DUKE ENERGY®

Brunswick Nuclear Plant
P.O. Box 10429
Southport, NC 28461

APR 3 0 2015

Serial: BSEP 15-0032

10 CFR 50.36a

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket No. 50-325 and 50-324
Radioactive Effluent Release Report for 2014

Ladies and Gentlemen:

In accordance with 10 CFR 50.36a and Technical Specification (TS) 5.6.3 for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2, Duke Energy Progress, Inc., is submitting the enclosed Radioactive Effluent Release Report for BSEP Unit Nos. 1 and 2. This report covers the period from January 1, 2014, through December 31, 2014.

TS 5.5.1, "Offsite Dose Calculation Manual (ODCM)," requires changes to the ODCM be submitted as part of, or concurrent with, the Radioactive Effluent Release Report. The ODCM was not revised during the report period.

No regulatory commitments are contained in this submittal. Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager - Regulatory Affairs, at (910) 457-2487.

Annette H. Pope
Director – Organizational Effectiveness
Brunswick Steam Electric Plant

AHS/ahs

Enclosure: Radioactive Effluent Release Report for 2014

IE48
NRR

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Victor M. McCree, Regional Administrator
245 Peachtree Center Ave, NE, Suite 1200
Atlanta, GA 30303-1257

U. S. Nuclear Regulatory Commission
ATTN: Ms. Michelle P. Catts, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission
ATTN: Mr. Andrew Hon **(Electronic Copy)**
11555 Rockville Pike
Rockville, MD 20852-2738

Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

Mr. W. Lee Cox, III, Section Chief **(Electronic Copy Only)**
Radiation Protection Section
North Carolina Department of Health and Human Services
1645 Mail Service Center
Raleigh, NC 27699-1645
lee.cox@dhhs.nc.gov

Radioactive Effluent Release Report for 2014

Brunswick Steam Electric Plant
Radioactive Effluent Release Report
January 1 through December 31, 2014

Table of Contents

Facility: Brunswick Steam Electric Plant
Licensee: Duke Energy Progress, Inc.

1. Regulatory Limits
   A. Fission and activation gases (ODCMS 7.3.8)
      (1) Calendar Quarter
         (a) ≤ 10 mrad gamma
         (b) ≤ 20 mrad beta
      (2) Calendar Year
         (a) ≤ 20 mrad gamma
         (b) ≤ 40 mrad beta
   B. Iodine-131, iodine-133, tritium, and particulates with half-lives greater than eight days (ODCMS 7.3.9)
      (1) Calendar Quarter
         (a) ≤ 15 mrem to any organ
      (2) Calendar Year
         (a) ≤ 30 mrem to any organ
   C. Liquid Effluents (ODCMS 7.3.4)
      (1) Calendar Quarter
         (a) ≤ 3 mrem to total body
         (b) ≤ 10 mrem to any organ
      (2) Calendar Year
         (a) ≤ 6 mrem to total body
         (b) ≤ 20 mrem to any organ
2. Effluent concentration limits and dose rates which determine maximum instantaneous release rates.
   A. Fission and activation gases (ODCMS 7.3.7.a)
      (1) ≤ 500 mrem/year to total body
      (2) ≤ 3000 mrem/year to the skin
   B. Iodine-131, iodine-133, tritium, and particulates with half-lives greater than eight days (ODCMS 7.3.7.b)
      (1) ≤ 1500 mrem/year to any organ

C. Liquid effluents (ODCMS 7.3.3)

The concentration of radioactive material released in liquid effluents to unrestricted areas after dilution in the discharge canal shall be limited to 10 times the concentrations specified in Appendix B, Table 2, Column 2 in 10 CFR 20.1001 - 20.2401 for radionuclides other than dissolved or entrained noble gases. The concentration shall be limited to the value given in the ODCM specifications for the following radionuclides:

(1) Tritium: limit = 1.00E-03 μCi/ml [1]
(2) Dissolved and entrained noble gases: limit = 2.00E-04 μCi/ml [1]

3. Measurements and Approximations of Total Radioactivity

A. Fission and activation gases

Analyses for specific radionuclides in representative grab samples by gamma spectroscopy.

B. Iodines

Analysis for specific radionuclides collected on charcoal cartridges by gamma spectroscopy.

C. Particulates

Analysis for specific radionuclides collected on filter papers by gamma spectroscopy.

D. Liquid Effluents

Analysis for specific radionuclides of individual releases by gamma spectroscopy.

E. Tritium

Analysis by liquid scintillation.

[1] Used as applicable limits for Attachment 2, Table 2A

Total error where reported represents a best effort to approximate the total of all individual and sampling errors.

4. Batch Releases

A. Liquid	Jan – Jun	Jul – Dec
(1) Number of batch releases:	8.80E+01	9.90E+01
(2) Total time period for batch releases (min):	1.47E+05	3.36E+05
(3) Maximum time period for a batch release (min):	3.16E+04	4.29E+04
(4) Average time period for a batch release (min):	1.67E+03	3.39E+03
(5) Minimum time period for a batch release (min):	1.00E+00	1.00E+00
(6) Average stream flow during periods of release of effluent into a flowing stream (gal/min):	6.09E+05	6.88E+05

B. Gaseous	
(1) Number of batch releases:	0.00E+00
(2) Total time period for batch releases:	0.00E+00 Minutes
(3) Maximum time period for a batch release:	0.00E+00 Minutes
(4) Average time period for a batch release:	0.00E+00 Minutes
(5) Minimum time period for a batch release:	0.00E+00 Minutes

5. Abnormal Releases[1]

A. Liquid	
(1) Number of releases:	0.00E+00
(2) Total activity released:	0.00E+00 Curies

B. Gaseous	
(1) Number of releases:	0.00E+00
(2) Total activity released:	0.00E+00 Curies

[1] There were no abnormal releases that exceeded 10 CFR 20 or 10 CFR 50 limits. See pages 5-6 for a discussion of release events that occurred.

Discussion of liquid release from the BSEP Sewage Treatment Plant

In accordance with the Brunswick Steam Electric Plant (BSEP) National Pollutant Discharge Elimination System (NPDES) Permit Number NC0007064 the decant from the BSEP Sewage Treatment Plant is released to Outfall Number 004. Outfall Number 004 discharges to the discharge canal which is a designated release point. The BSEP sewage decant is sampled monthly for gamma and tritium analysis. On December 11, 2013 the monthly effluent sample contained tritium, there was no detectable gamma activity. Condition Report (CR) 651320 was generated and daily sampling was initiated for effluent accountability. Inputs to the system were sampled and it was discovered that tritiated groundwater is leaking into the Number 6 lift station. The source of tritium is from pre-existing groundwater contamination in the general area surrounding the Number 6 lift station. Regulatory Affairs confirmed this was not reportable per NEI 07-07 groundwater reporting. Work Order 13341340 was initiated to inspect and repair the Number 6 lift station. Approximately 1.20E+06 gallons containing 1.30E-02 curies of tritium was released in 2014 to the discharge canal.

