Dresden Clean Energy Center

2025

Annual Radioactive Effluent Release Report

Document Number: 50-101, 50-237, 50-249

Unit 1, 2, and 3 Docket Numbers: 50-010, 50-237, and 50-249

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1.0 LIST OF ACRONYMS AND DEFINITIONS

1. 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.
2. BWR: Boiling Water Reactor
3. 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.
4. 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.
5. Counting Error: An estimate of the two-sigma uncertainty associated with the sample results based on total counts accumulated.
6. Curie (Ci): A measure of radioactivity; equal to 3.7×10^{10} disintegrations per second, or 2.22×10^{12} disintegrations per minute.
7. Direct Radiation Monitoring: The measurement of radiation dose at various distances from the plant is assessed using thermoluminescent dosimeters (TLDs), optically stimulated luminescent dosimeters (OSLDs), and/or pressurized ionization chambers.
8. Grab Sample: A single discrete sample drawn at one point in time.
9. Indicator: A sampling location that is potentially affected by plant effluents due to its proximity and/or direction from the plant.
10. Ingestion Pathway: The ingestion pathway includes milk, fish, drinking water and garden produce. Also sampled (under special circumstances) are other media such as vegetation or animal products when additional information about particular radionuclides is needed.
11. ISFSI: Independent Spent Fuel Storage Installation
12. LLD: Lower Limit of Detection. An *a priori* measure of the detection capability of a radiochemistry measurement based on instrument setup, calibration, background, decay time, and sample volume. An LLD is expressed as an activity concentration. The MDA is used for reporting results. LLD are specified by a regulator, such as the NRC and are typically listed in the ODCM.
13. MDA: Minimum Detectable Activity. For radiochemistry instruments, the MDA is the *a posteriori* minimum concentration that a counting system detects. The smallest concentration or activity of radioactive material in a sample that will yield a net count above instrument background and that is detected with 95% probability, with only 5% probability of falsely concluding that a blank observation represents a true signal.
14. MDC: Minimum Detectable Concentration. Essentially synonymous with MDA for the purposes of radiological monitoring.
15. Mean: The sum of all of the values in a distribution divided by the number of values in the distribution, synonymous with average.

16. Microcurie (µCi): 3.7 x 10^4 disintegrations per second, or 2.22 x10^6 disintegrations per minute.
17. millirem (mrem): 1/1000 rem; a unit of radiation dose equivalent in tissue.
18. Milliroentgen (mR): 1/1000 Roentgen; a unit of exposure to X- or gamma radiation.
19. N/A: Not Applicable
20. NEI: Nuclear Energy Institute
21. NRC: Nuclear Regulatory Commission
22. ODCM: Offsite Dose Calculation Manual
23. OSLD: Optically Stimulated Luminescence Dosimeter
24. Protected Area: A 10 CFR 73 security term is an area encompassed by physical barriers and to which access is controlled for security purposes. The fenced area immediately surrounding the plant and around ISFSI are commonly classified by the licensee as “Protected areas.” Access to the protected area requires a security badge or escort.
25. PWR: Pressurized Water Reactor
26. REC: Radiological Effluent Control
27. REMP: Radiological Environmental Monitoring Program
28. Restricted Area: A 10 CFRR 20 defined term where access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.
29. TEDE: Total Effective Dose Equivalent (TEDE) means the sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).
30. TLD: Thermoluminescent Dosimeter
31. TRM: Technical Requirements Manual
32. TS: Technical Specification
33. Unrestricted Area: An area, access to which is neither limited nor controlled by the licensee.

2.0 EXECUTIVE SUMMARY

Dresden Clean Energy Center (DCEC) 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 Technical Specifications,10 CFR 20, and by 40 CFR 190. Operational doses to the public during 2025 were calculated to be within the limits required by regulation and compared to other sources of radiation dose and pose no health hazard. These doses are summarized and compared to the regulatory limits in Section 2.1 Comparison to Regulatory Limits below.

The Annual Radioactive Effluent Release Report (ARERR) is published per REC requirements and provides data related to plant operation, including: quantities of radioactive materials released in liquid and gaseous effluents; radiation doses to members of the public; solid radioactive waste shipped offsite for processing or direct disposal; and other information as required by site licensing documents.

In 2025, the gaseous effluent dose assessments for locations from the Land Use Census showed that the critical receptor for Dresden Clean Energy Center is the Infant, due to Ground Plane - Dose and Inhalation – Dose pathways at the Sector F location. The maximum Annual Organ Dose calculated for this receptor from the site was 3.90E-02 mrem to the thyroid. This annual dose is a small fraction of the 10 CFR 50, Appendix I guideline of 15 mrem to the Maximum Organ per reactor unit.

The maximum dose calculated to any organ due to radioactive liquid effluents was 6.30E-05 mrem for teenager liver, due to the Aquatic - maximum dose pathways.

In accordance with ODCM Section 12.8.1 Condition B, detectable tritium activity found in the site storm sewers is to be reported in the ARERR. A positive tritium value of 2.70E+03 pCi/L was detected in Catch Basin Gulf (CBG). This value is well below the reporting level of 3.00E+04 pCi/L for tritium.

Solid radioactive waste shipped offsite for processing or direct disposal included 2.12E+02 Curies and 8.95E+02 m^3, shipped in 57 shipments.

In addition to monitoring radioactive effluents, DCEC has a Radiological Environmental Monitoring Program (REMP) that monitors for levels of radiation and radioactive materials in the local environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).

2.1 Comparison to Regulatory Limits

During 2025 all liquid and gaseous radioactive effluents from Dresden Clean Energy Center were well below regulatory limits, as summarized in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary, Table 2, Dresden Clean Energy Center Unit 2 Dose Summary, Table 3, Dresden Clean Energy Center Unit 3 Dose Summary, and Table 4, Total Annual Offsite-Dose Comparison to 40 CFR 190 Limits for DCEC.

Table 1, Dresden Clean Energy Center Unit 1 Dose Summary[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluent Dose Limit, Total Body	Limit	1.5 mrem	1.5 mrem	1.5 mrem	1.5 mrem	3 mrem
	Total Body Dose	N/A	N/A	N/A	N/A	N/A
	% of Limit	N/A	N/A	N/A	N/A	N/A
Liquid Effluent Dose Limit, Any Organ	Limit	5 mrem	5 mrem	5 mrem	5 mrem	10 mrem
	Max Organ Dose	N/A	N/A	N/A	N/A	N/A
	% of Limit	N/A	N/A	N/A	N/A	N/A
Gaseous Effluent Dose Limit, Gamma Air (Noble Gas)	Limit	5 mrad	5 mrad	5 mrad	5 mrad	10 mrad
	Gamma Air Dose	N/A	N/A	N/A	N/A	N/A
	% of Limit	N/A	N/A	N/A	N/A	N/A
Gaseous Effluent Dose Limit, Beta Air (Noble Gas)	Limit	10 mrad	10 mrad	10 mrad	10 mrad	20 mrad
	Beta Air Dose	N/A	N/A	N/A	N/A	N/A
	% of Limit	N/A	N/A	N/A	N/A	N/A
Gaseous Effluent Organ Dose Limit (Iodine, Tritium, Particulates with > 8-day half-life)	Limit	7.5 mrem	7.5 mrem	7.5 mrem	7.5 mrem	15 mrem
	Max Organ Dose	6.77E-04	6.77E-04	6.77E-04	6.77E-04	2.71E-03
	% of Limit	9.03E-03	9.03E-03	9.03E-03	9.03E-03	1.81E-02

[1] Table 1 demonstrates compliance with 10 CFR Part 50, App. I Limits.

Table 2, Dresden Clean Energy Center Unit 2 Dose Summary[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluent Dose Limit, Total Body	Limit	1.5 mrem	1.5 mrem	1.5 mrem	1.5 mrem	3 mrem
	Total Body Dose	N/A	N/A	N/A	1.97E-05	1.97E-05
	% of Limit	N/A	N/A	N/A	1.31E-03	6.56E-04
Liquid Effluent Dose Limit, Any Organ	Limit	5 mrem	5 mrem	5 mrem	5 mrem	10 mrem
	Max Organ Dose	N/A	N/A	N/A	3.15E-05	3.15E-05
	% of Limit	N/A	N/A	N/A	6.30E-04	3.15E-04
Gaseous Effluent Dose Limit, Gamma Air (Noble Gas)	Limit	5 mrad	5 mrad	5 mrad	5 mrad	10 mrad
	Gamma Air Dose	1.15E-04	1.26E-04	1.13E-04	1.90E-04	5.43E-04
	% of Limit	2.30E-03	2.52E-03	2.26E-03	3.80E-03	5.43E-03
Gaseous Effluent Dose Limit, Beta Air (Noble Gas)	Limit	10 mrad	10 mrad	10 mrad	10 mrad	20 mrad
	Beta Air Dose	4.29E-06	4.78E-06	4.21E-06	5.76E-06	1.90E-05
	% of Limit	4.29E-05	4.78E-05	4.12E-05	5.76E-05	9.52E-03
Gaseous Effluent Organ Dose Limit (Iodine, Tritium, Particulates with > 8-day half-life)	Limit	7.5 mrem	7.5 mrem	7.5 mrem	7.5 mrem	15 mrem
	Max Organ Dose	2.00E-03	5.06E-03	6.69E-03	6.31E-03	2.00E-02
	% of Limit	2.67E-02	6.75E-02	8.92E-02	8.41E-02	1.33E-01

[1] Table 2 demonstrates compliance with 10 CFR Part 50, App. I Limits.

