RTL# A9.690E

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION

2012 RADIOACTIVE EFFLUENT RELEASE REPORT

AND

2012 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

UNITS NO. 1 AND 2

LICENSES DPR-66 AND NPF-73

RTL A9.690E
Enclosure 1

BEAVER VALLEY POWER STATION

ENVIRONMENTAL & CHEMISTRY SECTION

Technical Report Approval:

2012 RADIOACTIVE EFFLUENT RELEASE REPORT

AND

2012 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

UNITS NO. 1 AND 2

LICENSES DPR-66 AND NPF-73

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Subject: **Beaver Valley Power Station, Unit Nos. 1 and 2**
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
Radioactive Effluent Release Report for 2012, and
Annual Radiological Environmental Operating Report for 2012

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Beaver Valley Power Station – Units 1 & 2

2012 Radioactive Effluent Release Report

FirstEnergy Nuclear Operating Company
FENOC

Beaver Valley Power Station – Units 1 & 2
Unit 1 License No. DPR-66
Unit 2 License No. NPF-73

Radioactive Effluent Release Report

Calendar Year – 2012

Index

Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Report Submittal Requirements

Report Submittal and Requirements: The report was prepared and submitted in accordance with the requirements contained in the following documents:

BVPS Integrated Technical Specifications, Administrative Control 5.6.2

Offsite Dose Calculation Manual (ODCM) procedure 1/2-ODC-3.03, *"Controls for RETS and REMP Programs," Attachment U, Control 6.9.3*

BVPS procedure 1/2-ENV-01.05, "Compliance with Regulatory Guide 1.21 and Technical Specifications"

NUREG-1301, *"Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors, Generic Letter 89-01, Supplement No. 1, April 1991"*

Regulatory Guide 1.21, *"Measuring Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Material in Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants, Revision 1, June 1974"*

BVPS Condition Report No. 2012-04412, Unable to meet required LLD for Ce-144 in Liquid Liter Bottle Geometry.

BVPS Condition Report No. 2012-02583, DIE process for Phase 2 of Coolant Recovery Project did not address ODCM..

BVPS Condition Report No. 2012-05875, Antimony-126 identified in the liquid waste system.

BVPS Condition Report No. 2012-10428, Co-58 identified in the Catch Basin System.

BVPS Condition Report No 2012-10727 - Groundwater Well Analysis Could Not Achieve Lower Limit of Detection (LLD) for Ba-La-140 due to Sample Age

BVPS Condition Report No. 2012-15547, Co-58 identified in the Catch Basin System.

BVPS SAP Notification No. 600739155, 2012 RETS and REMP Report

BVPS SAP Notification No. 600747531, Update 1/2-ODC-2.01 for RM-1RW-100

Radioactive Effluent Release Report

Calendar Year – 2012
Executive Summary – Liquid and Gaseous Effluent Control (Part 1 of 2)

Onsite Groundwater Monitoring: Twenty-three (23) on-site monitoring wells were sampled in the spring and fall sampling periods in 2012. The six (6) highest concentration monitoring wells were sampled in a summer sampling period for additional trend data. No new wells were installed and no wells were retired. Sixteen (16) wells returned results of less than the pre-operational mean (440 pCi/L) during all sample periods in 2012. One (1) well returned results >440 pCi/L, but <2000 pCi/L. Six (6) wells returned results >2000 pCi/L. No wells exceeded 20,000 pCi/L with the highest concentration recorded as 19,200 pCi/L. The NEI/FENOC communication level was reached for MW-12S & MW-12D during 2007. Notification to local, state & federal agencies was performed on 10/08/07. Additional communication for new well results was performed on 09/08/10 for those new wells that exceeded 2000 pCi/L. There were no wells that reached the 2000 pCi/L Communication Level for the first time in 2012. No adverse effect to the offsite environment has been detected at this time, because all offsite groundwater, drinking water and surface water samples were <440 pCi/L. Mitigation activities (catch basin sleeving) to prevent tritiated condensate water from reaching the groundwater were completed 12/17/11.

Onsite Spills: There were no onsite liquid spills >100 gallons.

Decommissioning File Update: One item was added to the site decommissioning files in accordance with 10CFR50.75(g). This item included the discovery of Licensed Radioactive Material (LRM) in the Unit 2 Catch Basin System. See Enclosure 2, Page xvi for additional details.

Abnormal Liquid Releases: There were no abnormal liquid releases.

Abnormal Gaseous Releases: There were no abnormal gaseous releases.

Liquid Radwaste Treatment System: The site operated via a shared Liquid Radwaste Treatment System, even though each Unit has its own ion-exchange vessels. Shared operation allowed either Unit to process liquid waste at the Unit of origin, or at the other Unit. Typically, when Unit 1 or 2 high level liquid waste was processed (e.g., coolant recovery waste) it was performed at Unit 1, because it has a carbon pre-conditioning filter.

Gaseous Radwaste Treatment System: The site operated via a shared Gaseous Radwaste Treatment System, even though each Unit has its own charcoal delay beds and storage/decay tanks. Shared operation allowed either Unit to process gaseous waste at the Unit of origin, or at the other Unit. Typically, when Unit 1 or 2 went to a shutdown condition, the gaseous waste was transferred for storage and decay at Unit 2, because Unit 2 has four (4) additional storage tanks.

Radioactive Effluent Release Report

Calendar Year – 2012
Executive Summary – Liquid and Gaseous Effluent Control (Part 2 of 2)

Lower Limits of Detectability (LLD): All a-priori calculated LLD met the minimum requirements specified in the ODCM for batch radioactive discharge purposes. One geometry was retired from the effluent program in the report period. See Enclosure 2, Page 20 for additional details.

Effluent Monitoring Channels Inoperable >30 Days: All Effluent Monitoring Instrumentation Channels were returned to service within 30 days during this report period.

ODCM Surveillance Deficiencies: There was one ODCM Surveillance Deficiency in the reporting period and a follow up to one reported previously. See Page 20 for details.

ODCM Changes: There were three changes made to the ODCM during the report period. All changes 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. Detailed descriptions of the ODCM changes are provided in Enclosure 2, Page 21 Table 9 and Attachment 2.

Meteorological Data Recovery: The Meteorological Data Recovery met the minimum requirement of at least 90%, as specified in Section 5 of Revision 1 to Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants.

Population Dose vs. Natural Background: The 0-50 mile total and average population doses were calculated using liquid and gaseous release quantities and real time meteorology. The average population dose is based on four (4) million people within 0-50 miles of the BVPS site. The following comparison to natural background radiation demonstrates that BVPS operations did not adversely affect the surrounding environment.

457 man-mrem = BVPS Total Population Dose for the year

0.0001142 mrem = BVPS Average Individual Dose for the year

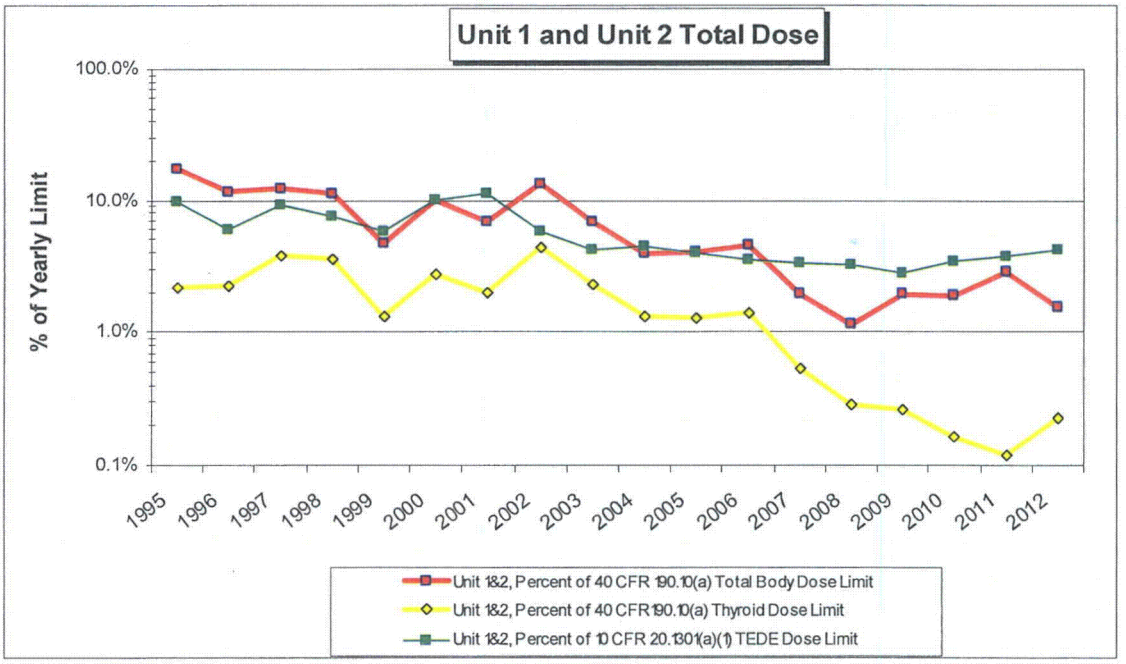
296 mrem = Natural Background Individual Dose for the year. This dose value is documented as natural background radiation exposure for an individual in a year from the 1990 BEIR V Report.

Carbon-14 Dose Assessment: Carbon-14 dose was calculated using actual sample measurements from gaseous release quantities and the default ODCM receptor. The highest organ doses were to the bone (child). Details of the dose assessment due to releases of Carbon-14 in gaseous effluents are provided in Attachment 3 of this report.

Radioactive Effluent Release Report

Calendar Year – 2012
Executive Summary – Trends of Total Dose

Trends of Total Dose: The following graph provides a comparison of the ODCM dose projections from all facility releases and direct radiation exposures to show compliance with Member of the Public dose limits from 10 CFR 20.1301 and 40 CFR Part 190. The graph reflects the results of the efforts to stabilize and reduce offsite dose. Engineering improvement projects are ongoing to the Liquid Waste System which have caused slight increases in liquid effluents and offsite dose. When the projects are complete and processing techniques are finalized using the new arrangements, trends should return to previous values.

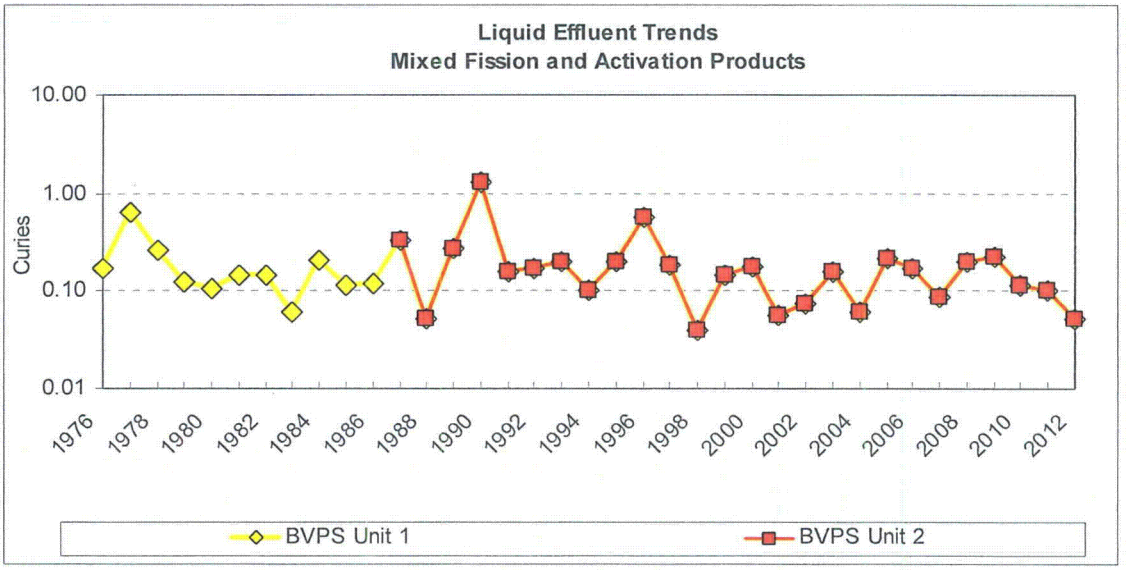


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Liquid Release Activity (Fission and Activation Products)

Liquid Release Activity (Fission and Activation Products): The following graph provides a comparison of total liquid mixed fission and activation product (particulate) radioactivity discharged from the site from 1976 to present.