Discussion of Carbon-14 in Gaseous Effluents

BNP's Updated Final Safety Analysis Report (UFSAR) states the C-14 release rate from a BWR is approximately 9.50E+00 Ci/yr assuming 80% plant capacity factor. Since BNP has two reactors, the release rate would be 1.90E+01 Ci/yr. This value was scaled using Effective Full Power Days (EFPD) to give a release rate of 2.20E+01 Ci/yr. Based on the 2014 Land Use Census, the critical receptor is located in the south sector at 1.8 miles with a garden. There are no meat or milk pathways within 5 miles. Regulatory Guide 1.109 methodology was used to determine the dose to this critical receptor. The bone dose for 2014 was 2.03E+00 mrem and the total body dose was 4.07E-01 mrem.

Discussion of liquid releases from the Storm Drain Collector Basin (SDCB)

During periods of heavy rain, the contents of the SDCB may be released to the discharge canal in accordance with regulatory requirements to protect plant personnel and equipment. The SDCB was released directly to the discharge canal on eighteen occasions in 2014 due to heavy rains. Approximately 3.39E+06 gallons containing 2.55E-01 curies of tritium were released. There was no detectable gamma radioactivity.

Discussion of liquid releases from the Storm Drain Stabilization Pond (SDSP) Infiltration

On August 22, 2014 water was found flowing from the Storm Drain Stabilization Facility (SDSF) outfall pipe into the intake canal when a permitted release was not in progress. The water was analyzed and found to contain tritium. Condition Report 704775 was generated and daily sampling was initiated for effluent accountability. Subsequent investigation determined the water was infiltrating through the side of the first collection box in the drainage line located near the SDSP discharge weir. The pipe was repaired by installing a fiberglass liner inside the existing outfall pipe and sealing the original pipe/liner interface. This repair was completed on March 24, 2015. Approximately 1.07E+05 gallons containing 2.75E-03 curies of tritium was released in 2014. There was no detectable gamma radioactivity.

Discussion of liquid releases from the Storm Drain Stabilization Facility (SDSF)

The SDSF collects rainwater, water from miscellaneous low volume drains on plant site, and water from the Groundwater Extraction System. Treatment consists of filtration and evaporation. When sufficient water has accumulated in the pond it is released into the intake

canal where it is drawn into the plant circulating and service water system and eventually released into the discharge canal. There were seventeen SDSF releases in 2014. Approximately 7.60E+07 gallons containing 8.43E+00 curies of tritium were released from the SDSF. There was no detectable gamma radioactivity.

Discussion of water evaporation from the Storm Drain Stabilization Pond

It was calculated that 6.14E+07 gallons of tritiated water was released via evaporation from the SDSP in 2014. This yields 7.17E-01 curies of tritium released to the atmosphere as a ground release. The nearest resident to the pond is in the northwest sector at approximately 0.3 miles. The maximum exposed individuals at that location received a calculated dose of 2.20E-04 mrem via the inhalation pathway in 2014. Only inhalation dose was determined because the exposed individuals do not have a garden and also do not have any milk or meat animals at this location.

Discussion of water evaporation from the Storm Drain Stabilization Facility

It was calculated that 4.90E+06 gallons of tritiated water was released via evaporation from the SDSF in 2014. This yields 5.73E-01 curies of tritium released to the atmosphere as a ground release. The nearest resident to the facility is in the north northwest sector at approximately 0.5 miles. The maximum exposed individuals at that location received a calculated dose of 3.69E-04 mrem via the inhalation pathway in 2014. Only inhalation dose was determined because the exposed individuals do not have a garden and also do not have any milk or meat animals at this location.

Discussion of liquid releases from the Marsh to Nancy's Creek

Samples are routinely analyzed from the marsh areas that drain into Nancy's Creek during falling tides. The marsh areas are all on company owned property. The marsh land is under the influence of high and low tides and releases to Nancy's Creek, which is offsite. This constitutes a release point for evaluation. The sampling program consists of weekly sampling and analysis at eight locations. All gamma analyses performed in 2014 were less than the Lower Limit of Detection (LLD). There were 416 tritium analyses performed, which resulted in 30 positive tritium results. The average concentration each month, two high tides per day, the area of the marsh at high tide, the days in the month, and a conservative factor of 2 was used to calculated the amount of tritium released each month. In 2014, it was calculated that 5.38E+07 gallons were released to Nancy's Creek containing 1.29E-01 curies of tritium. This yielded a Total Body dose of 1.57E-03 mrem to an adult from eating fish and invertebrate (shrimp, crabs, etc.).

Discussion of Groundwater Monitoring

The BSEP groundwater sampling and analysis program has grown into a significant surveillance program. Wells have been installed around the SDSP, in the Protected Area (PA), and throughout the Owner Controlled Area (OCA). Ten wells are listed in the ODCM and are addressed in the Radiological Environmental Monitoring Report (REMP). The monitoring wells that are not covered in the ODCM will be discussed below. These wells consist of shallow and intermediate wells in different locations around the OCA and PA. These wells are used to evaluate groundwater movement and for remediation of the Unit 1 Condensate Storage Tank (CST) leak and the SDSP.

Unit 1 CST Groundwater Wells – The investigation into groundwater impacts resulting from the December 2010 Unit 1 Condensate Storage Tank line leak resulted in the installation of numerous monitoring/recovery wells. Four of these wells (U1CSTREM-01, U1CSTREM-07, U1CSTREM-08, and U1CSTREM-09) are installed in the Castle Hayne aquifer (greater than 70' below ground surface) to investigate and monitor potential impacts to the aquifer. Ten of these wells (U1CSTREM-05, U1CSTREM-02B, U1CSTREM-08, U1CSTREM-09B, U1CSTREM-15, U1CSTREM-21B, U1CSTREM-22B, U1CSTREM-27B, MW-01B, and MWPA-111B) are installed in the dense sand unit (45' – 70' below ground surface) to investigate and monitor impacts to this flow zone comprised of native material beneath the plant excavation backfill. At least three of these dense sand wells are planned to be used as recovery wells as part of the groundwater remediation effort. Twenty-four of these wells (U1CSTREM-02C, U1CSTREM-09C, U1CSTEM-10, U1CSTREM-11, U1CSTREM-12, U1CSTREM-13, U1CSTREM-14, U1CSTREM-16, U1CSTREM-18, U1CSTREM-19, U1CSTREM-21C, U1CSTREM-22C, U1CSTREM-23, U1CSTREM-24, U1CSTREM-25, U1CSTREM-26, U1CSTREM-27C, U1CSTREM-28, U1CSTREM-29, U1CSTREM-30, U1CSTREM-31, U1CSTREM-32, U1CSTREM-33, and MWPA-112C) are installed in the plant excavation backfill (up to 45' below ground surface) to investigate and monitor impacts to this flow zone where the leak occurred. At least fifteen of these wells are planned to be used as recovery wells as part of the groundwater remediation effort. Additional wells are planned for installation as part of the monitoring and remediation effort.

