VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 30, 2021

United States Nuclear Regulatory Commission
Attention: Document Control Desk
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50-281
License Nos. DPR-32
DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

Enclosed is the Surry Power Station Annual Radioactive Effluent Release Report for January 1, 2020, through December 31, 2020. The report, submitted pursuant to Surry Power Station Technical Specification 6.6.B.3, includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released during the 2020 calendar year, as outlined in Regulatory Guide 1.21, Revision 1, June 1974.

If you have any further questions, please contact William Terry at 757-365-2010.

Sincerely,

J. Henderson
Director Nuclear Safety & Licensing
Surry Power Station

Attachment

Commitments made in this letter: None

cc: U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
ATTN: Division of Reactor Safety – Radiation Safety Branch
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Senior Resident Inspector
Surry Power Station

ATTACHMENT

2020 Annual Radioactive Effluent Release Report

Surry Power Station

SURRY POWER STATION UNITS 1 AND 2
VIRGINIA ELECTRIC AND POWER COMPANY

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

SURRY POWER STATION

January 1, 2020 through December 31, 2020

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ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

FOR THE

SURRY POWER STATION

January 1, 2020 through December 31, 2020

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FORWARD

This report is submitted as required by Appendix A to Operating License Nos. DPR-32 and DPR-37, Technical Specifications for Surry Power Station, Units 1 and 2, Virginia Electric and Power Company, Docket Nos. 50-280, 50-281, Section 6.6.B.3.

EXECUTIVE SUMMARY
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

The Annual Radioactive Effluent Release Report describes the radiological effluent control program conducted at Surry Power Station during the 2020 calendar year. This document summarizes the quantities of radioactive liquid and gaseous effluents and solid waste released from Surry Power Station in accordance with Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", Revision 1, June 1974. The report also includes an assessment of radiation doses to the maximum exposed member of the public due to the radioactive liquid and gaseous effluents.

During this reporting period, there was one unplanned liquid effluent release and no unplanned gaseous effluent release as classified according to the criteria in the Offsite Dose Calculation Manual. The unplanned liquid effluent release is described in Attachment 6.

Based on the 2020 effluent release data, 10CFR50 Appendix I dose calculations were performed in accordance with the Offsite Dose Calculation Manual. The dose calculations are as follows:

1. The total body dose due to liquid effluents was 1.77E-04 mrem, which is 2.95E-03% of the 6 mrem dose limit. The critical organ dose due to liquid effluents was 2.33E-04 mrem to the GI-LLI, which is 1.17E-03% of the 20 mrem dose limit.

2. The air dose due to noble gases in gaseous effluents was 9.84E-05 mrad gamma, which is 4.92E-04% of the 20 mrad gamma dose limit, and 3.68E-05 mrad beta, which is 9.20E-05% of the 40 mrad beta dose limit.

3. The critical organ dose from gaseous effluents due to I-131, I-133, H-3, and particulates with half-lives greater than 8 days is 1.05E-01 mrem, which is 3.50E-01% of the 30 mrem dose limit.

There were no major changes to the radioactive liquid, gaseous or solid waste treatment systems during this reporting period.

There were no revisions made to VPAP-2103S, Offsite Dose Calculation Manual, during this reporting period.

In accordance with the Nuclear Energy Institute (NEI) Industry Ground Water Protection Initiative, analysis results of ground water monitoring locations not included in the Radiological Environmental Monitoring Program (REMP), will be included in this report. Ground water monitoring well sample results are provided in Attachment 8.

Based on the radioactivity measured and the dose calculations performed during this reporting period, the operation of Surry Power Station has resulted in negligible radiation dose consequences to the maximum exposed member of the public in unrestricted areas.

Purpose and Scope

Attachment 1 includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste as outlined in Regulatory Guide 1.21, with data summarized on a quarterly or annual basis following the format of Tables 1, 2 and 3 of Appendix B, thereof. Attachment 2 of this report includes an assessment of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the site during 2020.

As required by Technical Specification 6.8.B, changes to the Offsite Dose Calculation Manual (ODCM) for the time period covered by this report are included in Attachment 3. Major changes to the radioactive liquid, gaseous and solid waste treatment systems are reported in Attachment 4, as required by the ODCM, Section 6.7.2. If changes are made to these systems, the report shall include information to support the reason for the change and a summary of the 10CFR50.59 evaluation. In lieu of reporting major changes in this report, major changes to the radioactive waste treatment systems may be submitted as part of the annual FSAR update.

As required by the ODCM, Sections 6.2.2 and 6.3.2, a list and explanation for the inoperability of radioactive liquid and/or gaseous effluent monitoring instrumentation is provided in Attachment 5 of this report. In 2020, one radiation monitor was inoperable and not returned to operable status within 30 days.

Attachment 6 provides a summary of unplanned releases that occurred during the reporting period. In 2020, one unplanned liquid release occurred and is summarized in Attachment 6.

Attachment 7 provides the typical lower limit of detection (LLD) capabilities of the radioactive effluent analysis instrumentation.

As required by the ODCM, Section 6.7.5, a summary is provided in Attachment 8 of on-site radioactive leaks or spills and ground water sample analyses that were communicated in accordance with the Industry Ground Water Protection Initiative reporting protocol. Sample analyses from ground water wells that are not part of the Radiological Environmental Monitoring Program are also provided in Attachment 8. One informal communication was made in 2020 in accordance with the Industry Ground Water Protection Initiative to State, Local, and NRC officials. The event details are summarized in Attachment 8.

Discussion

The basis for the calculation of the percent of technical specification for the critical organ in Table 1A of Attachment 1 is the ODCM, Section 6.3.1, which requires that the dose rate for iodine-131, iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days shall be less than or equal to 1500 mrem/yr to the critical organ at or beyond the site boundary. The critical receptor was modeled as a child for the 1st, 2nd and 3rd quarters and the teen was the critical receptor for the 4th quarter.

The basis for the calculation of the percent of technical specification for the total body and skin in Table 1A of Attachment 1 is the ODCM, Section 6.3.1, which requires that the dose rate for noble gases to areas at or beyond site boundary shall be less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.

