FENOC

Beaver Valley Power Station – Units 1 & 2

Annual Radioactive Effluent Release Report

Calendar Year – 1999

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FENOC
Beaver Valley Power Station – Units 1 & 2

RTL# A9.690E
HP Form A5.1
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Supplemental Information Page

FACILITY: B.V.P.S. Units 1 and 2 LICENSEE: FENOC

1. Regulatory Limits	
a. Fission and activation gases:	Annual Unit 1 or 2 Dose: 10 mrad from Gamma, & 20 mrad from Beta
b. Iodines & particulates, half-lives > 8 days:	Annual Unit 1 or 2 Dose: 15 mrem to Any Organ
c. Liquid effluents:	Annual Unit 1 or 2 Dose: 3 mrem to the Total Body, & 10 mrem to Any Organ

2. Maximum Permissable Concentrations Used In Determining Allowable Release Rates Or Concentrations	
a. Fission and activation gases:	Site Release Rate: 500 mrem/yr to the Total Body, & 3000 mrem/yr to the Skin
b. Iodines & particulates, half-lives > 8 days:	Site Release Rate: 1500 mrem/yr to Any Organ
c. Liquid effluents:	Site Release Concentration: 10 times 10 CFR 20 Appendix B, Table 2, EC's

3. Average Energy (Not Applicable To The BVPS ODCM)

4. Measurements and Approximations of Total Radioactivity	
The methods used to measure or approximate the total radioactivity in effluents, and the methods used to determine radionuclide composition are as follows:	
a. Fission and activation gases:	Ge Gamma Spectrometry, Liquid Scintillation Counter
b. Iodines:	Ge Gamma Spectrometry
c. Particulates, half-lives > 8 days:	Ge Gamma Spectrometry, Proportional Counter
d. Liquid effluents:	Ge Gamma Spectrometry, Proportional Counter, Liquid Scintillation

5. Batch & Abnormal Release Information	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
a. Liquid Batch Releases						
1. Number of batch releases		24	25	24	29	102
2. Total time period for batch releases	minutes	5594	6658	6160	5406	23818
3. Maximum time period for a batch release	minutes	997	995	1080	1182	1182
4. Average time period for batch releases	minutes	233	266	257	186	234
5. Minimum time period for a batch release	minutes	8	5	5	3	3
6. Average river flow during release periods	cuft/sec	61867	35967	7933	22533	32075
b. Gaseous Batch Releases						
1. Number of batch releases		4	17	9	11	41
2. Total time period for batch releases	minutes	9113	21030	7444	19447	57034
3. Maximum time period for a batch release	minutes	6318	5365	3533	5091	6318
4. Average time period for batch releases	minutes	2278	1237	827	1768	1391
5. Minimum time period for a batch release	minutes	900	85	1	54	54
c. Abnormal Liquid Releases						
1. Number of releases		NONE	NONE	NONE	NONE	NONE
2. Total activity released	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
d. Abnormal Gaseous Releases						
1. Number of releases		NONE	NONE	NONE	NONE	NONE
2. Total activity released	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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Table 1A

Gaseous Effluents – Summation Of All Releases

	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year	Total Error, %
A. Fission & Activation Gases							
1. Total release	Ci	8.54E+00	6.83E+00	6.92E+00	4.38E+01	6.60E+01	2.65E+01
2. Average release rate for period	uCi/sec	1.08E+00	8.67E-01	8.78E-01	5.55E+00	2.10E+00	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
B. Iodines							
1. Total Iodine - 131	Ci	8.02E-05	4.91E-05	2.31E-06	3.83E-05	1.70E-04	2.83E+01
2. Average release rate for period	uCi/sec	1.02E-05	6.23E-06	2.93E-07	4.86E-06	5.39E-06	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
C. Particulates							
1. Particulates with half-lives > 8 days	Ci	1.90E-05	2.31E-05	4.70E-07	8.97E-03	9.01E-03	3.00E+01
2. Average release rate for period	uCi/sec	2.41E-06	2.94E-06	5.96E-08	1.14E-03	2.86E-04	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
4. Gross alpha radioactivity	Ci	2.82E-06	1.88E-06	3.01E-06	3.00E-06	1.07E-05	
D. Tritium							
1. Total release	Ci	6.06E+01	4.38E+01	5.38E+01	1.05E+02	2.63E+02	3.29E+01
2. Average release rate for period	uCi/sec	7.69E+00	5.56E+00	6.83E+00	1.33E+01	8.35E+00	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	

N/A = Not Applicable

The amount of time (in seconds) used to calculate the release rates specified in A.2, B.2, C.2, and D.2 is the average amount of seconds per calendar quarter (7.88E+06 seconds).

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Table 1B-EB

Gaseous Effluents – Elevated Batch Releases

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	LLD	8.71E-05	LLD	1.64E-02	1.65E-02
krypton-85	Ci	2.62E-01	5.85E-01	1.60E-01	1.40E+00	2.41E+00
krypton-85m	Ci	LLD	7.90E-06	LLD	1.14E-01	1.14E-01
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	LLD	LLD	LLD
xenon-131m	Ci	LLD	9.60E-03	LLD	3.05E-01	3.15E-01
xenon-133	Ci	5.42E-03	2.61E-01	LLD	2.66E+01	2.69E+01
xenon-133m	Ci	LLD	3.39E-04	LLD	6.13E-01	6.13E-01
xenon-135	Ci	6.21E-05	5.61E-06	LLD	3.42E+00	3.42E+00
xenon-135m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	2.67E-01	8.56E-01	1.60E-01	3.25E+01	3.38E+01
2. Iodines						
Iodine-131	Ci	LLD	LLD	LLD	LLD	LLD
Iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
Iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	ND	ND	ND	ND	ND
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	Ci	LLD	LLD	LLD	8.89E-03	8.89E-03
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-60	Ci	LLD	LLD	LLD	LLD	LLD
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	LLD	LLD	LLD	LLD
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	ND	ND	8.89E-03	8.89E-03

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected

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Table 1B–EC

Gaseous Effluents – Elevated Continuous Releases

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	6.19E-02	LLD	LLD	LLD	6.19E-02
krypton-85	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85m	Ci	LLD	LLD	LLD	1.38E-02	1.38E-02
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	LLD	LLD	LLD
xenon-131m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-133	Ci	1.85E+00	1.52E+00	8.52E-01	1.19E+00	5.41E+00
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	4.30E-01	LLD	6.96E-03	2.62E-01	6.99E-01
xenon-135m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	2.34E+00	1.52E+00	8.59E-01	1.47E+00	6.19E+00
2. Iodines						
iodine-131	Ci	3.73E-06	4.56E-06	2.28E-06	2.73E-06	1.33E-05
iodine-133	Ci	LLD	LLD	LLD	2.45E-07	2.45E-07
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	3.73E-06	4.56E-06	2.28E-06	2.98E-06	1.35E-05
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	Ci	LLD	LLD	LLD	LLD	LLD
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-60	Ci	LLD	LLD	LLD	LLD	LLD
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	LLD	LLD	LLD	LLD
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	ND	ND	ND	ND

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected

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Table 1C–GB1

Gaseous Effluents – Ground Level Batch Releases (Unit 1)

