility.

2. a. Estimate of Major Nuclides by Waste Class and Stream: Resins, Filter Sludges and Evap. Bottoms, as determined by measurement.

Waste Class		Nuclide Name	Percent Abundance	Curies
A	**	H-3	90.009%	1.04E+01
A		SB-124	2.908%	3.36E-01
A		CO-58	1.895%	2.19E-01
A		CS-137	1.887%	2.18E-01
A	**	C-14	1.523%	1.76E-01
A		CS-134	1.480%	1.71E-01
A	**	FE-55	0.099%	1.14E-02
A		CO-60	0.082%	9.50E-03
A	**	PU-241	0.058%	6.69E-03
A	**	NI-63	0.020%	2.33E-03
A		MN-54	0.017%	1.92E-03
A		CE-144	0.015%	1.68E-03
A		SB-125	0.005%	6.29E-04
A	**	TC-99	0.002%	1.99E-04
A	**	PU-239/240	0.001%	1.13E-04

** Isotopic concentration derived using scaling factors in accordance with 10CFR 61.55.

Table A12 (Continued)

Solid Waste Summary for January - June 1989

Estimate of Major Nuclides by Waste Class and Stream: Resins, Filter Sludges and Evaporator Bottoms, as determined by measurement.

Waste Class		Nuclide Name	Percent Abundance	Curies
B		CS-137	29.259%	1.02E+02
B		CS-134	21.314%	7.43E+01
B		SB-124	13.626%	4.75E+01
B	**	FE-55	11.015%	3.84E+01
B		CO-60	10.011%	3.49E+01
B		CO-58	6.799%	2.37E+01
B		MN-54	3.299%	1.15E+01
B	**	NI-63	2.255%	7.86E+00
B		SB-125	0.697%	2.43E+00
B		NB-95	0.562%	1.96E+00
B		ZR-95	0.347%	1.21E+00
B		CR-51	0.256%	8.92E-01
B	**	H-3	0.217%	7.57E-01
B		FE-59	0.166%	5.77E-01
B	**	SR-90	0.110%	3.85E-01
B	**	C-14	0.036%	1.27E-01
B	**	PU-241	0.030%	1.04E-01
B	**	PU-239/240	0.001%	2.49E-03
C	**	FE-55	52.944%	2.17E+01
C		CO-60	20.007%	8.20E+00
C		AG-110M	7.807%	3.20E+00
C		CS-137	4.733%	1.94E+00
C	**	NI-63	3.391%	1.39E+00
C		CO-58	2.391%	9.80E-01
C	**	RU-106	1.957%	8.02E-01
C	**	C-14	1.896%	7.77E-01
C		MN-54	1.815%	7.44E-01
C		SB-124	1.554%	6.37E-01
C		CS-134	1.181%	4.84E-01
C	**	H-3	0.307%	1.26E-01
C	**	SR-90	0.014%	5.82E-03
C	**	PU-239/240	0.001%	4.95E-04

** Isotopic concentration derived using scaling factors in accordance with 10CFR 61.55.

Table A12 (Continued)

Solid Waste Summary for January - June 1989

2. b. Estimate of Major Nuclides by Waste Class and Stream: Dry Compressible Waste, Contaminated Equipment, etc., as determined by measurement.

Waste Class		Nuclide Name	Percent Abundance	Curies
A	**	FE-55	33.054%	2.08E+00
A		SB-124	15.669%	9.80E-01
A		CS-137	10.552%	6.64E-01
A		CR-51	9.376%	5.90E-01
A		CO-60	8.661%	5.45E-01
A		CO-58	5.705%	3.59E-01
A		CS-134	3.766%	2.37E-01
A		NB-95	3.019%	1.90E-01
A		MN-54	1.986%	1.25E-01
A		RU-103	1.716%	1.08E-01
A		FE-59	1.605%	1.01E-01
A		ZR-95	1.197%	7.53E-02
A		CE-144	1.127%	7.09E-02
A		CE-141	0.952%	5.99E-02
A	**	NI-63	0.578%	3.64E-02
A		AG-110M	0.413%	2.60E-02
A	**	C-14	0.353%	2.22E-02
A	**	H-3	0.238%	1.50E-02
A		I-131	0.027%	1.70E-03
A	**	SR-90	0.003%	1.89E-04
A	**	TC-99	0.001%	6.29E-05

** Isotopic concentration derived using scaling factors in accordance with 10CFR 61.55.

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
37	Exclusive use truck	Hanford

B. Irradiated Fuel Shipments: None

C. Additional Information

89-RW-01 16 - 29.3 ft^3 transfix vessels containing dewatered resin.

89-RW-02 1 - 49.9 ft^3 high integrity container containing dewatered filters.

89-RW-03 1 - 130.8 ft^3 high integrity container containing dewatered resin.

89-RW-04 10 - 107.5 ft^3 boxes containing dry compressible waste,
4 - 54.3 ft^3 boxes containing dry compressible waste.

Table A12 (Continued)

Solid Waste Summary for January - June 1989

89-RW-05	10 - 29.3 ft^3 transfix vessels containing dewatered resin, 1 - 54.3 ft^3 box containing dry compressible waste, 3 - 107.5 ft^3 boxes containing dry compressible waste.
89-RW-06	1 - 170.2 ft^3 steel liner containing dewatered resin, 1 - 199.4 ft^3 steel liner containing dewatered resin, 1 - 199.4 ft^3 steel liner containing oil solidified with envirostone.
89-RW-07	1 - 199.4 ft^3 steel liner containing dried dry compressible waste.
89-RW-08	2 - 199.4 ft^3 steel liners containing oil solidified with envirostone.
89-RW-09	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-10	1 - 199.4 ft^3 steel liner containing dried dry compressible waste.
89-RW-11	14 - 7.5 ft^3 drums containing dry compressible waste.
89-RW-12	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-13	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-14	1 - 130.8 ft^3 high integrity containers containing dewatered resin.
89-RW-15	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-16	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-17	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-18	3 - 199.4 ft^3 steel liners containing dewatered resin.
89-RW-19	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-20	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-21	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.