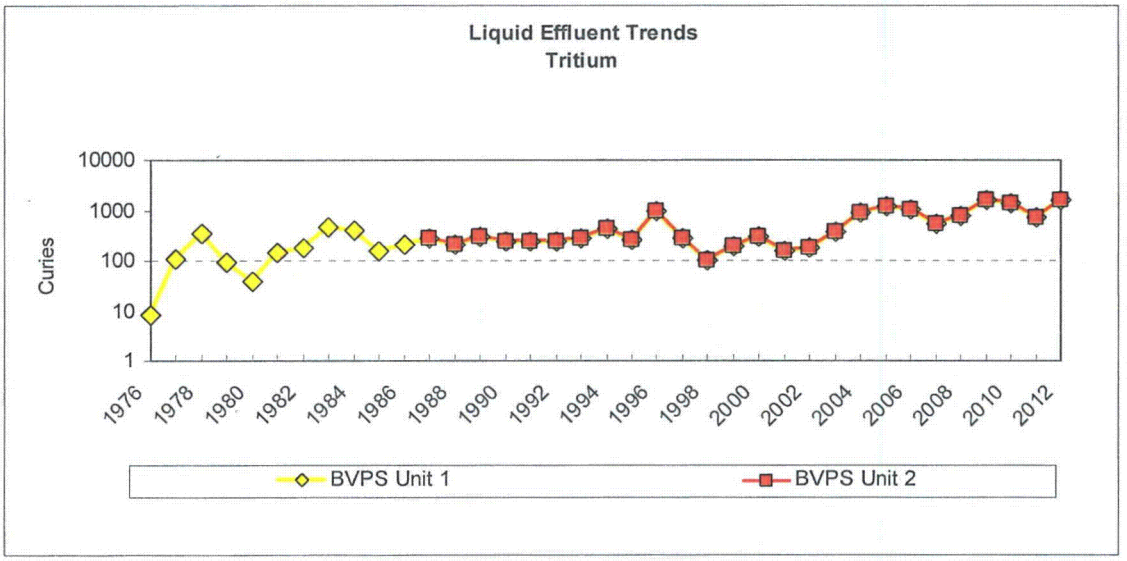


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Liquid Release Activity (Tritium)

Liquid Release Activity (Tritium): The following graph provides a comparison of total liquid tritium radioactivity discharged from the site from 1976 to present. The recent increases were due to efforts to reduce overall offsite dose. Specifically, discharging liquid radioactive inventory provided the benefit of reduced total offsite dose, due to reduction in evaporative losses from the fuel pools.

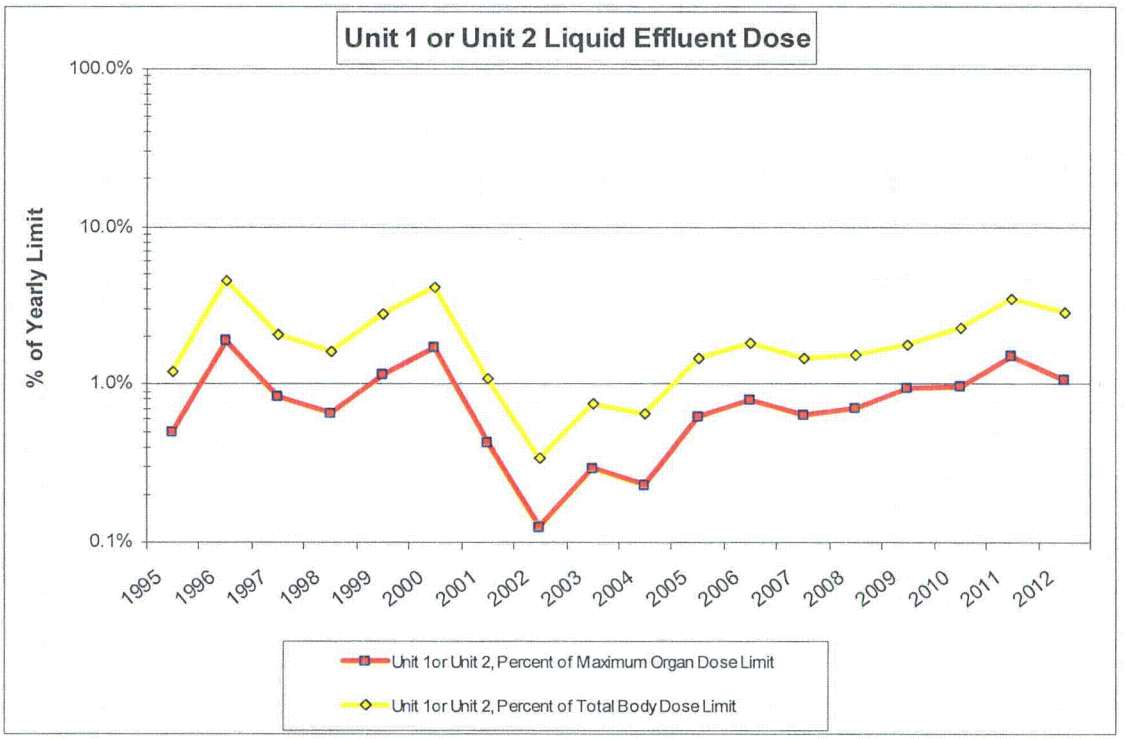


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Liquid Release Offsite Dose Projections

Liquid Release Offsite Dose Projections: The following graph provides a comparison of liquid offsite dose projections that were calculated to the maximum individual per 10 CFR 50, Appendix I and the ODCM. The projections use ODCM default flow rates for the receiving water (Ohio River), and were performed prior to release authorization. The recent increases were due to efforts to reduce overall offsite dose. Specifically, discharging liquid radioactive inventory provided the benefit of reduced total offsite dose, due to reduction in evaporative losses from the fuel pools. Engineering improvement projects are ongoing to the Liquid Waste System, as well, which have caused slight increases in liquid effluents and offsite dose. When the projects are complete and processing techniques are finalized using the new arrangements, trends should return to previous values.

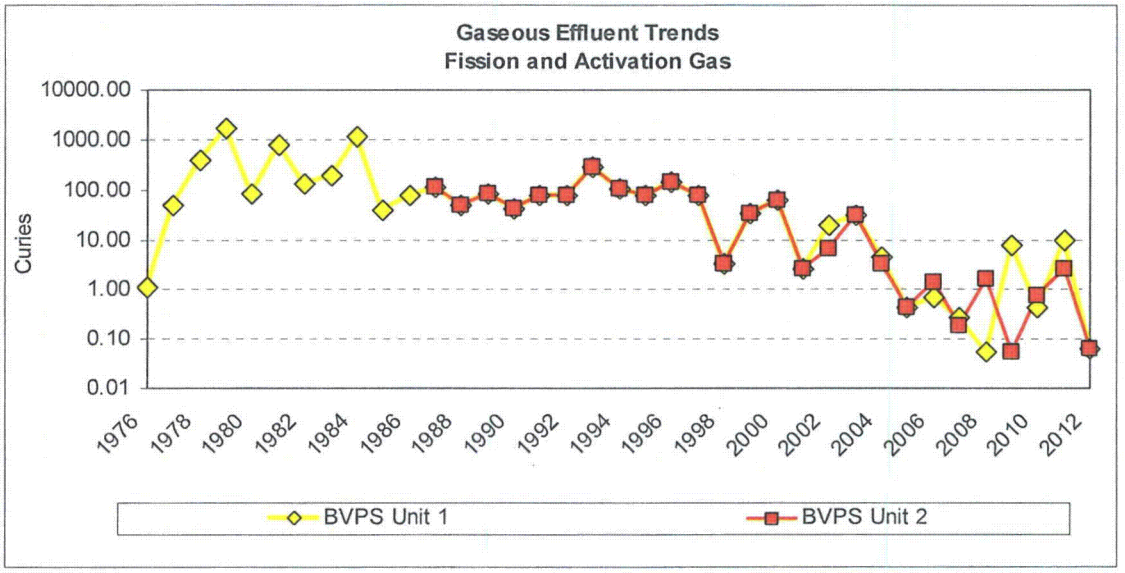


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Gaseous Release Activity (Fission and Activation Gas)

Gaseous Release Activity (Fission and Activation Gas): The following graph provides a comparison of total gaseous fission and activation gas discharged from the site from 1976 to present.

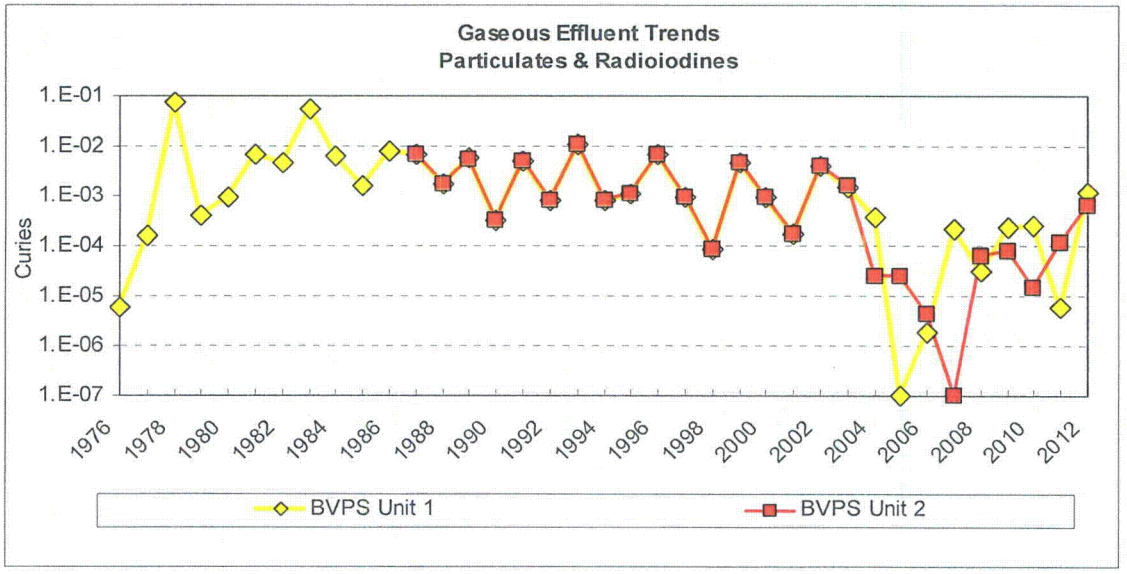


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Gaseous Release Activity (Particulates and Radioiodines)

Gaseous Release Activity (Particulates and Radioiodines): The following graph provides a comparison of total gaseous particulates and radioiodines discharged from the site from 1976 to present. The recent variations are due to identification of particulates in weekly effluent pathway samples at both Units 1 and 2, while decreasing trends are due to extended hold-up periods of gas space prior to release.

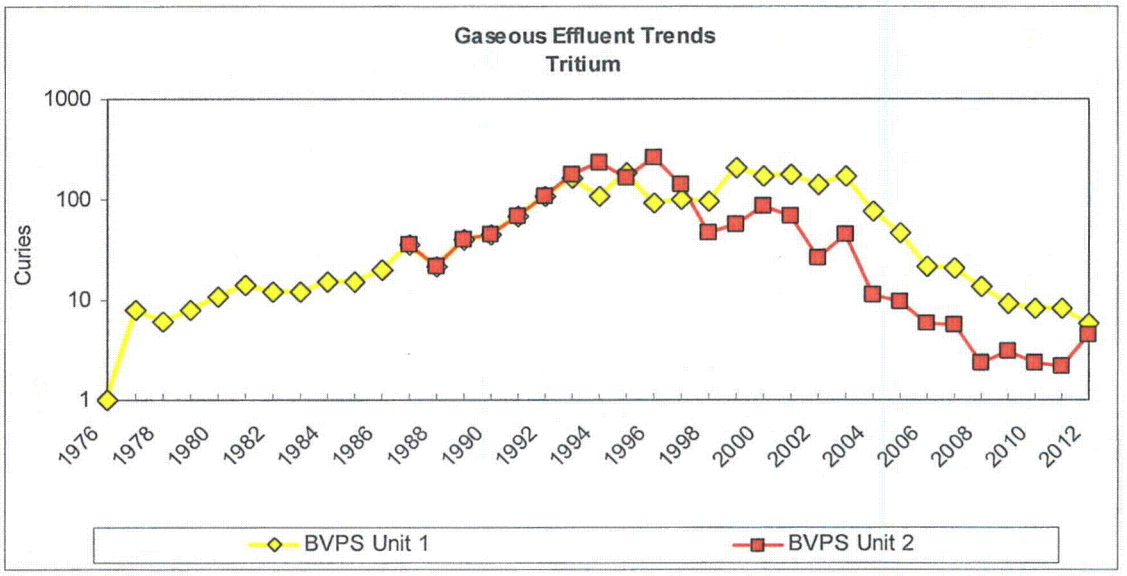


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Gaseous Release Activity (Tritium)

Gaseous Release Activity (Tritium): The following graph provides a comparison of total gaseous tritium discharged from the site from 1976 to present. The recent decreases were due to efforts to reduce overall offsite dose. Specifically, discharging liquid radioactive inventory provided the benefit of reduced total offsite dose, due to reduction in evaporative losses from the fuel pools.