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	NR	LLD	LLD	LLD	LLD
krypton-85	Ci	NR	LLD	LLD	LLD	LLD
krypton-85m	Ci	NR	LLD	LLD	LLD	LLD
krypton-87	Ci	NR	LLD	LLD	LLD	LLD
krypton-88	Ci	NR	LLD	LLD	LLD	LLD
xenon-131m	Ci	NR	LLD	LLD	LLD	LLD
xenon-133	Ci	NR	3.71E-01	LLD	LLD	3.71E-01
xenon-133m	Ci	NR	LLD	LLD	LLD	LLD
xenon-135	Ci	NR	LLD	LLD	LLD	LLD
xenon-135m	Ci	NR	LLD	LLD	LLD	LLD
xenon-138	Ci	NR	LLD	LLD	LLD	LLD
unidentified	Ci	NR	NONE	NONE	NONE	NONE
Total for period	Ci	ND	3.71E-01	ND	ND	3.71E-01
2. Iodines						
iodine-131	Ci	NR	LLD	2.78E-08	LLD	2.78E-08
iodine-133	Ci	NR	LLD	2.73E-08	LLD	2.73E-08
iodine-135	Ci	NR	LLD	LLD	LLD	LLD
Total for period	Ci	ND	ND	5.51E-08	ND	5.51E-08
3. Particulates						
chromium-51	Ci	NR	LLD	LLD	LLD	LLD
manganese-54	Ci	NR	LLD	LLD	LLD	LLD
iron-59	Ci	NR	LLD	LLD	LLD	LLD
cobalt-57	Ci	NR	LLD	LLD	LLD	LLD
cobalt-58	Ci	NR	5.14E-06	LLD	LLD	5.14E-06
cobalt-60	Ci	NR	LLD	LLD	LLD	LLD
zinc-65	Ci	NR	LLD	LLD	LLD	LLD
strontium-89	Ci	NR	LLD	LLD	LLD	LLD
strontium-90	Ci	NR	LLD	LLD	LLD	LLD
molybdenum-99	Ci	NR	LLD	LLD	LLD	LLD
cesium-134	Ci	NR	LLD	LLD	LLD	LLD
cesium-137	Ci	NR	LLD	4.76E-08	LLD	4.76E-08
barium/lanthanum-140	Ci	NR	LLD	LLD	LLD	LLD
cerium-141	Ci	NR	LLD	LLD	LLD	LLD
cerium-144	Ci	NR	LLD	LLD	LLD	LLD
unidentified	Ci	NR	NONE	NONE	NONE	NONE
Total for period	Ci	ND	5.14E-06	4.76E-08	ND	5.19E-06

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected
NR = No Batch Releases this period

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Table 1C-GC1

Gaseous Effluents – Ground Level Continuous Releases (Unit 1)

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	LLD	LLD	LLD	1.61E+00	1.61E+00
krypton-85	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85m	Ci	LLD	LLD	LLD	LLD	LLD
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	LLD	LLD	LLD
xenon-131m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-133	Ci	1.03E+00	1.18E+00	5.07E+00	5.44E+00	1.27E+01
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	LLD	4.48E-01	8.30E-01	1.67E+00	2.95E+00
xenon-135m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	1.03E+00	1.63E+00	5.90E+00	8.72E+00	1.73E+01
2. Iodines						
iodine-131	Ci	LLD	4.45E-05	LLD	LLD	4.45E-05
iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	ND	4.45E-05	ND	ND	4.45E-05
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	Ci	LLD	LLD	LLD	LLD	LLD
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	LLD	1.08E-05	LLD	LLD	1.08E-05
cobalt-60	Ci	LLD	LLD	LLD	LLD	LLD
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	LLD	LLD	LLD	LLD
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	1.08E-05	ND	ND	1.08E-05

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected

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Table 1C-GB2

Gaseous Effluents – Ground Level Batch Releases (Unit 2)

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85m	Ci	LLD	LLD	LLD	LLD	LLD
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	LLD	LLD	LLD
xenon-131m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-133	Ci	4.49E-02	3.06E-03	LLD	3.57E-01	4.05E-01
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	4.49E-02	3.06E-03	ND	3.57E-01	4.05E-01
2. Iodines						
iodine-131	Ci	LLD	LLD	LLD	8.86E-06	8.86E-06
iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	ND	ND	ND	8.86E-06	8.86E-06
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	Ci	LLD	LLD	LLD	LLD	LLD
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-60	Ci	LLD	LLD	LLD	LLD	LLD
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	LLD	LLD	LLD	LLD
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	ND	ND	ND	ND

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected

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Table 1C–GC2
Gaseous Effluents – Ground Level Continuous Releases (Unit 2)

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission gases						
argon-41	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85	Ci	LLD	2.45E+00	LLD	LLD	2.45E+00
krypton-85m	Ci	LLD	LLD	LLD	1.09E-02	1.09E-02
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	LLD	LLD	LLD
xenon-131m	Ci	LLD	LLD	LLD	6.90E-01	6.90E-01
xenon-133	Ci	3.89E+00	LLD	LLD	5.45E-02	3.94E+00
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	9.62E-01	LLD	LLD	LLD	9.62E-01
xenon-135m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	4.85E+00	2.45E+00	ND	7.55E-01	8.06E+00
2. Iodines						
iodine-131	Ci	7.65E-05	LLD	LLD	2.67E-05	1.03E-04
iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	7.65E-05	ND	ND	2.67E-05	1.03E-04
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	Ci	LLD	LLD	LLD	LLD	LLD
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	4.22E-07	LLD	4.22E-07
cobalt-58	Ci	1.90E-05	7.20E-06	LLD	7.88E-05	1.05E-04
cobalt-60	Ci	LLD	LLD	LLD	LLD	LLD
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	LLD	LLD	LLD	LLD
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	1.90E-05	7.20E-06	4.22E-07	7.88E-05	1.05E-04

LLD = Below the Lower Limit of Detectability, in uCi/cc (Table 4).
ND = None Detected

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Table 2A

Liquid Effluents – Summation Of All Releases

	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year	Total Error, %
A. Fission & activation products							
1. Total release (excl. H-3, gas & alpha)	Ci	5.09E-02	1.83E-01	7.98E-03	4.47E-02	2.86E-01	2.60E+01
2. Average diluted concentration	uCi/ml	9.33E-08	2.71E-07	1.20E-08	9.99E-08	1.23E-07	
3. Percent of applicable limit	%	2.04E+00	7.31E+00	3.19E-01	1.79E+00	2.86E+00	
B. Tritium							
1. Total release	Ci	1.06E+02	1.08E+02	5.62E+01	1.22E+02	3.93E+02	2.50E+01
2. Average diluted concentration	uCi/ml	1.94E-04	1.60E-04	8.47E-05	2.74E-04	1.68E-04	
3. Percent of applicable limit	%	1.94E+00	1.60E+00	8.47E-01	2.74E+00	1.68E+00	
C. Dissolved and entrained gases							
1. Total release	Ci	1.58E-03	1.37E-04	1.30E-04	2.29E-04	2.08E-03	2.70E+01
2. Average diluted concentration	uCi/ml	2.90E-09	2.03E-10	1.96E-10	5.12E-10	8.92E-10	
3. Percent of applicable limit	%	1.45E-03	1.02E-04	9.80E-05	2.56E-04	4.46E-04	
D. Gross alpha radioactivity (total release)	Ci	7.30E-07	4.46E-06	LLD	LLD	5.19E-06	2.89E+01
E. Volume of waste released (prior to dilution)	liters	7.87E+05	9.77E+05	8.55E+05	8.48E+05	3.47E+06	1.12E+01
F. Volume of dilution water used	liters	5.45E+08	6.74E+08	6.62E+08	4.47E+08	2.33E+09	2.29E+01

LLD = Below the Lower Limit of Detectability, in uCi/ml (Table 4)
ND = None Detected

A.3 is based on a historical PA-DEP guide of 10 Ci/yr

B.3 is based on a ODCM limit of 1.00E-2 uCi/ml

C.3 is based on a ODCM limit of 2.00E-04 uCi/ml

The values listed at F. are the volumes during actual liquid waste discharge periods. The total dilution volume for a continuous calendar quarter is approximately 1E+10 liters for BVPS-1 & 2 (ie.; ~ 22,800 gpm is the total dilution flowrate from the site)