Table 3, Dresden Clean Energy Center Unit 3 Dose Summary[1]

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluent Dose Limit, Total Body	Limit	1.5 mrem	1.5 mrem	1.5 mrem	1.5 mrem	3 mrem
	Total Body Dose	N/A	N/A	N/A	1.97E-05	1.97E-05
	% of Limit	N/A	N/A	N/A	1.31E-03	6.56E-04
Liquid Effluent Dose Limit, Any Organ	Limit	5 mrem	5 mrem	5 mrem	5 mrem	10 mrem
	Max Organ Dose	N/A	N/A	N/A	3.15E-05	3.15E-05
	% of Limit	N/A	N/A	N/A	6.30E-04	3.15E-04
Gaseous Effluent Dose Limit, Gamma Air (Noble Gas)	Limit	5 mrad	5 mrad	5 mrad	5 mrad	10 mrad
	Gamma Air Dose	6.90E-05	7.47E-05	6.68E-05	1.14E-04	3.24E-04
	% of Limit	1.38E-03	1.49E-03	1.34E-03	2.28E-03	3.24E-03
Gaseous Effluent Dose Limit, Beta Air (Noble Gas)	Limit	10 mrad	10 mrad	10 mrad	10 mrad	20 mrad
	Beta Air Dose	2.65E-06	2.87E-06	2.55E-06	4.15E-06	1.22E-05
	% of Limit	2.65E-05	2.87E-05	2.55E-05	4.15E-05	6.11E-05
Gaseous Effluent Organ Dose Limit (Iodine, Tritium, Particulates with > 8-day half-life)	Limit	7.5 mrem	7.5 mrem	7.5 mrem	7.5 mrem	15 mrem
	Max Organ Dose	2.61E-03	5.31E-03	5.40E-03	5.61E-03	1.89E-02
	% of Limit	3.48E-02	7.08E-02	7.20E-02	7.48E-02	1.26E-01

[1] Table 3 demonstrates compliance with 10 CFR Part 50, App. I Limits.

Table 4, Total Annual Offsite-Dose Comparison to 40 CFR 190 Limits for DCEC[1]

	Whole Body	**Thyroid**	**Max Other Organ**
Gaseous[2]	3.80E-03	3.90E-02	4.15E-03
Carbon-14	1.02E-02	1.02E-02	5.11E-02
Liquid	3.94E-05	2.25E-06	6.30E-05
Direct Shine	6.42E+00	6.42E+00	6.42E+00
Total Site Dose	**6.43E+00**	**6.47E+00**	**6.48E+00**
Nearby Facility	1.26E-01	1.26E-01	1.26E-01
Total w/Other Nearby Facility[3]	**6.56E+00**	**6.60E+00**	**6.61E+00**
Limit	**25 mrem**	**75 mrem**	**25 mrem**
% of Limit	**26.24**	**8.80**	**26.42**

[1] Table 4 is a summation of Units to show compliance with 40 CFR Part 190 Limits.
[2] Gaseous dose values include organ dose from Noble Gas, Iodine, Tritium, and particulates.
[3] Other fuel cycle sources within 5 miles of the site are considered in this analysis.GE Hitachi Morris Operations 2025 dose contribution is 1.26E-01 mrem.

3.0 INTRODUCTION

3.1 About Nuclear Power

Commercial nuclear power plants are generally classified as either Boiling Water Reactors (BWRs) or Pressurized Water Reactors (PWRs), 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. 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.

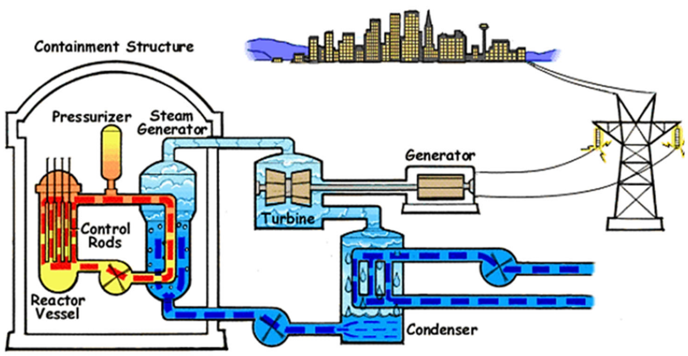


Figure 1, Pressurized Water Reactor (PWR) **[1]**

3.1 (Continued)

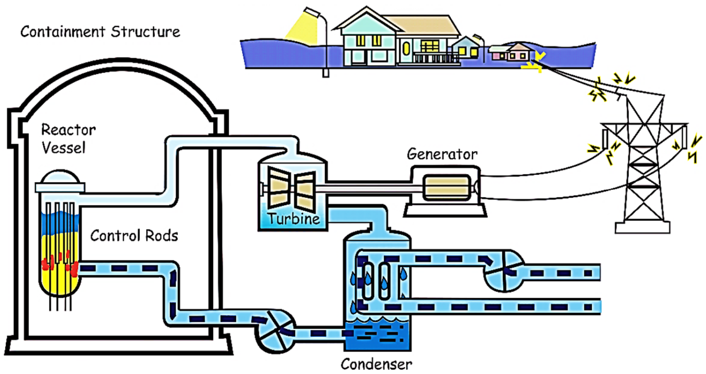


Figure 2, Boiling Water Reactor (BWR) **[2]**

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 powered by coal or natural gas. Water is boiled to generate steam; the steam turns 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 producing 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 the 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. Radiation dose is generally reported in units of millirem (mrem) in the US.

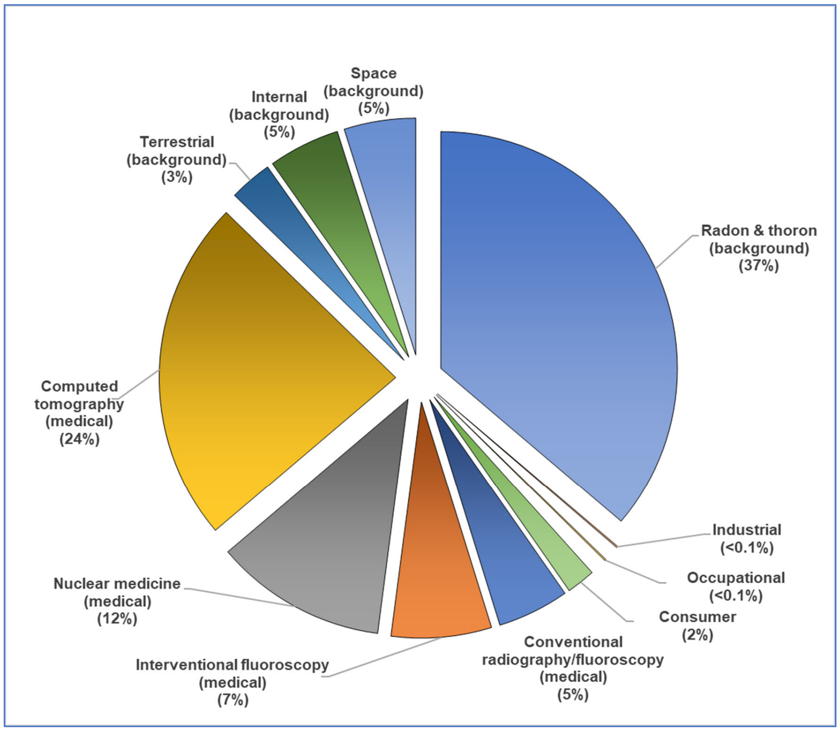


Figure 3, Sources of Radiation Exposure (NCRP Report No. 160) **[3]**

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 [3]. 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% of total mrem per year) 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 [4], and from the US Nuclear Regulatory Commission website [5].

3.3 About Dose Calculation

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 a dose 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.

3.3 (Continued)

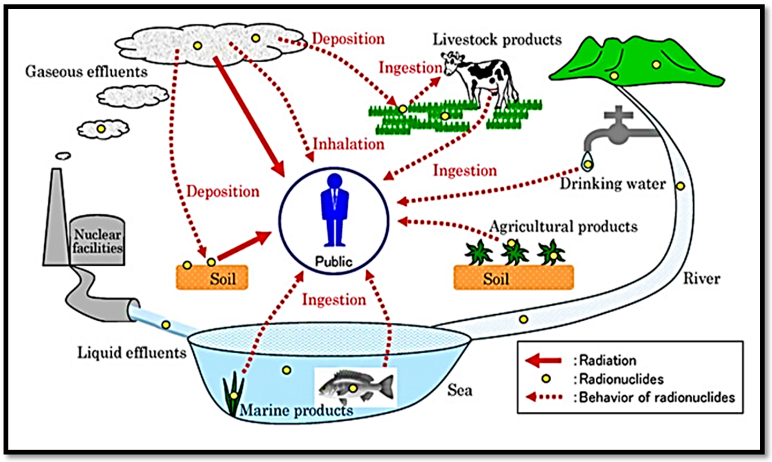


Figure 4, Potential exposure pathways to Members of the Public due to Plant Operations **[6]**

Each plant has an Offsite Dose Calculation Manual (ODCM) that specifies the methodology used to obtain the doses in the Dose Assessment section of this report. The dose assessment methodology in the ODCM is based on NRC Regulatory Guide 1.109 [7] and NUREG-0133 [8]. 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 (e.g., taken from wells, rivers, or lakes). 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.

3.3 (Continued)

Each year a Land Use Census is performed to determine what potential dose pathways currently exist within a five-mile radius around the plant, the area 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 likely to be most exposed to the radiation dose due to plant operation.

