U.S. DEPARTMENT of ENERGY | Office of Environmental Management

Annual Site Environmental Report

CALENDAR YEAR 2024

PREPARED BY
West Valley Cleanup Alliance, LLC

PREPARED FOR
U.S. Department of Energy
DOE – WVDP

UNDER CONTRACT
89303325DEM000121

September 2025
10282 Rock Springs Road
West Valley, New York 14171-9799

Cover photo credits:
Marty Regan
Robert McCloud
Marty Regan
Robert McCloud

Department of Energy
West Valley Demonstration Project
10282 Rock Springs Road
West Valley, NY 14171-9799

To the Reader:

This report, prepared by the United States (U.S.) Department of Energy (DOE) West Valley Demonstration Project (WVDP), represents a single, comprehensive summary of on-site and off-site environmental data collected during calendar year 2024.

CH2M HILL BWXT West Valley, LLC (CHBWV) conducted Phase 1 Decommissioning activities at the WVDP since 2011 through CY 2025. In 2024, West Valley Cleanup Alliance, LLC (WVCA) was awarded the WVDP Phase 1B Deactivation and Demolition (D&D) Contract by the DOE-EM and succeeded the WVDP decommissioning work from CHBWV as of June 23, 2025.

Monitoring and surveillance of the WVDP facilities are conducted to verify that public health and safety and the environment are protected. Environmental requirements and pollution prevention are integrated into work planning and execution. The quality assurance requirements applied to the environmental monitoring program by CHBWV and the DOE confirm the validity and accuracy of the monitoring data.

At the WVDP, radiological activities are conducted so that public exposure to ionizing radiation will be kept as low as reasonably achievable and will not cause a total effective dose exceeding 100 mrem in a year, per DOE Order 458.1 Chg 4 "Radiation Protection of the Public and the Environment." Radiological air emissions are controlled and permitted by the U.S. Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants, Subpart H, regulations. Liquid effluent discharges are controlled and permitted through the New York State Pollutant Discharge Elimination System (SPDES). Hazardous and mixed wastes are managed in accordance with the Resource Conservation and Recovery Act (RCRA) interim status regulations and the New York State Environmental Conservation Law.

Air, surface water, groundwater, stormwater, soil, sediment, and biological samples are collected and analyzed for radiological and nonradiological constituents as part of a site-wide environmental monitoring program. The resulting data are evaluated to assess the effects of activities at the WVDP on the nearby public and the environment.

The dose to the critical receptor from airborne radiological emissions in 2024 was estimated to be 1.8% of the 10-millirem (mrem) EPA limit. The dose from combined airborne and waterborne radiological releases in 2024 was estimated to be 0.18% of the 100-mrem DOE limit, verifying that the dose received by off-site residents continues to be well below regulatory limits.

The WVDP employees achieved 707,503 consecutive safe work hours without a lost-time work injury or illness in 2024, while accomplishing complex decontamination, deconstruction, and waste management activities.

If you have any questions or comments about the information in this report, please contact WVDP Communications at (716) 942-4996 or by e-mail at joseph.pillittere@wvdp.doe.gov. You are also encouraged to complete and return the enclosed survey.

Sincerely,

Bryan C. Bower, Director
West Valley Demonstration Project

WVDP Annual Site Environmental Report

Can We Make This Report More Useful to You?

We want to make the *WVDP Annual Site Environmental Report* useful to its readers. Please take a few minutes to let us know if the report meets your needs. You can e-mail or mail this survey, or call WVDP Communications at:

telephone: (716) 942-4996
e-mail: Joseph.Pillittere@wvdp.doe.gov
mailing address: WEST VALLEY DEMONSTRATION PROJECT
10282 ROCK SPRINGS ROAD
WEST VALLEY, NY 14171

1. How do you use the *WVDP Annual Site Environmental Report?*

☐ To learn general information about the WVDP
☐ To learn about doses received for the current year
☐ To learn about site compliance information
☐ To gather effluent or environmental surveillance data
☐ Other: _____

2. Does the *WVDP Annual Site Environmental Report* contain enough:

a. Useful illustrations and graphs? ☐ Yes ☐ No
b. Project background information? ☐ Yes ☐ No
c. Scientific background information? ☐ Yes ☐ No
Comments: _____

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☐ Graduate degree: ☐ Scientific ☐ Nonscientific
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☐ Little or no scientific background

West Valley Demonstration Project

Annual Site Environmental Report

for

Calendar Year 2024

Prepared for the U.S. Department of Energy

West Valley Demonstration Project Office

Under: Contract 89303325DEM000121

by

West Valley Cleanup Alliance, LLC

10282 Rock Springs Road

West Valley, New York 14171-9799

September 2025

A view of the site from Dutch Hill. The WVDP is located in a sparsely populated rural area
(Photographed before the start of deconstruction)

This report and previous Annual Site Environmental Reports (ASERs)
are available on the DOE-WVDP website https://www.energy.gov/wvdp/west-valley-demonstration-project-homepage.
Requests for digital copies of the 2024 ASER and questions
regarding the report should be referred to:

Joseph Pillittere, Director, Communications & External Affairs
West Valley Cleanup Alliance
10282 Rock Springs Road,
West Valley, New York 14171.
Telephone: (716) 942-4996
E-mail: joseph.pillittere@wvdp.doe.com

NOTE: This document includes external hot links to internet web pages as well as internal hot links that allow the reader to readily navigate to a reference within this document. Hot links are underlined and in blue font.

Disclaimer

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EXECUTIVE SUMMARY

Purpose of This Report

The West Valley Demonstration Project (WVDP) is located on the site of the former and only commercial spent nuclear fuel reprocessing facility to have operated in the United States. This former reprocessing facility was built in 1963 and was operated by Nuclear Fuel Services, Inc. from 1966 to 1972. Since 1982, the site has been managed by the United States (U.S.) Department of Energy (DOE) under the direction of the DOE's Office of Environmental Management (DOE-EM). Although the spatial size of the WVDP is not large (152 acres) compared with other nuclear cleanup sites, the WVDP operates under the same rigorous level of DOE oversight as the larger sites, with site-specific procedural and regulatory requirements that align with its historical background. The WVDP is located within the 3,338-acre New York State-owned Western New York Nuclear Service Center (WNYNSC).

The Annual Site Environmental Report (ASER) for the WVDP describes the work performed each year and provides valuable information about environmental conditions at the WVDP for members of the public, the DOE Headquarters (HQ), and other interested stakeholders.

In accordance with DOE Order 231.1B Chg 1, "Environment, Safety, and Health Reporting," this document summarizes calendar year (CY) 2024 environmental monitoring data and describes the performance of the WVDP's environmental management system (EMS). The 2024 environmental monitoring data confirms that the WVDP activities remained in compliance with environmental standards and regulations during 2024. WVDP activities are conducted by DOE in cooperation with the New York State (NYS) Energy Research and Development Authority (NYSERDA).

Project Status

In 1980, Congress passed Public Law 96-368 (the WVDP Act), which is included in its entirety in Appendix H. The Act requires the DOE to:

1) Solidify the high-level radioactive waste (HLW) at the WVDP by vitrification into a form suitable for transportation and disposal.

2) Develop containers suitable for the permanent disposal of the HLW.

3) As soon as feasible, transport the solidified HLW to an appropriate federal repository for permanent disposal.

4) Dispose of low-level radioactive waste (LLW) and transuranic (TRU) waste produced by the solidification of HLW at the WVDP.

5) Decontaminate and decommission:

    a. tanks and other facilities where the HLW was stored;

    b. facilities used in the solidification of the waste, and;

    c. any material or hardware used in connection with the project.

As per the WVDP Act requirements, 1) and 2) were completed by September 2002. The remaining requirements of the WVDP Act are or will be addressed consistent with the National Environmental Policy Act (NEPA) process.

Record of Decision (ROD). In April 2010, the DOE released a Record of Decision (ROD) for the Final Environmental Impact Statement (Final EIS or FEIS) for the WVDP and the WNYNSC ("Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center," DOE/

EIS-0226, issued on January 29, 2010). In the FEIS, the DOE and NYSERDA evaluated four alternatives: Site-wide Removal, Site-wide Close-In-Place, Phased Decisionmaking, and No Action. Phased Decisionmaking was selected as the preferred alternative. Under this alternative, decommissioning is being conducted in two phases. Phase 1 studies were performed to provide technical evaluations that support the preparation of the Supplemental EIS (SEIS). These studies were completed in 2018.

These documents are found at https://www.energy.gov/wvdp/document-index.

Phase 1 Site Decommissioning involves the removal of a number of contaminated facilities, soil remediation, soil and facility characterization, and focused studies that will facilitate future decisionmaking for the remaining facilities or areas on the property.

Phase 2 will address the Waste Tank Farm (WTF), the waste disposal areas, the Construction and Demolition Debris Landfill (CDDL), and the non-source area of the groundwater plume. The DOE intends to complete the remaining WVDP decisionmaking with its Phase 2 decision in the SEIS. The SEIS will evaluate a range of alternatives including removal, in-place closure, and a combination of those two.

Development of the Probabilistic Performance Assessment (PPA) and preparation of the draft SEIS continued in 2024. The DOE and NYSERDA will use the PPA to evaluate the SEIS alternatives. The draft SEIS is expected to be published in 2025.

Contract Update

CH2M HILL BWXT West Valley, LLC (CHBWV) conducted Phase 1 Decommissioning activities at the WVDP from 2011 through 2024. In 2024, West Valley Cleanup Alliance, LLC (WVCA) was awarded the WVDP Phase 1B Deactivation and Demolition (D&D) Contract by the DOE-EM and succeeded the WVDP decommissioning work from CHBWV as of June 23, 2025. This 2024 ASER is published in October 2025 under the WVCA contract, however, this report uses CHBWV when referring to the site activities performed in 2024.

2024 Accomplishments

In September 2022, the controlled deconstruction of the Main Plant Process Building (MPPB), a major project in Phase 1 decommissioning, began after years of thorough planning and deactivation activities. The deconstruction continued throughout 2024 while the on-site and off-site environment was monitored rigorously. As of the end of 2024, about 75% of planned deconstruction work had been completed. The entire deconstruction was expected to take approximately 33 months. The deconstruction completed on June 25, 2025.

The parts of the MPPB structure deconstructed in 2024 included: the Equipment Decontamination Room, the Chemical Operating Aisle (COA), the majority of the Mechanical Operating Aisle (MOA), the Upper and Lower Extraction Aisles (UXA & LXA), the Upper and Lower Warm Aisle (UWA & LWA), the Ventilation Wash Room (VWR), and the so-called “Green Giant,” the sampler system inside the Chemical Process Cell (CPC.) For waste disposal, the remaining four High Integrity Containers (HICs) and the last remaining five containers of legacy waste were shipped to the NNSS in 2024.

2024 Continued Projects

Permeable Treatment Wall (PTW) Performance. Overall, the PTW installed in November 2010 continues to mitigate the groundwater plume, reducing the concentrations downgradient through 2024. Since 2021, elevated strontium-90 activity has been detected in a few PTW wells and in the wells downgradient of the PTW. A study to identify methods to enhance the effectiveness and increase the longevity of the PTW, which included the collection of soil, zeolite, and groundwater for laboratory testing, was completed in 2024, and provided several recommendations, which are being evaluated for future implementation.

Tank 8D-4 (high-level waste storage tank) Sampling and Decommissioning. Tank liquid samples obtained in late 2023 were shipped off site for radioisotope and general chemistry analyses in February 2024. Other progresses made in 2024 includes video inspection of the tank interior, development and testing of a sludge sampling system, and obtaining sludge samples from various locations within the tank.

Compliance

The WVDP continued to operate in compliance with all applicable federal, state, and county environmental laws, regulations, permits, and standards in 2024. (See Chapter 2, "Environmental Compliance Summary".)

In 2024, there were:

- No New York State Pollutant Discharge Elimination System (SPDES) permit effluent limit noncompliance events.
- No exceedances of the U.S. Environmental Protection Agency's (EPA's) National Emission Standards for Hazardous Air Pollutants (NESHAP) dose standard.
- No exceedances of the all pathway dose standard in DOE Order 458.1 Chg 4, "Radiation Protection of the Public and the Environment."

In collaboration with the New York State Department of Environmental Conservation (NYSDEC), the WVDP continued to perform whole effluent toxicity (WET) testing on lagoon 3 discharges in 2024.

Worker Safety

As of December 31, 2024, CHBWV and its subcontractors achieved 707,503 consecutive work hours without lost-time work because of accidents or illness. There were 0 hours of lost time attributed to injury or illness in CY 2024.

Environmental Management System (EMS)

Following the third-party on-site audit in April 2024, the CHBWV EMS was recommended for continued certification under the EMS standard International Organization for Standardization (ISO) 14001:2015.

Environmental monitoring continued on site and off site in 2024 to detect changes in the environment resulting from the WVDP project or historical site activities on the environment or human population. Airborne and waterborne effluents and biota were sampled in accordance with the WVDP environmental monitoring program. There were no unplanned releases in 2024.

Preparation of closure certification reports for deconstructed structures for the Resource Conservation and Recovery Act (RCRA) continued in 2024. In 2024, certification reports for the Analytical & Process Chemistry (A&PC) and Lag Storage Area (LSA) #2 Hardstand were submitted to NYSDEC.

Environmental Monitoring

Airborne Radiological Monitoring Program. During 2024, monitoring of radiological emissions from on-site NESHAP-approved emission points, including three active on-site building/facility stacks and up to 15 portable ventilation units (PVUs), continued.

Off-site ambient air monitoring continued at the 16 ambient air sampling stations that surround the WNYNSC premises. The ambient air monitors were in operation 98.7% of the time in 2024. Measurement results demonstrated that airborne releases to the environment were well within permissible limit (Table C-6).

Surface Water Radiological Releases Monitoring Program. Waterborne radiological releases from the site were measured at two natural streams, sampled at locations WNSWAMP and WNSW74A, and one controlled outfall discharging from lagoon 3, sampled at outfall 001 (location code WNSP001) (Figure 4-4 in Chapter 4). Off-site surface water was sampled at two downstream locations, WFFELBR and WFBCTB. (See Figure 4-8.) All measurements demonstrated that waterborne releases to the environment were within permissible limits.

Groundwater Monitoring Program. Radiological isotopes and nonradiological chemical parameters and water levels were routinely monitored at 64 wells and seepage locations across the WVDP site. Two metals, chromium and nickel, have been detected above their NYS Technical Standards at three wells; the source of these detections is believed to be corrosion of the stainless steel well screens. Tributyl phosphate (TBP) was detected at one monitoring well, but the concentration of this chemical has been

decreasing steadily over time. Elevated levels of strontium-90 are present within the well-defined groundwater plume on the north plateau and are also observed in some isolated areas within and downgradient of the PTW, which continues to be monitored closely. The sampling results of emerging contaminants identified by the EPA (organic chemicals such as 1,4-dioxane and 1,2,3-trichloropropane) in groundwater were nondetects.

Drinking Water Monitoring Program. In accordance with the Cattaraugus County Health Department (CCHD) requirements, sampling for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane was performed on the drinking water supply wells in 2024, and all results were less than the analytical detection limits. According to the EPA's final rule on PFAS limits, issued in April 2024, and the ASER Guideline, the PFAS sampling reporting format has been updated in this 2024 ASER. Tables B-5I and B-5J now include six PFAS species and the EPA Hazard Index.

Radiological Dose Assessment

Airborne dose. The estimated dose in 2024 from airborne emissions from the WVDP activities was determined based on the data from the ambient air samplers. The total estimated annual dose from airborne emissions from point sources and ambient air in 2024 was 0.18 millirem (mrem) (0.0018 millisievert [mSv]). Compliance with the airborne dose regulations was demonstrated based on the annual average radioisotopic concentrations at the 16 off-site air samplers, where the averages were all well below the 10-mrem/yr (0.1 mSv) limit established by the EPA.

Waterborne dose. The estimated dose in 2024 from waterborne sources was 0.004 mrem (0.00004 mSv) based on measurements of the radioactivity in discharges from the site.

The total estimated maximum potential dose based on emissions from both airborne and waterborne sources in 2024 was 0.184 mrem (0.00184 mSv), which is well below the annual 100-mrem limit established by DOE Order 458.1. (See Table 5-2.) In comparison, the average dose to a member of the public in the U.S. from natural background and artificial sources is 620 mrem per year (National Council on Radiation Protection and Measurements [NCRP] Report No. 160, 2009).

Dose to Biota. Radioisotope concentrations in milk and venison (white-tailed deer) samples collected near the site were indistinguishable from concentrations of background (control) samples. The dose to biota evaluation for 2024 concluded that aquatic and terrestrial biota populations (both plants and animals) were not exposed to doses above the DOE biota dose standard of 1 rad/day (radiation absorbed dose) for aquatic animals and terrestrial plants, and 0.1 rad/day for riparian and terrestrial animals.

Quality Assurance (QA)

The data presented in this report are validated in accordance with WVDP QA procedures. The WVDP QA program includes evaluations of the performance of subcontract laboratories and routine assessments of the environmental and regulatory compliance programs. Subcontract laboratories that analyze WVDP environmental samples participated in independent radiological and nonradiological constituent performance evaluation studies. In these studies, environmental test samples with concentrations only known by the testing agency were analyzed by the laboratories. Of 195 performance evaluation analyses conducted for the WVDP, 96.9% were within accepted limits.

Conclusion

The WVDP complied with all environmental regulations and DOE directives and the project was operated in a safe manner throughout CY 2024. The environmental data collected and evaluated in 2024 indicate that the WVDP conducted the MPPB deconstruction and other site activities protecting site workers, the public and the environment, while preparing for the next phase of decommissioning.

CHAPTER 1
INTRODUCTION

Site History

The West Valley Demonstration Project (WVDP) is a U.S. Department of Energy (DOE)-operated cleanup site located within the New York State-owned Western New York Nuclear Service Center (WNYNSC) where commercial spent nuclear fuel reprocessing operations were previously conducted in the late 1960s and early 1970s.

The scope of the DOE's mission at the WVDP is established by the WVDP Act of 1980 (PL 98-356) (Appendix H), signed by President Jimmy Carter. The Act includes solidification of liquid high-level radioactive waste (HLW) that was generated from the prior commercial spent nuclear fuel (SNF) reprocessing operations, decontamination and decommissioning of facilities used in the solidification process, and disposal of waste generated. HLW solidification activities were completed in 2002, and in more recent years, significant facility decontamination and removal actions have been completed, as well as off-site shipment and disposal of low-level radioactive waste (LLW).