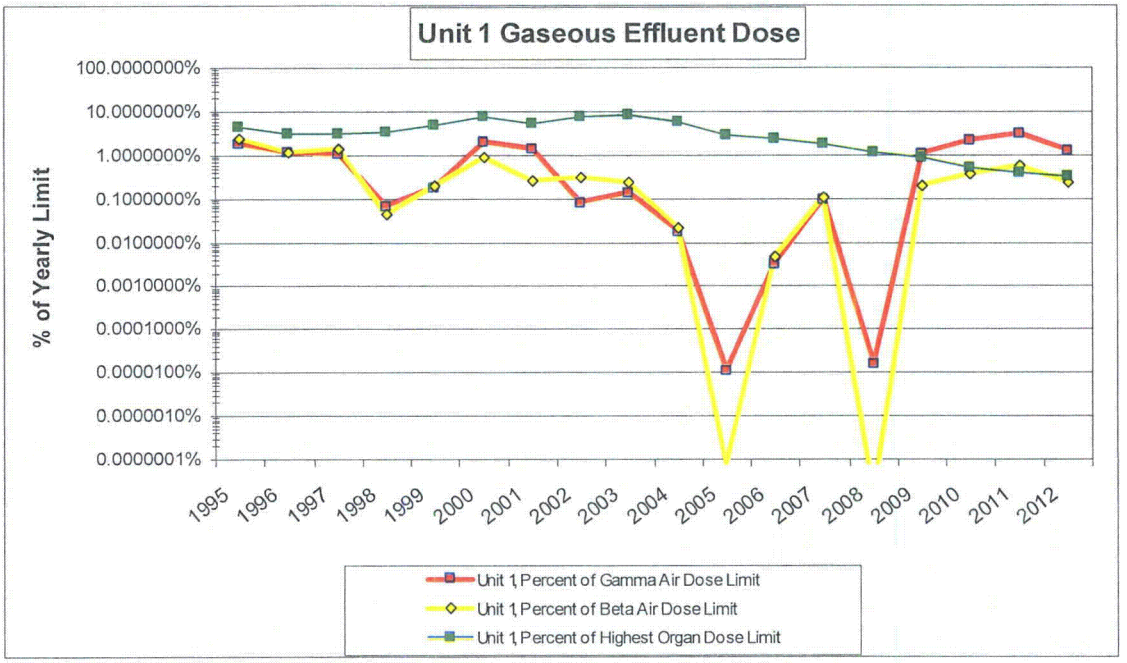


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Unit 1 Gaseous Release Offsite Dose Projections

Unit 1 Gaseous Release Offsite Dose Projections: The following graph provides a comparison of Unit 1 gaseous offsite dose projections that were calculated to the maximum individual per 10 CFR 50, Appendix I and the ODCM. The projections use ODCM default meteorological parameters for the atmospheric conditions surrounding the plant site, and were performed prior to release authorization. The steady decrease in highest organ dose were due to efforts to reduce overall offsite dose. Specifically, discharging liquid radioactive inventory provided the benefit of reduced total offsite dose, due to reduction in evaporative losses from the fuel pools.

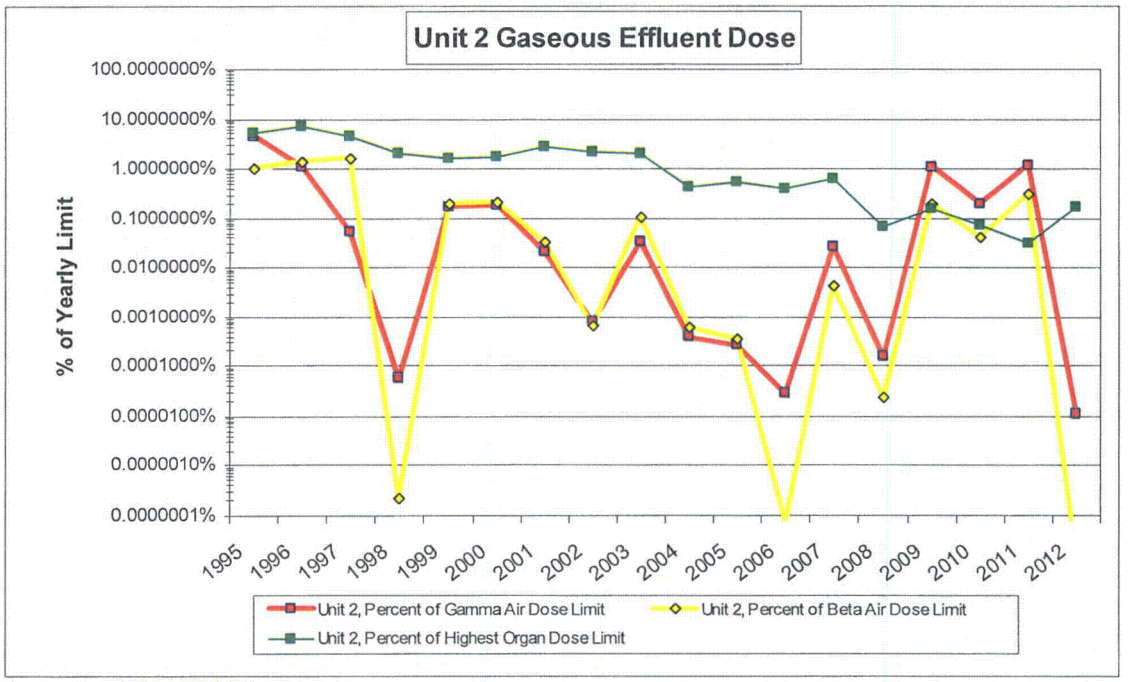


Radioactive Effluent Release Report

Calendar Year – 2012

Executive Summary – Trends of Unit 2 Gaseous Release Offsite Dose Projections

Unit 2 Gaseous Release Offsite Dose Projections: The following graph provides a comparison of Unit 2 gaseous offsite dose projections that were calculated to the maximum individual per 10 CFR 50, Appendix I and the ODCM. The projections use ODCM default meteorological parameters for the atmospheric conditions surrounding the plant site, and were performed prior to release authorization. The decrease in highest organ dose was due to efforts to reduce overall offsite dose. Specifically, discharging liquid radioactive inventory provided the benefit of reduced total offsite dose, due to reduction in evaporative losses from the fuel pools.



Radioactive Effluent Release Report

Calendar Year – 2012
Results of Abnormal Releases

Abnormal Liquid Releases: None

Abnormal Gas Releases: None

Radioactive Effluent Release Report

Calendar Year – 2012

Results of Onsite Spills and Items Added to Decommissioning Files per 10CFR50.75(g)

Summary of Onsite Spills (>100 Gallons): None

Summary of Items added to Decommissioning Files per 10CFR50.75(g) Files:

Item 1 of 1 (Unit 2 Catch Basins): Licensed Radioactive Material (Cobalt-57, Cobalt-58, Cobalt-60 and Cesium-137) was detected in sediment of two Unit 2 Catch Basins. The cause is believed to be from loose particulate material that escaped from the Radiologically Controlled Area during movement of a shipment for disposal. The material deposited in the Catch Basins and was detected during routine sampling. Material was removed from the Catch Basins and discarded. No Radiological Material is believed to have left the site boundary.

Radioactive Effluent Release Report

Calendar Year – 2012

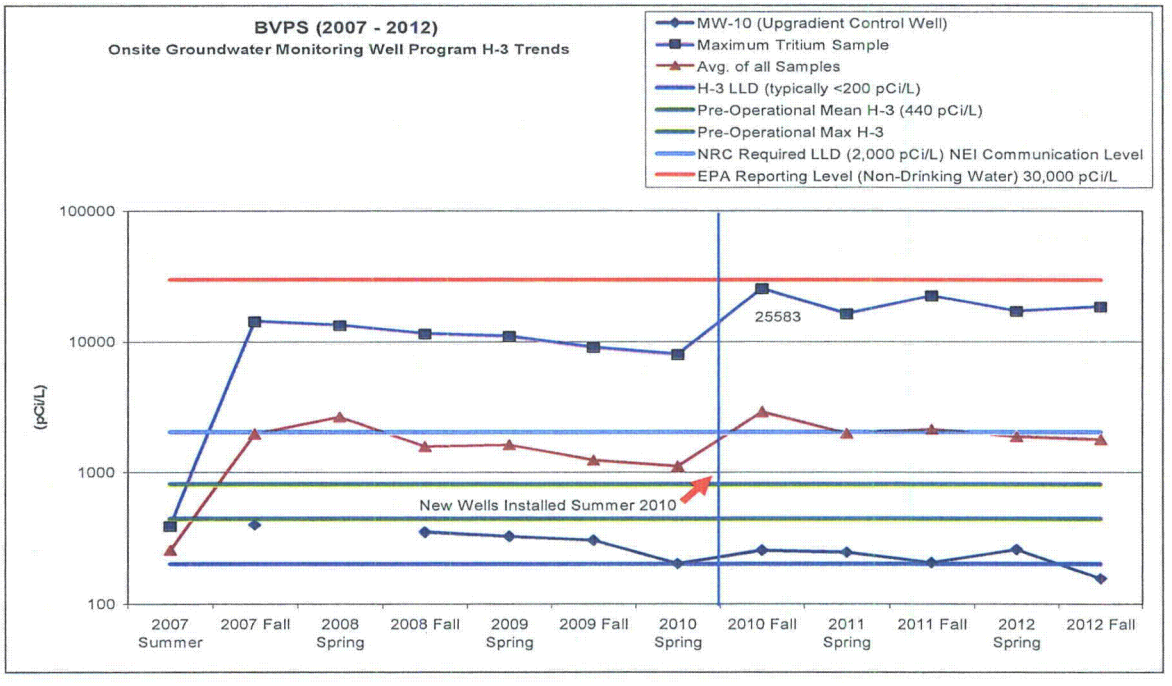
Results of Onsite Groundwater Monitoring Program

Summary of Onsite Groundwater Samples

	2012 H-3 Maximum (pCi/L)	2012 H-3 Minimum (pCi/L)	2012 H-3 Average (pCi/L)	Typical H-3 LLD (pCi/L)	Required H-3 LLD (pCi/L)	Pre Operational Mean For H-3 (pCi/L)	Are Any H-3 Analyses Greater Than The Pre Operational Mean For H-3 ?	NEI and FENOC Communication Level For H-3 (pCi/L)	EPA Reporting Level For H-3 (pCi/L)
2nd Quarter	17240	147	1888	<200	<2000	440	Yes	2000	30000
Summer (3rd Quarter)	19200	1900	6342	<200	<2000	440	Yes	2000	30000
4th Quarter	18633	155	1797	<200	<2000	440	Yes	2000	30000

2012 H3 Summary: Twenty-three (23) on-site monitoring wells were sampled in the spring and fall sampling periods in 2012. The six (6) highest concentration monitoring wells were sampled in a summer sampling period for additional trend data. No new wells were installed and no wells were retired. Sixteen (16) wells returned results of less than the pre-operational mean (440 pCi/L) during all sample periods in 2012. One (1) well returned results >440 pCi/L, but <2000 pCi/L. Six (6) wells returned results >2000 pCi/L. No wells exceeded 20,000 pCi/L with the highest concentration recorded as 19,200 pCi/L. The NEI/FENOC communication level was reached for MW-12S & MW-12D during 2007. Notification to local, state & federal agencies was performed on 10/08/07. Additional communication for new well results was performed on 09/08/10 for those new wells that exceeded 2000 pCi/L. There were no wells that reached the 2000 pCi/L Communication Level for the first time in 2012. No adverse effect to the offsite environment has been detected at this time, because all offsite groundwater, drinking water and surface water samples were <440 pCi/L. Mitigation activities (catch basin sleeving) to prevent tritiated condensate water from reaching the groundwater were completed 12/17/11.