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 maximum exposed individual due to plant operation are a very small fraction of the annual dose that is received due to other sources. The calculated doses due to plant effluents, along with REMP results, serve to provide assurance that radioactive effluents releases are not exceeding safety standards for 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 plant Technical Specifications and the Offsite Dose Calculation Manual (ODCM). These documents contain the limits to which DCEC must adhere. DCEC drives to maintain the philosophy to keep dose “as low as is 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 DCEC is well below the ODCM limits. The instantaneous concentration of liquid radioactive material released shall be limited to ten times the concentration specified in 10 CFR 20, Appendix B, Table 2, Column 2, 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.

The annual whole body, skin and organ dose was computed using the 2025 source term using the dose calculation methodology provided in the ODCM. The calculated doses due to gaseous effluents are used to demonstrate compliance with offsite dose limits are presented in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary, Table 2, Dresden Clean Energy Center Unit 2 Dose Summary, Table 3, Dresden Clean Energy Center Unit 3 Dose Summary, and Table 4, Total Annual Offsite-Dose Comparison to 40 CFR 190 Limits for DCEC.

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 site to areas at and beyond the site boundary shall be limited to the following:

        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, from each reactor unit to areas at and beyond the site boundary shall be limited to the following:

        1) Quarterly

            a) Less than or equal to 5 mrads gamma

            b) Less than or equal to 10 mrads beta

        2) Yearly

            a) Less than or equal to 10 mrads gamma

            b) Less than or equal to 20 mrads beta

2. Iodine, tritium, 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 from the site to areas at and beyond the site boundary shall be limited to the following:

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

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

        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 Gaseous Effluent Monitoring

The 2/3 Chimney (elevated), and 2/3 Reactor Building Vent (mixed mode) are continuously sampled for iodine and particulates. These samples are obtained weekly and analyzed by gamma spectroscopy. The particulate filters are composited and sent to a vendor for gross alpha, Sr-89, Sr-90, Ni-63 and Fe-55 analysis quarterly. Noble gas grab samples of the 2/3 Chimney and 2/3 Reactor Building Vent are obtained weekly and analyzed by gamma spectroscopy. Contributing streams of the 2/3 Chimney and 2/3 Reactor Building Vent are also sampled and analyzed by gamma spectroscopy. Tritium samples of the 2/3 Chimney and 2/3 Reactor Building Vent are obtained monthly and analyzed by liquid scintillation.

Unit 1 Chemical Cleaning Building (mixed mode) effluents, as per ODCM requirements, only require continuous iodine and particulate sampling when ventilation is in service. Both trains of Unit 1 Chem Cleaning ventilation have been out of service since 2019 and 2021, respectively (IR 4281629 and 4460047). Continuous sampling is not in progress. However, weekly Dresden Radiation Protection provide weekly air samples which are analyzed in the Dresden counting room.

For the 2/3 Chimney and 2/3 Reactor Building Vent effluents, the resultant activity concentration and measured flowrate at the release points are used to calculate the curies released. For the Chemical Cleaning Building effluent, the design basis flows are used to calculate curies released.

The Unit 1 Main Turbine Floor is used as an area to work on contaminated equipment. The Unit 1 Fuel Building is used as a storage area and potentially as a work area. The ventilation systems to these areas are no longer operational and the areas are at ambient pressure with the outside environment. The potential exists for airborne activity to be released to the environment through various points. Based on the work normally performed in these areas, an estimated 6.00E-06 Ci of Cs-137 was released via this path per month for a total of 7.20E-05 Ci during 2025.

The Unit 2/3 Heating Steam System has been contaminated in the past and occasionally contains low-level contamination. During normal operation, the condensate is converted to steam, a portion of which gets vented to the atmosphere. If tritium was identified above minimum detectable activity in 2025, permits are generated for the appropriate activity released. This will continue to be monitored when the system is running.

The Chemistry Laboratory exhausts directly into the environment via its ventilation system and is not monitored. The activity concentration from the Offgas Recombiner samples taken weekly from each unit and the sample size (15 cc) was used to calculate a monthly activity released from each unit from the Chemistry Hot Lab fume hood. This activity was captured in the monthly 10CFR50 Appendix I calculation and is included in the noble gas totals in Table 12, Gaseous Effluents – Ground Level Release Continuous Mode Unit 2 and Table 14, Gaseous Effluents – Ground Level Release Continuous Mode Unit 3.

4.4 Regulatory Limits for Liquid Effluent Doses

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

   a. Quarterly

      1) Less than or equal to 1.5 mrem total body

      2) Less than or equal to 5 mrem critical organ

   b. Yearly

      1) Less than or equal to 3 mrem total body

      2) Less than or equal to 10 mrem critical organ

4.5 Liquid Effluent Monitoring

The Waste Surge Tank (WST) utilized for river discharges is analyzed for gamma-emitting nuclides by gamma spectroscopy and for tritium by liquid scintillation prior to discharge. A representative portion of this sample is saved and composited with other discharges that occur during the calendar month. The composite is sent to a vendor for analyses of gross alpha, Sr-89, Sr-90, Ni-63, and Fe-55. The tank volumes and activities are used to calculate the diluted activity released at the discharge point from batch discharges. If discharges from the Waste Surge Tank occurred, the information is captured in batch release information.

Containment Cooling Service Water (CCSW) is sampled from the Low-Pressure Coolant Injection (LPCI) heat exchangers monthly and analyzed for gamma-emitting nuclides by gamma spectroscopy. These samples are composited quarterly and analyzed for tritium, gross alpha, Sr-89, Sr-90, Fe-55, and Ni-63. Results are conservatively applied for each month of the quarter. Batch release volume is based on LPCI heat exchanger volume.

On-site storm sewers are sampled and analyzed for tritium content. The CBG well tritium concentration measured during each month of 2025 was used to calculate the released activity for each month via the storm sewers. The volume was based on the monthly rainfall over a 100,000 sqft area of the Site.

Water in the Sewage Treatment Plant (STP) effluent is routinely sampled and analyzed for tritium, gross alpha, Sr-89, Sr-90, Fe-55, and Ni-63.

Beginning in September 2019, groundwater from the West Tritium Remediation Well was monitored via the 2/3 Discharge Tunnel. Although this is a planned continuous release, it is mentioned here due to its relatively short duration over this life of the plant.

The estimated calculated dose from all these releases was well below the regulatory limit of 25 mrem/yr for the whole body and 75 mrem/yr Thyroid as well as all quarterly dose limits.

4.6 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.

4.7 Onsite Doses (Within Site Boundary)

Dresden Clean Energy Center does not have members of the public or non-occupationally exposed individuals on site. Doses calculated to site boundary are sufficient in demonstrating these individuals do not receive dose exposure in excess of 100 mrem per year TEDE as per 10 CFR 20.1301 requirements.

5.0 SUPPLEMENTAL INFORMATION

5.1 Gaseous Batch Releases

5.1.1 DCEC Site

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		0	0	0	0	0
2. Total duration of batch releases	minutes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Maximum batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4. Average batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5. Minimum batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5.2 Liquid Batch Releases

5.2.1 DCEC Site

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
1. Number of Batch Releases		0	0	0	4	4
2. Total duration of batch releases	minutes	0.00E+00	0.00E+00	0.00E+00	9.41E+02	9.41E+02
3. Maximum batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	3.27E+02	3.27E+02
4. Average batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	2.35E+02	2.35E+02
5. Minimum batch release duration	minutes	0.00E+00	0.00E+00	0.00E+00	3.00E+01	3.00E+01
6. Avg stream flow during periods of release of liquid effluent into a flowing stream	Ft^3/sec	N/A	N/A	N/A	1.04E+04	1.04E+04

5.3 Abnormal Releases

5.3.1 Gaseous Abnormal Releases

Number of releases	0
Total activity released	0.00E+00 Ci

5.3.2 Liquid Abnormal Releases

Number of releases	0
Total activity released	0.00E+00 Ci

5.4 Land Use Census Changes

There was the addition of 6 goats in sector J, at a distance of 6.76 km (4.2 miles). While the resident does milk the goats, the resident declined to participate in the REMP sampling program effective in June 2025. Milk samples were collected from 06/14/2024 through 06/05/2025.

5.5 Meteorological Data

Meteorological data collected for 2025 met the 90% data accumulation requirement. Average data recovery was 99.8%. The Joint Frequency Distribution tables for 2025 are available on site per request.

5.6 Effluent Radiation Monitors Out of Service Greater Than 30 Days

The Liquid Radwaste Effluent monitor (2/3-2001-948) was out of service for greater than 30 days in 2025. The monitor was out of service all year, 365 days. In the early 2000s, the station made the decision to be a Zero Discharge plant. As a result of that decision, it was determined to suspend all PMs and maintenance associated with 2/3-2001-948. After the Service Water event in 2025, the station determined the best course of action to remove the large quantity of water was via river discharges. Since the rad monitor had not been maintained for a long period of time, it was not able to be placed back in service to support the river discharges. The rad monitor is currently on the station’s Operations Concerns list.

There were discharges from the plant with the radiation monitor out of service. The requirements of ODCM Section 12.2.1, Radioactive Liquid Effluent Monitor Instrumentation, were followed to support plant discharges with the effluent monitor out of service. IR 04943332 was written to address this issue.

5.7 Offsite Dose Calculation Manual (ODCM) Changes

No changes to the ODCM were made in 2025.

5.8 Process Control Program (PCP) Changes

No changes to PCP were made in 2025.

5.9 Radioactive Waste Treatment System Changes

No changes to the radioactive waste treatment system were made in 2025.