President Carter's remarks at the signing ceremony can be read at https://shorturl.at/no19D

The activities at the site in 2024 were primarily focused on the deconstruction of the building that had housed the former SNF reprocessing operations [the Main Plant Process Building (MPPB)], as well as waste packaging, storage, and off-site disposal. The deconstruction of the MPPB aboveground structure is completed in June 2025. For a more detailed site history timeline, refer to Table H-1 in the Appendix H, "West Valley Demonstration Project Act and the Timeline of the WVNSC and WVDP" of this report.

Site Location and General Environmental Setting

The WVDP is located in western New York State (NYS), about 30 miles (mi) (50 kilometers [km]) south of Buffalo, New York. The WVDP facilities currently occupy a security-fenced area of about 152 acres (61 hectares [ha]) within the 3,338-acre (1,351 ha) WNYNSC premises located in the Town of Ashford in northern Cattaraugus County. An aerial photo of the WVDP is presented in Figure 1-2.

Climate. Although extremes of 99°F (37°C) and -20°F (-29°C) have been recorded in western New York (NY) (weather station: Buffalo, NY), the climate is moderate, with an average annual temperature of 48.1°F (8.9°C). (Average data for 1940 to 2024 from The National Weather Service, National Oceanic, and Atmospheric Administration [NOAA], https://www.ncdc.noaa.gov/cag). Precipitation is markedly influenced by Lake Erie to the west and, to a lesser extent, by Lake Ontario to the north.

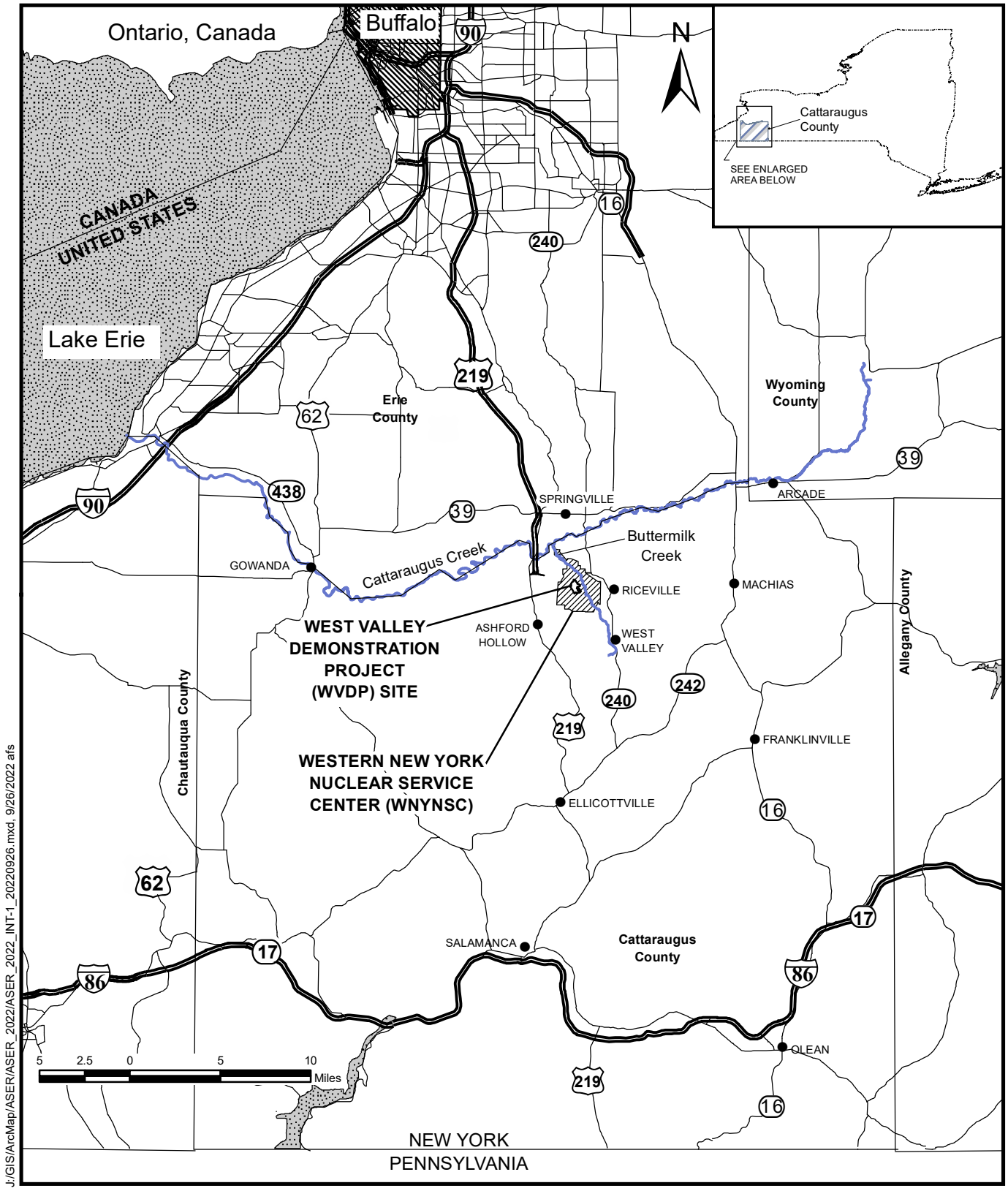
Based on data collected at the on-site meteorological tower, the recent 10-year average annual precipitation at the WVDP was 43.54 inches/year (110.59 cm). Total precipitation in 2024 was 43.96 inches (111.73 cm), very close to the 10-year average. Predominant wind directions are generally from the northwest and southeast that follow valleys extending toward Lake Erie, located north-northwest of the WVDP. The on-site meteorological tower continuously monitors the site-specific wind speed, wind direction, temperature, and barometric pressure. This data is accessible in real-time to site operations personnel.

Ecology. The WNYNSC lies within the northern deciduous forest biome, and the diversity of its vegetation is typical of the region. Equally divided between forest and open land, the WNYNSC premises provides a habitat attractive to white-tailed deer and various indigenous and migratory birds, reptiles, and small mammals. No species on the federal endangered species list are known to reside on the WNYNSC premises.

Geology and Hydrology. The WVDP premises lies on the Allegheny Plateau in New York State (NYS) at an elevation of approximately 1,300 to 1,450 feet (ft) (approximately 400 to 440 meters [m]) above mean sea level (MSL). The underlying geology

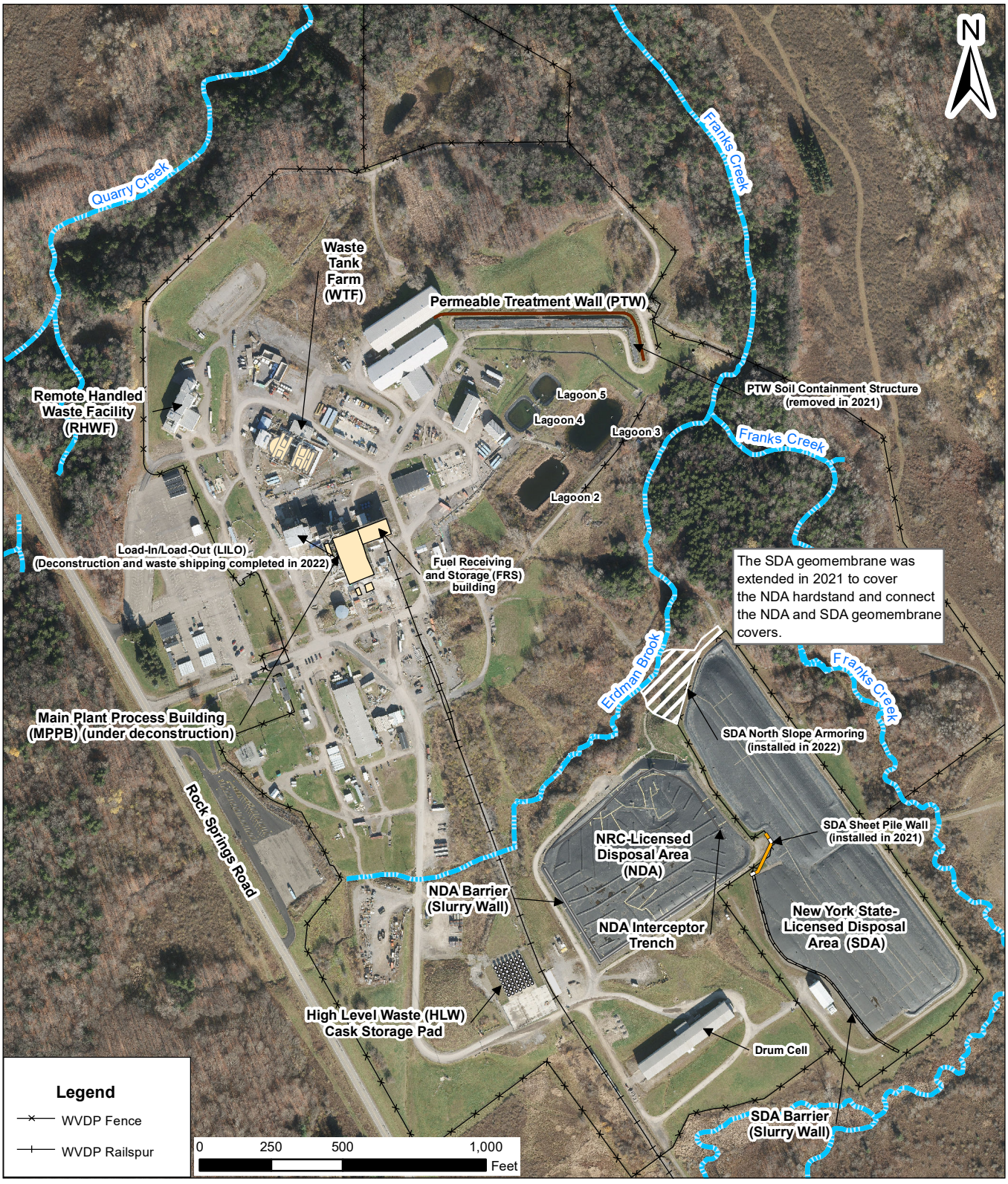
(continued on page 1-4)

FIGURE 1-1
Location of the Western New York Nuclear Service Center (WNYNSC)



J:/GIS/ArcMap/ASER/ASER_2022/ASER_2022_INT-1_20220926.mxd, 9/26/2022 afs

FIGURE 1-2
Aerial Photo of the West Valley Demonstration Project



Underlying aerial photograph was taken in November 2020.
Tan overlay highlights the Main Plant and the Waste Tank Farm at the end of CY 2024.

(continued from page 1-1)

includes a sequence of glacial sediments above shale bedrock. The WVDP site is drained by three small streams (Franks Creek, Quarry Creek, and Erdman Brook) and is divided by a stream valley (Erdman Brook) into two general areas: the north plateau and the south plateau.

Franks Creek, which receives drainage from Erdman Brook and Quarry Creek, flows into Buttermilk Creek, which enters Cattaraugus Creek and flows westward away from the WNYNSC premises. (See Figures A-1 and A-5 in Appendix A.) Cattaraugus Creek ultimately drains into Lake Erie to the northwest.

Relevant Demographics

Although several roads and a railway approach or pass through the WNYNSC, the public is prohibited from accessing the WNYNSC. A public deer hunting program on the WNYNSC premises managed by New York State Energy Research and Development Authority (NYSERDA) was suspended in 2022. No unescorted public access is allowed on the WVDP site.

Land near the WNYNSC is used primarily for agriculture and arboriculture. Cattaraugus Creek downstream of the WNYNSC is used locally for fishing and for recreational activities (such as swimming and kayaking). Although some water is taken from the creek to irrigate nearby golf course greens and tree farms, no public drinking water is drawn from the creek before it flows into Lake Erie. Water from Lake Erie is used as a public drinking water supply. Industrial water and potable water used for the WVDP activities are supplied by bedrock groundwater wells.

The communities of West Valley, Riceville, the town of Ashford, and the Village of Springville are located within approximately 5 miles (8 km) of the WVDP. The population around the site is sparse with an average population density of Cattaraugus County of about 58 persons/mi^2 (23 persons/km^2) (United States [U.S.] Census 2020). No major industries are located within this area.

Decommissioning Progress

The WVDP decommissioning consists of two major steps, Phase 1 and Phase 2. In January 2010, the DOE and NYSERDA issued the "Final Environmental Impact Statement (FEIS) for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center," DOE/EIS-0226. In the FEIS, the DOE and NYSERDA evaluated four alternatives: Site-wide Removal, Site-wide Close-In-Place, Phased Decisionmaking, and No Action. Phased Decisionmaking was identified as the preferred alternative. Under this alternative, it was decided that the decommissioning would be conducted in two phases. The work performed in 2024 to remove the above-grade portion of the MPPB was part of the Phase 1 decommissioning scope.

The DOE and NYSERDA are jointly preparing a Supplemental EIS (the SEIS) to implement the next phase (Phase 2) of decommissioning. The Proposed Action of the SEIS will address the decontamination and decommissioning of the facilities remaining at the WVDP site after the completion of Phase 1 decommissioning in accordance with the 2010 final EIS (FEIS) Record of Decision (ROD). Figure 1-3 on page 1-6 shows the timeline of decommissioning, SEIS, and major projects under each phase.

The SEIS is being prepared pursuant to the National Environmental Policy Act (NEPA) and the New York State Environmental Quality Review Act (SEQR). Phase 2 decisions will be informed by Phase 1 and other scientific studies being performed at the WVDP site. An explanation of Phase 1 and Phase 2 decommissioning work scope and a more detailed progress update for each of the SEIS study areas is provided in Chapter 2, "Environmental Compliance Summary" of this report.

Work on the long-term probabilistic performance assessment (PPA) for the WVDP site continued in 2024. The PPA simulates the outcomes of decommissioning and site end-stage alternatives, which are described in the FEIS, using computer modeling. The scenarios for simulation include HLW tank decommissioning options, erosion and natural disaster risk assessment, and a long-term health risk assessment. The simulation results will be evaluated in the SEIS.

The draft SEIS, including the DOE and NYSERDA preferred decommissioning alternative, is expected to be published in 2027. A six-month period for public comment on the SEIS will follow the issuance of the draft report. A final SEIS will subsequently be issued, followed by the Phase 2 decommissioning Record of Decision (ROD) and Findings Statement.

Timeline of the MPPB Deconstruction

June 2014
The original WNYNSC building structure

January 2018
Demolition of ancillary facilities

September 2018
Main stack removal

September 2022
MPPB deconstruction began

September 2024
The site landscape completely changed

By the end of 2030, the DOE expects to complete the decommissioning of the below-grade portions of the MPPB, as well as the Vitrification Facility (VF), where aboveground deconstruction was completed in 2019. The DOE will also complete the decommissioning of the site's radioactive water treatment system, including four active lagoons and one closed lagoon. By the end of 2032, the DOE expects to complete soil remediation efforts in the Waste Management Area (WMA)-1 and WMA-2. (See Figures A-9 and A-10 for the WMA boundaries.)

2024 Site Accomplishments

The WVDP continued to execute Phase 1 decommissioning work scope throughout 2024. The MPPB deconstruction project, which began in September 2022, continued to be a major focus of work activity during 2024.

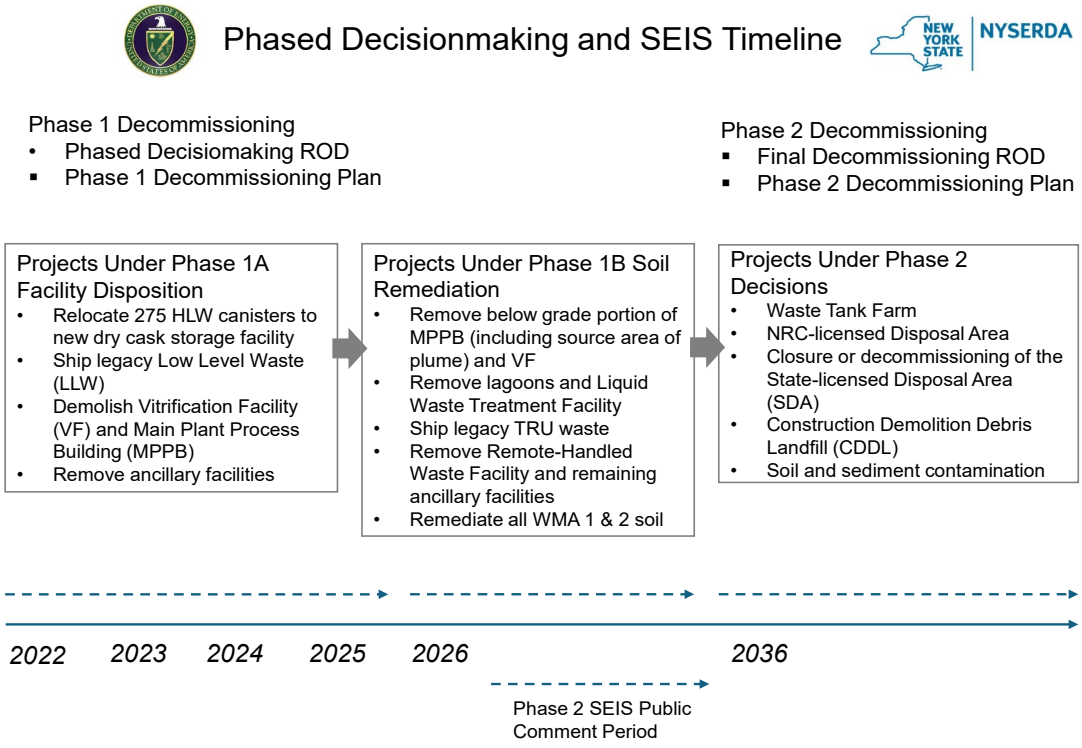
As of the end of 2024, approximately 75% of planned deconstruction work had been safely completed. An animation of the planned deconstruction sequence can be viewed on YouTube (https://www.youtube.com/watch?v=kobznp07Mow). The timeline of the MPPB deconstruction with major events can be seen on the previous page. At the end of 2024, the site landscape had been drastically changed as compared to 2022, prior to the initiation of the above-grade removal efforts .