The basis for the calculation of the percent of technical specification in Table 2A of Attachment 1 is the ODCM, Section 6.2.1, which states that the concentration of radioactive material released in liquid effluents to unrestricted areas shall not exceed ten times the concentrations specified in 10CFR20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.00E-04 microcuries/mL.

Percent of technical specification calculations are based on the total gaseous or liquid effluents released for the respective quarter.

The annual and quarterly doses, as reported in Attachment 2, were calculated according to the methodology presented in the ODCM. The beta and gamma air doses due to noble gases released from the site were calculated at the site boundary. The maximum exposed member of the public from the release of airborne iodine-131, iodine-133, tritium and all radionuclides in particulate form with half-lives greater than 8 days, was modeled as a child at 2.01 miles with the critical organ being the bone via the ingestion pathway. The maximum exposed member of the public from radioactive materials in liquid effluents in unrestricted areas was modeled as an adult, exposed by either the invertebrate or fish pathway, with the critical organ typically being the gastrointestinal-lower large intestine. The total body dose was also determined for this individual.

One liquid effluent radiation monitor was inoperable for greater than 30 days in 2020 and is summarized in Attachment 5 as required by the ODCM, Section 6.2.2 and 6.3.2. No gaseous effluent radiation monitors were inoperable for greater than 30 days in 2020.

There was one unplanned liquid release and no unplanned gaseous releases in 2020. The unplanned liquid release is summarized in Attachment 6 as required by the ODCM, Section 6.7.2.

The typical lower limit of detection (LLD) capabilities of the radioactive effluent analysis instrumentation are presented in Attachment 7. These LLD values are based upon conservative conditions (i.e., minimum sample volumes and maximum delay time prior to analysis). Actual LLD values may be lower. If a radioisotope was not detected when effluent samples were analyzed, then the activity of the radioisotope was reported as Not Detected (N/D) on Attachment 1 of this report. When all isotopes listed on Attachment 1 for a particular quarter and release mode are less than the lower limit of detection, then the totals for this period will be designated as Not Applicable (N/A).

Supplemental Information

Section 6.6.1 of the ODCM requires the identification of the cause(s) for the unavailability of milk, or if required, leafy vegetation samples, and the identification for obtaining replacement samples. In 2020, a control location was unavailable for two consecutive months. The details are summarized below.

- Milk from the Beachy Farm control location was seasonally unavailable during the months of January and February of 2020. During these two months the dairy farmer experienced a reduction in milking animals, the animal's diet was reduced, and the birth and nursing of a new calve resulted in limited milk being available for human consumption. Milk collection from Beachy Farm resumed in March 2020. During this period, leafy vegetation sampling was not required.

As required by the ODCM, Section 6.6.2, evaluation of the Land Use Census is made to determine if new sample location(s) must be added to the Radiological Environmental Monitoring Program. Evaluation of the Land Use Census conducted for this reporting period identified no change in sample locations for the Radiological Environmental Monitoring Program.

Attachment 1

EFFLUENT RELEASE DATA

January 1, 2020 through December 31, 2020

This attachment includes a summary of the quantities of radioactive liquid and gaseous effluents and solid waste as outlined in Regulatory Guide 1.21, Appendix B.

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENT-SUMMATION OF ALL RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	FIRST QUARTER	SECOND QUARTER	% EST. ERROR
A. FISSION & ACTIVATION GASES				
1. TOTAL RELEASE	Ci	1.64E-02	1.63E-01	1.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	2.09E-03	2.07E-02	
B. IODINE				
1. TOTAL I-131	Ci	N/D	N/D	2.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	N/A	N/A	
C. PARTICULATE				
1. HALF-LIFE >8 DAYS	Ci	6.23E-05	1.40E-05	2.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	7.92E-06	1.78E-06	
3. GROSS ALPHA RADIOACTIVITY	Ci	N/D	N/D	
D. TRITIUM				
1. TOTAL RELEASE	Ci	1.39E+01	1.61E+01	3.10E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	1.76E+00	2.04E+00	
E. CARBON-14				
1. TOTAL RELEASE	Ci	1.73E+00	1.71E+01	
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	2.20E-01	2.18E+00	
PERCENTAGE OF T.S. LIMITS				
CRITICAL ORGAN DOSE RATE	%	9.49E-03	3.25E-03	
TOTAL BODY DOSE RATE	%	6.37E-05	2.95E-07	
SKIN DOSE RATE	%	1.56E-05	1.16E-07	

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENT-SUMMATION OF ALL RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	THIRD QUARTER	FOURTH QUARTER	% EST. ERROR
A. FISSION & ACTIVATION GASES				
1. TOTAL RELEASE	Ci	2.75E-03	N/D	1.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	3.46E-04	N/A	
B. IODINE				
1. TOTAL I-131	Ci	N/D	N/D	2.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	N/A	N/A	
C. PARTICULATE				
1. HALF-LIFE >8 DAYS	Ci	N/D	N/D	2.80E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	N/A	N/A	
3. GROSS ALPHA RADIOACTIVITY	Ci	N/D	N/D	
D. TRITIUM				
1. TOTAL RELEASE	Ci	4.33E+00	8.46E+00	3.10E+01
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	5.45E-01	1.06E+00	
E. CARBON-14				
1. TOTAL RELEASE	Ci	2.89E-01	N/D	
2. AVE RELEASE RATE FOR PERIOD	µCi/sec	3.64E-02	N/A	
PERCENTAGE OF T.S. LIMITS				
CRITICAL ORGAN DOSE RATE	%	1.57E-03	1.63E-03	
TOTAL BODY DOSE RATE	%	1.10E-05	N/A	
SKIN DOSE RATE	%	2.69E-06	N/A	