5.10 Direct Radiation

There are five identified sources of direct radiation dose that meets the definition referenced in 10CFR72.104 and must be added to the gaseous and liquid effluents dose. They are:

1. Skyshine
2. West Independent Spent Fuel Storage Installation (ISFSI) Pad
3. East ISFSI Pad
4. Condensate Storage Tanks (CST)
5. General Electric Facility is located southwest of the plant on Collins Road.

5.10.1 <u>Skyshine</u>

The radioactivity source that results in the most significant offsite radiation dose at the Dresden Clean Energy Center is skyshine resulting from ^{16}N decay inside turbines and steam piping.

The ^{16}N that produces the skyshine effect is formulated through neutron activation of the oxygen atoms in the reactor coolant as the coolant passes through the operating reactor core. The ^{16}N travels with the steam produced in the reactor to the steam-driven turbine. While the ^{16}N is in transport, it radioactively decays with a half-life of about 7 seconds and produces 6-7 MeV gamma rays. Typically, offsite dose points are shielded from a direct view of components containing ^{16}N, but there can be skyshine at offsite locations due to scattering of gamma rays off the mass of air above the steam lines and turbine.

The dose rate due to skyshine has been found to have the following dependencies:

1. The dose rate decreases as distance from the station increases.
2. The dose rate increases non-linearly as the power production level increases.
3. The dose rate increases when hydrogen is added to the reactor coolant, an action taken to improve reactor coolant chemistry characteristics.

To calculate offsite dose due to skyshine in each time period, DCEC must track the following parameters:

1. The total gross energy E_h produced with hydrogen being added.
2. The total gross energy E_o produced without hydrogen being added.

The turbines at the site are sufficiently close to each other so that energy generated by the two operating units may be summed together. Because the hydrogen addition system is normally in-service during plant operation, the conservative assumption that all power is generated during hydrogen addition can be used.

An initial estimate of skyshine dose is calculated using equation 5-1 on page II.5.4 in the Dresden Offsite Dose Calculation Manual with the following assumptions from Table 5.1 on page II.5-11:

$$D_{sky}= (K)(E_o+M_hE_h)((OF_1*SF_1e^{-0.007*R1})+(OF_2*SF_2e^{-0.007*R2}) \quad (5\text{-}1)$$

Parameters for Calculations of N-16 Skyshine Radiation from Dresden Units 2 and 3

Location Number	Activity	Occupancy Hours (OH)	Occupancy Factor (OF)[e]	Shielding Factor (SF)	Distance (R)
1	Living at Home	8344[b]	0.95	0.7	868[c]
2	Fishing	416[a]	0.05	1	610[d]

These parameters are used to obtain an initial estimate of skyshine dose to the maximally exposed member of the public using Equation 5-1. If desired, more realistic parameters could be used in place of these to refine the estimate. For example, one could determine whether the nearest resident really fishes the specified number of hours at the specified location.

1. The amount of time in a year that a maximally exposed fisherman would spend fishing near the site is estimated as 12 hours per week for 8 months per year. This yields an estimate of:

    a. [12 hours/week] x [(8 months/yr)/(12 months/yr)] x [52 weeks/yr] = 416 hours/yr

    b. The remaining time is assumed to be spent at the nearest residence.

    c. Distance to nearest residence (See ODCM Table 4-1).

    d. Estimated from a drawing of the site.

    e. The OF_k is the quotient of the number of hours a location is occupied and the number of hours in a year. Thus OH_k/8760 hours = OF_k rounded to the 0.01 digit.

2. A survey of the nearest residents revealed that as they do enjoy fishing, they spend far less time than the above estimate. In addition, because they live on the Kankakee River, they enjoy fishing at their homes rather than the designated 610 meters from the plant. As such, these assumptions have been adjusted to calculate a more accurate dose to the nearest resident at 868 meters from the plant with 8344 occupancy hours per year. This yielded a dose from Unit 2 due to skyshine of 3.07 mrem and 3.35 mrem from Unit 3 for a total of 6.42 mrem for the site.

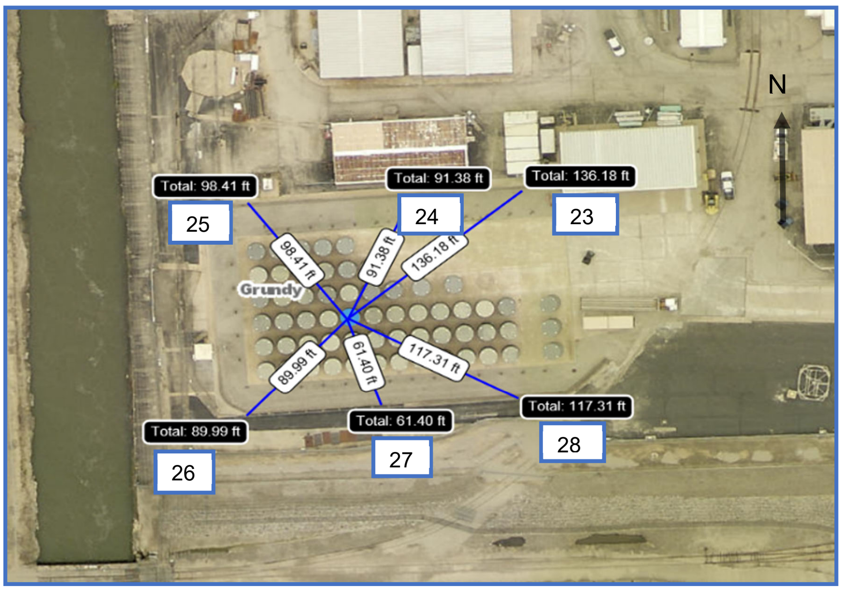
5.10.2 Independent Spent Fuel Storage Installation

There are currently two ISFSI pads (east and west) located within the Protected area of the Dresden station. These casks contain the spent fuel from the reactor, and the pad is designed to store the spent fuel until a more suitable location is available. Optically stimulated luminescence dosimeters (OSLD) are placed on the fence around the pads and exchanged semi-annually to measure the direct dose from the ISFSI pad. The dose from each location is summed to acquire an annual dose for that specific location a known distance from the casks.

The equation for a point source, ($DR_1 * D_1^2 = DR_2 * D_2^2$), is used to calculate the annual dose to the nearest member of the public. The OSLD with the highest annual reading was used because they have a lesser contribution by percent of background radiation lending to more accuracy in the dose attributable only to the ISFSI pad. D_2 values based on distances annotated on Distance to Nearest Resident map on page 28.

West ISFSI Pad Dose Calculations

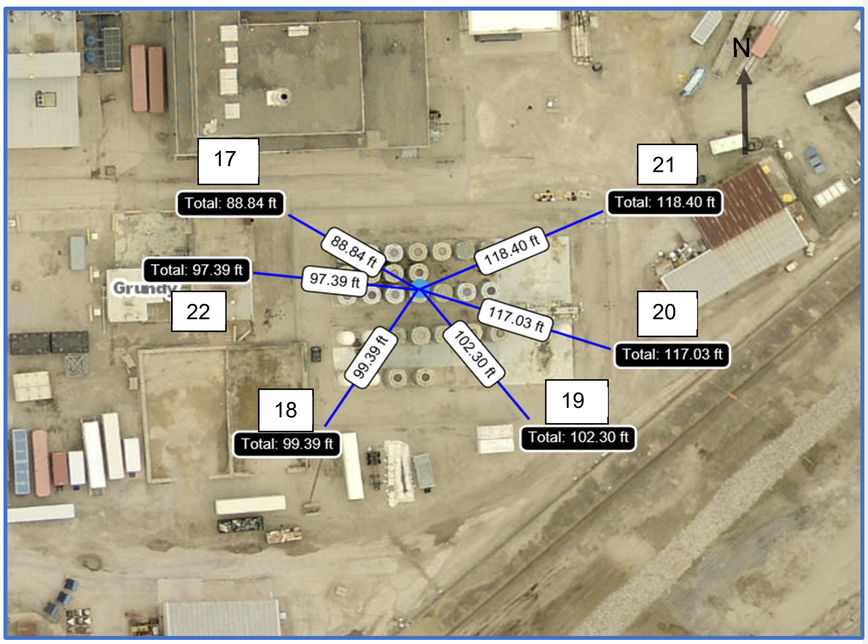
	Q1 (mrem)	Q2 (mrem)	DR_1 (mrem/yr)	D_1 (ft)	D_2 (ft)	DR_2 (mrem/yr)
23	1027.7	941.3	1969.0	136.18	2686	5.06
24	920.0	902.9	1823.0	91.38	2686	2.11
25	482.6	429.6	912.2	98.41	2686	1.22
26	152.7	148.0	300.7	89.99	2686	0.34
27	358.7	338.3	697.0	61.4	2686	0.36
28	289.4	292.4	581.8	117.3	2686	1.11



East ISFSI Pad Dose Calculations

	Q1 (mrem)	**Q2 (mrem)**	**DR_1 (mrem/yr)**	**D_1 (ft)**	**D_2 (ft)**	**DR_2 (mrem/yr)**
17	80.3	71.2	151.5	88.84	2622	0.17
18	82.5	90.1	172.6	99.39	2622	0.25
19	88.0	79.3	167.3	102.3	2622	0.25
20	126.4	286.3	412.7	117.0	2622	0.82
21	337.1	262.2	599.3	118.4	2622	1.22
22	85.4	88.4	173.8	97.39	2622	0.24

a. East ISFSI Pad



The highest annual dose received from the ISFSI pads were locations 21 (East) and 23 (West). These results and distances from the center of the pad were used to calculate a dose of 5.06E+00 mrem/yr for the West pad and 1.22E+00 mrem/yr for the East pad. This resulted in a combined annual dose of 6.28E+00 mrem due to direct radiation from storage of spent fuel on the IFSFI pads.