MPPB Deconstruction and Waste Disposal

The following lists some of the deconstructed areas (cells) and associated off-site waste disposal completed in 2024:

- **Equipment Decontamination Room (EDR).** The EDR was located at the northwest corner of the process building. This area was serviced by two 10-ton cranes and was used to transfer glass canisters from the Vitrification Facility (VF) to the Chemical Process Cell (CPC) for storage. Remote operation was conducted through viewing windows.
- **The Chemical Operating Aisle (COA) and the Majority of the Mechanical Operating Aisle (MOA).** The various CPC support

FIGURE 1-3



system valving (cooling water, steam, sampling, etc.) was performed in the area. The MOA was the operating aisle that supported the former Process Mechanical Cell (PMC) operations associated with SNF reprocessing. Deconstruction of COA and MOA began in 2023 and was completed in 2024.

- **Upper and Lower Extraction Aisles (UXA & LXA).** The UXA served as an operational aisle for the CPC. The LXA was the operating aisle for the Extraction Cells (XCs), the Product Purification Cell (PPC), and the Uranium Product Cell (UPC).
- **Upper and Lower Warm Aisle (UWA & LWA).** Process transfer pumps and valves were located in the UWA and LWA. The pumps were housed within shielded niches; chain hoists removed the niche cover for access into the pipe area.
- **Ventilation Wash Room (VWR).** The VWR was located next to the Process Mechanical Cell (PMC) and vented the Liquid Waste Cell (LWC). The VWR consisted of the air washer, a circulation pump, and various ductwork.
- **"Green Giant".** The sampler system inside the CPC, nicknamed "Green Giant", held samples from various vessels used for spent fuel processing operations. It weighed 1,100 lbs and was shielded with 75,000 lbs of steel and lead shield plates on the outside of it. The sampler system moved the samples to the Analytical & Process Chemistry (A&PC) Sample Storage Cell (SSC) using a small elevator and conveyor inside the wall.

Radiological Waste Disposition

The WVDP utilized three primary disposal facilities for the site's radiological waste disposition in 2024: Energy Solutions in Utah, Waste Control Specialists (WCS) in Texas, and the Nevada Nuclear Security Site (NNSS) in Nevada.

- **High Integrity Containers (HICs).** Eight HICs contained highly radioactive resin-like material used in the filters in the Fuel Receiving and Storage (FRS) building pool that was previously used to store the spent fuel rods during the original Nuclear Fuel Services, Inc. (NFS) project in the late 1960s and early 1970s. The four HICs were shipped off site in 2023 and the remaining four HICs were shipped to the WCS in 2024.
- **CPC Degraded Containers.** The planning and preparation for the disposition of the highly radioactive CPC Degraded Containers began in 2022 and continued in 2024. Progress during the year included transfer to the Remote Handled Waste Facility (RHWF) to support readiness for packaging, and the fabrication of specialty containers to be used to support transportation and off-site disposal. Shipment for the remaining two containers is planned for 2025.
- **Legacy Oversized Containers.** Shipment of legacy oversized waste began in 2022 and continued in 2024.; two of them were pumps used at the WTF. The last remaining five containers were shipped to the NNSS in March 2025.

Other Continued Projects in 2024

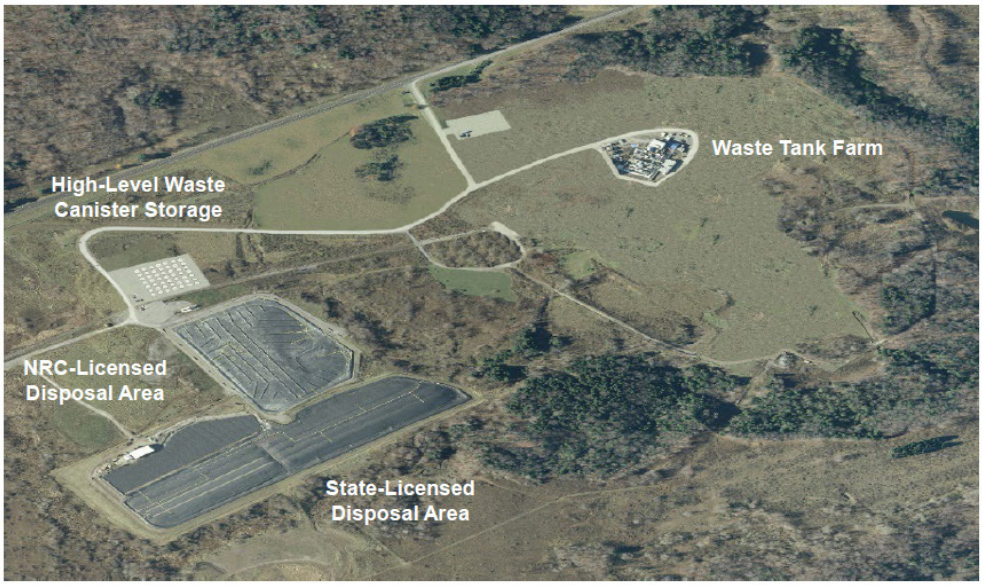
- **Former HLW 8D-4 Tank Sampling.** Significant milestones in tank liquid and sludge characterization were achieved in 2024. Tank liquid samples obtained in late 2023 were shipped off site for radioisotope and general chemistry analyses in February 2024. Steps taken to verify the liquid level of the 8D-4 tank and an interior inspection were completed in February 2024. Characterization of 8D-4 tank contents will continue in 2025. For more details, see Chapter 2, "Environmental Compliance Summary."
- **Permeable Treatment Wall (PTW) Performance Evaluation.** The discussions to evaluate PTW performance continued in 2024. Based on the samples collected in 2023, several options to extend the longevity of the wall (installed in 2010), were presented to the DOE and NYSERDA. Currently, the DOE and NYSERDA are evaluating these options.
- **Resource Conservation and Recovery Act (RCRA) Closures**. The demolition of the A&PC Hot Cells was completed and the final RCRA Hazardous Waste Closure Certification Report for A&PC was submitted. The Hazardous Waste Closure Certification report was submitted for Lag Storage Area (LSA) #2 Hardstand.

Projects in 2025

The deconstruction of the above-grade structure of the MPPB and shipment of the demolition waste, a major milestone in Phase 1 decommissioning, was completed in June 2025. Following the MPPB above-grade removal, a weather protective cover was placed over the remaining concrete foundation of the building footprint. 8D-4 tank sludge characterization and the disposal of additional legacy waste is also expected to be completed in 2025.

The DOE initiated a new contract in June 2025 to continue with Phase 1 decommissioning work (Phase 1B decommissioning). In addition to continuing site waste management and operational support functions, a significant aspect of the work in 2025 will be planning and preparations for the eventual removal of the MPPB foundation and below-grade structures and associated soils. Figure 1-4 shows the planned end state of the Phase 1B decommissioning, anticipated to occur over a 10-to-15-year timeframe. The WVDP will continue to execute its project in a safe manner for the workers, the nearby public and the environment.

Figure 1-4
Phase 1B End State Goal – Remaining Facilities



CHAPTER 2

ENVIRONMENTAL COMPLIANCE SUMMARY

2024 Highlights

Water Releases: All State Pollutant Discharge Elimination System (SPDES) discharges were within applicable SPDES permit limits in 2024. The results of the SPDES whole effluent toxicity (WET) tests performed during 2024 were compliant with SPDES permit limits.

Waste Management: In 2024, 678 boxes, 12,451 tons of wastes (including general debris and specialty wastes), were shipped off site. As of the end of 2024, about 90% of the wastes expected to be generated during the MPPB deconstruction were boxed, shipped and received by the disposal facility.

Resource Conservation and Recovery Act (RCRA) Closure Activities: Quarterly Progress Reports for the RCRA §3008(h) Administrative Order on Consent and Quarterly Exception Reports for RCRA Groundwater Monitoring Results were submitted to NYDEC on schedule. The RCRA Closure Certification Reports for the LSA #2 Hardstand and the A&PC Hot Cells were submitted in 2024 and accepted by NYSDEC in early 2025 to document clean closure of these units.

National Environmental Policy Act (NEPA): SEIS scoping and the preparation of draft SEIS and the PPA modeling continued in 2024. The draft SEIS is expected to be issued in 2027, and public hearings will follow.

Radiation Protection of the Public and the Environment (DOE Order 458.1 Chg 4): The dose estimated from 2024 air emissions and water discharges containing radionuclides was well below the DOE public dose limit of 100 millirem (mrem) per year from all pathways.

Air Emissions: The off-site ambient air sampling data indicated that the estimated dose based on air emissions in 2024 was well below the 10 mrem per year EPA compliance limit.

Compliance Program at the WVDP

This chapter summarizes the laws, regulations, permits, and agreements pertaining to the WVDP activities, environmental protection, and the public and worker, and the WVDP's compliance status in 2024 with regard to

- Federal environmental protection statutes and associated state and local environmental regulations;
- Permits required under specific environmental protection regulations; and
- EPA or NYSDEC issuance of notices of violation or noncompliance.

The EPA, NYSDEC, and the DOE have established standards for radiological and nonradiological effluents to protect human health and the environment. The DOE applies to the EPA for approval to release limited amounts of radiological constituents into the air and applies to the NYSDEC for permits to release limited amounts of non-radiological constituents into the air and water. The permits issued by these agencies describe release points, management and reporting requirements, and discharge limits on pollutants and define the sampling and analysis regimen. The following sections report major compliance drivers applicable to the WVDP activities and compliance status updates for the drivers. The environmental permits, approvals, and registrations applicable to the WVDP are listed in Table 2-9, and the applicable federal and state regulations are listed in Table 2-10 at the end of this chapter. Environmental monitoring results are presented in Chapter 4, "Environmental Monitoring."

Radiological Air Emissions Compliance

The Clean Air Act (CAA), administered through the EPA, requires compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) under Title 40 Code of Federal Regulations (CFR) Part 61, Subpart H. Sources of radioactive discharges to the atmosphere are regulated directly by the EPA. In New York State (NYS), the EPA has delegated to NYSDEC the authority to regulate nonradiological emissions to the atmosphere.

The NESHAP standard states that no member of the public may receive an Effective Dose Equivalent (EDE) greater than 10 mrem (0.1 millisievert [mSv]) per year resulting from radionuclide emissions to the atmosphere. The EPA approval must be obtained before conducting any work where it is expected that the potential to emit in dose will be 1% (0.1 mrem/year) or more of the 10 mrem standard.

Open-Air Deconstruction Using an EPA-Approved Alternative Method

NESHAP compliance is demonstrated at the WVDP based on the data collected at the ambient air samplers during the year. NESHAP regulations allow two methods for demonstrating compliance, (1) the “measure and model” approach which involves measuring radiological emissions in air released from point sources (such as stack effluents) and using EPA-approved computer models to estimate dose to the maximally exposed off-site individual (MEOSI), or (2) the “environmental measurement” approach which involves measuring environmental concentrations (ambient monitoring) of airborne radionuclides at ambient air monitoring locations and evaluating dose at the critical receptor. Since 2014, with EPA approval, NESHAP compliance at the WVDP has been demonstrated using the “environmental measurement” approach. This method is more appropriate since the majority of potential emissions from the WVDP have shifted from point sources to diffuse sources as more facilities are decommissioned or deconstructed.

An alternative methodology for estimating radionuclide emissions to air was developed by the DOE-WVDP and its subcontractors and was approved by the EPA in May 2016 for use to predict emissions during VF deconstruction. Validation involved collecting actual emissions data during VF deconstruction and comparing it to the emissions that were predicted. This comparison, “the validation study,” was performed during the deconstruction of the VF from September 2017 to September 2018. As a result of the study, the WVDP modified the emission factors in the Alternative Methodology to improve the accuracy of the analysis. In July 2019, the EPA approved the use of the revised radiological source term estimation methodology to demonstrate compliance with 40 CFR Part 61 Subpart H for other facilities undergoing deconstruction. The WVDP used this methodology to estimate airborne emissions predicted for the deconstruction of the MPPB.

In the fall of 2012, an ambient air monitoring network was installed surrounding the WVDP, consisting of 16 low-volume sampling stations (one for each of the 16 compass sectors) and one high-volume sampler (which can measure lower concentrations) in the sector most often identified as having the maximum estimated dose. The WVDP monitors the operational status of the monitors according to the NESHAP permit, and the annual percentage of operation in 2024 was 98.7%.

Routine ambient air network sampling results are discussed in Chapter 4, "Environmental Monitoring" and are tabulated in Appendix C. These data are used to estimate the annual dose from air emissions for NESHAP compliance as described in Chapter 5, "Dose Assessment."

TABLE 2-1
WVDP 2024 Air Quality Noncompliance Episodes

Air Release Type	*Regulated by*	*Date(s) Exceeded*	*Description/ Solutions*
Radiological	EPA	None	None
Nonradiological	NYSDEC, NYSDOL and EPA	None	None

Nonradiological Releases

The WVDP currently has an Air Facility Registration Certificate for nonradiological emission sources as required by NYSDEC and per 6NYCRR Chapter III, Part 201, but does not have any nonradiological sources that require air emissions permits. All potential nonradiological point sources of air emissions are evaluated annually against permitting requirements, and the results in 2024 were determined to be exempt or below permitting release limits.

Asbestos releases are regulated separately from other nonradiological releases under NESHAP and NYSDOL regulations (12 NYCRR Part 56). The asbestos NESHAP and NYSDOL regulations require notifications to the EPA and NYS, respectively, before deconstruction of any structure that could contain asbestos or asbestos-containing material (ACM) in an amount exceeding regulatory thresholds to ensure the safety of the workers and the public. NYS also requires notification of any activities involving the removal or abatement of any asbestos or ACM in amounts exceeding the regulatory thresholds. Table 2-3 provides a summary of the asbestos quantities managed in 2024. In 2024, two projects involving ACM were performed: the continued deconstruction of the MPPB and the deconstruction of the two locker room trailers.

Air Quality Compliance Update for 2024

All airborne releases of radiological constituents from the WVDP in 2024 were within the permissible EPA limits and DOE guidance. The estimated maximum potential dose to any off-site resident from air emissions in 2024 was significantly less than the 10 mrem NESHAP compliance limit as determined by the data collected at the ambient air samplers. (See Chapter 5, "Dose Assessment" for more discussion.) There were no releases that were out of compliance with EPA and NYSDEC regulations as summarized in Table 2-1.

Water Quality Compliance

WVDP State Pollutant Discharge Elimination System (SPDES) Permit

The Clean Water Act (CWA), administered in NYS by NYSDEC through EPA delegated authority, requires that all process water discharges and stormwater discharges from the site be compliant with the WVDP SPDES permit. The current site permit was issued in 2011 and regulates nonradiological liquid discharges through the site's monitored wastewater treatment system outfall and stormwater outfalls. With NYSDEC's approval, the WVDP is currently continuing to operate under the 2011 SPDES permit. The SPDES Permit is issued in compliance with Title 8 of Article 17 of the NYS Environmental Conservation Law (ECL), with the CWA.

TABLE 2-2
WVDP SPDES[a] Permit Limit Exceedances in 2024

Permit Type	*Outfall(s)*	*Parameter*	*No. of Permit Exceptions*	*No. of Samples Taken*	*No. of Compliant Samples*	*Percent Compliant Samples*
SPDES	All	All	0	773	773	100%

[a] Radionuclides are not regulated under the site's SPDES permit. However, special requirements in the permit specify that the concentration of radionuclides in the discharge is subject to requirements of DOE Order 5400.5. (Stated in the letter CHBWV to NYSDEC, January 8, 2013.)

Note: The WVDP notified NYSDEC that DOE Order 5400.5 was replaced by DOE Order 458.1. The WVDP is currently executing the requirements of DOE Order 458.1, including its referenced DCSs.

SPDES and Stormwater Update for 2024

All SPDES discharges were within applicable SPDES permit limits as shown by Table 2-2 on the previous page. Stormwater was monitored semiannually as required by the SPDES permit. No SPDES exceedances of stormwater compliance limits occurred in 2024.

The SPDES permit requires WET testing every five years, and the last testing was performed on four discharges spanning from 2022 to 2023. The WVDP, upon request of NYSDEC, performed supplemental WET testing twice and Toxic Inventory/Reduction Evaluations (TI/RE) in 2024 to evaluate sporadically observed toxicity. WET sampling was performed at the outfall 001 in accordance with the SPDES permit, and the sampling results were compliant with the action levels. In 2024, only invertebrate (water flea) species tests were conducted, with the agreement with NYSDEC. (See Table B-2K.) The WET test will continued to be performed in 2025 at the time of outfall 001 discharges.

The annual review of the WVDP CWA/SPDES best management practices and stormwater pollution prevention plan (SWPPP) was completed in November 2024. It was determined that no plan revisions were necessary in 2024.

Surface Water Radiological Release Compliance

Releases of radiological constituents in water effluents are subject to the requirements in DOE Order 458.1 (“Radiation Protection of the Public and the Environment”) and DOE-STD-1196-2022 (“Derived Concentration Technical Standard”). DOE Order 458.1 requires environmental monitoring of the air, water, groundwater and biota in order to ensure that the maximum potential public radiation dose from all pathways remains under 100 mrem/year. DOE-STD-1196-2022 establishes Derived Concentration Standards (DCSs) to be used in the design and conduct of radiological environmental programs at DOE facilities. (See the inset box, "Radiological Data Evaluation" in Chapter 4, "Environmental Monitoring" for additional information on DCSs.)

Compliance with DOE Order 458.1 for process water and non-process waterborne releases to the environment is based on dose and is discussed in Chapter 5, "Dose Assessment."

Radiological Release Update for 2024

All waterborne releases of radiological constituents from the WVDP in 2024 (from the SPDES outfall 001 [location code WNSP001] and natural surface water effluents such as WNSWAMP and WNSW74A) were within permissible limits. The total estimated dose from the waterborne release pathway was well below the DOE 100 mrem/year limit for all pathways.

Water Withdrawal and Drinking Water Compliance

New York State, as one of the participating states in the Great Lakes - St. Lawrence River Basin Water Resources Compact Council, regulates water withdrawal systems having the capacity to withdraw 100,000 gallons per day (gpd) or more. NYSDEC manages this water withdrawal and reporting program under NYS ECL Article 15, Title 5, and NYCRR 601.5. The WVDP reports the amount of groundwater and reservoir water withdrawn annually to the NYSDEC pursuant to the site water withdrawal permit issued in December 2019.

Potable and industrial water has been supplied by two groundwater wells located on the site since 2014. Prior to this, water was supplied by two reservoirs immediately south of the site. The reservoirs currently provide water for fire protection and SPDES discharge flow augmentation. The Cattaraugus County Health Department (CCHD) has assigned the WVDP drinking water (potable water) system a NYS tracking number and determines the required sampling for the WVDP drinking water system annually.