Annual Radioactive Effluent Release Report

Calendar Year – 1999

Table 2B–B

Liquid Effluents – Batch Releases

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission and activation products						
beryllium-7	Ci	LLD	LLD	LLD	LLD	LLD
sodium-24	Ci	6.13E-05	3.39E-05	LLD	8.54E-05	1.81E-04
chromium-51	Ci	7.42E-03	2.92E-02	LLD	LLD	3.66E-02
manganese-54	Ci	2.31E-04	1.84E-03	2.03E-05	7.16E-05	2.16E-03
iron-55	Ci	6.44E-03	1.96E-02	2.00E-03	4.88E-03	3.29E-02
iron-59	Ci	2.17E-04	1.04E-03	LLD	LLD	1.25E-03
cobalt-57	Ci	2.90E-05	1.57E-04	LLD	LLD	1.86E-04
cobalt-58	Ci	2.18E-02	8.13E-02	2.71E-03	2.88E-02	1.35E-01
cobalt-60	Ci	3.54E-03	1.19E-02	6.30E-04	1.19E-03	1.73E-02
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	4.74E-05	LLD	7.19E-05	9.13E-05	2.11E-04
strontium-90	Ci	LLD	1.88E-07	LLD	LLD	1.88E-07
zirconium/niobium-95	Ci	9.51E-04	9.32E-03	9.67E-05	5.14E-05	1.04E-02
zirconium/niobium-97	Ci	4.80E-04	5.88E-03	2.66E-04	5.79E-04	7.21E-03
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
technetium-99m	Ci	LLD	LLD	LLD	LLD	LLD
ruthenium-103	Ci	LLD	LLD	LLD	LLD	LLD
silver-110m	Ci	1.50E-03	6.15E-03	2.75E-04	3.36E-04	8.26E-03
antimony-124	Ci	2.62E-03	4.93E-03	2.14E-04	3.51E-03	1.13E-02
antimony-125	Ci	3.21E-03	1.03E-02	1.03E-03	1.97E-03	1.65E-02
iodine-131	Ci	1.05E-03	9.67E-07	1.08E-05	6.79E-04	1.74E-03
iodine-133	Ci	8.39E-06	LLD	LLD	LLD	8.39E-06
cesium-134	Ci	4.45E-04	4.73E-04	1.44E-04	8.14E-04	1.88E-03
cesium-137	Ci	8.49E-04	6.88E-04	5.14E-04	1.65E-03	3.70E-03
barium/lanthanum-140	Ci	3.84E-05	LLD	LLD	LLD	3.84E-05
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	5.09E-02	1.83E-01	7.98E-03	4.47E-02	2.86E-01
2. Dissolved and entrained gases						
argon-41	Ci	LLD	9.21E-05	LLD	LLD	9.21E-05
xenon-133	Ci	1.58E-03	4.50E-05	1.30E-04	2.29E-04	1.99E-03
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	1.58E-03	1.37E-04	1.30E-04	2.29E-04	2.08E-03

LLD = Below the Lower Limit of Detectability, in uCi/ml (Table 4)

FENOC
Beaver Valley Power Station – Units 1 & 2

RTL # A9.690E
HP Form A5.11
12/1999

Annual Radioactive Effluent Release Report

Calendar Year – 1999

Table 2B–C

Liquid Effluents – Continuous Releases

Nuclides released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Calendar Year
1. Fission and activation products						
beryllium-7	Ci	N/A	N/A	N/A	N/A	N/A
sodium-24	Ci	N/A	N/A	N/A	N/A	N/A
chromium-51	Ci	N/A	N/A	N/A	N/A	N/A
manganese-54	Ci	N/A	N/A	N/A	N/A	N/A
iron-55	Ci	N/A	N/A	N/A	N/A	N/A
iron-59	Ci	N/A	N/A	N/A	N/A	N/A
cobalt-57	Ci	N/A	N/A	N/A	N/A	N/A
cobalt-58	Ci	N/A	N/A	N/A	N/A	N/A
cobalt-60	Ci	N/A	N/A	N/A	N/A	N/A
zinc-65	Ci	N/A	N/A	N/A	N/A	N/A
strontium-89	Ci	N/A	N/A	N/A	N/A	N/A
strontium-90	Ci	N/A	N/A	N/A	N/A	N/A
zirconium/niobium-95	Ci	N/A	N/A	N/A	N/A	N/A
zirconium/niobium-97	Ci	N/A	N/A	N/A	N/A	N/A
molybdenum-99	Ci	N/A	N/A	N/A	N/A	N/A
technetium-99m	Ci	N/A	N/A	N/A	N/A	N/A
ruthenium-103	Ci	N/A	N/A	N/A	N/A	N/A
silver-110m	Ci	N/A	N/A	N/A	N/A	N/A
antimony-124	Ci	N/A	N/A	N/A	N/A	N/A
antimony-125	Ci	N/A	N/A	N/A	N/A	N/A
iodine-131	Ci	N/A	N/A	N/A	N/A	N/A
iodine-133	Ci	N/A	N/A	N/A	N/A	N/A
cesium-134	Ci	N/A	N/A	N/A	N/A	N/A
cesium-137	Ci	N/A	N/A	N/A	N/A	N/A
barium/lanthanum-140	Ci	N/A	N/A	N/A	N/A	N/A
cerium-141	Ci	N/A	N/A	N/A	N/A	N/A
cerium-144	Ci	N/A	N/A	N/A	N/A	N/A
unidentified	Ci	N/A	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A	N/A
2. Dissolved and entrained gases						
argon-41	Ci	N/A	N/A	N/A	N/A	N/A
xenon-133	Ci	N/A	N/A	N/A	N/A	N/A
xenon-133m	Ci	N/A	N/A	N/A	N/A	N/A
xenon-135	Ci	N/A	N/A	N/A	N/A	N/A
unidentified	Ci	N/A	N/A	N/A	N/A	N/A
Total for period	Ci	N/A	N/A	N/A	N/A	N/A

N/A = Not Applicable (liquids not discharged in a continuous mode during this period)

Annual Radioactive Effluent Release Report

Calendar Year – 1999

Table 3A

Solid Waste And Irradiated Fuel Shipments (Part 1 of 3)

A. Solid Waste Shipped Offsite For Burial Or Disposal (Not irradiated fuel)				
1. Type of Waste (Spent resins, Filter Sludges, Evaporator Bottoms, Oil)		1st Half	2nd Half	Estimated Total Error
a. Volume Shipped		4.09E+01 m3	5.76E+01 m3	0.00E+00 % (1)
b. Volume Buried		1.54E+01 m3	6.88E+00 m3	0.00E+00 % (1)
c. Total Activity		2.33E+02 Ci	1.15E+02 Ci	3.00E+01 %
2. Estimate of Major Nuclide Composition by Type of Waste On This Table (2)		Percent (%)	Percent (%)	
H-3		0.46 %	0.75 %	
Be-7		0.54 %	0.00 %	
C-14		1.36 %	0.32 %	
Cr-51		3.56 %	0.64 %	
Mn-54		1.30 %	1.44 %	
Fe-55		7.04 %	6.19 %	
Fe-59		0.08 %	0.00 %	
Co-57		0.15 %	0.20 %	
Co-58		41.00 %	61.90 %	
Co-60		20.00 %	9.33 %	
Ni-59		0.12 %	0.09 %	
Ni-63		16.10 %	13.10 %	
Sr-89		0.03 %	0.01 %	
Sr-90		0.02 %	0.01 %	
Nb-94		0.07 %	0.02 %	
Nb-95		0.37 %	0.66 %	
Zr-95		0.17 %	0.55 %	
Ru-106		0.45 %	0.00 %	
Ag-110m		0.06 %	0.66 %	
Sb-124		0.11 %	0.46 %	
Sb-125		0.42 %	0.82 %	
Cs-134		3.21 %	1.09 %	
Cs-137		3.27 %	1.78 %	
Ce-144/Pr-144		0.18 %	0.00 %	
3. Number of Shipments		7	6	
a. Type of Container Used	LSA	6	4	
	Type A	0	0	
	Type B	1	2	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	7	6	
c. Mode of Transport	Truck	7	6	
	Rail	0	0	
d. Final Destination	Barnwell, SC	2	2	
	Oak Ridge, TN	5	4	
e. Waste Class per 10 CFR Part 61	Class A	3	4	
	Class B	2	2	
	Class C	2	0	
	> Class C	0	0	

(1) Since container volumes are provided by the burial site, a calculational error of zero is assumed.