Table A12 (Continued)

Solid Waste Summary for January - June 1989

89-RW-22	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-23	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-24	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-25	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-26	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-27	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-28	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-29	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-30	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-31	2 - 107.5 ft^3 boxes containing dry compressible waste, 76 - 7.5 ft^3 drums containing dry compressible waste.
89-RW-32	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-33	1 - 49.9 ft^3 high integrity container containing dewatered filters.
89-RW-34	2 - 199.4 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-35	14 - 7.5 ft^3 drums containing dry compressible waste.
89-RW-36	2 - 170.2 ft^3 steel liners containing evaporator bottoms solidified with portland cement.
89-RW-37	2 - 170.2 ft^3 steel liners containing evaporator bottoms solidified with portland cement.

Table A12 (Continued)

Solid Waste Summary for January - June 1989

D. Changes to Processes and/or Equipment

D.1 No changes were made to the Solid Radwaste Process Control Program.

D.2 No major changes were made to installed plant equipment.

D.3 No major changes were made to installed plant equipment. Therefore, predicted releases or quantities of solid waste generated, remain unchanged as addressed in the FSAR.

D.4 No major changes were made to installed plant equipment. Therefore, predicted exposures to the public and general population, remain unchanged as addressed in the FSAR.

Table A13
PVNGS UNITS 1, 2 and 3
EFFLUENT MONITORING INSTRUMENTATION OUT OF SERVICE GREATER THAN 30 DAYS

Instrument	Inoperability Dates	Inoperability Cause	Explanation
RU12 (Unit 1)	12/7/88-2/3/89	Spurious alarms	Removed from service for diagnosis.
RU12 (Unit 1)	4/8/89-present	Spurious alarms	Software changes being considered. Note: This monitor is not required operable except during waste gas release.
RU141/142 (Unit 1)	3/30/89-4/14/89	Moisture accumulation in filter.	Evaluation in progress. Note: Unit 1 went to Mode 5 (cold shutdown) on 4/14/89, terminating requirement for operability of this monitor. The unit is still shut down at present.
RU141/142 (Unit 2)	1/1/89- 4/30/89	Moisture accumulation in filter. Also spiking due to grounding problems.	Extended monitoring period to correct moisture problem, localize spiking cause, and do plant change package.

Table A13
PVNGS UNITS 1, 2 and 3
EFFLUENT MONITORING INSTRUMENTATION OUT OF SERVICE GREATER
THAN 30 DAYS (Cont'd)

Instrument	Inoperability Dates	Inoperability Cause	Explanation
RU143/144	1/1/89-3/22/89	Spurious alarms and monitor spiking.	Extended monitoring period to localize the grounding problem and implement plant change package.

APPENDIX B

METEOROLOGY

JOINT FREQUENCY DISTRIBUTION TABLES

The tables presented in this section are results obtained from processing the hourly meteorological data collected at the Palo Verde Nuclear Generating Station for the period January - June 1989. The joint frequency distribution (JFD) tables represent the frequency, in terms of the number of observations, that a particular wind speed, wind direction, and stability category occurred simultaneously. On a quarterly and semi-annual basis, the JFDs were produced for 35-foot wind speed and wind direction by atmospheric stability class corresponding to the seven Pasquill stability categories, and for wind speed and wind direction for all stability classes combined. Atmospheric stability was classified per Regulatory Guide 1.23, using the 200-foot to 35-foot temperature difference (delta T).

In accordance with NUREG-0133, the batch releases for the first and second quarters for 1989 were considered as "long term", since for each quarter, the sum of the batch release periods for each unit exceeded 150 hours. Consequently, the JFDs for the batch releases for both quarters are the same as for the continuous releases.

Table B1

JFDs of 35-Foot Wind Versus Delta T

January - March 1989

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-ONE 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 3/31/89

*** FIRST QUARTER 1989 ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.51- 5.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.51- 6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.51- 8.50	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
8.51-11.50	0	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	4
11.51-14.50	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	1	7
14.51-20.50	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5	8
>20.50	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	5
TOTAL	2	0	1	0	1	1	0	0	0	6	3	1	2	3	0	6	26

STABILITY CLASS B

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4.51- 5.50	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
5.51- 6.50	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	4
6.51- 8.50	0	0	1	3	2	1	0	0	2	1	1	1	0	0	0	0	12
8.51-11.50	0	0	0	1	1	0	0	0	0	1	4	1	2	0	2	0	12
11.51-14.50	0	0	0	1	1	0	0	0	0	2	2	0	0	2	1	0	9
14.51-20.50	0	1	1	0	0	0	0	0	0	1	4	0	0	1	0	0	8
>20.50	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2
TOTAL	0	2	2	6	5	2	1	0	2	5	13	2	2	4	3	0	49

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-ONE 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 3/31/89

*** FIRST QUARTER 1989 ***

STABILITY CLASS C
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
3.51- 4.50	0	0	1	1	0	1	1	1	1	1	0	0	0	0	0	0	7
4.51- 5.50	1	0	3	1	1	0	1	1	1	1	1	2	0	0	0	0	13
5.51- 6.50	1	1	0	1	4	0	1	1	1	2	5	2	0	1	0	0	20
6.51- 8.50	0	2	2	5	3	5	1	0	0	4	9	4	1	0	2	0	38
8.51-11.50	1	0	0	1	1	0	0	0	0	4	7	0	1	1	1	0	17
11.51-14.50	0	0	1	1	2	1	0	0	0	1	6	0	1	3	0	0	16
14.51-20.50	0	0	3	0	0	0	0	0	0	0	1	0	0	3	0	0	7
>20.50	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
TOTAL	3	3	10	10	11	7	5	3	3	13	29	9	3	8	3	0	120

STABILITY CLASS D
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	3
1.51- 2.50	1	1	1	0	1	2	3	3	5	6	4	5	3	1	5	1	42
2.51- 3.50	6	2	6	3	2	2	6	14	10	15	13	12	8	7	3	7	116
3.51- 4.50	4	7	3	2	9	2	6	6	18	15	19	7	7	11	6	7	129
4.51- 5.50	4	1	0	4	3	2	1	5	10	10	17	6	2	1	0	2	68
5.51- 6.50	3	1	5	2	3	4	0	3	3	6	5	6	2	1	0	3	47
6.51- 8.50	0	4	4	4	5	2	2	5	3	5	11	2	0	2	2	0	51
8.51-11.50	1	0	0	0	7	1	3	1	3	7	14	3	1	4	2	0	47
11.51-14.50	0	2	0	2	2	0	0	0	1	2	6	2	2	4	1	0	24
14.51-20.50	0	0	1	2	7	0	0	0	0	3	10	0	1	6	4	1	35
>20.50	0	0	0	0	3	0	0	0	0	3	2	0	1	1	0	0	10
TOTAL	20	18	20	20	42	15	21	37	53	73	101	43	27	38	23	21	572

