Radioactive Effluent Release Report for 2010

Brunswick Steam Electric Plant
Radioactive Effluent Release Report
January 1 through December 31, 2010

Table of Contents

Attachment 1
Effluent and Waste Disposal Report Supplemental Information

Facility: Brunswick Steam Electric Plant
Licensee: Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc.

1. Regulatory Limits
   A. Fission and activation gases (ODCM 7.3.8)
      (1) Calendar Quarter[1]
         (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[1]
         (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[2]
         (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. Maximum permissible concentration 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

NOTE: Dose calculations are determined in accordance with the ODCM
[1] Used for percent of ODCMS limit determination in Attachment 2, Table 1A
[2] Used for percent of ODCMS limit determination in Attachment 2, Table 2A

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 to 10 CFR 20.1001 - 20.2401 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to the value given in the ODCM specifications.

(1) Tritium: limit = 1.00E-03 μCi/ml [3]
(2) Dissolved and entrained noble gases: limit = 2.00E-04 μCi/ml [3]

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.

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

Nuclear counting statistics are reported utilizing 1-sigma error. Total error where reported represents a best effort to approximate the total of all individual and sampling errors.

4. Batch Releases

   A. Liquid

(1) Number of batch releases:	3.31E+02
(2) Total time period for batch releases:	5.31E+04 Minutes
(3) Maximum time period for a batch release:	3.18E+02 Minutes
(4) Average time period for a batch release:	1.61E+02 Minutes
(5) Minimum time period for a batch release:	1.40E+01 Minutes
(6) Average stream flow during periods of release of effluent into a flowing stream:	8.14E+05 Gallons per Minute

   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[4]

   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

[4] 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 Carbon-14 in Gaseous Effluents

Carbon-14 (C-14), with a half-life of 5730 years, is a naturally occurring isotope of carbon produced by cosmic ray interactions in the atmosphere. The concentration of C-14 in the atmosphere was increased significantly in the 1950s and 1960s due to nuclear weapons testing. Commercial nuclear reactors also produce C-14, but in amounts much less than those produced naturally or as a result of weapons testing. Regulatory Guide 1.21 Revision 1 (1974), to which the Brunswick Nuclear Plant (BNP) is committed, did not address C-14. However, since that time analytical methods for determining C-14 have improved and Revision 2 (2009) states that Licensees should evaluate whether C-14 is a principal radionuclide for gaseous effluents. Improvements in fuel performance have resulted in a decrease in radioactive effluents from BNP to the point that C-14 is now considered a principal radionuclide. In Boiling Water Reactors (BWRs), such as BNP, the gaseous C-14 releases are primarily in the form of carbon dioxide. The dose contribution of C-14 in liquid radioactive waste is minimal, therefore, evaluation of C-14 in liquid discharges is not required. 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 to 100% capacity factor using Effective Full Power Days (EFPD) to give a release rate of 2.1E+01 Ci/yr. Based on the 2010 Land Use Census, the critical receptor is located in the south sector at 1.6 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 2010 was 2.36E+00 mrem and the total body dose was 4.71E-01 mrem. The curies released are included in Attachment 2, Table 1A and the dose is included in the Annual Dose Summary, Attachment 7.

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

During period of heavy rains, 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 fifteen occasions in 2010 due to heavy rains. Approximately 4.12E+06 gallons containing 8.87E-02 curies of tritium were released. There was no detectable gamma radioactivity. This resulted in an estimated maximum dose to the individual of 1.35E-07 mrem. The volume released was not included in the average diluted concentration determination or in the volume of waste released on Attachment 2, Table 2A. The tritium released was included in the quarterly summary on Attachment 2, Table 2A and the dose is included in the Annual Dose Summary, Attachment 7.

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

The SDSP collects rainwater and water from miscellaneous low volume drains on plant site. Treatment consists of sedimentation, evaporation and transpiration. 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. In 2010, approximately 7.01E+07 gallons containing 2.50E+00 curies of tritium were released from the SDSP to the intake canal. There was no detectable gamma radioactivity. This resulted in an estimated maximum dose to the individual of 4.06E-06 mrem. The SDSP is a permitted release point. The volume released was not included in the average diluted concentration determination or in the volume of waste released on Attachment 2, Table 2A. The tritium released is included

in the quarterly summary on Attachment 2, Table 2A and the dose is included in the Annual Dose Summary, Attachment 7.

Discussion of water evaporation from the Storm Drain Stabilization Pond

There was 5.72E+07 gallons of tritiated water released via evaporation from the SDSP in 2010. This yields 2.67E+00 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 8.16E-04 mrem via the inhalation pathway in 2010. 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. The curies of tritium released from the SDSP evaporation are included in Attachment 2, Table 1A. The dose is included in the Annual Dose Summary, Attachment 7.

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 (curies released, volume, offsite dose impact, etc). The sampling program consists of weekly sampling and analysis at eight locations. All gamma analyses performed in 2010 were less than the Lower Limit of Detection (LLD). There were 416 tritium analyses performed, which resulted in 149 positive tritium results. The minimum concentration detected from the 149 positive results was 2.38E-07 μCi/ml and the maximum concentration was 2.28E-05 μCi/ml. Using the average concentration of 1.15E-06 μCi/ml, two high tides per day, the area of the marsh at high tide, 365 days, and a conservative factor of 2, it is calculated that 5.37E+07 gallons were released to Nancy's Creek containing 2.35E-01 curies of tritium. This yielded a Total Body dose of 2.25E-03 mrem to an adult from eating fish and 5.54E-04 mrem from eating invertebrate (shrimp, crabs, etc.) for a total dose of 2.80E-03 mrem. The curies released are included in Attachment 2, Table 2A and the dose is included in the Annual Dose Summary, Attachment 7.

Discussion of liquid release from Pipe Outfall

On September 27, 2010 at 15:01, during a heavy rain event, a bladder plug in storm drain piping near the Storm Drain Stabilization Pond failed allowing water containing tritium to be released into the intake canal. The water was sampled at the time of discovery and contained 1.42E-06 μCi/ml of tritium. There was no detectable gamma radioactivity. Using a flow rate of 1.22 cfs, it is calculated that 6.05E+05 gallons were released containing 3.24E-03 curies of tritium in 2010. This resulted in an estimated maximum dose to the individual of 3.86E-09 mrem. The curies released are included in Attachment 2, Table 2A and the dose is included in the Annual Dose Summary, Attachment 7.

Discussion of Groundwater Monitoring

The BSEP groundwater sampling and analysis program has grown into a significant surveillance program over the past few years. Wells have been installed around the SDSP, in the Protected Area (PA), and throughout the Owner Controlled Area (OCA). Forty 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 and are

used to evaluate groundwater movement. Several gamma analyses were performed and all results were less than LLD. Below are the tritium results and maps showing the well location for the wells that are not included in the ODCM:

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2010	Number of Positive Samples in 2010	Average Pos Act (pCi/L)	Minimum Pos Act (pCi/L)	Maximum Pos Act (pCi/L)	Depth of Well (ft)
ESS-3C	8	7	4.24E+02	3.42E+02	5.27E+02	14
ESS-12C	5	2	3.22E+02	2.43E+02	4.02E+02	15
ESS-15C	1	0	< LLD	< LLD	< LLD	15
ESS-32C	1	0	< LLD	< LLD	< LLD	35
ESS-33C	1	0	< LLD	< LLD	< LLD	25
ESS-34C	1	0	< LLD	< LLD	< LLD	22
ESS-35C	1	0	< LLD	< LLD	< LLD	20
ESS-36C	1	0	< LLD	< LLD	< LLD	22
ESS-37C	1	0	< LLD	< LLD	< LLD	30
ESS-38C	4	1	2.96E+02	2.96E+02	2.96E+02	15
ESS-39C	4	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-43C	1	0	< LLD	< LLD	< LLD	17
ESS-44C	1	0	< LLD	< LLD	< LLD	14
ESS-45C	1	0	< LLD	< LLD	< LLD	21
ESS-46C	1	0	< LLD	< LLD	< LLD	18