(2) Percent values for any nuclide that are <0.01 % are not shown on this table. Data is available upon request

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Table 3B
Solid Waste And Irradiated Fuel Shipments (Part 2 of 3)

A. Solid Waste Shipped Offsite For Burial Or Disposal (Not irradiated fuel)				
1. Type of Waste (Dry Compressible Waste, Contaminated Equipment, etc.)		1st Half	2nd Half	Estimated Total Error
a. Volume Shipped		1.84E+02 m3	8.84E+01 m3	0.00E+00 % (1)
b. Volume Buried		1.12E+01 m3	4.52E+00 m3	0.00E+00 % (1)
c. Total Activity		3.17E+00 Ci	1.99E-01 Ci	3.00E+01 %
2. Estimate of Major Nuclide Composition by Type of Waste On This Table (2)		Percent (%)	Percent (%)	
H-3		2.28 %	1.28 %	
C-14		0.52 %	1.07 %	
Mn-54		0.57 %	0.20 %	
Fe-55		8.86 %	8.70 %	
Co-58		70.00 %	54.00 %	
Co-60		4.42 %	6.64 %	
Ni-59		0.07 %	0.08 %	
Ni-63		2.81 %	4.38 %	
Sr-90		0.02 %	0.06 %	
Tc-99		0.06 %	0.05 %	
I-129		0.13 %	0.07 %	
I-131		0.07 %	0.99 %	
Cs-134		4.04 %	6.60 %	
Cs-137		6.08 %	15.80 %	
Pu-241		0.04 %	0.10 %	
3. Number of Shipments		6	2	
a. Type of Container Used	LSA	6	2	
	Type A	0	0	
	Type B	0	0	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	6	2	
c. Mode of Transport	Truck	6	2	
	Rail	0	0	
	Other	0	0	
d. Final Destination	Oak Ridge, TN	6	2	
	Wampum, PA	0	0	
e. Waste Class per 10 CFR Part 61	Class A	6	2	
	Class B	0	0	
	Class C	0	0	
	> Class C	0	0	

(1) Since container volumes are provided by the burial site, a calculational error of zero is assumed.

(2) Percent values for any nuclide that are <0.01 % are not shown on this table. Data is available upon request

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Table 3C
Solid Waste And Irradiated Fuel Shipments (Part 3 of 3)

A. Solid Waste Shipped Offsite For Burial Or Disposal (Not irradiated fuel)				
1. Type of Waste (Irradiated components, Control Rods, etc)		1st Half	2nd Half	Estimated Total Error
a. Volume Shipped		5.75E-01 m3	0.00E+00 m3	0.00E+00 % (1)
b. Volume Buried		0.00E+00 m3	6.64E-01 m3	0.00E+00 % (1)
c. Total Activity		4.43E+00 Ci	0.00E+00 Ci	3.00E+01 %
2. Estimate of Major Nuclide Composition by Type of Waste On This Table (2)		Percent (%)	Percent (%)	
H-3		0.02 %	0.00 %	
Mn-54		0.09 %	0.00 %	
Fe-55		45.70 %	0.00 %	
Co-60		51.20 %	0.00 %	
Ni-63		2.69 %	0.00 %	
Nb-94		0.12 %	0.00 %	
Cs-137		0.09 %	0.00 %	
U-234/235		0.07 %	0.00 %	
3. Number of Shipments		1	0	
a. Type of Container Used	LSA	0	0	
	Type A	1	0	
	Type B	0	0	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	1	0	
c. Mode of Transport	Truck	1	0	
	Rail	0	0	
	Other	0	0	
d. Final Destination	Barnwell, SC	0	0	
	Oak Ridge, TN	1	0	
e. Waste Class per 10 CFR Part 61	Class A	0	0	
	Class B	1	0	
	Class C	0	0	
	> Class C	0	0	
B. No Irradiated Fuel Shipments				

(1) Since container volumes are provided by the burial site, a calculational error of zero is assumed.

(2) Percent values for any nuclide that are <0.01 % are not shown on this table. Data is available upon request

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Table 4

Lower Limits Of Detectability (LLD)

Nuclide	RWDA-G 1000 cc Gas Grab Sample (3) Calculated LLD (uCi/cc)	RWDA-G 1000 cc Gas Grab Sample ODCM Required LLD (uCi/cc)	RWDA-L 1000 ml Liquid Grab Sample (3) Calculated LLD (uCi/ml)	RWDA-L 1000 ml Liquid Grab Sample ODCM Required LLD (uCi/ml)	Filter Paper / Charcoal Continuous Effluent Sample (3) Calculated (2) LLD (uCi/cc)	Filter Paper / Charcoal Continuous Effluent Sample ODCM Required LLD (uCi/cc)
H-3	(4) 1.00E-06	1E-06	1.00E-06	1E-05	———	———
Na-24	8.41E-08	1E-04	1.76E-08	5E-07	1.66E-13	1E-11
Ar-41	1.80E-07	1E-04	3.79E-08	5E-07	———	———
Cr-51	7.89E-07	1E-04	1.72E-07	5E-07	8.46E-13	1E-11
Mn-54	1.08E-07	1E-04	2.29E-08	5E-07	2.34E-13	1E-11
Fe-55	———	———	(1) 1.00E-06	1E-06	———	———
Fe-59	3.00E-07	1E-04	6.33E-08	5E-07	3.38E-13	1E-11
Co-57	6.43E-08	1E-04	1.56E-08	5E-07	5.73E-14	1E-11
Co-58	1.06E-07	1E-04	2.25E-08	5E-07	2.04E-13	1E-11
Co-60	1.04E-07	1E-04	2.18E-08	5E-07	2.49E-13	1E-11
Zn-65	2.11E-07	1E-04	4.45E-08	5E-07	2.38E-13	1E-11
Kr-85	2.91E-05	1E-04	6.25E-06	1E-05	———	———
Kr-85m	8.66E-08	1E-04	2.01E-08	1E-05	———	———
Kr-87	1.68E-07	1E-04	3.63E-08	1E-05	———	———
Kr-88	2.64E-07	1E-04	5.94E-08	1E-05	———	———
Sr-89	———	———	(1) 5.00E-08	5E-08	(1) 1.00E-13	1E-11
Sr-90	———	———	(1) 5.00E-08	5E-08	(1) 1.00E-14	1E-11
Sr-92	9.44E-08	1E-04	1.98E-08	5E-07	1.86E-13	1E-11
Nb-95	1.23E-07	1E-04	2.61E-08	5E-07	1.36E-13	1E-11
Nb-97	1.18E-07	1E-04	2.50E-08	5E-07	1.70E-13	1E-11
Zr-95	1.79E-07	1E-04	3.80E-08	5E-07	1.72E-13	1E-11
Mo-99	5.98E-08	1E-04	1.41E-08	5E-07	9.88E-14	1E-11
Tc-99m	5.83E-08	1E-04	1.37E-08	5E-07	9.63E-14	1E-11
Ag-110m	1.22E-07	1E-04	2.60E-08	5E-07	1.53E-13	1E-11
Sb-124	1.23E-07	1E-04	2.63E-08	5E-07	7.84E-14	1E-11
Sb-125	3.00E-07	1E-04	6.46E-08	5E-07	5.95E-13	1E-11
I-131	1.03E-07	1E-04	2.24E-08	1E-06	8.71E-14	1E-12
I-133	5.85E-08	1E-04	1.25E-08	5E-07	1.87E-13	1E-10
I-135	4.74E-07	1E-04	9.95E-08	5E-07	5.77E-13	1E-11
Xe-131m	3.00E-06	1E-04	6.89E-07	1E-05	———	———
Xe-133	1.30E-07	1E-04	3.68E-08	1E-05	———	———
Xe-133m	7.21E-07	1E-04	1.60E-07	1E-05	———	———
Xe-135	7.50E-08	1E-04	1.66E-08	1E-05	———	———
Xe-135m	9.80E-08	1E-04	2.10E-08	1E-05	———	———
Xe-137	3.00E-07	1E-04	6.47E-08	1E-05	———	———
Xe-138	2.12E-07	1E-04	4.68E-08	1E-05	———	———
Ce-134	8.27E-08	1E-04	1.77E-08	5E-07	1.37E-13	1E-11
Ce-137	1.54E-07	1E-04	3.29E-08	5E-07	1.97E-13	1E-11
Ba-139	4.07E-07	1E-04	9.33E-08	5E-07	5.11E-13	1E-11
Ba-140	2.89E-07	1E-04	6.20E-08	5E-07	2.75E-13	1E-11
La-140	1.42E-07	1E-04	2.96E-08	5E-07	2.00E-13	1E-11
Ce-141	1.22E-07	1E-04	2.85E-08	5E-07	1.48E-13	1E-11
Ce-144	5.86E-07	1E-04	1.39E-07	5E-07	7.38E-13	1E-11
Gross Alpha	———	———	(1) 1.00E-07	1E-07	(1) 3.51E-15	1E-11

(1) Sample analyses performed by a contractor laboratory.