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-ONE 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 3/31/89

*** FIRST QUARTER 1989 ***

STABILITY CLASS E

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	0	2	1	0	0	1	1	0	1	0	0	0	0	7
1.51- 2.50	3	3	2	0	0	1	1	1	2	1	1	5	2	1	4	3	30
2.51- 3.50	3	1	2	1	4	1	1	2	4	1	3	4	5	4	6	6	48
3.51- 4.50	2	4	2	1	0	1	0	0	2	2	2	5	3	1	3	0	28
4.51- 5.50	5	1	3	1	0	0	0	0	0	8	9	2	1	1	3	2	36
5.51- 6.50	6	1	0	0	0	0	0	1	1	9	3	4	2	3	3	2	35
6.51- 8.50	2	1	1	2	0	1	1	1	2	8	10	6	2	2	2	0	41
8.51-11.50	1	1	0	2	0	0	0	1	2	2	18	6	2	4	3	2	44
11.51-14.50	0	1	0	3	5	1	1	0	2	3	11	0	3	2	5	1	38
14.51-20.50	0	0	1	0	5	0	0	0	0	0	2	1	1	2	3	2	17
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	23	13	11	10	16	6	4	6	16	35	59	34	21	20	32	18	324

STABILITY CLASS F

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	1
.76- 1.50	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
1.51- 2.50	2	1	2	0	0	0	1	1	1	1	4	0	7	3	5	8	36
2.51- 3.50	6	4	6	2	3	1	1	1	3	1	3	8	5	4	12	10	70
3.51- 4.50	8	5	2	3	1	1	0	1	3	2	4	9	1	7	5	10	62
4.51- 5.50	5	4	0	0	0	0	0	0	0	3	2	3	3	3	5	12	40
5.51- 6.50	2	3	0	0	0	0	0	0	1	4	11	4	2	4	3	5	39
6.51- 8.50	4	0	3	1	1	0	0	0	1	11	14	5	5	6	6	6	63
8.51-11.50	2	0	1	0	0	0	0	0	0	9	12	3	3	2	2	9	43
11.51-14.50	1	0	2	2	0	0	0	0	0	0	1	0	0	0	0	0	6
14.51-20.50	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	30	17	16	8	5	2	3	3	9	31	53	32	26	29	38	60	363

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-ONE 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 3/31/89

*** FIRST QUARTER 1989 ***

STABILITY CLASS G
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	3	1	1	0	0	0	1	0	0	0	0	0	1	0	1	1	9
1.51- 2.50	15	14	4	3	1	2	1	0	0	1	3	2	7	8	10	14	85
2.51- 3.50	44	29	3	5	2	0	2	0	1	1	4	6	6	13	37	40	193
3.51- 4.50	50	42	10	3	2	1	2	0	1	2	2	1	6	6	23	28	179
4.51- 5.50	32	23	13	2	0	0	0	1	1	2	1	4	3	1	4	15	102
5.51- 6.50	15	17	3	1	0	0	0	0	0	0	0	1	3	4	4	11	59
6.51- 8.50	12	12	2	1	0	0	0	0	0	0	0	2	2	2	1	11	45
8.51-11.50	4	9	0	0	0	0	0	0	0	3	4	1	0	0	0	3	24
11.51-14.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14.51-20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	175	147	36	15	5	3	6	1	3	9	14	17	28	34	80	123	696

STABILITY CLASS ALL
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED [redacted]	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
[redacted]																	1
.[redacted]1.50	5	1	1	1	2	1	2	0	1	2	0	1	1	0	1	1	20
1.51- 2.50	21	19	9	3	2	5	6	5	8	9	12	12	19	13	24	26	193
2.51- 3.50	59	36	17	11	11	4	11	17	18	18	23	30	24	28	58	63	428
3.51- 4.50	64	58	18	10	12	6	10	8	25	22	27	22	17	25	37	45	406
4.51- 5.50	47	29	19	8	4	2	2	7	12	24	31	17	9	6	12	31	260
5.51- 6.50	27	24	8	5	8	5	1	5	6	21	24	17	9	13	10	21	204
6.51- 8.50	18	19	14	16	11	10	4	6	8	29	45	20	10	12	13	17	252
8.51-11.50	9	10	1	4	10	1	3	2	5	28	60	14	9	11	10	14	191
11.51-14.50	1	3	3	9	10	2	1	0	3	12	28	2	6	11	7	2	100
14.51-20.50	2	1	6	2	12	0	0	0	0	4	19	1	3	12	7	8	77
>20.50	0	0	0	0	3	0	0	0	0	3	3	2	2	5	0	0	18
TOTAL	253	200	96	69	85	36	40	50	86	172	272	138	109	136	179	228	2150

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-ONE 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 3/31/89

*** FIRST QUARTER 1989 ***

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH

TOTAL NUMBER OF OBSERVATIONS: 2160
TOTAL NUMBER OF VALID OBSERVATIONS: 2150
TOTAL NUMBER OF MISSING OBSERVATIONS: 10
PERCENT DATA RECOVERY FOR THIS PERIOD: 99.5 %
MEAN WIND SPEED FOR THIS PERIOD: 5.9 MPH
TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A	B	C	D	E	F	G
1.21	2.28	5.58	26.60	15.07	16.88	32.37

DISTRIBUTION OF WIND DIRECTION VS STABILITY

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
A	2	0	1	0	1	1	0	0	0	6	3	1	2	3	0	6	0
B	0	2	2	6	5	2	1	0	2	5	13	2	2	4	3	0	0
C	3	3	10	10	11	7	5	3	3	13	29	9	3	8	3	0	0
D	20	18	20	20	42	15	21	37	53	73	101	43	27	38	23	21	0
E	23	13	11	10	16	6	4	6	16	35	59	34	21	20	32	18	0
F	30	17	16	8	5	2	3	3	9	31	53	32	26	29	38	60	1
G	175	147	36	15	5	3	6	1	3	9	14	17	28	34	80	123	0
TOTAL	253	200	96	69	85	36	40	50	86	172	272	138	109	136	179	228	1