5.10.3 Condensate Storage Tank (CST)

The Condensate Storage Tanks (A and B) are a source of make-up water and has become contaminated through the operation of the plant. Although the level of contamination of the water inside the tank isn't at a level to produce a measurable dose rate, tanks are specifically listed in 40CFR190 and a calculation of the annual dose to the nearest resident must be performed.

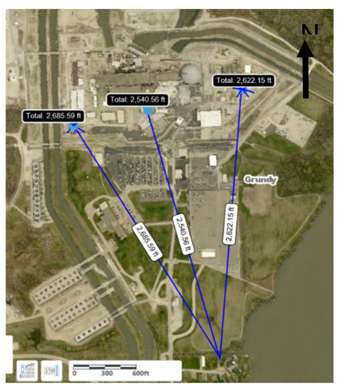
OSLD (07), was placed on the northeast perimeter fence of the 2/3 Condensate Storage Tank identical to those on the ISFSI pad, and as such will use the same methodology to calculate an annual dose.

3. CST Dose Calculations

	Q1 (mrem)	Q2 (mrem)	DR_1 (mrem/yr)	D_1 (ft)	D_2 (ft)	DR_2 (mrem/yr)
7	153.4	148.9	302.4	17	2541	0.014

2/3 Condensate Storage Tanks

Distance to Nearest Resident



The approximate distance from the dosimeter on the fence to the edge of the tank is 17 ft. Using the same equation and the distance to the nearest residence (2541 ft.) $DR_1*D_1^2=DR_2*D_2^2$ it yields an annual dose of 1.40E-02 mrem. These calculations are very conservative because the measured dose is almost entirely from background and not from the plant or storage tanks.

5.10.4 GE Hitachi Nuclear Energy Facility

This facility is located southwest of the Dresden Clean Energy Center on Collins Rd and is the location of a de facto high-level radioactive waste storage site that holds 772 tons of spent nuclear fuel. The used fuel from various nuclear generating sites across the country are stored in a spent fuel pool. The following table was taken from the NRC Technical Specifications for Safety Renewed License SNM-2500 for the GE Hitachi Energy Americas LLC Appendix A:

Since the source of radiation from the site is from the Uranium fuel cycle, the site is also required to ensure that the requirements of 40CFR190 and 10CFR72 are met. Therefore, an Annual Operating Report is generated and submitted to the NRC to demonstrate that the regulatory limits are not exceeded to members of the public.

40CFR190 states that the annual whole-body dose to a member of the public shall not exceed 25 mrem/yr from all sources of the uranium fuel cycle. This distinction dictates that the sum of the dose from the operation of the Dresden Clean Energy Center and the GE Hitachi Nuclear Energy site cannot cause a member of the public to exceed a whole-body dose of 25 mrem/year. As a result, communication from the two sites is necessary to exchange the calculated dose contributions to ensure this requirement is met. The dose contribution from the GE Hitachi site for the 2025 year was 1.26E-01 mrem.

5.11 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.

The Carbon-14 activity released is determined using Electric Power Research Institute Report 1021106 Boiling Water Reactor proxy value of 5.1 Ci per GWth year, gaseous release fraction of 0.99%, a carbon dioxide fraction of 0.95, a reactor power rating of 2957 MWt for Units 2 and 3. The resultant dose due to C-14 was calculated using the C-14 worksheet. The equivalent full power days (EFPD) of operation for Unit 2 was 335.79 EFPD and for Unit 3 was 357.42 EFPD. This resulted in 13.874 Ci of C-14 from Unit 2 and 14.768 Ci from Unit 3 being produced in 2025. The calculated dose from C-14 produced from Unit 2 was 4.947-03 mrem/yr (Total Body-Child). The calculated dose from C-14 produced from Unit 3 was 5.266-03 mrem/yr (Total Body-Child). This is a Station total of 1.02E-02 mrem/yr. The calculated organ dose from C-14 produced from Unit 2 was 2.475E-02 mrem/yr (Bone-Child) and 2.634E-02 mrem/yr (Bone-Child) for Unit 3.

C-14 activities are included in Table 24, Gaseous Effluents – Elevated Level Release Continuous Mode Unit 2 and Table 26, Gaseous Effluents – Elevated Level Release Continuous Mode Unit 3.

5.12 Errata/Corrections to Previous ARERRs

5.12.1 2024 ARERR

In the 2024 ARERR, it was identified that a correction is needed for Section 2.0, Executive Summary. The Executive Summary incorrectly states the values associated with the solid radioactive waste shipped offsite. The correct values are listed in Table 35, Types of Solid Waste Summary Site, and Table 37, Solid Waste Disposition Site.

See Attachment 4 for the correct information.

5.13 Other Supplemental Information

5.13.1 Temporary Outside Tanks

No outside tank exceeded ODCM or Tech Specs limits in 2025.

5.13.2 Vendor non-conformance with Interlaboratory Cross Check Program

Teledyne Brown Engineering (TBE), the vendor laboratory performing analysis for samples submitted by the Dresden Station, is required to participate in an interlaboratory cross check program. For the fourth quarter 2025, disagreements were discovered between TBE submitted results and the referenced values provided by the cross-check sample provider, Eckert & Ziegler Analytics (EZA). Constellation issued Issue Report (IR) 04947002 and TBE issued Non-Compliance Report (NCR) 26-01.

6.0 NEI 07-07 ONSITE RADIOLOGICAL GROUNDWATER MONITORING PROGRAM

Dresden Clean Energy Center has developed a Groundwater Protection Initiative (GPI) program in accordance with NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document [9]. 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 2025, DCEC collected and analyzed groundwater samples in accordance with site procedure EN-DR-408-4160.

Refer to Attachment 3, 2025 Annual RGPP Monitoring Report for information regarding Dresden’s Radiological Groundwater Monitoring Program for 2025.

6.1 Voluntary Notification

During 2025, Dresden Clean Energy Center did not make a voluntary NEI 07-07 notification to State/Local officials, NRC, and to other stakeholders required by site procedures.

Table 5, Groundwater Protection Program Monitoring Well Tritium Results

Location	Number of Positive Detections	Number of Analyses	Average Concentration[1] (pCi/L)	Maximum Concentration
DSP-106	4	4	889	1290
DSP-107	4	4	1150	1210
DSP-108	2	4	231.5	235
DSP-122	4	4	1111.3	1200
DSP-123	0	4		
DSP-124	4	4	332	353
DSP-125	3	4	245.7	327
DSP-126	0	1		
DSP-147	0	2		
DSP-148	0	1		
DSP-149	1	1	298	298
DSP-150	0	1		
DSP-154	0	1		
DSP-159 (M)	0	1		
DSP-159-S	0	1		
MD-11	4	4	3722.5	3840
MW-DN-101-I	1	4	202	202
MW-DN-101-S	0	4		
MW-DN-102-S	0	1		
MW-DN-103-I	0	1		
MW-DN-103-S	0	1		
MW-DN-104-S	1	4	208	208
MW-DN-105-S	1	4	442	442
MW-DN-106-S	0	1		
MW-DN-107-S	0	4		
MW-DN-109-I	1	4	264	264
MW-DN-109-S	0	4		
MW-DN-110-S	1	1	240	240
MW-DN-111-S	4	4	3477.5	6200
MW-DN-112-I	0	2		

Commented [MS11]: We usually don't put this table in

Commented [MS1]: Check this one.

Commented [BL2R1]: Value correct based on 2nd QTR H-3 results report.

MW-DN-112-S	1	1	190	190
MW-DN-113-S	0	1		
MW-DN-114-I	2	2	1185	1360
MW-DN-114-S	3	4	973.3	1280
MW-DN-115-I	1	2	189	189
MW-DN-115-S	0	4		
MW-DN-116-I	0	1		
MW-DN-116-S	1	4	215	215
MW-DN-118-S	1	4	206	206
MW-DN-119-I	0	4		
MW-DN-119-S	0	3		
MW-DN-122-I	0	1		
MW-DN-122-S	0	1		
MW-DN-124-I	4	4	1523	2230
MW-DN-124-S	4	4	783.5	1070
MW-DN-125-S	0	2		
MW-DN-126-S	0	4		
MW-DN-127-S	1	2	206	206
MW-DN-134-S	0	1		
MW-DN-135-S	0	1		
MW-DN-136-S	0	4		
MW-DN-137-S	0	1		
MW-DN-140-S	1	4	216	216
MW-DN-141-S	3	3	2850	4320
MW-DN-142-S	0	1		
MW-DN-143-S	0	1		
MW-DN-144-S	0	1		
RW-DN-100-S	1	4	206	206
RW-DN-101-S	4	4	7565	9930

[1] Results <MDA are not included in the average concentration calculation.

Commented [MS3]: Check this one

Commented [BL4R3]: Value correct based on 4th QTR H-3 results report.

Commented [MS5]: Check this one

Commented [BL6R5]: Values are incorrect. Should be 0 Positive Detections and 3 Analysis.

Commented [MS7]: Check this one

Commented [BL8R7]: Values are correct.

Commented [MS9]: Check this one.

Commented [BL10R9]: 3 Values are INCORRECT. # Positive Detections = 3, # Analysis = 3. Average Conc. = 2850, Max Conc. Is correct.