Several gamma analyses were performed and all results were less than LLD. Below are the tritium (H-3) results for the wells that are not included in the ODCM. Maps showing the locations of these wells are available upon request.

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
ESS-2C	4	4	1.61E+04	1.40E+04	1.99E+04	27
ESS-3C	2	2	1.76E+03	1.20E+03	2.31E+03	14
ESS-12C	2	0	<LLD	<LLD	<LLD	15
ESS-13C	5	2	7.34E+02	2.58E+02	1.21E+03	25
ESS-16	4	4	1.18E+03	8.17E+02	1.64E+03	27
ESS-17C	5	5	8.38E+03	4.63E+03	1.10E+04	26
ESS-18C	4	4	2.53E+04	4.08E+03	5.53E+04	20
ESS-19C	5	5	1.57E+05	1.20E+05	2.37E+05	20

Attachment 2
Effluent and Waste Disposal Report Supplemental Information

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
ESS-20C	5	5	2.12E+04	9.21E+03	3.78E+04	20
ESS-21C	2	2	1.26E+03	8.30E+02	1.69E+03	20
ESS-22C	5	4	9.10E+04	3.44E+03	2.86E+05	20
ESS-23C	3	3	1.69E+05	1.54E+05	1.87E+05	23
ESS-24C	3	3	4.46E+03	4.08E+03	4.68E+03	18
ESS-25C	4	0	< LLD	< LLD	< LLD	22
ESS-26C	3	3	4.36E+04	1.24E+04	7.78E+04	15
ESS-27C	2	2	1.67E+05	1.66E+05	1.68E+05	16
ESS-28C	2	2	7.21E+02	6.97E+02	7.44E+02	23
ESS-29C	2	0	< LLD	< LLD	< LLD	28
ESS-30C	4	4	9.14E+02	3.63E+02	2.04E+03	15
ESS-31C	4	1	3.16E+02	3.16E+02	3.16E+02	15
ESS-38C	1	0	< LLD	< LLD	< LLD	15
ESS-39C	1	0	< LLD	< LLD	< LLD	20
ESS-40C	1	0	< LLD	< LLD	< LLD	30
ESS-41C	1	0	< LLD	< LLD	< LLD	27
ESS-42C	1	0	< LLD	< LLD	< LLD	30
ESS-44C	1	0	< LLD	< LLD	< LLD	15
ESS-45C	1	0	< LLD	< LLD	< LLD	21
ESS-46C	1	0	< LLD	< LLD	< LLD	18
ESS-48C	1	0	< LLD	< LLD	< LLD	18
ESS-49C	1	0	< LLD	< LLD	< LLD	19

Attachment 2
Effluent and Waste Disposal Report Supplemental Information

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
ESS-50C	1	0	< LLD	< LLD	< LLD	22
ESS-51C	1	0	< LLD	< LLD	< LLD	22
ESS-54C	2	0	< LLD	< LLD	< LLD	24
ESS-55C	2	0	< LLD	< LLD	< LLD	38
ESS-56C	2	0	< LLD	< LLD	< LLD	32
ESS-58C	1	0	< LLD	< LLD	< LLD	18
ESS-59C	1	0	< LLD	< LLD	< LLD	18
ESS-60C	1	0	< LLD	< LLD	< LLD	19
ESS-67C	4	1	6.74E+02	6.74E+02	6.74E+02	25
ESS-68C	1	0	< LLD	< LLD	< LLD	19
ESS-69C	2	0	< LLD	< LLD	< LLD	30
ESS-70C	2	0	< LLD	< LLD	< LLD	18
ESS-71C	2	0	< LLD	< LLD	< LLD	19
ESS-72C	4	2	6.50E+02	2.99E+02	1.00E+03	18
ESS-73C	2	0	< LLD	< LLD	< LLD	15
ESS-74C	2	0	< LLD	< LLD	< LLD	25
ESS-201C	3	3	1.22E+04	6.30E+03	2.14E+04	19
ESS-202C	4	4	3.77E+04	2.14E+04	5.75E+04	19
ESS-203C	3	3	3.23E+03	2.34E+03	4.47E+03	19
ESS-STAB	3	3	1.19E+04	7.92E+03	1.70E+04	31
ESS-NC-4A	2	2	5.69E+03	5.58E+03	5.80E+03	17
MW-1	3	3	7.10E+02	5.05E+02	1.11E+03	24

Attachment 2
Effluent and Waste Disposal Report Supplemental Information

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
MW-2	2	1	4.16E+02	4.16E+02	4.16E+02	24
MW-3	3	1	2.68E+02	2.68E+02	2.68E+02	26
MWPA-100C	2	0	< LLD	< LLD	< LLD	30
MWPA-101C	1	1	3.58E+02	3.58E+02	3.58E+02	29
MWPA-102C	2	2	4.94E+02	4.40E+02	5.47E+02	30
MWPA-103C	2	1	6.25E+02	6.25E+02	6.25E+02	30
MWPA-104C	4	4	7.24E+03	5.13E+03	1.00E+04	29
MWPA-105C	2	2	1.01E+03	7.46E+02	1.27E+03	30
MWPA-106C	3	3	7.01E+02	5.82E+02	7.65E+02	29
MWPA-107C	5	5	2.50E+03	1.61E+03	5.10E+03	29
MWPA-108C	3	3	6.54E+02	4.62E+02	9.60E+02	29
MWPA-109C	2	2	7.98E+02	7.11E+02	8.84E+02	29
MWPA-110C	3	3	1.02E+03	7.53E+02	1.24E+03	29
MWPA-113C	4	3	8.64E+02	6.47E+02	1.08E+03	25
MWPA-114C	3	3	2.63E+03	2.00E+03	3.53E+03	30
MWPA-115C	3	3	7.84E+03	6.03E+03	1.06E+04	34
MWPA-116C	4	0	< LLD	< LLD	< LLD	30
MWPA-117C	4	4	6.49E+02	5.84E+02	6.92E+02	30
MWPA-118C	7	7	9.77E+02	6.31E+02	1.16E+03	30