Table B2

JFDs of 35-Foot Wind Versus Delta T

April-June 1989

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-TWO 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 4/ 1/89 - 6/30/89

*** SECOND QUARTER 1989 ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.51- 5.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.51- 6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.51- 8.50	0	0	0	0	0	0	0	0	2	3	9	3	1	0	0	0	18
8.51-11.50	0	0	0	0	0	0	0	0	2	14	36	19	9	3	0	1	84
11.51-14.50	0	0	0	0	0	0	0	0	2	12	34	7	3	1	0	0	59
14.51-20.50	0	0	0	0	0	0	0	0	1	10	21	6	1	1	0	0	40
>20.50	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
TOTAL	0	0	0	0	0	0	0	0	7	39	102	35	14	5	0	1	203

STABILITY CLASS B

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.51- 5.50	0	0	0	0	0	0	0	3	0	0	1	1	0	1	0	0	6
5.51- 6.50	0	1	0	0	0	0	0	0	3	0	6	0	2	1	0	0	13
6.51- 8.50	0	0	0	1	0	1	0	0	3	20	21	15	6	1	1	0	69
8.51-11.50	0	0	0	0	2	1	0	1	4	7	26	12	5	0	1	0	59
11.51-14.50	0	0	0	0	0	0	0	0	0	0	6	4	0	0	0	1	11
14.51-20.50	0	0	0	0	0	0	0	0	0	3	3	2	1	1	0	0	10
>20.50	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL	0	1	0	1	2	2	0	4	10	30	64	34	14	4	2	1	169

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-TWO 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 4/ 1/89 - 6/30/89

*** SECOND QUARTER 1989 ***

STABILITY CLASS C
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
3.51- 4.50	0	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	6
4.51- 5.50	0	0	0	0	1	2	2	6	3	5	5	3	0	0	0	0	27
5.51- 6.50	0	0	1	0	1	7	2	12	8	9	10	2	0	0	0	0	52
6.51- 8.50	0	0	0	1	3	1	3	7	3	14	13	10	4	2	1	0	62
8.51-11.50	0	0	0	2	1	0	1	1	0	0	11	16	3	1	1	1	38
11.51-14.50	0	0	0	0	0	0	0	0	0	0	7	0	1	1	0	0	9
14.51-20.50	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3
>20.50	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
TOTAL	0	0	1	3	7	12	9	26	15	30	48	33	8	4	2	1	199

STABILITY CLASS D
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
[illegible]																	0
.[illegible]1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	3	1	3	2	5	1	4	3	2	2	1	1	2	2	0	0	32
2.51- 3.50	1	2	4	4	5	21	8	18	14	3	2	0	1	1	1	1	86
3.51- 4.50	1	1	3	3	11	9	13	18	22	11	7	2	1	0	0	1	103
4.51- 5.50	0	0	2	1	4	5	10	21	12	10	8	1	4	0	1	0	79
5.51- 6.50	1	0	0	0	1	2	3	4	3	6	5	3	3	1	0	0	32
6.51- 8.50	0	0	1	0	1	0	0	0	0	8	10	7	5	0	1	0	33
8.51-11.50	0	0	0	0	1	0	0	0	0	1	18	17	4	2	1	1	45
11.51-14.50	0	0	0	0	4	0	0	0	0	3	17	7	1	1	2	0	35
14.51-20.50	0	0	0	0	0	0	0	0	0	5	7	5	1	1	0	0	19
>20.50	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
TOTAL	6	4	13	10	32	38	38	64	53	49	76	43	22	8	6	3	465

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-TWO 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 4/ 1/89 - 6/30/89

*** SECOND QUARTER 1989 ***

STABILITY CLASS E
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
1.51- 2.50	2	3	2	0	2	0	0	1	1	1	2	1	0	0	1	1	17
2.51- 3.50	2	4	1	4	0	2	0	0	1	1	2	2	0	0	0	0	19
3.51- 4.50	0	0	2	2	0	0	1	1	4	5	2	4	2	0	0	1	24
4.51- 5.50	0	0	0	0	0	0	0	0	3	10	7	3	2	0	0	0	25
5.51- 6.50	0	0	2	1	0	0	0	0	2	4	7	3	4	0	1	0	24
6.51- 8.50	0	0	0	0	1	0	0	1	1	13	27	13	2	0	3	0	61
8.51-11.50	0	0	0	0	0	0	0	0	2	15	37	25	6	0	7	0	92
11.51-14.50	0	0	0	0	0	0	0	0	0	14	30	15	4	2	1	0	66
14.51-20.50	0	0	0	0	0	0	0	0	0	3	9	1	0	0	0	0	13
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4	7	7	7	3	2	1	3	14	66	123	67	20	3	13	2	342

STABILITY CLASS F
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	4
1.51- 2.50	1	4	1	1	0	1	0	2	0	2	5	1	2	2	1	1	24
2.51- 3.50	3	7	5	3	2	3	0	5	3	4	5	4	3	8	7	4	66
3.51- 4.50	3	1	4	0	1	2	1	6	1	3	8	7	5	2	1	2	47
4.51- 5.50	1	0	0	2	1	1	2	0	1	3	7	4	5	2	1	0	30
5.51- 6.50	2	0	0	0	0	0	1	1	0	3	21	2	4	5	2	0	41
6.51- 8.50	0	0	0	0	0	0	0	0	1	16	33	18	7	3	5	0	83
8.51-11.50	0	1	0	0	0	0	0	0	0	7	33	14	6	2	1	1	65
11.51-14.50	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
14.51-20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	13	10	6	4	7	4	15	6	38	114	50	32	25	19	8	362

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-TWO 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 4/ 1/89 - 6/30/89

*** SECOND QUARTER 1989 ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
1.51- 2.50	10	12	7	3	0	1	2	1	3	1	2	4	1	5	6	8	66
2.51- 3.50	29	33	15	7	2	1	1	1	0	3	2	7	4	4	15	16	140
3.51- 4.50	26	39	15	7	2	0	0	1	0	2	4	5	3	2	6	12	124
4.51- 5.50	8	23	7	3	1	1	0	1	0	3	3	2	2	0	2	2	58
5.51- 6.50	4	5	2	1	1	0	0	0	0	1	5	1	1	1	0	2	24
6.51- 8.50	0	4	2	1	0	0	0	0	0	2	3	4	2	2	2	1	23
8.51-11.50	1	0	0	0	0	0	0	0	0	1	3	0	1	0	0	1	7
11.51-14.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14.51-20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	79	116	48	22	6	3	3	4	3	13	22	23	14	14	31	43	444