(2) These LLD calculations contain a default weekly continuous sample volume of 2.85E+8 cc. Therefore, grab sample LLD values reflect a different volume (ie; 10 cuft or 2.83E+5 cc).

(3) The calculated LLD's, except those denoted by (1), are from a counter/detector calibration on 11/19/99. These values are typical for other counter/detectors used for effluent counting at BVPS.

(4) Based on counting 50 ml of the water that was bubbled through a 20 liter air sample.

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Table 5A

Assessment Of Radiation Doses

		Unit 1 Liquid Effluents									
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Calendar Year	
	Batch Releases	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit
	Bone	1.44E-02	0.2880	9.93E-03	0.1986	8.64E-03	0.1728	3.24E-02	0.6480	6.54E-02	0.6537
O	Liver	2.54E-02	0.5080	1.84E-02	0.3680	1.49E-02	0.2980	5.45E-02	1.0900	1.13E-01	1.1320
R	Total Body	1.88E-02	1.2533	1.40E-02	0.9333	1.09E-02	0.7267	3.97E-02	2.6467	8.34E-02	2.7800
G	Thyroid	3.82E-03	0.0764	1.14E-03	0.0228	1.60E-03	0.0320	3.49E-03	0.0699	1.01E-02	0.1006
A	Kidney	9.26E-03	0.1852	6.71E-03	0.1342	5.99E-03	0.1198	1.90E-02	0.3800	4.10E-02	0.4096
N	Lung	4.02E-03	0.0804	3.06E-03	0.0612	3.09E-03	0.0618	7.43E-03	0.1486	1.76E-02	0.1760
(1)	GI-LLI	4.47E-03	0.0894	1.23E-02	0.2460	2.22E-03	0.0444	5.23E-03	0.1046	2.42E-02	0.2422

		Unit 1 Gaseous Effluents									
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Calendar Year	
	Batch & Continuous Releases	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit
(2)	Beta Air	3.91E-03	0.0391	5.25E-03	0.0525	8.53E-03	0.0853	2.32E-02	0.2320	4.09E-02	0.2044
(2)	Gamma Air	1.33E-03	0.0266	3.54E-03	0.0708	2.86E-03	0.0572	1.06E-02	0.2120	1.83E-02	0.1833
	Bone	3.81E-04	0.0051	8.38E-06	0.0001	6.90E-06	0.0001	2.33E-05	0.0003	4.20E-04	0.0028
O	Liver	1.30E-01	1.7333	2.25E-01	3.0000	1.93E-01	2.5671	1.85E-01	2.4613	7.32E-01	4.8809
R	Total Body	1.30E-01	1.7333	2.25E-01	3.0000	1.93E-01	2.5671	1.85E-01	2.4613	7.32E-01	4.8809
G	Thyroid	1.30E-01	1.7333	2.27E-01	3.0267	1.93E-01	2.5671	1.85E-01	2.4613	7.34E-01	4.8942
A	Kidney	1.30E-01	1.7333	2.25E-01	3.0000	1.93E-01	2.5671	1.85E-01	2.4613	7.32E-01	4.8809
N	Lung	1.30E-01	1.7333	2.25E-01	3.0000	1.93E-01	2.5671	1.85E-01	2.4613	7.32E-01	4.8809
(3)	GI-LLI	1.30E-01	1.7333	2.25E-01	3.0000	1.93E-01	2.5671	1.85E-01	2.4613	7.32E-01	4.8809

(1) These doses are listed in mrem; they are calculated for the maximum individual for all batch liquid effluents

(2) These doses are listed in mrad; they are calculated at the site boundary for batch & continuous gaseous effluents (0.4 mi NW)

(3) These doses are listed in mrem; they are calculated for the most likely exposed real individual (child) via all real pathways at 0.89 mi NW.

Limits used for calculation of percent (%) are from ODCM Appendix C CONTROLS 3.11.1.2, 3.11.2.2 and 3.11.2.3 (considered to be the design objectives).

Annual Radioactive Effluent Release Report

Calendar Year – 1999

Table 5B

Assessment Of Radiation Doses

		Unit 2 Liquid Effluents									
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Calendar Year	
	Batch Releases	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit
	Bone	1.44E-02	0.2880	9.93E-03	0.1986	8.64E-03	0.1728	3.24E-02	0.6480	6.54E-02	0.6537
O	Liver	2.54E-02	0.5080	1.84E-02	0.3680	1.49E-02	0.2980	5.45E-02	1.0900	1.13E-01	1.1320
R	Total Body	1.88E-02	1.2533	1.40E-02	0.9333	1.09E-02	0.7267	3.97E-02	2.6467	8.34E-02	2.7800
G	Thyroid	3.82E-03	0.0764	1.14E-03	0.0228	1.60E-03	0.0320	3.49E-03	0.0699	1.01E-02	0.1006
A	Kidney	9.26E-03	0.1852	6.71E-03	0.1342	5.99E-03	0.1198	1.90E-02	0.3800	4.10E-02	0.4096
N	Lung	4.02E-03	0.0804	3.06E-03	0.0612	3.09E-03	0.0618	7.43E-03	0.1486	1.76E-02	0.1760
(1)	GI-LLI	4.47E-03	0.0894	1.23E-02	0.2460	2.22E-03	0.0444	5.23E-03	0.1046	2.42E-02	0.2422

		Unit 2 Gaseous Effluents									
		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Calendar Year	
	Batch & Continuous Releases	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit	Dose	% of ODCM Limit
(2)	Beta Air	2.29E-02	0.2294	2.30E-02	0.2304	3.99E-09	0.0000	3.00E-03	0.0301	4.90E-02	0.2449
(2)	Gamma Air	1.34E-02	0.2680	2.69E-03	0.0538	1.19E-07	0.0000	8.16E-04	0.0163	1.69E-02	0.1691
	Bone	0.00E+00	0.0000	1.48E-05	0.0002	0.00E+00	0.0000	4.09E-05	0.0005	5.56E-05	0.0004
O	Liver	7.81E-02	1.0413	4.74E-02	0.6320	6.18E-02	0.8240	4.84E-02	0.6453	2.36E-01	1.5713
R	Total Body	7.81E-02	1.0413	4.75E-02	0.6333	6.18E-02	0.8240	4.83E-02	0.6440	2.36E-01	1.5713
G	Thyroid	7.81E-02	1.0413	5.05E-02	0.6733	6.18E-02	0.8240	4.98E-02	0.6640	2.40E-01	1.6013
A	Kidney	7.81E-02	1.0413	4.74E-02	0.6320	6.18E-02	0.8240	4.83E-02	0.6440	2.36E-01	1.5707
N	Lung	7.81E-02	1.0413	4.75E-02	0.6333	6.18E-02	0.8240	4.84E-02	0.6453	2.36E-01	1.5720
(3)	GI-LLI	7.81E-02	1.0413	4.75E-02	0.6333	6.18E-02	0.8240	4.85E-02	0.6467	2.36E-01	1.5727

(1) These doses are listed in mrem; they are calculated for the maximum individual for all batch liquid effluents

(2) These doses are listed in mrad; they are calculated at the site boundary for batch & continuous gaseous effluents (0.4 mi NW)

(3) These doses are listed in mrem; they are calculated for the most likely exposed real individual (child) via all real pathways at 0.89 mi NW.

Limits used for calculation of percent (%) are from ODCM Appendix C CONTROLS 3.11.1.2, 3.11.2.2 and 3.11.2.3 (considered to be the design objectives).

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Table 6

Effluent Monitoring Instrumentation Channels Not Returned To Operable Status Within 30 Days

All Effluent Monitoring Instrumentation Channels

(as required by Appendix C of the Offsite Dose Calculation Manual)

Were Returned To Operable Status Within 30 Days

during this report period.