Intermediate Wells for Plant Site						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
ESS-2B	1	0	< LLD	< LLD	< LLD	58
ESS-3B	2	0	< LLD	< LLD	< LLD	52
ESS-18B	4	3	4.36E+02	3.87E+02	5.11E+02	23
ESS-19B	4	4	4.91E+03	3.81E+03	5.89E+03	42
ESS-20B	4	0	< LLD	< LLD	< LLD	43
ESS-22B	5	5	1.61E+03	1.30E+03	1.84E+03	76
ESS-38B	1	0	< LLD	< LLD	< LLD	55
ESS-39B	1	0	< LLD	< LLD	< LLD	55
ESS-51B	2	0	< LLD	< LLD	< LLD	45
ESS-52B	2	0	< LLD	< LLD	< LLD	51
ESS-53B	3	0	< LLD	< LLD	< LLD	76
MWPA-104B	4	4	1.00E+04	8.65E+03	1.10E+04	59
MWPA-107B	5	5	3.64E+04	3.31E+04	4.09E+04	60

Unit 1 CST Groundwater Wells						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
MWPA-111B	261	256	1.01E+04	3.16E+03	2.46E+05	61
MWPA-112C	259	247	3.67E+04	8.87E+03	1.76E+05	33
U1CSTREM-01[1]	0	0	N/A	N/A	N/A	85
U1CSTREM-02B	1	0	< LLD	< LLD	< LLD	68

[1] Was not monitored in 2014 but will be used in the future for U1 CST remediation monitoring.

Unit 1 CST Groundwater Wells						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
U1CSTREM-02C	258	258	6.42E+04	3.02E+03	2.40E+06	45
U1CSTREM-05	5	0	< LLD	< LLD	< LLD	65
U1CSTREM-07	2	0	< LLD	< LLD	< LLD	85
U1CSTREM-08	16	4	3.22E+03	2.97E+03	3.46E+03	68
U1CSTREM-09	4	0	< LLD	< LLD	< LLD	85
U1CSTREM-09B	4	2	3.33E+03	3.01E+03	3.65E+03	68
U1CSTREM-09C	4	1	3.16E+03	3.16E+03	3.16E+03	45
U1CSTREM-10	3	0	< LLD	< LLD	< LLD	45
U1CSTREM-11	4	0	< LLD	< LLD	< LLD	40
U1CSTREM-12	3	1	2.43E+04	2.43E+04	2.43E+04	34
U1CSTREM-13	264	264	1.68E+05	4.13E+03	5.99E+05	44
U1CSTREM-14	264	264	8.81E+04	5.68E+03	6.31E+05	44
U1CSTREM-15	265	265	4.66E+04	1.52E+04	1.43E+05	59
U1CSTREM-16	266	266	1.37E+05	4.07E+04	2.71E+05	40
U1CSTREM-18	264	264	2.14E+06	1.76E+04	4.63E+06	29
U1CSTREM-19	263	263	1.25E+05	6.76E+03	3.74E+06	40
U1CSTREM-21B	15	11	1.41E+04	3.00E+03	1.14E+05	69
U1CSTREM-21C	4	3	4.07E+03	3.83E+03	4.23E+03	45
U1CSTREM-22B	3	0	< LLD	< LLD	< LLD	69
U1CSTREM-22C	246	185	7.46E+03	2.95E+03	2.42E+05	45
U1CSTREM-23	222	221	1.78E+04	3.41E+03	2.07E+05	45
U1CSTREM-24	254	253	3.29E+04	1.36E+04	5.10E+04	29
U1CSTREM-25	264	264	4.63E+04	3.05E+03	7.78E+05	45

Attachment 2
Effluent and Waste Disposal Report Supplemental Information

Unit 1 CST Groundwater Wells						
Well Name	Number of Samples in 2014	Number of Positive H-3 Samples in 2014	Average H-3 Act (pCi/L)	Minimum H-3 Act (pCi/L)	Maximum H-3 Act (pCi/L)	Depth of Well (ft)
U1CSTREM-26	14	6	2.46E+04	3.95E+03	1.14E+05	45
U1CSTREM-27B	5	1	4.40E+03	4.40E+03	4.40E+03	68
U1CSTREM-27C	5	1	3.85E+03	3.85E+03	3.85E+03	45
U1CSTREM-28	2	0	< LLD	< LLD	< LLD	45
U1CSTREM-29	198	198	8.16E+04	3.18E+03	2.34E+05	45
U1CSTREM-30	200	166	1.42E+04	2.73E+03	1.11E+06	45
U1CSTREM-31	165	73	9.44E+03	2.91E+03	1.81E+05	46
U1CSTREM-32	5	0	< LLD	< LLD	< LLD	45
U1CSTREM-33	217	216	1.50E+04	5.76E+03	1.46E+05	45
MW-1B	17	13	2.82E+04	3.21E+03	4.64E+04	45

Attachment 2
Effluent and Waste Disposal Data

Table 1A	Gaseous Effluents – Summation of all Releases
Table 1B	Gaseous Effluents – Elevated Releases
Table 1C	Gaseous Effluents – Ground Level Releases
Table 1D	Gaseous Effluents – Mixed Mode Releases
Table 2A	Liquid Effluents – Summation of all Releases (Discharge Canal)
	Liquid Effluents – Summation of all Releases (Marsh Area)
Table 2B	Liquid Effluents – Batch Mode
Table 2C	Liquid Effluents – Continuous Mode
	Lower Limits of Detection
Table 3A	Solid Waste and Irradiated Fuel Shipments - Waste Class A
Table 3B	Solid Waste and Irradiated Fuel Shipments - Waste Class B
Table 3C	Solid Waste and Irradiated Fuel Shipments - Waste Class C

Attachment 2
Effluent and Waste Disposal Data

Table 1A: Gaseous Effluents – Summation of all Releases

A. FISSION AND ACTIVATION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	3.40E+01	2.26E+01	5.46E+01	2.90E+01	2.50E+01
2. Average release rate for period	µCi/sec	4.37E+00	2.88E+00	6.87E+00	3.65E+00	NA

B. IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total Iodine - 131 release	Ci	1.09E-03	1.45E-03	1.87E-03	1.38E-03	2.50E+01
2. Average release rate for period	µCi/sec	1.40E-04	1.84E-04	2.35E-04	1.74E-04	NA

C. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	3.07E-04	2.92E-04	3.37E-04	3.02E-04	2.50E+01
2. Average release rate for period	µCi/sec	3.95E-05	3.72E-05	4.24E-05	3.81E-05	NA
3. Gross Alpha	Ci	2.60E-08	2.07E-09	≤ LLD	≤ LLD	2.50E+01

D. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	1.22E+02	8.48E+01	1.95E+02	1.66E+02	1.50E+01
2. Average release rate for period	µCi/sec	1.57E+01	1.08E+01	2.45E+01	2.08E+01	NA

E. CARBON-14

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	4.66E+00	5.40E+00	6.00E+00	5.99E+00	NA
2. Average release rate for period	µCi/sec	5.99E-01	6.87E-01	7.55E-01	7.54E-01	NA

Attachment 2
Effluent and Waste Disposal Data

Table 1B: Gaseous Effluents – Elevated Releases
Continuous Release

Nuclides Released

1. FISSION AND ACTIVATION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
argon-41	Ci	≤ LLD	2.54E+00	≤ LLD	≤ LLD
xenon-135m	Ci	≤ LLD	≤ LLD	3.66E+00	1.45E+00
xenon-135	Ci	7.54E+00	5.87E+00	1.12E+01	1.41E+01
xenon-138	Ci	4.74E-01	3.24E-01	2.19E+01	≤ LLD
total for period	Ci	8.02E+00	8.74E+00	3.67E+01	1.55E+01

2. IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
iodine-131	Ci	5.16E-04	7.52E-04	9.51E-04	6.71E-04
iodine-133	Ci	3.04E-03	5.95E-03	8.49E-03	5.54E-03
iodine-135	Ci	5.27E-03	1.04E-02	1.50E-02	9.73E-03
total for period	Ci	8.82E-03	1.71E-02	2.44E-02	1.59E-02

3. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
cobalt-60	Ci	1.61E-06	≤ LLD	≤ LLD	≤ LLD
strontium-89	Ci	1.08E-05	2.57E-05	2.50E-05	2.57E-05
strontium-90	Ci	≤ LLD	≤ LLD	6.87E-08	4.68E-09
silver-110m	Ci	≤ LLD	≤ LLD	5.83E-06	4.99E-07
barium-140	Ci	2.39E-05	8.89E-05	1.01E-04	8.81E-05
lanthanum-140	Ci	3.60E-05	1.31E-04	1.69E-04	1.57E-04
total for period	Ci	7.23E-05	2.46E-04	3.01E-04	2.71E-04

4. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	1.55E+01	2.08E+01	5.65E+01	4.18E+01

5. GROSS ALPHA

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
gross alpha	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

6. CARBON-14

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Carbon-14	Ci	1.86E+00	2.16E+00	2.40E+00	2.40E+00

Attachment 2
Effluent and Waste Disposal Data

Table 1C: Gaseous Effluents – Ground Level Releases
Continuous Release

Nuclides Released

1. FISSION AND ACTIVATION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
xenon-133	Ci	≤ LLD	≤ LLD	6.46E-02	≤ LLD
xenon-135	Ci	2.60E+01	1.39E+01	1.78E+01	4.58E+00
xenon-138	Ci	≤ LLD	≤ LLD	≤ LLD	8.89E+00
total for period	Ci	2.60E+01	1.39E+01	1.79E+01	1.35E+01

2. IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
iodine-131	Ci	5.65E-04	6.77E-04	8.66E-04	6.83E-04
iodine-133	Ci	6.33E-03	7.98E-03	1.09E-02	7.69E-03
iodine-135	Ci	1.24E-02	1.72E-02	2.47E-02	1.79E-02
total for period	Ci	1.93E-02	2.59E-02	3.64E-02	2.63E-02

3. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
cobalt-57	Ci	≤ LLD	≤ LLD	≤ LLD	1.41E-06
cobalt-60	Ci	3.33E-06	2.72E-07	≤ LLD	≤ LLD
strontium-89	Ci	6.16E-07	5.95E-06	1.25E-05	1.14E-05
total for period	Ci	3.95E-06	6.23E-06	1.25E-05	1.28E-05

4. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	1.02E+02	5.77E+01	1.29E+02	1.16E+02

5. GROSS ALPHA

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
gross alpha	Ci	2.60E-08	2.07E-09	≤ LLD	≤ LLD

6. CARBON-14

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
carbon-14	Ci	9.32E-01	1.08E+00	1.20E+00	1.20E+00

Attachment 2
Effluent and Waste Disposal Data

Table 1D: Gaseous Effluents – Mixed Mode Releases
Continuous Release

Nuclides Released

1. FISSION AND ACTIVATION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
total for period	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

2. GASEOUS IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
iodine-131	Ci	6.86E-06	1.96E-05	5.27E-05	2.53E-05
iodine-133	Ci	1.11E-04	2.12E-04	3.24E-04	2.91E-04
total for period	Ci	1.18E-04	2.32E-04	3.77E-04	3.17E-04

3. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
chromium-51	Ci	1.04E-04	1.90E-05	≤ LLD	≤ LLD
manganese-54	Ci	2.49E-06	3.49E-07	≤ LLD	≤ LLD
cobalt-58	Ci	1.10E-05	3.50E-07	1.29E-06	≤ LLD
cobalt-60	Ci	8.24E-05	2.09E-05	2.23E-05	1.83E-05
zinc-65	Ci	1.29E-05	≤ LLD	≤ LLD	≤ LLD
strontium-89	Ci	≤ LLD	≤ LLD	2.36E-07	1.68E-08
cesium-137	Ci	1.75E-06	≤ LLD	≤ LLD	≤ LLD
total for period	Ci	2.14E-04	4.06E-05	2.38E-05	1.83E-05

4. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	4.70E+00	6.32E+00	9.18E+00	7.59E+00

5. GROSS ALPHA

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
gross alpha	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

6. CARBON-14

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
carbon-14	Ci	1.86E+00	2.16E+00	2.40E+00	2.40E+00

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases (Discharge Canal)

A. FISSION AND ACTIVATION PRODUCTS (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release (excluding tritium, gases, and alpha)	Ci	4.91E-03	5.26E-04	6.57E-04	1.28E-04	1.70E+01
2. Average diluted concentration	µCi/ml	1.44E-11	1.12E-12	1.25E-12	2.73E-13	NA
3. Percent of applicable limit	%	3.03E-05	5.06E-06	4.73E-06	1.11E-06	NA

B. TRITIUM (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	5.08E+01	1.51E+01	5.14E+01	1.33E+01	2.30E+01
2. Average diluted concentration	µCi/ml	1.49E-07	3.22E-08	9.80E-08	2.84E-08	NA
3. Percent of applicable limit	%	1.49E-03	3.22E-04	9.80E-04	2.84E-04	NA

C. DISSOLVED AND ENTRAINED GASES (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	2.34E-04	7.34E-05	2.33E-04	2.77E-05	1.70E+01
2. Average diluted concentration	µCi/ml	6.87E-13	1.56E-13	4.43E-13	5.90E-14	NA
3. Percent of applicable limit	%	3.44E-07	7.82E-08	2.22E-07	2.95E-08	NA

D. GROSS ALPHA RADIOACTIVITY (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD	3.20E+01

NOTE 1: Includes releases from Radwaste, SDCB, SDSP, SDSP Infiltration, SDSF, and BSEP Effluent.

