Jason Jennings
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PSEG NUCLEAR

Technical Specification 6.9.1.8 (Salem)
Technical Specification 6.9.1.7 (Hope Creek)

LR-N25-0046

April 24, 2025

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

Salem Generating Station, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-70 and DPR-75
NRC Docket Nos. 50-272 and 50-311

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
Docket No. 50-354

Subject: 2024 Annual Radiological Effluent Release Report (ARERR)

PSEG Nuclear LLC hereby submits the 2024 Annual Radiological Effluent Release Report (Enclosure) for the period January 1, 2024 to December 31, 2024.

There are no regulatory commitments contained in this letter.

Please contact Rick Heathwaite at Rick.Heathwaite@PSEG.com with questions or comments.

Sincerely,

Jennings, Jason

Digitally signed by Jennings, Jason
Date: 2025.04.24 15:50:28 -04'00'

Jason Jennings
Director, Site Regulatory Compliance

Enclosure: 2024 Annual Radiological Effluent Release Report for Salem and Hope Creek Generating Stations

cc: USNRC Regional Administrator − Region 1
USNRC NRR Project Manager – Salem
USNRC Senior Resident Inspector – Salem
USNRC NRR Project Manager – Hope Creek
USNRC Senior Resident Inspector – Hope Creek
NJ Department of Environmental Protection, Bureau of Nuclear Engineering

LR-N25-0046

Enclosure

2024 Annual Radiological Effluent Release Report

for

Salem and Hope Creek Generating Stations

(Total Pages 107)

PSEG Nuclear LLC

Salem & Hope Creek Generating Stations

Annual Radioactive Effluent Release Report 2024

Document Number: SGS-73 / HCGS-47

Unit 1 DOCKET No. 50-272 OPERATING LICENSE No. DPR-070	Unit 2 DOCKET No. 50-311 OPERATING LICENSE No. DPR-075	Unit 1 DOCKET No. 50-354 OPERATING LICENSE No. NPF-057

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ARERR (REC) Review and Approval Confirmation in SAP

(I.A.W. AD-AA-1006 SIGNATURE AUTHORITY)

SAP Order 80136643

Operation		Date
0011	**Stephen Gattuso**, Salem Chemistry Manager	**04/23/2025**
0012	**Jason Nordin**, Hope Creek Chemistry Manager	**04/15/2025**
0013	**William Gropp**, Salem Radiation Protection Manager	**04/13/2025**
0014	**Robert Ronan**, Hope Creek Radiation Protection Manager	**04/21/2025**
0015	**Matthew Mog**, Salem Senior Director of Operations	**04/22/2025**
0016	**Joshua Moss**, Hope Creek Senior Director of Operations	**04/20/2025**
0017	**Richard DeSanctis**, Salem Plant Manager	**04/21/2025**
0018	**Robert McLaughlin**, Hope Creek Plant Manager	**04/23/2025**

Report Prepared By: 

Rick M. Heathwaite (REMP/REC Program Manager)

1.0 EXECUTIVE SUMMARY

Salem & Hope Creek Generating Stations (SGS/HCGS) Radiological Effluent Control (REC) Program was established to limit the quantities of radioactive material that may be released based on calculated radiation doses or dose rates. Dose to Members of the Public due to radioactive materials released from the plant is limited by Appendix I of 10 CFR 50 and by 40 CFR 190. Operational doses to the public during 2024 were calculated to be very small compared to the limits required by regulation and when compared to other sources of radiation dose (Section 3.2) pose no health hazard.

In 2024 Dose assessments showed that the critical dose receptor for Salem & Hope Creek Generating Stations was the Child at the Dairy Farm located 4.9 miles in the W sector, due to the pathways of Inhalation, Ground Plane, Meat, Vegetation, and Cow Milk. The maximum Annual Organ Dose calculated for this receptor was 1.30E-02 mrem, to the Thyroid. This annual dose represents 0.03 percent of the 10 CFR 50, Appendix I guideline of 45 mrem to the Maximum Organ from three Units.

Salem solid radioactive waste shipped offsite for disposal included 1.44E+01 Curies and 3.78E+02 m^3, shipped in 12 shipments. Hope Creek solid radioactive waste shipped offsite for disposal included 1.45E+04 Curies and 3.17E+01 m^3, shipped in 11 shipments.

During 2024, the mass flux within the shallow, water bearing unit and deeper groundwater was estimated to be 0.006 Ci and 0.012 Ci, respectively. Therefore, the total potential estimated mass flux of tritium in groundwater reaching the Delaware River during 2024 was 0.018 Ci.

In addition to monitoring radioactive effluents, Salem & Hope Creek Generating Stations have a Radiological Environmental Monitoring Program (REMP) that monitors for buildup of radioactivity in the offsite environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).

1.1 Summary of Conclusions:

During 2024 all liquid, and gaseous radioactive effluents from Salem & Hope Creek Generating Stations were well below regulatory limits. For individual effluent streams, the quarterly limit most closely approached was the Liquid Effluent Maximum Organ Dose for the second quarter for Salem Unit 1 at 0.62 percent (Table 1, Salem Generating Station Unit 1 Dose Summary, 2024).

40 CFR 190 [1] and 10 CFR 72.104 [2] limit the total dose to a the maximum exposed Member of the Public to 25 mrem to the total body, 75 mrem to the thyroid and 25 mrem to other organs other than the thyroid. The maximum annual total body and organ doses from gaseous and liquid pathways with all other uranium fuel cycle sources present on site were calculated as required by section 3.11.4 (Total Dose) of the SGS and HCGS ODCMs. The direct dose from the ISFSI pad was determined using the

Radiological Environmental Monitoring Program (REMP) and the guidance provided in Regulatory Guide 4.13 [3].

The direct shine dose from the ISFSI to the highest dose potential receptor located at 3.7 miles in the NW sector was conservatively estimated at 5.90E-03 mrem. The doses from the gaseous radioactive effluents released from SGS Units 1 and Unit 2 and HCGS Unit 1 in 2024 resulted in a calculated total body, thyroid and organ doses of 1.08E-01 mrem, 1.09E-01 mrem, and 4.91E-01 mrem, respectively. The majority of the gaseous dose was from C-14 (4.78E-01 mrem) to the child bone.

The doses from the liquid radioactive effluents released from SGS Units 1 and Unit 2 and HCGS Unit 1 in 2024 resulted in a calculated total body, thyroid and organ doses of 6.85E-02 mrem, 2.21E-02 mrem, and 5.97E-02 mrem, respectively.

Adding in the direct shine dose from the ISFSI to the gaseous and liquid doses, results in total doses to the Total Body, Thyroid and Max Organ of 1.83E-01 mrem, 1.37E-01 mrem and 5.57E-01 mrem, respectively. The max organ dose represented 2.23% of the 25 mrem limit. These analyses are in Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024.

Maximum calculated TEDE dose from ISFSI direct shine and gaseous effluents to Members of the Public working on site was calculated at 2.38E+00 mrem for Sewage Treatment Plant Operators. The Maximum TEDE dose to the Wind Port workers was esitmated at 1.47E+00 mrem. These analyses are in Table 6, Summary of TEDE doses to Members of the Public Due to Activities Inside the Site Boundary, 2024.

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ATTACHMENTS

2.0 LIST OF ACRONYMS AND DEFINITIONS

1. Airborne Activity Sampling: Sampling of air through the collection of particulates and radionuclides on filter media, collection of noble gases in a container, and collection of water vapor containing tritium.
2. amsl: above mean seal level.
3. Alpha Particle (α): A charged particle emitted from the nucleus of an atom having a mass and charge equal in magnitude of a helium nucleus.
4. AREOR: Annual Radiological Environmental Operating Report.
5. ARERR: Annual Radioactive Effluent Release Report.
6. Abnormal Release: is an unplanned or uncontrolled release of licensed radioactive material from the plant. Abnormal releases may be categorized as either batch or continuous depending on the circumstances.
7. Abnormal Discharge: is an unplanned or uncontrolled release of licensed radioactive material to the unrestricted area. Abnormal discharges may also be categorized as either batch or continuous depending on the circumstances.
8. bgs: below ground surface.
9. BWR: Boiling Water Reactor.
10. CDE: The committed effective dose equivalent (for internal exposures).
11. cfm: cubic feet per minute.
12. Composite Sample: A series of single collected portions (aliquots) analyzed as one sample. The aliquots making up the sample are collected at time intervals that are very short compared to the composite period.
13. Control: A sampling station in a location not likely to be affected by plant effluents due to its distance and/or direction from the Plant.
14. Counting Error: An estimate of the two-sigma uncertainty associated with the sample results based on respective count times.
15. Critical Receptor: Represents the MEMBER(S) of the Public in the Unrestricted Area who because of the combination of age group and existing local dose exposure pathways has the potential to receive the highest dose.
16. Curie (Ci): A measure of radioactivity; equal to 3.7×10^{10} disintegrations per second, or 2.22×10^{12} disintegrations per minute.
17. Direct Radiation Monitoring: The measurement of radiation dose at various distances from the plant is assessed using thermoluminescent dosimeters (TLDs).
18. FIN: Fix It Now.
19. Grab Sample: A single discrete sample drawn at one point in time.
20. IAW: In Accordance With.
21. Indicator: A sampling location that is likely to be affected by plant effluents due to its proximity and/or direction from the plant.

22. Ingestion Pathway: The ingestion pathway includes saltwater fish, saltwater invertebrates, cow milk, garden produce, and meat.
23. ISFSI: Independent Spent Fuel Storage Installation.
24. JFD: Joint Frequency Distribution.
25. Lower Limit of Detection (LLD): The smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability with a 5% probability of a false conclusion that a blank observation represents "real" signal.
26. LUC: Land Use Census.
27. m/s: Meters per second.
28. MDA: Minimum Detectable Activity.
29. MDC: Minimum Detectable Concentration, essentially synonymous with MDA for the purposes of radiological monitoring.
30. Mean: The average, i.e., the sum of results divided by the number of results.
31. Microcurie (µCi): 3.7×10^4 disintegrations per second, or 2.22×10^6 disintegrations per minute.
32. millirem (mrem): 1/1000 rem; a unit of radiation dose equivalent in tissue.
33. Milliroentgen (mR): 1/1000 Roentgen; a unit of exposure to X- or gamma radiation.
34. MWe: Megawatts Electric.
35. MWTh: Megawatts Thermal.
36. N/A: Not Applicable.
37. N/D: Not Detectable.
38. NEI: Nuclear Energy Institute.
39. NEO: Nuclear Equipment Operator.
40. Nonroutine, planned discharge—An effluent release from a release point that is not defined in the ODCM but that has been planned, monitored, and discharged in accordance with 10 CFR 20.2001.
41. NRC: Nuclear Regulatory Commission.
42. ODCM: Offsite Dose Calculation Manual.
43. Protected Area: The fenced area immediately surrounding the Plant. Access to the protected area requires a security badge or escort.
44. PWR: Pressurized Water Reactor.
45. RCA: Radiation Controlled Area.
46. REC: Radiological Effluent Control.
47. REMP: Radiological Environmental Monitoring Program.

48. Restricted Area: Any area where access is controlled for the purpose of protecting individuals from exposure to radiation or radioactive materials.
49. RGPP: Radiological Ground Water Protection Program.
50. RPD: Relative to plant datum.
51. SLCs: Selected Licensee Commitments.
52. TEDE: The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).
53. TLD: Thermoluminescent Dosimeter.
54. TRM: Technical Requirements Manual.
55. TS: Technical Specification.
56. Unrestricted Area: an area, access to which is neither limited nor controlled by the licensee.

2.1 Comparison to Regulatory Limits

During 2024 all solid, liquid, and gaseous radioactive effluents from Salem & Hope Creek Generating Stations were well below regulatory limits, as summarized in Table 1 through Table 5.

Table 1, Salem Generating Station Unit 1 Dose Summary, 2024[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluents						
	Limit	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**3 mrem**
	Total Body Dose[2]	3.19E-03	9.15E-03	7.70E-03	1.79E-03	2.18E-02
	% Of Limit	0.21	0.61	0.51	0.12	0.73
	Limit	**5 mrem**	**5 mrem**	**5 mrem**	**5 mrem**	**10 mrem**
	Maximum Organ Dose[3]	4.41E-03	3.12E-02	8.86E-03	2.10E-03	4.66E-02
	% Of Limit	0.09	0.62	0.18	0.04	0.47
Gaseous Effluents						
	Limit	**5 mrad**	**5 mrad**	**5 mrad**	**5 mrad**	**10 mrad**
	Gamma Air Dose[4]	2.70E-06	8.78E-06	8.35E-06	4.19E-06	2.40E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**10 mrad**	**10 mrad**	**10 mrad**	**10 mrad**	**20 mrad**
	Beta Air Dose[5]	1.02E-06	3.16E-06	2.98E-06	1.53E-06	8.70E-06
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**5 mrem**
	NG Total Body Dose[6]	2.56E-06	8.34E-06	7.93E-06	3.98E-06	2.28E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	NG Skin Dose[7]	3.76E-06	1.22E-05	1.16E-05	5.84E-06	3.34E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	Maximum Organ Dose[8]	7.93E-04	1.74E-03	2.12E-03	2.35E-03	7.01E-03
	% Of Limit	0.01	0.02	0.03	0.03	0.05

[1] Table 1 is meant to demonstrate compliance to 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.
[2] 0.75 mi. N of Salem / Adult
[3] 0.75 mi. N of Salem / Adult, GI-Lli
[4] SB 0.83 mi. N / All Age Groups
[5] SB 0.83 mi. N / All Age Groups
[6] SB 0.83 mi. N / All Age Groups
[7] SB 0.83 mi. N / All Age Groups
[8] Dairy 4.9 mi. W / Child, Thyroid

Table 2, Salem Generating Station Unit 2 Dose Summary, 2024[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluents						
	Limit	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**3 mrem**
	Total Body Dose[2]	7.32E-04	3.76E-04	1.84E-03	2.12E-03	4.66E-03
	% Of Limit	0.05	0.03	0.12	0.14	0.17
	Limit	**5 mrem**	**5 mrem**	**5 mrem**	**5 mrem**	**10 mrem**
	Maximum Organ Dose[3]	3.27E-03	5.73E-04	2.44E-03	6.60E-03	1.29E-02
	% Of Limit	0.07	0.01	0.05	0.13	0.13
Gaseous Effluents						
	Limit	**5 mrad**	**5 mrad**	**5 mrad**	**5 mrad**	**10 mrad**
	Gamma Air Dose[4]	1.39E-05	2.04E-05	1.90E-05	1.24E-06	5.46E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**10 mrad**	**10 mrad**	**10 mrad**	**10 mrad**	**20 mrad**
	Beta Air Dose[5]	4.99E-06	7.20E-06	7.44E-06	7.28E-07	2.04E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**5 mrem**
	NG Total Body Dose[6]	1.32E-05	1.94E-05	1.81E-05	1.17E-06	5.19E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	NG Skin Dose[7]	1.94E-05	2.83E-05	2.66E-05	1.80E-06	7.61E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	Maximum Organ Dose[8]	4.80E-04	9.33E-04	1.93E-03	1.24E-03	4.59E-03
	% Of Limit	0.01	0.01	0.03	0.02	0.03

[1] Table 2 is meant to demonstrate compliance to 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.
[2] 0.75 mi. N of Salem / Adult
[3] 0.75 mi. N of Salem / Adult, GI-Lli
[4] SB 0.83 mi. N / All Age Groups
[5] SB 0.83 mi. N / All Age Groups
[6] SB 0.83 mi. N / All Age Groups
[7] SB 0.83 mi. N / All Age Groups
[8] Dairy 4.9 mi. W / Child, Thyroid

Table 3, Hope Creek Generating Station Unit 1 Dose Summary, 2024[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluents						
	Limit	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**1.5 mrem**	**3 mrem**
	Total Body Dose[2]	1.26E-05	6.02E-05	2.19E-06	1.96E-06	7.70E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**5 mrem**	**5 mrem**	**5 mrem**	**5 mrem**	**10 mrem**
	Maximum Organ Dose[3]	4.11E-05	1.37E-04	2.57E-06	2.03E-06	1.83E-04
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Gaseous Effluents						
	Limit	**5 mrad**	**5 mrad**	**5 mrad**	**5 mrad**	**10 mrad**
	Gamma Air Dose[4]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	% Of Limit	N/A	N/A	N/A	N/A	N/A
	Limit	**10 mrad**	**10 mrad**	**10 mrad**	**10 mrad**	**20 mrad**
	Beta Air Dose[5]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	% Of Limit	N/A	N/A	N/A	N/A	N/A
	Limit	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**2.5 mrem**	**5 mrem**
	NG Total Body Dose[6]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	% Of Limit	N/A	N/A	N/A	N/A	N/A
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	NG Skin Dose[7]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	% Of Limit	N/A	N/A	N/A	N/A	N/A
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	Maximum Organ Dose[8]	6.89E-04	2.85E-04	1.57E-04	2.91E-04	1.42E-03
	% Of Limit	0.01	< 0.01	< 0.01	< 0.01	0.01

[1] Table 3 is meant to demonstrate compliance to 10 CFR Part 50, Appendix I Limits. It does not include dose from C-14.
[2] 0.75 mi. N of Salem / Adult
[3] 0.75 mi. N of Salem / Adult, GI-Lli
[4] SB 0.5 mi. N / All Age Groups
[5] SB 0.5 mi. N / All Age Groups
[6] SB 0.5 mi. N / All Age Groups
[7] SB 0.5 mi. N / All Age Groups
[8] Dairy 4.9 mi. W / Child, Thyroid

Table 4, Salem & Hope Creek Generating Stations Site Dose Summary, 2024[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluents						
	Limit	**4.5 mrem**	**4.5 mrem**	**4.5 mrem**	**4.5 mrem**	**9 mrem**
	Total Body Dose	3.93E-03	9.58E-03	9.54E-03	3.91E-03	6.85E-02
	% Of Limit	0.09	0.21	0.21	0.09	0.76
	Limit	**15 mrem**	**15 mrem**	**15 mrem**	**15 mrem**	**30 mrem**
	Maximum Organ Dose	7.72E-03	3.20E-02	1.13E-02	8.70E-03	5.97E-02
	% Of Limit	0.05	0.21	0.08	0.06	0.20
Gaseous Effluents						
	Limit	**15 mrad**	**15 mrad**	**15 mrad**	**15 mrad**	**30 mrad**
	Gamma Air Dose	1.66E-05	2.92E-05	2.74E-05	5.44E-06	7.86E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**30 mrad**	**30 mrad**	**30 mrad**	**30 mrad**	**60 mrad**
	Beta Air Dose	6.01E-06	1.04E-05	1.04E-05	2.26E-06	2.91E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**7.5 mrem**	**15 mrem**
	NG Total Body Dose	1.58E-05	2.77E-05	2.60E-05	5.15E-06	7.47E-05
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**22.5 mrem**	**22.5 mrem**	**22.5 mrem**	**22.5 mrem**	**45 mrem**
	NG Skin Dose	2.31E-05	4.06E-05	3.82E-05	7.63E-06	1.10E-04
	% Of Limit	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	Limit	**22.5 mrem**	**22.5 mrem**	**22.5 mrem**	**22.5 mrem**	**45 mrem**
	Maximum Organ Dose	1.96E-03	2.96E-03	4.21E-03	3.88E-03	1.30E-02
	% Of Limit	0.01	0.01	0.02	0.02	0.03

[1] Compliance to 10 CFR Part 50, Appendix I Limits is demonstrated from Tables 1 to 3 for each unit. Table 4 is a summary of the cumulative dose from all three units.

Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024[1]

	Whole Body	Thyroid	Max Organ
Limit	**25 mrem**	**75 mrem**	**25 mrem**
Gaseous[2]			
Salem 1 NG	2.28E-05	2.28E-05	3.34E-05
Salem 1 Particulates/Iodines	7.01E-03	7.01E-03	7.01E-03
Carbon 14	3.03E-02	3.03E-02	1.52E-01
Salem 2 NG	5.19E-05	5.19E-05	7.61E-05
Salem 2 Particulates/Iodines	4.58E-03	4.59E-03	4.58E-03
Carbon 14	2.53E-02	2.53E-02	1.27E-01
Hope Creek 1 NG	0.00E+00	0.00E+00	0.00E+00
Hope Creek 1 Particulates/Iodines	1.21E-03	1.42E-03	1.21E-03
Carbon 14	4.00E-02	4.00E-02	2.00E-01
Total Gaseous mrem	**1.08E-01**	**1.09E-01**	**4.91E-01**
Total C-14 Dose mrem	**9.56E-02**	**9.56E-02**	**4.78E-01**
% Contribution to Gaseous Dose	**88%**	**88%**	**97%**
Liquid			
Salem 1	2.18E-02	1.76E-02	4.66E-02
Salem 2	4.66E-02	4.46E-03	1.29E-02
Hope Creek 1	7.70E-05	4.84E-05	1.83E-04
Total Liquid mrem[3]	**6.85E-02**	**2.21E-02**	**5.97E-02**
Direct Shine[4]	**5.90E-03**	**5.90E-03**	**5.90E-03**
Other Nearby Facility[5]	N/A	N/A	N/A
Total mrem	**1.83E-01**	**1.37E-01**	**5.57E-01**
% Of Limit	**0.73%**	**0.18%**	**2.23%**

[1] Table 5 is a summation of all Units to show compliance with 40 CFR Part 190 Limits.
[2] Gaseous dose values include total body dose from Noble Gas, Iodine, Tritium, C-14, and Particulates.
[3] Individual groups with the highest dose are used: Adult for Liquid, Teen for Noble Gas and Child for Particulates. The individual age group sum is lower.
[4] Nearest Residence 3.7 miles NW sector.
[5] Other fuel cycle sources within 5 miles of the site are considered in this analysis; however, there are none.

3.0 INTRODUCTION

3.1 About Nuclear Power

Commercial nuclear power plants are generally classified as either Boiling Water Reactors (BWR) or Pressurized Water Reactors (PWR), based on their design. A BWR includes a single coolant system where water used as reactor coolant boils as it passes through the core and the steam generated is used to turn the turbine generator for power production [4]. A PWR, in contrast, includes two separate water systems: radioactive reactor coolant and a secondary system. Reactor coolant is maintained under high pressure, preventing boiling. The high-pressure coolant is passed through a heat exchanger called a steam generator where the secondary system water is boiled, and the steam is used to turn the turbine generator for power production [5].