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENTS-MIXED MODE RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	CONTINUOUS MODE FIRST QUARTER	CONTINUOUS MODE SECOND QUARTER	BATCH MODE FIRST QUARTER	BATCH MODE SECOND QUARTER
1. FISSION & ACTIVATION GASES					
Kr-85	Ci	N/D	N/D	N/D	N/D
Kr-85m	Ci	N/D	N/D	N/D	N/D
Kr-87	Ci	N/D	N/D	N/D	N/D
Kr-88	Ci	N/D	N/D	N/D	N/D
Xe-133	Ci	N/D	N/D	N/D	1.63E-01
Xe-135	Ci	N/D	N/D	N/D	1.98E-04
Xe-135m	Ci	N/D	N/D	N/D	N/D
Xe-138	Ci	N/D	N/D	N/D	N/D
Xe-131m	Ci	N/D	N/D	N/D	N/D
Xe-133m	Ci	N/D	N/D	N/D	N/D
Ar-41	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	1.63E-01
2. IODINES					
I-131	Ci	N/D	N/D	N/D	N/D
I-133	Ci	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A
3. PARTICULATES					
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Cs-134	Ci	N/D	N/D	N/D	N/D
Cs-137	Ci	N/D	N/D	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	N/D	N/D	N/D	N/D
Co-60	Ci	N/D	N/D	N/D	N/D
Mn-54	Ci	N/D	N/D	N/D	N/D
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	N/D
Mo-99	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
C-14	Ci	N/D	N/D	N/D	1.71E+01
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	1.71E+01

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENTS-MIXED MODE RELEASES

		CONTINUOUS MODE		BATCH MODE	
SURRY POWER STATION UNITS 1&2	UNIT	THIRD QUARTER	FOURTH QUARTER	THIRD QUARTER	FOURTH QUARTER
1. FISSION & ACTIVATION GASES					
Kr-85	Ci	N/D	N/D	N/D	N/D
Kr-85m	Ci	N/D	N/D	N/D	N/D
Kr-87	Ci	N/D	N/D	N/D	N/D
Kr-88	Ci	N/D	N/D	N/D	N/D
Xe-133	Ci	N/D	N/D	N/D	N/D
Xe-135	Ci	N/D	N/D	N/D	N/D
Xe-135m	Ci	N/D	N/D	N/D	N/D
Xe-138	Ci	N/D	N/D	N/D	N/D
Xe-131m	Ci	N/D	N/D	N/D	N/D
Xe-133m	Ci	N/D	N/D	N/D	N/D
Ar-41	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A
2. IODINES					
I-131	Ci	N/D	N/D	N/D	N/D
I-133	Ci	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A
3. PARTICULATES					
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Cs-134	Ci	N/D	N/D	N/D	N/D
Cs-137	Ci	N/D	N/D	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	N/D	N/D	N/D	N/D
Co-60	Ci	N/D	N/D	N/D	N/D
Mn-54	Ci	N/D	N/D	N/D	N/D
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	N/D
Mo-99	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
C-14	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	CONTINUOUS MODE FIRST QUARTER	CONTINUOUS MODE SECOND QUARTER	BATCH MODE FIRST QUARTER	BATCH MODE SECOND QUARTER
1. FISSION & ACTIVATION GASES					
Kr-85	Ci	N/D	N/D	N/D	N/D
Kr-85m	Ci	N/D	N/D	N/D	N/D
Kr-87	Ci	N/D	N/D	N/D	N/D
Kr-88	Ci	N/D	N/D	N/D	N/D
Xe-133	Ci	N/D	N/D	N/D	N/D
Xe-135	Ci	1.30E-05	N/D	8.80E-04	N/D
Xe-135m	Ci	N/D	N/D	N/D	N/D
Xe-138	Ci	N/D	N/D	N/D	N/D
Xe-131m	Ci	N/D	N/D	N/D	N/D
Xe-133m	Ci	N/D	N/D	N/D	N/D
Ar-41	Ci	3.50E-04	N/D	1.52E-02	N/D
TOTAL FOR PERIOD	Ci	3.63E-04	N/A	1.61E-02	N/A
2. IODINES					
I-131	Ci	N/D	N/D	N/D	N/D
I-133	Ci	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A
3. PARTICULATES					
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Cs-134	Ci	N/D	N/D	N/D	N/D
Cs-137	Ci	N/D	1.67E-08	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	5.81E-05	1.40E-05	N/D	N/D
Co-60	Ci	4.17E-06	N/D	N/D	N/D
Mn-54	Ci	N/D	N/D	N/D	N/D
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	N/D
Mo-99	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
C-14	Ci	3.82E-02	N/D	1.69E+00	N/D
TOTAL FOR PERIOD	Ci	3.83E-02	1.40E-05	1.69E+00	N/A

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
SURRY POWER STATION UNITS 1&2	UNIT	THIRD QUARTER	FOURTH QUARTER	THIRD QUARTER	FOURTH QUARTER
1. FISSION & ACTIVATION GASES					
Kr-85	Ci	N/D	N/D	N/D	N/D
Kr-85m	Ci	N/D	N/D	N/D	N/D
Kr-87	Ci	N/D	N/D	N/D	N/D
Kr-88	Ci	N/D	N/D	N/D	N/D
Xe-133	Ci	N/D	N/D	N/D	N/D
Xe-135	Ci	N/D	N/D	N/D	N/D
Xe-135m	Ci	N/D	N/D	N/D	N/D
Xe-138	Ci	N/D	N/D	N/D	N/D
Xe-131m	Ci	N/D	N/D	N/D	N/D
Xe-133m	Ci	N/D	N/D	N/D	N/D
Ar-41	Ci	1.90E-04	N/D	2.56E-03	N/D
TOTAL FOR PERIOD	Ci	1.90E-04	N/A	2.56E-03	N/A
2. IODINES					
I-131	Ci	N/D	N/D	N/D	N/D
I-133	Ci	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A
3. PARTICULATES					
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Cs-134	Ci	N/D	N/D	N/D	N/D
Cs-137	Ci	N/D	N/D	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	N/D	N/D	N/D	N/D
Co-60	Ci	N/D	N/D	N/D	N/D
Mn-54	Ci	N/D	N/D	N/D	N/D
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	N/D
Mo-99	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
C-14	Ci	2.00E-02	N/D	2.69E-01	N/D
TOTAL FOR PERIOD	Ci	2.00E-02	N/A	2.69E-01	N/A