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases (Discharge Canal)

E. PRIMARY WASTE VOLUME RELEASED (NOTE 2)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	2.79E+06	2.42E+06	4.40E+06	8.73E+05	1.50E+01

F. SECONDARY WASTE VOLUME RELEASED (NOTE 3)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	9.60E+07	5.88E+07	8.79E+07	6.29E+07	1.50E+01

G. VOLUME OF COOLING WATER DISCHARGED FROM PLANT

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	3.41E+11	4.70E+11	5.25E+11	4.70E+11	1.50E+01

NOTE 2: This is the volume released from Radwaste.
NOTE 3: This is the volume released from the SDCB, SDSP, SDSP Infiltration, SDSF, and BSEP Effluent

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases (Marsh Area)

A. FISSION AND ACTIVATION PRODUCTS

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release (excluding tritium, gases, and alpha)	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD	1.70E+01
2. Average diluted concentration	µCi/ml	NA	NA	NA	NA	NA
3. Percent of applicable limit	%	NA	NA	NA	NA	NA

B. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	2.45E-02	2.07E-02	4.86E-02	3.55E-02	2.30E+01
2. Average diluted concentration	µCi/ml	4.89E-07	4.07E-07	9.47E-07	6.93E-07	NA
3. Percent of applicable limit	%	4.89E-03	4.07E-03	9.47E-03	6.93E-03	NA

C. DISSOLVED AND ENTRAINED GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD	1.70E+01
2. Average diluted concentration	µCi/ml	NA	NA	NA	NA	NA
3. Percent of applicable limit	%	NA	NA	NA	NA	NA

D. GROSS ALPHA RADIOACTIVITY

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD	3.20E+01

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases (Marsh Area)

E. PRIMARY WASTE VOLUME RELEASED

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	NA	NA	NA	NA	1.50E+01

F. SECONDARY WASTE VOLUME RELEASED

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	5.02E+07	5.07E+07	5.13E+07	5.13E+07	1.50E+01

G. DILUTION WATER VOLUME DURING PERIOD

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	5.02E+07	5.07E+07	5.13E+07	5.13E+07	1.50E+01

Attachment 2
Effluent and Waste Disposal Data

Table 2B: Liquid Effluents - Batch Mode

Nuclides Released

1. FISSION AND ACTIVATION PRODUCTS (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
manganese-54	Ci	5.07E-05	4.44E-06	≤ LLD	≤ LLD
cobalt-58	Ci	1.39E-04	≤ LLD	≤ LLD	≤ LLD
cobalt-60	Ci	2.69E-03	2.60E-04	3.81E-05	2.58E-05
nickel-63	Ci	1.03E-03	≤ LLD	≤ LLD	≤ LLD
zinc-65	Ci	3.58E-06	≤ LLD	≤ LLD	≤ LLD
antimony-124	Ci	≤ LLD	1.29E-06	≤ LLD	≤ LLD
antimony-125	Ci	8.95E-04	1.38E-05	≤ LLD	≤ LLD
iodine-131	Ci	3.13E-05	8.05E-05	1.69E-04	3.48E-05
iodine-133	Ci	7.94E-06	1.13E-04	4.47E-04	3.93E-05
iodine-135	Ci	≤ LLD	≤ LLD	≤ LLD	2.61E-05
cesium-134	Ci	1.00E-05	≤ LLD	≤ LLD	≤ LLD
cesium-137	Ci	4.26E-05	5.34E-05	2.38E-06	2.30E-06
cesium-138	Ci	9.25E-06	≤ LLD	≤ LLD	≤ LLD
tungsten-187	Ci	5.05E-06	≤ LLD	≤ LLD	≤ LLD
total for period	Ci	4.91E-03	5.26E-04	6.57E-04	1.28E-04

2. DISSOLVED AND ENTRAINED GASES (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
krypton-88	Ci	4.82E-07	≤ LLD	≤ LLD	≤ LLD
xenon-133	Ci	2.15E-05	8.71E-06	1.40E-05	4.51E-06
xenon-135	Ci	2.12E-04	6.47E-05	2.19E-04	2.32E-05
total for period	Ci	2.34E-04	7.34E-05	2.33E-04	2.77E-05

3. TRITIUM (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	5.08E+01	1.51E+01	5.14E+01	1.33E+01

4. GROSS ALPHA (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
gross alpha	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

NOTE 1: Includes releases from Radwaste, SDCB, SDSP, SDSP Infiltration, and SDSF.

Attachment 2
Effluent and Waste Disposal Data

Table 2C: Liquid Effluents - Continuous Mode

Nuclides Released

1. FISSION AND ACTIVATION PRODUCTS (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
total for period	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

2. DISSOLVED AND ENTRAINED GASES (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
total for period	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

3. TRITIUM (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	2.45E-02	2.07E-02	5.76E-02	3.95E-02

4. GROSS ALPHA (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
gross alpha	Ci	≤ LLD	≤ LLD	≤ LLD	≤ LLD

NOTE 1: Includes releases from BSEP Effluent and Marsh Area.

Attachment 2
Effluent and Waste Disposal Data

Lower Limits of Detection

Units: µCi/ml

1. LIQUID RELEASES

Alpha	2.29E-08
H-3	2.86E-06
H-3	2.74E-07*
Cr-51	1.49E-07
Mn-54	1.62E-08
Fe-55	5.25E-07
Co-58	1.59E-08
Fe-59	1.82E-08
Co-60	1.71E-08
Ni-63	2.38E-07
Zn-65	2.90E-08
Zn-69m	1.95E-08
Sr-89	1.49E-08
Sr-90	1.56E-08
Nb-95	1.69E-08
Zr-95	3.57E-08
Mo-99	1.15E-07
Tc-99m	1.53E-08
Ag-110m	2.42E-08
Sb-124	2.17E-08
I-131	2.34E-08
I-133	1.71E-08
Cs-134	2.09E-08
I-135	7.00E-08
Cs-137	2.21E-08
Cs-138	4.63E-08
Ba-140	8.60E-08
La-140	3.33E-08
Ce-141	2.58E-08
Ce-144	1.30E-07
W-187	7.53E-08
Kr-87	4.78E-08
Kr-88	6.33E-08
Xe-133	5.65E-08
Xe-133m	1.33E-07
Xe-135	1.47E-08
Xe-135m	8.87E-08
Xe-138	1.84E-07