STABILITY CLASS ALL

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	2	0	0	0	0	0	0	1	0	0	0	0	0	2	1	1	7
1.51- 2.50	16	20	13	6	7	3	6	7	6	6	10	7	5	9	8	10	139
2.51- 3.50	35	46	25	18	9	28	9	24	18	11	11	13	8	13	23	21	312
3.51- 4.50	30	41	24	12	15	12	16	26	28	22	22	18	11	4	7	16	304
4.51- 5.50	9	23	9	6	7	9	14	31	19	31	31	14	13	3	4	2	225
5.51- 6.50	7	6	5	2	3	9	6	17	16	23	54	11	14	8	3	2	186
6.51- 8.50	0	4	3	3	5	2	3	8	10	76	116	70	27	8	13	1	349
8.51-11.50	1	1	0	2	4	1	1	2	8	45	164	103	34	8	11	5	390
11.51-14.50	0	0	0	0	4	0	0	0	2	29	96	33	9	5	3	1	182
14.51-20.50	0	0	0	0	0	0	0	0	1	21	41	16	3	3	0	0	85
>20.50	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	5
TOTAL	100	141	79	49	54	64	55	116	108	265	549	285	124	63	73	59	2184

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR QUARTER-TWO 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 4/ 1/89 - 6/30/89

*** SECOND QUARTER 1989 ***

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH

TOTAL NUMBER OF OBSERVATIONS: 2184
TOTAL NUMBER OF VALID OBSERVATIONS: 2184
TOTAL NUMBER OF MISSING OBSERVATIONS: 0
PERCENT DATA RECOVERY FOR THIS PERIOD: 100.0 %
MEAN WIND SPEED FOR THIS PERIOD: 6.9 MPH
TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A	B	C	D	E	F	G
9.29	7.74	9.11	21.29	15.66	16.58	20.33

DISTRIBUTION OF WIND DIRECTION VS STABILITY

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
A	0	0	0	0	0	0	0	0	7	39	102	35	14	5	0	1	0
B	0	1	0	1	2	2	0	4	10	30	64	34	14	4	2	1	0
C	0	0	1	3	7	12	9	26	15	30	48	33	8	4	2	1	0
D	6	4	13	10	32	38	38	64	53	49	76	43	22	8	6	3	0
E	4	7	7	7	3	2	1	3	14	66	123	67	20	3	13	2	0
F	11	13	10	6	4	7	4	15	6	38	114	50	32	25	19	8	0
G	79	116	48	22	6	3	3	4	3	13	22	23	14	14	31	43	0
TOTAL	100	141	79	49	54	64	55	116	108	265	549	285	124	63	73	59	0

Table B3

JFDs of 35-Foot Wind Versus Delta T

January - June 1989

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR FIRST SEMI-ANNUAL 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 6/30/89

*** FIRST SEMIANNUAL ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.51- 5.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.51- 6.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.51- 8.50	0	0	1	0	0	1	0	0	2	3	9	3	1	0	0	0	20
8.51-11.50	0	0	0	0	1	0	0	0	2	16	37	19	9	3	0	1	88
11.51-14.50	0	0	0	0	0	0	0	0	2	16	36	7	3	1	0	1	66
14.51-20.50	2	0	0	0	0	0	0	0	1	10	21	6	2	1	0	5	48
>20.50	0	0	0	0	0	0	0	0	0	0	2	1	1	3	0	0	7
TOTAL	2	0	1	0	1	1	0	0	7	45	105	36	16	8	0	7	229

STABILITY CLASS B

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.51- 4.50	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4.51- 5.50	0	0	0	0	0	0	0	3	0	0	2	1	0	1	0	0	7
5.51- 6.50	0	2	0	1	1	1	0	0	3	0	6	0	2	1	0	0	17
6.51- 8.50	0	0	1	4	2	2	0	0	5	21	22	16	6	1	1	0	81
8.51-11.50	0	0	0	1	3	1	0	1	4	8	30	13	7	0	3	0	71
11.51-14.50	0	0	0	1	1	0	0	0	0	2	8	4	0	2	1	1	20
14.51-20.50	0	1	1	0	0	0	0	0	0	4	7	2	1	2	0	0	18
>20.50	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	3
TOTAL	0	3	2	7	7	4	1	4	12	35	77	36	16	8	5	1	218

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR FIRST SEMI-ANNUAL 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 6/30/89

*** FIRST SEMIANNUAL ***

STABILITY CLASS C

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.51- 2.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.51- 3.50	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2
3.51- 4.50	0	0	1	1	1	2	2	1	2	2	1	0	0	0	0	0	13
4.51- 5.50	1	0	3	1	2	2	3	7	4	6	6	5	0	0	0	0	40
5.51- 6.50	1	1	1	1	5	7	3	13	9	11	15	4	0	1	0	0	72
6.51- 8.50	0	2	2	6	6	6	4	7	3	18	22	14	5	2	3	0	100
8.51-11.50	1	0	0	3	2	0	1	1	0	4	18	16	4	2	2	1	55
11.51-14.50	0	0	1	1	2	1	0	0	0	1	13	0	2	4	0	0	25
14.51-20.50	0	0	3	0	0	0	0	0	0	0	2	2	0	3	0	0	10
>20.50	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2
TOTAL	3	3	11	13	18	19	14	29	18	43	77	42	11	12	5	1	319

STABILITY CLASS D

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	3
1.51- 2.50	4	2	4	2	6	3	7	6	7	8	5	6	5	3	5	1	74
2.51- 3.50	7	4	10	7	7	23	14	32	24	18	15	12	9	8	4	8	202
3.51- 4.50	5	8	6	5	20	11	19	24	40	26	26	9	8	11	6	8	232
4.51- 5.50	4	1	2	5	7	7	11	26	22	20	25	7	6	1	1	2	147
5.51- 6.50	4	1	5	2	4	6	3	7	6	12	10	9	5	2	0	3	79
6.51- 8.50	0	4	5	4	6	2	2	5	3	13	21	9	5	2	3	0	84
8.51-11.50	1	0	0	0	8	1	3	1	3	8	32	20	5	6	3	1	92
11.51-14.50	0	2	0	2	6	0	0	0	1	5	23	9	3	5	3	0	59
14.51-20.50	0	0	1	2	7	0	0	0	0	8	17	5	2	7	4	1	54
>20.50	0	0	0	0	3	0	0	0	0	3	3	0	1	1	0	0	11
TOTAL	26	22	33	30	74	53	59	101	106	122	177	86	49	46	29	24	1037