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	FIRST QUARTER	SECOND QUARTER	% EST. ERROR
A. FISSION AND ACTIVATION PRODUCTS				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	Ci	4.66E-03	4.24E-03	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	7.36E-12	7.22E-12	
3. PERCENT OF APPLICABLE LIMIT	%	7.76E-06	1.09E-05	
B. TRITIUM				
1. TOTAL RELEASE	Ci	2.90E+02	4.78E+02	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	4.58E-07	8.14E-07	
3. PERCENT OF APPLICABLE LIMIT	%	4.59E-03	8.14E-03	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	Ci	N/D	N/D	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	N/A	N/A	
3. PERCENT OF APPLICABLE LIMIT	%	N/A	N/A	
D. GROSS ALPHA RADIOACTIVITY				
1. TOTAL RELEASE	Ci	N/D	N/D	2.00E+01
E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)	LITERS	5.32E+07	5.38E+07	3.00E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD	LITERS	6.33E+11	5.87E+11	3.00E+00

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

SURRY POWER STATION UNITS 1&2	UNIT	THIRD QUARTER	FOURTH QUARTER	% EST. ERROR
A. FISSION AND ACTIVATION PRODUCTS				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	Ci	1.15E-03	1.13E-03	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	1.46E-12	1.63E-12	
3. PERCENT OF APPLICABLE LIMIT	%	5.37E-06	5.95E-06	
B. TRITIUM				
1. TOTAL RELEASE	Ci	4.92E+01	2.14E+01	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	6.23E-08	3.09E-08	
3. PERCENT OF APPLICABLE LIMIT	%	2.17E-03	1.10E-02	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	Ci	N/D	N/D	2.00E+01
2. AVE DIL. CONC. DURING PERIOD	µCi/mL	N/A	N/A	
3. PERCENT OF APPLICABLE LIMIT	%	N/A	N/A	
D. GROSS ALPHA RADIOACTIVITY				
1. TOTAL RELEASE	Ci	N/D	N/D	2.00E+01
E. VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)	LITERS	5.32E+07	5.34E+07	3.00E+00
F. VOLUME OF DILUTION WATER USED DURING PERIOD	LITERS	7.90E+11	6.92E+11	3.00E+00

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
LIQUID EFFLUENTS

SURRY POWER STATION UNITS 1&2	UNIT	CONTINUOUS MODE FIRST QUARTER	CONTINUOUS MODE SECOND QUARTER	BATCH MODE FIRST QUARTER	BATCH MODE SECOND QUARTER
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Fe-55	Ci	N/D	N/D	N/D	N/D
Cs-134	Ci	N/D	N/D	N/D	N/D
Cs-137	Ci	1.51E-04	1.43E-04	1.05E-04	1.49E-04
I-131	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	N/D	N/D	7.19E-04	1.60E-03
Co-60	Ci	N/D	N/D	2.56E-04	6.36E-04
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	N/D
Mn-54	Ci	N/D	N/D	N/D	N/D
Cr-51	Ci	N/D	N/D	N/D	N/D
Zr-95	Ci	N/D	N/D	N/D	N/D
Nb-95	Ci	N/D	N/D	N/D	N/D
Mo-99	Ci	N/D	N/D	N/D	N/D
Tc-99m	Ci	N/D	N/D	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
Sb-124	Ci	N/D	N/D	1.08E-05	N/D
Sb-125	Ci	N/D	N/D	3.41E-03	1.71E-03
Nd-147	Ci	5.02E-06	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	1.56E-04	1.43E-04	4.50E-03	4.10E-03
Xe-133	Ci	N/D	N/D	N/D	N/D
Xe-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	1.17E-04

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD: 1/1/20 TO 12/31/20
LIQUID EFFLUENTS

SURRY POWER STATION UNITS 1&2	UNIT	CONTINUOUS MODE		BATCH MODE	
		THIRD QUARTER	FOURTH QUARTER	THIRD QUARTER	FOURTH QUARTER
Sr-89	Ci	N/D	N/D	N/D	N/D
Sr-90	Ci	N/D	N/D	N/D	N/D
Fe-55	Ci	N/D	N/D	N/D	5.13E-06
Cs-134	Ci	N/D	N/D	N/D	8.27E-07
Cs-137	Ci	2.07E-04	1.64E-04	8.70E-05	1.18E-04
I-131	Ci	N/D	N/D	N/D	N/D
Co-58	Ci	N/D	N/D	3.78E-04	2.69E-04
Co-60	Ci	N/D	N/D	2.24E-04	3.25E-04
Fe-59	Ci	N/D	N/D	N/D	N/D
Zn-65	Ci	N/D	N/D	N/D	5.66E-07
Mn-54	Ci	N/D	N/D	N/D	2.75E-06
Cr-51	Ci	N/D	N/D	N/D	N/D
Zr-95	Ci	N/D	N/D	N/D	1.22E-06
Nb-95	Ci	N/D	N/D	N/D	2.23E-06
Mo-99	Ci	N/D	N/D	N/D	N/D
Tc-99m	Ci	N/D	N/D	N/D	N/D
Ba-140	Ci	N/D	N/D	N/D	N/D
La-140	Ci	N/D	N/D	N/D	N/D
Ce-141	Ci	N/D	N/D	N/D	N/D
Ce-144	Ci	N/D	N/D	N/D	N/D
Sb-124	Ci	N/D	N/D	2.51E-04	N/D
Sb-125	Ci	N/D	N/D	N/D	2.35E-04
Co-57	Ci	N/D	N/D	N/D	1.34E-06
Nb-97	Ci	N/D	N/D	N/D	1.07E-06
TOTAL FOR PERIOD	Ci	2.07E-04	1.64E-04	9.39E-04	9.62E-04
Xe-133	Ci	N/D	N/D	N/D	N/D
Xe-135	Ci	N/D	N/D	N/D	N/D
TOTAL FOR PERIOD	Ci	N/A	N/A	N/A	N/A

TABLE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
PERIOD: 1/1/20 - 12/31/20

SURRY POWER STATION
A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

1. Type of waste		12 month Period		Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	2.18E+01	Note 1	1.00E+01
	Ci	1.70E+02		3.00E+01
b. Dry compressible waste, contaminated equip., etc.	m^3	2.36E+02	Note 2	1.00E+01
	Ci	9.26E-01		3.00E+01
c. Irradiated components, control rods, etc.	m^3	0.00E+00		
	Ci	0.00E+00		
d. Other (Waste oil)	m^3	3.96E+00	Note 3	1.00E+01
	Ci	4.57E-03		3.00E+01