Attachment 1
Effluent and Waste Disposal Report Supplemental Information

Shallow Wells for Plant Site						
Well Name	Number of Samples in 2010	Number of Positive Samples in 2010	Average Pos Act (pCi/L)	Minimum Pos Act (pCi/L)	Maximum Pos Act (pCi/L)	Depth of Well (ft)
ESS-47C	1	0	< LLD	< LLD	< LLD	20
ESS-48C	1	0	< LLD	< LLD	< LLD	18
ESS-49C	1	0	< LLD	< LLD	< LLD	19
ESS-50C	1	0	< LLD	< LLD	< LLD	22
ESS-51C	2	0	< LLD	< LLD	< LLD	22
ESS-54C	1	0	< LLD	< LLD	< LLD	24
ESS-55C	1	0	< LLD	< LLD	< LLD	38
ESS-56C	2	0	< LLD	< LLD	< LLD	32
ESS-57C	2	0	< LLD	< LLD	< LLD	30
ESS-58C	1	0	< LLD	< LLD	< LLD	19
ESS-59C	1	0	< LLD	< LLD	< LLD	18
ESS-60C	2	0	< LLD	< LLD	< LLD	19
ESS-61C	1	0	< LLD	< LLD	< LLD	28
ESS-62C	1	0	< LLD	< LLD	< LLD	20
ESS-63C	1	0	< LLD	< LLD	< LLD	29
ESS-64C	1	0	< LLD	< LLD	< LLD	21
ESS-65C	1	0	< LLD	< LLD	< LLD	15
ESS-66C	1	0	< LLD	< LLD	< LLD	20
ESS-67C	12	0	< LLD	< LLD	< LLD	25
ESS-68C	1	0	< LLD	< LLD	< LLD	19
ESS-69C	1	0	< LLD	< LLD	< LLD	30

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Shallow Wells for Plant Site						
Well Name	Number of Samples in 2010	Number of Positive Samples in 2010	Average Pos Act (pCi/L)	Minimum Pos Act (pCi/L)	Maximum Pos Act (pCi/L)	Depth of Well (ft)
ESS-70C	1	0	< LLD	< LLD	< LLD	19
ESS-71C	1	0	< LLD	< LLD	< LLD	19
ESS-72C	1	0	< LLD	< LLD	< LLD	18
ESS-73C	12	0	< LLD	< LLD	< LLD	15
ESS-74C	1	0	< LLD	< LLD	< LLD	20
ESS-STAB	8	8	3.15E+04	2.11E+04	4.14E+04	31
ESS-MW-1	5	0	< LLD	< LLD	< LLD	24
MWPA-100C	10	5	3.76E+02	2.77E+02	4.60E+02	30
MWPA-101C	9	7	6.79E+02	4.52E+02	8.21E+02	30
MWPA-102C	9	9	3.09E+03	2.15E+03	4.72E+03	30
MWPA-103C	10	10	< LLD	< LLD	< LLD	30
MWPA-104C	12	12	1.80E+04	1.03E+04	2.55E+04	29
MWPA-105C	9	8	2.24E+03	1.33E+03	5.12E+03	30
MWPA-106C	9	7	4.92E+02	3.47E+02	6.29E+02	29
MWPA-107C	12	12	3.67E+03	3.13E+03	4.15E+03	29
MWPA-108C	10	4	3.54E+02	2.86E+02	4.22E+02	29
MWPA-109C	9	1	4.37E+02	4.37E+02	4.37E+02	29
MWPA-110C	12	7	3.89E+02	2.50E+02	4.99E+02	29
MWPA-111C	16	16	2.05E+04	1.11E+04	2.80E+04	30
MWPA-112C	22	22	1.17E+06	6.24E+03	4.23E+06	34
MWPA-113C	12	3	3.13E+02	2.69+02	3.82E+02	25

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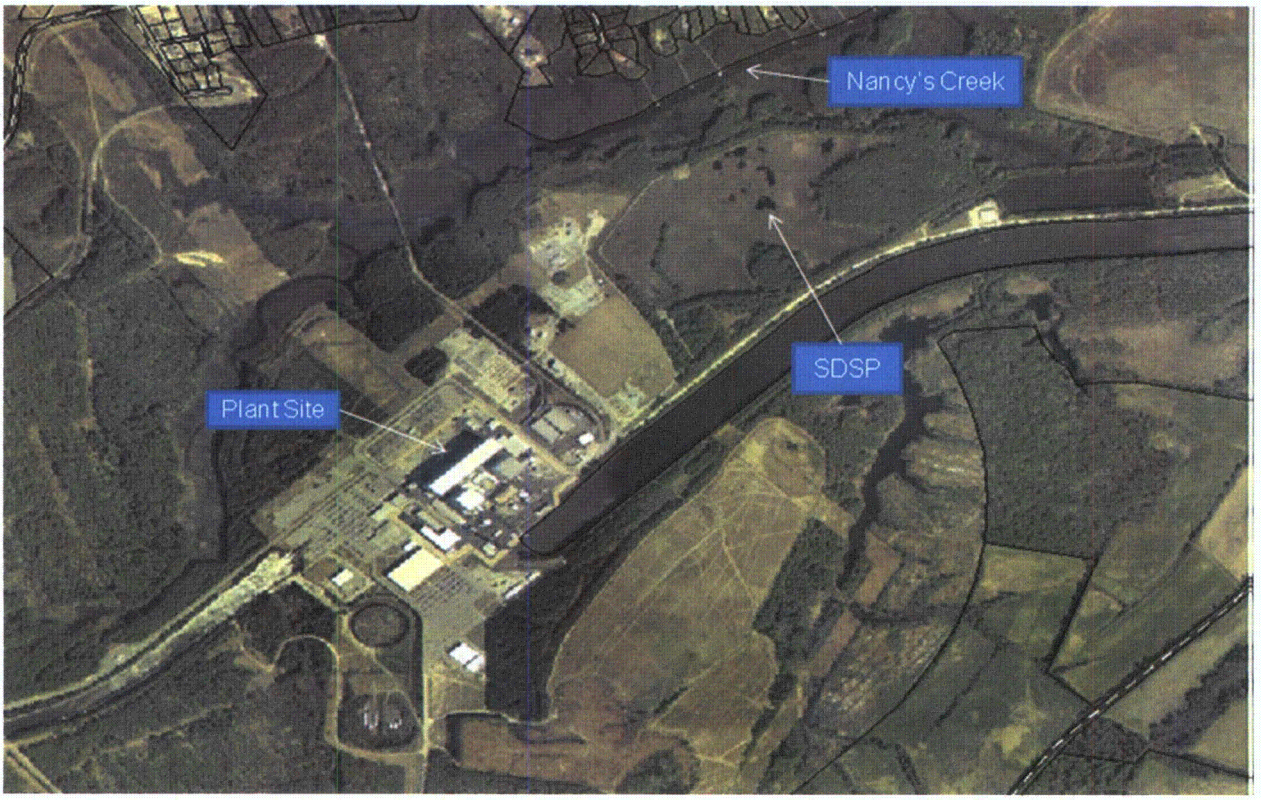
Shallow Wells for Plant Site						
Well Name	Number of Samples in 2010	Number of Positive Samples in 2010	Average Pos Act (pCi/L)	Minimum Pos Act (pCi/L)	Maximum Pos Act (pCi/L)	Depth of Well (ft)
MWPA-114C	12	9	1.05E+03	5.58E+02	1.95E+03	30
MWPA-115C	17	17	1.73E+04	9.76E+03	2.50E+04	34
MWPA-116C	12	1	2.41E+02	2.41E+02	2.41E+02	30
MWPA-117C	16	11	8.42E+02	4.90E+02	1.39E+03	30
MWPA-118C	10	4	6.17E+02	4.02E+02	7.75E+02	30