Principal Gamma Emitter Summary: Twenty-three (23) onsite monitoring wells were sampled on at least two occasions during the year and analyzed for Principle Gamma Emitters. The results showed no positive indication of Licensed Radioactive Material (LRM) in any of the analyses. Due to high H-3 concentrations in the six (6) wells previously mentioned, a hard-to-detect analysis was conducted. Results from the hard-to-detect analysis also showed no positive indication of LRM.



Radioactive Effluent Release Report

Calendar Year – 2012

Corrections to Previous Radioactive Effluent Release Reports

Correction(s) to Previous Radioactive Effluent Release Reports None

Radioactive Effluent Release Report

Calendar Year - 2012

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 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 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		28	36	37	37	138
2. Total time period for batch releases	minutes	9665	11341	11719	19048	51773
3. Maximum time period for a batch release	minutes	3750	4200	3661	3900	4200
4. Average time period for batch releases	minutes	345	315	317	515	375
5. Minimum time period for a batch release	minutes	71	5	203	60	5
6. Average river flow during release periods	cuft/sec	63400	24167	10500	40967	34758
b. Gaseous Batch Releases						
1. Number of batch releases		6	14	14	15	49
2. Total time period for batch releases	minutes	2633	8283	10191	4827	25934
3. Maximum time period for a batch release	minutes	2398	3725	4492	1080	4492
4. Average time period for batch releases	minutes	439	592	728	322	529
5. Minimum time period for a batch release	minutes	57	0.2	0.2	37	0
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

Radioactive Effluent Release Report

Calendar Year - 2012

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. Site Total release	Ci	0.00E+00	4.85E-02	7.02E-02	1.25E-02	1.31E-01	26.5%
1a. Unit 1 Gases	Ci	0.00E+00	2.42E-02	3.51E-02	6.23E-03	6.56E-02	
1b. Unit 2 Gases	Ci	0.00E+00	2.42E-02	3.51E-02	6.23E-03	6.56E-02	
2. Average release rate for period	uCi/sec	0.00E+00	6.15E-03	8.91E-03	1.58E-03	4.16E-03	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
B. Iodines							
1. Site Total iodine - 131	Ci	0.00E+00	8.52E-08	0.00E+00	2.91E-06	3.00E-06	28.3%
1a. Unit 1 iodine - 131	Ci	0.00E+00	4.26E-08	0.00E+00	0.00E+00	4.26E-08	
1b. Unit 2 iodine - 131	Ci	0.00E+00	4.26E-08	0.00E+00	2.91E-06	2.95E-06	
2. Average release rate for period	uCi/sec	0.00E+00	1.08E-08	0.00E+00	3.69E-07	9.50E-08	
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	30.0%
1a. Unit 1 Particulates	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1b. Unit 2 Particulates	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
2. Average release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
D. Gross Alpha							
1. Site Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	30.0%
1a. Unit 1 Gross alpha	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1b. Unit 2 Gross alpha	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
2. Average release rate for period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
E. Tritium							
1. Site Total release	Ci	2.54E+00	1.61E+00	2.39E+00	3.67E+00	1.02E+01	32.9%
1a. Unit 1 Tritium	Ci	1.51E+00	1.40E+00	1.54E+00	1.37E+00	5.82E+00	
1b. Unit 2 Tritium	Ci	1.03E+00	2.09E-01	8.50E-01	2.30E+00	4.39E+00	
2. Average release rate for period	uCi/sec	3.22E-01	2.04E-01	3.03E-01	4.66E-01	3.24E-01	
3. Percent of applicable limit	%	N/A	N/A	N/A	N/A	N/A	
F. Carbon-14							
1. Site Total release	Ci	3.17E-01	8.02E-01	7.97E-01	3.63E-01	2.28E+00	41.1%
1a. Unit 1 Carbon-14	Ci	2.91E-01	7.82E-01	7.79E-01	1.51E-01	2.00E+00	
1b. Unit 2 Carbon-14	Ci	2.59E-02	1.95E-02	1.76E-02	2.12E-01	2.75E-01	
2. Average release rate for period	uCi/sec	4.02E-02	1.02E-01	1.01E-01	4.61E-02	7.23E-02	
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, D.2 and E.2 is the average amount of seconds per calendar quarter (7.88E+06 seconds).

Radioactive Effluent Release Report

Calendar Year - 2012
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	1.99E-03	3.09E-02	2.08E-05	3.29E-02
krypton-85	Ci	LLD	LLD	LLD	LLD	LLD
krypton-85m	Ci	LLD	1.77E-05	4.95E-04	LLD	5.13E-04
krypton-87	Ci	LLD	LLD	LLD	LLD	LLD
krypton-88	Ci	LLD	LLD	7.57E-04	LLD	7.57E-04
xenon-131m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-133	Ci	LLD	2.26E-02	1.93E-02	3.05E-05	4.19E-02
xenon-133m	Ci	LLD	4.16E-04	5.92E-04	LLD	1.01E-03
xenon-135	Ci	LLD	5.08E-03	1.37E-02	LLD	1.88E-02
xenon-135m	Ci	LLD	1.83E-04	4.48E-03	LLD	4.66E-03
xenon-138	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	3.03E-02	7.02E-02	5.13E-05	1.01E-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	LLD	LLD
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	LLD	LLD	8.69E-04	LLD	8.69E-04
cobalt-60	Ci	LLD	5.63E-06	2.71E-04	LLD	2.77E-04
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
selenium-75	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	5.63E-06	1.14E-03	ND	1.15E-03

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

ND = None Detected

Radioactive Effluent Release Report

Calendar Year - 2012
Table 1B-EC
Gaseous Effluents - Elevated Continuous Release

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	LLD	1.82E-02	LLD	1.24E-02	3.06E-02
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	ND	1.82E-02	ND	1.24E-02	3.06E-02
2. Iodines						
iodine-131	Ci	LLD	8.52E-08	LLD	LLD	8.52E-08
iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	ND	8.52E-08	ND	ND	8.52E-08
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	1.99E-07	1.99E-07
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
antimony-124	Ci	2.49E-05	LLD	LLD	LLD	2.49E-05
antimony-125	Ci	8.36E-05	LLD	LLD	LLD	8.36E-05
antimony-126	Ci	LLD	LLD	LLD	3.87E-07	3.87E-07
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
selenium-75	Ci	5.26E-08	7.28E-07	1.50E-06	5.72E-07	2.85E-06
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	1.09E-04	7.28E-07	1.50E-06	1.16E-06	1.12E-04

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

ND = None Detected

Radioactive Effluent Release Report

Calendar Year - 2012
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	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	LLD	LLD	LLD	LLD	LLD
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	ND	ND	ND	ND	ND
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	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
selenium-75	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

Radioactive Effluent Release Report

Calendar Year - 2012
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	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	LLD	LLD	LLD	LLD	LLD
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	ND	ND	ND	ND	ND
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	3.66E-05	1.15E-04	LLD	LLD	1.52E-04
manganese-54	Ci	LLD	1.74E-06	LLD	LLD	1.74E-06
iron-59	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-57	Ci	LLD	LLD	LLD	LLD	LLD
cobalt-58	Ci	8.23E-05	1.70E-04	LLD	1.35E-05	2.66E-04
cobalt-60	Ci	1.76E-05	3.70E-05	LLD	LLD	5.46E-05
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
zirconium/niobium-95	Ci	8.84E-06	4.65E-05	LLD	LLD	5.53E-05
zirconium/niobium-97	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99	Ci	LLD	LLD	LLD	LLD	LLD
tin-113	Ci	LLD	1.55E-06	LLD	LLD	1.55E-06
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	LLD	4.12E-06	LLD	LLD	4.12E-06
barium/lanthanum-140	Ci	LLD	LLD	LLD	LLD	LLD
cerium-141	Ci	LLD	LLD	LLD	LLD	LLD
cerium-144	Ci	LLD	3.24E-06	LLD	LLD	3.24E-06
selenium-75	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	1.45E-04	3.79E-04	ND	1.35E-05	5.38E-04

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

ND = None Detected

Radioactive Effluent Release Report

Calendar Year - 2012
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	LLD	LLD	LLD	LLD	LLD
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	ND	ND	ND	ND	ND
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						
beryllium-7	Ci	LLD	LLD	LLD	LLD	LLD
chromium-51	Ci	LLD	LLD	LLD	LLD	LLD
manganese-54	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
zirconium/niobium-97	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
selenium-75	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

Radioactive Effluent Release Report

Calendar Year - 2012
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	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	LLD	LLD	LLD	LLD	LLD
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	ND	ND	ND	ND	ND
2. Iodines						
iodine-131	Ci	LLD	LLD	LLD	2.91E-06	2.91E-06
iodine-133	Ci	LLD	LLD	LLD	LLD	LLD
iodine-135	Ci	LLD	LLD	LLD	LLD	LLD
Total for period	Ci	ND	ND	ND	2.91E-06	2.91E-06
3. Particulates						
chromium-51	Ci	LLD	LLD	LLD	5.50E-06	5.50E-06
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	1.18E-06	9.79E-05	9.91E-05
cobalt-60	Ci	LLD	LLD	LLD	4.69E-06	4.69E-06
zinc-65	Ci	LLD	LLD	LLD	LLD	LLD
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
zirconium/niobium-95	Ci	LLD	LLD	LLD	1.06E-05	1.06E-05
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
selenium-75	Ci	LLD	LLD	LLD	LLD	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	ND	1.18E-06	1.19E-04	1.20E-04

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

ND = None Detected

Radioactive Effluent Release Report

Calendar Year - 2012

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	8.51E-03	1.35E-02	6.65E-03	2.35E-02	5.21E-02	26.1%
2. Average diluted concentration	uCi/ml	1.27E-08	2.64E-09	4.64E-09	1.73E-08	6.08E-09	
3. Percent of applicable limit	%	3.41E-01	5.40E-01	2.66E-01	9.38E-01	5.21E-01	
B. Tritium							
1. Total release	Ci	7.58E+02	3.57E+02	3.16E+02	2.04E+02	1.64E+03	25.0%
2. Average diluted concentration	uCi/ml	1.13E-03	6.98E-05	2.20E-04	1.51E-04	1.91E-04	
3. Percent of applicable limit	%	1.13E+01	6.98E-01	2.20E+00	1.51E+00	1.91E+00	
C. Dissolved and entrained gases							
1. Total release	Ci	ND	ND	1.00E-05	3.52E-05	4.52E-05	27.0%
2. Average diluted concentration	uCi/ml			6.98E-12	2.60E-11	5.27E-12	
3. Percent of applicable limit	%			3.49E-06	1.30E-05	2.64E-06	
D. Gross alpha radioactivity (total release)	Ci	LLD	LLD	LLD	LLD	LLD	28.9%
E. Volume of waste released (prior to dilution)	liters	2.10E+06	2.46E+06	2.64E+06	3.42E+06	1.06E+07	11.2%
F. Volume of dilution water used	liters	6.70E+08	5.11E+09	1.43E+09	1.35E+09	8.56E+09	22.9%

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

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)