2. Estimate of major nuclide composition (by type of waste)

a. Mn-54	%	2.90E+00
Fe-55	%	2.88E+01
Co-58	%	2.03E+00
Co-60	%	5.13E+01
Ni-63	%	1.64E+00
Zn-65	%	1.31E+00
Sb-125	%	9.68E+00
b. Mn-54	%	3.41E+00
Fe-55	%	5.45E+00
Co-60	%	7.25E+01
Ni-63	%	1.16E+01
Nb-95	%	1.01E+00
Sb-125	%	1.42E+00
Pu-241	%	2.05E+00
c. n/a	%	n/a
d. H-3	%	9.87E+01
Cs-137	%	1.26E+00

TABLE 3

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
PERIOD: 1/1/20 - 12/31/20
CONTINUED

SURRY POWER STATION

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
12	Truck	Oak Ridge, TN (Energy*Solutions*)
1	Truck	Clive, UT (Energy*Solutions*)

B. IRRADIATED FUEL SHIPMENT (Disposition)

Number of Shipments	Mode of Transportation	Destination
0		

NOTE 1: Some of this waste was shipped to licensed waste processors for processing and/or volume reduction. Therefore, this volume is not representative of the actual volume buried. The total volume buried for this reporting period is 7.58E+00 m^3.

NOTE 2: Some DAW was shipped to licensed waste processors for processing and/or volume reduction. Therefore, this volume is not representative of the actual volume buried. The total volume buried for this reporting period is 1.04E+02 m^3.

NOTE 3: This waste was shipped to a licensed waste processor for processing and/or volume reduction. Therefore, this volume is not representative of the actual volume buried. The total volume buried for this reporting period is 0.00E+00 m^3.

ANNUAL AND QUARTERLY DOSES

An assessment of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the site for each calendar quarter for the calendar year of this report, along with an annual total of each effluent pathway is made pursuant to the ODCM, Section 6.7.2, requirement.

2020	LIQUID		
	Maximum Receptor - Adult		
	Total Body (mrem)	GI-LLI (mrem)	Liver (mrem)
1st Quarter	5.73E-05	7.04E-05	5.72E-05
2nd Quarter	1.03E-04	1.32E-04	1.02E-04
3rd Quarter	9.94E-06	1.49E-05	1.02E-05
4th Quarter	6.53E-06	1.59E-05	6.90E-06
Annual	1.77E-04	2.33E-04	1.76E-04

2020	GASEOUS - Air Dose	
	Gamma (mrad)	Beta (mrad)
1st Quarter	8.34E-05	3.03E-05
2nd Quarter	4.40E-07	1.30E-06
3rd Quarter	1.46E-05	5.15E-06
4th Quarter	0.00E+00	0.00E+00
Annual	9.84E-05	3.68E-05

2020	GASEOUS - Organ Dose		
	Annual Maximum	Maximum by Quarter	
	Child/Bone (mrem)	(mrem)	Receptor / Organ
1st Quarter	2.40E-02	3.55E-02	Child/Bone
2nd Quarter	7.74E-02	7.74E-02	Child/Bone
3rd Quarter	4.02E-03	5.92E-03	Child/Bone
4th Quarter	0.00E+00	6.14E-03	Teen/Lung
Annual	1.05E-01		

REVISIONS TO OFFSITE DOSE CALCULATION MANUAL (ODCM)

As required by Technical Specification 6.8.B, revisions to the ODCM, effective for the period covered by this report, are included with this attachment. There were no revisions to the ODCM implemented during this reporting period.

MAJOR CHANGES TO RADIOACTIVE LIQUID, GASEOUS AND SOLID WASTE TREATMENT SYSTEMS

There were no major changes to the radioactive liquid, gaseous or solid waste treatment systems for this reporting period.

INOPERABILITY OF RADIOACTIVE LIQUID AND GASEOUS EFFLUENT MONITORING INSTRUMENTATION

The Annual Radioactive Effluent Release Report shall explain why monitoring instrumentation required by the ODCM Attachments 1 and 5, which were determined to be inoperable, were not returned to operable status within 30 days. One radiation monitor, 1-SW-RM-107D, was not returned to operable status within 30 days and is detailed below.

1-SW-RM-107D was declared non-functional on 1/25/2020 at 04:10 due to lower than expected radiation monitor readings and was returned to service on 3/5/2020 at 14:38 following maintenance to clean the pin sockets on the radiation monitor cable connector.

During this period (1/25/2020 – 3/5/2020), 1-CC-E-1D, the CCHX for radiation monitor 1-SW-RM-107D, was removed from service on 1/27/2020 at 03:00 to clean tubes and to perform weld and coating repairs and was returned to service on 2/8/2020 at 04:51.

UNPLANNED RELEASES

There was one unplanned liquid release and no unplanned gaseous release during this reporting period. A summary of the liquid release is described below.

While investigating a lowering trend in Unit 2 RWST level, the North Yard Operator reported standing water adjacent to 2-CD-E-2B. The ground around the piping below 2-CS-36 appeared wet. No active leak could be seen from the piping and components and the source could not be immediately identified due to installed insulation. HP-3010.023 – Unplanned Liquid Release was initiated. The total volume discharged was estimated to be 336 gallons. The calculated total % Tech Spec for this release is 2.53e-05. The State and Local officials and NRC were notified of this event.

Liquid Release Permit (L-20201207-284-B) was generated to account for the activity released. Total activity released is 5.76E-02 Ci with a maximum receptor dose of 5.11E-06 mRem.