In November 2024, the WVDP conducted a lead service line survey on the potable (drinking) water system at the site in accordance with the EPA requirements under 40 CFR Part 141 Subpart I [141.48(a)] and NY State Department of Health requirements under 10 NYCRR 5-1.42. Written records and field verification determined that there were no lead service lines in the potable water system at the WVDP.

Analytical results of the well water and potable water at the site are presented in Appendix B-5.

Water Withdrawal Update for 2024

The 2024 WVDP water withdrawal report was submitted to NYSDEC in March 2025. In 2024, controlled discharges from lagoon 3 were performed in February, May, and November, with a total volume of 5,827,550 gallons discharged. The maximum daily withdrawal volume in 2024 was 323,564 gallons during the February discharge. The average daily withdrawal rate in 2024 was 217,852 gallons.

The total amount of augmentation water used during these discharges totaled 11,081,400 gallons (41,947,662 liters). Augmentation water is used during lagoon 3 discharges to reduce total dissolved solids (TDS) concentrations.

Waste Management Compliance

The DOE sites that manage radioactive waste are required to develop, document, implement, and maintain a site-wide radioactive waste management program under DOE Order 435.1 Chg 2, Radioactive Waste Management. The order aims to ensure that all radioactive waste generated at DOE sites is managed in a manner that protects workers and public health.

At the WVDP, waste is managed in accordance with 1) "Waste Acceptance Manual" for HLW, 2) "TRU Waste Management Program Plan" for TRU waste, 3) "LLW Management Program Plan" for LLW, and 4) "Site Treatment Plan (STP)" for the radioactive component of mixed LLW.

Waste Treatment, Storage, and Disposal. Waste generated at the WVDP is shipped to off-site waste storage and disposal facilities. The DOE Consolidated Audit Program (DOECAP), under DOE Order 414.1D Chg 2, "Quality Assurance, " ensures that contracted commercial treatment, storage, and disposal facilities (TSDFs) are audited on their ability to provide services in a manner that is technically defensible and legally compliant. The WVDP conducts the QA of contracted analytical laboratories and waste storage and disposal facilities annually and submits an annual TSDF report to DOE. The WVDP QA program is described in Chapter 7, "Quality Assurance." The RCRA section below describes the waste management compliance and activities at the WVDP in detail.

Nonradioactive, Nonhazardous, Regulated Waste Management (Non-RCRA). Nonradioactive, nonhazardous waste is also shipped off site to solid waste management facilities. Sanitary wastewaters are shipped to the Buffalo Sewer Authority, the Gowanda Sewage Treatment Plant, or the Arcade Sewage Treatment Plant for treatment and disposal. This waste volume is provided in the annual water withdrawal report.

Overpacked Chemical Process Cell specialty waste container ready for shipment off site

RCRA Permit and §3008(h) Consent Order History at the WVDP

Hazardous Waste Permitting - **RCRA Interim Status Permit Application**. In 1984, the DOE notified the EPA of hazardous waste activities at the WVDP and identified DOE-WVDP as a hazardous waste generator. In 1990, to comply with Title 6 New York State Official Compilation of Codes, Rules, and Regulations (6 NYCRR) Part 373-3, a RCRA Part A (i.e., Interim Status or Part A) Permit Application for the WVDP was filed with NYSDEC for activities associated with storage and treatment of hazardous waste. The WVDP has operated under interim status ever since. RCRA facility operations are limited to those described in the Part A Permit Application and must comply with an interim status regulations unless certain exemptions apply. The RCRA Part A Permit Application must be revised prior to changes to the WVDP's RCRA waste management operations.

According to Part A requirements, the DOE prepares closure plans for the hazardous waste management units at the WVDP. The closure plans are transmitted to NYSDEC for approval in anticipation of closure activities and are revised to address NYSDEC comments or changes in activities. To complete the closure of a RCRA unit, all wastes are removed, and other actions, such as decontamination or removal of structures, are taken to meet the specific RCRA closure requirements. A closure certification report is then prepared for approval by NYSDEC to document closure was performed in accordance with the NYSDEC-approved RCRA closure plan.

RCRA Final Status Permit Application. In 2003, NYSDEC requested the submittal of a 6 NYCRR Part 373-2 Permit Application (i.e., Final Status or Part B) for the WVDP, which was transmitted to NYSDEC in December 2004. On April 16, 2009, NYSDEC requested the submittal of a revised Part B Permit Application for the WVDP, which was submitted to NYSDEC on September 30, 2010. On March 22, 2012, NYSDEC notified NYSERDA and the DOE that they had reassessed the WVDP RCRA regulatory program and that the processing of the September 30, 2010, Part B permit application, including revisions, would be deferred. As a result, the WVDP continues to operate as an interim status facility pursuant to its Part A Permit application.

RCRA §3008(h) Consent Order (Docket No. II RCRA §3008(h) 92-0202) (abbreviated as "Consent Order")**.** Section §3008(h) of RCRA authorizes the EPA to issue an order requiring corrective action at RCRA Part A Interim Status facilities to protect human health and the environment from a release of hazardous waste or hazardous constituents to the environment from a Solid Waste Management Unit (SWMU). (See Table 2-10 on Page 2-26.) The DOE and NYSERDA entered into a Consent Order with the EPA and NYSDEC in March 1992. Consent Order activities performed at the WVDP to date include the following:

- The RCRA Facility Investigation (RFI) evaluated potential releases of RCRA-regulated hazardous constituents from SWMUs. Final RFI reports were submitted in 1997, with no corrective actions required, with the exception of groundwater monitoring as outlined in the RFI and approved by the EPA and NYSDEC.

- The Solid Waste Management Unit (SWMU) and Super SWMU (SSWMU) Assessment and Current Conditions Report. SSWMU refers to a unit where two or more SWMUs are treated as one larger waste management unit. These reports, initially submitted in 2004 and most recently updated in 2020, summarized the historical activities at each SWMU, providing environmental monitoring data and an update on activities performed since the RFI reports were submitted. See Table 2-7 for a complete list of WVDP RCRA SSWMUs.

- As a result of reviewing the current conditions report in 2004, NYSDEC requested additional evaluations for six SWMUs (the NDA Burial Area, NDA Interceptor Trench, Demineralizer Sludge Ponds, lagoon 1, the CDDL, and the LLWTF) as Corrective Measures Studies (CMSs). These studies, submitted to NYSDEC and the EPA in 2010, identified and evaluated potential corrective measures and made recommendations on remedial alternatives.

- The 1990 and 2008 Interim Measures (IMs) for the NDA were implemented, (1) to intercept and collect groundwater within the NDA potentially contaminated with a mixture of n-dodecane and tributyl phosphate (TBP), and (2) to minimize water infiltration into the NDA and groundwater flow through the NDA, thereby minimizing the potential release of impacted groundwater until the final disposition of the NDA is determined. Liquid organic material was never observed. Therefore, with NYSDEC and EPA approval, in 2019, the Liquid Pretreatment System (LPS) building was removed, and a geomembrane cover was placed over the building footprint.

Waste Generation and Storage Activity Update for 2024

Most of the construction and demolition (C&D) waste generated during FY 2024 resulted from waste generation associated with the demolition of the MPPB. C&D debris from this project could not be diverted or recycled primarily due to the presence of radiological and/or asbestos contamination. The total amount of C&D waste, including radiological, asbestos, or hazardous wastes sent to landfills, was approximately 28,478 m^3 (31,392.5 tons). This was a 19% increase in the generation of C&D waste as compared to FY 2023.

- At the end of FY 2024, a total of 86,776 lbs of mixed and hazardous waste were stored on the WVDP site (85,900 lbs at the end of 2023).

- Zero TRU waste was generated in 2024. As of the end of 2024, a total of 53.84 m^3 of mixed TRU waste (liquid and solid) was stored as residual waste in tank 8D-4. The volume slightly decreased from the quantity in December 2024 (54.44 m^3).

- The Annual Hazardous Waste Report for 2024 waste activities was submitted to NYSDEC in February 2025. The reported quantities generated, treated, and shipped are shown in Table 2-3.

A summary of non-RCRA regulated waste as required to be reported in the ASER in compliance with DOE Order 435.1, "Radioactive Waste Management," is listed in Table 2-3.

Resource Conservation and Recovery Act (RCRA)

RCRA and its implementing regulations govern the life cycle of hazardous waste from "cradle-to-grave" and mandate that generators take responsibility for ensuring the proper treatment, storage, and ultimate disposal of their wastes. A hazardous waste permit is required for facilities that store large quantities of hazardous waste for more than 90 days or treat and/or dispose of hazardous waste at the facility.

The EPA is responsible for issuing guidelines and regulations for the proper management of solid and hazardous waste (including mixed [radioactive and hazardous] waste). In NYS, the EPA has delegated the authority to issue permits and enforce these regulations to NYSDEC. In addition, the NY Department of Transportation (DOT) is responsible for issuing guidelines and regulations for labeling, packaging, and reporting spills of hazardous and mixed wastes while in transit.

The WVDP is a hazardous waste generator requiring RCRA permitting, RCRA corrective actions, and routine RCRA reporting of hazardous waste activities to NYSDEC. An agreement between the DOE, NYSERDA, EPA, and NYSDEC (the §3008[h] Consent Order) directs the implementation of the WVDP RCRA corrective action program. (See the inset, "RCRA Permit and §3008(h) Consent Order History at the WVDP" on the previous page.)

Routine Reporting Required Under RCRA

Quarterly Status Reports, RCRA §3008(h) Consent Order (Docket No. II RCRA §3008(h) 92-0202). Under the Consent Order signed in 1992, the DOE transmits two quarterly reports to the EPA and NYSDEC:

(1) A progress report summarizing all Consent Order activities at the WVDP for the previous quarter.

(2) A groundwater exception report, summarizing RCRA groundwater monitoring results that exceed established trigger levels and an update on the performance of the NDA interceptor trench, geomembrane cover, and slurry wall.

The progress report includes recent activities associated with hazardous waste management, contacts with local community interest groups and regulatory agencies, and an inventory of mixed waste generated from decontamination, deactivation, and deconstruction activities during the reporting period. The groundwater exception report also includes an update on the performance of the NDA interceptor trench, geomembrane cover, and slurry wall.

TABLE 2-3
Summary of Waste Generated at the WVDP During 2024

Waste Description/ Facility	*Type of Project Generating Waste*	*Quantity Generated*	*Waste Destinations*
Transuranic (TRU) waste	No TRU waste was generated from decontamination and deactivation activities in 2024.	0 cubic feet (ft^3) (0 cubic meters [m^3])	TRU waste and Mixed TRU waste is stored and managed on site under the TRU Waste Management Program and the WVDP Site Treatment Plan (STP). Mixed high activity and TRU residual waste in tank 8D-4 are also stored on site.
Low-Level Waste (LLW)	Includes LLW from deactivation, MPPB deconstruction, or soil removal.	779,700 ft^3 (22,079 m^3)	LLW is temporarily stored on site, then shipped off site to a permitted disposal facility.
Hazardous and Mixed LLW	The hazardous and mixed wastes generated in 2024 were from deconstruction activities.	Hazardous waste[a] 786 lbs (0.39 tons[b]) Mixed waste[a] 199,363 lbs (99.68 tons[b])	These wastes are temporarily stored on site until packaged and shipped off site to a permitted Treatment, Storage, and Disposal Facility (TSDF).
Radiological wastewater from the LLW Treatment Facility (LLWTF) (outfall 001)	NYSDEC regulates point source liquid effluent discharges of treated process wastewater (SPDES permit). The wastewater included groundwater pumped from the NDA trench in 2024.	5,827,550 gallons (22,059,676 L)	Wastewater from LLWTF is treated and processed, then, discharged through outfall 001. During 2024, treated and processed water was discharged from the outfall twice.
Radiological groundwater from the NDA interceptor trench	Groundwater accumulated in the interceptor trench (WNNDATR) is pumped from the trench sump to the on-site LLW treatment facility.	10,732 gallons (40,625 L)	LLW treatment building (LLW2)
Asbestos	In 2024, two projects involving ACM were performed: the continued deconstructition of the MPPB and the deconstruction of the two locker room trailers.	MPPB Friable: 8,183 ft^2 (760.23 m^2) and 2,164 linear feet (659.59 m) MPPB Nonfriable: 9 ft^2 (0.83 m^2) and 2,633 linear feet (802.54 m) Locker Rooms Nonfriable: 1,640 ft2 (152.36 m2)	Wastes are packaged and shipped to an off-site disposal facility.
Waste Description/ Facility	***Type of Project Generating Waste***	***Quantity Shipped[c]***	***Discussion***
Sanitary wastewaters	The sanitary wastewaters are generated from personnel water use on site.	1,062,164 gallons (4020728.12 L)	All sanitary wastes are disposed off site. The WVDP is authorized to ship these wastes to the Arcade Sewage Treatment Plant for treatment and disposal.
Universal waste	Spent hydraulic oil from machinery used during the MPPB deconstruction work and spent bulb/battery wastes were generated and recycled.	Bulbs - 161 lbs (0.08 tons) Batteries - 815 lbs (0.41 tons) Oil - 1610 lbs (0.81 tons)	Universal waste is shipped to permitted or authorized off-site facilities for recycling, reclamation, and/or disposal.

[a] Generated net weight.

[b] Ton short (U.S.).

[c] The sanitary wastewaters and universal waste are most accurately measured at the time of shipping. There is one universal waste shipment each year and multiple sanitary waste shipments.

Status Reports, RCRA Section 3016. The RCRA 3016 statute requires all federal hazardous facilities to report the current status of their hazardous waste activities to the EPA and NYS. The annual/biennial hazardous waste reports are submitted through the EPA's RCRAInfo Industry Application web-based system.

Hazardous Waste Management. Hazardous wastes at the WVDP are managed in accordance with 6 NYCRR Part 373 and reported to NYSDEC in the WVDP's Annual Hazardous Waste Report. This report specifies the quantities of waste generated, treated, and/or disposed of, and identifies the treatment, storage, and disposal facilities used for the waste. If less than 25 tons of hazardous waste is generated in a year, no annual Hazardous Waste Reduction Plan is required. (Note: Waste generated from deconstruction, construction, or spill cleanup is exempt from hazardous waste reduction plans.)

Hazardous and universal waste is shipped off site to RCRA-permitted solid waste management facilities. Some of the universal waste (i.e., lead-acid batteries and spent lamps) are reclaimed or recycled at off-site, authorized reclamation and recycling facilities. (See Table 2-3.)

Mixed Waste Management. Mixed waste (a waste that is both radioactive and RCRA hazardous) is also shipped off site. Mixed wastes that cannot be treated or disposed of within one year are managed according to the Site Treatment Plan (STP), prepared by the WVDP under requirements of the Federal Facilities Compliance Act (FFCA) (an amendment to RCRA), in accordance with the Consent Order. The annually updated plan describes the development of treatment capabilities and technologies for treating mixed waste and updates the mixed waste inventory. Currently, the only wastes covered under the WVDP STP are mixed transuranic (TRU) waste stored in containers and mixed high activity and TRU residual waste remaining in tank 8D-4, for which off-site disposal options are still unavailable and for which on-site treatment is impractical.

Installation of video inspection equipment to verify the liquid level of tank 8D-4 and an interior video inspection were completed in February 2024. Most of the year was spent developing, testing, and refining a sludge sampling system that could obtain samples down to the bottom of the tank.

Depths of the sludge in different sectors of tank 8D-4 were measured in September 2024 with a range of 14.9 to 18.3 inches (37.8 to 46.5 cm) deep, which includes an approximately 2-inch thick floc layer above firmer, consolidated sludge. The overall average sludge depth was 16.4 inches (41.6 cm). Ten sludge samples from different locations in the tank were obtained between October and December 2024, and five will be shipped to an off-site laboratory in January 2025 for radioisotope and general chemistry analyses. Characterization of 8D-4 tank contents will continue in 2025, and the collected data will support the evaluation of treatment options for the high-activity sludge and liquid waste in the tank.

RCRA Waste Management Activities for 2024

Per the Consent Order requirements, quarterly progress reports were submitted to the EPA and NYSDEC, documenting progress on decontamination activities for SWMUs and waste generation activities. A Hazardous Waste Reduction Plan Annual Status Report was not required by NYSDEC in 2024 because the amount of reportable, non-deconstruction, hazardous waste generated was less than the 25-ton threshold. Groundwater monitoring, as recommended in the RFI reports and approved by the EPA and NYSDEC, continued during 2024 per the Consent Order requirements. This included submitting the quarterly RCRA groundwater exception reports to the EPA and NYSDEC. The groundwater program and monitoring results at the WVDP are discussed in Chapter 6, "Groundwater Protection Program."

The WVDP continued to have open communications with NYSDEC and the EPA through monthly RCRA teleconferences. The WVDP is continuing to operate according to the 6 NYCRR Part 373-3, Part A (Interim Status) Permit Application and the RCRA §3008(h) Administrative Order on Consent.

Other highlights of the RCRA work performed in 2024 are:

NDA and the NDA Interim Measures (IMs). The NDA IM continued to perform as designed, helping to contain the buried waste, while minimizing the potential for the release of chemical and radiological contaminants to the environment. The volume of water pumped from the NDA interceptor trench has decreased noticeably since the removal of the Liquid Pretreatment System

(LPS) building and the covering the footprint of the building with a new geomembrane in May 2019. The volume pumped from the NDA trench in 2024 was 10,732 gallons (gal) (40,625 liters [L]), a 32% decrease compared to the volume pumped in 2023 (15,789 gal [59,768 L]). The volume pumped in 2024 was about 98.4% below the pre-IM volumes of over 700,000 gal/year.

RCRA Inspection. In February 2024, the representatives of the NYSDEC visited the WVDP and conducted the RCRA inspection of the DOE interim status units (LSA #3 and #4). The representatives walked through the facilities guided by the WVDP and DOE-WVDP personnel. The inspection identified no observations.

RCRA Closure Certification. The demolition of the A&PC Hot Cells was completed, and the final RCRA Hazardous Waste Closure Certification Report for A&PC was submitted to NYDEC and accepted. The Hazardous Waste Closure Certification report was submitted for the Lag Storage Area (LSA) #2 Hardstand.

HLW Tank. The T&VDS, installed in the WTF to maintain the tanks and control corrosion, continued to operate during 2024. The T&VDS reduced the residual liquid in tank 8D-4 in 2024 by 285 gal (1,079 L). At the end of 2024, 3,047 gal (11,533 L) of liquid and solids remained in tank 8D-4. The inoperable steam jet was removed from tank 8D-4 in January 2024 and disposed of as low-level radioactive waste. Three of the six tank liquid samples obtained in late 2023 from different tank depths were shipped off site for radioisotope and general chemistry analyses in February 2024, with the results received in March. The liquid samples showed an acceptable pH of 10.0 for corrosion control.