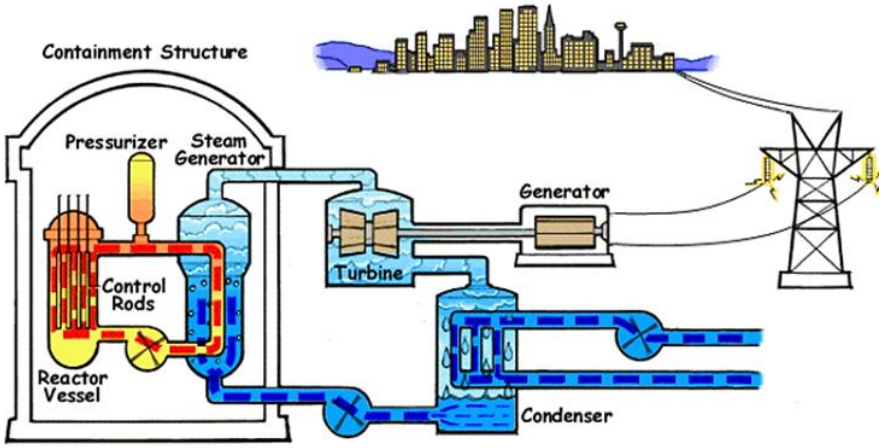

Figure 1, Pressurized Water Reactor (PWR)

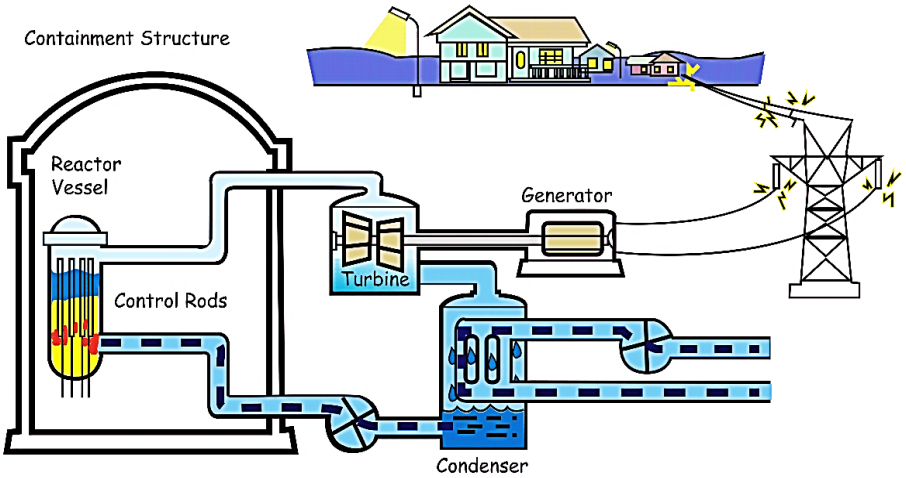

Figure 2, Boiling Water Reactor (BWR)

Electricity is generated by a nuclear power plant similarly to the way that electricity is generated at other conventional types of power plants, such as those driven by coal or natural gas. Water is boiled to generate steam; the steam rotates a turbine that is attached to a generator and the steam is condensed back into water to be returned to the boiler. What makes nuclear power different from these other types of power plants is that the heat is generated by fission and decay reactions occurring within and around the core containing fissionable uranium (U-235).

Nuclear fission occurs when certain nuclides (primarily U-233, U-235, or Pu-239) absorb a neutron and break into several smaller nuclides (called fission products) as well as some additional neutrons.

Fission results in production of radioactive materials including gases and solids that must be contained to prevent release or treated prior to release. These effluents are generally treated by filtration and/or hold-up prior to release. Releases are generally monitored by sampling and by continuously indicating radiation monitors. The effluent release data is used to calculate doses to ensure that dose to the public due to plant operation remains within required limits.

3.2 About Radiation Dose

Ionizing radiation, including alpha, beta, and gamma radiation from radioactive decay, has enough energy to break chemical bonds in tissues and results in damage to tissue or genetic material. The amount of ionization that will be generated by a given exposure to ionizing radiation is quantified as dose. The units for dose are generally given in millirem (mrem) in the US.

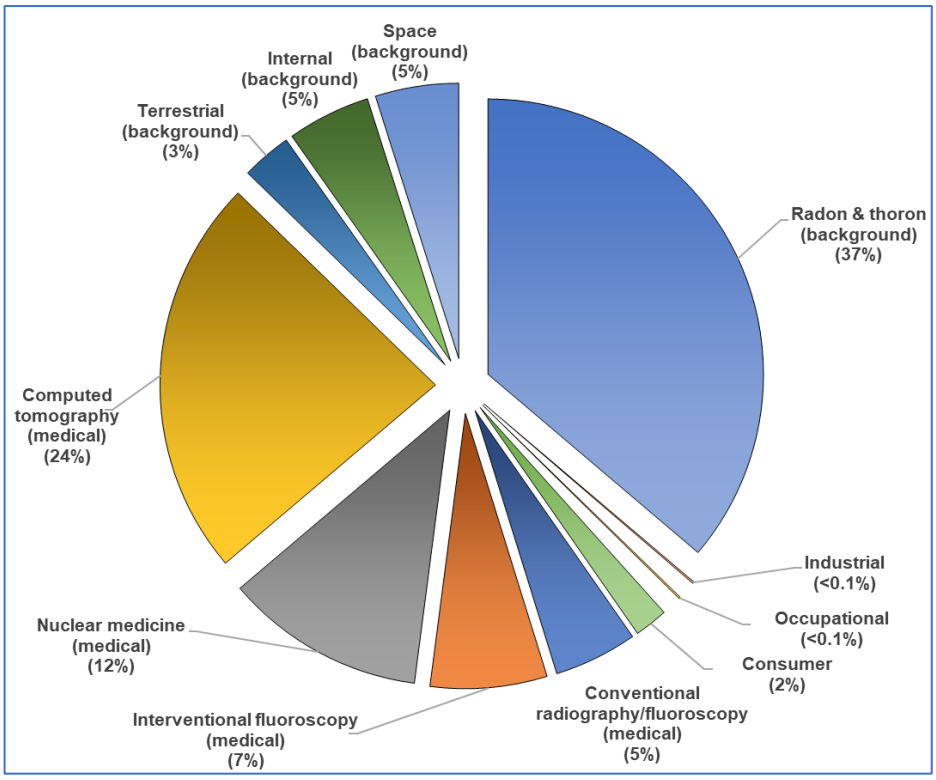

Figure 3, Sources of Radiation Exposure (ICRP Report No. 160) [6]

3.2 (Continued)

The National Council on Radiation Protection (NCRP) has evaluated the population dose for the US and determined that the average individual is exposed to approximately 620 mrem per year. There are many sources for radiation dose, ranging from natural background sources to medical procedures, air travel, and industrial processes. Approximately half (310 mrem) of the average exposure is due to natural sources of radiation including exposure to Radon, cosmic radiation, and internal radiation and terrestrial due to naturally occurring radionuclides. The remaining 310 mrem of exposure is due to man-made sources of exposure, with the most significant contributors being medical (48%) due to radiation used in various types of medical scans and treatments. Of the remaining 2% of dose, most is due to consumer activities such as air travel, smoking cigarettes, and building materials. A small fraction of this 2% is due to industrial activities including the generation of nuclear power.

Readers that are curious about common sources and effects of radiation dose that they may encounter can find excellent sources of information from the Health Physics Society, including the Radiation Fact Sheets [7], and from the US Nuclear Regulatory Commission website [8].

3.3 About Dose Calculation

The concentrations of radioactive material in the environment resulting from plant operations are very small and it is not possible to determine doses directly using measured activities of environmental samples. To overcome this, Dose Calculations based on measured activities of effluent streams are used to model the dose impact for Members of the Public due to plant operation and effluents. There are several mechanisms that can result in doses to Members of the Public, including: Ingestion of radionuclides in food or water; Inhalation of radionuclides in air; Immersion in a plume of noble gases; and Direct Radiation from the ground, the plant or from an elevated plume.

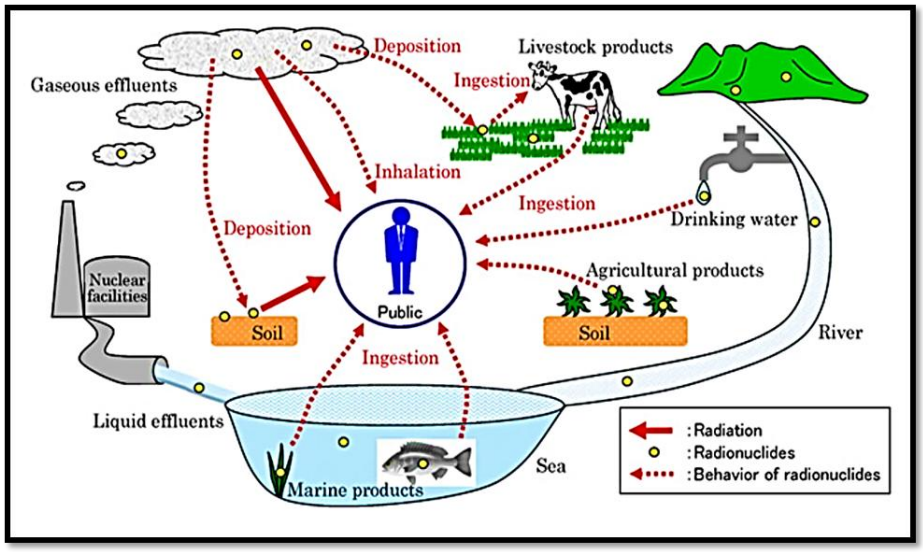

Figure 4, Potential exposure pathways to Members of the Public due to Plant Operations [9]

3.3 (Continued)

The Offsite Dose Calculation Manual (ODCM) specifies the methodology used to obtain the doses in the Dose Assessment section of this report. The methodology in the ODCM is based on NRC Regulatory Guide 1.109 [10] and NUREG-0133 [11]. Doses are calculated by determining what the nuclide concentration will be in air, water, on the ground, or in food products based on plant effluent releases. Release points are continuously monitored to quantify what concentrations of nuclides are being released. For gaseous releases meteorological data is used to determine how much of the released activity will be present at a given location outside of the plant either deposited onto the ground or in gaseous form. Intake patterns and nuclide bio-concentration factors are used to determine how much activity will be transferred into animal milk or meat. Finally, human ingestion factors and dose factors are used to determine how much activity will be consumed and how much dose the consumer will receive. Inhalation dose is calculated by determining the concentration of nuclides and how much air is breathed by the individual.

For liquid releases, dilution and mixing factors are used to model the environmental concentrations in water. Drinking water pathways are modeled by determining the concentration of nuclides in the water at the point where the drinking water is sourced. Fish and invertebrate pathways are determined by using concentration at the release point, bioaccumulation factors for the fish or invertebrate and an estimate of the quantity of fish consumed.

Each year a Land Use Census is performed to determine what potential dose pathways exist within a five-mile radius from the plant, which are the areas most affected by plant operations. The Annual Land Use Census identifies the locations of vegetable gardens, nearest residences, milk animals and meat animals. The data from the census is used to determine who is the most likely to be exposed to radiation dose due to plant operations.

There is significant uncertainty in dose calculation results, due to modeling dispersion of material released and bioaccumulation factors, as well as assumptions associated with consumption and land-use patterns. Even with these sources of uncertainty, the calculations do provide a reasonable estimate of the order of magnitude of the exposure. Conservative assumptions are made in the calculation inputs such as the number of various foods and water consumed, the amount of air inhaled, and the amount of direct radiation exposure from the ground or plume, such that the actual dose received are likely lower than the calculated dose. Even with the built-in conservatism, doses calculated for the highest hypothetical exposed individual due to plant operation are a very small fraction of the annual dose that is received due to other sources. The low calculated doses due to plant effluents, along with REMP results indicating low levels of detectible radioactive material due to plant operations, serve to provide assurance that the site is not having a negative impact on the environment or people living near the plant.

4.0 DOSE ASSESSMENT FOR PLANT OPERATIONS

4.1 Regulatory Limits

Regulatory limits are detailed in Station Licensing documents such as the Offsite Dose Calculation Manual (ODCM) and Selected Licensing Commitments. These documents contain the limits to which SGS/HCGS must adhere. SGS/HCGS drives to maintain the philosophy to keep dose "as low as reasonably achievable" (ALARA) and actions are taken to reduce the amount of radiation released to the environment. Liquid and gaseous release data show that the dose from SGS/HCGS is well below the ODCM limits. The concentration of liquid radioactive material released shall be limited to the Maximum Permissible Concentration specified in 10 CFR 20, Appendix B, Table II, Column 2 (pre-1994), for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the total concentration released shall be limited to 2.0E-04 microcuries/ml. This data reveals that radioactive effluents have an overall minimal dose contribution to the surrounding environment.

The annual whole body, skin and organ doses were computed using the 2024 source term and using the dose calculation methodology provided in the ODCM. The calculated doses due to liquid and gaseous effluents to demonstrate compliance with offsite dose limits are presented in Table 1, Salem Generating Station Unit 1 Dose Summary, 2024, Table 2, Salem Generating Station Unit 2 Dose Summary, 2024, Table 3, Hope Creek Generating Station Unit 1 Dose Summary, 2024 and Table 4, Salem & Hope Creek Generating Stations Site Dose Summary, 2024.

The total annual dose summary compared to 40 CFR 190 limits are presented in Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024. This table also includes projected doses from the ISFSI.

4.2 Regulatory Limits for Gaseous Effluent Doses:

1. Fission and activation gases:

   a. Noble gases dose rate due to radioactive materials released in gaseous effluents from the areas at and beyond the site boundary shall be limited to the following for the three (3) units:

      1) Less than or equal to 500 mrem/year to the total body

      2) Less than or equal to 3000 mrem/year to the skin

   b. Noble gas air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following for each unit:

      1) Quarterly

         a) Less than or equal to 5 mrads gamma

         b) Less than or equal to 10 mrads beta

4.2 (Continued)

2) Yearly

a) Less than or equal to 10 mrads gamma

b) Less than or equal to 20 mrads beta

c) Less than or equal to 5 mrem total body[1]

d) Less than or equal to 15 mrem skin[1]

2. Iodine, tritium, carbon-14, and all radionuclides in particulate form with half-lives greater than 8 days.

a. The dose rate for iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following for the three (3) units:

1) Less than or equal to 1500 mrem/year to any organ

b. The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, carbon-14, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following for each unit:

1) Quarterly

a) Less than or equal to 7.5 mrem to any organ

2) Yearly

a) Less than or equal to 15 mrem to any organ

4.3 <u>Regulatory Limits for Liquid Effluent Doses</u>

1. The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following for each unit:

a. Quarterly

1) Less than or equal to 1.5 mrem total body

2) Less than or equal to 5 mrem critical organ

[1] 10 CFR 50, Appendix I, B.2(b)

4.3 Continued

b. Yearly

1) Less than or equal to 3 mrem total body

2) Less than or equal to 10 mrem critical organ

4.4 40 CFR 190 Regulatory Dose Limits for a Member of the Public

1. Total Dose (40 CFR 190)

a. The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC in the unrestricted area due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to the following:

1) Less than or equal to 25 mrem, Total Body or any Organ except Thyroid.

2) Less than or equal to 75 mrem, Thyroid.

4.5 Onsite Doses (Within Site Boundary)

This section evaluates dose to non-occupationally exposed workers that may be onsite for various reasons. Groups of concern include plant personnel that are not RCA badged including Sewage Treatment Plant Operators, Emergency Responders (National Guard, State Police, etc.) at the Site Security Gate, and various areas that cover the Wind Turbine Laydown Areas. These workers are considered not to be occupationally exposed, because the work activities are not related to plant-operational activities. Use of a conservative assumption of 3000 hours/year spent inside the site boundary by these groups conservatively represents the most-exposed individual. Doses to these groups are required per 10 CFR 20.1301(a) and (b) to limit the dose to a Member of the Public Dose to 100 mrem. Actions to be taken for these workers are clarified in RIS-2002-21 [12].

Available dose pathways for these receptors were noble gas plume dose, ground plane dose and inhalation dose. The adult age group was the only age group considered. In addition, the doses calculated were adjusted for an occupancy of 34%. The locations for the special dose calculation for the Wind Turbine Laydown Area are in Figure 5, Special Wind Turbine Laydown Areas, 16W4, 01W4, 02W5, and 03W2.

The annual total body and organ doses were computed using the 2024 gaseous source terms from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1 using the NRC dose code GASPAR and the 2015 – 2020 five-year annual average meteorological dispersion (X/Q) and deposition (D/Q) data. The calculated doses due to gaseous effluents for non-rad workers onsite are presented in Table 6, Summary of TEDE doses to Members of the Public Due to Activities Inside the Site Boundary, 2024 and in Attachment 5, Doses to Onsite Receptors Using NRC Code GASPAR.

Table 6, Summary of TEDE doses to Members of the Public Due to Activities Inside the Site Boundary, 2024

Location	Operating Unit	CDE mrem	Total Body mrem	TEDE mrem	% of Limit (100 mrem) per 10 CFR 20.1301
Sewage Treatment Plant	SGS U1	9.02E-03	9.02E-03		
	SGS U2	6.13E-03	6.13E-03		
	HCGS	2.28E-02	9.19E-03		
	ISFSI	N/A	2.32E+00		
	Total	**3.80E-02**	**2.34E+00**	**2.38E+00**	**2.38E+00**
Emergency Responders	SGS U1	3.26E-03	3.26E-03		
	SGS U2	2.21E-03	2.21E-03		
	HCGS	2.42E-03	9.74E-04		
	ISFSI	N/A	1.95E-02		
	Total	**7.89E-03**	**2.59E-02**	**3.38E-02**	**3.38E-02**
Wind Turbine Laydown Areas					
03W2	SGS U1	1.50E-02	1.50E-02		
	SGS U2	1.02E-02	1.02E-02		
	HCGS	8.91E-03	3.63E-03		
	ISFSI	N/A	1.19E-01		
	Total	**3.42E-02**	**1.48E-01**	**1.82E-01**	**1.82E-01**
16W4	SGS U1	5.52E-03	5.52E-03		
	SGS U2	3.73E-03	3.73E-03		
	HCGS	1.41E-02	5.68E-03		
	ISFSI	N/A	6.75E-01		
	Total	**2.33E-02**	**6.90E-01**	**7.14E-01**	**7.14E-01**
01W4	SGS U1	5.52E-03	5.52E-03		
	SGS U2	3.73E-03	3.73E-03		
	HCGS	9.65E-03	3.91E-03		
	ISFSI	N/A	1.44E+00		
	Total	**1.89E-02**	**1.45E+00**	**1.47E+00**	**1.47E+00**
02W5	SGS U1	6.54E-03	6.54E-03		
	SGS U2	4.42E-03	4.42E-03		
	HCGS	1.12E-02	4.50E-03		
	ISFSI	N/A	5.74E-01		
	Total	**2.22E-02**	**5.90E-01**	**6.12E-01**	**6.12E-01**

Figure 5, Special Wind Turbine Laydown Areas, 16W4, 01W4, 02W5, and 03W2

5.0 SUPPLEMENTAL INFORMATION

5.1 Gaseous Batch Releases

5.1.1 Salem Unit 1

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		6	3	8	6	23
2. Total duration of batch releases	minutes	1.31E+05	1.31E+05	1.33E+05	4.49E+04	4.40E+05
Maximum batch release duration	minutes	4.46E+04	4.46E+04	4.46E+04	4.46E+04	4.46E+04
4. Average batch release duration	minutes	2.19E+04	4.37E+04	1.66E+04	7.49E+03	1.91E+04
5. Minimum batch release duration	minutes	4.00E+01	4.32E+04	7.30E+01	5.00E+00	5.00E+00

5.1.2 Salem Unit 2

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		6	8	10	26	50
2. Total duration of batch releases	minutes	1.31E+05	1.31E+05	1.33E+05	6.10E+04	4.57E+05
3. Maximum batch release duration	minutes	4.46E+04	4.46E+04	4.46E+04	4.46E+04	4.46E+04
4. Average batch release duration	minutes	2.19E+04	1.64E+04	1.33E+04	2.35E+03	9.13E+03
5. Minimum batch release duration	minutes	3.00E+01	4.40E+01	4.20E+01	1.60E+01	1.60E+01

5.1.3 Hope Creek Unit 1

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		0	3	0	0	3
2. Total duration of batch releases	minutes	N/A	5.24E+03	N/A	N/A	5.24E+03
3. Maximum batch release duration	minutes	N/A	2.88E+03	N/A	N/A	2.88E+03
4. Average batch release duration	minutes	N/A	1.75E+03	N/A	N/A	1.75E+03
5. Minimum batch release duration	minutes	N/A	8.22E+02	N/A	N/A	8.22E+02

5.2 Liquid Batch Releases

5.2.1 Salem Unit 1

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		18	10	15	13	56
2. Total duration of batch releases	minutes	7.14E+03	5.62E+03	8.12E+03	4.16E+03	2.50E+04
3. Maximum batch release duration	minutes	7.18E+02	7.10E+02	8.07E+02	5.75E+02	8.07E+02
4. Average batch release duration	minutes	3.96E+02	5.62E+02	5.42E+02	3.20E+02	4.47E+02
5. Minimum batch release duration	minutes	1.00E+01	2.59E+02	3.17E+02	2.20E+01	1.00E+01
6. Avg stream flow during periods of release of liquid effluent into a flowing stream	Ft^3/sec	*	*	*	*	*

5.2.2 Salem Unit 2

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		17	10	18	54	99
2. Total duration of batch releases	minutes	8.65E+03	5.85E+03	9.95E+03	2.60E+04	5.05E+04
3. Maximum batch release duration	minutes	8.36E+02	7.38E+02	7.71E+02	1.98E+03	1.98E+03
4. Average batch release duration	minutes	5.09E+02	5.85E+02	5.53E+02	4.82E+02	5.10E+02
5. Minimum batch release duration	minutes	2.76E+02	3.62E+02	3.61E+02	2.80E+01	2.80E+01
6. Avg stream flow during periods of release of liquid effluent into a flowing stream	Ft^3/sec	*	*	*	*	*

5.2.3 Hope Creek Unit 1

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		28	78	7	6	119
2. Total duration of batch releases	minutes	2.10E+03	5.73E+03	4.33E+02	4.58E+02	8.72E+03
3. Maximum batch release duration	minutes	9.00E+01	1.01E+02	8.60E+01	9.00E+01	1.01E+02
4. Average batch release duration	minutes	7.51E+01	7.34E+01	6.19E+01	7.63E+01	7.33E+01
5. Minimum batch release duration	minutes	3.80E+01	3.40E+01	3.50E+01	4.80E+01	3.40E+01
6. Avg stream flow during periods of release of liquid effluent into a flowing stream	Ft^3/sec	*	*	*	*	*

* Salem and Hope Creek do not use average stream flow in calculating dose. The Delaware River is a tidal river making the calculation difficult to perform.