LOWER LIMIT OF DETECTION (LLD) FOR EFFLUENT SAMPLE ANALYSIS

	Isotope	Required LLD	Typical LLD
GASEOUS:	Kr-87	1.00E-04	2.43E-06 - 1.78E-05
	Kr-88	1.00E-04	1.11E-06 - 1.82E-05
	Xe-133	1.00E-04	1.10E-06 - 1.24E-05
	Xe-133m	1.00E-04	3.93E-06 - 4.06E-05
	Xe-135	1.00E-04	5.50E-07 - 5.38E-06
	Xe-135m	1.00E-04	6.18E-06 - 4.59E-05
	Xe-138	1.00E-04	1.65E-05 - 9.90E-05
	I-131	1.00E-12	4.06E-13 - 4.06E-13
	I-133	1.00E-10	4.06E-11 4.06E-11
	Sr-89	1.00E-11	1.38E-14 - 3.73E-12
	Sr-90	1.00E-11	2.03E-15 - 4.76E-13
	Cs-134	1.00E-11	8.39E-14 - 7.83E-13
	Cs-137	1.00E-11	6.75E-14 - 8.48E-13
	Mn-54	1.00E-11	2.06E-13 - 8.21E-13
	Fe-59	1.00E-11	1.97E-13 - 2.01E-12
	Co-58	1.00E-11	1.65E-13 - 9.65E-13
	Co-60	1.00E-11	3.12E-14 - 1.16E-12
	Zn-65	1.00E-11	2.12E-13 - 2.14E-12
	Mo-99	1.00E-11	4.06E-12 - 4.06E-12
	Ce-141	1.00E-11	1.62E-13 - 6.87E-13
	Ce-144	1.00E-11	7.08E-13 - 3.06E-12
	Alpha	1.00E-11	1.68E-14 - 2.08E-14
	Tritium	1.00E-06	5.75E-08 - 1.07E-07
LIQUID:	Sr-89	5.00E-08	2.88E-08 - 4.86E-08
	Sr-90	5.00E-08	5.58E-09 - 1.86E-08
	Cs-134	5.00E-07	8.80E-09 - 6.48E-08
	Cs-137	5.00E-07	7.54E-09 - 1.05E-07
	I-131	1.00E-06	2.65E-08 - 9.98E-08
	Co-58	5.00E-07	3.33E-08 - 7.47E-08
	Co-60	5.00E-07	5.92E-09 - 7.72E-08
	Fe-59	5.00E-07	1.75E-08 - 1.69E-07
	Zn-65	5.00E-07	1.10E-08 - 2.03E-07
	Mn-54	5.00E-07	4.34E-08 - 1.01E-07
	Mo-99	5.00E-07	1.66E-07 - 4.95E-07
	Ce-141	5.00E-07	3.63E-08 - 8.39E-08
	Ce-144	5.00E-07	2.08E-07 - 4.33E-07
	Fe-55	1.00E-06	1.33E-07 - 7.91E-07
	Alpha	1.00E-07	2.62E-08 - 3.23E-08
	Tritium	1.00E-05	1.42E-06 - 2.64E-06
	Xe-133	1.00E-05	9.08E-08 - 2.33E-07
	Xe-135	1.00E-05	2.85E-08 - 5.30E-08
	Xe-133m	1.00E-05	2.25E-07 - 3.77E-07
	Xe-135m	1.00E-05	6.88E-07 - 2.68E-06
	Xe-138	1.00E-05	2.05E-06 - 7.63E-06
	Kr-87	1.00E-05	1.02E-07 - 2.29E-07
	Kr-88	1.00E-05	8.06E-08 - 1.62E-07

INDUSTRY GROUND WATER PROTECTION INITIATIVE

In 2020, one leak to ground occurred resulting in voluntary communications to Local, State, and NRC officials, in accordance with Section 6.7.5 of the ODCM. This event is summarized below.

At 2214, on 12/12/20, Surry Power Station personnel identified leakage from the Unit 2 RWST Cooling System to the ground. Leakage was estimated to be greater than 100 gallons (336 gallons est.) with a tritium concentration determined to be 4.5E-07 pCi/L, requiring report in accordance with the industry voluntary groundwater protection program. This event is documented in NRC Form 361 – Reactor Plant Event Notification Worksheet (EN#55035). This event is also documented in Attachment 6.

INDUSTRY GROUND WATER PROTECTION INITIATIVE

The following is a summary of 2020 sample analyses of ground water monitoring wells that are not a part of the Radiological Environmental Monitoring Program (REMP).

Well Designation	Sample Date	Tritium pCi/Liter	Gamma pCi/Liter	Fe-55 pCi/Liter	Ni-63 pCi/Liter	Sr-90 pCi/Liter	TRU pCi/Liter
1-PL-Piez-44	1/6/20	3,350	NA	NA	NA	NA	NA
1-PL-Piez-51	1/6/20	3,320	NA	NA	NA	NA	NA
G-06	1/6/20	27,100	NA	NA	NA	NA	NA
G-08	1/6/20	1,920	NA	NA	NA	NA	NA
G-06	1/15/20	26,700	NA	NA	NA	NA	NA
1-PL-Piez-49	1/16/20	4,320	NA	NA	NA	NA	NA
1-PL-Piez-44	1/23/20	3,210	NA	NA	NA	NA	NA
1-PL-Piez-49	1/23/20	2,950	NA	NA	NA	NA	NA
1-PL-Piez-51	1/23/20	3,050	NA	NA	NA	NA	NA
G-06	1/23/20	23,000	NA	NA	NA	NA	NA
G-08	1/23/20	3,140	NA	NA	NA	NA	NA
G-06	1/30/20	32,500	NA	NA	NA	NA	NA
1-PL-Piez-44	2/3/20	3,590	NA	NA	NA	NA	NA
1-PL-Piez-49	2/3/20	2,700	NA	NA	NA	NA	NA
1-PL-Piez-51	2/3/20	7,900	NA	NA	NA	NA	NA
G-06	2/3/20	34,400	NA	NA	NA	NA	NA
G-08	2/3/20	2,420	NA	NA	NA	NA	NA
G-06	2/21/20	29,400	NA	NA	NA	NA	NA
G-08	2/21/20	3,240	NA	NA	NA	NA	NA
1-PL-Piez-44	2/24/20	8,660	NA	NA	NA	NA	NA
1-PL-Piez-49	2/24/20	3,320	NA	NA	NA	NA	NA
1-PL-Piez-44	2/26/20	3,060	NA	NA	NA	NA	NA
1-PL-Piez-44	2/26/20	3,060	NA	NA	NA	NA	NA
1-PL-Piez-49	2/26/20	1,900	NA	NA	NA	NA	NA
1-PL-Piez-51	2/26/20	3,330	NA	NA	NA	NA	NA
G-06	2/26/20	15,800	NA	NA	NA	NA	NA
G-08	2/26/20	2,020	NA	NA	NA	NA	NA
1-PL-Piez-44	3/13/20	3,030	NA	NA	NA	NA	NA
1-PL-Piez-51	3/13/20	3,090	NA	NA	NA	NA	NA
G-08	3/13/20	1,650	NA	NA	NA	NA	NA
1-PL-Piez-29	3/26/20	1,410	ND	ND	ND	ND	ND
1-PL-Piez-49	3/26/20	1,310	ND	ND	ND	ND	ND
1-PL-Piez-52	3/26/20	ND	ND	NA	NA	NA	NA