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR FIRST SEMI-ANNUAL 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 6/30/89

*** FIRST SEMIANNUAL ***

STABILITY CLASS E

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	1	0	0	0	2	1	0	0	1	1	0	1	0	1	0	0	8
1.51- 2.50	5	6	4	0	2	1	1	2	3	2	3	6	2	1	5	4	47
2.51- 3.50	5	5	3	5	4	3	1	2	5	2	5	6	5	4	6	6	67
3.51- 4.50	2	4	4	3	0	1	1	1	6	7	4	9	5	1	3	1	52
4.51- 5.50	5	1	3	1	0	0	0	0	3	18	16	5	3	1	3	2	61
5.51- 6.50	6	1	2	1	0	0	0	1	3	13	10	7	6	3	4	2	59
6.51- 8.50	2	1	1	2	1	1	1	2	3	21	37	19	4	2	5	0	102
8.51-11.50	1	1	0	2	0	0	0	1	4	17	55	31	8	4	10	2	136
11.51-14.50	0	1	0	3	5	1	1	0	2	17	41	15	7	4	6	1	104
14.51-20.50	0	0	1	0	5	0	0	0	0	3	11	2	1	2	3	2	30
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	27	20	18	17	19	8	5	9	30	101	182	101	41	23	45	20	666

STABILITY CLASS F

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	1
.76- 1.50	1	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	5
1.51- 2.50	3	5	3	1	0	1	1	3	1	3	9	1	9	5	6	9	60
2.51- 3.50	9	11	11	5	5	4	1	6	6	5	8	12	8	12	19	14	136
3.51- 4.50	11	6	6	3	2	3	1	7	4	5	12	16	6	9	6	12	109
4.51- 5.50	6	4	0	2	1	1	2	0	1	6	9	7	8	5	6	12	70
5.51- 6.50	4	3	0	0	0	0	1	1	1	7	32	6	6	9	5	5	80
6.51- 8.50	4	0	3	1	1	0	0	0	2	27	47	23	12	9	11	6	146
8.51-11.50	2	1	1	0	0	0	0	0	0	16	45	17	9	4	3	10	108
11.51-14.50	1	0	2	2	0	0	0	0	0	0	3	0	0	0	0	0	8
14.51-20.50	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	41	30	26	14	9	9	7	18	15	69	167	82	58	54	57	68	725

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR FIRST SEMI-ANNUAL 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 6/30/89

*** FIRST SEMIANNUAL ***

STABILITY CLASS G
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.76- 1.50	4	1	1	0	0	0	1	0	0	0	0	0	1	0	1	2	11
1.51- 2.50	25	26	11	6	1	3	3	1	3	2	5	6	8	13	16	22	151
2.51- 3.50	73	62	18	12	4	1	3	1	1	4	6	13	10	17	52	56	333
3.51- 4.50	76	81	25	10	4	1	2	1	1	4	6	6	9	8	29	40	303
4.51- 5.50	40	46	20	5	1	1	0	2	1	5	4	6	5	1	6	17	160
5.51- 6.50	19	22	5	2	1	0	0	0	0	1	5	2	4	5	4	13	83
6.51- 8.50	12	16	4	2	0	0	0	0	0	2	3	6	4	4	3	12	68
8.51-11.50	5	9	0	0	0	0	0	0	0	4	7	1	1	0	0	4	31
11.51-14.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14.51-20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>20.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	254	263	84	37	11	6	9	5	6	22	36	40	42	48	111	166	1140

STABILITY CLASS ALL
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
[illegible]																	1
[illegible].50	7	1	1	1	2	1	2	1	1	2	0	1	1	2	2	2	27
1.51- 2.50	37	39	22	9	9	8	12	12	14	15	22	19	24	22	32	36	332
2.51- 3.50	94	82	42	29	20	32	20	41	36	29	34	43	32	41	81	84	740
3.51- 4.50	94	99	42	22	27	18	26	34	53	44	49	40	28	29	44	61	710
4.51- 5.50	56	52	28	14	11	11	16	38	31	55	62	31	22	9	16	33	485
5.51- 6.50	34	30	13	7	11	14	7	22	22	44	78	28	23	21	13	23	390
6.51- 8.50	18	23	17	19	16	12	7	14	18	105	161	90	37	20	26	18	601
8.51-11.50	10	11	1	6	14	2	4	4	13	73	224	117	43	19	21	19	581
11.51-14.50	1	3	3	9	14	2	1	0	5	41	124	35	15	16	10	3	282
14.51-20.50	2	1	6	2	12	0	0	0	1	25	60	17	6	15	7	8	162
>20.50	0	0	0	0	3	0	0	0	0	4	7	2	2	5	0	0	23
TOTAL	353	341	175	118	139	100	95	166	194	437	821	423	233	199	252	287	4334

JOINT FREQUENCY DISTRIBUTION ANALYSIS FOR FIRST SEMI-ANNUAL 1989
SITE IDENTIFIER: PVNGS
DATA PERIOD EXAMINED: 1/ 1/89 - 6/30/89

*** FIRST SEMIANNUAL ***

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
WIND MEASURED AT: 35.0 FEET
WIND THRESHOLD AT: .75 MPH

TOTAL NUMBER OF OBSERVATIONS: 4344
TOTAL NUMBER OF VALID OBSERVATIONS: 4334
TOTAL NUMBER OF MISSING OBSERVATIONS: 10
PERCENT DATA RECOVERY FOR THIS PERIOD: 99.8 %
MEAN WIND SPEED FOR THIS PERIOD: 6.4 MPH
TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A	B	C	D	E	F	G
5.28	5.03	7.36	23.93	15.37	16.73	26.30