5.3 Abnormal Releases

5.3.1 Gaseous Abnormal Releases

1. Salem Unit 1

None

2. Salem Unit 2

None

3. Hope Creek Unit 1

None

5.3.2 Liquid Abnormal Releases

1. Salem Unit 1

None

2. Salem Unit 2

None

3. Hope Creek Unit 1

None

5.4 Non-Routine Planned Discharges

5.4.1 Salem Unit 1

None

5.4.2 Salem Unit 2

None

5.4.3 Hope Creek Unit 1

1. Hope Creek had a planned discharge of condensate water due to a salt intrusion from the circulator water system. A total of 130,600 gallons were discharged to the River after bypassing the radwaste treatment system. The tank had no tritium or gamma emitters present. Discharging this water without processing through the radwaste treatment system was permitted because the 31-day projected Organ and Total Body dose limits of 0.2 and 0.06 mrem, respectively, were not exceeded. (20962541)

5.5 Land Use Census Changes

The results of the 2024 Land Use Census showed no changes in the nearest residences and milk farms. There were no gardens of greater than 500 ft^2 within five miles of the SGS/HCGS site. As a result, there were no changes to the radiological effluent control program.

5.6 Meteorological Data

The 2024 meteorological monitoring program had a Joint Frequency Distribution (JFD) recovery rate of 99.9%. The JFD recovery rate per Reg. Guide 1.23 [13] includes wind speed, wind direction and stability class. A loss of data from any one of these parameters impacts the overall recovery rate, which is required to be 90% or greater. The percent recovery rate for each required sensor is detailed in Attachment 3, Meteorological Data. The quarterly JFDs are retained onsite and available upon request.

Attachment 3, Meteorological Data includes the annual JFD for all stability classes, percent by stability class, and Salem's and Hope Creek's 2024 annual average dispersion (X/Q) and deposition (D/Q) data.

A graphical representation of the annual JFD using Lakes, Inc., software WRPLOT VIEW. This software graphically presents the JFD data at only six windspeeds in meters per second. The data in Table 38, 2024 Percentage of Joint Frequency Distribution of Wind Direction and Speed - All Stability Classes, which is in 10 windspeed categories, was converted to the six windspeed categories as required by the Lakes software. This graphical representation is presented in Figure 6, Locations of Dose Calculation Receptors with 2024 Wind Rose Overlay.

5.7 Instrument Monitors Out of Service Greater Than 30 Days

5.7.1 Salem Unit 1

None

5.7.2 Salem Unit 2

1. The 2R37 non-rad waste basin radiation monitor went out of service on 10/01/2024 and remains out of service as of 12/31/2024 due to 1LW426 being removed from the system for maintenance. The 1LW426 valve could not produce a flow greater than 1000 gpm. The tank discharge to the river has a higher fill rate than the available discharge rate. This hinders the ability to process waste and makes the system vulnerable to an overflow. (20973133, 20978918)

5.7.3 Hope Creek Unit 1

1. The 'A' Circulating Water Dewatering Sump Pump (CWDS) run time meter display was found blank on 10/29/2024. The run time meter is needed to quantify the volume of discharge water for the weekly permit. Run time was being conservatively estimated at 168 hours per week. (60162141). The run time meter was replaced and confirmed functional under notifications 20979236 and 20986659. However, the FIN team found the alternator that swaps between the 'A' and 'B' pumps was found not working properly (20986659). The NEOs are running the sumps manually each day IAW HC.OP-DL.ZZ-00026 Attachment 1D.

5.8 Offsite Dose Calculation Manual (ODCM) Changes

5.8.1 Salem

None

5.8.2 Hope Creek

None

5.8.3 Common REMP

None

5.9 Process Control Program (PCP) Changes

None

5.10 Radioactive Waste Treatment System Changes

There were no changes to the Radioactive Waste Treatment Systems for either Salem Unit 1, Salem Unit 2, or Hope Creek Unit 1.

5.11 Independent Spent Fuel Storage Installation (ISFSI) Monitoring Program

There have been no gaseous or liquid releases from the Independent Spent Fuel Storage Installation (ISFSI) since it was placed in service in the summer of 2006. In 2024 zero casks were placed on the pad. Currently a total of 89 casks are on the ISFSI.

5.12 Carbon-14

Carbon-14 (C-14) is a naturally occurring radionuclide with a 5,730-year half-life. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. Nuclear power plants also produce C-14, but the amount is infinitesimal compared to what has been distributed in the environment due to weapons testing and what is produced by natural cosmic ray interactions.

In accordance with Regulatory Guide 1.21, “Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste,” [14] the NRC recommended re-evaluating “principal radionuclides” and reporting C-14 as appropriate. Carbon-14 production and release estimates were calculated using EPRI Report 1021106, “Estimation of Carbon-14 in Nuclear Plant Gaseous Effluents” [15]. The assessment methodology used to estimate the quantity of C-14 discharged in gaseous effluent from SGS/HCGS involved the use of a normalized C-14 source term and scaling factors based on power generation. The following assumptions were incorporated into the method:

Only C-14 in the form of CO_2 was incorporated into vegetation through photosynthesis, which causes dose via the ingestion exposure pathways.

- The concentration of C-14 in vegetation was proportional to the concentration of C-14 in air (per equation C-8 in Regulatory Guide 1.109).

- 95% of C-14 released from a BWR (i.e., HCGS) and 30% of C-14 released from a PWR (i.e., SGS Units 1 and 2) was in the form of CO_2 [15].

The estimated generation for Salem & Hope Creek Generating Stations for 2024 was as follows:

Salem Unit 1	11.65 curies
Salem Unit 2	9.69 curies
Hope Creek Unit 1	15.34 curies

Public dose estimates were performed using methodology from the ODCM which is based on Regulatory Guide 1.109 methodology [10]. Carbon dioxide is assumed to make up 95% and 30% of the Carbon-14 gaseous emissions from Hope Creek and Salem stations, respectively. Based upon available references [15]. Carbon-14 is the highest dose contributor of all radionuclides released in gaseous effluents. Annual dose resulting from Carbon-14 releases in gaseous effluents is estimated to be 97% of the dose to the Child bone.

5.13 Errata/Corrections to Previous Reports

None

5.14 Other Supplemental Information

5.14.1 Program Deviations

1. Salem

   a. The November monthly Unit 2 containment sample required by ODCM Table 4.11-2 Section B was not obtained. The sample is normally done in the first ten days of the month. During the month of October and the first half of November the unit was in the 2R27 outage. A review of the data obtained from the previous fuel cycle was performed. The highest results of that review were used to complete the November containment permit. (20985477)

2. Hope Creek

   a. ODA FIT-2164 CTBD Weir Flow OOS > 30 days due to HC refueling outage. Per Action 112 of Table 3.3.7.10-1 Notation *** provides the following guidance when the Cooling Tower is OOS for outages:

      During periods when releases are made using the Service Water Bypass Line for dilution, the Cooling Tower Blowdown Weir flow measurement device is bypassed. During this configuration, the number of channels OPERABLE for the flow rate measurement device is less than required by the Minimum Channels OPERABLE requirement. Effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves generated in place may be used to estimate flow. The flow rate when releases are being made using the Service Water Bypass Line must have a minimum of 12,000 gpm to maintain the minimum dilution factor required for liquid releases to the Delaware River. (20965042)

5.14.2 Data Trend for Curies Released from the SGS/HCGS Site

Graphical trends of the curies released from the SGS/HCGS site in gaseous and liquid effluents are presented in Attachment 4, Radiological Effluent Trends.

5.14.3 Temporary Outside Tanks

In 2024 the SGS/HCGS sites did not utilize temporary outside tanks to hold radioactive material of more than 10 Curies. This requirement does not apply to tritium per Tech. Specs. 3.11.1.4.

6.0 NEI 07-07 ONSITE RADIOLOGICAL GROUNDWATER MONITORING PROGRAM

Salem & Hope Creek Generating Stations have developed an Integrated Tritium Management Program which includes the Groundwater Protection Initiative (GPI) program in accordance with NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document [16] and monitoring well investigation program. The purpose of the GPI is to ensure timely detection and an effective response to situations involving inadvertent radiological releases to groundwater to prevent migration of licensed radioactive material off-site and to quantify impacts on decommissioning. During 2024, SGS/HCGS collected and analyzed groundwater samples in accordance with the requirements of site procedures.

Monitoring wells installed as part of Groundwater Protection Initiative (GPI) (NEI 07-07) program are sampled either monthly, quarterly, or semiannually and analyzed for various radionuclides.

During 2024, the mass flux within the shallow, water bearing unit and deeper groundwater was estimated to be 0.006 Ci and 0.012 Ci, respectively. Therefore, the total potential estimated mass flux of tritium in groundwater reaching the Delaware River during 2024 was 0.018 Ci.

Except for tritium, no plant-related radionuclides were detected in any HCGS or SGS wells sampled in 2024, including both RGPP and non-RGPP well samples.

The detailed report is included in Attachment 6, 2024 Radiological Groundwater Protection Program (RGPP) Report.

6.1 VOLUNTARY NOTIFICATION

During 2024, Salem & Hope Creek Generating Stations did not make any voluntary NEI 07-07 notification to State/Local officials, NRC, or to other stakeholders required by site procedures.

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Attachment 1, ARERR Release Summary Tables (RG-1.21 Tables)

Attachment 1, ARERR Release Summary - RG-1.21 Tables

1.0 GASEOUS EFFLUENTS

1.1 Salem Unit 1

Table 7, Gaseous Effluents Summation of All Releases (SGS Unit 1), 2024 [1]

A. Fission & Activation Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
Total Release	Ci	1.15E-02	3.21E-02	2.98E-02	1.60E-02	8.93E-02	3.40E+01
Average release rate for the period	µCi/sec	1.46E-03	4.08E-03	3.74E-03	2.01E-03	2.82E-03	
B. Iodines and Halogens							
Total Release	Ci	N/D	N/D	N/D	N/D	N/D	3.00E+01
Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
C. Particulates							
Total Release	Ci	N/D	N/D	N/D	3.67E-05	3.67E-05	3.00E+01
Average release rate for the period	µCi/sec	N/A	N/A	N/A	4.61E-06	1.16E-06	
D. Tritium							
Total Release	Ci	5.01E+01	1.10E+02	1.34E+02	1.47E+02	4.42E+02	3.10E+01
Average release rate for the period	µCi/sec	6.37E+00	1.40E+01	1.69E+01	1.85E+01	1.40E+01	
E. Gross Alpha							
Total Release	Ci	N/D	N/D	N/D	N/D	N/D	3.00E+01
Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
F. Carbon-14							
Total Release	Ci	2.54E+00	2.87E+00	3.04E+00	3.17E+00	1.16E+01	
Average release rate for the period	µCi/sec	3.23E-01	3.66E-01	3.82E-01	3.99E-01	3.67E-01	

[1] Percent of limit is on Table 1, Salem Generating Station Unit 1 Dose Summary, 2024. C-14 is not part of the Appendix I dose limits and therefore, not included in Table 1. However, C-14 is reported in Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024.

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 8, Gaseous Effluents – Ground Level Release Continuous Mode (SGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
Iodines and Halogens						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
Particulates						
As-76	Ci	N/D	N/D	N/D	3.67E-05	3.67E-05
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**3.67E-05**	**3.67E-05**
Tritium						
H-3	Ci	5.00E+01	1.07E+02	1.33E+02	1.47E+02	4.37E+02
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	2.54E+00	2.87E+00	3.04E+00	3.17E+00	1.16E+01

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 9, Gaseous Effluents – Ground Level Release Batch Mode (SGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
Ar-41	Ci	9.10E-03	2.98E-02	2.84E-02	1.42E-02	8.15E-02
Xe-133	Ci	2.38E-03	2.25E-03	1.35E-03	1.79E-03	7.76E-03
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**1.15E-02**	**3.21E-02**	**2.98E-02**	**1.60E-02**	**8.93E-02**
Iodines and Halogens						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Particulates						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Tritium						
H-3	Ci	7.83E-02	3.04E+00	1.10E+00	2.78E-01	4.49E+00
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Attachment 1, ARERR Release Summary - RG-1.21 Tables

1.2 Salem Unit 2

Table 10, Gaseous Effluents Summation of All Releases (SGS Unit 2), 2024 [1]

A. Fission & Activation Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	4.99E-02	6.97E-02	8.81E-02	1.35E-02	2.21E-01	3.40E+01
2. Average release rate for the period	µCi/sec	6.34E-03	8.87E-03	1.11E-02	1.70E-03	6.99E-03	
B. Iodine and Halogens							
1. Total Release	Ci	7.30E-05	N/D	2.93E-05	3.17E-05	1.34E-04	3.00E+01
2. Average release rate for the period	µCi/sec	9.29E-06	N/A	3.69E-06	3.99E-06	4.24E-06	
C. Particulates							
1. Total Release	Ci	N/D	N/D	N/D	1.63E-05	1.63E-05	3.00E+01
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	2.05E-06	5.15E-07	
D. Tritium							
1. Total Release	Ci	3.01E+01	5.89E+01	1.22E+02	7.83E+01	2.89E+02	3.10E+01
2. Average release rate for the period	µCi/sec	3.83E+00	7.49E+00	1.53E+01	9.85E+00	9.14E+00	
E. Gross Alpha							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	3.00E+01
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
F. Carbon-14							
1. Total Release	Ci	2.59E+00	2.38E+00	2.35E+00	2.38E+00	9.70E+00	N/A
2. Average release rate for the period	µCi/sec	3.30E-01	3.02E-01	2.95E-01	3.00E-01	3.07E-01	

[1] Percent of Limit is on Table 2, Salem Generating Station Unit 2 Dose Summary, 2024. C-14 is not part of the Appendix I dose limits and therefore, not included in Table 2. However, C-14 is reported in Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024.

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 11, Gaseous Effluents – Ground Level Release Continuous Mode (SGS Unit 2), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
Iodines and Halogens						
I-131	Ci	5.24E-07	N/D	N/D	1.41E-06	1.93E-06
I-133	Ci	7.25E-05	N/D	2.93E-05	3.03E-05	1.32E-04
	Ci					
Total for Period	Ci	7.30E-05	N/D	2.93E-05	3.17E-05	1.34E-04
Particulates						
Co-58	Ci	N/D	N/D	N/D	1.30E-05	1.30E-05
Co-60	Ci	N/D	N/D	N/D	3.30E-06	3.30E-06
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	Ci	N/D	N/D	N/D	1.63E-05	1.63E-05
Tritium						
H-3	Ci	2.97E+01	5.79E+01	1.20E+02	7.81E+01	2.86E+02
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	2.59E+00	2.38E+00	2.35E+00	2.38E+00	9.70E+00

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 12, Gaseous Effluents – Ground Level Release Batch Mode (SGS Unit 2), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
Ar-41	Ci	4.74E-02	6.95E-02	6.38E-02	3.82E-03	1.84E-01
Xe-133	Ci	2.40E-03	1.96E-04	2.34E-02	9.37E-03	3.54E-02
Xe-135	Ci	1.33E-04	N/D	8.36E-04	2.91E-04	1.26E-03
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**4.99E-02**	**6.97E-02**	**8.81E-02**	**1.35E-02**	**2.21E-01**
Iodines and Halogens						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Particulates						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Tritium						
H-3	Ci	3.65E-01	9.79E-01	1.72E+00	1.40E-01	3.20E+00
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Attachment 1, ARERR Release Summary - RG-1.21 Tables

1.3 Hope Creek Unit 1

Table 13, Gaseous Effluents Summation of All Releases (HCGS Unit 1), 2024 [1]

A. Fission & Activation Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	3.40E+01
2. Average release rate for the period	μCi/sec	N/A	N/A	N/A	N/A	N/A	
B. Iodine and Halogens							
1. Total Release	Ci	1.52E-03	9.06E-06	N/D	3.78E-04	1.90E-03	3.00E+01
2. Average release rate for the period	μCi/sec	1.93E-04	1.15E-06	N/A	4.75E-05	6.02E-05	
C. Particulates							
1. Total Release	Ci	5.39E-05	1.10E-06	N/D	3.01E-07	5.53E-05	3.00E+01
2. Average release rate for the period	μCi/sec	6.85E-06	1.39E-07	N/A	3.78E-08	1.75E-06	
D. Tritium							
1. Total Release	Ci	3.29E+01	1.68E+01	9.95E+00	1.62E+01	7.58E+01	3.10E+01
2. Average release rate for the period	μCi/sec	4.19E+00	2.14E+00	1.25E+00	2.03E+00	2.40E+00	
E. Gross Alpha							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	3.00E+01
2. Average release rate for the period	μCi/sec	N/A	N/A	N/A	N/A	N/A	
F. Carbon-14							
1. Total Release	Ci	3.76E+00	3.74E+00	3.68E+00	4.15E+00	1.53E+01	
2. Average release rate for the period	μCi/sec	4.79E-01	4.76E-01	4.64E-01	5.22E-01	4.85E-01	

[1] Percent of limit is on Table 3, Hope Creek Generating Station Unit 1 Dose Summary, 2024. C-14 is not part of the Appendix I dose limits and therefore, not included in Table 3. However, C-14 is reported in Table 5, Total Annual Offsite-Dose Comparison to 40 CFR 190 Regulatory Limits for SGS/HCGS, 2024.

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 14, Gaseous Effluents – Ground Level Release Continuous Mode (HCGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Iodines						
I-131	Ci	5.83E-05	9.06E-06	N/D	1.20E-05	7.93E-05
I-133	Ci	1.46E-03	N/D	N/D	3.66E-04	1.83E-03
	Ci					
Total for Period	**Ci**	**1.52E-03**	**9.06E-06**	**N/D**	**3.78E-04**	**1.90E-03**
Particulates						
Co-60	Ci	5.39E-05	N/D	N/D	N/D	5.39E-05
Cs-137	Ci	N/D	1.10E-06	N/D	3.01E-07	1.40E-06
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**5.39E-05**	**1.10E-06**	**N/D**	**3.01E-07**	**5.53E-05**
Tritium						
H-3	Ci	3.29E+01	1.68E+01	9.95E+00	1.62E+01	7.58E+01
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	3.76E+00	3.74E+00	3.68E+00	4.15E+00	1.53E+01

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 15, Gaseous Effluents – Ground Level Release Continuous Mode (HCGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Fission Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Iodines and Halogens						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Particulates						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Tritium						
H-3	Ci	N/D	5.25E-03	N/D	N/D	5.25E-03
Gross Alpha						
Alpha	Ci	N/D	N/D	N/D	N/D	N/D
Carbon-14						
C-14	Ci	N/A	N/A	N/A	N/A	N/A

Attachment 1, ARERR Release Summary - RG-1.21 Tables

2.0 LIQUID EFFLUENTS

2.1 Salem Unit 1

Table 16, Liquid Effluents – Summation of All Releases (SGS Unit 1), 2024 [1]

A. Fission & Activation Products	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	2.01E-03	3.07E-02	2.03E-03	1.51E-03	3.62E-02	2.70E+01
2. Average diluted concentration	μCi/mL	4.08E-11	6.00E-10	3.67E-11	3.13E-11	1.78E-10	
B. Tritium							
1. Total Release	Ci	7.60E+01	4.90E+01	2.57E+02	8.88E+01	4.71E+02	2.70E+01
2. Average diluted concentration	μCi/mL	1.54E-06	9.61E-07	4.64E-06	1.84E-06	2.31E-06	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	2.70E+01
2. Average diluted concentration	μCi/mL	N/A	N/A	N/A	N/A	N/A	
D. Gross Alpha Activity							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	2.70E+01
2. Average diluted concentration	μCi/mL	N/A	N/A	N/A	N/A	N/A	
E. Volume of Waste Released (prior to dilution)	Liters	4.13E+07	4.06E+07	4.42E+07	5.24E+07	1.79E+08	
F. Volume of Dilution Water Used During Period	Liters	4.92E+10	5.10E+10	5.53E+10	4.82E+10	2.04E+11	

[1] Percent of limit is on Table 1, Salem Generating Station Unit 1 Dose Summary, 2024

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 17, Continuous Mode Liquid Effluents (SGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Tritium						
H-3	Ci	5.36E-02	1.06E-01	1.54E-01	4.02E-02	3.55E-01
Fission & Activation Products						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Entrained Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 18, Batch Mode Liquid Effluents (SGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Tritium						
H-3	Ci	7.60E+01	4.89E+01	2.57E+02	8.88E+01	4.70E+02
Fission & Activation Products						
Mn-54	Ci	N/D	7.54E-04	3.94E-05	N/D	7.93E-04
Fe-55	Ci	N/D	2.51E-03	N/D	N/D	2.51E-03
Co-57	Ci	N/D	3.81E-05	N/D	N/D	3.81E-05
Co-58	Ci	1.36E-03	4.89E-04	3.40E-04	3.31E-04	2.52E-03
Co-60	Ci	6.42E-04	2.55E-02	1.30E-03	2.53E-04	2.77E-02
Zn-65	Ci	N/D	2.19E-04	N/D	N/D	2.19E-04
Nb-95	Ci	N/D	1.29E-04	3.26E-06	N/D	1.32E-04
Sn-113	Ci	N/D	3.61E-05	N/D	N/D	3.61E-05
Sb-124	Ci	N/D	N/D	1.06E-05	1.18E-04	1.28E-04
Sb-125	Ci	N/D	9.49E-04	3.34E-04	5.81E-04	1.86E-03
Sb-126	Ci	N/D	N/D	N/D	1.40E-05	1.40E-05
Cs-137	Ci	8.57E-07	N/D	N/D	2.13E-04	2.14E-04
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**2.01E-03**	**3.07E-02**	**2.03E-03**	**1.51E-03**	**3.62E-02**
Entrained Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 1, ARERR Release Summary - RG-1.21 Tables

2.2 Salem Unit 2

Table 19, Liquid Effluents – Summation of All Releases (SGS Unit 2), 2024 [1]