2. GASEOUS RELEASES

Ar-41	1.17E-08
Kr-85	2.59E-06
Kr-85m	7.98E-09
Kr-87	2.60E-08
Kr-88	2.62E-08
Xe-133	2.11E-08
Xe-133m	6.56E-08
Xe-135	8.12E-09
Xe-135m	9.64E-08
Xe-137	1.38E-06
Xe-138	2.63E-07

3. IODINES AND PARTICULATES

Alpha	1.21E-15
H-3	3.43E-11
Cr-51	2.70E-12
Mn-54	5.07E-13
Co-57	2.93E-13
Co-58	6.09E-13
Fe-59	1.02E-12
Co-60	3.98E-13
Zn-65	6.62E-13
Sr-89	8.53E-15
Sr-90	3.51E-15
Nb-95	3.32E-13
Mo-99	3.95E-12
Ag-110m	5.22E-13
I-131	3.79E-13
I-133	1.14E-12
Cs-134	4.65E-13
I-135	7.25E-12
Cs-137	4.12E-13
Ba-140	1.17E-12
La-140	5.64E-13
Ce-141	4.56E-13
Ce-144	2.25E-12

NOTES:
1. The above values represent typical "a priori" LLDs for isotopes where values of "≤ LLD" are indicated in Tables 1A, 1B, 1C, 1D, 2A, 2B, and 2C. Also included are isotopes specified in ODCMS 7.3.3 and 7.3.7.
2. Where activity for any nuclide is reported as "≤ LLD," that nuclide is considered not present and the LLD activity listed is not considered in the summary data.

*Tritium LLD value for ground water monitoring.

Attachment 2
Effluent and Waste Disposal Data

Table 3A: Solid Waste and Irradiated Fuel Shipments – Waste Class A

Waste Class A

1. Total volume shipped (cubic meters) 1.83E+03

   Total curie quantity (estimated) 3.64E+01

2. Type of Waste

		Unit	Period	Estimated Total %Error
a.	Spent resins, filter, sludges	meter^3	4.81E+01	
		Curies	3.33E+01	1.00E+01
b.	Dry active waste, compacted/non-compacted	meter^3	1.78E+03	
		Curies	3.06E+00	1.00E+01
c.	Irradiated components	meters^3	0.00E+00	
		Curies	0.00E+00	N/A
d.	Others (describe)	meters^3	8.50E+00	
	Oily water/water	Curies	1.22E-02	1.00E+01

3. Estimate of major radionuclides composition

   a. C-14 2.99E+00 %
      Mn-54 1.82E+00 %
      Fe-55 1.71E+01 %
      Co-60 6.29E+01 %
      Ni-63 1.04E+01 %
      Cs-137 2.06E+00 %

   b. Mn-54 3.68E+00 %
      Fe-55 2.98E+01 %
      Co-60 6.03E+01 %
      Ni-63 1.15E+00 %
      Cs-137 0.88E+00 %

   c. N/A

   d. N/A

NOTE:

Solid Radioactive Waste listed above was shipped for processing to various waste processing services or directly shipped to a licensed disposal facility.

Table 3A: Solid Waste and Irradiated Fuel Shipments – Waste Class A

4. Cross reference table, waste stream, form, and container type

Stream	Form	Container Type Type A/Type B	No. of shipments
a. Resin/filters	Dewatered	Type A or GDP	1.50E+01
b. Dry active waste	Compacted/ Non-compacted	Type A or GDP	4.00E+01
c. Irradiated components		N/A	N/A
d. Others (describe) Oily water/water		Type A or GDP	2.00E+00

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
5.50E+01	Highway	Oak Ridge, TN
2.00E+00	Highway	Wampum, PA

b. Irradiated Fuel

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

Attachment 2
Effluent and Waste Disposal Data

Table 3B: Solid Waste and Irradiated Fuel Shipments – Waste Class B

Waste Class B

1. Total volume shipped (cubic meters) 0.00E+00

   Total curie quantity (estimated) 0.00E+00

2. Type of Waste

		Unit	Period	Estimated Total %Error
a.	Spent resins, filter, sludges	meter^3	0.00E+00	
		Curies	0.00E+00	N/A
b.	Dry active waste, compacted/non-compacted	meter^3	0.00E+00	
		Curies	0.00E+00	N/A
c.	Irradiated components	meters^3	0.00E+00	
		Curies	0.00E+00	N/A
d.	Others (describe)	meters^3	0.00E+00	
		Curies	0.00E+00	N/A

3. Estimate of major radionuclides composition

   a. N/A

   b. N/A

   c. N/A

   d. N/A

NOTE:

No Waste Class B material or spent fuel was shipped offsite for storage or disposal during the reporting period.

Table 3B: Solid Waste and Irradiated Fuel Shipments – Waste Class B

4. Cross reference table, waste stream, form, and container type

Stream	Form	Container Type Type A/Type B	No. of shipments
a. Resin & Filters	Dewatered	Type A/Type B	0.00E+00
b. Dry active waste	Compacted/ Non-compacted	N/A	N/A
c. Irradiated components		N/A	N/A
d. Others (describe)		N/A	N/A

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
0.00E+00	N/A	N/A

b. Irradiated Fuel

Number of Shipments	Mode of Transportation	Destination
0.00E+00	N/A	N/A

Attachment 2
Effluent and Waste Disposal Data

Table 3C: Solid Waste and Irradiated Fuel Shipments – Waste Class C

Waste Class C

1. Total volume shipped (cubic meters) 0.00E+00

   Total curie quantity (estimated) 0.00E+00

2. Type of Waste

		Unit	Period	Estimated Total %Error
a.	Spent resins, filter, sludges	meter^3	0.00E+00	
		Curies	0.00E+00	N/A
b.	Dry active waste, compacted/non-compacted	meter^3	0.00E+00	
		Curies	0.00E+00	N/A
c.	Irradiated components	meters^3	0.00E+00	
		Curies	0.00E+00	N/A
d.	Others (describe)	meters^3	0.00E+00	
		Curies	0.00E+00	N/A

3. Estimate of major radionuclides composition

   a. N/A

   b. N/A

   c. N/A

   d. N/A

NOTE:

No Waste Class C material or spent fuel was shipped offsite for storage or disposal during the reporting period.

Table 3C: Solid Waste and Irradiated Fuel Shipments – Waste Class C

4. Cross reference table, waste stream, form, and container type

Stream	Form	Container Type Type A/Type B	No. of shipments
a. Resin & Filters	Dewatered	N/A	N/A
b. Dry active waste	Compacted/ Non-compacted	N/A	N/A
c. Irradiated components		N/A	N/A
d. Others (describe)		N/A	N/A

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
0.00E+00	N/A	N/A

b. Irradiated Fuel

Number of Shipments	Mode of Transportation	Destination
0.00E+00	N/A	N/A

Enclosure 1: Milk and Vegetable Sample Location

Enclosure 2: Land Use Census

Enclosure 1: Milk and Vegetable Sample Location

No milk animals are located in the area evaluated by the last Land Use Census, therefore, no milk sampling locations were available during this time period.