Radioactive Effluent Release Report

Calendar Year - 2012

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	LLD	LLD	LLD	LLD	LLD
chromium-51	Ci	LLD	5.68E-04	LLD	5.39E-04	1.11E-03
manganese-54	Ci	8.41E-06	3.44E-05	5.27E-06	4.87E-05	9.68E-05
iron-55	Ci	2.72E-03	2.50E-03	9.63E-04	1.11E-03	7.29E-03
iron-59	Ci	LLD	LLD	LLD	3.07E-04	3.07E-04
cobalt-57	Ci	1.31E-05	3.00E-05	LLD	2.79E-05	7.10E-05
cobalt-58	Ci	1.70E-03	5.46E-03	1.49E-03	1.44E-02	2.31E-02
cobalt-60	Ci	1.65E-03	2.55E-03	6.08E-04	1.29E-03	6.10E-03
zinc-65	Ci	LLD	3.09E-05	LLD	2.91E-05	6.00E-05
strontium-89	Ci	LLD	LLD	LLD	LLD	LLD
strontium-90	Ci	LLD	LLD	LLD	LLD	LLD
zirconium/niobium-95	Ci	LLD	2.18E-04	LLD	2.52E-04	4.70E-04
zirconium/niobium-97	Ci	LLD	LLD	LLD	LLD	LLD
molybdenum-99/technetium-99m	Ci	LLD	LLD	LLD	LLD	LLD
tin-113	Ci	LLD	LLD	LLD	LLD	LLD
tin-117m	Ci	LLD	LLD	LLD	1.04E-05	1.04E-05
silver-110m	Ci	2.65E-04	4.17E-04	3.40E-04	3.32E-04	1.35E-03
antimony-122	Ci	LLD	3.50E-05	LLD	LLD	3.50E-05
antimony-124	Ci	1.01E-04	1.56E-04	7.30E-05	4.56E-04	7.86E-04
antimony-125	Ci	1.89E-03	1.07E-03	2.15E-03	2.92E-03	8.03E-03
iodine-131	Ci	LLD	LLD	LLD	LLD	LLD
iodine-133	Ci	LLD	LLD	1.22E-06	LLD	1.22E-06
cesium-134	Ci	LLD	LLD	LLD	LLD	LLD
cesium-137	Ci	1.66E-04	4.34E-04	1.02E-03	1.73E-03	3.35E-03
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	8.51E-03	1.35E-02	6.65E-03	2.35E-02	5.21E-02
2. Dissolved and entrained gases						
krypton-85	Ci	LLD	LLD	LLD	LLD	LLD
xenon-133	Ci	LLD	LLD	1.00E-05	3.52E-05	4.52E-05
xenon-133m	Ci	LLD	LLD	LLD	LLD	LLD
xenon-135	Ci	LLD	LLD	LLD	LLD	LLD
carbon-14	Ci	N/A	N/A	N/A	N/A	LLD
unidentified	Ci	NONE	NONE	NONE	NONE	NONE
Total for period	Ci	ND	ND	1.00E-05	3.52E-05	4.52E-05

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

Radioactive Effluent Release Report

Calendar Year - 2012
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)

Radioactive Effluent Release Report

Calendar Year – 2012
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		9.09E+00 m3	6.37E+00 m3	0.0% (1)
b. Volume Buried		7.49E-01 m3	1.27E-02 m3	0.0% (1)
c. Total Activity		7.27E+01 Ci	2.695E+00 Ci	30.0%
2. Estimate of Major Nuclide Composition by Type of Waste on This Table (2)		Percent (%)	Percent (%)	
H-3		0.124 %	26.2 %	
Ag-110m		.00255 %	1.94 %	
C-14		0.204 %	12.2 %	
Mn-54		0.0315 %	0.903 %	
Fe-55		6.25 %	13.7 %	
Co-58		0.0081 %	4.59 %	
Co-60		21.30 %	25.5 %	
Ni-59		0.452 %	.0067 %	
Ni-63		65.5 %	4.05 %	
Zn-65		0.365 %	6.62 %	
Cs-134		0.316 %	0.00 %	
Cs-137		5.32 %	3.09 %	
Ce-144/Pr-144		0.0046 %	.305 %	
Pu-241		0.00434 %	.00385 %	
3. Number of Shipments		4	1	
a. Type Of Container Used	LSA	2	1	
	Type A	0	0	
	Type B	2	0	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	4	1	
c. Mode of Transport	Truck	4	1	
	Rail	0	0	
d. Final Destination	Erwin, TN	2	0	
	Barnwell, SC	0	1	
	Oak Ridge, TN	2	0	
e. Waste Class per 10 CFR Part 61	Class A	2	1	
	Class B	2	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.

Radioactive Effluent Release Report

Calendar Year – 2012

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		4.44E+02 m3	4.72E+02 m3	0.0% (1)
b. Volume Buried		4.97E+01 m3	5.43E+01 m3	0.0% (1)
c. Total Activity		1.83 Ci	1.09 Ci	30.0%
2. Estimate of Major Nuclide Composition by Type of Waste on This Table (2)		Percent (%)	Percent (%)	
H-3		0.12 %	1.13 %	
C-14		0.306 %	0.852 %	
Cr-51		0.00 %	0.056 %	
Mn-54		0.045 %	0.383 %	
Fe-55		82.9 %	36.7 %	
Co-58		0.418 %	2.21 %	
Co-60		7.76 %	20.6 %	
Ni-59		0.027 %	0.277 %	
Ni-63		7.34 %	29.5 %	
Sr-90		0.00 %	0.00 %	
Nb-95		0.06 %	0.093 %	
Zn-65		0.00 %	0.033 %	
Zr-95		0.00 %	0.148 %	
Ag-110m		0.011 %	0.24 %	
Sb-124		0.00 %	0.00 %	
Sb-125		0.188 %	1.09 %	
I-129		0.00 %	2.34 %	
Cs-134		0.057 %	0.031 %	
Cs-137		0.66 %	3.46 %	
Tc-99		0.00 %	0.117 %	
Ce-144/Pr-144		0.032 %	0.075 %	
Pu-241		0.00 %	0.10 %	
3. Number of Shipments		8	10	
a. Type Of Container Used	LSA	8	10	
	Type A	0	0	
	Type B	0	0	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	8	10	
c. Mode of Transport	Truck	8	10	
	Rail	0	0	
	Other	0	0	
d. Final Destination	Oak Ridge, TN	6	9	
	Clive, UT	2	1	
e. Waste Class per 10 CFR Part 61	Class A	8	10	
	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.

Radioactive Effluent Release Report

Calendar Year – 2012
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		0.00+00 m3	0.00+00 m3	0.0% (1)
b. Volume Buried		0.00+00 m3	0.00+00 m3	0.0% (1)
c. Total Activity		0.00+00 Ci	0.00+00 Ci	0.0%
2. Estimate of Major Nuclide Composition by Type of Waste on This Table (2)		Percent (%)	Percent (%)	
3. Number of Shipments		0	0	
a. Type Of Container Used	LSA	0	0	
	Type A	0	0	
	Type B	0	0	
	Large Quantity	0	0	
b. Solidification Agent Used	Cement	0	0	
	Urea Formaldehyde	0	0	
	None	0	0	
c. Mode of Transport	Truck	0	0	
	Rail	0	0	
	Other	0	0	
d. Final Destination	Barnwell, SC	0	0	
	Oak Ridge, TN	0	0	
e. Waste Class per 10 CFR Part 61	Class A	0	0	
	Class B	0	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.

Radioactive Effluent Release Report

Calendar Year – 2012
Table 4
Lower Limits Of Detectability (LLD)

Nuclide	RWDA-G 1000 cc Gas Grab Sample		RWDA-L 1000 ml Liquid Grab Sample		Filter Paper/Charcoal Continuous Effluent Sample	
	(3) Calculated LLD (uCi/cc)	ODCM Required LLD (uCi/cc)	(3) Calculated LLD (uCi/cc)	ODCM Required LLD (uCi/cc)	(3) Calculated (2) LLD (uCi/cc)	ODCM Required LLD (uCi/cc)
H-3	(4) 1.00E-06	1E-06	1.00E-06	1E-05	----------	----------
Na-24	2.27E-07	1E-04	5.72E-08	5E-07	1.98E-13	1E-11
Ar-41	1.76E-07	1E-04	4.47E-08	5E-07	----------	----------
Cr-51	5.56E-07	1E-04	1.65E-07	5E-07	6.76E-13	1E-11
Mn-54	1.42E-07	1E-04	3.75E-08	5E-07	2.10E-13	1E-11
Fe-55	----------	----------	(1) 1.00E-06	1E-06	----------	----------
Fe-59	3.23E-07	1E-04	8.34E-08	5E-07	2.81E-13	1E-11
Co-57	5.00E-08	1E-04	1.75E-08	5E-07	4.22E-14	1E-11
Co-58	1.38E-07	1E-04	3.68E-08	5E-07	2.05E-13	1E-11
Co-60	1.12E-07	1E-04	2.87E-08	5E-07	1.95E-13	1E-11
Zn-65	3.65E-07	1E-04	9.40E-08	5E-07	3.17E-13	1E-11
Se-75	----------	----------	----------	----------	8.64E-14	1E-11
Kr-85	1.53E-05	1E-04	4.26E-06	1E-05	----------	----------
Kr-85m	6.96E-08	1E-04	2.32E-08	1E-05	----------	----------
Kr-87	1.50E-07	1E-04	4.29E-08	1E-05	----------	----------
Kr-88	1.67E-07	1E-04	5.34E-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	2.69E-07	1E-04	6.77E-08	5E-07	3.95E-13	1E-11
Nb-95	1.31E-07	1E-04	3.49E-08	5E-07	1.36E-13	1E-11
Nb-97	7.73E-08	1E-04	2.10E-08	5E-07	1.69E-13	1E-11
Zr-95	1.34E-07	1E-04	3.60E-08	5E-07	2.43E-13	1E-11
Mo-99	4.95E-08	1E-04	1.68E-08	5E-07	4.63E-14	1E-11
Tc-99m	4.85E-08	1E-04	1.64E-08	5E-07	4.54E-14	1E-11
Ag-110m	7.95E-08	1E-04	2.16E-08	5E-07	1.75E-13	1E-11
Sb-124	7.86E-08	1E-04	2.15E-08	5E-07	8.91E-14	1E-11
Sb-125	1.43E-07	1E-04	4.08E-08	5E-07	2.52E-13	1E-11
I-131	4.41E-08	1E-04	1.28E-08	1E-06	8.99E-14	1E-12
I-133	9.36E-08	1E-04	2.60E-08	5E-07	9.90E-14	1E-10
I-135	7.46E-07	1E-04	1.90E-07	5E-07	7.15E-13	1E-11
Xe-131m	1.90E-06	1E-04	6.21E-07	1E-05	----------	----------
Xe-133	1.43E-07	1E-04	5.92E-08	1E-05	----------	----------
Xe-133m	5.84E-07	1E-04	1.81E-07	1E-05	----------	----------
Xe-135	5.86E-08	1E-04	1.80E-08	1E-05	----------	----------
Xe-135m	1.57E-07	1E-04	4.35E-08	1E-05	----------	----------
Xe-137	1.16E-06	1E-04	3.28E-07	1E-05	----------	----------
Xe-138	4.05E-07	1E-04	1.24E-07	1E-05	----------	----------
Cs-134	8.66E-08	1E-04	2.37E-08	5E-07	1.04E-13	1E-11
Cs-137	1.09E-07	1E-04	2.95E-08	5E-07	1.46E-13	1E-11
Ba-139	2.23E-07	1E-04	7.29E-08	5E-07	2.57E-13	1E-11
Ba-140	2.46E-07	1E-04	6.81E-08	5E-07	4.00E-13	1E-11
La-140	1.90E-07	1E-04	4.74E-08	5E-07	2.36E-13	1E-11
Ce-141	9.91E-08	1E-04	3.33E-08	5E-07	8.78E-14	1E-11
Ce-144	3.53E-07	1E-04	1.21E-07	5E-07	3.47E-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 09/21/12. 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.