Compliance for Decommissioning

The National Environmental Policy Act (NEPA)

NEPA requires federal agencies, including the DOE, to consider the environmental effects of their proposed actions. Evaluations are performed to assess potential environmental effects associated with proposed project activities. The level of evaluation and documentation depends upon whether the action constitutes a major federal action significantly affecting the quality of the human environment within the meaning of NEPA. Since the WVDP began, a number of proposed site activities have warranted environmental impact evaluations. A comprehensive summary of the NEPA documents published over the years is included in Table 2-8. WVDP Environmental Assessment (EA) and EISs can be found at the URL below under the documents index.
https://www.energy.gov/wvdp/west-valley-demonstration-project-homepage

The 2010 FEIS provides the blueprint for all activities currently underway at the WVDP. No new major NEPA documents were initiated in 2024. The inset text on page 2-12 provides an overview of NEPA and the EIS relevant to the WVDP. For the WVDP decommissioning timeline, please see Figure 1-3 in Chapter 1, "Introduction."

NRC Work Instruction Packages (WIP) and MPPB Deconstruction

The 1981 Memorandum of Understanding (MOU), mandated by the WVDP Act (See Appendix H), established the NRC's role in reviewing and providing consultation for the activities conducted at the WNYNSC and the DOE. The agreement applies to all aspects of construction, operations, and demolition and decontamination (D&D) activities at the WVDP. Upon completion of the Phase 1 Decommissioning Plan (DP) in 2010, the NRC required the preparation of work plans for the decommissioning and deconstruction of the Vitrification Facility (VF) and the MPPB. These plans are used to define the requirements and sequencing of the deconstruction work. Work Instruction Packages (WIPs) provide the full work details needed to complete the deconstruction of these facilities. The deconstruction of the MPPB was performed in compliance with the MPPB D&D plan, which was reviewed by the NRC and follows the WIPs. Following the start of deconstruction in September 2022, the MPPB deconstruction WIP was periodically updated to modify the required work and to add additional clarification and details involved in the planned deconstruction process.

The NRC Region 1 conducted on-site visits in March and November 2024. The representatives conducted field observations, reviewed work planning documents, conducted plant walkdowns, and held interviews with site personnel. The NRC concluded that the Phase 1 Decommissioning was in progress in accordance with the approved planning. For the history of document transmittal to the NRC at the WVDP, refer to the inset on page 2-13, "Phase 1 Decommissioning NRC Requirements."

Phase 2 Decisionmaking and SEIS Preparation

The DOE and NYSERDA established the Cooperative Agreement to implement the WVDP Act in 1980. In 1990, the first supplemental agreement was signed by DOE and NYSERDA to prepare a joint EIS. As stated in Chapter 1, "Introduction," NYSERDA and DOE continued to work on the PPA modeling, which is part of the EIS preparation, in 2024. The modeling results will be evaluated in the SEIS and are expected to support the Phase 2 decisions.

Lake 2, one of the two lakes (reservoirs), located about 0.5 miles south of the MPPB
(photo credit: A. Carr)

National Environmental Policy Act of 1969 (NEPA) and EIS

The categories of the NEPA documentation include categorical exclusion (CX), environmental assessment (EA), and EIS. CXs describe actions that will not have a significant effect on the environment. EAs are used to evaluate the extent to which a proposed action, not categorically excluded, will affect the environment. Based on the analyses presented in an EA and considering regulatory agency, stakeholder, and public comments, the DOE may determine that a proposed action is not a major federal action significantly affecting the quality of the human environment within the meaning of NEPA. Consequently, the DOE may issue a notice indicating the finding of no significant impact (FONSI) and therefore would not require the preparation of an EIS.

If a proposed action has the potential for significant environmental effects, an EIS would be prepared that describes proposed alternatives to the action and explains the effects of each. Based on the analyses presented and considering regulatory agency and public input, the DOE will determine the preferred alternative and issue a ROD regarding the action.

Final Decommissioning Environmental Impact Statement (FEIS). In January 2010, the DOE and NYSERDA issued the "Final Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center," DOE/EIS-0226. In the FEIS, the DOE and NYSERDA evaluated four alternatives: Site-wide Removal, Site-wide Close-In-Place, Phased Decisionmaking, and No Action. Phased Decisionmaking was identified as the preferred alternative. Under this alternative, decommissioning will be conducted in two phases as shown in Figure 1-3. Decommissioning the MPPB is part of the Phase 1 EIS work.

Record of Decision (ROD). On April 14, 2010, the DOE issued the ROD for the FEIS, selecting the phased decisionmaking alternative. During Phase 1 Site Decommissioning, a number of highly contaminated facilities are being removed under a facilities disposition contract awarded in 2011. The original estimated cost for all of the Phase 1 work was approximately $1.2 billion (FEIS, 2010). Phase 1 was estimated to take up to 10 years, during which time DOE will manage the site's remaining facilities in a safe manner. Phase 1B contract awarded in 2025 has a 10-year ordering period with a maximum value of up to $3.0 billion that can be performed for up to 15 years.

Phase 1 Studies. Phase 1 studies were scientific studies conducted to facilitate interagency consensus necessary for the completion of decommissioning the remaining facilities following the completion of Phase 1. The Phase 1 studies provide technical evaluations supporting the SEIS preparation. The final reports on these studies, published in 2018, are available at https://wvphaseonestudies.emcbc.doe.gov/php/pas-update.html.

Supplemental EIS (SEIS). After completing an EIS (the 2010 FEIS) and issuing an ROD in 2010 for Phase 1 decisions, the DOE and NYSERDA determined that the preparation of an SEIS would further the purposes of NEPA and SEQRA (State Environmental Quality Review Act). The Phase 2 decision, which will be informed by the SEIS, will determine the decommissioning approach for the remaining facilities. The SEIS will evaluate a range of alternatives for the remaining facilities for which it has decommissioning responsibility including removal, in-place closure, and a combination of those two. SC&A, Inc. is preparing the SEIS under a DOE contract awarded in April 2017 that was modified in 2022. A draft SEIS is expected to be released in 2027 with a public hearing and comments period to follow.

Phase 1 Decommissioning NRC Requirements

Decommissioning Plan documents for the NRC are required under the Phase 1 decommissioning and facility disposition scope of work. These planning documents must be consistent with the preferred alternative in the EIS ROD and NYSERDA Findings statement.

Phase 1 Decommissioning Plan (DP) for the WVDP

On December 5, 2008, the DOE issued the "Phase 1 Decommissioning Plan for the West Valley Demonstration Project, West Valley, NY" (73 Federal Register [FR] 74162) and transmitted it for NRC review. The DP was prepared to meet WVDP obligations to the NRC as directed under the WVDP Act.

The DP addressed Phase 1 of the proposed two-phased approach for WVDP decommissioning, consistent with the preferred alternative selected in the ROD (see the inset, "National Environmental Policy Act of 1969 (NEPA) and EIS," for a summary of the general NEPA process) and the Findings Statement for the WVDP and the WNYNSC. On December 18, 2009, the DOE submitted revision 2 of the Phase 1 DP after incorporating responses to NRC's comments.

On February 25, 2010, the NRC transmitted to DOE-WVDP the Technical Evaluation Report (TER) for the Phase 1 DP, concluding that the Phase 1 DP was consistent with the preferred alternative in the EIS prepared for NEPA. The NRC also determined that there is reasonable assurance that the proposed Phase 1 actions will meet the decommissioning criteria.

Phase 1 Characterization Sampling and Analysis Plan (CSAP) and the Phase 1 Final Status Survey Plan (FSSP) for the WVDP

The Phase 1 DP required the preparation of two supplemental documents, the CSAP and the FSSP. These two documents provide the specific details of sampling activities to support Phase 1 decommissioning of the WVDP. The CSAP describes the radiological environmental data collection activities (surface and subsurface soils, sediments, and groundwater) that will specifically support the implementation of the Phase 1 decommissioning actions within the WVDP premises as described in the Phase 1 DP.

The FSSP provides the technical basis and sampling protocols to demonstrate that specific portions of the WVDP premises meet the Phase 1 radiological cleanup goals for surface and subsurface soils identified in the Phase 1 DP. The FSSP is consistent with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).

Flocks of Canada geese are frequently sighted in Western New York

Enforcement and Compliance History Online (ECHO)

The WVDP participates in the EPA's ECHO Database for Facility Registry Service Number (FRS #) 110000326790 (West Valley Demonstration Project.)

Other Compliance Related Updates

Occurrence Report. Under the DOE O 232.2A Chg 1, DOE nuclear sites are required to notify DOE personnel, including National Nuclear Security Administration (NNSA) personnel, about events that could adversely affect the health and safety of the public or the workers, the environment, DOE missions, or the credibility of the Department. The WVDP submitted two notifications to the Occurrence Reporting and Processing System (ORPS) in 2024. Those events pertained to the Lockout/Tagout (LOTO) procedure and the preventive maintenance system for the Petroleum Bulk Storage (PBS) program, respectively. Subsequent fact-finding analyses identified procedural weaknesses, and corrective measures were implemented.

Emergency Planning and Community Right-to-Know Act (EPCRA). The EPCRA, also known as the Superfund Amendments and Reauthorization Act (SARA) Title III, is a federal law passed in 1986 to inform the public of potential environmental and hazards posed by the storage and handling of hazardous or toxic chemicals at facilities in their communities.

The WVDP is required to maintain Safety Data Sheets (SDSs) that describe the properties and health effects of all chemicals used and stored on site. Annual reporting requirements are based on the types and quantities of these potentially hazardous or toxic chemicals.

In 2024, the WVDP did not use or store any EPCRA-listed extremely hazardous substances exceeding their threshold planning quantity. The WVDP did continue to use and store hazardous chemicals on site. As shown in Table 2-4, the only report required under SARA Title III in 2024 was the hazardous chemical inventory. The 2024 inventory of chemicals stored at the WVDP is provided in Table 2-5. This chemical inventory was provided to state and local emergency response organizations and the nearby local fire departments.

TABLE 2-4
Status of EPCRA (SARA Title III) Reporting at the WVDP for 2024

EPCRA Section	*Description of Reporting*	*Submission Required*
EPCRA 302–303	Planning Notification for Extremely Hazardous Substances	No
EPCRA 304	Extremely Hazardous Substance Release Notification	No
EPCRA 311	Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS)	No
EPCRA 312	Hazardous Chemical Inventory	Yes
EPCRA 313	Toxic Chemical Release Inventory Reporting	No

TABLE 2-5
Reportable Chemicals Above EPCRA 312 (SARA Title III) Threshold Planning Quantities Stored at the WVDP in 2024

Chemicals Stored at the WVDP Above the Threshold Planning Quantities	
Diesel Fuel #2	Sulfuric Acid
Potassium Acetate (Alpine Ice-melt®)	Lead Acid Batteries
Copolymer-based Dust Control Agent (Gorilla Snot®)	

TABLE 2-6
WVDP Migratory Bird Nest Depredation Activities in 2024

Permit/License Type	*Parameter*	*Permit Limit*	*Total*
U.S. Fish and Wildlife - Bird Depredation Permit	Removal of Active Barn Swallow Nests	20	0
	Removal of Active American Robin Nests	15	0
	Removal of Active Eastern Phoebe Nests	5	0
	Removal of Active Common Grackle Nests	15	0
	Removal of Inactive Migratory Bird Nests	Not limited	0
U.S. Fish and Wildlife - Registration	Canada Goose Egg Nests Destroyed	NA	3 Nests

NA - Not applicable.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act provides for the protection of migratory birds, their nests, and their eggs. The DOE maintains a Bird Depredation permit that allows for the removal of bird nests from areas where they would be impacted by site operations. Under the Bird Depredation permit, an additional registration is required for the removal or destruction of Canada geese nests and/or goose eggs. Table 2-6 summarizes the migratory bird activities conducted during 2024.

The Endangered Species Act and the National Historic Preservation Act. Several ecological surveys of the WNYNSC premises have been conducted over the years. Except for occasional transient individuals, no plant or animal species protected under the Endangered Species Act of 1973 resides at the WNYNSC premises. Surveys of the historic and archaeological sites revealed Native American and historic homestead artifacts on the WNYNSC premises and in the nearby areas. None of the sites were impacted by the WVDP activities in 2024.

Invasive Species Control. Federal agencies are required to prevent the introduction, establishment and spread of invasive species, as well as to eradicate and control populations of invasive species according to EO 13751 Safeguarding the Nation from the Impacts of Invasive Species. In 2023, wild parsnip, which can cause burns, was identified along the fence by the south parking lot and removed. Additionally, less harmful invasive species seen on site, including multiflora rose, phragmites, nonnative honeysuckle, European starlings, Japanese knotweed, and house sparrows. These species were continue to be monitored for potential concerns in 2024.

Floodplain Management. EO 11988, Floodplain Management, was issued to avoid adverse impacts associated with the occupancy and modification of floodplains. The WVDP is required to report when it develops new floodplains or conducts activities that would impact the existing 100-year floodplain within the premises. No such development or activities were performed in 2024.

Project Assessment Compliance

Project assessments are conducted through the Integrated Assessment Program (IAP) at the WVDP. This program effectively complies with applicable DOE directives, regulations, and standards, and Integrated Safety Management System (ISMS) as well as Environmental Management System (EMS) requirements. Chapter 3, "Environmental Management System" describes these assessment projects at the WVDP in detail.

The Construction and Demolition Debris Landfill (CDDL) and Permeable Treatment Wall (PTW). The overall condition of the CDDL grounds was inspected in March and September 2024 with minor ground maintenance performed. The CDDL has been closed since 1986 under a NYSDEC-approved closure plan for a nonradioactive solid waste disposal facility.

Over time, the north plateau groundwater plume has migrated from the MPPB into the CDDL area and beyond. In 2010, a full-scale PTW was installed south of the CDDL. Construction of the PTW did not impact the CDDL. Routine inspections of the PTW area were also performed in 2024. Additional discussion of the PTW is provided in Chapter 6, "Groundwater Monitoring Program" of this report.

The WNYNSC Lakes/Canal/Dams/Spillway System. The two lakes (#1 and #2), or reservoirs, canal connecting the two lakes, a spillway for discharging overflow from Lake #1 to Buttermilk Creek, and two dams are located on the WNYNSC property. The lakes/dams/canal/spillway system was conceived and designed in the late 1950s through the early 1960s. The system has been maintained to provide water for fire protection and SPDES discharge flow augmentation for the WVDP. The WVDP rail spur and an access roadway are located parallel to the lakes and run along the crest of both dams.

The lakes, dams, canal, and culverts are inspected by Plant Systems Operations (PSO) operators weekly and by site engineering personnel twice every year. The Lake #1 spillway (shown in Figure A-4)was inspected by Regulatory Strategy personnel of CHBWV monthly in 2024. In recent years, the dams and a spillway have suffered progressive erosion. An independent engineering review of the lakes and dams was performed in 2021 by McMahon and Mann Consulting Engineers, Inc. In 2023, a dam meeting with NYSDEC personnel was held, and the NYSDEC performed an inspection of the dams, canal, and spillway. The DOE, together with the U.S. Army Corps of Engineers (USACE), evaluated the NYSDEC's inspection results and made engineering recommendations for repairs and improvements. A final design of the spillway reinforcement was proposed by the USACE in 2024. The contract finalization and Lake 1 spillway improvement construction will occur in 2025.

The railway continued to be used in 2024 for the transport of wastes off site. Routine maintenance and inspections of the railway also continued to be performed in 2025.

TABLE 2-7
WVDP RCRA SSWMUs
Identified in the RFI under the RCRA 3008(h) Order on Consent

SSWMU	*SWMU #*	*Designation (Please refer to Acronyms and Abbreviations chapter for*
SSWMU #1 – LLWTF	3	Former lagoon 1
	4	LLWTF, lagoons #2, #3, #4, and #5
	17/17a/17b	LLWTF, including LLW2
SSWMU #2 – Miscellaneous Small Units	5	Demineralizer sludge ponds
	6	Solvent dike
	7	Effluent mixing basin
	10	Waste paper incinerator
SSWMU #3 – LWTS	18/18a	LWTS
	22	Cement solidification system
	NA	Specific sealed rooms in the MPPB (per the RFI Workplan and Current Conditions Report)
SSWMU #4 – HLW Storage and Processing Area	12/12a	VIT test facility waste storage tanks
	13	High-level WTF
	19	STS
	20	High-level VF
SSWMU #5 – Maintenance Shop Leach Field	8	Maintenance shop leach field
SSWMU #6 – Low-Level Waste Storage Area Drum Cells	9/9a	Old and new hardstand storage areas
	15	LSAs #1 and #2 hardstands
	16/16a	Lag storage building, extension, LSAs #3 and #4
	38	Drum supercompactor
SSWMU #7 – Chemical Process Cell - Waste Storage Area (CPC-WSA)	14	CPC-WSA
SSWMU #8 – CDDL	1	CDDL
SSWMU #9 – NDA	2	NDA area
	11/11a	Kerosene tanks, NDA container storage area
	23	Interceptor trench project
	31	NDA trench soil container area
	39	Staging area for NDA / NDA hardstand
SSWMU #10 – Integrated Radwaste Treatment System (IRTS) Drum Cell	NA	Integrated radwaste treatment system drum cell
SSWMU #11 – SDA	NA	The SDA is a closed radioactive waste landfill that is contiguous with the Project premises and is owned and managed by NYSERDA. For more information on the SDA, go to: https://shorturl.at/RYaU0.
SSWMU #12 – Hazardous Waste Storage Lockers (HWSLs)	NA	HWSLs #1 to #4

Note: The WVDP RCRA SSWMUs are also discussed in Chapter 6. See Figures A-9 and A-10 for the locations of the SSWMUs.

TABLE 2-7 *(concluded)*
WVDP RCRA SSWMUs
Identified in the RFI under the RCRA 3008(h) Order on Consent

SSWMU	*SWMU #*	*Constituent SWMUs*
Individual SWMUs (WVDP RCRA SWMUs Not Associated with a SSWMU)	25	Inactive scrap metal landfill adjacent to bulk storage warehouse (NYSERDA SWMU)
	26	Subcontractor maintenance area
	27	Fire brigade training area
	28	VIT hardstand
	29	Industrial waste storage area
	30	Cold hardstand area near the CDDL
	32	Old sewage treatment facility
	33	Existing sewage treatment facility
	34	Temporary storage locations for well purge water
	35	Construction and demolition area
	36	Old school house septic system
	37	CSRF
	40	Satellite accumulation areas and 90-day storage areas
	41	Designated roadways
	42	Product storage area
	43	Warehouse extension staging area
	44	Fuel receiving and storage area; high-integrity container and SUREPAK™ staging area
	45	Breach in laundry wastewater line
	46	VIT vault and empty container hardstand
	47	RHWF

Note: The WVDP RCRA SSWMUs are discussed in Chapter 6. See Figures A-9 and A-10 for the locations of the SSWMUs.