A. Fission & Activation Products	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Annual**	**Est. Total Error %**
1. Total Release	Ci	4.38E-03	4.55E-04	1.58E-03	3.56E-03	9.98E-03	2.70E+01
2. Average diluted concentration	μCi/mL	6.68E-10	1.02E-10	2.27E-10	2.69E-10	3.20E-10	
B. Tritium							
1. Total Release	Ci	8.84E+01	5.63E+01	2.42E+02	2.34E+02	6.21E+02	2.70E+01
2. Average diluted concentration	μCi/mL	1.35E-05	1.27E-05	3.48E-05	1.77E-05	1.99E-05	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	2.70E+01
2. Average diluted concentration	μCi/mL	N/A	N/A	N/A	N/A	N/A	
D. Gross Alpha Activity							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	2.70E+01
2. Average diluted concentration	μCi/mL	N/A	N/A	N/A	N/A	N/A	
E. Volume of Waste Released (prior to dilution)	Liters	1.35E+07	1.30E+07	1.64E+07	1.47E+07	5.76E+07	
F. Volume of Dilution Water Used During Period	Liters	6.55E+09	4.43E+09	6.95E+09	1.32E+10	3.11E+10	

[1] Percent of limit is on Table 2, Salem Generating Station Unit 2 Dose Summary, 2024

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 20, Continuous Mode Liquid Effluents (SGS Unit 2), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Tritium						
H-3	Ci	N/D	N/D	N/D	N/D	N/D
Fission & Activation Products						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Entrained Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 21, Batch Mode Liquid Effluents (SGS Unit 2), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Tritium						
H-3	Ci	8.84E+01	5.63E+01	2.42E+02	2.34E+02	6.21E+02
Fission & Activation Products						
Cr-51	Ci	N/D	N/D	N/D	5.19E-05	5.19E-05
Mn-54	Ci	5.83E-06	N/D	N/D	4.41E-06	1.02E-05
Co-57	Ci	1.04E-06	N/D	N/D	N/D	1.04E-06
Co-58	Ci	3.36E-03	2.28E-04	3.54E-04	7.84E-04	4.72E-03
Co-60	Ci	9.86E-04	2.27E-04	7.40E-04	7.17E-04	2.67E-03
Zr-95	Ci	N/D	N/D	N/D	5.89E-05	5.89E-05
Nb-95	Ci	3.36E-05	N/D	N/D	7.89E-05	1.12E-04
Sb-124	Ci	N/D	N/D	N/D	1.35E-04	1.35E-04
Sb-125	Ci	N/D	N/D	4.91E-04	7.21E-04	1.21E-03
Sb-126	Ci	N/D	N/D	N/D	1.01E-05	1.01E-05
Cs-137	Ci	N/D	N/D	N/D	9.96E-04	9.96E-04
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**4.38E-03**	**4.55E-04**	**1.58E-03**	**3.56E-03**	**9.98E-03**
Entrained Gases						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 1, ARERR Release Summary - RG-1.21 Tables

2.3 Hope Creek Unit 1

Table 22, Liquid Effluents – Summation of All Releases (HGS Unit 1), 2024 [1]

A. Fission & Activation Products	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Annual**	**Est. Total Error %**
1. Total Release	Ci	1.20E-04	3.36E-04	2.80E-06	4.89E-07	4.59E-04	2.70E+01
2. Average diluted concentration	μCi/mL	1.94E-11	7.87E-11	4.51E-13	7.57E-14	1.99E-11	
B. Tritium							
1. Total Release	Ci	3.69E+00	1.36E+01	9.77E-01	7.58E-01	1.91E+01	2.70E+01
2. Average diluted concentration	μCi/mL	5.97E-07	3.20E-06	1.57E-07	1.17E-07	8.25E-07	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	3.89E-05	4.81E-05	9.60E-06	3.35E-05	1.30E-04	2.70E+01
2. Average diluted concentration	μCi/mL	6.30E-12	1.13E-11	1.55E-12	5.18E-12	5.63E-12	
D. Gross Alpha Activity							
1. Total Release	Ci	N/D	N/D	N/D	N/D	N/D	2.70E+01
2. Average diluted concentration	μCi/mL	N/A	N/A	N/A	N/A	N/A	
E. Volume of Waste Released (prior to dilution)	Liters	3.84E+06	5.55E+06	5.56E+06	3.61E+06	1.86E+07	
F. Volume of Dilution Water Used During Period	Liters	6.18E+09	4.26E+09	6.21E+09	6.45E+09	2.31E+10	

[1] Percent of limit is on Table 3, Hope Creek Generating Station Unit 1 Dose Summary, 2024

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 23, Continuous Mode Liquid Effluents (HGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Tritium						
H-3	Ci	3.07E-02	5.00E-02	1.43E-01	1.58E-02	2.40E-01
Fission & Activation Products						
None Found	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Entrained Gases						
None	Ci	N/D	N/D	N/D	N/D	N/D
	Ci					
Total for Period	**Ci**	**N/D**	**N/D**	**N/D**	**N/D**	**N/D**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 1, ARERR Release Summary - RG-1.21 Tables

Table 24, Batch Mode Liquid Effluents (HGS Unit 1), 2024

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year
Tritium						
H-3	Ci	3.66E+00	1.36E+01	8.34E-01	7.42E-01	1.88E+01
Fission & Activation Products						
Cr-51	Ci	N/D	1.95E-05	N/D	N/D	1.95E-05
Mn-54	Ci	1.25E-06	7.58E-05	1.71E-07	N/D	7.72E-05
Co-58	Ci	N/D	2.68E-05	N/D	N/D	2.68E-05
Co-60	Ci	1.18E-04	1.88E-04	2.43E-06	3.30E-07	3.09E-04
Zn-65	Ci	N/D	1.17E-05	N/D	N/D	1.17E-05
Sb-124	Ci	N/D	1.40E-05	N/D	N/D	1.40E-05
Cs-137	Ci	N/D	N/D	1.99E-07	1.59E-07	3.58E-07
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
	Ci					
Total for Period	**Ci**	**1.20E-04**	**3.36E-04**	**2.80E-06**	**4.89E-07**	**4.59E-04**
Entrained Gases						
Xe-133	Ci	2.51E-05	3.47E-05	N/D	5.05E-06	6.49E-05
Xe-135	Ci	1.38E-05	1.34E-05	9.60E-06	2.84E-05	6.52E-05
	Ci					
Total for Period	Ci	**3.89E-05**	**4.81E-05**	**9.60E-06**	**3.35E-05**	**1.30E-04**
Gross Alpha						
Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D

Attachment 2, Solid Waste Information

Attachment 2, Solid Waste Information

3.0 SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (NOT IRRADIATED FUEL)

During Period From: 01/01/2024 to 12/31/2024

Table 25, Resins, Filters, and Evaporator Bottoms Summary for the Salem Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	7.91E+02	2.24E+01	1.14E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	7.91E+02	2.24E+01	1.14E+01
H-3, C-14, Mn-54, Fe-55, Co-58, Co-60, Ni-59, Ni-63, Sr-90, Zr-95, Nb-95, Tc-99, Sb-125, I-129, Cs-137, Ce-144, Cm-243			

Waste Class A		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
H-3	21.34%	2.38E+00
Fe-55	6.19%	6.90E-01
Co-58	21.29%	2.37E+00
Co-60	12.34%	1.38E+00
Ni-63	14.73%	1.64E+00
Sb-125	17.54%	1.96E+00
Cs-137	3.14%	3.50E-01

Waste Class B		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
H-3	21.34%	2.38E+00
Fe-55	6.19%	6.90E-01
Co-58	21.29%	2.37E+00
Co-60	12.34%	1.38E+00
Ni-63	14.73%	1.64E+00
Sb-125	17.54%	1.96E+00
Cs-137	3.14%	3.50E-01

Attachment 2, Solid Waste Information

Table 26, Dry Active Waste (DAW) Summary for the Salem Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	1.26E+04	3.56E+02	3.05E+00
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	1.26E+04	3.56E+02	3.05E+00

Major Nuclides for Above Table: H-3, C-14, Cr-51, Mn-54, Fe-55, Co-58, Co-60, Ni-63, Nb-95, Tc-99, Sb-125, I-129, Cs-137, Ce-144

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	1.92%	5.85E-02
Cr-51	1.38%	4.20E-02
Mn-54	1.19%	3.63E-02
Fe-55	11.81%	3.59E-01
Co-58	9.35%	2.84E-01
Co-60	40.78%	1.24E+00
Ni-63	26.82%	8.16E-01
Sb-125	3.23%	9.83E-02
Cs-137	1.91%	5.82E-02

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	1.92%	5.85E-02
Cr-51	1.38%	4.20E-02
Mn-54	1.19%	3.63E-02
Fe-55	11.81%	3.59E-01
Co-58	9.35%	2.84E-01
Co-60	40.78%	1.24E+00
Ni-63	26.82%	8.16E-01
Sb-125	3.23%	9.83E-02
Cs-137	1.91%	5.82E-02

Attachment 2, Solid Waste Information

Table 27, Irradiated Components Summary for the Salem Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	0.00E+00	0.00E+00	0.00E+00

Major Nuclides for Above Table: None

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Attachment 2, Solid Waste Information

Table 28, Other Waste Summary for the Salem Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	0.00E+00	0.00E+00	0.00E+00

Major Nuclides for Above Table:
None

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Attachment 2, Solid Waste Information

Table 29, Sum of All Low-Level Waste Shipped from the Salem Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	1.34E+04	3.78E+02	1.44E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	1.34E+04	3.78E+02	1.44E+01

Major Nuclides for Above Table: H-3, C-14, Cr-51, Mn-54, Fe-55, Co-58, Co-60, Ni-59, Ni-63, Sr-90, Zr-95, Nb-95, Tc-99, Sb-125, I-129, Cs-137, Ce-144, Cm-243

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	17.18%	2.44E+00
Fe-55	7.39%	1.05E+00
Co-58	18.73%	2.66E+00
Co-60	18.44%	2.62E+00
Ni-63	17.32%	2.46E+00
Sb-125	14.47%	2.05E+00
Cs-137	2.87%	4.08E-01

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	17.18%	2.44E+00
Fe-55	7.39%	1.05E+00
Co-58	18.73%	2.66E+00
Co-60	18.44%	2.62E+00
Ni-63	17.32%	2.46E+00
Sb-125	14.47%	2.05E+00
Cs-137	2.87%	4.08E-01

Attachment 2, Solid Waste Information

Table 30, Resins, Filters, and Evaporator Bottoms Summary for the Hope Creek Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	9.09E+02	2.57E+01	1.66E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	9.09E+02	2.57E+01	1.66E+01

Major Nuclides for Above Table: H-3, C-14, Mn-54, Fe-55, Co-58, Co-60, Ni-63, Zn-65, Sr-90, Tc-99, I-129, Cs-137, Pu-238, Cm-243

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	2.68%	4.45E-01
Mn-54	9.35%	1.55E+00
Fe-55	56.16%	9.33E+00
Co-60	25.9%	4.30E+00
Zn-65	2.13%	3.54E-01
Cs-137	1.83%	3.03E-01

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	2.68%	4.45E-01
Mn-54	9.35%	1.55E+00
Fe-55	56.16%	9.33E+00
Co-60	25.9%	4.30E+00
Zn-65	2.13%	3.54E-01
Cs-137	1.83%	3.03E-01

Attachment 2, Solid Waste Information

Table 31, Dry Active Waste (DAW) Summary for the Hope Creek Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	2.00E+02	5.65E+00	2.22E+01
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	2.00E+02	5.65E+00	2.22E+01

Major Nuclides for Above Table: H-3, C-14, Cr-51, Mn-54, Fe-55, Fe-59, Co-58, Co-60, Ni-63, Zn-65, Tc-99, I-129, Cs-137

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	6.45%	1.43E+00
Fe-55	46.61%	1.03E+01
Co-60	43.29%	9.60E+00
Ni-63	1.01%	2.25E-01

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	6.45%	1.43E+00
Fe-55	46.61%	1.03E+01
Co-60	43.29%	9.60E+00
Ni-63	1.01%	2.25E-01

Attachment 2, Solid Waste Information

Table 32, Irradiated Components Summary for the Hope Creek Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	0.00E+00	0.00E+00
C	1.09E+01	3.10E-01	1.45E+04
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	1.09E+01	3.10E-01	1.45E+04

Major Nuclides for Above Table: H-3, C-14, Cr-51, Mn-54, Fe-55, Fe-59, Co-58, Co-60, Ni-59, Ni-63, Zn-65, Nb-94, Tc-99, I-129, Cs-137, Hf-181, Ta-182

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	2.51%	3.64E+02
Fe-55	65.11%	9.43E+03
Co-60	22.49%	3.26E+03
Ni-63	5.98%	8.66E+02
Ta-182	2.94%	4.26E+02

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	2.51%	3.64E+02
Fe-55	65.11%	9.43E+03
Co-60	22.49%	3.26E+03
Ni-63	5.98%	8.66E+02
Ta-182	2.94%	4.26E+02

Attachment 2, Solid Waste Information

Table 33, Other Waste Summary for the Hope Creek Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	0.00E+00	0.00E+00
C	0.00E+00	0.00E+00	0.00E+00
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	0.00E+00	0.00E+00	0.00E+00

Major Nuclides for Above Table: None

Waste Class A		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class B		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Total Combined		**Percent Abundance > 1.0%**
Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Attachment 2, Solid Waste Information

Table 34, Sum of All Low-Level Waste Shipped from the Hope Creek Site

Waste Class	Volume ft^3	Volume m^3	Curies Shipped
A	1.11E+03	3.14E+01	3.88E+01
B	0.00E+00	0.00E+00	0.00E+00
C	1.09E+01	3.10E-01	1.45E+04
Unclassified	0.00E+00	0.00E+00	0.00E+00
All	1.12E+03	3.17E+01	1.45E+04

Major Nuclides for Above H-3, C-14, Cr-51, Mn-54, Fe-55, Fe-59, Co-58, Co-60, Ni-59, Ni-63, Zn-65, Sr-90, Nb-94, Tc-99, I-129, Cs-137, Hf-181, Ta-182, Pu-238, Cm-243

Waste Class A — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
H-3	1.15%	4.45E-01
Mn-54	7.69%	2.98E+00
Fe-55	50.7%	1.97E+01
Co-60	35.84%	1.39E+01
Ni-63	1.01%	3.90E-01
Zn-65	1.16%	4.51E-01

Waste Class B — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
None	N/A	N/A

Waste Class C — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	2.51%	3.64E+02
Fe-55	65.11%	9.43E+03
Co-60	22.49%	3.26E+03
Ni-63	5.98%	8.66E+02
Ta-182	2.94%	4.26E+02

Total Combined — **Percent Abundance > 1.0%**

Nuclide Name	Percent Abundance	Curies
Mn-54	2.52%	3.67E+02
Fe-55	65.07%	9.45E+03
Co-60	22.53%	3.27E+03
Ni-63	5.97%	8.67E+02
Ta-182	2.93%	4.26E+02

Attachment 2, Solid Waste Information

4.0 SOLID WASTE DISPOSITION

Table 35, Solid Waste Shipped from the Salem Site

Number of Shipments	Mode of Transportation	Destination
3	Hittman Transport Services Inc	Barnwell Disposal Facility Operated by Chem-Nuclear Systems, Inc.
3	Hittman Transport Services Inc	Energy Solutions, LLC Barnwell Processing Facility
3	Interstate Ventures	UniTech Processing Facility 2323 Zirconium Road
3	Landstar for Unitech Services	UniTech Processing Facility 2323 Zirconium Road
12	Total	

Table 36, Solid Waste Shipped from the Hope Creek Site

Number of Shipments	Mode of Transportation	Destination
10	Hittman Transport Services, Inc.	Energy Solutions – BDF Barnwell Disposal Facility
1	Hittman Transport Services, Inc.	Energy Solutions, LLC Barnwell Processing Facility
11	Total	

Attachment 3, Meteorological Data

Attachment 3, Meteorological Data

1.0 Meteorological Data Summary

1.1 Joint Frequency Distributions

1. Period of Record: 01/01/2024 – 12/31/2024
2. Elevation:
   a. Tower height (91 m)
   b. Wind Level (10 m)
3. Variable
   a. Delta T: (91-10 m)
   b. Total period of calm hours: 0.09%
   c. Percentage of missing data: 0.1%
   d. JFD Recovery: 99.9%

January – December 2024

Sensor	Number of Missing Hours	Data Recovery (%)
33’ Wind	13	99.9
150’ Wind	12	99.9
197’ Wind*	12	99.9
300’ Wind	45	99.5
Backup Wind	39	99.6
300’ Temp*	11	99.9
33’ Temp	12	99.9
Dew Point*	20	99.8
150’ – 33’ Delta Temp	295	96.6
197’ – 33’ Delta Temp*	1825	79.2
300’ – 33’ Delta Temp	13	99.9
33’ Relative Humidity*	12	99.9
300’ Relative Humidity*	1631	81.4
Precipitation	11	99.9
Barometric Pressure*	11	99.9
Solar Radiation*	11	99.9

Note:
* Parameters are not subject to the NRC 90% data recovery requirement.

** Not subject to the NRC 90% data recovery requirement if Primary Sensors are available.

Attachment 3, Meteorological Data

4. Stability Class

Table 37, Classification of Atmospheric Stability

Stability Condition	Pasquill Categories	Percentage
Extremely Unstable	A	1.16
Moderately Stable	B	2.72
Slightly Unstable	C	3.57
Neutral	D	45.23
Slightly Stable	E	33.20
Moderately Stable	F	10.73
Extremely Stable	G	3.39

Attachment 3, Meteorological Data

Table 38, 2024 Percentage of Joint Frequency Distribution of Wind Direction and Speed - All Stability Classes

		WIND SPEED GROUPS (m/sec)											
WIND DIRECTION		< 0.5	0.5 – 1.0	1.1 – 1.5	1.6 – 2.0	2.1 – 3.0	3.1 – 4.0	4.1 – 5.0	5.1 – 6.0	6.1 – 8.0	8.1 – 10	> 10.0	Total
(Degrees)	Sect.												
348.75 – 11.25	N	0.000	0.091	0.422	0.513	1.653	1.938	1.015	0.445	0.376	0.011	0.011	6.48
11.25 – 33.75	NNE	0.011	0.068	0.217	0.570	1.710	1.596	0.650	0.388	0.125	0.000	0.011	5.35
33.75 – 56.25	NE	0.000	0.080	0.296	0.536	1.813	1.699	1.129	0.331	0.091	0.000	0.000	5.97
56.25 – 78.75	ENE	0.011	0.080	0.308	0.593	1.334	1.083	0.695	0.182	0.103	0.000	0.000	4.39
78.75 – 101.25	E	0.023	0.148	0.399	0.684	1.060	0.821	0.433	0.080	0.057	0.000	0.000	3.71
101.25 – 123.75	ESE	0.011	0.182	0.376	0.479	1.368	1.357	0.809	0.308	0.182	0.091	0.114	5.28
123.75 – 146.25	SE	0.034	0.068	0.205	0.422	1.596	1.950	1.950	1.516	2.052	0.752	0.217	10.76
146.25 – 168.75	SSE	0.000	0.080	0.194	0.410	1.311	1.494	1.140	0.821	1.197	0.125	0.034	6.81
168.75 – 191.25	S	0.000	0.080	0.239	0.581	1.471	1.129	0.878	0.524	0.604	0.114	0.011	5.63
191.25 – 213.75	SSW	0.000	0.034	0.228	0.581	1.893	1.152	0.593	0.388	0.228	0.034	0.000	5.13
213.75 – 236.25	SW	0.000	0.103	0.228	0.365	1.824	1.528	0.764	0.433	0.194	0.011	0.000	5.45
236.25 – 258.75	WSW	0.000	0.000	0.182	0.308	1.231	1.448	0.901	0.422	0.524	0.160	0.011	5.19
258.75 – 281.25	W	0.000	0.068	0.217	0.388	1.117	1.140	1.277	0.878	0.593	0.274	0.046	6.00
281.25 – 303.75	WNW	0.000	0.160	0.251	0.422	1.277	1.323	1.231	1.174	0.981	0.365	0.080	7.26
303.75 – 326.25	NW	0.000	0.160	0.331	0.479	1.391	1.562	1.596	1.095	1.345	0.581	0.068	8.61
326.25 – 348.75	NNW	0.000	0.171	0.399	0.445	1.608	1.790	1.402	1.095	0.923	0.160	0.000	7.99
	Total	0.09	1.57	4.49	7.78	23.66	23.01	16.46	10.08	9.58	2.68	0.60	
												Total	100.00

MISSING HOURS: 13

JOINT DATA RECOVERY: 99.9%

Attachment 3, Meteorological Data

1.2 2024 Annual Average X/Q and D/Q Values for Each Site

1.2.1 Salem Generating Station

Table 39, 2024 Annual Average Salem Ground Level Release Dispersion (X/Q) and Deposition (D/Q) Factors