Commented [BL12R11]: I agree. A statement stating these reports are available at the site for review should be sufficient.

7.0 BIBLIOGRAPHY

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[8] "NUREG-0133 - Preparation of Effluent Technical Specifications for Nuclear Power Plants," Nuclear Regulatory Commission, 1987.

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[10] "10 CFR 50 - Domestic Licensing of Production and Utilization Facilities," US Nuclear Regulatory Commission, Washington, DC.

[11] "40 CFR 190 - Environmental Radiation Protection Standards for Nuclear Power Operation," US Environmental Protection Agency, Washington, DC.

[12] "10 CFR 20 - Standards for Protection Against Radiation," US Nuclear Regulatory Commission, Washington, DC.

[13] "40 CFR 141 - National Primary Drinking Water Regulations," US Environmental Protection Agency, Washington, DC..

[14] "NUREG-0324 - XOQDOQ, Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations," Nuclear Regulatory Commission, September, 1977.

[15] "NUREG-1301 - Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," Nuclear Regulatory Commission, April 1991.

[16] "NUREG-1302 - Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors," Nuclear Regulatory Commission, April 1991.

[17] "Regulatory Guide 4.13 - Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications, Revision 2," Nuclear Regulatory Commision, June, 2019.

[18] "Regulatory Guide 4.15 - Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination) -- Effluent Streams and the Environment," Nuclear Regulatory Commission, July, 2007.

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

1.0 GASEOUS EFFLUENTS

Table 6, Gaseous Effluents Summation of All Releases Unit 1[1]

A. Fission & Activation Gases	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Annual**	**Est. Total Error %**
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	1.31E+01
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
B. Iodine-131							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.60E+01
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
C. Particulates							
1. Total Release	Ci	1.80E-05	1.80E-05	1.80E-05	1.80E-05	7.20E-05	2.94E+01
2. Average release rate for the period	µCi/sec	2.31E-06	2.29E-06	2.26E-06	2.26E-06	2.28E-06	
D. Tritium							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	7.56E+00
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	
E. Gross Alpha							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.94E+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	N/A	N/A	N/A	N/A	N/A	
2. Average release rate for the period	µCi/sec	N/A	N/A	N/A	N/A	N/A	

[1] % of limit is provided in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary

Table 7, Gaseous Effluents Summation of All Releases Unit 2[1]

A. Fission & Activation Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	2.21E+00	2.43E+00	2.18E+00	3.21E+00	1.00E+01	1.31E+01
2. Average release rate for the period	µCi/sec	2.84E-01	3.09E-01	2.75E-01	4.03E-01	3.18E-01	
B. Iodine-131							
1. Total Release	Ci	3.15E-05	8.50E-05	1.12E-04	1.08E-04	3.36E-04	2.60E+01
2. Average release rate for the period	µCi/sec	4.05E-06	1.08E-05	1.41E-05	1.36E-05	1.07E-05	
C. Particulates							
1. Total Release	Ci	2.75E-04	2.25E-04	5.16E-04	5.89E-04	1.60E-03	2.94E+01
2. Average release rate for the period	µCi/sec	3.54E-05	2.86E-05	6.50E-05	7.41E-05	5.09E-05	
D. Tritium							
1. Total Release	Ci	3.48E+00	1.17E+01	7.08E+00	7.33E+00	2.96E+01	7.56E+00
2. Average release rate for the period	µCi/sec	4.48E-01	1.49E+00	8.90E-01	9.22E-01	9.36E-01	
E. Gross Alpha							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.94E+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	3.67E+00	3.68E+00	3.74E+00	2.66E+00	1.38E+01	
2. Average release rate for the period	µCi/sec	4.72E-01	4.68E-01	4.70E-01	3.34E-01	4.37E-01	

[1] % of limit is provided in Table 2, Dresden Clean Energy Center Unit 2 Dose Summary

Table 8, Gaseous Effluents Summation of All Releases Unit 3[1]

A. Fission & Activation Gases	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Annual**	**Est. Total Error %**
1. Total Release	Ci	1.39E+00	1.50E+00	1.35E+00	2.17E+00	6.41E+00	1.31E+01
2. Average release rate for the period	µCi/sec	1.78E-01	1.90E-01	1.70E-01	2.73E-01	2.03E-01	
B. Iodine-131							
1. Total Release	Ci	4.14E-05	8.93E-05	9.02E-05	9.58E-05	3.17E-04	2.60E+01
2. Average release rate for the period	µCi/sec	5.32E-06	1.14E-05	1.13E-05	1.21E-05	1.00E-05	
C. Particulates							
1. Total Release	Ci	3.47E-04	2.43E-04	4.21E-04	5.38E-04	1.55E-03	2.94E+01
2. Average release rate for the period	µCi/sec	4.46E-05	3.09E-05	5.29E-05	6.77E-05	4.90E-05	
D. Tritium							
1. Total Release	Ci	4.27E+00	1.26E+01	5.70E+00	6.42E+00	2.89E+01	7.56E+00
2. Average release rate for the period	µCi/sec	5.48E-01	1.60E+00	7.17E-01	8.08E-01	9.17E-01	
E. Gross Alpha							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.94E+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	3.64E+00	3.68E+00	3.54E+00	3.76E+00	1.46E+01	
2. Average release rate for the period	µCi/sec	4.68E-01	4.68E-01	4.45E-01	4.73E-01	4.63E-01	

[1] % of limit is provided in Table 3, Dresden Clean Energy Center Unit 3 Dose Summary

Table 9, Gaseous Effluents – Ground Level Release Batch Mode Unit 1

Radionuclide Released	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total for year**
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 10, Gaseous Effluents – Ground Level Release Continuous Mode Unit 1

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Cs-137	Ci	1.80E-05	1.80E-05	1.80E-05	1.80E-05	7.20E-05
Total for Period	**Ci**	**1.80E-05**	**1.80E-05**	**1.80E-05**	**1.80E-05**	**7.20E-05**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 11, Gaseous Effluents – Ground Level Release Batch Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 12, Gaseous Effluents – Ground Level Release Continuous Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	6.14E-08	6.36E-08	6.49E-08	6.08E-08	2.51E-07
Kr-85m	Ci	1.89E-08	1.48E-08	1.43E-08	1.07E-08	5.87E-08
Kr-87	Ci	1.02E-07	9.30E-08	9.34E-08	6.34E-08	3.52E-07
Kr-88	Ci	6.16E-08	5.30E-08	5.50E-08	4.26E-08	2.12E-07
Xe-135	Ci	2.27E-09	<LLD	5.24E-10	4.73E-08	5.01E-08
Xe-135m	Ci	<LLD	<LLD	<LLD	9.34E-08	9.34E-08
Xe-138	Ci	<LLD	<LLD	<LLD	3.64E-07	3.64E-07
Total for Period	**Ci**	**2.46E-07**	**2.24E-07**	**2.28E-07**	**6.82E-07**	**1.38E-06**
Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Particulates						
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Tritium						
H-3	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Table 13, Gaseous Effluents – Ground Level Release Batch Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 14, Gaseous Effluents – Ground Level Release Continuous Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	4.37E-08	2.88E-08	2.95E-08	6.17E-08	1.64E-07
Kr-85m	Ci	1.28E-08	1.22E-08	1.34E-08	1.98E-08	5.81E-08
Kr-87	Ci	6.60E-08	7.12E-08	7.83E-08	1.06E-07	3.22E-07
Kr-88	Ci	4.11E-08	4.72E-08	4.24E-08	6.85E-08	1.99E-07
Xe-133	Ci	3.90E-10	<LLD	8.09E-10	<LLD	1.20E-09
Xe-135	Ci	6.86E-08	7.65E-08	8.55E-08	1.15E-07	3.46E-07
Xe-135m	Ci	1.46E-07	1.66E-07	1.78E-07	2.41E-07	7.31E-07
Xe-138	Ci	4.80E-07	5.31E-07	5.75E-07	8.32E-07	2.42E-06
Total for Period	**Ci**	**8.58E-07**	**9.33E-07**	**1.00E-06**	**1.44E-06**	**4.24E-06**
Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Particulates						
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Tritium						
H-3	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Table 15, Gaseous Effluents – Mixed Level Release Batch Mode Unit 1

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 16, Gaseous Effluents – Mixed Level Release Continuous Mode Unit 1

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 17, Gaseous Effluents – Mixed Level Release Batch Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 18, Gaseous Effluents – Mixed Level Release Continuous Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Particulates						
Cr-51	Ci	<LLD	<LLD	<LLD	1.21E-05	1.21E-05
Mn-54	Ci	<LLD	<LLD	<LLD	8.04E-06	8.04E-06
Co-58	Ci	<LLD	<LLD	<LLD	1.84E-06	1.84E-06
Co-60	Ci	<LLD	<LLD	<LLD	1.74E-05	1.74E-05
Zn-65	Ci	<LLD	<LLD	<LLD	1.49E-05	1.49E-05
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**5.43E-05**	**5.43E-05**
Tritium						
H-3	Ci	**1.26E+00**	**1.30E+00**	**9.86E-01**	**1.66E+00**	**5.21E+00**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Table 19, Gaseous Effluents – Mixed Level Release Batch Mode Unit 3