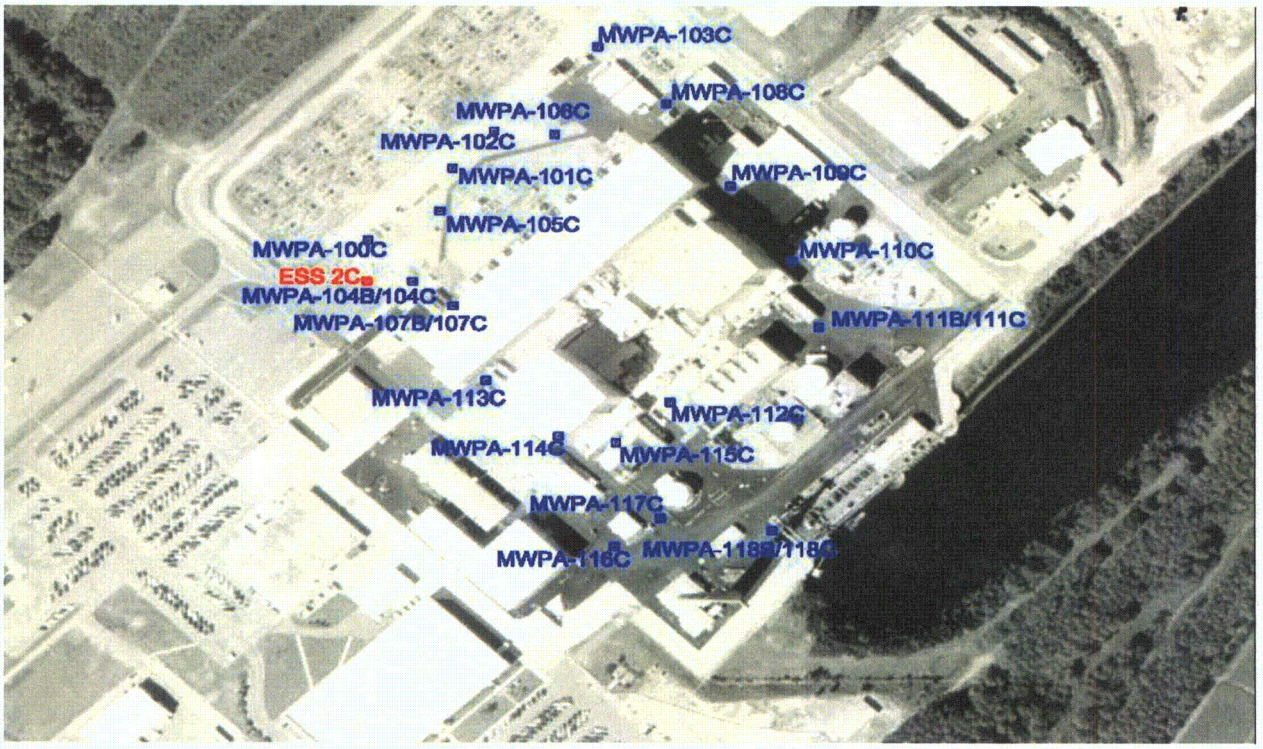
Intermediate Wells for Plant Site						
Well Name	Number of Samples in 2010	Number of Positive Samples in 2010	Average Pos Act (pCi/L)	Minimum Pos Act (pCi/L)	Maximum Pos Act (pCi/L)	Depth of Well (ft)
ESS-38B	4	0	< LLD	< LLD	< LLD	55
ESS-39B	4	1	3.20E+02	3.20E+02	3.20E+02	55
ESS-51B	4	0	< LLD	< LLD	< LLD	45
ESS-52B	4	0	< LLD	< LLD	< LLD	51
ESS-53B	5	0	< LLD	< LLD	< LLD	76
MWPA-104B	12	12	2.27E+04	1.86E+04	2.89E+04	59
MWPA-107B	11	11	5.38E+04	4.43E+04	6.06E+04	60
MWPA-111B	11	8	2.16E+03	1.32E+03	4.00E+03	59
MWPA-118B	10	0	< LLD	< LLD	< LLD	60