DISTRIBUTION OF WIND DIRECTION VS STABILITY

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
A	2	0	1	0	1	1	0	0	7	45	105	36	16	8	0	7	0
B	0	3	2	7	7	4	1	4	12	35	77	36	16	8	5	1	0
C	3	3	11	13	18	19	14	29	18	43	77	42	11	12	5	1	0
D	26	22	33	30	74	53	59	101	106	122	177	86	49	46	29	24	0
E	27	20	18	17	19	8	5	9	30	101	182	101	41	23	45	20	0
F	41	30	26	14	9	9	7	18	15	69	167	82	58	54	57	68	1
G	254	263	84	37	11	6	9	5	6	22	36	40	42	48	111	166	0
TOTAL	353	341	175	118	139	100	95	166	194	437	821	423	233	199	252	287	1

APPENDIX C

DOSE CALCULATIONS

GASEOUS EFFLUENT* DOSE CALCULATION

Doses to the maximum individual and the surrounding population resulting from the release of radioactive material in gaseous effluents from the Palo Verde Nuclear Generating Station were calculated using the GASPAR computer program. Gaseous effluents were released from Units 1, 2 and 3 during the first and second quarters. The radionuclides considered in the dose calculations were Tritium, Iodine-131, Iodine-132, Iodine-133, Iodine-135, all noble gases, and particulates having a half-life greater than eight days and for which dose factors are contained in NUREG-0172. Strontium-89 and Strontium-90 were considered for the first quarter only since the second quarter results were not available. Locations selected for individual dose calculations included for each sector, the site boundary, and within five miles, if present, the nearest residence, the nearest garden, and the nearest milk animal. GASPAR implements the radiological dose models of Regulatory Guide 1.109 to determine the radiation exposure to man from four principal atmospheric exposure pathways: plume, ground deposition, inhalation, and ingestion. The ingestion pathways considered were cow milk, goat milk, meat, and vegetables. Doses to the maximum individual and the population were calculated as a function of age group and pathway for significant body organs. Assumptions and data sources used for input to the GASPAR code are described on page C6.

Table C1 presents the doses for the first two quarters and the first semi-annual period of 1989 for the highest exposed location on the site boundary and the maximum individual in the general public. The site boundary and residence locations for which data are presented represent the highest annual doses.

Table C2 presents the population doses for the first two quarters, and the first semiannual period of 1989. Table C3 summarizes the individual doses and compares the result to PVNGS Technical Specification limits.

Based on results obtained by placing TLDs on the site boundary in each sector, the net annual dose from direct-radiation, plume and ground deposition from all three units was determined to be zero.

*There were no liquid effluents associated with the operation of this facility.

TABLE C1

DOSES TO SPECIAL LOCATIONS FOR JANUARY - JUNE 1989

SITE BOUNDARY 1.40 MILES SSW FROM UNIT 1, 1.14 MILES SSW FROM UNIT 2, 1.00 MILES SSW FROM UNIT 3

	BETA	GAMMA
AIR DOSES(MRAD)		
1ST QUARTER	4.16E-01	1.93E-01
2ND QUARTER	7.33E-03	3.06E-04
1ST SEMI-ANNUAL	4.24E-01	1.94E-01

	T. BODY	SKIN
MAXIMUM INDIVIDUAL(MREM)		
1ST QUARTER	1.19E-01	3.01E-01
2ND QUARTER	1.81E-04	4.98E-03
1ST SEMI-ANNUAL	1.19E-01	3.06E-01

MAXIMUM INDIVIDUAL IN GENERAL PUBLIC LOCATED AT A RESIDENCE 4.55 MILES SSW FROM UNIT 1, 4.37 MILES S FROM UNIT 2, AND 4.22 MILES S FROM UNIT 3

(MREM)	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
1ST QUARTER								
ADULT	7.97E-02	7.97E-02	4.34E-02	7.97E-02	7.97E-02	9.01E-02	7.97E-02	1.48E-01
TEEN	7.99E-02	7.98E-02	4.34E-02	7.99E-02	8.00E-02	9.29E-02	7.98E-02	1.48E-01
CHILD	7.58E-02	7.57E-02	4.34E-02	7.58E-02	7.58E-02	9.01E-02	7.58E-02	1.44E-01
INFANT	6.20E-02	6.19E-02	4.34E-02	6.20E-02	6.20E-02	7.51E-02	6.20E-02	1.31E-01
2ND QUARTER								
ADULT	1.80E-02	1.80E-02	7.09E-05	1.80E-02	1.80E-02	1.81E-02	1.80E-02	1.97E-02
TEEN	1.81E-02	1.81E-02	7.11E-05	1.81E-02	1.81E-02	1.83E-02	1.82E-02	1.99E-02
CHILD	1.60E-02	1.60E-02	7.13E-05	1.60E-02	1.60E-02	1.62E-02	1.60E-02	1.78E-02
INFANT	9.24E-03	9.24E-03	7.11E-05	9.24E-03	9.24E-03	9.43E-03	9.25E-03	1.10E-02
1ST SEMI-ANNUAL								
ADULT	9.77E-02	9.77E-02	4.34E-02	9.77E-02	9.77E-02	1.08E-01	9.77E-02	1.68E-01
TEEN	9.81E-02	9.80E-02	4.35E-02	9.81E-02	9.82E-02	1.11E-01	9.80E-02	1.68E-01
CHILD	9.18E-02	9.17E-02	4.35E-02	9.18E-02	9.18E-02	1.06E-01	9.18E-02	1.62E-01
INFANT	7.12E-02	7.12E-02	4.35E-02	7.12E-02	7.12E-02	8.45E-02	7.12E-02	1.42E-01

TABLE C2

INTEGRATED POPULATION DOSES FOR JANUARY - JUNE 1989

PERSONREM

JANUARY 1 - MARCH 31 1989

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	3.79E-01	1.31E+00
GROUND	6.88E-05	6.88E-05	6.88E-05	6.88E-05	6.88E-05	6.88E-05	6.88E-05	8.13E-05
INHAL	7.02E-01	7.02E-01	3.92E-04	7.02E-01	7.03E-01	8.64E-01	7.02E-01	7.02E-01
VEGET	2.12E+00	2.12E+00	5.50E-04	2.13E+00	2.13E+00	2.32E+00	2.12E+00	2.12E+00
COW MILK	2.95E-01	2.95E-01	7.81E-05	2.95E-01	2.95E-01	3.21E-01	2.95E-01	2.95E-01
MEAT	9.17E-02	9.17E-02	7.15E-07	9.17E-02	9.17E-02	9.17E-02	9.17E-02	9.17E-02
TOTAL	3.59E+00	3.59E+00	3.80E-01	3.59E+00	3.59E+00	3.98E+00	3.59E+00	4.52E+00
(a) PER CAPITA DOSE (REM)	2.00E-06	2.00E-06	2.12E-07	2.00E-06	2.00E-06	2.22E-06	2.00E-06	2.52E-06