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Table 7
Total Dose Commitments, Total Effective Dose Equivalents and Population Doses

1999 Total Dose Commitment From All Facility Releases To Members of the Public 40 CFR 190.10(a) Environmental Doses

Organ	(1) Effluent Dose (mrem)	(2) Direct Radiation Dose (mrem)	Total Dose (mrem)	% of ODCM or 40 CFR 190 Limit
Bone	1.31E-01	0.00E+00	1.31E-01	0.52%
Liver	1.20E+00	0.00E+00	1.20E+00	4.80%
Total Body	1.17E+00	0.00E+00	1.17E+00	4.68%
Thyroid	9.95E-01	0.00E+00	9.95E-01	1.33%
Kidney	1.05E+00	0.00E+00	1.05E+00	4.20%
Lung	1.00E+00	0.00E+00	1.00E+00	4.00%
GI-LLI	1.02E+00	0.00E+00	1.02E+00	4.08%

(1) The cumulative dose contributions from liquid and gaseous effluents were determined in accordance with the applicable CONTROLS & SURVEILLANCE REQUIREMENTS listed in Appendix C of the ODCM. The dose commitment limits for 40 CFR 190 MEMBERS OF THE PUBLIC (ODCM Appendix C Control 3.11.4.1) are as follows:
a) < or = 25 mrem / calendar year (for the total body, or any organ except the thyroid)
b) < or = 75 mrem / calendar year (for the thyroid)

(2) The dose contribution listed for the total body is for Direct Radiation. This was calculated by comparing offsite TLD exposure at the ODCM controlling location (0.8 miles NW; Midland, PA) to TLD exposure at the REMP control location (16.5 miles SSW; Weirton, WV).

Members of the Public Doses Due To Their Activities Inside The Site Boundary

The radiation doses for MEMBER(S) OF THE PUBLIC due to their activities inside the site boundary would be the same as those doses reported in the above table to show compliance with 40 CFR Part 190.10(a). Evaluations have shown that the exposure time for individuals not occupationally associated with the plant site is minimal in comparison to the exposure time considered for the dose calculation at or beyond the site boundary. Therefore, a separate assessment of radiation doses from radioactive effluents to MEMBER(S) OF THE PUBLIC, due to their activities inside the site boundary, is not necessary for this report period.

Compliance to 100 mrem Limit of 10 CFR 20.1301 For Total Effective Dose Equivalent

Pursuant to 10 CFR 20.1301(a)(1), the Total Effective Dose Equivalent from licensed operation to the maximum individual during the report period, is 5.61 mrem. This is a summation of Direct Radiation Exposure (calculated by comparing the maximum of all perimeter TLD exposures to TLD exposure at the REMP control location) plus Effluent Doses (calculated per the ODCM).

0-50 Mile Population Doses From Liquid and Gaseous Effluents

The 0-50 mile Total Population Dose from liquid and gaseous effluents is 0.918 man-rem (Total Body)
The 0-50 mile Average Population Dose from liquid and gaseous effluents is 0.000258 mrem (Total Body)

Offsite Dose Calculation Manual Surveillance Deficiencies

There were no

Surveillance Deficiencies

(as required by Appendix C of the Offsite Dose Calculation Manual)

during this report period.

This is regarding

monitoring, sampling & analysis and dose determination.

Unit 1 and 2 Offsite Dose Calculation Manual Changes (Description)

Change (13) to the BV-1 and 2 ODCM was implemented as Issue 3, Revision 6, Effective May 20, 1999. A complete description of the changes can be found in the ODCM. A brief description of the changes are as follows:

- INDEX: Made editorial changes for clarity.

- SECTION 3: Updated figure number and table reference. Removed a redundant upstream environmental surface water sampling location.

- APPENDIX C: Added definitions for SHUTDOWN and STARTUP. Changed ODCM definition to agree with definition provided in Technical Specification Amendments 220/97. Clarified use of the Primary and Alternate Flow Rate Measurement Devices used for determining Cooling Tower Blowdown Flowrate in Tables C:3.3-12 and C:4.3-12. Updated Actions 24, 25 and 26 of Table C:3.3-12 to allow use of comparable alternate monitoring channels. Clarified Table C:3.3-13 Action 28 applicability for BV-2 Sampler Flowrate Monitors. Clarified Table C:3.3-13 Action 30 to show that applicability is for batch purges of the reactor containments. Changed reference of Special Report compliance requirements to those requirements provided in Technical Specification Amendments 220/97. Clarified note b of Table C:4.11-2 regarding sampling and surveillance frequencies. Clarified Controls 3.12.1 and 3.12.2 to ensure agreement with NUREG-1301. Made other editorial changes for clarity.

- APPENDIX E: Changed reference of Special Report compliance requirements to those requirements provided in Technical Specification Amendments 220/97. Changed submittal date of annual REMP report from May 1 to May 15 as permitted by Technical Specification Amendments 220/97. Changed column heading in Table E:6.9-1 to ensure agreement with NUREG-1301. Made other editorial changes for clarity.

The Concluding Statement of Change 13 to the BV-1 and 2 ODCM is as follows:

- The ODCM changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the ODCM changes will not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculations.

FENOC

Beaver Valley Power Station – Units 1 & 2

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Attachment 1
Joint Frequency Distribution Tables

Attachment 1
An annual summary of hourly meteorological data, in the form of joint frequency distribution, is provided for the calendar year as specified in the ODCM.

Attachment 1 Clarification
All Gaseous Releases for the calendar year were determined to be within the design objectives (ODCM Dose and Dose Rate Limits). Also, there were no Abnormal Gaseous Releases during the calendar year. Therefore, hourly meteorological data is not provided for the specific periods of Abnormal Gaseous Release (during the calendar quarters) as indicated in Regulatory Guide 1.21. For a copy of the hourly meteorological data during the calendar quarters, contact Mr. Anthony T Lonnett at 412-393-5860.

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	15	76	2	0	0	0	93
NNE	31	54	1	0	0	0	86
NE	37	47	0	0	0	0	84
ENE	32	54	0	0	0	0	86
E	15	35	0	0	0	0	50
ESE	27	36	0	0	0	0	63
SE	31	26	0	0	0	0	57
SSE	19	31	0	0	0	0	50
S	6	47	0	0	0	0	53
SSW	13	57	12	0	0	0	82
SW	10	48	29	1	0	0	88
WSW	11	85	34	0	0	0	130
W	7	131	15	0	0	0	153
WNW	20	104	15	0	0	0	139
NW	13	66	10	0	0	0	89
NNW	11	70	9	0	0	0	90
TOTAL	298	967	127	1	0	0	1393

PERIODS OF CALM(HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	12	1	0	0	0	17
NNE	5	5	0	0	0	0	10
NE	5	1	0	0	0	0	6
ENE	4	7	0	0	0	0	11
E	4	3	0	0	0	0	7
ESE	1	2	0	0	0	0	3
SE	4	1	0	0	0	0	5
SSE	1	3	0	0	0	0	4
S	3	9	1	0	0	0	13
SSW	2	4	2	0	0	0	8
SW	4	13	14	0	0	0	31
WSW	2	15	4	0	0	0	21
W	1	22	4	0	0	0	27
WNW	6	18	2	0	0	0	26
NW	3	15	3	0	0	0	21
NNW	3	17	2	0	0	0	22
TOTAL	52	147	33	0	0	0	232

PERIODS OF CALM (HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	13	0	0	0	0	17
NNE	6	4	0	0	0	0	10
NE	5	3	0	0	0	0	8
ENE	10	11	0	0	0	0	21
E	5	1	0	0	0	0	6
ESE	2	0	0	0	0	0	2
SE	3	1	0	0	0	0	4
SSE	4	2	0	0	0	0	6
S	0	6	0	0	0	0	6
SSW	0	6	5	0	0	0	11
SW	3	14	8	0	0	0	25
WSW	4	24	6	0	0	0	34
W	5	40	9	0	0	0	54
WNW	6	33	2	0	0	0	41
NW	2	25	1	0	0	0	28
NNW	4	14	2	0	0	0	20
TOTAL	63	197	33	0	0	0	293

PERIODS OF CALM (HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	49	73	3	0	0	0	125
NNE	84	28	0	0	0	0	112
NE	107	12	0	0	0	0	119
ENE	90	39	0	0	0	0	129
E	47	17	0	0	0	0	65
ESE	31	5	0	0	0	0	36
SE	24	3	0	0	0	0	27
SSE	18	5	0	0	0	0	23
S	28	23	1	0	0	0	52
SSW	30	71	11	0	0	0	112
SW	42	144	131	7	0	0	324
WSW	68	199	98	2	0	0	367
W	47	235	49	0	0	0	331
WNW	99	167	27	0	0	0	293
NW	95	183	13	0	0	0	292
NNW	65	116	3	0	0	0	184
TOTAL	924	1320	336	9	0	0	2591