Attachment 1
Effluent and Waste Disposal Report Supplemental Information

Overview of Plant Site, SDSP, and Nancy's Creek



Protected Area Wells



Attachment 1
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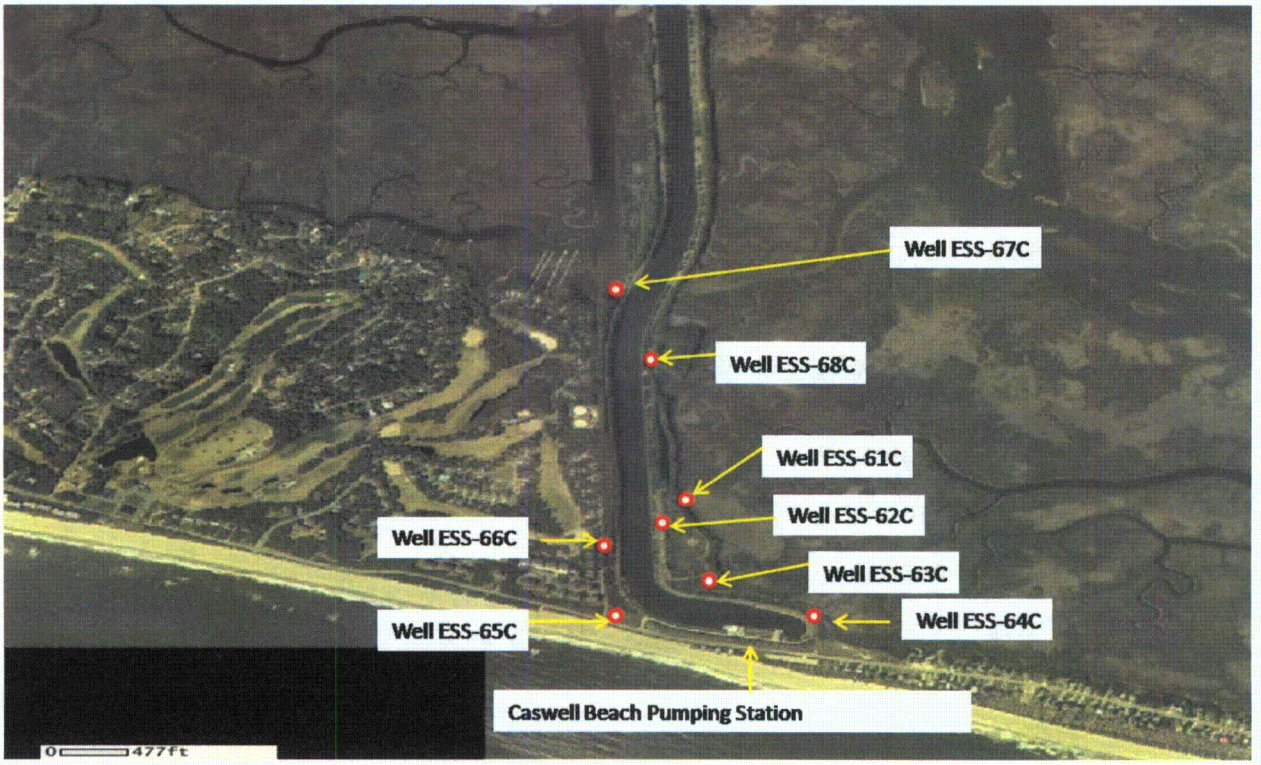
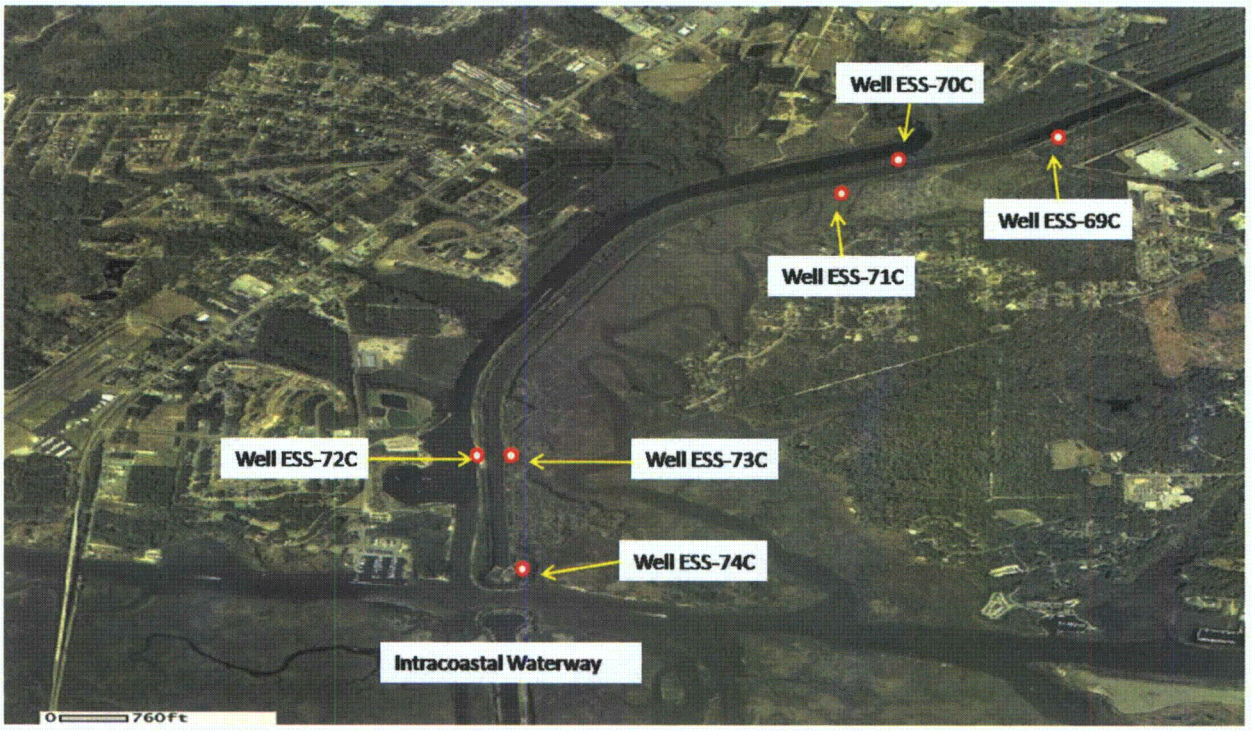
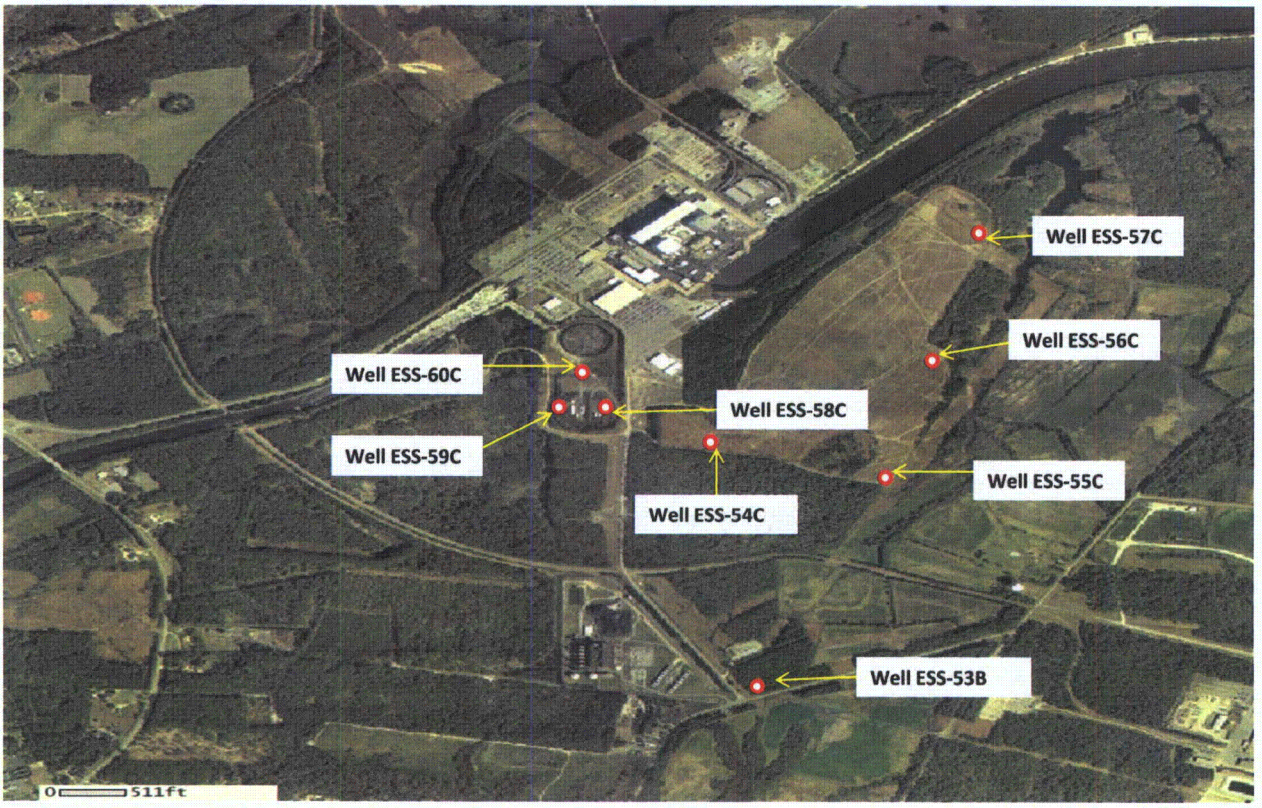
Area One Wells Near Caswell Beach