APRIL 1 - JUNE 30 1989

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	7.98E-04	3.35E-02
GROUND	3.12E-04	3.12E-04	3.12E-04	3.12E-04	3.12E-04	3.12E-04	3.12E-04	3.67E-04
INHAL	3.98E-01	3.98E-01	7.86E-06	3.98E-01	3.98E-01	4.00E-01	3.98E-01	3.98E-01
VEGET	1.08E+00	1.08E+00	2.11E-05	1.08E+00	1.08E+00	1.08E+00	1.08E+00	1.08E+00
COW MILK	1.50E-01	1.50E-01	4.23E-06	1.50E-01	1.50E-01	1.51E-01	1.50E-01	1.50E-01
MEAT	3.69E-02	3.69E-02	8.11E-08	3.69E-02	3.69E-02	3.69E-02	3.69E-02	3.69E-02
TOTAL	1.67E+00	1.67E+00	1.14E-03	1.67E+00	1.67E+00	1.67E+00	1.67E+00	1.70E+00
(a) PER CAPITA DOSE (REM)	9.30E-07	9.30E-07	6.35E-10	9.30E-07	9.30E-07	9.30E-07	9.30E-07	9.47E-07

JANUARY 1 - JUNE 30 1989

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.80E-01	3.80E-01	3.80E-01	3.80E-01	3.80E-01	3.80E-01	3.80E-01	1.34E+00
GROUND	3.81E-04	3.81E-04	3.81E-04	3.81E-04	3.81E-04	3.81E-04	3.81E-04	4.48E-04
INHAL	1.10E+00	1.10E+00	4.00E-04	1.10E+00	1.10E+00	1.26E+00	1.10E+00	1.10E+00
VEGET	3.21E+00	3.21E+00	5.72E-04	3.21E+00	3.21E+00	3.41E+00	3.20E+00	3.20E+00
COW MILK	4.44E-01	4.44E-01	8.23E-05	4.45E-01	4.45E-01	4.72E-01	4.44E-01	4.44E-01
MEAT	1.29E-01	1.29E-01	7.97E-07	1.29E-01	1.29E-01	1.29E-01	1.29E-01	1.29E-01
TOTAL	5.26E+00	5.26E+00	3.82E-01	5.26E+00	5.26E+00	5.65E+00	5.26E+00	6.22E+00
(a) PER CAPITA DOSE (REM)	2.93E-06	2.93E-06	2.13E-07	2.93E-06	2.93E-06	3.15E-06	2.93E-06	3.46E-06

(a) PERSONREM DIVIDED BY 50-MILE POPULATION OF 1,796,000

Table C3
SUMMARY OF INDIVIDUAL DOSES FOR JANUARY - JUNE 1989*

	Unit	Quarter #1	Quarter #2	Quarter #3	Quarter #4	Year to Date
Gamma Air Dose	mrad	1.93E-01	3.06E-04	NA	NA	1.94E-01
T.S. 3.11.2.2 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% T.S. Limit	%	3.86E+00	6.12E-03	NA	NA	1.94E+00
Beta Air Dose	mrad	4.16E-01	7.33E-03	NA	NA	4.24E-01
T.S. 3.11.2.2 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% T.S. Limit	%	4.16E+00	7.33E-02	NA	NA	2.12E+00
Maximum Organ Dose		**	**			**
(neglecting skin)	mrem	9.29E-02	1.83E-02	NA	NA	1.11E-01
T.S. 3.11.2.3 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% T.S. Limit	%	1.24E+00	2.44E-01	NA	NA	7.40E-01

*From Table C1.

**These control location doses are imparted via three principal atmospheric pathways: plume, ground exposure and inhalation. The highest organ dose is to the teen thyroid resulting from exposure at a residence 4.55 miles SSW from Unit 1, 4.37 miles S from Unit 2, and 4.22 miles S from Unit 3. Technical Specification 3.11.4 has higher limits than Technical Specification 3.11.2.3 and therefore the percent of limits are more conservative based on Technical Specification 3.11.2.3 than on Technical Specification 3.11.4.

DOSE CALCULATION MODELS

The GASPAR computer code was used to evaluate the radiological consequences of the routine release of gaseous effluents. GASPAR implements the dose calculational methodologies of Regulatory Guide 1.109, Revision 1.

Source terms for each quarter are combined with station-specific demographic data and each quarter's atmospheric diffusion estimates for gaseous dose calculations.

Atmospheric diffusion estimates are generated by the XOQDOQ computer code using onsite meteorological data as input. Doses for the semi-annual period are the summation for the quarterly doses. Additional input to GASPAR includes the following site-specific data:

- 0 to 5 mile nearest residence, milk animal and garden in each of 16 compass sectors, based on the 1988 Land Use Census.
- 0 to 5 mile population distribution based on the Land Use Census conducted June-August, 1984.
- 5 to 50 mile population distrubution from PVNGS ER-OL Figure 2.1-6.
- The population distribution of metropolitan Phoenix greater than 50 miles from PVNGS, based on the 1980 federal census results, was conservatively included in the 40 to 50 mile sectors.
- Absolute humidity of 6.0 g/m^3 from PVNGS ER-OL Table 2.3-34.
- The fraction of the year that vegetables are grown (0.667) from PVNGS ER-OL Section 2.1.3.4.
- The fraction of daily feed derived from pasture while on pasture and length of grazing season for milk animals beyond 5 miles (0.35 and 0.75) from PVNGS ER-OL Section 2.1.3.4.
- The only milk animal (goats) located within 5 miles from PVNGS was fed fifty percent on stored feed and the other fifty on pasture grass during 1988, based on the 1988 Land Use Census.
- The fraction of daily feed derived from pasture while on pasture and length of grazing season for meat animals (0.05 and 0.25) from PVNGS ER-OL Section 2.1.3.4.

Other values used for input to GASPAR are default values from Regulatory Guide 1.109, Revision 1.