SPECIFIC POINTS OF INTEREST						
Location	Direction From Site	Distance (mi)	X/Q (Sec/m^3) No Decay Undepleted	X/Q (Sec/m^3) Decay Undepleted	X/Q (Sec/m^3) Decay Depleted	D/Q ($1/m^2$)
SITE BOUNDARY	S	0.17	1.30E-05	1.30E-05	1.30E-05	6.90E-08
SITE BOUNDARY	SSW	0.13	2.00E-05	2.00E-05	1.90E-05	8.30E-08
SITE BOUNDARY	SW	0.11	2.60E-05	2.60E-05	2.50E-05	1.10E-07
SITE BOUNDARY	WSW	0.11	1.90E-05	1.90E-05	1.90E-05	7.90E-08
SITE BOUNDARY	W	0.12	1.80E-05	1.80E-05	1.70E-05	6.10E-08
SITE BOUNDARY	WNW	0.16	1.60E-05	1.60E-05	1.50E-05	6.10E-08
SITE BOUNDARY	NW	0.28	7.10E-06	7.10E-06	6.70E-06	5.10E-08
SITE BOUNDARY	NNW	0.68	1.10E-06	1.10E-06	9.80E-07	8.20E-09
SITE BOUNDARY	N	0.79	7.70E-07	7.70E-07	6.90E-07	5.20E-09
SITE BOUNDARY	NNE	0.89	6.50E-07	6.50E-07	5.70E-07	3.90E-09
SITE BOUNDARY	NE	1.07	5.30E-07	5.30E-07	4.60E-07	3.00E-09
SITE BOUNDARY	ENE	0.88	5.60E-07	5.60E-07	4.90E-07	4.00E-09
SITE BOUNDARY	E	0.89	6.10E-07	6.10E-07	5.40E-07	4.50E-09
SITE BOUNDARY	ESE	0.24	5.80E-06	5.80E-06	5.50E-06	4.40E-08
SITE BOUNDARY	SE	0.15	1.60E-05	1.60E-05	1.50E-05	1.10E-07
SITE BOUNDARY	SSE	0.15	1.70E-05	1.70E-05	1.60E-05	9.90E-08
NEAREST RES	S	5.22	7.10E-08	7.10E-08	5.30E-08	2.20E-10
NEAREST RES	SSW	3.85	1.00E-07	1.00E-07	7.70E-08	3.10E-10
NEAREST RES	SW	4.29	9.00E-08	9.00E-08	6.90E-08	2.90E-10
NEAREST RES	WSW	4.41	6.60E-08	6.60E-08	5.00E-08	2.00E-10
NEAREST RES	W	3.98	8.00E-08	8.00E-08	6.10E-08	2.10E-10
NEAREST RES	WNW	3.42	1.30E-07	1.30E-07	1.00E-07	3.80E-10
NEAREST RES	NW	3.67	1.60E-07	1.60E-07	1.20E-07	6.90E-10
NEAREST RES	NNW	4.23	7.90E-08	7.90E-08	6.00E-08	3.40E-10
NEAREST RES	N	5.65	4.40E-08	4.40E-08	3.20E-08	1.70E-10
NEAREST RES	NNE	4.97	5.40E-08	5.40E-08	4.00E-08	1.90E-10
NEAREST RES	NE	3.85	8.50E-08	8.50E-08	6.50E-08	3.20E-10
NEAREST RES	ENE	3.85	6.60E-08	6.60E-08	5.10E-08	3.00E-10
NEAREST RES	E	5.28	4.60E-08	4.60E-08	3.40E-08	2.00E-10
NEAREST RES	ESE	5.84	5.30E-08	5.30E-08	3.90E-08	2.00E-10
NEAREST RES	SE	9.44	3.10E-08	3.10E-08	2.10E-08	1.10E-10
NEAREST RES	SSE	9.44	3.30E-08	3.30E-08	2.20E-08	9.90E-11

Attachment 3, Meteorological Data

Table 39, 2024 Annual Average Salem Ground Level Release Dispersion (X/Q) and Deposition (D/Q) Factors

SPECIFIC POINTS OF INTEREST						
Location	Direction From Site	Distance (mi)	X/Q (Sec/m^3) No Decay Undepleted	X/Q (Sec/m^3) Decay Undepleted	X/Q (Sec/m^3) Decay Depleted	D/Q ($1/m^2$)
GARDENS	NNW	0.57	1.40E-06	1.40E-06	1.30E-06	1.10E-08
GARDENS	SE	0.18	1.10E-05	1.10E-05	1.10E-05	8.10E-08
GARDENS	N	0.57	1.30E-06	1.30E-06	1.10E-06	8.90E-09
GARDENS	NW	0.58	2.20E-06	2.20E-06	2.00E-06	1.70E-08
GARDENS	SSW	3.90	9.80E-08	9.80E-08	7.60E-08	3.10E-10
GARDENS	NE	4.90	6.00E-08	6.00E-08	4.50E-08	2.10E-10
GARDENS	ENE	5.00	4.60E-08	4.60E-08	3.40E-08	1.90E-10
GARDENS	NE	5.00	5.80E-08	5.80E-08	4.40E-08	2.00E-10
GARDENS	E	6.00	3.80E-08	3.80E-08	2.80E-08	1.60E-10
GARDENS	ENE	6.00	3.50E-08	3.50E-08	2.60E-08	1.40E-10
GARDENS	ESE	6.30	4.80E-08	4.80E-08	3.50E-08	1.70E-10
GARDENS	NW	7.00	6.60E-08	6.60E-08	4.70E-08	2.20E-10
GARDENS	NNE	7.50	3.00E-08	3.00E-08	2.10E-08	9.20E-11
GARDENS	NW	8.30	5.20E-08	5.20E-08	3.60E-08	1.60E-10
GARDENS	NE	9.30	2.40E-08	2.40E-08	1.70E-08	6.90E-11
GARDENS	N	10.90	1.70E-08	1.70E-08	1.10E-08	5.50E-11
01W4 Parcel C	N	0.63	1.10E-06	1.10E-06	9.70E-07	7.60E-09
02W5	NNE	0.60	1.20E-06	1.20E-06	1.00E-06	7.50E-09
03W2	NE	0.38	2.40E-06	2.40E-06	2.30E-06	1.70E-08
16W4 Parcel A	NNW	0.67	1.10E-06	1.10E-06	1.00E-06	8.30E-09
STP	NNW	0.50	1.70E-06	1.70E-06	1.60E-06	1.30E-08
DAIRY & CATTL	W	4.90	6.00E-08	6.00E-08	4.50E-08	1.40E-10
DAIRY & CATTL	WNW	8.50	4.00E-08	4.00E-08	2.70E-08	7.80E-11
DAIRY & CATTL	NE	11.30	1.90E-08	1.90E-08	1.20E-08	5.00E-11
DAIRY & CATTL	N	11.70	1.50E-08	1.50E-08	1.00E-08	4.90E-11
DAIRY & CATTL	NNE	11.80	1.60E-08	1.60E-08	1.00E-08	4.40E-11
DAIRY & CATTL	NE	4.20	7.50E-08	7.50E-08	5.70E-08	2.70E-10
DAIRY & CATTL	NE	5.80	4.70E-08	4.70E-08	3.50E-08	1.50E-10
DAIRY & CATTL	SSW	8.30	3.50E-08	3.50E-08	2.40E-08	8.20E-11
DAIRY & CATTL	N	11.50	1.60E-08	1.60E-08	1.00E-08	5.00E-11
DAIRY & CATTL	NE	17.70	1.00E-08	1.00E-08	6.00E-09	2.30E-11

Attachment 3, Meteorological Data

1.2.2 Hope Creek Generating Station

Table 40, 2024 Annual Average Hope Creek Ground Level Release Dispersion (X/Q) and Deposition (D/Q) Factors

SPECIFIC POINTS OF INTEREST						
Location	Direction From Site	Distance (mi)	X/Q (Sec/M^3) No Decay Undepleted	X/Q (Sec/m^3) No Decay Undepleted	X/Q (Sec/m^3) No Decay Depleted	D/Q ($1/m^2$)
SITE BOUNDARY	S	0.25	6.30E-06	6.30E-06	5.90E-06	3.70E-08
SITE BOUNDARY	SSW	0.19	9.60E-06	9.60E-06	9.20E-06	4.70E-08
SITE BOUNDARY	SW	0.17	1.20E-05	1.20E-05	1.20E-05	6.10E-08
SITE BOUNDARY	WSW	0.17	9.30E-06	9.30E-06	9.00E-06	4.50E-08
SITE BOUNDARY	W	0.18	8.70E-06	8.70E-06	8.40E-06	3.50E-08
SITE BOUNDARY	WNW	0.22	8.80E-06	8.80E-06	8.40E-06	3.80E-08
SITE BOUNDARY	NW	0.31	6.20E-06	6.20E-06	5.80E-06	4.50E-08
SITE BOUNDARY	NNW	0.55	1.50E-06	1.50E-06	1.30E-06	1.10E-08
SITE BOUNDARY	N	0.56	1.30E-06	1.30E-06	1.20E-06	9.20E-09
SITE BOUNDARY	NNE	0.63	1.10E-06	1.10E-06	9.60E-07	6.90E-09
SITE BOUNDARY	NE	0.74	8.90E-07	8.90E-07	7.90E-07	5.60E-09
SITE BOUNDARY	ENE	0.94	5.00E-07	5.00E-07	4.40E-07	3.50E-09
SITE BOUNDARY	E	0.94	5.60E-07	5.60E-07	4.90E-07	4.10E-09
SITE BOUNDARY	ESE	0.75	1.00E-06	1.00E-06	8.90E-07	7.30E-09
SITE BOUNDARY	SE	0.47	2.20E-06	2.20E-06	2.10E-06	1.90E-08
SITE BOUNDARY	SSE	0.42	2.80E-06	2.80E-06	2.60E-06	2.10E-08
NEAREST RES	S	5.22	7.10E-08	7.10E-08	5.30E-08	2.20E-10
NEAREST RES	SSW	3.85	9.90E-08	9.90E-08	7.70E-08	3.10E-10
NEAREST RES	SW	4.29	9.00E-08	9.00E-08	6.90E-08	2.90E-10
NEAREST RES	WSW	4.41	6.60E-08	6.60E-08	5.00E-08	2.00E-10
NEAREST RES	W	3.98	8.00E-08	8.00E-08	6.10E-08	2.10E-10
NEAREST RES	WNW	3.42	1.30E-07	1.30E-07	1.00E-07	3.80E-10
NEAREST RES	NW	3.67	1.60E-07	1.60E-07	1.20E-07	6.90E-10
NEAREST RES	NNW	4.23	7.80E-08	7.80E-08	6.00E-08	3.40E-10
NEAREST RES	N	5.65	4.40E-08	4.40E-08	3.20E-08	1.70E-10
NEAREST RES	NNE	4.97	5.40E-08	5.40E-08	4.00E-08	1.90E-10
NEAREST RES	NE	3.85	8.40E-08	8.40E-08	6.50E-08	3.20E-10
NEAREST RES	ENE	3.85	6.60E-08	6.60E-08	5.10E-08	3.00E-10
NEAREST RES	E	5.28	4.60E-08	4.60E-08	3.40E-08	2.00E-10
NEAREST RES	ESE	5.84	5.30E-08	5.30E-08	3.90E-08	2.00E-10
NEAREST RES	SE	9.44	3.10E-08	3.10E-08	2.10E-08	1.10E-10
NEAREST RES	SSE	9.44	3.30E-08	3.30E-08	2.20E-08	9.90E-11
GARDENS	NNW	0.57	1.40E-06	1.40E-06	1.30E-06	1.10E-08
GARDENS	SE	0.18	1.10E-05	1.10E-05	1.10E-05	8.10E-08

Attachment 3, Meteorological Data

Table 40, 2024 Annual Average Hope Creek Ground Level Release Dispersion (X/Q) and Deposition (D/Q) Factors

SPECIFIC POINTS OF INTEREST						
Location	Direction From Site	Distance (mi)	X/Q (Sec/M^3) No Decay Undepleted	X/Q (Sec/m^3) No Decay Undepleted	X/Q (Sec/m^3) No Decay Depleted	D/Q ($1/m^2$)
GARDENS	N	0.57	1.20E-06	1.20E-06	1.10E-06	8.90E-09
GARDENS	NW	0.58	2.20E-06	2.20E-06	2.00E-06	1.70E-08
GARDENS	SSW	3.9	9.80E-08	9.80E-08	7.50E-08	3.10E-10
GARDENS	NE	4.9	6.00E-08	6.00E-08	4.50E-08	2.10E-10
GARDENS	ENE	5	4.50E-08	4.50E-08	3.40E-08	1.90E-10
GARDENS	NE	5	5.80E-08	5.80E-08	4.30E-08	2.00E-10
GARDENS	E	6	3.80E-08	3.80E-08	2.80E-08	1.60E-10
GARDENS	ENE	6	3.50E-08	3.50E-08	2.50E-08	1.40E-10
GARDENS	ESE	6.3	4.80E-08	4.80E-08	3.50E-08	1.70E-10
GARDENS	NW	7	6.50E-08	6.50E-08	4.70E-08	2.20E-10
GARDENS	NNE	7.5	3.00E-08	3.00E-08	2.10E-08	9.20E-11
GARDENS	NW	8.3	5.20E-08	5.20E-08	3.60E-08	1.60E-10
GARDENS	NE	9.3	2.40E-08	2.40E-08	1.70E-08	6.90E-11
GARDENS	N	10.9	1.70E-08	1.70E-08	1.10E-08	5.50E-11
03W2	E	0.39	2.00E-06	2.00E-06	1.90E-06	1.70E-08
16W4 Parcel A	NW	0.4	4.00E-06	4.00E-06	3.70E-06	3.00E-08
01W4 Parcel C	NNE	0.39	2.20E-06	2.20E-06	2.00E-06	1.50E-08
02W5	NE	0.39	2.30E-06	2.30E-06	2.20E-06	1.60E-08
STP	NNW	0.25	5.40E-06	5.40E-06	5.10E-06	3.90E-08
DAIRY & CATTL	W	4.9	6.00E-08	6.00E-08	4.50E-08	1.40E-10
DAIRY & CATTL	WNW	8.5	3.90E-08	3.90E-08	2.70E-08	7.80E-11
DAIRY & CATTL	NE	11.3	1.90E-08	1.90E-08	1.20E-08	5.00E-11
DAIRY & CATTL	N	11.7	1.50E-08	1.50E-08	1.00E-08	4.90E-11
DAIRY & CATTL	NNE	11.8	1.60E-08	1.60E-08	1.00E-08	4.40E-11
DAIRY & CATTL	NE	4.2	7.50E-08	7.50E-08	5.70E-08	2.70E-10
DAIRY & CATTL	NE	5.8	4.70E-08	4.70E-08	3.40E-08	1.50E-10
DAIRY & CATTL	SSW	8.3	3.50E-08	3.50E-08	2.40E-08	8.20E-11
DAIRY & CATTL	N	11.5	1.60E-08	1.60E-08	1.00E-08	5.00E-11
DAIRY & CATTL	NE	17.7	9.90E-09	9.90E-09	6.00E-09	2.30E-11

Attachment 3, Meteorological Data

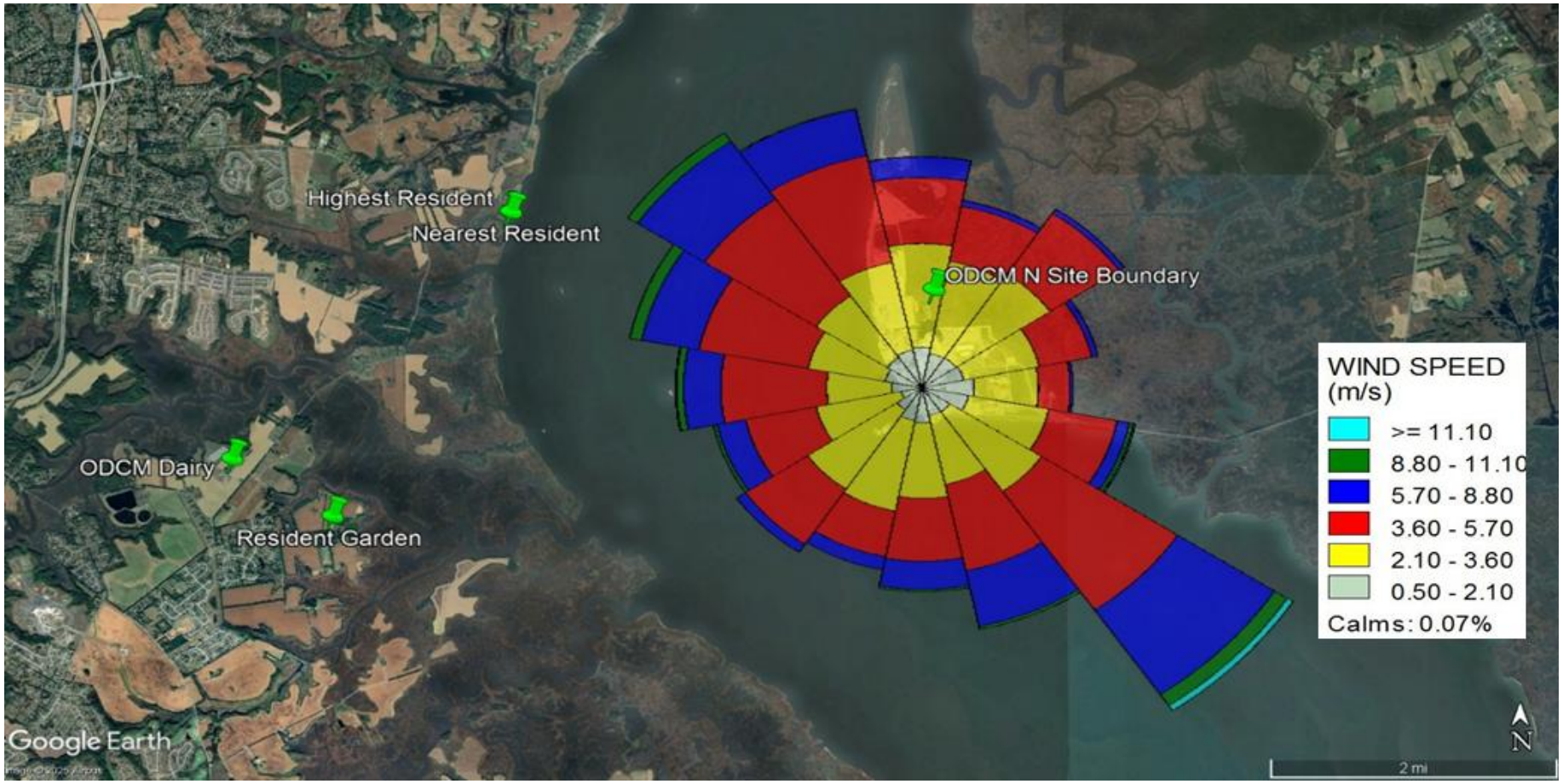

Figure 6, Locations of Dose Calculation Receptors with 2024 Wind Rose Overlay

Attachment 4, Radiological Effluent Trends

Attachment 4, Radiological Effluent Trends

1.0 The following trend graphs display the total curies of liquid and gaseous effluents released for SGS and HCGS from 2011 through 2024.

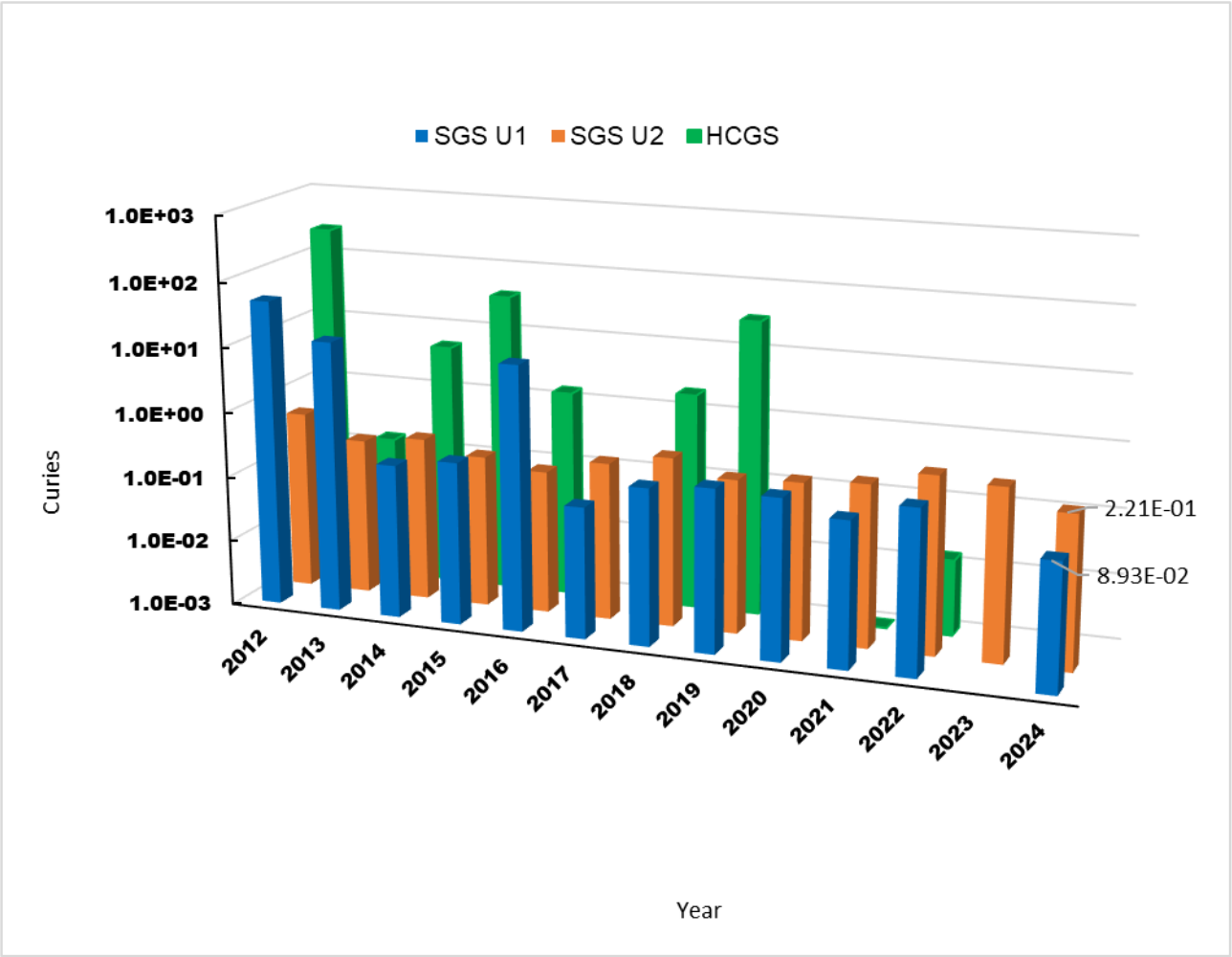

Figure 7, Fission and Activation Gases Released in Gaseous Effluents from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 4, Radiological Effluent Trends