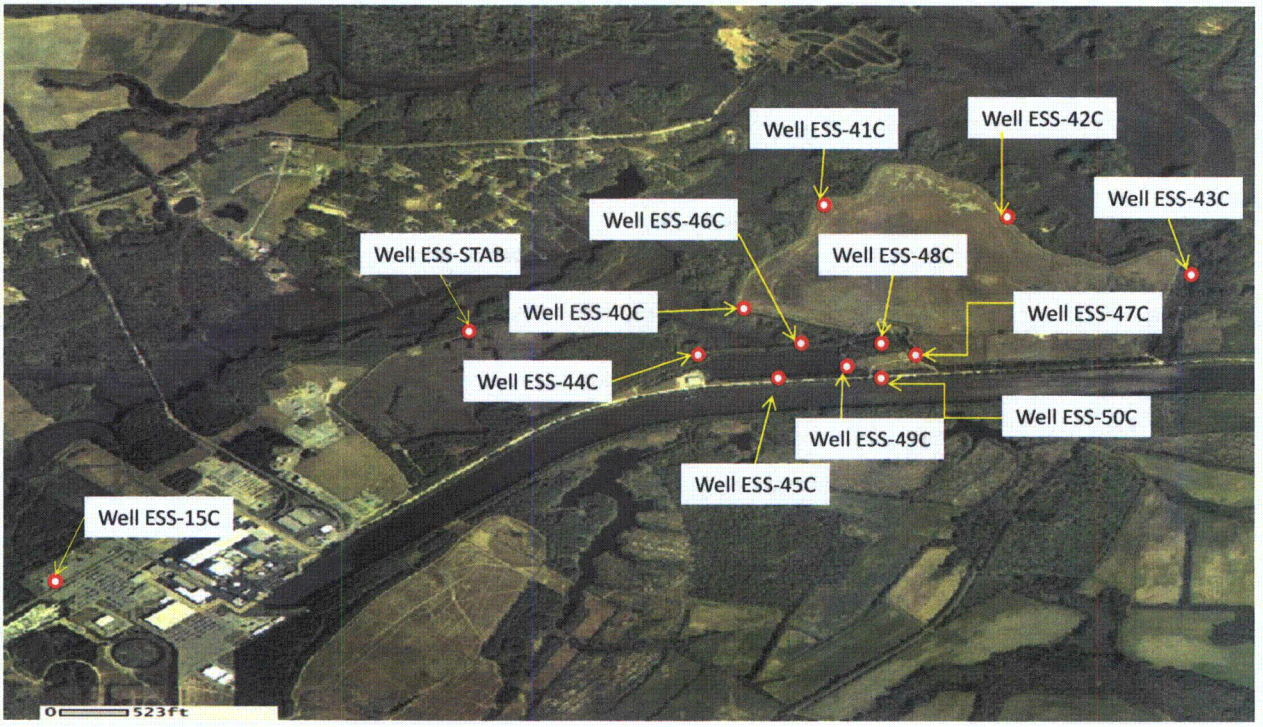
Area 2 Wells Near Intracoastal Waterway



Area 3 and Area 4 Near Plant



Area 5, Area 6, and Area 10 Wells in OCA



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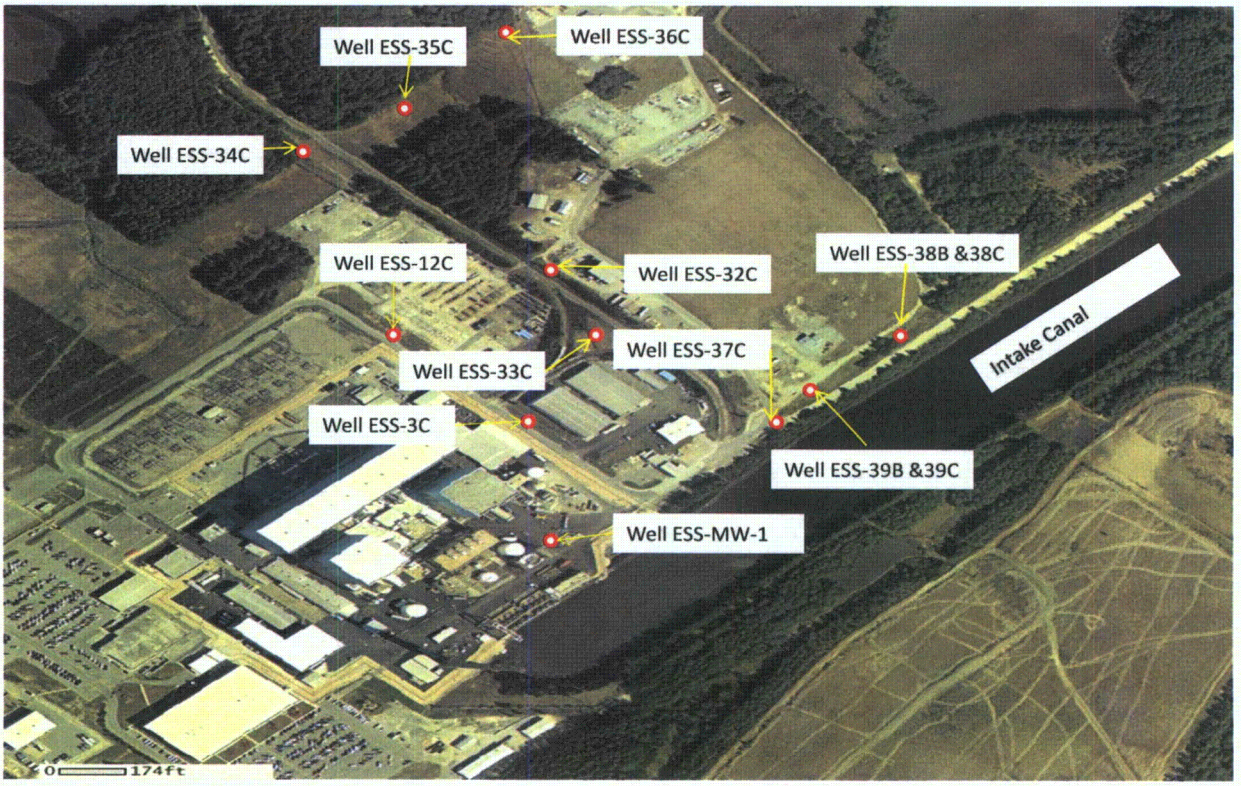
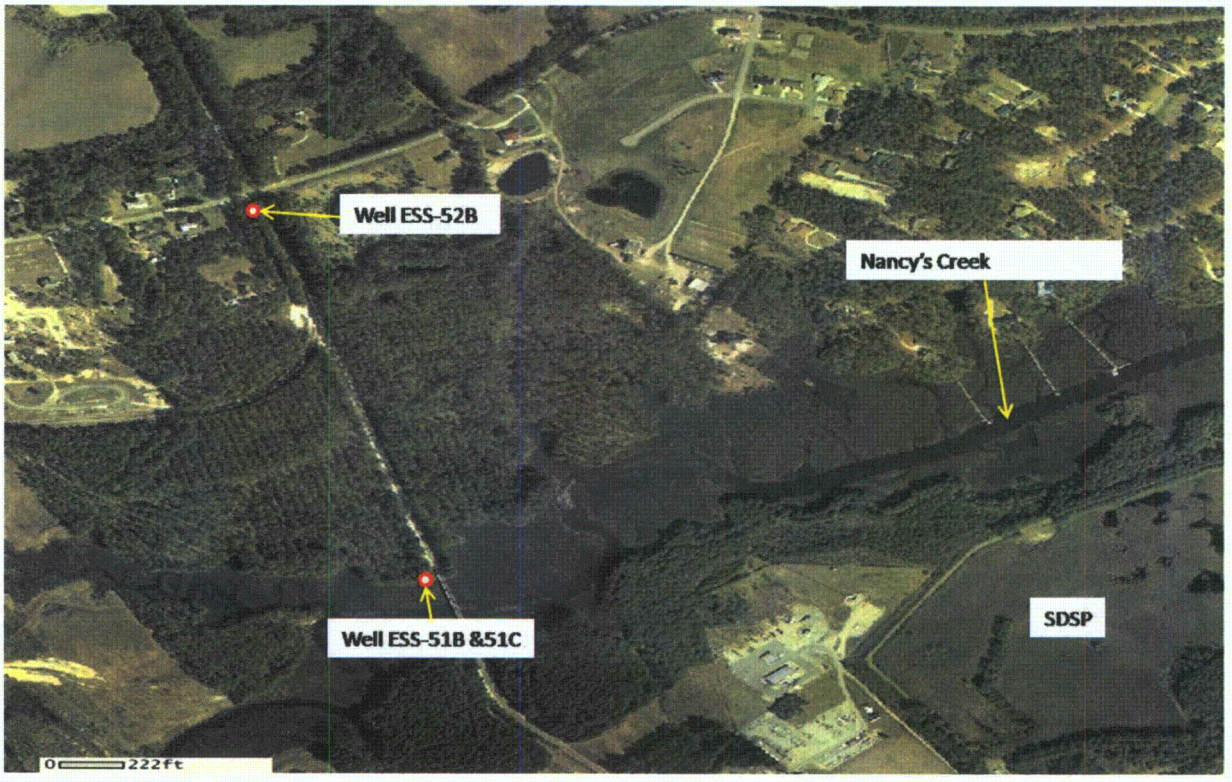
Area 8 and Area 11 Wells in OCA