Radioactive Effluent Release Report

Calendar Year - 2012
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	2.60E-03	0.0520	6.49E-03	0.1298	9.08E-03	0.1816	2.56E-02	0.5120	4.38E-02	0.4377
O	Liver	1.72E-02	0.3440	2.22E-02	0.4440	1.98E-02	0.3960	4.73E-02	0.9460	1.07E-01	1.0650
R	Total Body	1.59E-02	1.0600	1.92E-02	1.2800	1.56E-02	1.0400	3.52E-02	2.3467	8.59E-02	2.8633
G	Thyroid	1.36E-02	0.2720	1.33E-02	0.2660	7.43E-03	0.1486	1.21E-02	0.2420	4.64E-02	0.4643
A	Kidney	1.48E-02	0.2960	1.64E-02	0.3280	1.16E-02	0.2320	2.40E-02	0.4800	6.68E-02	0.6680
N	Lung	1.41E-02	0.2820	1.43E-02	0.2860	8.83E-03	0.1766	1.61E-02	0.3220	5.33E-02	0.5333
(1)	GI-LLI	1.42E-02	0.2840	1.50E-02	0.3000	7.81E-03	0.1562	1.45E-02	0.2900	5.15E-02	0.5151

		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)	Gamma Air	1.28E-01	2.5600	1.22E-07	0.0000	8.96E-07	0.0000	4.66E-08	0.0000	1.28E-01	1.2800
(2)	Beta Air	4.69E-02	0.4690	5.35E-10	0.0000	1.81E-09	0.0000	2.18E-10	0.0000	4.69E-02	0.2345
	Bone	2.91E-06	0.0000	1.22E-03	0.0163	4.12E-05	0.0005	5.43E-06	0.0001	1.27E-03	0.0085
O	Liver	1.17E-02	0.1560	1.35E-02	0.1800	1.45E-02	0.1933	9.77E-03	0.1303	4.95E-02	0.3298
R	Total Body	1.17E-02	0.1560	1.35E-02	0.1800	1.45E-02	0.1933	9.77E-03	0.1303	4.95E-02	0.3298
G	Thyroid	1.17E-02	0.1560	1.34E-02	0.1787	1.45E-02	0.1933	9.77E-03	0.1303	4.94E-02	0.3291
A	Kidney	1.17E-02	0.1560	1.34E-02	0.1787	1.45E-02	0.1933	9.77E-03	0.1303	4.94E-02	0.3291
N	Lung	1.18E-02	0.1573	1.43E-02	0.1907	1.45E-02	0.1933	9.78E-03	0.1304	5.04E-02	0.3359
(3)	GI-LLI	1.18E-02	0.1573	1.36E-02	0.1813	1.45E-02	0.1933	9.77E-03	0.1303	4.97E-02	0.3311

(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 miles 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 miles NW.

Limits used for calculation of percent (%) are from ODCM procedure 1/2-ODC-3.03, Attachment H Control 3.11.1.2, Attachment L Control 3.11.2.2, and Attachment M Control 3.11.2.3 (considered to be the design objectives).

Radioactive Effluent Release Report

Calendar Year - 2012
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	2.60E-03	0.0520	6.49E-03	0.1298	9.08E-03	0.1816	2.56E-02	0.5120	4.38E-02	0.4377
O	Liver	1.72E-02	0.3440	2.22E-02	0.4440	1.98E-02	0.3960	4.73E-02	0.9460	1.07E-01	1.0650
R	Total Body	1.59E-02	1.0600	1.92E-02	1.2800	1.56E-02	1.0400	3.52E-02	2.3467	8.59E-02	2.8633
G	Thyroid	1.36E-02	0.2720	1.33E-02	0.2660	7.43E-03	0.1486	1.21E-02	0.2420	4.64E-02	0.4643
A	Kidney	1.48E-02	0.2960	1.64E-02	0.3280	1.16E-02	0.2320	2.40E-02	0.4800	6.68E-02	0.6680
N	Lung	1.41E-02	0.2820	1.43E-02	0.2860	8.83E-03	0.1766	1.61E-02	0.3220	5.33E-02	0.5333
(1)	GI-LLI	1.42E-02	0.2840	1.50E-02	0.3000	7.81E-03	0.1562	1.45E-02	0.2900	5.15E-02	0.5151

		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)	Gamma Air	0.00E+00	0.0000	1.22E-07	0.0000	8.96E-07	0.0000	4.66E-08	0.0000	1.06E-06	0.0000
(2)	Beta Air	0.00E+00	0.0000	5.35E-10	0.0000	1.81E-09	0.0000	2.18E-10	0.0000	2.56E-09	0.0000
	Bone	9.30E-05	0.0012	8.16E-07	0.0000	4.12E-05	0.0005	6.27E-05	0.0008	1.98E-04	0.0013
O	Liver	7.54E-04	0.0101	1.87E-03	0.0249	3.73E-03	0.0497	1.95E-02	0.2600	2.59E-02	0.1724
R	Total Body	7.55E-04	0.0101	1.87E-03	0.0249	3.73E-03	0.0497	1.95E-02	0.2600	2.59E-02	0.1724
G	Thyroid	7.53E-04	0.0100	1.87E-03	0.0249	3.73E-03	0.0497	1.95E-02	0.2600	2.59E-02	0.1724
A	Kidney	7.53E-04	0.0100	1.87E-03	0.0249	3.73E-03	0.0497	1.95E-02	0.2600	2.59E-02	0.1724
N	Lung	7.66E-04	0.0102	1.87E-03	0.0249	3.73E-03	0.0497	1.96E-02	0.2613	2.60E-02	0.1731
(3)	GI-LLI	7.56E-04	0.0101	1.87E-03	0.0249	3.73E-03	0.0497	1.95E-02	0.2600	2.59E-02	0.1724

(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 miles 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 miles NW.

Limits used for calculation of percent (%) are from ODCM procedure 1/2-ODC-3.03, Attachment H Control 3.11.1.2, Attachment L Control 3.11.2.2, and Attachment M Control 3.11.2.3 (considered to be the design objectives).

Radioactive Effluent Release Report

Calendar Year – 2012
Table 6

Effluent Monitoring Instrumentation Channels Not Returned to Operable Status Within 30 Days
All Effluent Monitoring Instrumentation Channels (as required by procedure 1/2-ODC-3.03 of the Offsite Dose Calculation Manual) were returned to service within 30 days during this report period.

Radioactive Effluent Release Report

Calendar Year - 2012

Table 7

Total Dose Commitments, Total Effective Dose Equivalents and Population Doses

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	8.90E-02	0.00E+00	8.90E-02	0.36%
Liver	2.88E-01	0.00E+00	2.88E-01	1.15%
Total Body	3.75E-01	0.00E+00	3.75E-01	1.50%
Thyroid	1.68E-01	0.00E+00	1.68E-01	0.22%
Kidney	2.09E-01	0.00E+00	2.09E-01	0.84%
Lung	1.83E-01	0.00E+00	1.83E-01	0.73%
GI-LLI	1.79E-01	0.00E+00	1.79E-01	0.72%

(1) The cumulative dose contributions from liquid and gaseous effluents were determined in accordance with the applicable CONTROLS & SURVEILLANCE REQUIREMENTS listed in ODCM procedure 1/2-ODC-3.03. The dose commitment limits for 40 CFR 190 MEMBERS OF THE PUBLIC (ODCM 1/2-ODC-3.03 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).

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 4.13 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).

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 are not greater than the doses listed in this table to show compliance with 40 CFR Part 190 or 10 CFR 20.1301. Evaluations have shown that 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.

0-50 Mile Population Doses From Liquid and Gaseous Effluents

0-50 mile Total Population Dose from liquid and gaseous effluents =	457	man-mrem (Total Body)
0-50 mile Average Population Dose from liquid and gaseous effluents =	0.0001142	man-mrem (Total Body)

Radioactive Effluent Release Report

Calendar Year – 2012
Table 8

Offsite Dose Calculation Manual Surveillance Deficiencies
ODCM Deficiency Part 1 of 2 In 2011, it was reported that germanium detectors are not able to meet the ODCM required Lower Limits of Detection (LLD) for Cerium-144 (Ce-144) in the 1 liter bottle geometry. This geometry has since been removed from the program and is no longer used for any Radiological Effluent samples. Notification in this report is for follow-up purposes only because the condition was still under investigation last year (documented in Condition Report #2012-04412). **ODCM Deficiency Part 2 of 2** The groundwater monitoring well sample analysis for could not achieve the Lower Limit of Detection (LLD) for Ba-La-140 due to the age of the samples at the time of analysis. Ba-140 has a half life of 12.75 days and La-140 has a half life of 1.68 days. The extended period of time between the sampling dates and the analysis date combined with the short half lives of the isotopes in question, prevented the laboratory performing the analysis from reaching the LLD required. Delays in sample shipping were determined to be the cause (documented in Condition Report # 2012-10727).

Radioactive Effluent Release Report

Calendar Year – 2012
Table 9

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

There were three changes made to the ODCM during the report period. See ODCM procedure 1/2-ODC-1.01, "ODCM: Index, Matrix and History of ODCM Changes" for a complete description of the changes and the change justifications. A brief description of the changes are as follows:

Change (32) to the ODCM (Effective February 2012)

1) **Procedure 1/2-ODC-1.01, "ODCM: Index, Matrix and History of ODCM Changes" (Rev 14)**
   Updated the History of ODCM Changes to include this change.

2) **Procedure 1/2-ODC-2.01, "ODCM: Liquid Effluents" (Rev 10)**
   Incorporated changes to the Liquid Waste System from design changes.

Change (33) to the ODCM (Effective June 2012)

1) **Procedure 1/2-ODC-1.01, "ODCM: Index, Matrix and History of ODCM Changes" (Rev 15)**
   Updated the History of ODCM Changes to include this change.

2) **Procedure 1/2-ODC-2.01, "ODCM: Liquid Effluents" (Rev11)**
   Incorporated Ingestion Dose Commitment Factors for isotopes identified in the liquid waste system that were not previously included in the ODCM. Reduced the setpoints for Unit 1 Radiation Monitor [RM-1RW-100] per Calculation Package ERS-ART-93-021 Rev 4.

Change (34) to the ODCM (Effective July 2012)

1) **Procedure 1/2-ODC-1.01, "ODCM: Index, Matrix and History of ODCM Changes" (Rev 16)**
   Updated the History of ODCM Changes to include this change. Removed reference to analytical procedure 1/2-ENV-05.25.

2) **Procedure 1/2-ODC-2.01, "ODCM: Liquid Effluents" (Rev12)**
   Added the ability to discharge processed and unprocessed liquid wastes from the low level drains tanks [LW-TK-3A/B].

ENCLOSURE 2, ATTACHMENT 1

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1
Joint Frequency Distribution Tables

Attachment 1
As specified in the ODCM, an annual summary of hourly meteorological data (in form of joint frequency distribution) is provided for the calendar year. In summary, data collection for the year was near 100% for the 35 and 150 ft levels and about 98% at the 500 ft level. There were more unstable (A, B and C stability classes) hours than in recent years. This can probably be attributed to the overall warmer weather in 2012 which would generally be produced by more sunny days and therefore more unstable conditions.

Meteorological Data Recovery
The Meteorological Data Recovery for the calendar year met the minimum requirement of at-least 90% (as specified in Section 5 of Revision 1 to Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants). The actual Meteorological Data Recovery is shown in the following table:
PERCENT RECOVERY OF INDIVIDUAL METEROLOGICAL PARAMETERS
100% = Wind Speed 35'
100% = Wind Speed 150'
100% = Wind Speed 500'
100% = Wind Direction 35'
100% = Wind Direction 150'
98.8% = Wind Direction 500'
100% = Delta Temperature (150' – 35') 1P
100% = Delta Temperature (500' – 35') 2P
100% = Temperature 35'
100% = Precipitation
99.9% = Average Recovery of Individual Meteorological Parameters
PERCENT RECOVERY OF COMPOSITE VARIABLES
100% = Wind Speed 35', Wind Direction 35', Delta Temperature 1P
100% = Wind Speed 150', Wind Direction 150', Delta Temperature 1P
98.8% = Wind Speed 500', Wind Direction 500', Delta Temperature 2P
99.8% = Average Recovery of Composite Variables

Attachment 1 Clarification
Hourly meteorological data is not provided for specific periods of Abnormal Gaseous Release during the calendar quarters (as indicated in Regulatory Guide 1.21), for the following reasons: 1) All routine Gaseous Releases for the calendar year were determined to be within design objectives, where as, the ODCM Dose Limits and the ODCM Dose Rate Limits are considered to be the design objectives. 2) There were no Abnormal Gaseous Releases during the calendar year.
For a copy of the hourly meteorological data during the calendar quarters, contact Dr. Lara Renz at 724-682-4255.