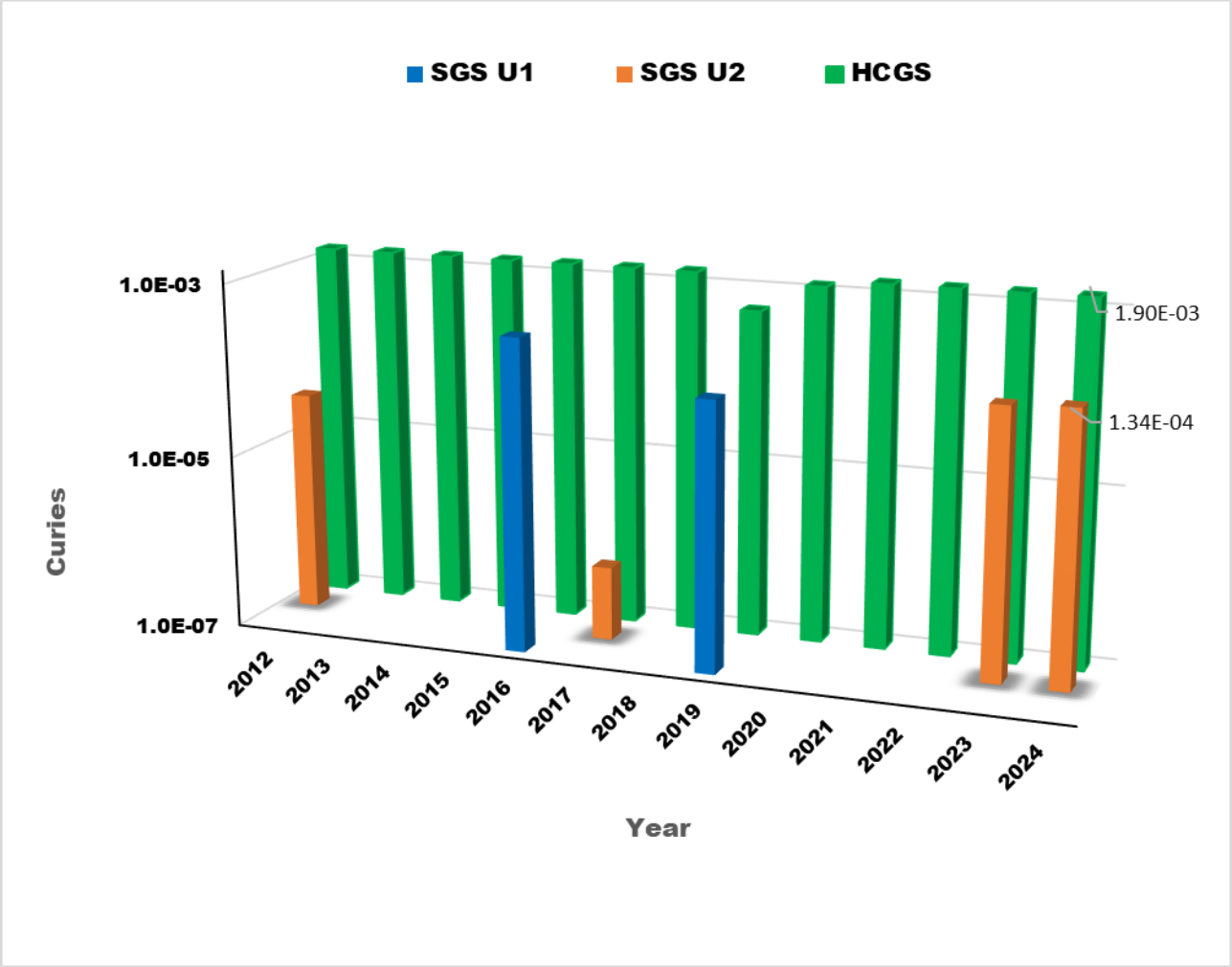

Figure 8, Iodines Released in Gaseous Effluents from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 4, Radiological Effluent Trends

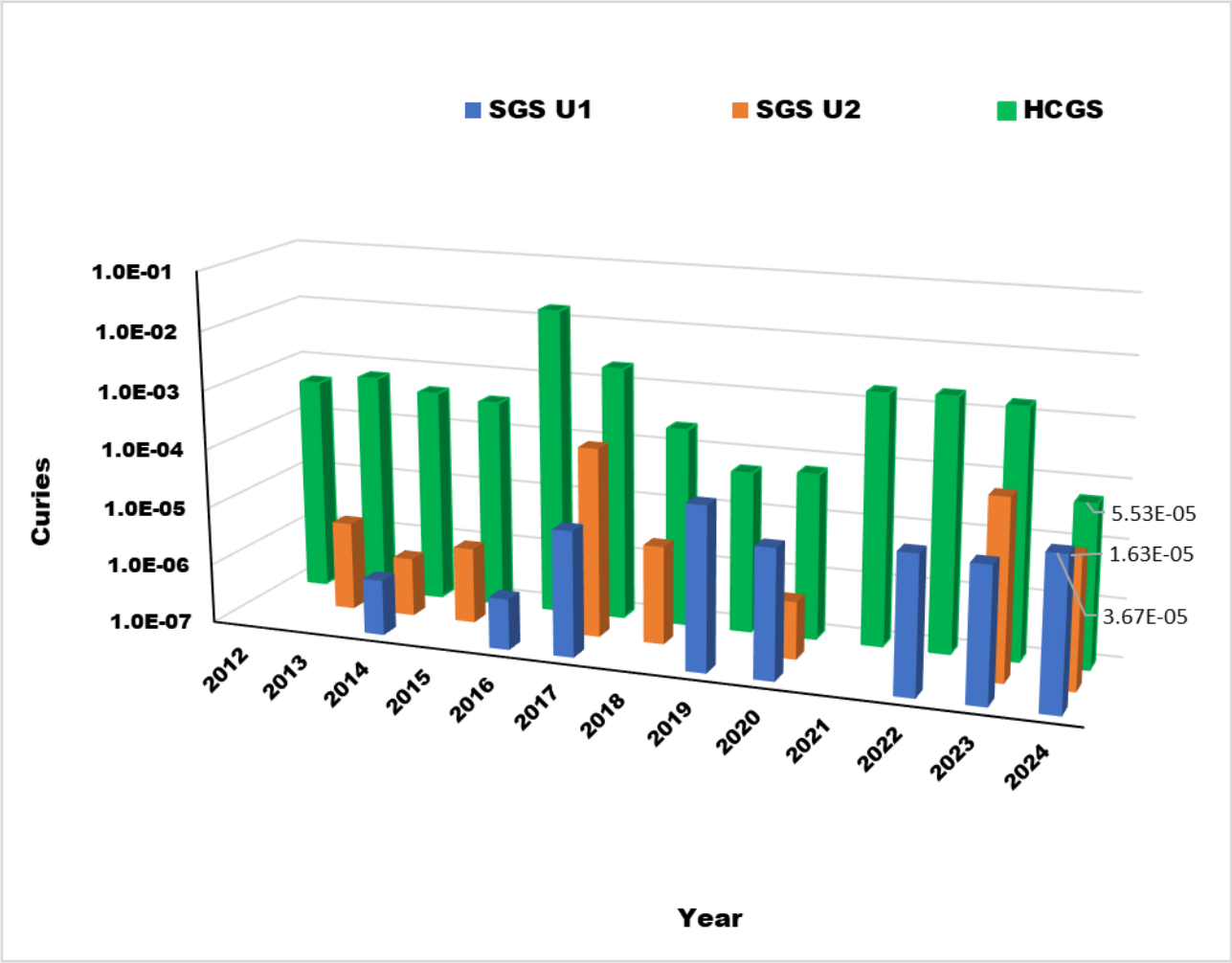

Figure 9, Particulates Released in Gaseous Effluents from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 4, Radiological Effluent Trends

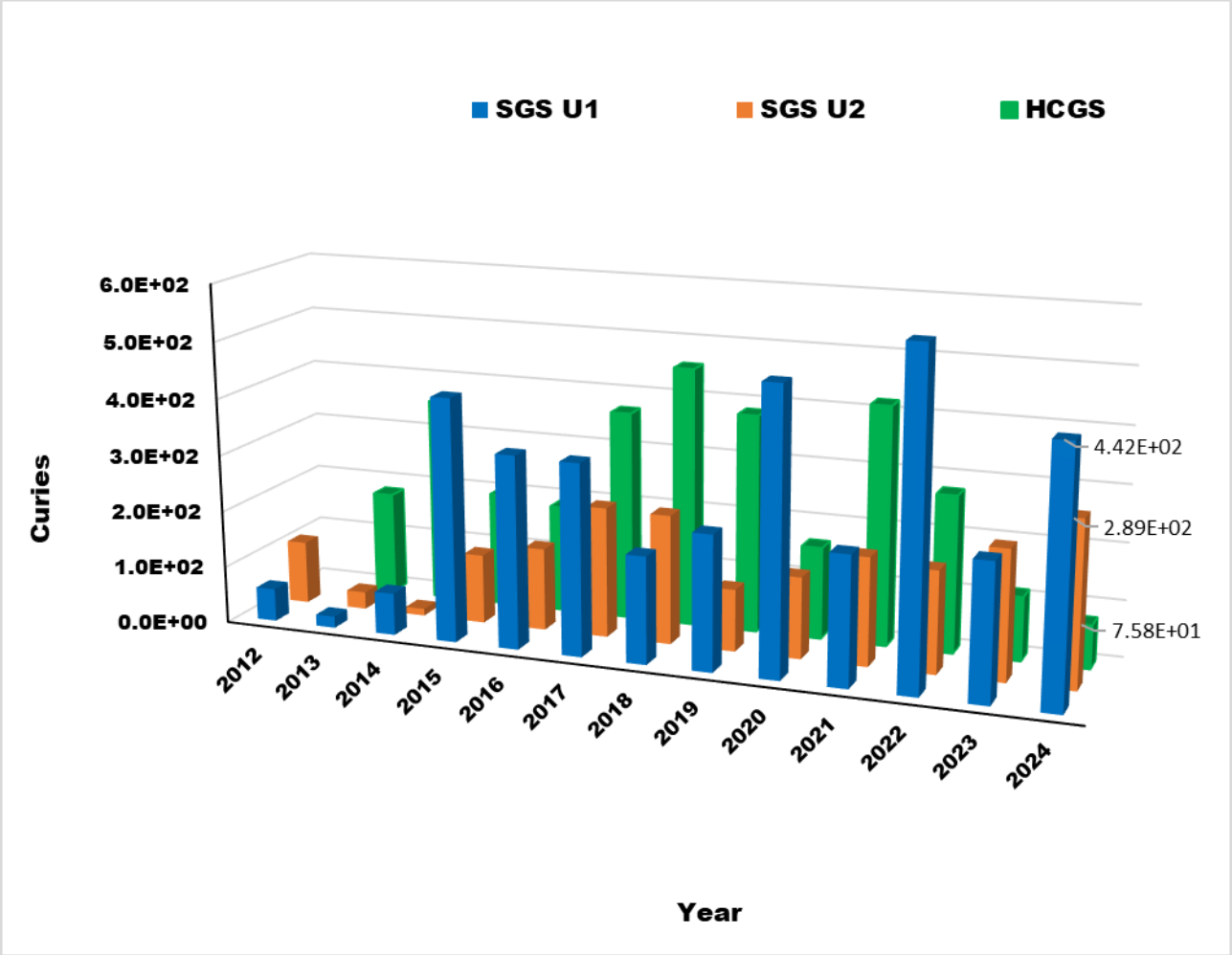

Figure 10, Tritium Released in Gaseous Effluents from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 4, Radiological Effluent Trends

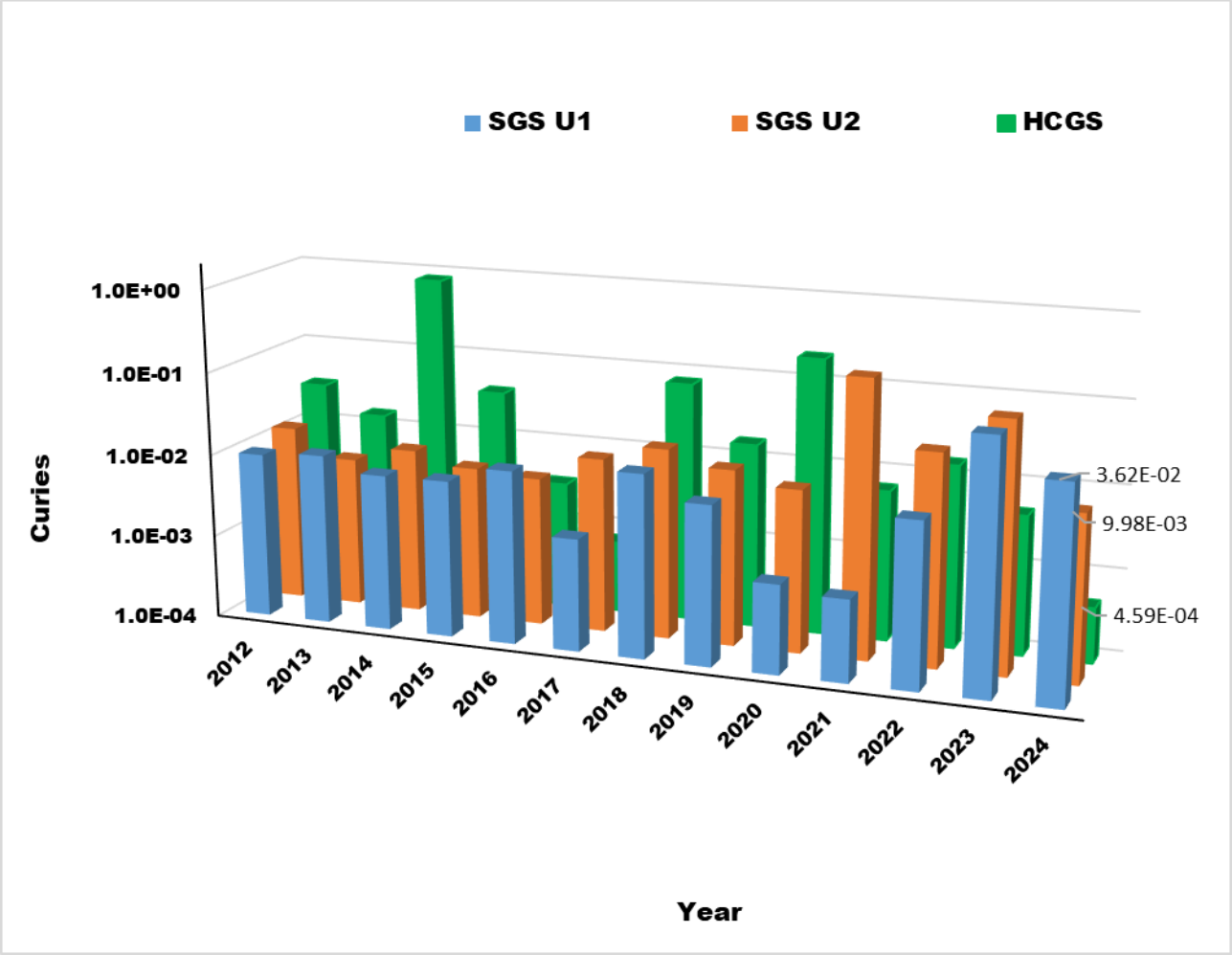

Figure 11, Fission and Activation Products Released in Liquid Effluents, Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 4, Radiological Effluent Trends

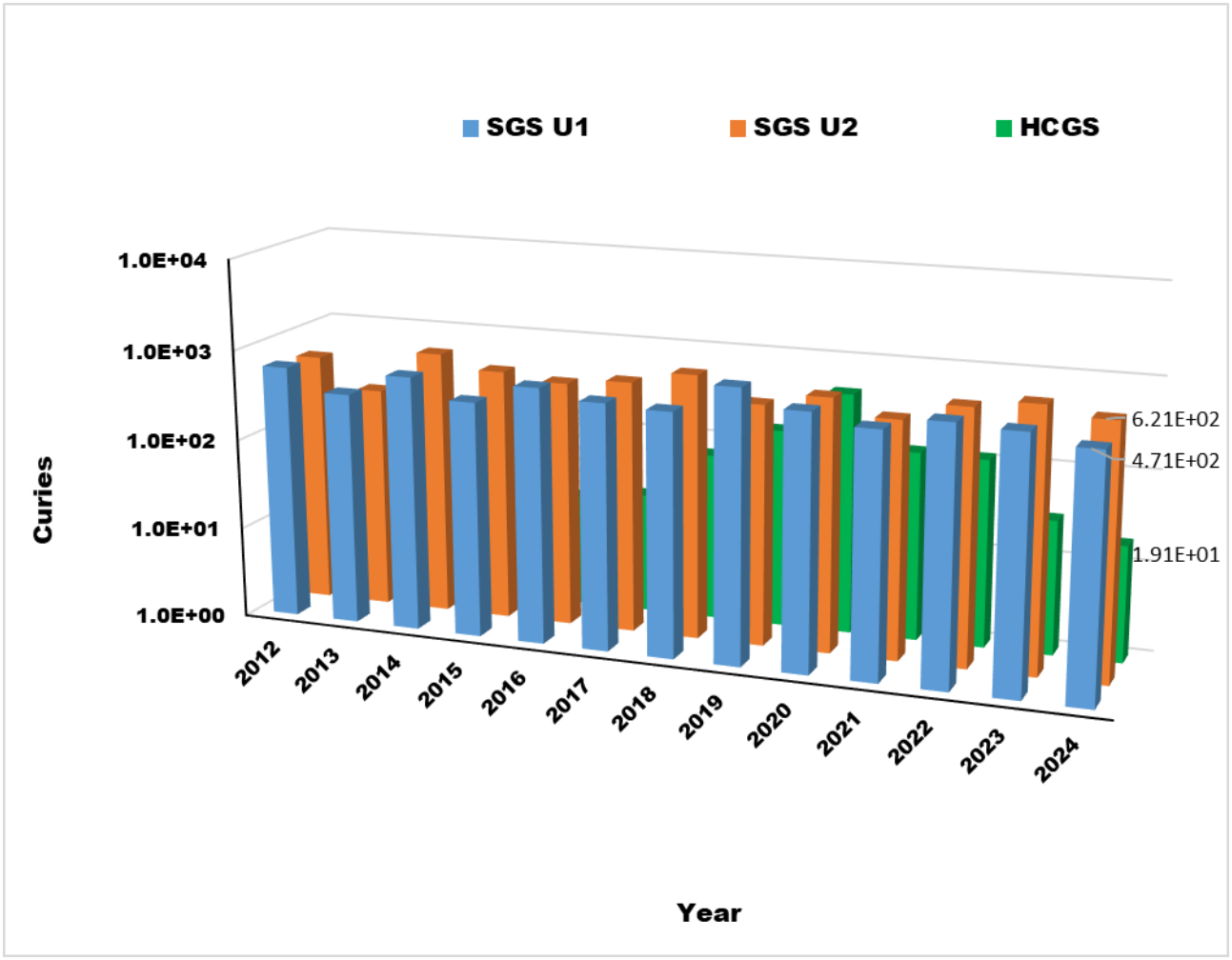

Figure 12, Tritium Released in Liquid Effluents, Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1, 2012 – 2024

Attachment 5, Doses to Onsite Receptors Using NRC Code GASPAR

Attachment 5, Doses to the Onsite Receptors

1.0 Doses for the following receptors were compiled from the 2024 gaseous curie releases from Salem Unit 1, Salem Unit 2 and Hope Creek Unit 1 and the 2016 – 2020 five-year meteorological dispersion and deposition data.

Table 41, Highest Potential Onsite Dose Receptors, Distances from Salem, and Hope Creek, and 2016 – 2020 Five Year Annual Average X/Q, and D/Q Values[1]

Location	Plant	Sector	Distance (miles)	Occupancy Factor[2]	X/Q Undecayed / Undepleted (sec/m^3)	X/Q Decayed / Undepleted (sec/m^3)	X/Q Decayed / Depleted (sec/m^3)	Deposition D/Q ($1/m^2$)
Emergency Personnel[3]	HC	E	0.94	0.34	7.80E-07	7.80E-07	6.89E-07	5.59E-09
	SA	E	0.89	0.34	8.45E-07	8.45E-07	7.41E-07	6.24E-09
03W2[4]	HC	E	0.39	0.34	2.86E-06	2.86E-06	2.73E-06	2.47E-08
	SA	NE	0.38	0.34	3.90E-06	3.90E-06	3.51E-06	2.47E-08
16W4 Parcel A[4]	HC	NW	0.40	0.34	4.55E-06	4.55E-06	4.16E-06	3.25E-08
	SA	NNW	0.67	0.34	1.43E-06	1.43E-06	1.30E-06	1.11E-08
01W4 Parcel C[4]	HC	NNE	0.39	0.34	3.12E-06	3.12E-06	2.86E-06	2.21E-08
	SA	N	0.63	0.34	1.43E-06	1.43E-06	1.29E-06	9.75E-09
02W5[4]	HC	NE	0.39	0.34	3.64E-06	3.64E-06	3.38E-06	2.34E-08
	SA	NNE	0.60	0.34	1.69E-06	1.69E-06	1.43E-06	1.08E-08
STP[5]	HC	NNW	0.25	0.34	7.37E-06	7.37E-06	6.98E-06	5.29E-08
	SA	NNW	0.50	0.34	2.34E-06	2.34E-06	2.14E-06	1.79E-08

[1] X/Q and D/Q values have a plus 30% conservative factor added.
[2] Occupancy Factor represents 3000 working hours per year.
[3] Emergency Workers are considered National Guard, Police, and other personnel necessary during an emergency.
[4] Wind Port Locations.
[5] Sewage Treatment Plant Workers.