Area 9 Wells in OCA



Attachment 2
Effluent and Waste Disposal Data

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	1.17E+02	1.02E+02	1.19E+02	1.11E+02	4.50E+01
2. Average release rate for period	µCi/sec	1.50E+01	1.30E+01	1.50E+01	1.40E+01	NA
3. Percent of ODCM limit	%	5.81E-02	5.71E-02	5.50E-02	5.15E-02	NA

B. IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total Iodine - 131 release	Ci	6.26E-03	1.02E-02	1.33E-02	9.10E-03	3.50E+01
2. Average release rate for period	µCi/sec	8.06E-04	1.30E-03	1.68E-03	1.14E-03	NA

C. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	1.60E-03	7.32E-04	2.14E-03	1.12E-03	3.50E+01
2. Average release rate for period	µCi/sec	2.06E-04	9.31E-05	2.69E-04	1.41E-04	NA
3. Gross Alpha	Ci	1.24E-11	2.73E-11	0.00E+00	0.00E+00	3.50E+01

D. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	4.46E+01	3.61E+01	4.90E+01	6.76E+01	3.00E+01
2. Average release rate for period	µCi/sec	5.73E+00	4.59E+00	6.16E+00	8.51E+00	NA

Attachment 2
Effluent and Waste Disposal Data

Table 1A: Gaseous Effluents – Summation of all Releases

E. IODINE-131, IODINE-133, TRITIUM AND PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Total release	Ci	4.46E+01	3.62E+01	4.91E+01	6.77E+01
2. Average release rate for period	µCi/sec	5.74E+00	4.60E+00	6.18E+00	8.52E+00
3. Percent of ODCM limit	%	4.16E-01	6.47E-01	8.35E-01	5.79E-01

D. CARBON-14

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	4.51E+00	4.82E+00	5.94E+00	5.90E+00	3.00E+01
2. Average release rate for period	µCi/sec	5.80E-01	6.13E-01	7.47E-01	7.43E-01	NA

Attachment 2
Effluent and Waste Disposal Data

Table 1B: Gaseous Effluents – Elevated Releases
Continuous Release

Nuclides Released

1. FISSION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
krypton-85m	Ci	≤ LLD	≤ LLD	≤ LLD	1.86E-01
krypton-87	Ci	≤ LLD	1.22E+00	1.92E+00	2.93E-01
krypton-88	Ci	≤ LLD	≤ LLD	3.97E-01	3.09E-01
xenon-133	Ci	≤ LLD	1.06E+00	4.53E+00	3.76E+00
xenon-135	Ci	9.25E+00	9.00E+00	9.75E+00	1.05E+01
xenon-135m	Ci	2.96E+01	2.50E+01	2.47E+01	3.08E+01
xenon-138	Ci	6.95E+01	5.56E+01	7.07E+01	5.83E+01
total for period	Ci	1.08E+02	9.19E+01	1.12E+02	1.04E+02

2. GASEOUS IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
iodine-131	Ci	4.59E-03	7.96E-03	1.07E-02	7.16E-03
iodine-132	Ci	3.00E-02	7.59E-02	1.28E-01	8.27E-02
iodine-133	Ci	3.64E-02	7.85E-02	1.15E-01	7.40E-02
iodine-134	Ci	6.04E-02	1.62E-01	2.89E-01	1.67E-01
iodine-135	Ci	6.03E-02	1.36E-01	2.10E-01	1.38E-01
total for period	Ci	1.92E-01	4.60E-01	7.52E-01	4.69E-01

3. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
chromium-51	Ci	2.29E-05	≤ LLD	≤ LLD	≤ LLD
manganese-54	Ci	6.26E-07	2.07E-06	≤ LLD	≤ LLD
cobalt-58	Ci	7.89E-06	2.18E-06	≤ LLD	≤ LLD
cobalt-60	Ci	5.40E-05	1.01E-05	1.16E-05	4.50E-06
zinc-65	Ci	4.12E-06	1.99E-06	≤ LLD	≤ LLD
strontium-89	Ci	8.30E-05	3.70E-05	1.92E-04	8.96E-05
strontium-90	Ci	1.24E-06	2.13E-07	3.56E-06	8.78E-07
cesium-137	Ci	4.11E-06	≤ LLD	≤ LLD	4.65E-06
barium-140	Ci	1.77E-04	2.18E-05	4.89E-04	3.17E-04
lanthanum-140	Ci	3.15E-04	3.07E-05	8.76E-04	5.49E-04
total for period	Ci	6.70E-04	1.06E-04	1.57E-03	9.65E-04

4. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	1.19E+01	1.31E+01	2.28E+01	2.58E+01

Attachment 2
Effluent and Waste Disposal Data

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

Nuclides Released

1. FISSION GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
xenon-133	Ci	7.92E-01	9.55E-01	≤ LLD	≤ LLD
xenon-133m	Ci	≤ LLD	2.94E-01	7.34E-01	≤ LLD
xenon-135	Ci	6.92E+00	9.18E+00	5.98E+00	6.06E+00
xenon-135m	Ci	5.58E-01	≤ LLD	6.28E-01	8.76E-01
total for period	Ci	8.27E+00	1.04E+01	7.34E+00	6.93E+00

2. GASEOUS IODINES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
iodine-131	Ci	1.67E-03	2.23E-03	2.69E-03	1.94E-03
iodine-132	Ci	2.18E-02	3.50E-02	5.18E-02	3.27E-02
iodine-133	Ci	1.60E-02	2.45E-02	3.09E-02	2.18E-02
iodine-134	Ci	3.04E-02	8.51E-02	1.07E-01	5.47E-02
iodine-135	Ci	3.45E-02	5.32E-02	6.92E-02	4.50E-02
total for period	Ci	1.04E-01	2.00E-01	2.62E-01	1.56E-01

3. PARTICULATES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
chromium-51	Ci	5.08E-04	5.62E-05	2.44E-05	≤ LLD
manganese-54	Ci	1.63E-05	4.59E-06	≤ LLD	≤ LLD
cobalt-58	Ci	7.25E-05	5.76E-05	1.45E-05	≤ LLD
cobalt-60	Ci	1.53E-04	2.12E-04	7.49E-05	2.33E-05
zinc-65	Ci	4.01E-06	≤ LLD	≤ LLD	≤ LLD
strontium-89	Ci	8.21E-05	6.98E-05	7.25E-05	4.44E-05
strontium-90	Ci	9.21E-07	4.27E-07	1.36E-06	≤ LLD
barium-140	Ci	4.07E-05	7.32E-05	2.20E-04	2.32E-05
lanthanum-140	Ci	5.50E-05	1.52E-04	1.57E-04	6.12E-05
total for period	Ci	9.32E-04	6.26E-04	5.64E-04	1.52E-04

4. TRITIUM

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
hydrogen-3	Ci	3.27E+01	2.29E+01	2.62E+01	4.18E+01