TABLE 2-8
Timeline of NEPA Documentation Associated with WVDP Decommissioning

Year	*Action*	*Outcome*
1982	The FEIS, "Final Environmental Impact Statement: Long-Term Management of Liquid High-Level Radioactive Wastes Stored at the WNYNSC, West Valley (DOE/EIS-0081)" and associated ROD were issued outlining the actions DOE proposed for solidification of the liquid HLW contained in the underground tanks.	The initial period of WVDP Act work activities, completed in September 2002, removed the HLW from the tanks and immobilized it into borosilicate glass through VIT. The canisters of vitrified HLW remain on site in temporary storage inside the VSCs on the south plateau interim HLW Cask Storage Pad.
1988	DOE and NYSERDA published a NOI to prepare the EIS for "Completion of the WVDP and Closure or Long-Term Management of the Facilities at the WNYNSC (the Center)."	The DEIS was issued in 1996.
1996	DOE and NYSERDA issued the “Draft EIS for the Completion of the WVDP and Closure or Long-Term Management of the Facilities at the WNYNSC” (DOE/EIS-0226-D).	The DEIS was issued without a preferred alternative for a six-month review and comment period. After issuing the DEIS, and despite long negotiations, DOE and NYSERDA were unable to reach an agreement on the future course of action for closure at the Center (see Government Accounting Office [GAO], 2001).
1997	Following issuance of the 1996 DEIS, NYSERDA and DOE formed a stakeholder advisory group (the West Valley Citizen Task Force) to provide additional input to the public comment process required by the NEPA.	The Citizen Task Force's mission is to provide stakeholder input to decisionmaking for development of a closure option for the WVDP and the WNYNSC.
1997	DOE-HQ issued the “Final Waste Management Programmatic EIS,” (WM PEIS [DOE/EIS-0200F]) to evaluate nationwide management and siting alternatives for treatment, storage, and disposal of five types of radioactive and hazardous waste.	The WM PEIS (DOE/EIS-0200F) was issued with the intent to issue a separate ROD for each type of waste generated, stored, or buried over the next 20 years at 54 sites in the DOE complex.
1999	DOE issued a ROD for nationwide management of HLW, Vol. 64, FR, p. 46661 (64 FR 46661).	The ROD specified that WVDP-vitrified HLW will remain in storage on site until it is accepted at a geologic repository.
2000	DOE issued a ROD for nationwide management of LLW and mixed LLW (65 FR 10061).	The Hanford site in Washington State and the Nevada National Security Site (previously the Nevada Test Site) were designated as national DOE disposal sites for LLW and mixed LLW.
2001	DOE published an NOI (66 FR 16447) formally announcing its rescoping plan for preparing the waste management EIS for the WVDP. DOE published an Advance NOI (66 FR 56090), announcing in advance, its intention to prepare an EIS for Decommissioning and/or Long-Term Stewardship at the WVDP and the WNYNSC.	The rescoping plan split the scope of the 1996 WVDP DEIS into two phases: (1) near-term waste management decisionmaking and (2) final decommissioning and/or long-term stewardship decisionmaking. The advanced NOI informed interested parties of a pending EIS and provided opportunity for public comments early in the process.

TABLE 2-8 *(continued)*
Timeline of NEPA Documentation Associated with WVDP Decommissioning

Year	*Action*	*Outcome*
2003	DOE issued a notice of availability of the "WVDP Draft Waste Management EIS" (68 FR 26587). DOE, in cooperation with NYSERDA, issued an NOI (68 FR 12044) to issue an EIS for "Decommissioning and/or Long-Term Stewardship at the WVDP and the WNYNSC."	The DEIS presented alternatives for near-term management of WVDP LLW, mixed LLW, TRU waste, and HLW. Based on comments during the scoping process and the complexity of issues relating to long-term agency responsibility, this EIS was delayed (DOE-EIS-0226-R).
2005	DOE issued a ROD, based on alternative A, for the "WVDP Waste Management EIS (WVDP WM EIS-0337)" (70 FR 35073).	The ROD dictated that (1) the canisters of vitrified HLW will remain in storage on site until transfer to a geologic repository, (2) the decision on TRU waste will be deferred until certification is obtained from the Waste Isolation Pilot Plant in Carlsbad, New Mexico, and (3) LLW and mixed LLW will be shipped off site for disposal at commercial or DOE sites.
2005	On August 26, 2005, The Coalition filed a complaint in the U.S. District Court, Western District of New York, against DOE regarding the NEPA process at the WVDP. The Coalition contended that DOE's rescoping plan to split the 1996 WVDP DEIS violated NEPA and the Stipulation of Compromise. The Coalition also sought a declaration that DOE is not empowered to reclassify waste at the WVDP using the "waste incidental to reprocessing" determination.	On September, 28, 2007, the U.S. District Court, Western District of New York ruled to dismiss the complaint in its entirety. Refer to Case 1:05-cv-00614-JTC, Document 41, filed September 28, 2007 for the ruling.
2006	An EA (DOE/EA-1552) evaluated the proposed decontamination, deconstruction, and removal of select site facilities. A FONSI was issued.	The EA, with the FONSI, cleared the way for removal of 36 facilities that were (or in the next four years would be) no longer required to support WVDP activities.
2007	DOE issued an NOI to prepare an EIS for the disposal of Greater-Than-Class-C (GTCC) LLW (72 FR 40135). In March 2011, DOE issued the DEIS for the disposal of GTCC LLW and GTCC-like waste.	Nine scoping meetings for the EIS were held throughout 2007. On February 25, 2011, a notice of availability for the GTCC draft EIS was issued with the 120-day public comment period ending on June 27, 2011. The final EIS for disposal of GTCC and GTCC-like waste was issued on March 4, 2016 with a review period ending April 4, 2016.
2008	DOE issued a notice of availability for the revised "Draft Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the WVDP and WNYNSC (DOE/EIS-0226-D [Revised])" (73 FR 74160).	The DEIS evaluated the range of reasonable alternatives for decommissioning and/or long-term stewardship of the facilities at the Center. This DEIS is a revision of the 1996 Cleanup and Closure DEIS. This DEIS was distributed December 5, 2008, for a six-month public review period, which was extended through September 8, 2009.

TABLE 2-8 *(concluded)*
Timeline of NEPA Documentation Associated with WVDP Decommissioning

Year	*Action*	*Outcome*
2010	In January 2010, DOE issued the "Final EIS (FEIS) for Decommissioning and/or Long-Term Stewardship at the WVDP and WNYNSC (DOE/EIS-0226 [Revised])". On April 14, 2010, DOE issued the ROD for the FEIS, selecting the phased decisionmaking alternative as the preferred alternative. On May 12, 2010, NYSERDA issued a SEQR Findings Statement selecting the phased decisionmaking alternative as the preferred alternative.	In Phase 1 of the phased decisionmaking preferred alternative, DOE will decommission the MPPB, the VF, RHWF, the wastewater treatment lagoons, and a number of other facilities. The Phase 2 decision will be made within 10 years of the EIS ROD.
2014	In early 2014, DOE and NYSERDA announced that a joint Supplemental EIS would be prepared for the Phase 2 decisions. The integrated approach developed by DOE and NYSERDA for making the Phase 2 decision will incorporate probabilistic performance assessment to support the Phase 2 Decisionmaking Alternative for the WVDP and WNYNSC.	In September 2015, DOE awarded the contract for preparing the PPA to Neptune and Company, Inc.
2015	In December 2015, DOE issued a request for information seeking feedback from contractors and other interested parties regarding their capabilities and proposed innovative approaches for performance of the Supplemental EIS (SEIS).	This market research was designed to assist DOE with identifying interested and capable companies to perform the EIS to support Phase 2 decisions for the disposal areas and the underground storage tanks.
2016	In August 2016, DOE issued a final Request For Proposals (RFP) for the SEIS.	The SEIS contract was awarded to SC&A, Inc. in April 2017.
2017	At the November 2017 quarterly public meeting, the SEIS project team presented an overview of the process for developing the SEIS.	Work continued on the probablistic perfromance assessment to support the SEIS. Work began on development of SEIS alternatives and conceptual engineering designs for disposition of the disposal areas and underground storage tanks.
2018	NOI to prepare an SEIS was submitted to the *Federal Register* by DOE and to the *State Environmental Notice Bulletin* by NYSERDA in February 2018. Three SEIS public scoping meetings were held in March 2018.	Comments and recommendations from the ninety day public scoping period that ended in May 2018 will be evaluated for the draft report. Work continued in all areas of the draft SEIS preparation as described for year 2017 above.
2019 - 2024	Work continued in all areas of the preparation of the draft SEIS and completion of the PPA model.	DOE and NYSERDA will use the PPA to evaluate SEIS alternatives. The SEIS schedule has been extended to 2027 due to complexities in the PPA modeling.

TABLE 2-9
WVDP Environmental Permits, Approvals, and Registrations

Permit Description	*Status of Permit, Approval, or Registration and System Updates*
Hazardous Waste Management (NYSDEC)	
WVDP RCRA Part A Interim Status Permit Application (EPA ID #NYD980779540)	
RCRA permit that provides interim status for treatment and storage of hazardous waste.	DOE is currently operating under the April 2011 RCRA Part A Permit Application, conditionally approved on June 9, 2011. An updated part A was provided to NYSDEC and anticipated to be approved in 2025.
RCRA Final Status Permit (6 NYCRR Part 373-2) - *INDEFINITELY SUSPENDED*	
RCRA permit that provides final status for treatment and storage of hazardous waste.	NYSDEC has suspended action relative to the RCRA Final Status permit application until completion of Phase 1 work.
Effluent Water (NYSDEC)	
SPDES (NY0000973)	
Permit to discharge to surface waters from various on-site sources with associated monitoring requirements.	The current SPDES permit was issued by NYSDEC, effective July 1, 2011, modified in July 2015 for the relocation of the S09 stormwater outfall, and expired on June 30, 2016. With NYSDEC approval, the WVDP is currently continuing to operate under the terms and conditions of the existing (2011) SPDES permit.
Water Withdrawal (NYSDEC)	
Water Withdrawal (NYS ID# 9-0422-00005/00112)	
Permit to withdraw waters from two groundwater supply wells and from the on-site reservoirs.	The WVDP is operating under a NYSDEC approved water withdrawal permit that requires renewal every 10 years. The next renewal is due in 2029.
Drinking Water (NYSDOH and CCHD)	
Public Water System (ID #NY0417557)	
Approval to operate the WVDP nontransient noncommunity public drinking water system under NYSDOH.	The WVDP drinking water system operates with CCHD and NYSDOH approval and is assigned a NYS drinking water system tracking number by CCHD.

Note: Permit, approval, and license expiration dates are current as of December 2024.

TABLE 2-9 *(continued)*
WVDP Environmental Permits, Approvals, and Registrations

Permit Description	*Status of Permit, Approval, or Registration and System Updates*
Flood Protection and Dam Safety (NYSDEC)	
NYS Atomic Development Dam #1 and Dam #2 (Reg. ID #019-3149 and Reg. ID #019-3150)	
Permit to operate and maintain two Class A Low-Hazard Dams on the WNYNSC property.	Dam permits were issued for operation and routine maintenance of the dams and lakes. The dams create lakes that supply water for SPDES discharge augmentation. The dam permits have no expiration date.
Air Emissions - Radiological (EPA)	
Supernatant Treatment System (STS)/Permanent Ventilation System (PVS) (WVDP-387-01)	
EPA approval for STS ventilation for radio-nuclide emissions.	The STS ventilation system is operating under an EPA approval that was obtained in 1987 and has no expiration date.
Remote Handled Waste Facility (RHWF) (WVDP-RHWF Mod-001)	
EPA approval for RHWF ventilation for radionuclide emissions.	The RHWF is operating under an EPA approval that was obtained in 2012 that has no expiration date.
Outdoor Ventilated Enclosures (OVE)/Potable Ventilation Units (PVUs) (WVDP-587-01)	
EPA approval for up to 15 PVUs for ventilation and removal of radionuclides.	The PVUs are operating under an EPA approval originally obtained in 1987 for 10 PVUs and expanded in 2007 to allow usage of up to 15 units. The approval has no expiration date.

Note: Permit, approval, and license expiration dates are current as of December 2024.

TABLE 2-9 *(concluded)*
WVDP Environmental Permits, Approvals, and Registrations

Permit Description	*Status of Permit, Approval, or Registration and System Updates*
Air Emissions - Nonradiological (NYSDEC and NYSDOL)	
Air Facility Registration Certificate (9-0422-00005/00099) - NYSDEC	
Certificate identifies potential sources of nonradiological emissions from the WVDP that do not require a permit. Exempt or trivial emissions are not included.	The WVDP has a NYSDEC approved air facility registration certificate. There are currently no nonradiological emissions sources at the WVDP that require a permit. The air facility registration is renewed as new units are installed or old sources are modified or taken out of service.
Asbestos-Handling License (CHBWV #61646) - NYSDOL	
Asbestos contractor license.	The CHBWV asbestos handling license is renewed annually.
Petroleum Bulk Storage (PBS) (NYSDEC)	
PBS Registration (#9-008885)	
Registration of bulk storage tanks used for petroleum.	The WVDP operates five NYSDEC registered tanks for gasoline and diesel fuel storage under a PBS certificate. The PBS registration certificate requires renewal every five years. The current certificate is valid from 2021 to 2026.
Wildlife (U.S. Fish and Wildlife Service)	
Bird Depredation Permit (MB747595-0)	
Federal permit for the limited removal of migratory birds and active bird nests.	The WVDP has a bird depredation permit that is renewed annually.
Resident Canada Goose Nest and Egg Registration	
Federal registration for management of goose nests and eggs.	The WVDP has a goose nest and egg registration that is updated annually.
Groundwater (EPA)	
Underground Injection Control Program Regulation (UICID: 11NY00906001)	
Approval to use PTW wells to inject sodium bromide tracer solution to estimate groundwater flow velocities.	EPA authorized operation of injection wells for tracer testing within the PTW at the WVDP in November 2010. This authorization has no expiration.

Note: Permit, approval, and license expiration dates are current as of December 2024.

TABLE 2-10
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
42 United States Code (USC) §2011 et seq.	The **Atomic Energy Act (AEA)** of 1954 was enacted to assure the proper management of source, special nuclear, and by-product materials. The AEA and the statutes that amended it delegate the control of nuclear energy primarily to DOE, NRC, and EPA. See discussions of the WVDP Act, DOE Orders 435.1, and 458.1 below.
Public Law 96-368	The **WVDP Act** of 1980 authorized DOE to carry out a HLW demonstration project at the WNYNSC (the Center) in West Valley, New York.
Cooperative Agreement between DOE and NYSERDA	The **Cooperative Agreement** between DOE and NYSERDA established a cooperative framework for implementing the WVDP Act, effective October 1980, as amended in September 1981. In 1990, the first supplemental agreement was signed by DOE and NYSERDA which set forth specific provisions for preparing a joint EIS. The DOE ROD for the FEIS was issued in April 2010 for the WVDP. A second supplemental agreement to the Cooperative Agreement was drafted in January 2010 and issued by DOE and NYSERDA in March 2011.
WVDP MOU between DOE and NRC	The 1981 **Memorandum of Understanding (MOU),** mandated by the WVDP Act, established procedures for review and consultation by NRC with respect to activities conducted at the WNYNSC by DOE. The agreement encompassed development, design, construction, operation, and D&D activities associated with the Project as described in the WVDP Act. Under the WVDP Act, and to satisfy commitments made to NRC, DOE was required to prepare a DP for the Project and submit it to NRC for review.
DOE Order 231.1B	DOE Order 231.1B Chg 1, **Environment, Safety, and Health Reporting** (updated and approved on June 27, 2011 with Change 1 issued on November 28, 2012), was issued to ensure that DOE and National Nuclear Security Administration receives timely and accurate information about events that could adversely affect the health, safety, and security of the public or workers, the environment, the operations of DOE facilities, or the credibility of the Department. This is accomplished through timely collection, reporting, analysis, and dissemination of data pertaining to environment, safety, and health issues as required by law or regulations, or in support of U.S. political commitments to the International Atomic Energy Agency (IAEA).
DOE Order 232.2A	DOE Order 232.2A, **Occurrence Reporting and Processing (ORP) of Operations Information** defines requirements to notify DOE about events that could adversely affect the public, the workers, or the environment.
DOE Order 458.1	DOE Order 458.1 Chg 4, **Radiation Protection of the Public and the Environment** established requirements to protect the public and environment against undue risk from radiation associated with radiological activities conducted under control of DOE pursuant to the AEA, by ensuring that: (1) operations are conducted to limit radiation exposure to members of the public pursuant to limits established in the Order, (2) radiological clearance of DOE real and personal property is controlled, (3) potential radiation exposures to members of the public are as low as reasonably achievable (ALARA), (4) routine and nonroutine releases are monitored and dose to the public is assessed, and (5) the environment is protected from the effects of radiation and radioactive material.