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class A Delta Temperature Extremely Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	7	65	2	0	0	0	74
NNE	8	47	0	0	0	0	55
NE	19	21	0	0	0	0	40
ENE	17	23	0	0	0	0	40
E	8	19	0	0	0	0	27
ESE	12	10	0	0	0	0	22
SE	15	13	0	0	0	0	28
SSE	14	17	0	0	0	0	31
S	5	34	1	0	0	0	40
SSW	13	53	3	0	0	0	69
SW	14	53	19	1	0	0	87
WSW	17	85	31	0	0	0	133
W	20	123	13	0	0	0	156
WNW	16	82	7	0	0	0	105
NW	18	48	5	0	0	0	71
NNW	10	37	3	0	0	0	50
Total	213	730	84	1	0	0	1028

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	1028
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 2 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class B Delta Temperature Moderately Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	> 25	Total
N	6	15	2	0	0	0	23
NNE	4	2	0	0	0	0	6
NE	4	2	0	0	0	0	6
ENE	4	3	0	0	0	0	7
E	2	1	0	0	0	0	3
ESE	3	0	0	0	0	0	3
SE	1	0	0	0	0	0	1
SSE	3	1	0	0	0	0	4
S	1	4	0	0	0	0	5
SSW	4	7	1	0	0	0	12
SW	4	13	7	0	0	0	24
WSW	6	25	4	0	0	0	35
W	3	31	3	0	0	0	37
WNW	2	20	1	0	0	0	23
NW	4	27	5	0	0	0	36
NNW	2	16	0	0	0	0	18
Total	53	167	23	0	0	0	243

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	243
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class C Delta Temperature Slightly Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	7	16	1	0	0	0	24
NNE	11	4	0	0	0	0	15
NE	9	4	0	0	0	0	13
ENE	6	3	1	0	0	0	10
E	5	1	0	0	0	0	6
ESE	1	1	0	0	0	0	2
SE	2	0	0	0	0	0	2
SSE	0	2	0	0	0	0	2
S	3	2	0	0	0	0	5
SSW	4	13	2	0	0	0	19
SW	5	16	7	0	0	0	28
WSW	5	19	9	1	0	0	34
W	9	27	2	0	0	0	38
WNW	5	17	3	0	0	0	25
NW	3	17	0	0	0	0	20
NNW	3	14	0	0	0	0	17
Total	78	156	25	1	0	0	260

Calm Hours not Included above for :	**Total Period**	4
Variable Direction Hours for:	**Total Period**	0
Invalid Hours for:	**Total Period**	0
Valid Hours for this Stability Class for:	**Total Period**	260
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 4 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class D Delta Temperature Neutral

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	70	89	2	0	0	0	161
NNE	60	36	0	0	0	0	96
NE	79	9	0	0	0	0	88
ENE	64	28	0	0	0	0	92
E	44	18	0	0	0	0	62
ESE	21	5	0	0	0	0	26
SE	25	3	0	0	0	0	28
SSE	22	10	0	0	0	0	32
S	22	31	3	0	0	0	56
SSW	42	60	11	0	0	0	113
SW	52	159	105	11	0	0	327
WSW	52	182	93	19	0	0	346
W	61	235	109	6	0	0	411
WNW	85	134	25	0	0	0	244
NW	80	127	8	0	0	0	215
NNW	80	101	2	0	0	0	183
Total	859	1227	358	36	0	0	2480

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	2480
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 5 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class E Delta Temperature Slightly Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	94	26	0	0	0	0	120
NNE	84	18	0	0	0	0	102
NE	129	19	0	0	0	0	148
ENE	167	42	0	0	0	0	209
E	172	10	0	0	0	0	182
ESE	112	4	0	0	0	0	116
SE	112	4	0	0	0	0	116
SSE	127	7	0	0	0	0	134
S	140	28	0	0	0	0	168
SSW	153	90	10	1	0	0	254
SW	97	131	51	3	0	0	282
WSW	73	105	57	6	1	0	242
W	67	74	40	1	0	0	182
WNW	68	43	2	0	0	0	113
NW	74	53	6	0	0	0	133
NNW	78	36	1	0	0	0	115
Total	1747	690	167	11	1	0	2616

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	2616
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 6 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class F Delta Temperature Moderately Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	15	1	0	0	0	0	16
NNE	16	3	0	0	0	0	19
NE	31	0	0	0	0	0	31
ENE	71	0	0	0	0	0	71
E	164	2	0	0	0	0	166
ESE	279	0	0	0	0	0	279
SE	232	1	0	0	0	0	233
SSE	140	3	0	0	0	0	143
S	161	4	0	0	0	0	165
SSW	87	16	1	0	0	0	104
SW	31	8	2	0	0	0	41
WSW	13	8	1	0	0	0	22
W	8	1	0	0	0	0	9
WNW	5	3	0	0	0	0	8
NW	9	0	0	0	0	0	9
NNW	15	0	0	0	0	0	15
Total	1277	50	4	0	0	0	1331

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	1331
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 7 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35
Stability Class G Delta Temperature Extremely Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	5	2	0	0	0	0	7
NNE	11	0	0	0	0	0	11
NE	20	0	0	0	0	0	20
ENE	44	0	0	0	0	0	44
E	109	0	0	0	0	0	109
ESE	172	0	0	0	0	0	172
SE	195	0	0	0	0	0	195
SSE	111	0	0	0	0	0	111
S	66	3	0	0	0	0	69
SSW	33	10	0	0	0	0	43
SW	20	1	0	0	0	0	21
WSW	8	0	0	0	0	0	8
W	3	0	0	0	0	0	3
WNW	2	0	0	0	0	0	2
NW	1	0	0	0	0	0	1
NNW	6	0	0	0	0	0	6
Total	806	16	0	0	0	0	822

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	822
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 1: Joint Frequency Distribution Tables (35 ft)
Page 8 of 8

Hours at Each Wind Speed and Direction

Summary of All Stability Classes

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00

Elevation: **Speed:** SP35P **Direction:** DI35P **Lapse:** DT150-35

Delta Temperature

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	204	214	7	0	0	0	425
NNE	194	110	0	0	0	0	304
NE	291	55	0	0	0	0	346
ENE	373	99	1	0	0	0	473
E	504	51	0	0	0	0	555
ESE	600	20	0	0	0	0	620
SE	582	21	0	0	0	0	603
SSE	417	40	0	0	0	0	457
S	398	106	4	0	0	0	508
SSW	336	249	28	1	0	0	614
SW	223	381	191	15	0	0	810
WSW	174	424	195	26	1	0	820
W	171	491	167	7	0	0	836
WNW	183	299	38	0	0	0	520
NW	189	272	24	0	0	0	485
NNW	194	204	6	0	0	0	404
Total	5033	3036	661	49	1	0	8780

Calm Hours not Included above for :	Total Period	4
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	8780
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 1 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class A Delta Temperature Extremely Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	5	28	41	8	0	0	82
NNE	2	16	28	11	0	0	57
NE	0	13	7	0	0	0	20
ENE	1	28	9	1	0	0	39
E	0	33	9	0	0	0	42
ESE	1	20	7	0	0	0	28
SE	1	25	25	0	0	0	51
SSE	1	27	21	2	0	0	51
S	3	27	24	2	0	0	56
SSW	1	19	28	3	0	0	51
SW	4	12	27	4	0	0	47
WSW	8	31	41	12	0	0	92
W	10	85	69	19	1	0	184
WNW	8	55	51	11	3	0	128
NW	1	29	21	0	0	0	51
NNW	6	15	25	3	0	0	49
Total	52	463	433	76	4	0	1028

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	1028
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 2 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class B Delta Temperature Moderately Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	1	9	9	2	0	0	21
NNE	0	9	1	1	0	0	11
NE	1	1	1	0	0	0	3
ENE	2	5	2	0	0	0	9
E	0	4	0	0	0	0	4
ESE	1	3	1	0	0	0	5
SE	0	2	1	0	0	0	3
SSE	0	4	1	0	0	0	5
S	1	7	6	0	0	0	14
SSW	1	3	5	1	0	0	10
SW	1	6	3	2	0	0	12
WSW	5	4	17	1	0	0	27
W	2	14	20	4	0	0	40
WNW	0	9	15	4	0	0	28
NW	3	15	11	4	0	0	33
NNW	1	10	6	1	0	0	18
Total	19	105	99	20	0	0	243

Calm Hours not Included above for :	**Total Period**	0
Variable Direction Hours for:	**Total Period**	0
Invalid Hours for:	**Total Period**	0
Valid Hours for this Stability Class for:	**Total Period**	243
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 3 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class C Delta Temperature Slightly Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	5	14	6	1	0	0	26
NNE	4	8	5	0	0	0	17
NE	0	9	0	0	0	0	9
ENE	1	6	4	0	0	0	11
E	0	3	1	0	0	0	4
ESE	1	3	0	0	0	0	4
SE	0	2	2	0	0	0	4
SSE	1	2	2	0	0	0	5
S	0	8	4	0	0	0	12
SSW	1	5	5	1	0	0	12
SW	4	4	9	5	0	0	22
WSW	3	7	14	4	0	0	28
W	4	17	17	3	0	0	41
WNW	1	12	8	7	1	0	29
NW	2	11	10	1	0	0	24
NNW	3	4	5	0	0	0	12
Total	30	115	92	22	1	0	260

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	260
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 4 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class D Delta Temperature Neutral

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	> 25	Total
N	27	84	65	2	0	0	178
NNE	36	62	26	1	0	0	125
NE	22	32	5	0	0	0	59
ENE	23	56	22	8	0	0	109
E	7	29	5	1	0	0	42
ESE	6	13	1	0	0	0	20
SE	3	21	7	0	0	0	31
SSE	3	36	9	0	0	0	48
S	15	43	28	5	1	0	92
SSW	11	39	46	10	0	0	106
SW	26	49	113	40	5	0	233
WSW	34	63	104	63	9	1	274
W	28	97	201	133	34	5	498
WNW	22	104	116	51	4	0	297
NW	32	92	72	13	0	0	209
NNW	28	91	40	0	0	0	159
Total	323	911	860	327	53	6	2480

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	2480
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 5 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class E Delta Temperature Slightly Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	35	51	20	0	0	0	106
NNE	74	38	17	1	0	0	130
NE	85	64	2	0	0	0	151
ENE	87	135	40	2	0	0	264
E	51	54	8	0	0	0	113
ESE	35	43	10	1	0	0	89
SE	34	38	15	0	0	0	87
SSE	23	46	10	1	0	0	80
S	39	69	34	1	0	0	143
SSW	51	85	50	11	1	0	198
SW	61	91	119	23	0	0	294
WSW	53	101	61	17	2	0	234
W	43	91	83	58	18	3	296
WNW	27	118	45	12	1	0	203
NW	20	80	27	7	0	0	134
NNW	19	65	11	0	0	0	95
Total	737	1169	552	134	22	3	2617

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	2617
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 6 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class F Delta Temperature Moderately Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	71	16	1	0	0	0	88
NNE	143	30	0	0	0	0	173
NE	107	81	0	0	0	0	188
ENE	69	63	0	0	0	0	132
E	28	15	0	1	0	0	44
ESE	17	9	1	0	0	0	27
SE	8	11	4	0	0	0	23
SSE	19	14	0	0	0	0	33
S	30	15	8	0	0	0	53
SSW	78	61	6	0	0	0	145
SW	97	58	8	4	0	0	167
WSW	57	55	8	1	0	0	121
W	35	19	3	0	0	0	57
WNW	6	23	1	1	0	0	31
NW	16	9	0	0	0	0	25
NNW	21	6	0	0	0	0	27
Total	802	485	40	7	0	0	1334

Calm Hours not Included above for :	**Total Period**	0
Variable Direction Hours for:	**Total Period**	0
Invalid Hours for:	**Total Period**	0
Valid Hours for this Stability Class for:	**Total Period**	1334
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)
Page 7 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35
Stability Class G Delta Temperature Extremely Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	30	4	0	0	0	0	34
NNE	65	41	0	0	0	0	106
NE	99	37	0	0	0	0	136
ENE	49	20	0	0	0	0	69
E	18	19	0	0	0	0	37
ESE	12	22	1	0	0	0	35
SE	11	5	0	0	0	0	16
SSE	10	7	0	0	0	0	17
S	22	37	7	0	0	0	66
SSW	48	49	4	0	0	0	101
SW	51	32	10	0	0	0	93
WSW	18	13	1	0	0	0	32
W	20	6	0	0	0	0	26
WNW	15	5	0	0	0	0	20
NW	16	5	0	0	0	0	21
NNW	12	1	0	0	0	0	13
Total	496	303	23	0	0	0	822