Attachment 5, Doses to the Onsite Receptors

Table 42, Calculated Doses (mrem) to Emergency Workers (i.e., National Guard, State Police, etc.) (34 Percent Occupancy) from Gaseous Effluents from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor – Emergency Workers – Salem Unit 1								
ANNUAL BETA AIR DOSE =			2.51E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			6.94E-06	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.62E-06	4.62E-06	4.62E-06	4.62E-06	4.62E-06	4.62E-06	4.62E-06	7.41E-06
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	3.26E-03	3.26E-03	1.94E-03	3.26E-03	3.26E-03	3.26E-03	3.26E-03	2.89E-03
Total	3.26E-03	3.26E-03	1.94E-03	3.26E-03	3.26E-03	3.26E-03	3.26E-03	2.90E-03
Receptor – Emergency Workers – Salem Unit 2								
ANNUAL BETA AIR DOSE =			5.88E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			1.58E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.05E-05	1.69E-05
GROUND	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06	6.46E-06
INHAL								
ADULT	2.19E-03	2.19E-03	1.61E-03	2.19E-03	2.19E-03	2.20E-03	2.19E-03	1.89E-03
Total	2.21E-03	2.21E-03	1.62E-03	2.21E-03	2.21E-03	2.21E-03	2.21E-03	1.91E-03
Receptor – Emergency Workers – Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	7.65E-05	7.65E-05	7.65E-05	7.65E-05	7.65E-05	7.65E-05	7.65E-05	9.01E-05
INHAL								
ADULT	8.98E-04	8.98E-04	2.34E-03	8.98E-04	8.98E-04	9.38E-04	9.01E-04	4.59E-04
Total	9.74E-04	9.74E-04	2.42E-03	9.74E-04	9.74E-04	1.01E-03	9.78E-04	5.49E-04
Receptor – Emergency Workers – Total All Units								
ANNUAL BETA AIR DOSE =			8.39E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			2.27E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.51E-05	1.51E-05	1.51E-05	1.51E-05	1.51E-05	1.51E-05	1.51E-05	2.43E-05
GROUND	8.20E-05	8.20E-05	8.20E-05	8.20E-05	8.20E-05	8.20E-05	8.20E-05	9.66E-05
INHAL								
ADULT	6.35E-03	6.35E-03	5.89E-03	6.35E-03	6.35E-03	6.39E-03	6.35E-03	5.24E-03
Total	6.44E-03	6.44E-03	5.98E-03	6.44E-03	6.44E-03	6.48E-03	6.44E-03	5.36E-03

Attachment 5, Doses to the Onsite Receptors

Table 43, Calculated Doses (mrem) to Sewage Treatment Plant Workers (34 Percent Occupancy) from Gaseous Effluents from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor – STP Worker – Salem Unit 1								
ANNUAL BETA AIR DOSE =			6.97E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			1.92E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	1.28E-05	2.05E-05
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	9.01E-03	9.01E-03	5.37E-03	9.01E-03	9.01E-03	9.01E-03	9.01E-03	8.02E-03
Total	9.02E-03	9.02E-03	5.38E-03	9.02E-03	9.02E-03	9.02E-03	9.02E-03	8.04E-03
Receptor – STP Worker – Salem Unit 2								
ANNUAL BETA AIR DOSE =			1.63E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			4.39E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	4.69E-05
GROUND	1.57E-05	1.57E-05	1.57E-05	1.57E-05	1.57E-05	1.57E-05	1.57E-05	1.85E-05
INHAL								
ADULT	6.09E-03	6.09E-03	4.45E-03	6.09E-03	6.09E-03	6.09E-03	6.09E-03	5.24E-03
Total	6.13E-03	6.13E-03	4.50E-03	6.13E-03	6.13E-03	6.13E-03	6.13E-03	5.30E-03
Receptor – STP Worker – Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	7.24E-04	7.24E-04	7.24E-04	7.24E-04	7.24E-04	7.24E-04	7.24E-04	8.50E-04
INHAL								
ADULT	8.47E-03	8.47E-03	2.21E-02	8.47E-03	8.47E-03	8.84E-03	8.50E-03	4.32E-03
Total	9.19E-03	9.19E-03	2.28E-02	9.19E-03	9.19E-03	9.56E-03	9.22E-03	5.17E-03
Receptor – STP Worker – Total All Units								
ANNUAL BETA AIR DOSE =			2.33E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			6.31E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05	6.75E-05
GROUND	7.40E-04	7.40E-04	7.40E-04	7.40E-04	7.40E-04	7.40E-04	7.40E-04	8.68E-04
INHAL								
ADULT	2.36E-02	2.36E-02	3.19E-02	2.36E-02	2.36E-02	2.39E-02	2.36E-02	1.76E-02
Total	2.43E-02	2.43E-02	3.27E-02	2.43E-02	2.43E-02	2.47E-02	2.44E-02	1.85E-02

Attachment 5, Doses to the Onsite Receptors

Table 44, Calculated Doses (mrem) to Special Interest Location 03W2 from Gaseous Effluents (34 Percent Occupancy) from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor: 03W2–Salem Unit 1								
ANNUAL BETA AIR DOSE =			1.16E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			3.20E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.13E-05	2.13E-05	2.13E-05	2.13E-05	2.13E-05	2.13E-05	2.13E-05	3.43E-05
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	1.50E-02	1.50E-02	8.94E-03	1.50E-02	1.50E-02	1.50E-02	1.50E-02	1.34E-02
Total	1.50E-02	1.50E-02	8.96E-03	1.50E-02	1.50E-02	1.50E-02	1.50E-02	1.34E-02
Receptor: 03W2–Salem Unit 2								
ANNUAL BETA AIR DOSE =			2.72E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			7.31E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.86E-05	4.86E-05	4.86E-05	4.86E-05	4.86E-05	4.86E-05	4.86E-05	7.82E-05
GROUND	2.17E-05	2.17E-05	2.17E-05	2.17E-05	2.17E-05	2.17E-05	2.17E-05	2.55E-05
INHAL								
ADULT	1.01E-02	1.01E-02	7.41E-03	1.01E-02	1.01E-02	1.01E-02	1.01E-02	8.74E-03
Total	1.02E-02	1.02E-02	7.46E-03	1.02E-02	1.02E-02	1.02E-02	1.02E-02	8.82E-03
Receptor: 03W2–Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	3.38E-04	3.38E-04	3.38E-04	3.38E-04	3.38E-04	3.38E-04	3.38E-04	3.98E-04
INHAL								
ADULT	3.29E-03	3.29E-03	8.57E-03	3.29E-03	3.29E-03	3.43E-03	3.30E-03	1.68E-03
Total	3.63E-03	3.63E-03	8.91E-03	3.63E-03	3.63E-03	3.77E-03	3.64E-03	2.08E-03
Receptor: 03W2–Total All Units								
ANNUAL BETA AIR DOSE =			3.88E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			1.05E-04	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	6.99E-05	6.99E-05	6.99E-05	6.99E-05	6.99E-05	6.99E-05	6.99E-05	1.13E-04
GROUND	3.60E-04	3.60E-04	3.60E-04	3.60E-04	3.60E-04	3.60E-04	3.60E-04	4.23E-04
INHAL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	2.84E-02	2.84E-02	2.49E-02	2.84E-02	2.85E-02	2.86E-02	2.85E-02	2.38E-02
Total	2.89E-02	2.89E-02	2.53E-02	2.89E-02	2.89E-02	2.90E-02	2.89E-02	2.43E-02

Attachment 5, Doses to the Onsite Receptors

Table 45, Calculated Doses (mrem) to Special Interest Location 16W4 from Gaseous Effluents (34 Percent Occupancy) from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor: 16W4–Salem Unit 1								
ANNUAL BETA AIR DOSE =			4.25E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			1.17E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	1.25E-05
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	5.51E-03	5.51E-03	3.28E-03	5.51E-03	5.51E-03	5.51E-03	5.51E-03	4.90E-03
Total	5.52E-03	5.52E-03	3.29E-03	5.52E-03	5.52E-03	5.52E-03	5.52E-03	4.91E-03
Receptor: 16W4–Salem Unit 2								
ANNUAL BETA AIR DOSE =			9.96E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			2.68E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	2.87E-05
GROUND	9.76E-06	9.76E-06	9.76E-06	9.76E-06	9.76E-06	9.76E-06	9.76E-06	1.15E-05
INHAL								
ADULT	3.71E-03	3.71E-03	2.72E-03	3.71E-03	3.71E-03	3.71E-03	3.71E-03	3.20E-03
Total	3.72E-03	3.72E-03	2.74E-03	3.72E-03	3.72E-03	3.72E-03	3.72E-03	3.23E-03
Receptor: 16W4–Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	4.45E-04	4.45E-04	4.45E-04	4.45E-04	4.45E-04	4.45E-04	4.45E-04	5.24E-04
INHAL								
ADULT	5.24E-03	5.24E-03	1.36E-02	5.24E-03	5.24E-03	5.47E-03	5.24E-03	2.67E-03
Total	5.68E-03	5.68E-03	1.41E-02	5.68E-03	5.68E-03	5.92E-03	5.68E-03	3.19E-03
Receptor: 16W4–Total All Units								
ANNUAL BETA AIR DOSE =			1.42E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			3.85E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	4.12E-05
GROUND	4.55E-04	4.55E-04	4.55E-04	4.55E-04	4.55E-04	4.55E-04	4.55E-04	5.35E-04
INHAL								
ADULT	1.45E-02	1.45E-02	1.96E-02	1.45E-02	1.45E-02	1.47E-02	1.45E-02	1.08E-02
Total	1.49E-02	1.49E-02	2.01E-02	1.49E-02	1.49E-02	1.52E-02	1.49E-02	1.13E-02

Attachment 5, Doses to the Onsite Receptors

Table 46, Calculated Doses (mrem) to Special Interest Location 01W4 from Gaseous Effluents (34 Percent Occupancy) from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor: 01W4– Salem Unit 1								
ANNUAL BETA AIR DOSE =			4.25E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			1.17E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	7.82E-06	1.25E-05
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	5.51E-03	5.51E-03	3.28E-03	5.51E-03	5.51E-03	5.51E-03	5.51E-03	4.90E-03
Total	5.52E-03	5.52E-03	3.29E-03	5.52E-03	5.52E-03	5.52E-03	5.52E-03	4.91E-03
Receptor: 01W4–Salem Unit 2								
ANNUAL BETA AIR DOSE =			9.96E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			2.68E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	1.78E-05	2.87E-05
GROUND	8.57E-06	8.57E-06	8.57E-06	8.57E-06	8.57E-06	8.57E-06	8.57E-06	1.01E-05
INHAL								
ADULT	3.71E-03	3.71E-03	2.72E-03	3.71E-03	3.71E-03	3.71E-03	3.71E-03	3.20E-03
Total	3.73E-03	3.73E-03	2.75E-03	3.73E-03	3.73E-03	3.73E-03	3.73E-03	3.24E-03
Receptor: 01W4–Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	3.02E-04	3.02E-04	3.02E-04	3.02E-04	3.02E-04	3.02E-04	3.02E-04	3.57E-04
INHAL								
ADULT	3.60E-03	3.60E-03	9.35E-03	3.60E-03	3.60E-03	3.74E-03	3.60E-03	1.83E-03
Total	3.91E-03	3.91E-03	9.65E-03	3.91E-03	3.91E-03	4.04E-03	3.91E-03	2.19E-03
Receptor: 01W4–Total All Units								
ANNUAL BETA AIR DOSE =			1.42E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			3.85E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	2.56E-05	4.12E-05
GROUND	3.11E-04	3.11E-04	3.11E-04	3.11E-04	3.11E-04	3.11E-04	3.11E-04	3.67E-04
INHAL								
ADULT	1.28E-02	1.28E-02	1.54E-02	1.28E-02	1.28E-02	1.30E-02	1.28E-02	9.93E-03
Total	1.32E-02	1.32E-02	1.57E-02	1.32E-02	1.32E-02	1.33E-02	1.32E-02	1.03E-02

Attachment 5, Doses to the Onsite Receptors

Table 47, Calculated Doses (mrem) to Special Interest Location 02W5 from Gaseous Effluents (34 Percent Occupancy) from Salem Unit 1, Salem Unit 2, and Hope Creek Unit 1 using the NRC Code GASPAR, 2024

Receptor: 02W5–Salem Unit 1								
ANNUAL BETA AIR DOSE =			5.03E-06	MRAD				
ANNUAL GAMMA AIR DOSE =			1.39E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	9.21E-06	9.21E-06	9.21E-06	9.21E-06	9.21E-06	9.21E-06	9.21E-06	1.48E-05
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
INHAL								
ADULT	6.53E-03	6.53E-03	3.88E-03	6.53E-03	6.53E-03	6.53E-03	6.53E-03	5.78E-03
Total	6.54E-03	6.54E-03	3.89E-03	6.54E-03	6.54E-03	6.54E-03	6.54E-03	5.79E-03
Receptor: 02W5–Salem Unit 2								
ANNUAL BETA AIR DOSE =			1.18E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			3.16E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	2.10E-05	3.39E-05
GROUND	9.49E-06	9.49E-06	9.49E-06	9.49E-06	9.49E-06	9.49E-06	9.49E-06	1.12E-05
INHAL								
ADULT	4.39E-03	4.39E-03	3.21E-03	4.39E-03	4.39E-03	4.39E-03	4.39E-03	3.77E-03
Total	4.42E-03	4.42E-03	3.24E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	3.82E-03
Receptor: 02W5–Hope Creek Unit 1								
ANNUAL BETA AIR DOSE =			0.00E+00	MRAD				
ANNUAL GAMMA AIR DOSE =			0.00E+00	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	3.20E-04	3.20E-04	3.20E-04	3.20E-04	3.20E-04	3.20E-04	3.20E-04	3.77E-04
INHAL								
ADULT	4.18E-03	4.18E-03	1.09E-02	4.18E-03	4.18E-03	4.39E-03	4.18E-03	2.14E-03
Total	4.50E-03	4.50E-03	1.12E-02	4.50E-03	4.50E-03	4.71E-03	4.50E-03	2.51E-03
Receptor: 02W5–Total All Units								
ANNUAL BETA AIR DOSE =			1.68E-05	MRAD				
ANNUAL GAMMA AIR DOSE =			4.55E-05	MRAD				
PATHWAY	EFFECTIVE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.02E-05	3.02E-05	3.02E-05	3.02E-05	3.02E-05	3.02E-05	3.02E-05	4.87E-05
GROUND	3.29E-04	3.29E-04	3.29E-04	3.29E-04	3.29E-04	3.29E-04	3.29E-04	3.89E-04
INHAL								
ADULT	1.51E-02	1.51E-02	1.80E-02	1.51E-02	1.51E-02	1.53E-02	1.51E-02	1.17E-02
Total	1.55E-02	1.55E-02	1.84E-02	1.55E-02	1.55E-02	1.57E-02	1.55E-02	1.21E-02

Attachment 6, 2024 Radiological Groundwater Protection Program (RGPP) Report

Attachment 6, 2024 Radiological Groundwater Protection Program (RGPP) Report

1.0 Radiological Groundwater Protection Program (RGPP)

1.1 Introduction

PSEG implemented the Integrated Tritium Management Program (ITMP), which encompasses the Radiological Groundwater Protection Program (RGPP) and the Monitoring Well and Remedial Action Work Plan (RAWP). This report presents results of the 2024 groundwater monitoring activities performed by PSEG Nuclear at both the Hope Creek Generating Station (HCGS) and Salem Generating Station (SGS), collectively referred to as "the Station". Well locations at the Station are shown on Table 48 and Table 49, respectively. The ITMP links the various Station groundwater monitoring programs that integrate the following three broad programs:

- The Radiological Groundwater Protection Program (RGPP) is a program that was developed to ensure the timely detection of an unpermitted release of radioactive material.

- The Remedial Action Work Plan (RAWP) is a program that monitors the remediation of the historical release from the SGS Unit 1 Spent Fuel Pool.

- Investigation wells were installed as part of independent investigations into groundwater quality, that are not included as part of the RGPP or RAWP.

Well construction details for the Station's RGPP wells are presented on Table 48 and Table 49, respectively.

PSEG initiated the RGPP in 2006 to characterize groundwater at, and in the vicinity of, the Station with respect to historical releases of radionuclides and to provide the mechanism to detect such releases if one were to occur. The RGPP is a voluntary program implemented by PSEG in conjunction with the nuclear industry initiatives and associated guidance NEI 07-07 [16]. The other key elements that comprise the RGPP and contribute to public safety are spill/leak prevention, effective remediation of spills and leaks, and effective stakeholder communication.

In 2002, PSEG operations personnel at SGS identified a release of tritiated water from the SGS Unit 1 Spent Fuel Pool to the environment. PSEG developed a RAWP to remediate the tritium in groundwater, which was reviewed by the United States Nuclear Regulatory Commission (USNRC) and approved by the New Jersey Department of Environmental Protection (NJDEP) Bureau of Nuclear Engineering (BNE). A Groundwater Recovery System (GRS) was installed to control the migration of groundwater in the shallow, water-bearing unit and to reduce the remaining mass of tritiated groundwater. The operation and performance of the GRS is documented in the Remedial Action Progress Reports (RAPRs) provided to the NRC and NJDEP-BNE by PSEG. PSEG generates an effluent release permit for the residual tritium in groundwater discharging to the Delaware River. The permit values are included in the liquid effluent data reported earlier in this document. The Station is in a flat, largely undeveloped region of southern New Jersey, which is bordered to the west and south

by the Delaware River and to the east and north by extensive marshlands. The Station obtains cooling water from the Delaware River.

The Station is underlain with over 1,000 feet of inter-layered sand, silt, and clay. PSEG owns seven production/potable wells, which range in depth from 270 feet below ground surface (bgs) to 1135 feet bgs. These wells are installed in deeper formations isolated by confining units beneath the Vincentown Formation.

The results from a computer-based search of wells have identified the nearest off-site permitted potable well located approximately 3.5 miles from the Station. Shallow groundwater and the Vincentown aquifer (the two most shallow water bearing units underlying the Station) flow toward and discharge to the Delaware River, thus reducing the potential that Station operations have or will influence off-site potable wells.

1.2 Radiological Groundwater Protection Program

This section of the annual report is prepared to summarize the status, activities, and groundwater analytical results collected in 2024 at the Site. This report also describes any changes made to the monitoring program during the 2024 reporting year.

Details on non-RGPP wells (including construction details and analytical results) can be found in the RAPR submitted annually to the NJDEP-BNE and NRC.

1.2.1 Objectives of the Radiological Groundwater Protection Program

The long-term sampling program objectives are as follows:

- Identify suitable locations to monitor and evaluate potential impacts from Station operations before significant radiological impact to the environment or potential drinking water sources can occur.
- Refine the conceptual understanding of local hydrogeology and maintain current knowledge of potential flow paths on the surface and in groundwater beneath the Station.
- Evaluate systems, structures, components (SSCs) and work practices, which have the potential to release licensed radioactive material to the groundwater and develop strategies to mitigate potential releases to the environment.
- Perform routine groundwater monitoring and evaluate analytical results.
- Report any leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.
- Take necessary corrective actions to protect groundwater resources.

1.2.2 Sample Collection

In 2006, the original RGPP monitoring wells (Table 48 and Table 49) were installed at the Station as part of site investigation activities. Details pertaining to these activities are documented in the Site Investigation Reports (Arcadis 2006A and 2006B). Modifications have been made to some RGPP wells since and are reflected in the tables. Groundwater samples are collected from all RGPP monitoring wells at least semi-annually, with additional monitoring conducted as appropriate. The groundwater sample collection schedule is adaptively managed to ensure that representative data is collected to provide the information necessary to evaluate groundwater quality conditions. Monitoring wells are sampled following the low flow purging and sampling techniques in accordance with the Field Sampling Procedures Manual (NJDEP 2005). This methodology is consistent with protocols established in the RAWP.

1.2.3 Sample Analysis

Groundwater samples collected from RGPP wells are analyzed for plant-related gamma emitting radionuclides (semi-annually), total strontium (annually), nickel-63 and iron-55 (biennially), and tritium (every sample) by an off-site radiochemical analytical laboratory.

The samples are maintained under chain of custody procedures throughout sample handling, screening, shipping, and laboratory analysis process. Samples are submitted to the respective Station's on-site chemistry laboratory for radiological analysis screening prior to shipment to Teledyne Brown Engineering (TBE) located in Knoxville, Tennessee, for radiological analysis. Analytical laboratories are subject to internal quality assurance programs and inter-laboratory cross-check programs. Station personnel review and evaluate analytical data obtained from the laboratory.

1.2.4 Data Evaluation

Analytical results are reviewed for adverse trends or anomalies. Investigations and corrective action program notifications (CAP) are made as required by program procedures. The radiological data collected since the inception of the RGPP program is the basis for the baseline statistical evaluation to which current operational data are compared. Several factors are important in the interpretation and evaluation of the radiological data:

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1. Detection limits

   The Offsite Dose Calculation Manual (ODCM) specifies detection capabilities for each isotope that may be produced by the Station. While the detection capability for tritium specified in the ODCM is 3,000 picocuries per liter (pCi/L) in water, RGPP tritium analyses are performed to a lower value of 200 pCi/L at our offsite lab. Lower values for LLDs are used to being consistent with the State of New Jersey where PSEG conducts split samples with the NJDEP-BNE for specific wells. Each well has a statistically derived action level. When an action level is exceeded, PSEG may increase monitoring frequency or evaluate potential sources of the elevated tritium. Relevant groundwater evaluation criteria are listed in Table 50.

2. Laboratory Measurements Uncertainty

   Statistically, the value of a measurement is expressed as a range with a stated level of confidence. PSEG is required to report results with a 95% level of confidence.

   Analytical uncertainties are reported at the 95% confidence level in this report and are consistent with the methodologies used to report data in the Annual Radiological Environmental Operating Report.

1.2.5 RGPP Data Quality

Groundwater samples consist of up to four aliquots. One of the aliquots is submitted to the respective Site's on-site chemistry laboratory for initial screening, which includes tritium and gamma spectroscopy analysis. The second aliquot is sent to TBE for tritium analysis. In accordance with NJDEP-BNE's request, the third aliquot is collected from specific wells and submitted for split sample analysis to GEL Laboratories located in Charleston, South Carolina. The final aliquot is held as a back-up, "retained" sample until all the analytical results are received and determined to be valid.

All radionuclide results are compared to the following limitations defined as part of the RGPP:

- Internal Administrative Control Limits are defined within the RGPP procedures. They are developed based on a statistical analysis of the historical baseline concentrations of tritium in each specific well and are used to identify tritium concentrations that warrant further investigation for that specific well. Exceeding an Administrative Control Limit does not initiate external communication unless the external reporting limit is also exceeded.

- The Courtesy Communication Limit is a tritium concentration, below regulatory requirements, based on agreements with NJDEP-BNE, USNRC and other stakeholders ensuring the stakeholders are cognizant of potential issues. If a confirmed tritium result, collected from a RGPP well, exceeds the Courtesy Communication Limit of 3,000 pCi/L, PSEG provides courtesy communication by telephone or virtual meeting no later than the end of the next business day to NJDEP-BNE. The NRC Site Resident is also informed. This communication is not a regulatory commitment.

  NOTE: It is not expected that a courtesy communication be generated when a subsequent sample(s) is documented to be from the same source/mechanism as a previous event.

- Voluntary Communication Limits are those concentrations of radionuclides that require voluntary communication and reporting to regulators and/or stakeholders based on NEI 07-07, the ODCM, and Site procedures.

2.0 Discussion

The locations of the RGPP monitoring wells located at HCGS and SGS are depicted on Figure 13 and Figure 14, respectively. Additionally, well construction details for the HCGS RGPP wells and SGS RGPP wells are presented on Table 48 and Table 49, respectively. The relevant radiological parameters used to evaluate groundwater analytical results are provided in Table 50. The groundwater tritium analytical results for HCGS and SGS are shown in Table 51 and Table 52, respectively.

Except for tritium, no plant-related radionuclides were detected in any HCGS or SGS wells sampled in 2024, including both RGPP and non-RGPP well samples.