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases

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	1.17E-03	1.18E-03	1.67E-03	3.48E-04	4.00E+01
2. Average diluted concentration (NOTE 2)	µCi/ml	3.23E-11	2.61E-11	3.26E-11	1.13E-11	NA
3. Percent of applicable limit	%	4.90E-03	4.43E-03	4.00E-03	4.07E-03	NA

B. TRITIUM (NOTE 1)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total release	Ci	7.14E+01	7.36E+01	7.30E+01	8.28E+01	4.50E+01
2. Average diluted concentration (NOTE 2)	µCi/ml	1.97E-06	1.62E-06	1.43E-06	2.69E-06	NA
3. Percent of applicable limit	%	1.97E-01	1.62E-01	1.43E-01	2.69E-01	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	3.15E-02	2.74E-02	2.66E-02	2.63E-02	4.00E+01
2. Average diluted concentration (NOTE 2)	µCi/ml	8.67E-10	6.02E-10	5.19E-10	8.53E-10	NA
3. Percent of applicable limit	%	4.33E-04	3.01E-04	2.60E-04	4.27E-04	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	4.00E+01

NOTE 1: Includes radionuclides released via abnormal and/or non-routine releases
NOTE 2: Does not include rainwater (i.e. Storm Drain Collector Basin and/or Storm Drain Stabilization Pond)

Attachment 2
Effluent and Waste Disposal Data

Table 2A: Liquid Effluents – Summation of all Releases

E. VOLUME OF WASTE RELEASED (NOTE 2)

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume	liters	5.75E+06	6.89E+06	7.13E+06	4.45E+06	1.50E+01

F. VOLUME OF DILUTION WATER

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Estimated Total Percent Error
1. Total volume (used during release for average diluted concentration)	liters	3.63E+10	4.54E+10	5.12E+10	3.08E+10	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	3.68E+11	4.51E+11	5.24E+11	4.70E+11	1.50E+01

NOTE 1: Includes radionuclides released via abnormal and/or non-routine releases
NOTE 2: Does not include rainwater (i.e. Storm Drain Collection Basin and/or Storm Drain Stabilization Pond)

Attachment 2
Effluent and Waste Disposal Data

Table 2B: Liquid Effluents - Batch Mode

Nuclides Released

1. FISSION AND ACTIVATION PRODUCTS

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
chromium-51	Ci	≤ LLD	1.25E-05	≤ LLD	≤ LLD
manganese-54	Ci	5.83E-06	2.13E-05	≤ LLD	≤ LLD
cobalt-58	Ci	2.11E-05	7.64E-06	2.41E-06	≤ LLD
cobalt-60	Ci	4.94E-04	4.54E-04	6.55E-04	1.15E-04
arsenic-76	Ci	7.62E-06	≤ LLD	≤ LLD	≤ LLD
yitrium-91m	Ci	2.68E-06	≤ LLD	≤ LLD	≤ LLD
yitrium-92	Ci	4.04E-05	≤ LLD	≤ LLD	≤ LLD
iodine-131	Ci	1.84E-04	1.87E-04	2.64E-04	1.17E-04
iodine-133	Ci	2.36E-04	3.50E-04	6.41E-04	1.09E-04
iodine-135	Ci	≤ LLD	≤ LLD	2.08E-05	≤ LLD
cesium-134	Ci	5.85E-06	7.00E-06	≤ LLD	≤ LLD
cesium-137	Ci	1.74E-04	1.45E-04	8.42E-05	7.25E-06
total for period	Ci	1.17E-03	1.18E-03	1.67E-03	3.48E-04

2. DISSOLVED AND ENTRAINED GASES

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4
krypton-85	Ci	≤ LLD	≤ LLD	2.45E-04	≤ LLD
xenon-133	Ci	6.94E-03	4.70E-03	4.65E-03	4.88E-03
xenon-133m	Ci	1.92E-04	≤ LLD	≤ LLD	≤ LLD
xenon-135	Ci	2.43E-02	2.27E-02	2.17E-02	2.14E-02
xenon-135m	Ci	1.46E-05	2.97E-06	≤ LLD	≤ LLD
total for period	Ci	3.15E-02	2.74E-02	2.66E-02	2.63E-02

Attachment 2
Effluent and Waste Disposal Data

Lower Limits of Detection

Units: μCi/ml

1. LIQUID RELEASES

Alpha	1.92E-08
H-3	2.53E-06
H-3	2.33E-07*
Cr-51	1.72E-07
Mn-54	1.14E-08
Fe-55	1.33E-07
Co-58	2.05E-08
Fe-59	3.90E-08
Co-60	2.63E-08
Zn-65	4.69E-08
As-76	3.72E-08
Sr-89	2.03E-08
Sr-90	1.35E-08
Y-91m	2.96E-08
Y-92	1.16E-07
Mo-99	1.41E-07
I-131	1.99E-08
I-135	8.00E-08
Cs-134	1.46E-08
Cs-137	2.12E-08
Ce-141	2.38E-08
Ce-144	9.93E-07
Kr-85	5.14E-06
Kr-87	3.90E-08
Kr-88	5.40E-08
Xe-133	3.72E-08
Xe-133m	1.54E-07
Xe-135	1.71E-08
Xe-135m	6.00E-08
Xe-138	2.07E-07

2. GASEOUS RELEASES

Kr-85	2.67E-06
Kr-85m	8.57E-09
Kr-87	2.28E-08
Kr-88	3.27E-08
Xe-133	2.09E-08
Xe-133m	5.62E-08
Xe-135	8.07E-09
Xe-135m	8.79E-08
Xe-137	1.20E-06
Xe-138	2.70E-07

3. IODINES AND PARTICULATES

Alpha	1.01E-15
H-3	8.71E-11
Cr-51	2.99E-12
Mn-54	2.36E-13
Co-58	4.01E-13
Fe-59	5.38E-13
Co-60	3.56E-13
Zn-65	1.04E-12
Sr-89	2.04E-15
Sr-90	1.06E-15
Mo-99	3.11E-12
I-131	4.17E-13
Cs-134	4.58E-13
Cs-137	5.93E-13
Ce-141	5.07E-13
Ce-144	1.96E-12

NOTES:

1. The above values represent typical "a priori" LLDs for isotopes where values of "≤ LLD" are indicated in Tables 1A, 1B, 1C, 2A, and 2B. 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) 9.16E+02

   Total curie quantity (estimated) 9.68E+01

2. Type of Waste

		Unit	Period	Estimated Total %Error
a.	Spent resins, filter, sludges	meter^3	5.25E+01	
		Curies	9.52E+01	1.00E+01
b.	Dry active waste, compacted/non-compacted	meter^3	8.64E+02	
		Curies	1.60E+00	1.00E+01
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. Fe-55 1.88E+01%
      Co-60 5.32E+01%
      Ni-63 1.98E+01%
      Cs-137 5.04E+00%

   b. Fe-55 1.89E+01 %
      Co-60 6.21E+01 %
      Ni-63 5.38E+00 %
      Cs-137 1.27E+01 %

   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	Dewatered	Type A or GDP	1.00E+01
b. Dry active waste	Compacted/ Non-compacted	Type A or GDP	2.30E+01
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
2.00E+01	Highway	Oak Ridge, TN
3.00E+00	Rail	Clive, UT
1.00E+01	Highway	Erwin, TN

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) 7.70E+00

   Total curie quantity (estimated) 2.01E+02

2. Type of Waste

		Unit	Period	Estimated Total %Error
a.	Spent resins, filter, sludges	meter^3	7.70E+00	
		Curies	2.01E+02	1.00E+01
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.

Mn-54	3.87E+00 %
Fe-55	5.61E+00 %
Co-58	4.90E+00 %
Co-60	7.11E+01 %
Ni-63	4.94E+00 %
Zn-65	5.45E+00 %
Cs-137	2.40E+00 %

   b. N/A

   c. N/A

   d. N/A

NOTE:

Solid Radioactive Waste was shipped to a waste processor for processing and then transported for storage pending future disposal by the processor.