NA = Analysis not required.
ND = No non-natural gamma emitting nuclides detected when analyzed to REMP LLDs.
TRU = Transuranics (Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240 and Pu-241)
ND = not detected NA = analysis not required

INDUSTRY GROUND WATER PROTECTION INITIATIVE

Well Designation	Sample Date	Tritium pCi/Liter	Gamma pCi/Liter	Fe-55 pCi/Liter	Ni-63 pCi/Liter	Sr-90 pCi/Liter	TRU pCi/Liter
1-PL-Piez-51	3/26/20	2,030	ND	ND	ND	ND	ND
1-PL-Piez-46	3/26/20	ND	ND	ND	ND	ND	ND
1-PL-Piez-50	3/30/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-48	3/30/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-47	3/30/20	ND	ND	ND	ND	ND	ND
1-PL-Piez-44	3/30/20	1,480	ND	ND	ND	ND	ND
1-PL-Piez-07	3/30/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-45	3/30/20	ND	ND	ND	ND	ND	ND
1-PL-Piez-04	3/30/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-05	3/30/20	3,530	ND	ND	ND	ND	ND
1-PL-Piez-06	3/30/20	ND	ND	ND	ND	ND	ND
1-PL-Piez-43	3/30/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-05	4/1/20	5,000	NA	NA	NA	NA	NA
1-PL-Piez-06	4/1/20	863	NA	NA	NA	NA	NA
1-PL-Piez-43	4/1/20	621	NA	NA	NA	NA	NA
1-PL-Piez-45	4/1/20	1,120	NA	NA	NA	NA	NA
1-PL-Piez-47	4/1/20	1,760	NA	NA	NA	NA	NA
1-PL-Piez-41	4/1/20	1,960	NA	NA	NA	NA	NA
1-PL-Piez-05	4/7/20	3,530	NA	NA	NA	NA	NA
1-PL-Piez-29	4/7/20	1,410	NA	NA	NA	NA	NA
1-PL-Piez-44	4/7/20	1,480	NA	NA	NA	NA	NA
1-PL-Piez-49	4/7/20	1,310	NA	NA	NA	NA	NA
1-PL-Piez-51	4/7/20	2,030	NA	NA	NA	NA	NA
1-PL-Piez-44	4/15/20	2,350	NA	NA	NA	NA	NA
1-PL-Piez-49	4/15/20	2,030	NA	NA	NA	NA	NA
1-PL-Piez-51	4/15/20	3,040	NA	NA	NA	NA	NA
G-08	4/15/20	1,800	NA	NA	NA	NA	NA
G-06	4/22/20	16,300	NA	NA	NA	NA	NA
1-PL-Piez-44	4/28/20	4,060	NA	NA	NA	NA	NA
1-PL-Piez-49	4/28/20	1,790	NA	NA	NA	NA	NA
1-PL-Piez-44	4/29/20	4,060	NA	NA	NA	NA	NA
1-PL-Piez-49	4/29/20	1,790	NA	NA	NA	NA	NA
1-PL-Piez-44	5/11/20	1,260	NA	NA	NA	NA	NA
1-PL-Piez-49	5/11/20	1,890	NA	NA	NA	NA	NA
1-PL-Piez-44	5/26/20	7,450	NA	NA	NA	NA	NA
1-PL-Piez-49	5/26/20	3,410	NA	NA	NA	NA	NA
G-08	5/26/20	1,580	NA	NA	NA	NA	NA
1-PL-Piez-44	6/8/20	3,570	NA	NA	NA	NA	NA

NA = Analysis not required.

ND = No non-natural gamma emitting nuclides detected when analyzed to REMP LLDs.

INDUSTRY GROUND WATER PROTECTION INITIATIVE

Well Designation	Sample Date	Tritium pCi/Liter	Gamma pCi/Liter	Fe-55 pCi/Liter	Ni-63 pCi/Liter	Sr-90 pCi/Liter	TRU pCi/Liter
1-PL-Piez-44	6/8/20	3,570	NA	NA	NA	NA	NA
1-PL-Piez-49	6/8/20	2,590	NA	NA	NA	NA	NA
G-08	6/8/20	1,960	NA	NA	NA	NA	NA
1-PL-Piez-44	7/1/20	3,080	NA	NA	NA	NA	NA
1-PL-Piez-49	7/2/20	5,250	NA	NA	NA	NA	NA
G-06	7/14/19	16,500	NA	NA	NA	NA	NA
1-PL-Piez-48	7/15/19	1,620	NA	NA	NA	NA	NA
1-PL-Piez-49	7/15/19	2,340	NA	NA	NA	NA	NA
1-PL-Piez-49	7/16/20	1,140	NA	NA	NA	NA	NA
1-PL-Piez-29	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-46	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-49	7/16/20	1,140	ND	NA	NA	NA	NA
1-PL-Piez-48	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-52	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-50	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-28	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-47	7/16/20	1,110	ND	NA	NA	NA	NA
1-PL-Piez-45	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-44	7/16/20	14,900	ND	NA	NA	NA	NA
1-PL-Piez-05	7/16/20	3,250	ND	NA	NA	NA	NA
1-PL-Piez-06	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-43	7/16/20	ND	ND	NA	NA	NA	NA
1-PL-Piez-44	7/16/20	14,900	NA	NA	NA	NA	NA
1-PL-Piez-47	7/16/20	1,110	NA	NA	NA	NA	NA
1-PL-Piez-44	7/23/20	23,800	NA	NA	NA	NA	NA
G-08	7/27/20	2,590	NA	NA	NA	NA	NA
G-08	8/11/20	2,810	NA	NA	NA	NA	NA
1-PL-Piez-44	8/11/20	7,450	NA	NA	NA	NA	NA
1-PL-Piez-43	8/13/20	3,210	NA	NA	NA	NA	NA
G-08	8/25/20	2,090	NA	NA	NA	NA	NA
1-PL-Piez-44	8/25/20	3,470	NA	NA	NA	NA	NA
1-PL-Piez-49	9/1/20	2,670	NA	NA	NA	NA	NA
G-08	9/10/20	1,370	NA	NA	NA	NA	NA
1-PL-Piez-44	9/10/20	2,810	NA	NA	NA	NA	NA
1-PL-Piez-49	9/10/20	2,420	NA	NA	NA	NA	NA
1-PL-Piez-29	9/21/20	1,080	NA	NA	NA	NA	NA
1-PL-Piez-49	9/21/20	4,940	NA	NA	NA	NA	NA
1-PL-Piez-06	9/22/20	1,590	NA	NA	NA	NA	NA
1-PL-Piez-44	9/22/20	9,520	NA	NA	NA	NA	NA