2.1.1 Groundwater Results - RGPP

Groundwater samples were collected from all RGPP monitoring wells during 2024 in accordance with the Station and PSEG's Laboratory and Testing Services (LTS) procedures for the RGPP. Sample results are discussed below.

1. HCGS RGPP Wells

   Tritium analytical results for groundwater samples collected during 2024 from HCGS RGPP monitoring wells are summarized below and are presented in Table 51.

   - Tritium was not detected in groundwater samples collected from 7 of the 13 HCGS RGPP wells (wells BH, BI, BK, BL, BQ, BR-R, and BS-R).

   - Well BJ: Tritium concentrations detected in well BJ ranged from 1,350 pCi/L (August) to 1,720 pCi/L (February) and averaged 1,480 pCi/L. Well BJ is

located near the HCGS main permitted gaseous effluent vent (i.e., south plant vent).

- Well BM: Well BM was sampled in May and November, with results of 560 pCi/L and 333 pCi/L respectively. Well BM is located northwest of the reactor containment and is a sentinel (source) well for facilities and buried piping.

- Well BN: Tritium concentrations detected in well BN ranged from 363 pCi/L (November) to 625 pCi/L (May) and averaged 489 pCi/L. Well BN is located northeast of the Materials Control Center and is a sentinel (source) well for the Auxiliary Boiler building and buried piping.

- Well BO: Well BO was sampled in May and November. Tritium was detected at a concentration of 530 pCi/L in May. Tritium was not detected in the sample collected in November. Well BO is located north of the Material Center and is a sentinel (source) well for the onsite sewage building and buried piping.

- Well BP: Well BP was sampled in May and November. Tritium was detected at a concentration of 201 pCi/L in May. Tritium was not detected in the sample collected in November. Well BP is located northwest of the Material Center and is a sentinel (source) well for the onsite sewage building and buried piping.

- Well BT-R: Well BT-R was sampled in May and November. Tritium was detected at a concentration of 272 pCi/L in May. Tritium was not detected in the sample collected in November. Well BT-R is located northeast of the turbine building and is considered an upgradient groundwater monitoring well.

Except for tritium, no plant-related radionuclides were detected in any HCGS RGPP well sampled in 2024.

2. SGS RGPP Wells

Tritium analytical results for groundwater samples collected during 2024 from SGS RGPP monitoring wells are summarized below and are presented on Table 52.

- Tritium was not detected in groundwater samples collected from 6 of the 13 SGS RGPP wells (wells BA, BB, BF, BU, T, Y).

- Well AL: Tritium was detected at concentrations ranging from 476 pCi/L (November) to 982 pCi/L (May) and averaged 786 pCi/L. Well AL is located south of the SGS Unit 1 reactor building and is a sentinel (source) well.

- Well BC: Well BC was sampled in May and November, with results of 332 pCi/L and 352 pCi/L respectively. Well BC is a sentinel (source)/perimeter well located southwest of Facilities, Refueling Water Storage Tank, Auxiliary

Feedwater Storage Tank and Primary Water Storage Tank (RAP) tanks and piping.

- Well BD: Well BD was sampled in May and November. Tritium was detected at a concentration of 436 pCi/L in May. Tritium was not detected in the sample collected in November. Well BD is located to the west of SGS Unit 2 reactor building and is a sentinel (source) well for Facilities, RAP tanks, and piping.

- Well BE: Well BE was sampled in May and November, with results of 331 pCi/L and 271 pCi/L respectively. Well BE is located to the west of SGS Unit 2 reactor building and is a perimeter well.

- Well BG: Well BG was sampled in May and November. Tritium was detected at a concentration of 466 pCi/L in May. Tritium was not detected in the sample collected in November. Well BG is located northwest of SGS Unit 2 reactor building (and south of HCGS) and is a perimeter well.

- Well U: Well U was sampled in May, September and November, with results of 541 pCi/L, 250 pCi/L and 458 pCi/L respectively. Well U is located north of SGS Unit 2 reactor building and is a sentinel (source) well for the House Heating Boilers that have been abandoned for several years.

- Well Z: Well Z was sampled in May and November, with results of 634 pCi/L and 336 pCi/L respectively. Well Z is located west of the SGS Unit 1 & 2 reactor buildings and is a perimeter well.

Except for tritium, no plant-related radionuclides were detected in any SGS RGPP well sampled in 2024.

2.1.2 New RGPP Wells

No new wells were added to the RGPP during 2024.

2.1.3 Mass Flux Estimation of Tritium to the Delaware River

PSEG uses transect methods to calculate the mass flux of tritium to the Delaware River in the shallow, water bearing unit and the deeper basal sand unit and Vincentown Formation. To calculate the mass flux, the tritium concentration was conservatively estimated using the average concentration detected in monitoring wells located nearest to the Delaware River during each quarter. During 2024, the mass flux within the shallow, water bearing unit and deeper groundwater was estimated to be 0.006 Ci and 0.012 Ci, respectively. Therefore, the total potential estimated mass flux of tritium in groundwater reaching the Delaware River during 2024 was 0.018 Ci.

The calculated mass flux of 0.018 Ci (total of four quarterly estimates) was included in the Station's liquid effluent discharge and reported in the data tables of the Annual Radiological Effluent Release Report.

2.1.4 Investigations

1. Groundwater Monitoring Well Data (Non-RGPP)

As previously discussed, PSEG monitors a series of wells located at the Station. The ITMP is comprised of the RGPP wells, the RAWP wells, and a series of monitoring wells that were installed to investigate groundwater quality but are not included as part of the RGPP or RAWP. Tritium analytical results for those wells that are not specifically part of the RGPP are presented in the RAPRs submitted annually to the NJDEP-BNE and NRC.

2.1.5 Past Spills and Leaks: Impacts to Groundwater

In 2024, there were no known active unmonitored or unevaluated releases into the groundwater at the Station.

3.0 RGPP 2024 Status

The RGPP long-term sampling program will be modified as required to meet the RGPP objectives. Baseline sampling and analysis of groundwater is planned to continue the following schedule:

- Tritium will be analyzed at least semi-annually each calendar year to a detection capability less than or equal to 200 pCi/L,
- Plant-related gamma emitters will be analyzed at least semi-annually to the environmental detection limits specified in the ODCM,
- RGPP monitoring well sample frequency will be adjusted as needed based on analytical results.

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Table 48, RGPP Well Construction Details, HCGS

Well ID	Installation Date	Construction Details	Diameter (inches)	Total Depth (feet bgs)	Monitoring Interval (feet bgs)	MP Elevation (feet RPD)	MP Elevation (feet amsl)	Monitoring Purpose	Source Targets
Well BH	May-2006	Sch-40 PVC	4	37.0	27.0 - 37.0	101.16	11.24	Perimeter	NA
Well BI	May-2006	Sch-40 PVC	4	37.0	27.0 - 37.0	103.07	13.15	Source	Facilities; Piping
Well BJ	May-2006	Sch-40 PVC	4	38.0	28.0 - 38.0	102.97	13.05	Source	Condensate Storage & Transfer; Facilities; Piping
Well BK	May-2006	Sch-40 PVC	4	38.5	28.5 - 38.5	101.42	11.50	Perimeter	NA
Well BL	May-2006	Sch-40 PVC	4	37.0	27.0 - 37.0	102.43	12.51	Perimeter	NA
Well BM	May-2006	Sch-40 PVC	4	37.5	27.5 - 37.5	102.75	12.83	Source	Facilities; Piping
Well BN	May-2006	Sch-40 PVC	4	12.5	7.5 - 12.5	102.64	12.72	Source	Auxiliary Boiler Building; Piping
Well BO	May-2006	Sch-40 PVC	4	35.0	25.0 - 35.0	97.98	8.06	Perimeter/Source	Building Sewage
Well BP	May-2006	Sch-40 PVC	4	38.0	28.0 - 38.0	99.06	9.14	Perimeter/Source	Building Sewage
Well BQ	May-2006	Sch-40 PVC	4	42.0	32.0 - 42.0	105.62	15.70	Source	Auxiliary Boiler Building; Dry Cask Storage Building; Piping
Well BR-R[1]	Jan-2022	Sch-40 PVC	4	40.5	30.5 - 40.5	102.18	12.26	Perimeter/Source	Piping; Dry Cask Storage Building
Well BS-R[1]	Jan-2022	Sch-40 PVC	4	35.0	25.0 - 35.0	102.50	12.58	Upgradient	NA
Well BT-R[2]	Nov-2021	Sch-40 PVC	4	38.5	28.5 - 38.5	103.17	13.25	Upgradient	NA

Notes:
MP, Measuring Point, bgs, Below ground surface, RPD , Relative to plant datum , amsl, Above mean sea level (NAVD 1988),
NA, Not applicable

[1] Wells BR and BS were decommissioned and replaced with wells BR-R and BS-R respectively in January 2022 and first sampled in May 2022.

[2] Well BT was decommissioned and replaced with well BT-R in December 2021 and first sampled in May 2022.

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Table 49, RGPP Well Construction Details, SGS

Well ID	Installation Date	Construction Details	Diameter (inches)	Total Depth (feet bgs)	Monitoring Interval (feet bgs)	MP Elevation (feet RPD)	MP Elevation (feet amsl)	Monitoring Purpose	Source Targets
Well T	Jun-2003	Sch-40 PVC	2	31.2	21.2 - 31.2	104.13	14.21	Source	NA
Well U[1]	May-2003	Sch-40 PVC	2	32.2	27.2 - 32.2	101.46	11.54	Source	NA
Well Y	Sep-2003	Sch-40 PVC	2	37.0	27.0 - 37.0	101.81	11.89	Perimeter	NA
Well Z	Sep-2003	Sch-40 PVC	2	37.5	27.5 - 37.5	101.86	11.94	Perimeter	NA
Well AL	Jan-2004	Sch-40 PVC	2	25.3	15.3 - 25.3	99.13	9.21	Perimeter	NA
Well BA	May-2006	Sch-40 PVC	4	39.5	29.5 - 39.5	101.07	11.15	Perimeter	NA
Well BB[1]	May-2006	Sch-40 PVC	4	47.0	37.0 - 47.0	102.18	12.26	Perimeter	NA
Well BC[2]	May-2006	Sch-40 PVC	4	38.0	28.0 - 38.0	102.29	12.37	Source / Perimeter	Facilities; RAP Tanks; Piping
Well BD	May-2006	Sch-40 PVC	4	40.5	30.5 - 40.5	98.78	8.86	Source	Facilities; RAP Tanks; Piping
Well BE	May-2006	Sch-40 PVC	4	37.0	27.0 - 37.0	98.31	8.39	Perimeter	NA
Well BF[1]	May-2006	Sch-40 PVC	4	42.0	32.0 - 42.0	101.45	11.53	Perimeter	NA
Well BG[1]	May-2006	Sch-40 PVC	4	37.0	27.0 - 37.0	103.34	13.42	Perimeter	NA
Well BU	May-2006	Sch-40 PVC	4	36.0	26.0 - 36.0	100.16	10.24	Upgradient	NA

Notes:

MP Measuring Point, bgs Below ground surface, RPD Relative to plant datum,

amsl Above mean sea level (NAVD 1988), NA Not applicable,

[1] Monitoring wells U, BB, BF, and BG were surveyed in July/August 2013 following retrofitting or repair activities.

[2] Monitoring well BC was converted from flush-grade to above-grade (stick mount) in June 2021.

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Table 50, Relevant Groundwater Evaluation Criteria, SGS and HCGS

Isotope	RGPP LLD (pCi/L)	PSEG Reporting Level (pCi/L)
Tritium	200	30,000
Total Strontium	2	8
Mn-54	15	1,000
Fe-55	200	1000
Fe-59	30	400
Co-58	15	1,000
Co-60	15	300
Zn-65	30	300
Nb-95	15	400
Zr-95	15	400
Cs-134	15	30
Cs-137	18	50
Ba-140	60	200
La-140	15	200
Ni-63	530	1000

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Table 51, Tritium Analytical Results, HCGS RGPP Wells

Well ID	Sample Date	Tritium Result (pCi/L)
Well BH	2/6/2024	< 189
Well BH	5/7/2024	< 192
Well BH	8/6/2024	< 194
Well BH	11/7/2024	< 191
Well BI	2/6/2024	< 195
Well BI	5/6/2024	< 191
Well BI	8/6/2024	< 195
Well BI	11/6/2024	< 191
Well BJ	2/5/2024	**1,720**
Well BJ	5/3/2024	**1,430**
Well BJ	8/5/2024	**1,350**
Well BJ	11/4/2024	**1,420**
Well BK	5/7/2024	< 194
Well BK	11/7/2024	< 192
Well BL	5/7/2024	< 195
Well BL	11/7/2024	< 192
Well BM	5/7/2024	**560**
Well BM	11/6/2024	**333**
Well BN	2/5/2024	**550**
Well BN	5/2/2024	**625**
Well BN	8/5/2024	**418**
Well BN	11/4/2024	**363**
Well BO	5/6/2024	**530**
Well BO	11/1/2024	< 190
Well BP	5/2/2024	**201**
Well BP	11/1/2024	< 192
Well BQ	5/1/2024	< 195
Well BQ	11/5/2024	< 194
Well BR-R	5/2/2024	< 196
Well BR-R	11/4/2024	< 195
Well BS-R	5/2/2024	< 194
Well BS-R	11/4/2024	< 190
Well BT-R	5/2/2024	**272**
Well BT-R	11/5/2024	< 194

Notes:

pCi/L	Picocuries per liter
<	Tritium not detected above indicated concentration
272	Bolded values indicate tritium was detected

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Table 52, Tritium Analytical Results, SGS RGPP Wells

Well ID	Sample Date	Tritium Result (pCi/L)
Well AL	5/1/2024	**982**
Well AL	11/4/2024	**476**
Well BA	5/6/2024	< 194
Well BA	11/6/2024	< 182
Well BB	5/6/2024	< 191
Well BB	11/6/2024	< 177
Well BC	5/3/2024	**332**
Well BC	11/6/2024	**352**
Well BD	5/3/2024	**436**
Well BD	11/4/2024	< 192
Well BE	5/7/2024	**331**
Well BE	11/7/2024	**271**
Well BF	5/7/2024	< 199
Well BF	11/6/2024	< 183
Well BG	5/3/2024	**466**
Well BG	11/7/2024	< 179
Well BU	5/2/2024	< 179
Well BU	11/5/2024	< 187
Well T	5/1/2024	< 188
Well T	11/5/2024	< 180
Well U	5/6/2024	**541**
Well U	9/4/2024	**250**
Well U	11/5/2024	**458**
Well Y	5/3/2024	< 195
Well Y	11/6/2024	< 181
Well Z	5/3/2024	**634**
Well Z	11/6/2024	**336**

Notes:

pCi/L	Picocuries per liter
<	Tritium not detected above indicated concentration
336	Bolded values indicate tritium was detected

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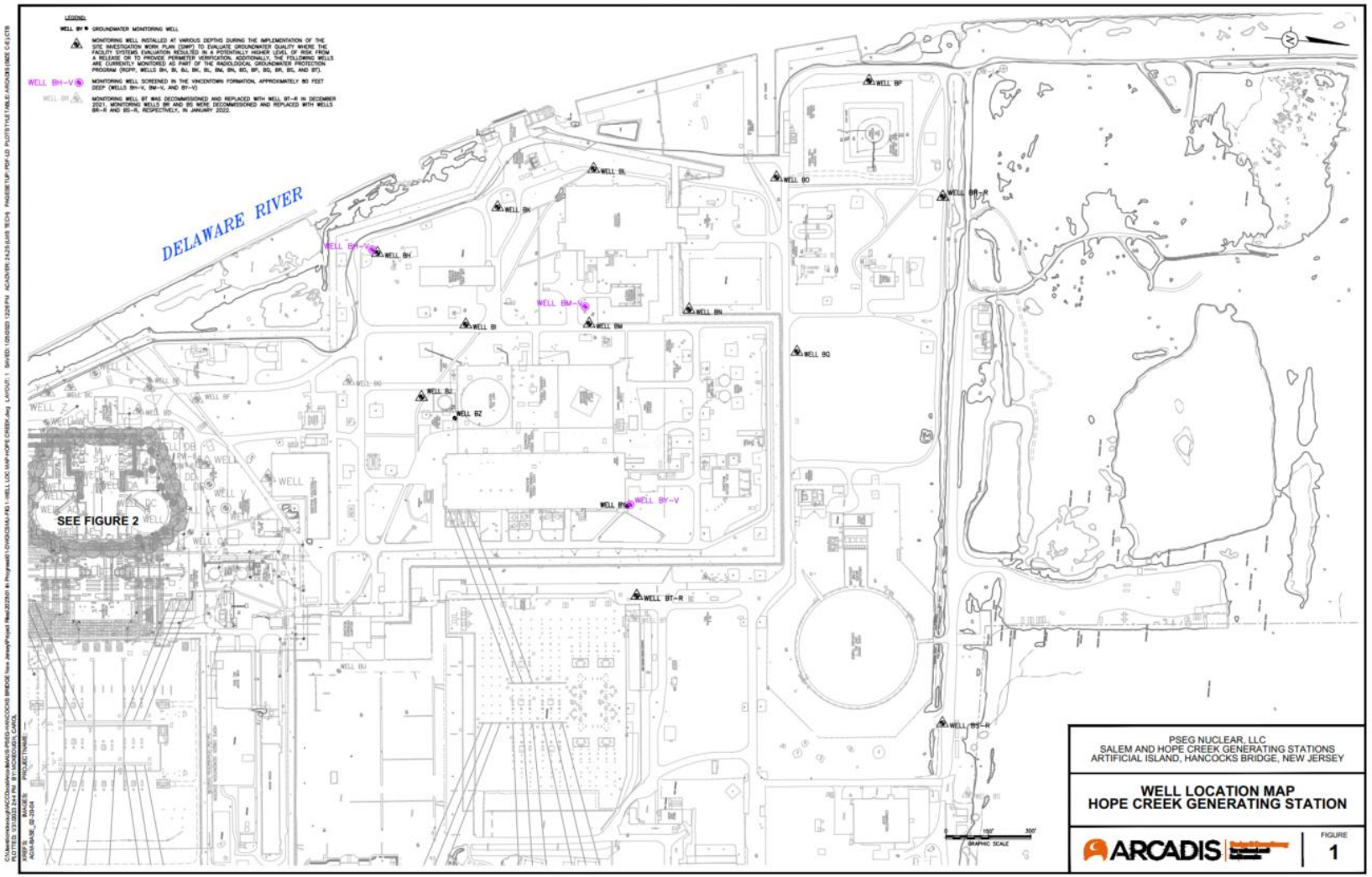

Figure 13, Well Location Map, Hope Creek Generating Station

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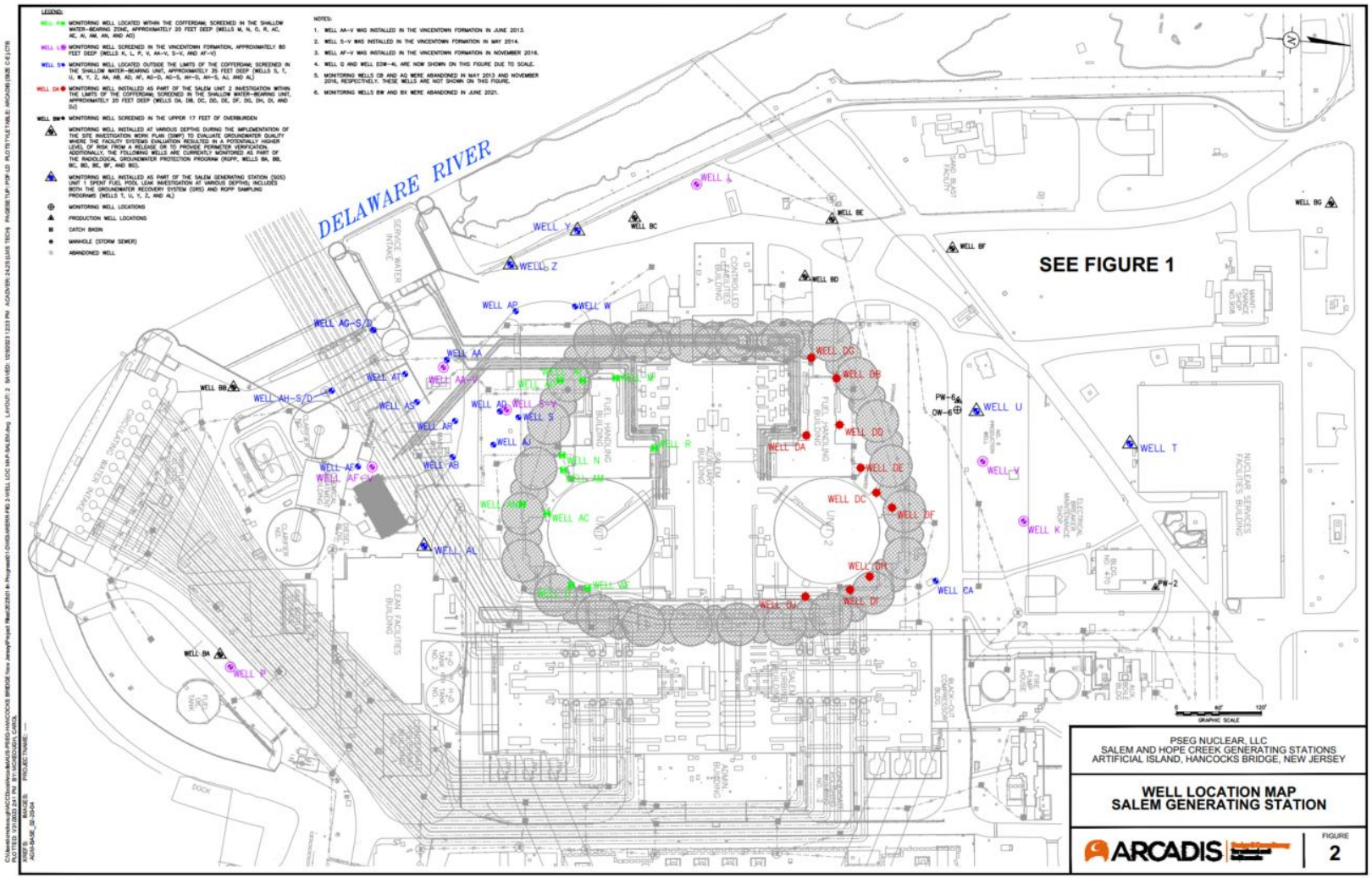

Figure 14, Well Location Map, Salem Generating Station