Attachment 2
Effluent and Waste Disposal Data

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 B	3.00E+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
3.00E+00	Highway	Erwin, TN

b. Irradiated Fuel

Number of Shipments	Mode of Transportation	Destination
0	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	1.00E+01
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.

Enclosure 2: Land Use Census

The 2010 Land Use Census did not identify any locations that are reportable in the Radioactive Effluent Release Report for 2010.

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	1.4 miles
SE	None	None
SSE	2.1 miles	None
S	1.1 miles	1.6 miles
SSW	1.2 miles	1.7 miles
SW	1.1 miles	1.6 miles
WSW	1.2 miles	1.2 miles
W	0.9 miles	1.0 mile
WNW	0.9 miles	None
NW	0.9 miles	1.0 miles
NNW	0.8 miles	0.9 miles
N	0.7 miles	0.9 miles

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.

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). The following change was made during this reporting period:

The installation of the Unit 2 Salt Water Release Tank (SWRT) was completed under Engineering Change 70824. This change was submitted under Licensing Document Change Request 10FSAR-014. This change will revise Section 11.2.2, Table 9-24, and Table 11-4 of the UFSAR.

Portions of the Unit 2 system were installed during the Unit 1 SWRT installation including the SWRT and piping from the condenser pit to enable pump out to the Unit 1 SWRT. This EC completed the installation and includes various upgrades based on Unit 1 operating experience.

The following work activities were required to complete the Unit 2 SWR system:

- Installation of SWRT pump, filters, piping and supports.
- Installation of local instrument control panel, wiring and associated instruments.
- Installation of tank level indicator at the Radwaste control panel.
- Installation of electrical power feeds from local 480 and 120VAC distribution systems to the SWRT pump and instrument control panel.
- Completion of the SWRT grating. Most of the grating was in place but modifications were required to mount various components including the pump, filters and piping.
- Completion of the tank inlet and outlet piping. The tank has two inlets: one for condenser pit pumpout and one for spray cooler basin drains. Tank outlet piping was tied-in with the Unit 1 tank outlet piping which goes to Radwaste.

The following design upgrades were included for the Unit 2 SWR system:

- Epoxy lining for the SWRT interior to protect the concrete, improve the ability to clean the tank wall, and reduce maintenance.
- Upgraded tank level instrumentation including installation of a stilling well and local indicator for improved performance.
- Upgraded filters to reduce maintenance dose rate exposure. The new horizontal filters are single cartridge design compared to nearly sixty cartridges on the existing units. The existing filter housing design has long since been discontinued due to poor sealing performance.
- Filter isolation valves that are operable from the outside the high rad area on top of the tank to reduce maintenance dose rate exposure.
- The system will not include the control valve on the tank inlet which closes automatically when the tank is 80% full. This change is due to the addition of a second inlet pipe to the SWRTs under interfacing EC 70821 for the spray cooler basin overflow drains. SWRT isolation will be accomplished by closing both inlet valves manually per revised procedures.
- Modified DPI instrument valve configuration to facilitate in-place calibration of instruments.

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 liquid releases: SW sector at 0.1 miles[1]

Supplemental Dose*	SDSP	SDCB	Marsh[1]	Pipe	Total
mrem	4.06E-06	1.35E-07	2.80E-03	3.86E-09	2.80E-03

*Reference page 5-6 of Supplemental Information

	Routine ODCM Dose (mrem)	Supplemental Dose (mrem)	Total Dose (mrem)	Limit (mrem)
GI-LLI	7.85E-04	2.80E-03	3.59E-03	2.00E+01
Bone	2.55E-05	0.00E+00	2.55E-05	2.00E+01
Liver	5.15E-04	2.80E-03	3.32E-03	2.00E+01
Lung	4.65E-04	2.80E-03	3.27E-03	2.00E+01
Total Body	5.22E-04	2.80E-03	3.33E-03	6.00E+00
Thyroid	9.92E-04	2.80E-03	3.80E-03	2.00E+01
Kidney	4.76E-04	2.80E-03	3.28E-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.

Gaseous Effluents

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

	Routine ODCM Dose (mrad)	Limit (mrad)
Gamma	2.22E-02	2.00E+01
Beta	1.50E-02	4.00E+01

Iodine, Particulates, and Tritium:

Supplemental Dose*	SDSP Evaporation	Carbon-14 (All except Bone and Skin)	Carbon-14 (Bone)
mrem	8.16E-04	4.71E-01	2.36E+00

*Reference page 5-6 of Supplemental Information

Critical Age: Infant
Controlling location: NE sector at 4.75 mile, assuming a cow milk pathway[2] [3]

	Routine ODCM Dose (mrem)	Supplemental Dose (mrem)	Total Dose (mrem)	Limit (mrem)
Thyroid	3.71E-01	4.72E-01	8.43E-01	3.00E+01
Kidney	5.36E-03	4.72E-01	4.77E-01	3.00E+01
Liver	5.16E-03	4.72E-01	4.77E-01	3.00E+01
Total Body	4.45E-03	4.72E-01	4.76E-01	3.00E+01
Skin	4.00E-03	8.16E-04	4.82E-03	3.00E+01
GI-LLI	4.02E-03	4.72E-01	4.76E-01	3.00E+01
Lung	3.96E-03	4.72E-01	4.76E-01	3.00E+01
Bone	1.38E-03	2.36E+00	2.36E+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 Carbon-14 supplemental dose is the south sector at 1.6 miles with a garden. The critical age is a child. Reference page 5 of supplemental information.

Off-Site Dose Calculation Manual (ODCM) And Process Control Program (PCP) Revisions

The PCP was not revised during the report period.

ODCM Revision 34 was effective on July 13, 2010. The ODCM Revision 34 changes are as follows:

1. On Page 1-1, included a reference to 10CFR72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste. Reference Engineering Change 67583.

2. On page 4-6, updated Table 4.0-1, Radiological Environmental Monitoring Program, 1. Direct Radiation to include information about TLDs: 82, 83, 84, and 85. Reference Engineering Change 67583.

3. On page 4-14, updated Figure 4.0-1 to include the location of TLDs 82, 83, 84, and 85. Reference Engineering Change 67583.

On December 9, 2010, water was found leaking from electrical junction box WL2 into the Diesel Generator Building basement. The tritium levels of the water were determined to be in excess of the Nuclear Energy Institute (NEI) voluntary reporting criteria (i.e., 30,000 pCi/L for onsite groundwater, as specified in the Offsite Dose Calculation Manual). Further investigation determined the source of the tritiated water to be an underground portion of the Unit 1 Hotwell Makeup line, 1-CO-32-12-C-2, from the Unit 1 Condensate Storage Tank (CST). The Unit 1 Hotwell Make-up line was isolated and Engineering Changes 79448 and 79450 were implemented to provide Unit 1 Hotwell Makeup from the Unit 2 CST. The leak was inside the plant protected area, well inside the site's property boundary. There is no indication that tritium migrated into drinking water sources or off plant property. The leakage did not impacted plant reliability or the operability of any safety-related equipment. Corrective actions were taken to capture the inleakage of water into the diesel generator building and route it through normal permitted discharge paths. Additional water samples were obtained from site monitoring wells until the leak was isolated. The Brunswick plant has had an extensive groundwater protection monitoring program in place since 2007. This environmental sampling program consists of more than 100 monitoring wells which are routinely sampled. The following agencies were notified of this incident: City of Southport, Brunswick County, State Officials, NEI, INPO, ANI, and the NRC Resident Inspector. Reference Nuclear Condition Report 437478 for further details on this leak.