NA = Analysis not required.

ND = No non-natural gamma emitting nuclides detected when analyzed to REMP LLDs.

INDUSTRY GROUND WATER PROTECTION INITIATIVE

Well Designation	Sample Date	Tritium pCi/Liter	Gamma pCi/Liter	Fe-55 pCi/Liter	Ni-63 pCi/Liter	Sr-90 pCi/Liter	TRU pCi/Liter
1-PL-Piez-44	8/11/20	7,450	NA	NA	NA	NA	NA
1-PL-Piez-43	8/13/20	3,210	NA	NA	NA	NA	NA
G-08	8/25/20	2,090	NA	NA	NA	NA	NA
1-PL-Piez-44	8/25/20	3,470	NA	NA	NA	NA	NA
1-PL-Piez-49	9/1/20	2,670	NA	NA	NA	NA	NA
G-08	9/10/20	1,370	NA	NA	NA	NA	NA
1-PL-Piez-44	9/10/20	2,810	NA	NA	NA	NA	NA
1-PL-Piez-49	9/10/20	2,420	NA	NA	NA	NA	NA
1-PL-Piez-29	9/21/20	1,080	NA	NA	NA	NA	NA
1-PL-Piez-49	9/21/20	4,940	NA	NA	NA	NA	NA
1-PL-Piez-06	9/22/20	1,590	NA	NA	NA	NA	NA
1-PL-Piez-44	9/22/20	9,520	NA	NA	NA	NA	NA
1-PL-Piez-47	9/22/20	1,590	NA	NA	NA	NA	NA
1-PL-Piez-06	9/22/20	1,170	NA	NA	NA	NA	NA
1-PL-Piez-44	9/22/20	8,260	NA	NA	NA	NA	NA
1-PL-Piez-47	9/22/20	1,050	NA	NA	NA	NA	NA
1-PL-Piez-49	9/22/20	1,170	ND	NA	NA	NA	NA
1-PL-Piez-44	9/22/20	8,260	ND	NA	NA	NA	NA
1-PL-Piez-47	9/22/20	1,050	ND	NA	NA	NA	NA
1-PL-Piez-51	9/22/20	ND	ND	NA	NA	NA	NA
G-8	9/22/20	1,050	ND	NA	NA	NA	NA
G-08	9/23/20	2,260	NA	NA	NA	NA	NA
1-PL-Piez-05	9/28/20	2,860	NA	NA	NA	NA	NA
1-PL-Piez-49	10/12/20	3,000	NA	NA	NA	NA	NA
1-PL-Piez-44	10/12/20	3,070	NA	NA	NA	NA	NA
1-PL-Piez-51	10/13/20	2,250	NA	NA	NA	NA	NA
1-PL-Piez-51	10/14/20	ND	NA	NA	NA	NA	NA
1-PL-Piez-44	10/21/20	6,410	NA	NA	NA	NA	NA
1-PL-Piez-49	10/21/20	2,890	NA	NA	NA	NA	NA
1-PL-Piez-51	10/21/20	2,540	NA	NA	NA	NA	NA
1-PL-Piez-29	11/9/20	1,030	ND	NA	NA	NA	NA
1-PL-Piez-49	11/9/20	1,720	ND	NA	NA	NA	NA
1-PL-Piez-44	11/12/20	3,840	NA	NA	NA	NA	NA
1-PL-Piez-49	11/12/20	2,610	NA	NA	NA	NA	NA
1-PL-Piez-44	11/19/20	2,090	ND	NA	NA	NA	NA
1-PL-Piez-05	11/23/20	3,380	ND	NA	NA	NA	NA
1-PL-Piez-44	11/24/20	2,140	NA	NA	NA	NA	NA
1-PL-Piez-49	11/24/20	2,470	NA	NA	NA	NA	NA

NA = Analysis not required.

ND = No non-natural gamma emitting nuclides detected when analyzed to REMP LLDs.

INDUSTRY GROUND WATER PROTECTION INITIATIVE

Well Designation	Sample Date	Tritium pCi/Liter	Gamma pCi/Liter	Fe-55 pCi/Liter	Ni-63 pCi/Liter	Sr-90 pCi/Liter	TRU pCi/Liter
G-08	11/25/20	2,540	NA	NA	NA	NA	NA
G-08	12/8/20	3,210	NA	NA	NA	NA	NA
1-PL-Piez-49	12/8/20	2,450	NA	NA	NA	NA	NA
1-PL-Piez-51	12/8/20	2,540	NA	NA	NA	NA	NA
1-PL-Piez-51	12/8/20	1,790	ND	NA	NA	NA	NA
G-09	12/15/20	2,370	NA	NA	NA	NA	NA
1-PL-Piez-48	12/15/20	2,360	NA	NA	NA	NA	NA
G-08	12/23/20	4,360	NA	NA	NA	NA	NA
1-PL-Piez-44	12/23/20	3,470	NA	NA	NA	NA	NA
1-PL-Piez-49	12/23/20	9,630	NA	NA	NA	NA	NA
1-PL-Piez-51	12/23/20	3,760	NA	NA	NA	NA	NA

NA = Analysis not required.
ND = No non-natural gamma emitting nuclides detected when analyzed to REMP LLDs.
TRU = Transuranics (Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240 and Pu-241)
ND = not detected