Radionuclide Released	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total for year**
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 20, Gaseous Effluents – Mixed Level Release Continuous Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Particulates						
Cr-51	Ci	<LLD	<LLD	<LLD	1.09E-05	1.09E-05
Mn-54	Ci	<LLD	<LLD	<LLD	7.12E-06	7.12E-06
Co-58	Ci	<LLD	<LLD	<LLD	1.62E-06	1.62E-06
Co-60	Ci	<LLD	<LLD	<LLD	1.53E-05	1.53E-05
Zn-65	Ci	<LLD	<LLD	<LLD	1.30E-05	1.30E-05
Total for Period	**Ci**	**<LLD**	**<LLD**	**<LLD**	**4.80E-05**	**4.80E-05**
Tritium						
H-3	Ci	**1.65E+00**	**1.43E+00**	**7.97E-01**	**1.51E+00**	**5.38E+00**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Table 21, Gaseous Effluents – Elevated Level Release Batch Mode Unit 1

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 22, Gaseous Effluents – Elevated Level Release Continuous Mode Unit 1

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 23, Gaseous Effluents – Elevated Level Release Batch Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 24, Gaseous Effluents – Elevated Level Release Continuous Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	4.59E-01	4.66E-01	4.62E-01	1.87E+00	3.25E+00
Kr-85m	Ci	4.21E-02	4.31E-02	4.05E-02	6.13E-02	1.87E-01
Kr-87	Ci	5.96E-02	7.21E-02	5.62E-02	4.68E-02	2.35E-01
Kr-88	Ci	3.28E-02	3.51E-02	2.79E-02	4.31E-02	1.39E-01
Xe-133	Ci	1.16E-01	1.16E-01	1.16E-01	1.38E-01	4.85E-01
Xe-135	Ci	4.29E-02	4.78E-02	4.49E-02	2.78E-02	1.63E-01
Xe-135m	Ci	2.86E-01	3.23E-01	2.89E-01	1.94E-01	1.09E+00
Xe-138	Ci	1.17E+00	1.33E+00	1.15E+00	8.30E-01	4.48E+00
Total for Period	**Ci**	**2.21E+00**	**2.43E+00**	**2.18E+00**	**3.21E+00**	**1.00E+01**
Iodines						
I-131	Ci	3.15E-05	8.50E-05	1.12E-04	1.08E-04	3.36E-04
I-133	Ci	4.68E-04	7.78E-04	1.11E-03	7.06E-04	3.06E-03
I-135	Ci	1.70E-04	<LLD	4.11E-04	1.11E-04	6.92E-04
Total for Period	**Ci**	**6.70E-04**	**8.63E-04**	**1.63E-03**	**9.25E-04**	**4.09E-03**
Particulates						
Mn-54	Ci	3.60E-05	2.92E-05	8.28E-05	1.09E-04	2.57E-04
Co-58	Ci	1.38E-05	2.06E-05	3.83E-05	3.80E-05	1.11E-04
Co-60	Ci	1.25E-04	1.09E-04	2.25E-04	2.22E-04	6.80E-04
Zn-65	Ci	8.90E-05	5.71E-05	1.46E-04	1.51E-04	4.43E-04
Sr-89	Ci	7.07E-06	9.19E-06	1.09E-05	6.85E-06	3.40E-05
Ag-110m	Ci	<LLD	<LLD	2.60E-06	2.96E-06	5.56E-06
Sn-117m	Ci	4.53E-06	<LLD	5.42E-06	5.00E-06	1.50E-05
Ba-140	Ci	<LLD	<LLD	4.92E-06	<LLD	4.92E-06
Total for Period	**Ci**	**2.75E-04**	**2.25E-04**	**5.16E-04**	**5.35E-04**	**1.55E-03**
Tritium						
H-3	Ci	**2.22E+00**	**1.04E+01**	**6.09E+00**	**5.67E+00**	**2.44E+01**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**3.67E+00**	**3.68E+00**	**3.74E+00**	**2.66E+00**	**1.38E+01**

Table 25, Gaseous Effluents – Elevated Level Release Batch Mode Unit 3

Radionuclide Released	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total for year**
Fission Gases						
Ar-41	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Iodines						
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Particulates						
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	**Ci**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Carbon-14						
C-14	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 26, Gaseous Effluents – Elevated Level Release Continuous Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission Gases						
Ar-41	Ci	2.20E-01	2.20E-01	2.20E-01	5.07E-01	1.17E+00
Kr-85m	Ci	3.07E-02	3.03E-02	2.95E-02	2.79E-02	1.18E-01
Kr-87	Ci	3.56E-02	3.67E-02	3.05E-02	4.69E-02	1.50E-01
Kr-88	Ci	1.90E-02	2.03E-02	1.47E-02	2.54E-02	7.93E-02
Xe-133	Ci	9.10E-02	9.09E-02	9.11E-02	1.09E-01	3.82E-01
Xe-135	Ci	2.74E-02	3.01E-02	2.87E-02	3.96E-02	1.26E-01
Xe-135m	Ci	2.02E-01	2.25E-01	2.07E-01	2.93E-01	9.29E-01
Xe-138	Ci	7.60E-01	8.43E-01	7.31E-01	1.12E+00	3.46E+00
Total for Period	**Ci**	**1.39E+00**	**1.50E+00**	**1.35E+00**	**2.17E+00**	**6.41E+00**
Iodines						
I-131	Ci	4.14E-05	8.93E-05	9.02E-05	9.58E-05	3.17E-04
I-133	Ci	5.90E-04	8.10E-04	8.93E-04	6.40E-04	2.93E-03
I-135	Ci	2.35E-04	<LLD	3.35E-04	1.00E-04	6.71E-04
Total for Period	**Ci**	**8.67E-04**	**8.99E-04**	**1.32E-03**	**8.36E-04**	**3.92E-03**
Particulates						
Mn-54	Ci	4.64E-05	3.27E-05	6.73E-05	9.85E-05	2.45E-04
Co-58	Ci	1.73E-05	2.23E-05	3.11E-05	3.47E-05	1.05E-04
Co-60	Ci	1.58E-04	1.16E-04	1.82E-04	2.04E-04	6.60E-04
Zn-65	Ci	1.13E-04	6.23E-05	1.19E-04	1.39E-04	4.33E-04
Sr-89	Ci	7.07E-06	9.19E-06	1.09E-05	6.85E-06	3.40E-05
Ag-110m	Ci	<LLD	<LLD	2.09E-06	2.75E-06	4.84E-06
Sn-117m	Ci	5.59E-06	<LLD	4.39E-06	4.51E-06	1.45E-05
Ba-140	Ci	<LLD	<LLD	3.95E-06	<LLD	3.95E-06
Total for Period	**Ci**	**3.47E-04**	**2.43E-04**	**4.21E-04**	**4.90E-04**	**1.50E-03**
Tritium						
H-3	Ci	**2.62E+00**	**1.11E+01**	**4.90E+00**	**4.91E+00**	**2.36E+01**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Carbon-14						
C-14	Ci	**3.64E+00**	**3.68E+00**	**3.54E+00**	**3.76E+00**	**1.46E+01**

2.0 LIQUID EFFLUENTS

Table 27, Liquid Effluents – Summation of All Releases Unit 1[1]

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	1.95E+01
2. Average diluted concentration	µCi/mL	N/A	N/A	N/A	N/A	N/A	
B. Tritium							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.37E+00
2. Average diluted concentration	µCi/mL	N/A	N/A	N/A	N/A	N/A	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	N/A	N/A	N/A	N/A	N/A	2.03E+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/A	N/A	N/A	N/A	N/A	2.00E+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	N/A	N/A	N/A	N/A	N/A	
F. Volume of Dilution Water Used During Period	Liters	N/A	N/A	N/A	N/A	N/A	

[1] % of limit is provided in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary

Table 28, Liquid Effluents – Summation of All Releases Unit 2[1]

A. Fission & Activation Products	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Annual**	**Est. Total Error %**
1. Total Release	Ci	<LLD	<LLD	<LLD	2.66E-04	2.66E-04	1.95E+01
2. Average diluted concentration	µCi/mL	<LLD	<LLD	<LLD	2.69E-11	2.69E-11	
B. Tritium							
1. Total Release	Ci	<LLD	<LLD	<LLD	3.08E-01	3.08E-01	2.37E+00
2. Average diluted concentration	µCi/mL	<LLD	<LLD	<LLD	3.12E-08	3.12E-08	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.03E+01
2. Average diluted concentration	µCi/mL	<LLD	<LLD	<LLD	<LLD	<LLD	
D. Gross Alpha Activity							
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.00E+01
2. Average diluted concentration	µCi/mL	<LLD	<LLD	<LLD	<LLD	<LLD	
E. Volume of Waste Released (prior to dilution)	Liters	<LLD	<LLD	<LLD	9.33E+04	9.33E+04	
F. Volume of Dilution Water Used During Period	Liters	<LLD	<LLD	<LLD	9.87E+09	9.87E+09	

[1] % of limit is provided in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary

Table 29, Liquid Effluents – Summation of All Releases Unit 3[1]

A. Fission & Activation Products	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Est. Total Error %
1. Total Release	Ci	<LLD	<LLD	<LLD	2.66E-04	2.66E-04	1.95E+01
2. Average diluted concentration	μCi/mL	<LLD	<LLD	<LLD	2.69E-11	2.69E-11	
B. Tritium							
1. Total Release	Ci	<LLD	<LLD	<LLD	3.08E-01	3.08E-01	2.37E+00
2. Average diluted concentration	μCi/mL	<LLD	<LLD	<LLD	3.12E-08	3.12E-08	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.03E+01
2. Average diluted concentration	μCi/mL	<LLD	<LLD	<LLD	<LLD	<LLD	
D. Gross Alpha Activity							
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.00E+01
2. Average diluted concentration	μCi/mL	<LLD	<LLD	<LLD	<LLD	<LLD	
E. Volume of Waste Released (prior to dilution)	Liters	<LLD	<LLD	<LLD	9.33E+04	9.33E+04	
F. Volume of Dilution Water Used During Period	Liters	<LLD	<LLD	<LLD	9.87E+09	9.87E+09	