Attachment 3
Environmental Monitoring Program

Enclosure 2: Land Use Census

The following is a summary of the nearest resident and garden locations identified within five miles of the plant for each of the 16 meteorological sectors. No milk animals were found within five miles of the plant.

Direction	Residence	Garden
NNE	0.8 miles	0.9 miles
NE	None	None
ENE	None	None
E	None	None
ESE	1.4 miles	None
SE	None	None
SSE	2.1 miles	None
S	1.1 miles	1.8 miles
SSW	1.2 miles	1.9 miles
SW	1.1 miles	1.4 miles
WSW	1.2 miles	1.3 miles
W	0.9 miles	1.1 mile
WNW	0.9 miles	1.0 miles
NW	0.9 miles	4.9 miles
NNW	0.8 miles	0.9 miles
N	0.7 miles	1.0 miles

Based on the 2014 Land Use evaluation the ODCM controlling location of 4.75 miles in the North-East sector using a hypothetical cow milk-infant pathway may not be the most conservative. Brunswick has continued to report in this location due to NRC Task Interface Agreement 2009-04. Unit 2 Once Through Ventilation and Carbon-14 dose reporting are the main drivers for the location change. Condition Report 682424 has been generated to determine the most appropriate reporting location and to update the Environmental Monitoring Program to support this change. An industry expert is currently reviewing the data to recommend any necessary changes.

Attachment 4
Effluent Instrumentation

Enclosure 1: Radioactive Liquid Effluent Monitoring Instrumentation

Enclosure 2: Radioactive Gaseous Effluent Monitoring Instrumentation

Enclosure 3: Liquid Hold-Up Tank

Enclosure 1: Radioactive Liquid Effluent Monitoring Instrumentation

No Radioactive Liquid Effluent Monitoring Instruments were inoperable for a period of greater than 30 days.

Enclosure 2: Radioactive Gaseous Effluent Monitoring Instrumentation

No Radioactive Gaseous Effluent Monitoring Instruments were inoperable for a period of greater than 30 days.

Attachment 4
Effluent Instrumentation

Enclosure 3: Liquid Hold-Up Tank

No Liquid Hold-Up Tank exceeded the 10-Curie limit of ODCMS 7.3.6 during this reporting period.

Attachment 5

Major Modification To The Radioactive Waste Treatment Systems

In accordance with ODCMS 7.5.1, major changes to the liquid, gaseous, and solid Radioactive Waste Treatment Systems shall be reported to the NRC as part of the Radioactive Effluent Release Report or as part of the Updated Final Safety Analysis Report (UFSAR) update. Any major modifications to the radioactive waste treatment systems will be submitted with the UFSAR in accordance with 10 CFR 50.71(e). There were no major modifications to the Radioactive Waste Treatment System during the reporting period.

Attachment 6

Meteorological Data

Per Technical Specification 5.6.3 and ODCMS 7.4.2, the annual summary of meteorological data collected over the calendar year has been retained in a file and is available for NRC review upon request.

Attachment 7

Annual Dose Assessment

Liquid Effluents

Critical Age: Adult
Controlling Location for Routine ODCM Liquid Releases: SW sector at 0.1 miles

Supplemental Dose*	Marsh[1]
mrem	1.57E-03

*Reference page 6 of Supplemental Information for a discussion of the Marsh release.

	Routine ODCM Dose (mrem)	Marsh Dose (mrem)	Total Dose (mrem)	Limit (mrem)
GI-LLI	1.29E-04	1.57E-03	1.70E-03	2.00E+01
Bone	3.02E-05	0.00E+00	3.02E-05	2.00E+01
Liver	7.40E-05	1.57E-03	1.64E-03	2.00E+01
Lung	6.67E-05	1.57E-03	1.64E-03	2.00E+01
Total Body	7.58E-05	1.57E-03	1.65E-03	6.00E+00
Thyroid	8.89E-05	1.57E-03	1.66E-03	2.00E+01
Kidney	6.79E-05	1.57E-03	1.64E-03	2.00E+01

[1] Dose from the Marsh was calculated based on guidance from Regulatory Guide 1.109 assuming a fish and invertebrate ingestion pathway for an adult.

Attachment 7

Annual Dose Assessment

Gaseous Effluents

Noble Gas:
Critical Age: Child
Controlling location: ENE sector at 0.7 mile

	Routine ODCM Dose (mrad)	Limit (mrad)
Gamma	3.97E-02	2.00E+01
Beta	3.74E-02	4.00E+01

Iodine, Particulates, and Tritium:

Supplemental Dose*	SDSP Evaporation[2]	SDSF Evaporation[3]	Carbon-14 (All except Bone and Skin)[4]	Carbon-14 (Bone)[4]
mrem	2.20E-04	3.69E-04	4.07E-01	2.03E+00

*Reference page 5-6 of Supplemental Information

Critical Age: Infant
Controlling Location for Routine ODCM Dose: NE sector at 4.75 mile, assuming a cow milk pathway

	Routine ODCM Dose (mrem)	Supplemental Dose (mrem)*[2][3][4]	Total Dose (mrem)	Limit (mrem)
Thyroid	8.54E-02	4.08E-01	4.93E-01	3.00E+01
Kidney	1.36E-02	4.08E-01	4.22E-01	3.00E+01
Liver	1.36E-02	4.08E-01	4.22E-01	3.00E+01
Total Body	1.35E-02	4.08E-01	4.22E-01	3.00E+01
GI-LLI	1.34E-02	4.08E-01	4.21E-01	3.00E+01
Lung	1.34E-02	4.08E-01	4.21E-01	3.00E+01
Bone	2.85E-04	2.03E+00	2.03E+00	3.00E+01

[2] The controlling location for the SDSP evaporation is the NW sector at approximately 0.3 miles assuming inhalation pathway only, since no garden is present. The critical age is a teen. Reference page 6 of supplemental information.

[3] The controlling location for the SDSF evaporation is the NNW sector at approximately 0.5 miles assuming inhalation pathway only, since no garden is present. The critical age is a teen. Reference page 6 of supplemental information.

[4] The controlling location for the Carbon-14 supplemental dose is the south sector at 1.8 miles with a garden. The critical age is a child. Reference page 5 of supplemental information.

The PCP was not revised during the report period.

The ODCM was not revised during the report period.

No special reports were made as a result of any radioactive spills or leaks.