PERIODS OF CALM(HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND SPEED(MPH)

WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	61	23	0	0	0	0	84
NNE	89	15	0	0	0	0	105
NE	115	16	0	0	0	0	131
ENE	142	21	0	0	0	0	164
E	141	5	0	0	0	0	147
ESE	149	1	0	0	0	0	153
SE	136	2	0	0	0	0	144
SSE	107	3	0	0	0	0	111
S	136	25	2	0	0	0	164
SSW	99	38	4	0	0	0	141
SW	72	92	20	0	0	0	185
WSW	52	66	17	2	0	0	137
W	33	26	13	0	0	0	72
WNW	52	6	4	0	0	0	62
NW	56	19	0	0	0	0	75
NNW	55	17	0	0	0	0	73
TOTAL	1495	375	60	2	0	0	1948

PERIODS OF CALM(HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	2	0	0	0	0	8
NNE	13	3	0	0	0	0	16
NE	22	0	0	0	0	0	22
ENE	61	0	0	0	0	0	61
E	116	0	0	0	0	0	117
ESE	180	0	0	0	0	0	186
SE	282	0	0	0	0	0	302
SSE	179	0	0	0	0	0	187
S	114	7	0	0	0	0	124
SSW	45	12	0	0	0	0	57
SW	19	4	0	0	0	0	23
WSW	6	3	0	0	0	0	9
W	6	2	0	0	0	0	8
WNW	8	0	0	0	0	0	8
NW	7	0	0	0	0	0	7
NNW	10	0	0	0	0	0	10
TOTAL	1074	33	0	0	0	0	1145

PERIODS OF CALM (HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	0	0	0	0	0	2
NNE	11	1	0	0	0	0	12
NE	12	0	0	0	0	0	12
ENE	35	0	0	0	0	0	35
E	84	0	0	0	0	0	86
ESE	179	0	0	0	0	0	187
SE	309	0	0	0	0	0	329
SSE	149	0	0	0	0	0	156
S	67	2	0	0	0	0	72
SSW	25	3	0	0	0	0	29
SW	13	0	0	0	0	0	13
WSW	9	0	0	0	0	0	9
W	0	1	0	0	0	0	1
WNW	6	0	0	0	0	0	6
NW	2	0	0	0	0	0	2
NNW	1	0	0	0	0	0	1
TOTAL	904	7	0	0	0	0	952

PERIODS OF CALM(HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 35 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:38

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:SP 35P DIRECTION:DI 35P LAPSE:DT150-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	141	199	6	0	0	0	346
NNE	239	110	1	0	0	0	351
NE	303	79	0	0	0	0	382
ENE	374	132	0	0	0	0	507
E	412	61	0	0	0	0	478
ESE	569	44	0	0	0	0	630
SE	789	33	0	0	0	0	868
SSE	477	44	0	0	0	0	537
S	354	119	4	0	0	0	484
SSW	214	191	34	0	0	0	440
SW	163	315	202	8	0	0	689
WSW	152	392	159	4	0	0	707
W	99	457	90	0	0	0	646
WNW	197	328	50	0	0	0	575
NW	178	308	27	0	0	0	514
NNW	149	234	16	0	0	0	400
TOTAL	4810	3046	589	12	0	0	8554

PERIODS OF CALM(HOURS): 96
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 206

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	45	29	3	0	0	80
NNE	2	38	36	4	0	0	80
NE	5	41	15	2	0	0	63
ENE	2	53	54	3	0	0	112
E	2	47	35	0	0	0	84
ESE	5	34	32	1	0	0	72
SE	1	39	31	1	0	0	72
SSE	1	32	27	1	0	0	61
S	0	28	36	1	0	0	65
SSW	5	16	22	7	0	0	50
SW	3	20	31	7	0	0	61
WSW	5	23	45	21	3	0	97
W	6	59	95	33	5	0	198
WNW	5	36	80	30	0	0	151
NW	8	24	53	6	0	0	91
NNW	6	33	30	3	0	0	72
TOTAL	59	568	651	123	8	0	1409

PERIODS OF CALM (HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	8	8	0	0	0	17
NNE	0	8	2	1	0	0	11
NE	0	3	0	0	0	0	3
ENE	1	3	10	2	0	0	16
E	0	6	3	0	0	0	9
ESE	0	2	1	0	0	0	3
SE	1	2	2	0	0	0	5
SSE	0	3	6	1	0	0	10
S	2	1	5	0	0	0	8
SSW	0	6	3	3	0	0	12
SW	1	4	7	2	0	0	14
WSW	3	5	17	6	0	0	31
W	2	13	12	7	3	0	37
WNW	0	9	17	9	0	0	35
NW	1	8	6	1	0	0	16
NNW	0	11	9	1	0	0	21
TOTAL	12	92	108	33	3	0	248

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	9	7	0	0	0	16
NNE	0	6	6	0	0	0	12
NE	3	4	2	0	0	0	9
ENE	1	13	8	4	0	0	26
E	0	5	4	0	0	0	9
ESE	0	1	0	0	0	0	1
SE	0	3	0	0	0	0	3
SSE	0	3	1	1	0	0	5
S	1	1	9	0	0	0	11
SSW	1	3	5	3	0	0	12
SW	0	6	8	3	0	0	17
WSW	2	15	7	4	0	0	28
W	1	22	29	20	1	0	73
WNW	1	14	26	10	0	0	51
NW	0	7	15	0	0	0	22
NNW	2	7	9	0	0	0	18
TOTAL	12	119	136	45	1	0	313

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	23	54	47	1	0	0	125
NNE	25	55	32	5	0	0	118
NE	29	39	11	0	0	0	79
ENE	28	84	59	1	0	0	172
E	16	44	22	2	0	0	84
ESE	3	12	8	2	0	0	25
SE	4	9	6	1	0	0	20
SSE	6	25	7	0	0	0	38
S	10	29	21	0	0	0	60
SSW	13	28	62	9	0	0	112
SW	21	34	138	37	2	0	232
WSW	25	71	132	74	1	0	303
W	32	125	249	131	18	0	555
WNW	18	138	153	64	3	0	376
NW	30	133	74	8	0	0	245
NNW	16	85	45	3	0	0	149
TOTAL	299	965	1066	338	24	0	2693

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	40	36	18	0	0	0	95
NNE	60	28	8	3	0	0	99
NE	117	69	3	1	0	0	190
ENE	82	166	42	2	0	0	292
E	45	57	8	0	0	0	110
ESE	13	19	6	0	0	0	38
SE	28	37	11	0	0	0	76
SSE	16	25	8	0	0	0	49
S	22	49	24	4	0	0	100
SSW	37	77	14	1	0	0	129
SW	55	58	70	6	0	0	189
WSW	41	59	52	13	1	1	167
W	23	58	31	25	5	0	142
WNW	15	111	35	3	2	0	166
NW	19	41	3	0	0	0	63
NNW	16	41	1	0	0	0	58
TOTAL	629	931	334	58	8	1	1963

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	60	9	0	0	0	0	69
NNE	121	23	0	0	0	0	144
NE	141	81	0	0	0	0	222
ENE	62	67	3	0	0	0	132
E	21	13	1	0	0	0	35
ESE	16	8	1	0	0	0	26
SE	13	11	2	0	0	0	26
SSE	13	9	0	0	0	0	22
S	31	16	2	0	0	0	50
SSW	70	58	0	0	0	0	128
SW	61	38	16	0	0	0	115
WSW	37	25	5	0	0	0	67
W	16	15	2	0	0	0	33
WNW	18	10	0	0	0	0	28
NW	10	8	0	0	0	0	18
NNW	24	7	0	0	0	0	31
TOTAL	714	398	32	0	0	0	1146

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	39	7	0	0	0	0	46
NNE	89	30	0	0	0	0	119
NE	96	81	0	0	0	0	177
ENE	34	34	1	0	0	0	69
E	21	17	0	0	0	0	39
ESE	16	7	0	0	0	0	23
SE	13	13	1	0	0	0	27
SSE	11	14	0	0	0	0	25
S	22	42	2	0	0	0	66
SSW	50	54	5	0	0	0	109
SW	55	36	4	0	0	0	95
WSW	31	21	2	0	0	0	54
W	26	11	2	0	0	0	39
WNW	14	10	0	0	0	0	24
NW	10	3	0	0	0	0	13
NNW	25	2	0	0	0	0	27
TOTAL	552	382	17	0	0	0	952