TABLE 2-10 *(continued, page 2 of 6)*
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
DOE Order 435.1	DOE M 435.1 Chg 2, **Radioactive Waste Management** ensures that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety and the environment, and complies with applicable state, federal, and local laws and regulations. Under the Order, sites that manage radioactive waste are required to develop, document, implement, and maintain a site-wide radioactive waste management program which includes actions to minimize radioactive waste generation.
Title 10 CFR Part 830, Subpart A, DOE Order 414.1D Chg2	**10 CFR Part 830, Nuclear Safety Management**, Subpart A, **Quality Assurance Requirements,** and **DOE Order 414.1D Chg 2, Quality Assurance**, provide the quality assurance (QA) program policies and requirements applicable to WVDP activities.
42 USC §4321 et seq., and 10 CFR Part 1021	The **National Environmental Policy Act (NEPA)** of 1969 and as amended in 1970, established a national policy to ensure that protection of the environment is included in federal planning and decisionmaking. The President's Council on Environmental Quality established a screening system of analyses and documentation that requires each proposed action to be categorized according to the extent of its potential environmental impact.
Environmental Conservation Law (ECL), 6 NYCRR Part 617 NYS	The NY **State Environmental Quality Review (SEQR) Act** of January 1, 1996, enacted in September 1976 and as amended on June 26, 2000, requires adequate environmental review and assessment of whether a proposed action has the potential to have a significant environmental impact, prior to a decision regarding the action. Where a project involves both NYS and federal approvals, it is preferred to coordinate the SEQR and NEPA processes. Coordinated efforts were made at the WVDP to effectively utilize information from the federal EIS process to make the required SEQR Findings Statement for the WVDP and WNYNSC, which was issued in May 2010.
42 USC §6901 et seq., and NYS ECL, 6 NYCRR Chapter 4, Subchapter B Part 373	The **RCRA** of 1976 and the **NYS Solid Waste Disposal Act** (NYS ECL Article 27 [Title 9]) govern the generation, storage, handling, and disposal of hazardous wastes and closure of systems that handle these wastes. RCRA was enacted to ensure that hazardous wastes are managed in a way that protects human health, safety, and the environment.
Amendment to 42 USC §6961, NYS ECL, and NYSDEC Administrative Order on Consent with DOE	The **Federal Facility Compliance Act (FFCA)** of 1992 (an amendment to RCRA) requires DOE facilities to prepare an Site Treatment Plan (STP) for treating mixed waste inventories to meet land disposal restrictions (LDR) and to annually update the plan to account for changes in mixed waste inventories, capacities, and treatment technologies. DOE entered into a Consent Order with NYSDEC for the WVDP in 1996.
Docket No. II RCRA §3008(h) 92-0202, and NYS ECL	DOE and NYSERDA entered into the **RCRA §3008(h) Administrative Order on Consent** with EPA (lead agency) and NYSDEC in March 1992. The state and federal RCRA regulations authorize the agencies to issue orders requiring RCRA corrective actions associated with the potential releases of hazardous waste and/or hazardous constituents from WVDP Solid Waste Management Units (SWMUs) (under DOE jurisdiction) and WNYNSC SWMUs (under NYSERDA jurisdiction).

TABLE 2-10 *(continued, page 3 of 6)*
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
RCRA Section 3016	The **RCRA 3016 Statute** applies to all federal hazardous waste facilities currently owned or operated by the government. It requires that the status of facility hazardous waste activities be reported to EPA and are authorized every two years. WVDP facility hazardous waste activities are reported biennially to EPA and NYSDEC.
42 USC §7401 et seq.; 40 CFR 61, Subpart H; and 6 NYCRR Chapter 3, Air Resources	The **Clean Air Act (CAA)** of 1970 and the **NYS ECL** regulate the release of air pollutants through permits, approvals, and air quality limits. Emissions of radionuclides are regulated by EPA via the NESHAP regulations. On April 5, 1995, the DOE and the EPA entered into an MOU concerning the CAA Emission Standards for Radionuclides, 40 CFR Part 61, including Subparts H, I, Q, and T. Nonradiological emissions are regulated under 6 NYCRR Chapter 3 Part 201-4 (Minor Facility Registrations). At the WVDP, the DOE has the EPA approval to release radiological emissions from four active stacks and up to 15 Portable Ventilation Units (PVUs). The DOE also maintains a NYS Air Facility Registration Certificate for nonradiological sources.
33 USC §1251 et seq. and NYS ECL and 6 NYCRR Chapter 10, Division of Water	The **Federal Water Pollution Control Act** of 1977 (**Clean Water Act [CWA])** and **NYS ECL** (Article 17 [Title 8]) seek to improve surface water quality by establishing standards and a system of permits. Wastewater and stormwater discharges are regulated by NYSDEC through the SPDES permit. Discharges of fill material are regulated through permits issued by the U.S. Army Corps of Engineers (USACE) and water quality certifications issued by NYSDEC. NYSDEC has granted the WVDP permission to continue operating under the current SPDES permit, with an effective date of July 1, 2011, based on the project's timely and compliant renewal application per the provisions of the State Administrative Procedure Act (SAPA).
NYS ECL Article 17 (Titles 7 and 8) and Article 70	**NYS ECL Article 17 (Titles 7 and 8), and ECL Article 70** regulate stormwater discharges related to construction activity.
NYS Navigation Law and NYS ECL Article 17 (Titles 10 and 17)	**NYS ECL Article 17 (Titles 10 and 17), 6 NYCRR 612–614 and Parts 595–599, and 6 NYCRR Subpart 360-14** regulate design, operation, inspection, maintenance, and closure of aboveground and underground petroleum bulk storage (PBS) and chemical bulk storage (CBS) tanks**.** These laws also regulate spill reporting and cleanup. Under terms of a 1996 agreement, amended in 2005, DOE is not required to report a spill of petroleum product onto an impervious surface if the spill is less than five gallons and is cleaned up within two hours of discovery. Minor petroleum spills that do not meet these conditions are reported quarterly to NYSDEC. Spills of larger significance may have immediate reporting requirements. The WVDP has five registered PBS tanks (four aboveground storage tanks [ASTs] and one underground storage tank [UST]). They are inspected monthly and maintained. Spills are reported and cleaned up in accordance with WVDP policies and procedures.

TABLE 2-10 *(continued, page 4 of 6)*
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
EO 11990 and NYS ECL	**EO 11990, Protection of Wetlands**, directed federal agencies to avoid, where possible, impacts (e.g., destruction, modification, or new construction) that would adversely affect wetlands wherever there is a practical alternative. Activities in wetlands are regulated by the USACE and NYSDEC permits. The wetlands on the WVDP are subject to regulation under Section 404 of the CWA and NYS ECL Articles 24 and 36. The most recent site-wide WVDP wetlands survey was performed in 2003 and approved by USACE in March 2006. Additional wetlands were delineated in the vicinity of the firing range in October 2006 and in the vicinity of the HLW Cask Storage Pad and NDA in May 2013.
42 USC §9601 et seq.	The **Comprehensive Environmental Response, Compensation, and Liability Act** of 1980 **(CERCLA)**, including the **Superfund Amendments and Reauthorization Act of 1986 [SARA]**) provided the regulatory framework for remediation of releases of hazardous substances and remediation of inactive hazardous waste disposal sites. If a hazardous substance spill exceeds a reportable quantity, CERCLA reporting requirements are triggered. Based on the results of a Preliminary Assessment Report prepared for DOE, it was determined that the WVDP did not qualify for listing on the National Priorities List. Therefore, no further investigation pursuant to CERCLA was warranted.
42 USC §11001 et seq.	The **Emergency Planning and Community Right-to-Know Act (EPCRA)** of 1986 (also known as SARA Title III) was designed to create a working partnership between industry, business, state, and local government, and emergency response representatives to help local communities protect public health, safety, and the environment from chemical hazards.
42 USC §300f et seq.	The **Safe Drinking Water Act** of 1974 requires that each federal agency operating or maintaining a public water system must comply with all federal, state, and local requirements regarding safe drinking water. Compliance in NYS is verified by oversight of the NYSDOH, through NYS Public Health Law, and the Cattaraugus County Health Department (CCHD).
40 CFR Part 141 Subpart I	EPA published a regulation in 1991 to control lead and copper in drinking water. This regulation is known as the **Lead and Copper Rule** (also referred to as the LCR). In October 2024, EPA issued the Lead and Copper Rule Improvements (LCRI) final rule, which updates various aspects of the LCR, including requiring public water systems to replace all lead and galvanized requiring replacement (GRR) service lines within 10 years and setting minimum annual service line replacement rates. The LCRI also lowered the lead action level from 15 µg/L to 10 µg/L. §141.84(a) (**Service line inventory and replacement requirements**) requires that all water systems must develop a service line inventory that identifies the material, including lead, and location of each service line connected to the public water distribution.
10 CFR Part 851	10 CFR 851 **Worker Safety and Health Program** of 2006 requires DOE contractors to provide workers with a safe and healthful workplace. To accomplish this objective, the rule established program requirements specific to management responsibilities, worker rights, hazard identification and prevention, safety health standards, required training, recordkeeping, and reporting. Worker safety and training are discussed in Chapter 3, "Environmental Management System."

TABLE 2-10 *(continued, page 5 of 6)*
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
10 CFR Part 835	10 CFR Part 835, **Occupational Radiation Protection**, amended August 2017, established radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities. The document "CH2MHILL·B&W West Valley, LLC Documented Radiation Protection Program and Implementation for 10 CFR Part 835, as Amended 2017" (WVDP-477) was last revised in February 2021. Occupational radiation protection is discussed in Chapter 3, "Environmental Management System."
15 USC §2601 et seq., and 12 NYCRR Part 56	The **Toxic Substances Control Act** of 1976 regulates the manufacture, processing, and distribution of chemicals, including asbestos-containing material (ACM) and polychlorinated biphenyls (PCBs). Effective September 2006, the NYS Department of Labor (NYSDOL) significantly revised the asbestos regulations, cited in 12 NYCRR Part 56. As a result, operating procedures were revised, special training for asbestos workers was conducted, and the WVDP applied for and was granted site-specific variances.
7 USC §136 et seq. and NYS ECL	The **Federal Insecticide, Fungicide, and Rodenticide Act** of 1996 and **NYS ECL** provide for EPA and NYSDEC control of pesticide distribution, sale, and use. At the WVDP, herbicides are used to control weed growth during summer. All Covid-19 cleaners and sanitizers were included on the NYSDEC approval list.
NYS ECL Article 15 (Title 5), et seq.	**NYS ECL**, Article 15, Title 5, **Protection of Water** regulates the safety of dams and other surface water impounding structures, including construction, inspection, operation, maintenance, and modification of these structures. Revised dam safety regulations became effective on August 19, 2009. The dams maintained by the WVDP, on the WNYNSC property, are classified as Class A - low-hazard dams. Two surface water impounding dam structures are located on the WNYSC.
6 NYCRR 601.5	**6 NYCRR 601.5 Water Withdrawal Reporting** requires that any person who withdraws or is operating any system or method of withdrawal that has a capacity to withdraw more than 100,000 gallons (378,541 L) of groundwater or surface water per day shall file an annual report with NYSDEC. The legislation was enacted to gain more complete information for managing the state's water resources. Modifications to the law that became effective in 2017 require a water withdrawal permit for all water withdrawal systems with a potential to withdraw 100,000 gallons per day or more. NYSDEC issued a water withdrawal permit to the DOE-WVDP in December 2019. The permit is effective through December 2029.

TABLE 2-10 *(continued, page 6 of 6)*
Federal and State Regulations Applicable to the WVDP

Citation	*Environmental Statute, DOE Directive, EO, Agreement*
49 CFR Part 172, and 6 NYCRR Part 364.9	**6 NYCRR Part 364.9** regulates handling and storage of potentially infectious regulated **medical waste**. 49 CFR Part 172, Subpart H regulates transportation safety and disposal of regulated medical waste at a licensed facility. Medical services generate potentially infectious medical wastes.
16 USC §703 et seq. and EO 13186	The **Migratory Bird Treaty Act** of 1918 implemented various treaties and conventions between the U.S. and foreign countries for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.
16 USC §1531 et seq., and 6 NYCRR Part 182	The **Endangered Species Act** of 1973 provided for the conservation of endangered and threatened species of fish, wildlife, and plants. (See also 6 NYCRR Part 182, **Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern**.) Several ecological surveys of the WNYNSC premises have been conducted. Except for "occasional transient individuals," no plant or animal species protected under the Endangered Species Act are known to reside at the WNYNSC.
16 USC §470	The **National Historic Preservation Act** of 1966 established a program for the preservation of historic properties throughout the nation. Surveys of the WNYNSC have been conducted for historic and archaeological sites. Surveys revealed American Indian and historic homestead artifacts, consistent with the area.
EO 11988	EO 11988, **Floodplain Management**, was issued to avoid adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.
6 NYCRR Part 360	**NYS ECL Solid Waste Management Facility** defines the requirements for closure of nonradioactive solid waste disposal facilities in a manner that protects the environment. **Per a 1986 NYSDEC approved engineering closure plan, the CDDL was closed.**
EO 13751	EO 13751, **Safeguarding the Nation from the Impacts of Invasive Species**, calls on Federal agencies to prevent the introduction, establishment and spread of invasive species, as well as to eradicate and control populations of invasive species that are established.

CHAPTER 3
ENVIRONMENTAL MANAGEMENT SYSTEM

2024 Highlights

EMS recertification: The CHBWV EMS was recommended for certification under the ISO 14001:2015 standard following the successful completion of the annual third-party EMS recertification audit in April 2024. The WVDP scored 100% (which equates to the highest score of "green") on the federal EMS performance metrics scorecard for 2024, indicating that the site has a robust EMS.

Energy Usage: The natural gas usage for FY 2024 was approximately 4.1% lower than that of FY 2023. Total potable water usage decreased by 6.3% in FY 2024 as compared to FY 2023. Industrial, Landscaping, and Agricultural (ILA) water use increased 19.4% from FY 2023 to FY 2024.

Procurement Practices: WVDP acquisition and procurement practices continue to ensure that 100% of all eligible electronics were Electronic Product Environmental Assessment Tool (EPEAT) registered. In FY 2024, the WVDP purchased approximately $131,651 of products containing recycled or biobased materials.

Environmental Management System (EMS)

The DOE is committed to implementing sound stewardship practices to protect the air, water, land, and other natural and cultural resources that may be affected by its activities at the WVDP. Environmental requirements and pollution prevention were incorporated into the WVDP's work planning and execution, and actions were taken to minimize the environmental impact of the operations, in accordance with its environmental policy.

An EMS is a management practice that enables an organization to conduct its work in a systematic manner, minimizing the environmental impacts of its operations. The WVDP EMS was designed to meet ISO 14001:2015 (the Environmental Management Systems [EMS] Standard). An effective EMS ensures that appropriate operational procedures and environmental monitoring programs are in place to minimize or eliminate any potential environmental impact from each project. Establishing the EMS also helps systematically address regulatory requirements, reducing the risk of noncompliance and improving environmental performance by ensuring that environmental evaluations include effective communication, adhere to all applicable regulatory guidance, and include necessary regulatory notifications and approvals.

At the WVDP, the EMS is incorporated into all planned work activities. The scope of EMS in 2024 focused on the continued deconstruction and demolition of the remaining above-ground structure of the MPPB, which was conducted in a manner safe for the workers and the surrounding environment. The 2024 scope also included the management and shipment of radiologically contaminated waste generated prior to the commencement of deconstruction.

An independent third-party EMS ISO 14001:2015 certification audit conducted by Orion Group in April 2024 revealed no nonconformities, areas of concern, or opportunities for improvement. Two strengths (engaged leadership team and excellent communication program) were noted during the audit for the certification. An internal audit of the EMS for the ISO 14001:2015 standard was conducted in August 2024 by the WVDP Performance Assurance department. During the audit, CHBWV was commended for the WVDP teams' promptness and thoroughness in addressing project needs and environmental concerns, including reducing emissions, lowering the site's carbon footprint, and minimizing water and fuel usage, as well as their impact on the surrounding wetlands.

Communications. CHBWV actively participates in the DOE-HQ Office of Sustainable Environmental Stewardship, an organization that fosters the sharing of EMS best practices. Additionally, the WVDP maintains its routine and frequent communications with regulatory agencies, including teleconferences with NYSDEC and the EPA on RCRA projects and RCRA path forward meetings.

The WVDP has engaged in direct and frequent communications with its stakeholders throughout the project. As one example, to inform the stakeholders on the preparations and planning for the deconstruction of the MPPB, CHBWV created three videos in 2021 and 2022:

- The Environmental Monitoring team providing details on the site's state-of-the-art monitoring system and verifies the protective measures and safeguards in place that continue to protect employees, the public, and the environment.
- Subject Matter Experts (SMEs) describing the safe and compliant approach being employed to deconstruct this facility.
- An animation showing the equipment used to deconstruct the MPPB, including the dust suppression misters, as well as the order in which the rooms will be removed.

Quarterly environmental monitoring data are also now available to the public. At the request of stakeholders, this initiative was implemented to provide monitoring information ahead of the ASER, which, by DOE order, is published annually in October every year. Links to these electronic communications are below.

https://www.westvalleycleanup.com/
(West Valley Cleanup Alliance, LLC homepage)

https://Bit.ly/EMWVDP
(WVDP Facebook page [not accessible on site])

https://www.youtube.com/watch?v=R0tU4XQ5Irc
(Video - Environmental monitoring)

https://www.youtube.com/watch?v=u1he0p663Ks
(Video - Preparations for MPPB removal)

https://www.youtube.com/watch?v=kobznp07Mow
(Animation video showing the deconstruction sequence)

Self-Assessments. At the WVDP, self-assessment activities are stressed as a mechanism for evaluating, improving, and maintaining safety and protection of the public and the environment. These self-assessments are coordinated through the site Integrated Assessment Program (IAP) and involve an annual review of each functional area of the WVDP.

Deconstruction Activity Monitoring. Since the commencement of the MPPB deconstruction in 2022, the WVDP EMS team has monitored any changes in the on-site and off-site environment associated with the deconstruction. Monitored activities include air emissions, waste management, soil, and surface water and groundwater quality.

Lessons Learned. The WVDP participates in the DOE Lessons Learned Program, providing internal training and opportunities for improvement in safety and environmental stewardship.

Management Review. The routine annual internal review by the EMS Executive Safety Review Board (ESRB) was held in March 2024. The ESRB reviews the site's environmental performance annually to ensure the continuing suitability, adequacy, and effectiveness of the EMS. The WVDP EMS was determined to be operating effectively during this review.

Policy and Commitment

It is the policy of the WVDP to integrate environmental requirements and pollution prevention into project planning and execution to ensure that sound environmental stewardship practices are implemented. The WVDP environmental policy for 2024 requires commitments in nine areas.

- Identify and comply with all applicable environmental laws and regulations;

- Use practicable means to minimize or eliminate the generation of new wastes without a path for disposition;
- Protect the unique natural, biological and cultural resources associated with WVDP activities;
- Conserve natural resources by reusing and recycling materials, purchasing recycled materials, and using recyclable materials; and
- Consider the input of our stakeholders when weighing alternative environmental courses of action.

Managers are expected to take prompt action to address environmental concerns and to have zero tolerance for noncompliance with the policy.

EMS Implementation

The EMS directs that work planning must involve identifying activities with specific regulatory requirements and activities with the potential for significant environmental impacts. Additionally, planned work must be performed in a manner that contributes to the DOE's EMS goals. Incorporating the EMS in the planning stage contributes to successful project outcomes, in terms of the DOE's EMS objectives. See Figure 3-1 for the key pillars of the WVDP's EMS implementation plan.