Calm Hours not Included above for :	**Total Period**	0
Variable Direction Hours for:	**Total Period**	0
Invalid Hours for:	**Total Period**	0
Valid Hours for this Stability Class for:	**Total Period**	822
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 2: Joint Frequency Distribution Tables (150 ft)

Hours at Each Wind Speed and Direction

Summary of All Stability Classes

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00

Elevation: **Speed:** SP150P **Direction:** DI150P **Lapse:** DT150-35

Delta Temperature

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	174	206	142	13	0	0	535
NNE	324	204	77	14	0	0	619
NE	314	237	15	0	0	0	566
ENE	232	313	77	11	0	0	633
E	104	157	23	2	0	0	286
ESE	73	113	21	1	0	0	208
SE	57	104	54	0	0	0	215
SSE	57	136	43	3	0	0	239
S	110	206	111	8	1	0	436
SSW	191	261	144	26	1	0	623
SW	244	252	289	78	5	0	868
WSW	178	274	246	98	11	1	808
W	142	329	393	217	53	8	1142
WNW	79	326	236	86	9	0	736
NW	90	241	141	25	0	0	497
NNW	90	192	87	4	0	0	373
Total	2459	3551	2099	586	80	9	8784

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	0
Valid Hours for this Stability Class for:	Total Period	8784
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class A Delta Temperature Extremely Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	0	2	4	2	0	0	8
NNE	0	0	0	2	0	0	2
NE	0	1	0	0	0	0	1
ENE	0	2	2	0	0	0	4
E	0	3	4	0	0	0	7
ESE	0	2	7	0	0	0	9
SE	0	2	9	0	0	0	11
SSE	0	3	7	9	0	0	19
S	0	0	2	0	0	0	2
SSW	0	0	3	0	0	0	3
SW	0	0	0	0	0	0	0
WSW	0	2	0	0	0	0	2
W	0	2	7	4	0	0	13
WNW	0	3	1	3	0	0	7
NW	0	2	2	2	0	0	6
NNW	0	0	1	0	0	0	1
Total	0	24	49	22	0	0	95

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	95
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 2 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class B Delta Temperature Moderately Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	> 25	Total
N	0	3	13	13	1	0	30
NNE	0	0	6	4	0	0	10
NE	0	3	6	0	0	0	9
ENE	0	5	4	0	0	0	9
E	0	1	2	0	0	0	3
ESE	0	4	1	0	0	0	5
SE	0	5	8	0	0	0	13
SSE	0	4	9	1	0	0	14
S	0	6	14	1	0	0	21
SSW	1	0	3	2	0	0	6
SW	0	1	3	2	0	0	6
WSW	0	6	9	3	0	0	18
W	0	3	6	12	0	0	21
WNW	0	9	17	7	0	0	33
NW	0	3	8	3	0	0	14
NNW	0	1	8	2	0	0	11
Total	1	54	117	50	1	0	223

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	223
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 3 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class C Delta Temperature Slightly Unstable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	1	7	21	13	0	0	42
NNE	1	4	5	3	0	0	13
NE	0	2	3	0	0	0	5
ENE	0	7	4	0	0	0	11
E	1	10	2	1	0	0	14
ESE	1	14	3	0	0	0	18
SE	0	8	6	1	0	0	15
SSE	0	3	8	0	0	0	11
S	0	14	15	3	0	0	32
SSW	0	10	22	10	0	0	42
SW	1	5	19	5	1	0	31
WSW	1	3	21	13	0	0	38
W	3	15	28	12	3	0	61
WNW	2	13	33	9	4	1	62
NW	1	2	8	5	0	0	16
NNW	0	9	11	9	0	0	29
Total	12	126	209	84	8	1	440

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	440
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 4 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class D Delta Temperature Neutral

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	16	64	171	89	0	0	340
NNE	12	37	36	34	0	0	119
NE	25	43	28	3	0	0	99
ENE	19	57	54	25	4	0	159
E	31	59	46	9	2	0	147
ESE	12	56	39	13	1	0	121
SE	14	35	28	14	5	0	96
SSE	15	30	29	16	2	0	92
S	7	39	95	39	4	2	186
SSW	9	33	73	84	23	1	223
SW	12	43	111	197	94	12	469
WSW	17	52	130	161	62	13	435
W	13	78	171	262	136	60	720
WNW	17	73	208	142	59	19	518
NW	16	63	133	73	18	3	306
NNW	15	67	145	43	10	1	281
Total	250	829	1497	1204	420	111	4311

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	4311
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 5 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class E Delta Temperature Slightly Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	15	26	29	16	0	0	86
NNE	29	22	21	9	0	0	81
NE	27	29	8	0	0	0	64
ENE	35	48	45	4	0	0	132
E	28	84	33	2	0	0	147
ESE	36	65	43	10	0	0	154
SE	24	55	41	19	6	1	146
SSE	24	38	38	24	8	0	132
S	22	33	44	46	8	0	153
SSW	14	25	45	68	14	0	166
SW	27	36	67	85	55	7	277
WSW	37	72	59	11	7	1	187
W	40	74	110	38	7	0	269
WNW	31	56	50	11	0	0	148
NW	17	34	25	4	2	0	82
NNW	16	21	26	16	0	0	79
Total	422	718	684	363	107	9	2303

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	2303
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 6 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class F Delta Temperature Moderately Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	> 25	Total
N	21	11	10	0	0	0	42
NNE	20	7	5	0	0	0	32
NE	21	20	0	1	0	0	42
ENE	25	24	7	0	0	0	56
E	36	53	17	0	0	0	106
ESE	41	43	10	3	0	0	97
SE	24	32	10	8	0	0	74
SSE	32	35	13	7	0	0	87
S	15	35	24	16	1	0	91
SSW	18	20	40	33	2	0	113
SW	17	19	30	28	11	0	105
WSW	25	37	25	1	0	0	88
W	15	27	28	8	0	0	78
WNW	14	24	22	1	0	0	61
NW	15	10	4	1	0	0	30
NNW	20	6	5	0	0	0	31
Total	359	403	250	107	14	0	1133

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	1133
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 7 of 8

Hours at Each Wind Speed and Direction

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00
Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35
Stability Class G Delta Temperature Extremely Stable

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	1	1	0	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	1	1	0	0	0	0	2
E	1	5	1	0	0	0	7
ESE	3	5	2	0	0	0	10
SE	5	2	0	3	0	0	10
SSE	3	5	7	2	1	0	18
S	1	9	17	4	0	0	31
SSW	2	6	11	6	0	0	25
SW	0	2	2	1	0	0	5
WSW	0	2	0	0	0	0	2
W	3	0	0	0	0	0	3
WNW	0	0	0	0	0	0	0
NW	1	0	0	0	0	0	1
NNW	1	0	0	0	0	0	1
Total	22	38	40	16	1	0	117

Calm Hours not Included above for :	Total Period	0
Variable Direction Hours for:	Total Period	0
Invalid Hours for:	Total Period	162
Valid Hours for this Stability Class for:	Total Period	117
Total Hours for Period		8784

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 1

Part 3: Joint Frequency Distribution Tables (500 ft)
Page 8 of 8

Hours at Each Wind Speed and Direction

Summary of All Stability Classes

Total Period

Period of Record = 1/1/2012 00:00 - 12/31/2012 23:00

Elevation: **Speed:** SP500P **Direction:** DI500P **Lapse:** DT500-35

Delta Temperature

Wind Speed (mph)

Wind Direction	1 - 4	4 - 8	8 - 13	13 - 19	19 - 25	≥ 25	Total
N	54	114	248	133	1	0	550
NNE	62	70	73	52	0	0	257
NE	73	98	45	4	0	0	220
ENE	80	144	116	29	4	0	373
E	97	215	105	12	2	0	431
ESE	93	189	105	26	1	0	414
SE	67	139	102	45	11	1	365
SSE	74	118	111	59	11	0	373
S	45	136	211	109	13	2	516
SSW	44	94	197	203	39	1	578
SW	57	106	232	318	161	19	893
WSW	80	174	244	189	69	14	770
W	74	199	350	336	146	60	1165
WNW	64	178	331	173	63	20	829
NW	50	114	180	88	20	3	455
NNW	52	104	196	70	10	1	433
Total	1066	2192	2846	1846	551	121	8622

Calm Hours not Included above for :	**Total Period**	0
Variable Direction Hours for:	**Total Period**	0
Invalid Hours for:	**Total Period**	162
Valid Hours for this Stability Class for:	**Total Period**	8622
Total Hours for Period		8784

ENCLOSURE 2, ATTACHMENT 2

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 2

Unit 1 and 2 Offsite Dose Calculation Manual Changes

Attachment 2
Attached is a complete copy of the ODCM that includes: Change (32) of the ODCM (Effective February 2012) Change (33) of the ODCM (Effective June 2012) Change (34) of the ODCM (Effective July 2012)

Attachment 2 Clarification
A complete copy of the ODCM has been provided to the following offices: United States Nuclear Regulatory Commission Attention: Document Control Desk Washington, DC 20555-0001 United States Nuclear Regulatory Commission Regional Administrator 475 Allendale Road King of Prussia, PA 19406
For a complete copy of the ODCM, contact Dr. Lara M. Renz at 724-682-4255.

ENCLOSURE 2, ATTACHMENT 3

Beaver Valley Power Station – Units 1 & 2

Radioactive Effluent Release Report

Calendar Year – 2012
Attachment 3

Unit 1 and 2 Carbon-14 (C-14) Dose Estimates

Carbon-14 Methodology

Gaseous doses from carbon-14 were calculated according to Regulatory Guide 1.109 methodology. However, only daylight growing season hours were utilized for batch releases, which accounted for minimal dose consequence compared to continuous releases. Liquid effluent release doses are considered to be insignificant and are not included in this report. This report does not address the amount of carbon-14 disposed of in shipments of solid waste and irradiated fuel. The term "other" discussed below refers to liver, total body, thyroid, kidney, lung and GI. Doses for these organs are assumed to be equal.

The receptor chosen was selected based upon the default ODCM receptor - NW 1432 meters (0.89 miles). It is assumed that only vegetation and inhalation exposure pathways are available.

The year of 2012 was the beginning of carbon-14 sampling (in the form of CO_2) at BVPS for gaseous effluent releases. The large disparity between data from Unit 1 and Unit 2 is believed to be caused by differences in the dilution flow in the ventilation systems. Future data will be needed to confirm this trend.

Dose Calculations for Unit 1

Exposure Pathway	Infant		Child		Teen		Adult	
	Bone	Other*	Bone	Other*	Bone	Other*	Bone	Other*
Inhalation	3.1E-01	6.0E-02	4.0E-01	7.7E-02	3.0E-01	5.7E-02	2.1E-01	4.0E-02
Vegetation Ingestion	-	-	3.0E+00	6.0E-01	1.2E+00	2.5E-01	7.7E-01	1.5E-01
TOTAL	**3.1E-01**	**6.0E-02**	**3.4E+00**	**6.8E-01**	**1.5E+00**	**3.1E-01**	**9.8E-01**	**1.9E-01**

Dose Calculations for Unit 2

Exposure Pathway	Infant		Child		Teen		Adult	
	Bone	Other*	Bone	Other*	Bone	Other*	Bone	Other*
Inhalation	3.1E-02	6.4E-03	4.3E-02	8.0E-03	3.0E-02	5.7E-03	2.1E-02	4.0E-03
Vegetation Ingestion	-	-	1.5E-02	3.1E-03	6.5E-03	1.3E-03	4.0E-03	8.0E-04
TOTAL	**3.1E-02**	**6.4E-03**	**5.9E-02**	**1.1E-02**	**3.7E-02**	**7.0E-03**	**2.5E-02**	**4.8E-03**

Dose Calculations for Total Site

	Infant		Child		Teen		Adult	
	Bone	Other*	Bone	Other*	Bone	Other*	Bone	Other*
TOTAL	**3.4E-01**	**6.6E-02**	**3.5E+00**	**6.9E-01**	**1.5E+00**	**3.1E-01**	**1.0E+00**	**1.9E-01**