PERIODS OF CALM (HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 150 FT VERSUS
DELTA TEMPERATURE 150-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:39

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:SP150P DIRECTION:DI150P LAPSE:DT150-

WIND SPEED(MPH)

WIND DIRECTION	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	166	168	109	4	0	0	448
NNE	297	188	84	13	0	0	583
NE	391	318	31	3	0	0	743
ENE	210	420	177	12	0	0	819
E	105	189	73	2	0	0	370
ESE	53	83	48	3	0	0	188
SE	60	114	53	2	0	0	229
SSE	47	111	49	3	0	0	210
S	88	166	99	5	0	0	360
SSW	176	242	111	23	0	0	552
SW	196	196	274	55	2	0	723
WSW	144	219	260	118	5	1	747
W	106	303	420	216	32	0	1077
WNW	71	328	311	116	5	0	831
NW	78	224	151	15	0	0	468
NNW	89	186	94	7	0	0	376
TOTAL	2277	3455	2344	597	44	1	8724

PERIODS OF CALM(HOURS): 6
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 36

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	1	1	0	0	3
NNE	0	0	2	1	0	0	3
NE	0	2	2	2	0	0	6
ENE	0	4	11	3	0	0	18
E	0	3	15	2	0	0	20
ESE	0	2	12	0	0	0	14
SE	0	8	13	5	0	0	26
SSE	0	5	6	0	0	0	11
S	0	0	9	0	0	0	9
SSW	0	1	3	0	1	0	5
SW	0	2	1	1	0	0	4
WSW	0	2	0	1	0	0	3
W	0	2	5	0	0	0	7
WNW	0	2	2	0	0	0	4
NW	0	1	1	1	0	0	3
NNW	0	1	1	0	0	0	2
TOTAL	0	36	84	17	1	0	138

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	3	2	2	0	0	7
NNE	0	2	2	3	0	0	7
NE	0	1	2	3	0	0	6
ENE	0	6	10	4	0	0	20
E	0	5	10	0	0	0	15
ESE	0	9	4	2	0	0	15
SE	0	5	6	3	0	0	14
SSE	1	3	5	2	0	0	11
S	0	1	9	0	0	0	10
SSW	0	3	7	1	0	0	11
SW	0	1	3	0	0	0	4
WSW	0	1	4	4	2	0	11
W	0	3	6	0	0	0	9
WNW	0	2	10	8	1	0	21
NW	0	2	5	1	0	0	8
NNW	0	1	0	3	0	0	4
TOTAL	1	48	85	36	3	0	173

PERIODS OF CALM (HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	3	6	3	0	0	14
NNE	1	5	6	3	0	0	15
NE	0	2	8	1	0	0	11
ENE	0	17	18	4	1	0	40
E	0	13	13	2	0	0	28
ESE	0	5	10	2	0	0	17
SE	1	8	3	0	0	0	12
SSE	1	3	3	0	0	0	7
S	0	2	10	3	0	0	15
SSW	1	0	6	2	1	0	10
SW	0	0	8	2	1	0	11
WSW	0	3	6	10	1	0	20
W	1	7	13	6	2	0	29
WNW	1	1	12	9	2	0	25
NW	0	3	6	5	0	0	14
NNW	1	4	7	5	0	0	17
TOTAL	9	76	135	57	8	0	285

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	55	174	47	1	0	283
NNE	8	50	62	44	6	0	170
NE	13	47	37	12	1	0	110
ENE	10	50	76	48	3	0	187
E	9	44	84	43	2	0	182
ESE	9	54	78	23	2	0	166
SE	8	49	46	20	1	0	124
SSE	9	25	50	14	2	0	100
S	8	32	70	43	2	0	155
SSW	9	40	72	80	12	0	213
SW	6	38	117	199	76	3	439
WSW	12	50	112	185	74	6	439
W	17	71	196	266	134	25	709
WNW	13	69	245	201	70	12	610
NW	11	49	195	109	15	1	380
NNW	13	56	176	61	3	0	309
TOTAL	161	779	1790	1395	404	47	4576

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	17	20	39	16	0	0	92
NNE	11	25	23	7	0	0	66
NE	22	31	12	9	1	0	75
ENE	30	47	35	10	0	0	122
E	25	60	42	14	0	0	141
ESE	26	79	43	11	1	0	160
SE	31	46	53	27	6	0	163
SSE	21	45	35	21	8	1	131
S	15	47	53	32	5	0	152
SSW	24	35	40	38	7	0	144
SW	23	27	52	65	33	3	203
WSW	32	57	49	14	7	0	159
W	27	71	90	34	9	1	232
WNW	23	41	58	9	0	0	131
NW	15	37	21	13	1	0	87
NNW	16	20	34	15	0	0	85
TOTAL	358	688	679	335	78	5	2143

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	7	16	8	1	0	0	32
NNE	14	16	4	1	0	0	35
NE	13	24	12	0	0	0	49
ENE	28	37	25	3	0	0	93
E	44	53	12	2	0	0	111
ESE	28	62	16	2	0	0	108
SE	29	62	35	11	0	0	137
SSE	15	42	17	15	3	0	92
S	16	27	42	17	0	0	102
SSW	16	22	28	18	1	0	85
SW	12	28	26	25	9	0	100
WSW	25	41	19	2	0	0	87
W	16	34	21	6	0	0	77
WNW	11	25	25	0	0	0	61
NW	7	13	8	2	0	0	30
NNW	12	13	5	0	0	0	30
TOTAL	293	515	303	105	13	0	1229

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	0	0	0	0	1
NNE	0	0	0	0	0	0	0
NE	1	0	0	0	0	0	1
ENE	2	4	1	0	0	0	7
E	4	1	0	0	0	0	5
ESE	3	3	1	1	0	0	8
SE	4	4	4	1	0	0	13
SSE	4	7	3	3	0	0	17
S	3	8	15	0	0	0	26
SSW	1	13	11	3	0	0	28
SW	1	13	12	3	0	0	29
WSW	2	4	3	0	0	0	9
W	0	1	1	0	0	0	2
WNW	0	2	0	0	0	0	2
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	25	61	51	11	0	0	148

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

BEAVER VALLEY JOINT FREQUENCY DISTRIBUTION
WIND SPEED AND DIRECTION 500 FT VERSUS
DELTA TEMPERATURE 500-35FT
JANUARY 1, 1999 THROUGH DECEMBER 31, 1999

SITE: BEAVER VALLEY UNIT: ONE 02/23/00 13:40

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 99010101-99123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:SP500P DIRECTION:DI500P LAPSE:DT500-

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	32	99	230	70	1	0	432
NNE	34	98	99	59	6	0	296
NE	49	107	73	27	2	0	258
ENE	70	165	176	72	4	0	487
E	82	179	176	63	2	0	502
ESE	66	214	164	41	3	0	488
SE	73	182	160	67	7	0	489
SSE	51	130	119	55	13	1	369
S	42	117	208	95	7	0	469
SSW	51	114	167	142	22	0	496
SW	42	109	219	295	119	6	790
WSW	71	158	193	216	84	6	728
W	61	189	332	312	145	26	1065
WNW	48	142	352	227	73	12	854
NW	33	105	236	131	16	1	522
NNW	42	95	223	84	3	0	447
TOTAL	847	2203	3127	1956	507	52	8692

PERIODS OF CALM (HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 68

FENOC
Beaver Valley Power Station – Units 1 & 2

Annual Radioactive Effluent Release Report

Calendar Year – 1999
Attachment 2
Unit 1 and 2 Offsite Dose Calculation Manual Changes

Attachment 2

Attached is a complete copy of the ODCM that includes:

Issue 3, Revision 6, Effective May 20, 1999

Attachment 2 Clarification

In an effort to reduce overall costs associated with this report, only the following have been sent a complete copy of the ODCM:

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

United States Nuclear Regulatory Commission
Regional Administrator, Region 1
475 Allendale Road
King of Prussia, PA 19406

For a complete copy of the ODCM, contact Mr. Anthony T Lonnett at 412–393–5860.