[1] % of limit is provided in Table 1, Dresden Clean Energy Center Unit 1 Dose Summary

Table 30, Liquid Effluents Batch Mode Unit 1

Radionuclide Released	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total for year**
Fission and Activation Products						
Cr-51	Ci	N/A	N/A	N/A	N/A	N/A
Mn-54	Ci	N/A	N/A	N/A	N/A	N/A
Fe-55	Ci	N/A	N/A	N/A	N/A	N/A
Fe-59	Ci	N/A	N/A	N/A	N/A	N/A
Co-57	Ci	N/A	N/A	N/A	N/A	N/A
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Nb-95	Ci	N/A	N/A	N/A	N/A	N/A
Zn-65	Ci	N/A	N/A	N/A	N/A	N/A
Ag-110m	Ci	N/A	N/A	N/A	N/A	N/A
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Cs-137	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Entrained Gases						
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 31, Liquid Effluents Continuous Mode Unit 1

Radionuclide Released	**Units**	**Quarter 1**	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Total for year**
Fission and Activation Products						
Cr-51	Ci	N/A	N/A	N/A	N/A	N/A
Mn-54	Ci	N/A	N/A	N/A	N/A	N/A
Fe-55	Ci	N/A	N/A	N/A	N/A	N/A
Fe-59	Ci	N/A	N/A	N/A	N/A	N/A
Co-57	Ci	N/A	N/A	N/A	N/A	N/A
Co-58	Ci	N/A	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A	N/A
Nb-95	Ci	N/A	N/A	N/A	N/A	N/A
Zn-65	Ci	N/A	N/A	N/A	N/A	N/A
Ag-110m	Ci	N/A	N/A	N/A	N/A	N/A
I-131	Ci	N/A	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A	N/A
Cs-137	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Tritium						
H-3	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Gross Alpha						
Alpha	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Entrained Gases						
Xe-133	Ci	N/A	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A	N/A
Total for Period	Ci	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Table 32, Liquid Effluents Batch Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission and Activation Products						
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	1.73E-05	1.73E-05
Fe-55	Ci	<LLD	<LLD	<LLD	8.12E-05	8.12E-05
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	5.29E-06	5.29E-06
Co-60	Ci	<LLD	<LLD	<LLD	5.97E-05	5.97E-05
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	4.93E-05	4.93E-05
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	5.27E-05	5.27E-05
Total for Period	Ci	<LLD	<LLD	<LLD	**2.66E-04**	**2.66E-04**
Tritium						
H-3	Ci	<LLD	<LLD	<LLD	**3.08E-01**	**3.08E-01**
Gross Alpha						
Alpha	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Entrained Gases						
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	<LLD	<LLD	<LLD

Table 33, Liquid Effluents Continuous Mode Unit 2

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission and Activation Products						
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Tritium						
H-3	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Entrained Gases						
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Table 34, Liquid Effluents Batch Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission and Activation Products						
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	1.73E-05	1.73E-05
Fe-55	Ci	<LLD	<LLD	<LLD	8.12E-05	8.12E-05
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	5.29E-06	5.29E-06
Co-60	Ci	<LLD	<LLD	<LLD	5.97E-05	5.97E-05
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	4.93E-05	4.93E-05
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	5.27E-05	5.27E-05
Total for Period	Ci	<LLD	<LLD	<LLD	**2.66E-04**	**2.66E-04**
Tritium						
H-3	Ci	<LLD	<LLD	<LLD	**3.08E-01**	**3.08E-01**
Gross Alpha						
Alpha	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Entrained Gases						
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	<LLD	<LLD	<LLD

Table 35, Liquid Effluents Continuous Mode Unit 3

Radionuclide Released	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for year
Fission and Activation Products						
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Tritium						
H-3	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Gross Alpha						
Alpha	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**
Entrained Gases						
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

Attachment 2, Solid Waste Information

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

Table 36, Types of Solid Waste Summary Site

Types of Waste	Total Volume (m3)	Total Activity (Ci)	Est. Total Error (%)
a. Spent resins, filter sludges, evaporator bottoms, etc.	1.79E+02	1.70E+02	25
b. Dry compressible waste, contaminated equip, etc.	6.78E+02	1.24E+00	25
c. Irradiated components, control rods, etc.	1.47E-01	4.07E+01	25
d. Other (describe)	3.84E+01	4.28E-02	25

2.0 ESTIMATE OF MAJOR NUCLIDE COMPOSITION (BY WASTE TYPE) ONLY >1% ARE REPORTED.

Table 37, Major Nuclides Site

Major Nuclide Composition	%	Curies
a. Spent resins, filter sludges, evaporator bottoms, etc.		
Co-60	53.88	9.18E+01
Cs-137	8.04	1.37E+01
Fe-55	26.16	4.46E+01
Ni-63	3.77	6.42E+00
Mn-54	2.59	4.41E+00
Zn-65	2.23	3.80E+00
b. Dry compressible waste, contaminated equip, etc.		
Fe-55	37.61	4.67E-01
Co-60	40.62	5.04E-01
Mn-54	5.84	7.25E-02
Zn-65	5.47	6.78E-02
Cr-51	4.54	5.64E-02
Ni-63	1.00	1.25E-02
Co-58	1.34	1.66E-02
Fe-59	1.28	1.59E-02

Attachment 2, Solid Waste Information

Table 37, Major Nuclides Site (Continued)

Major Nuclide Composition	%	Curies
c. Irradiated components, control rods, etc.		
Fe-55	7.45	3.03E+00
Co-60	28.13	1.15E+01
Ni-63	4.76	1.94E+00
Sb-125	59.44	2.42E+01
d. Other (describe)		
Fe-55	37.27	1.60E-02
Co-60	40.12	1.72E-02
Mn-54	5.88	2.52E-03
Cr-51	5.09	2.19E-03
Zn-65	5.53	2.37E-03
Co-58	1.43	6.16E-04
Fe-59	1.41	6.06E-04

3.0 SOLID WASTE DISPOSITION

Table 38, Solid Waste Disposition Site

Number of Shipments	Mode of Transportation	Destination
21	Hittman Transport	Energy Solution Services (Bear Creek) 1560 Bear Creek Road
25	Hittman Transport	Energy Solutions Clive CWF Clive Containerized Waste Facility
11	Hittman Transport	Energy Solution Clive BWF Clive Bulk Waste Facility

4.0 IRRADIATED FUEL DISPOSITION

None

Attachment 3, 2025 Annual RGPP Monitoring Report

See attached report.

Attachment 4, ERATTA/Corrections to Previous ARERR

1.0 ERRATA

1.1 2024 ARERR

1.1.1 Correction to 2024 Section 2.0, Executive Summary

2.0 EXECUTIVE SUMMARY

Dresden Clean Energy Center (DCEC) 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 Technical Specifications,10 CFR 20, and by 40 CFR 190. Operational doses to the public during 2024 were calculated to be within the limits required by regulation and compared to other sources of radiation dose and pose no health hazard. These doses are summarized and compared to the regulatory limits in Section 2.1 Comparison to Regulatory Limits below.

The Annual Radioactive Effluent Release Report (ARERR) is published per REC requirements and provides data related to plant operation, including: quantities of radioactive materials released in liquid and gaseous effluents; radiation doses to members of the public; solid radioactive waste shipped offsite for processing or direct disposal; and other information as required by site licensing documents.

In 2024, the gaseous effluent dose assessments for locations from the Land Use Census showed that the critical receptor for Dresden Clean Energy Center is the infant. The maximum Annual Organ Dose calculated for this receptor from the site was 2.14E-02 mrem to the thyroid.

The maximum dose calculated to any organ due to radioactive liquid effluents was 1.92E-09 mrem for child total body.

Solid radioactive waste shipped offsite for processing or direct disposal included 1.48E+02 Curies and 1.02E+03 m^3, shipped in 48 shipments.

In addition to monitoring radioactive effluents, DCEC has a Radiological Environmental Monitoring Program (REMP) that monitors for levels of radiation and radioactive materials in the local environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).

Amended version of 2024 Section 2.0 Executive Summary

2.0 EXECUTIVE SUMMARY

Dresden Clean Energy Center (DCEC) 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 Technical Specifications,10 CFR 20, and by 40 CFR 190. Operational doses to the public during 2024 were calculated to be within the limits required by regulation and compared to other sources of radiation dose and pose no health hazard. These doses are summarized and compared to the regulatory limits in Section 2.1 Comparison to Regulatory Limits below.

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In 2024, the gaseous effluent dose assessments for locations from the Land Use Census showed that the critical receptor for Dresden Clean Energy Center is the infant. The maximum Annual Organ Dose calculated for this receptor from the site was 2.14E-02 mrem to the thyroid.

The maximum dose calculated to any organ due to radioactive liquid effluents was 1.92E-09 mrem for child total body.

Solid radioactive waste shipped offsite for processing or direct disposal included ~~1.48E+02~~ 1.40E+02 Curies and ~~1.02E+03~~ 6.01E+02 m^3, shipped in ~~48~~ 42 shipments.

In addition to monitoring radioactive effluents, DCEC has a Radiological Environmental Monitoring Program (REMP) that monitors for levels of radiation and radioactive materials in the local environment. Data from the REMP is published in the Annual Radiological Environmental Operating Report (AREOR).