Regulatory Compliance. Assessment of the applicability of environmental laws and regulations prior to initiating a project ensures that appropriate permits and operating practices are in place. Compliance is also maintained by routine environmental monitoring of air, surface water, drinking water, groundwater, and ambient radiation exposure. Required regulatory reports that analyze these data are submitted to NYSERDA, the EPA, and the DOE.

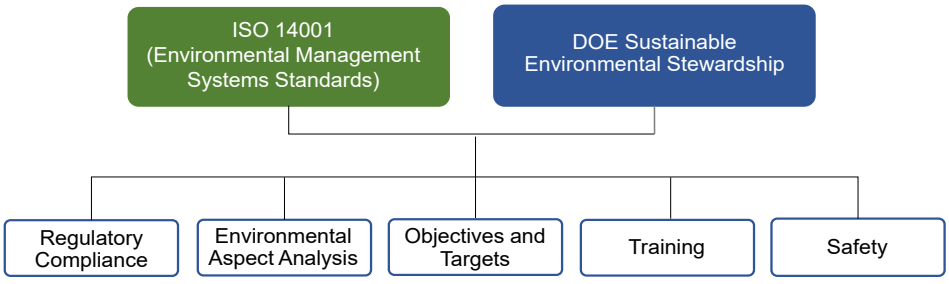
Environmental Aspect Analysis. For each facility or structure considered for deconstruction, the base environmental aspects were identified and addressed during work planning, with the assistance of hazard control specialists. An "environmental aspect" is any element of an organization's activities, products, or services that can impact the environment.

Activities that have regulatory implications or those that have the potential for significant environmental impacts are identified as "significant aspects" through a quantitative ranking process, per the ISO 14001:2015 standard.

Identified potential significant aspects were systematically graded for their likelihood of occurring, the potential magnitude of the impact, the potential regulatory requirements or ramifications, the anticipated level of community concern, and the resulting potential risk. The purpose of grading environmental aspects is to focus management attention on the most important environmental concerns associated with the WVDP's scope of work.

The potential significant environmental aspects identified for 2024 are summarized in Table 3-1. The activities evaluated for their environmental aspects in 2024 included radiological and asbestos air emissions, radiological waste generation, and toxic discharge to surface water.

FIGURE 3-1 Pillars of the WVDP EMS Implementation



Integrated Safety Management System (ISMS). The EMS is reinforced by the Integrated Safety Management System (ISMS) (DOE Order 450.2 Chg1). The DOE's ISMS ensures that the DOE, including the National Nuclear Security Administration (NNSA), systematically integrates safety into management and work practices at all levels and that missions are accomplished efficiently while protecting workers, the public, and the environment. EMS and ISMS guidelines help to ensure a safe and environmentally sound deconstruction plan.

Objectives and Targets. The WVDP establishes environmental aspects and then sets objectives and measurable targets for improving environmental performance or minimizing potential environmental impacts. Objectives and targets are re-aligned annually to support upcoming operations and work activities. The WVDP's EMS objectives in 2024 included minimizing potential surface water contamination, reducing legacy waste volumes, the removal of the MPPB facility, the purchase of EPEAT products, and reducing electric usage. EPEAT purchasing and electric usage in 2024 are reported in the "2024 EMS Results" section on the following page.

Occupational Radiation Protection. The aspects of EMS include not only the impacts on the environment but also the impact on personnel health and safety. Worker safety and health protection at DOE sites are governed by 10 CFR Part 851, Worker Safety and Health Program. The program established requirements for management responsibilities, worker rights, hazard identification, training, record-keeping, and other related aspects. The WVDP implements these rules and requirements in its operational procedures and continues to review whether its procedures comply with worker protection protocols.

Training. The key elements of an effective EMS include employee training demonstrating leadership's commitment to procedure compliance and environmental stewardship. The "WVDP Worker Safety and Health Plan" at the WVDP describes required safety training and explains how the WVDP complies with 10 CFR 851. Based on individual work requirements, employees receive specialized safety training tailored to their specific needs. For example, employees who work in environments with airborne hazards must first medically qualify and successfully complete Respiratory Protection training. Those who may work with asbestos removal take asbestos training. Regulatory compliance personnel involved in waste management are required to take Hazardous Waste Operations and Emergency Response training.

Safety Record. At the WVDP, all employees participate in human performance/behavior-based safety training to help reduce errors and prevent accidents. Any person working at the WVDP with a personal photo badge that allows unescorted access to administrative areas of the site must successfully complete general employee training, which covers health and safety, emergency response, environmental compliance, and other essential topics.

Additionally, the WVDP conducts an annual all-employee safety event. At the event, the employees participate in hands-on activities and listen to safety lectures that highlight the importance of safety during complex deconstruction activities. The 2024 event was held again in July.

TABLE 3-1

WVDP Significant Environmental Aspects for 2024[a]

Environmental Aspect:
· Radiological and/or Asbestos Air Emissions
· Radiological Waste Generation (low-level waste [LLW] and mixed [hazardous radiological] waste)
· Vulnerability and Potential for Release (rad emissions from accident scenario, i.e., HEPA filter failure, transportation of RH-TRU drum [dropped])
· Toxic Discharge to Surface Water (metals, organics, or radiological constituents)
· Savings in Energy Use (positive aspect due to significant reductions and purchase of renewable energy credits [RECs])

[a] Each year all planned work activities are evaluated using a ranking system developed for the EMS that is based on potential environmental and regulatory impacts, community concerns, and likelihood of occurrence. Under this ranking system, aspects with an overall significance of 14 or greater are identified as "significant aspects."

The WVDP's record with respect to worker safety and protection of the public and the environment demonstrates the success of a well implemented ISMS and EMS. CHBWV and its subcontractors achieved 707,503 safe work hours in 2024. This safety performance was achieved while also protecting the public and the environment.

2024 EMS Results

EMS Performance Metrics for 2024 EMS Scorecard. The EMS Annual Report establishes EMS performance metrics in several categories on which each site is scored. Each year, the WVDP updates their site-specific EMS goals to correlate with the planned work scope. Based on the status of the site's EMS, the WVDP scored 100% (which equates with the highest score of "**green**") on the federal scorecard for FY 2024, indicating that the site has a compliant and robust EMS.

Deconstruction Safety

The WVDP began the MPPB deconstruction in September 2022. Throughout the deconstruction processes, the safety of site workers has been the top priority for the project management group. Radiation levels at the site are constantly monitored with multiple layers of air monitoring devices, and the WVDP management routinely updates the site workers about the monitoring results. (See Chapter 4, "Environmental Monitoring".)

WVLL Lessons Learned

CHBWV West Valley Decommissioning Team

We Value Learning and Living

Any issues found in daily deconstruction activities, from an extension cord protection to machinery operations, are reviewed and feedback is provided in Lessons Learned that are shared site wide.

Energy Use Credit. The Renewable Energy Credit (REC) is a type of EAC that proves electricity was generated from a renewable source. In FY 2024, the WVDP used 5,629 MWh of electricity to support site activities, and purchased 2,400 MWh, consisting of certified solar and wind energy, which offset the site's energy usage by 42.6%. The electric usage in 2024 was 53% lower, while natural gas was 65% lower than the 2008 baselines. (See Figure 3-2.)

Water Use. All potable and Industrial, Landscaping, and Agricultural (ILA) water is supplied by two groundwater wells except for the augmentation water required during lagoon discharges, which is supplied by the reservoirs. In FY 2024, approximately 15.6% of the total water used at the WVDP was for potable water and 84.4% was used for industrial purposes. (See Figure 3-3.) Total water usage increased by 14.0%, potable water use decreased by 6.5%, and ILA water usage increased 18.9% compared to FY 2023. ILA water increased due to dust suppression during MPPB deconstruction activities.

Pollution Prevention and Waste Reduction. The WVDP "Waste Minimization and Pollution Prevention Awareness Plan" requires that waste minimization objectives be included in the work instructions for all projects, and encourages procurement of recycled products, reusing existing products, and using methods that conserve energy. Material recycling and reuse is tracked under the EMS. Nonradiologically contaminated solid waste generated in FY 2024 was recycled or reused where practical. A total of approximately 46.82 tons of material was diverted from landfills in FY 2024. The quantity of each type of material recycled, reused, or donated is summarized in Table 3-2 on the next page.

FIGURE 3-2
Energy Use

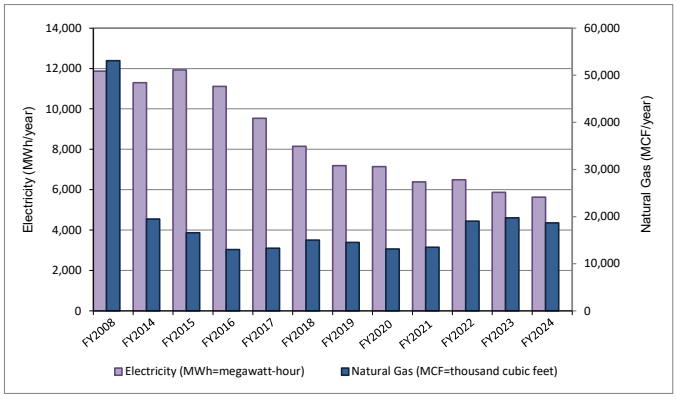


FIGURE 3-3
Water Use

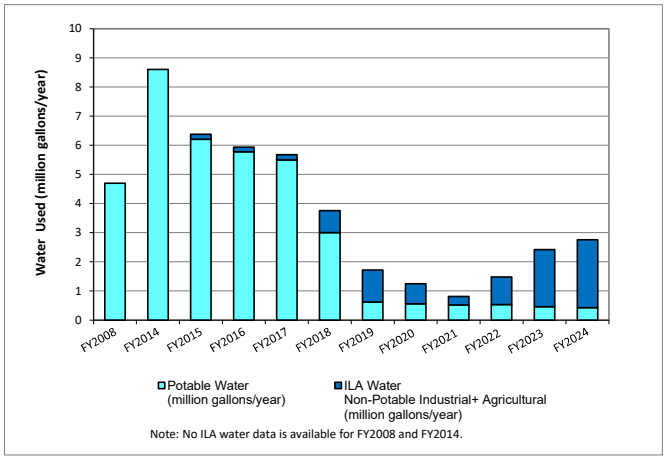
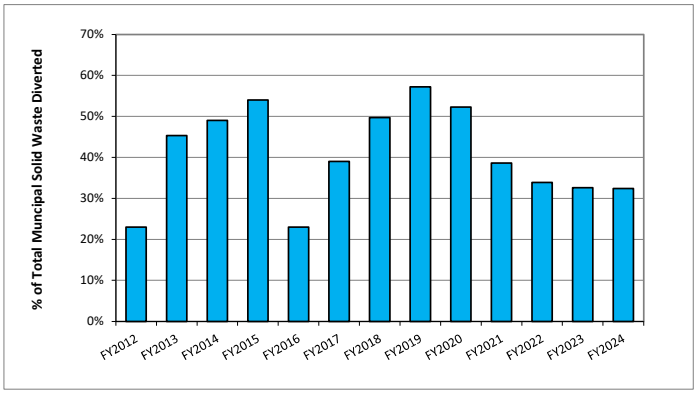


TABLE 3-2
Recycled/Reused/Donated Material
in FY 2024

Material	*FY 2024 Quantity (tons)* [a]
Metals	17.1
Mixed paper and corrugated cardboard	14.4
Electronics	1.4
Light bulbs	0.1
Batteries	3.6
Miscellaneous (oil, bottles, etc.)	0.8
Toner Cartridges	0.3
Transfers to other DOE sites	5.5
Transfers to non-federal sites	0.4
Laboratory Equipment Donation	0.0
GSA Sales	3.3
Total	**46.8**

[a] U.S. tons.

FIGURE 3-4
Perecentage of Waste Recycled/Reused/Donated



The WVDP recycled/reused/donated 32.4% of all non-hazardous municipal solid waste generated in 2024 (Figure 3-4.) This percentage has declined since 2019, along with a decrease in total municipal solid waste volume resulting from the reduction of facilities and personnel. (Note: This excludes construction and deconstruction debris which is frequently radiologically contaminated at the WVDP and cannot be recycled.)

Strategic Acquisition. To support DOE EMS goals, the WVDP continues to purchase products that save energy, conserve water, and reduce health and environmental impacts. Routine activities or projects that require the purchase of chemicals, equipment, and supplies prompt evaluations for potential purchases of green products.

Warehouse stock items are selected with the objective of meeting recycled and/or bio-based content preferences, such as copy paper with at least 30% post-consumer fiber. Reused material is also considered for major purchases.

To reduce the procurement of toxic or hazardous materials, all proposed chemical purchases are evaluated to ensure they meet the requirement for utilization of nontoxic or less toxic alternative chemicals. All 2024 construction and custodial subcontracts incorporated the requirements of the DOE acquisition regulations.

Electronic Stewardship. Electronic Product Environmental Assessment Tool (EPEAT) is a global environmental rating system that helps purchasers identify high-performance, environmentally preferable computers and other electronics. The WVDP purchased 100% of their eligible computer and electronic equipment through the certified EPEAT program in FY 2024. CHBWV was recognized with an EPEAT Purchaser Award by the Global Electronics Council for this accomplishment, marking the second consecutive year of recognition. Electronic equipment that is no longer needed is sent out for recycling through approved facilities.

Environmental Resilience. The WVDP has worked to ensure the site has safeguarded against potential challenges by prioritizing environmental resilience. The WVDP aims meet regulatory requirements as well as provide protection for the surrounding ecosystems and communities, embodying a commitment to environmental stability and safety. Future environmental disturbances, such as soil erosion or flooding caused by extreme weather events, will be modeled in the Probabilistic Performance Assessment (PPA) and alternatives will be evaluated the Supplemental Environmental Impact Statement (SEIS).

Site Security: As the DOE mission is to complete the WVDP Act and associated waste management activities, a continued emphasis will be placed on organizational resilience through site security and emergency preparedness procedures.

Community Outreach

Working With the Seneca Nation. The Seneca Nation is a federally recognized Native nation located approximately 17 miles downstream and to the west of the WVDP. Cattaraugus Creek runs the extent of the Territory before emptying into Lake Erie. Due to this, the Cattaraugus Territory community be potentially impacted by activities at the WVDP. This territory of the Seneca Nation is about 22,000 acres (89 km^2).

The DOE and the Seneca Nation signed a Cooperative Agreement in 1996 on the on-site low-level waste disposal as part of the 1996 initial Environmental Impact Statement (EIS, DOE/EIS-0200-F). The Cooperative Agreement has been instrumental in fostering the government-to-government relationship between the Seneca Nation and the DOE. The Seneca Nation's Environmental Protection Department (EPD) manages the DOE Cooperative Agreement on behalf of the Seneca Nation. The Cooperative Agreement has enabled the Seneca Nation to participate in the West Valley Citizen Task Force (CTF) and the DOE State and Tribal Government Working Group.

The proposed tasks (provided every five years in the form of a work plan and budget request) for the Cooperative Agreement activities continue to promote communication between the Seneca Nation and the DOE regarding environmental, human health, and cultural resources of the Seneca Nation. The DOE at the WVDP also entered into a Memorandum of Agreement (MOA) between the Seneca Nation and the DOE. The purpose of the MOA is to provide for notification to the Seneca Nation in advance of any shipments of the WVDP spent nuclear fuel and high-level waste across the Seneca Nation lands and to provide for the safe and secure transportation of such material, including the development of culturally sensitive risk management strategies and emergency planning and response, in coordination with the Seneca Nation.

Community Engagement. The WVDP has worked to establish long-term relationships with local communities and strives to communicate and engage community stakeholders regularly. The communication plan is focused on keeping internal and external stakeholders informed of environmental work and project-related cleanup progress. Some of these communication methods include community outreach/involvement, project presentations at Quarterly Public Meetings (QPM) and CTF meetings, and digital communications (links provided in the Communications section of this chapter). Residents from surrounding communities, across all segments of society, can become members of the CTF.

In 2024, WVDP participated in annual events, including the Toys for Tots Program and a food drive for nine local food pantries, during the holiday season. In total, the WVDP Food Drive has collected more than 2.4 million pounds of food since its inception in 1989. In April, the WVDP president and general manager and the communications director served as two of the judges at the Cattaraugus County Environthon, an environmental competition for high school students. At the ENVIROTHON, students tested their knowledge of soils, aquatics, forestry, wildlife, and current environmental issues in NYS.

A view from Mill Street Bridge over Cattaraugus Creek in winter
(photo credit: A. Carr)

CHAPTER 4
ENVIRONMENTAL MONITORING

2024 Highlights

Air: The WVDP continued to monitor on-site air and off-site air in 2024. On-site monitoring results at two active stacks and eight PVUs were well under the DOE Derived Concentration Standards (DCSs) (See the inset, "Radiological Data Evaluation" in this chapter.) There were very low positive detections of several isotopes in 2024 on the ambient air monitoring network (AAMN) samplers from the deconstruction activities corresponding with local winds. The estimated maximum dose from those detections to one of the nearest residents was 1.8% of the NESHAP annual emission limit of 10 mrem/year.

Water: Concentrations of radioisotopes and other water quality indicators in the controlled SPDES discharge were similar to previous years. Whole Effluent Toxicity (WET) testing continued to be performed during 2024 with results compliant with the action levels. Above background levels of gross alpha, gross beta, cesium-137, strontium-90, tritium, and uranium isotopes were detected in surface water on the WVDP premises. However, these concentrations were well below DOE standards. An annual strontium-90 data indicated a positive detection in creek water samples collected downstream of the WVDP. Again, these concentrations were multiple orders of magnitude lower than the DCS.

Drinking Water: On-site drinking water continued to remain below the local, state, and federal maximum contaminant levels (MCLs) and drinking water standards for chemical and biological contaminants. As required by the EPA's new PFAS monitoring directive, the WVDP reports six PFAS compound measurements and a hazard index ratio of PFAS mixture in this report, starting this year. Sampling results were all far below the MCLs and the hazard index result was 0.2 of MCL ratio of 1.

Food Sources: Milk was sampled at a near-site farm and venison samples were collected at near-site locations and background locations in 2024. In addition to naturally occurring potassium-40, cesium-137 was detected in one background sample and strontium-90 was detected in one near-site sample. Those detections were within the historical measurement ranges.

Direct Radiation Monitoring: Direct radiation measurements on the WNYNSC perimeter were not significantly different from background measurements taken in Great Valley, 18 miles south of the site. Direct radiation measurement results on site were similar to those in previous years.

Environmental Monitoring Program (EMP)

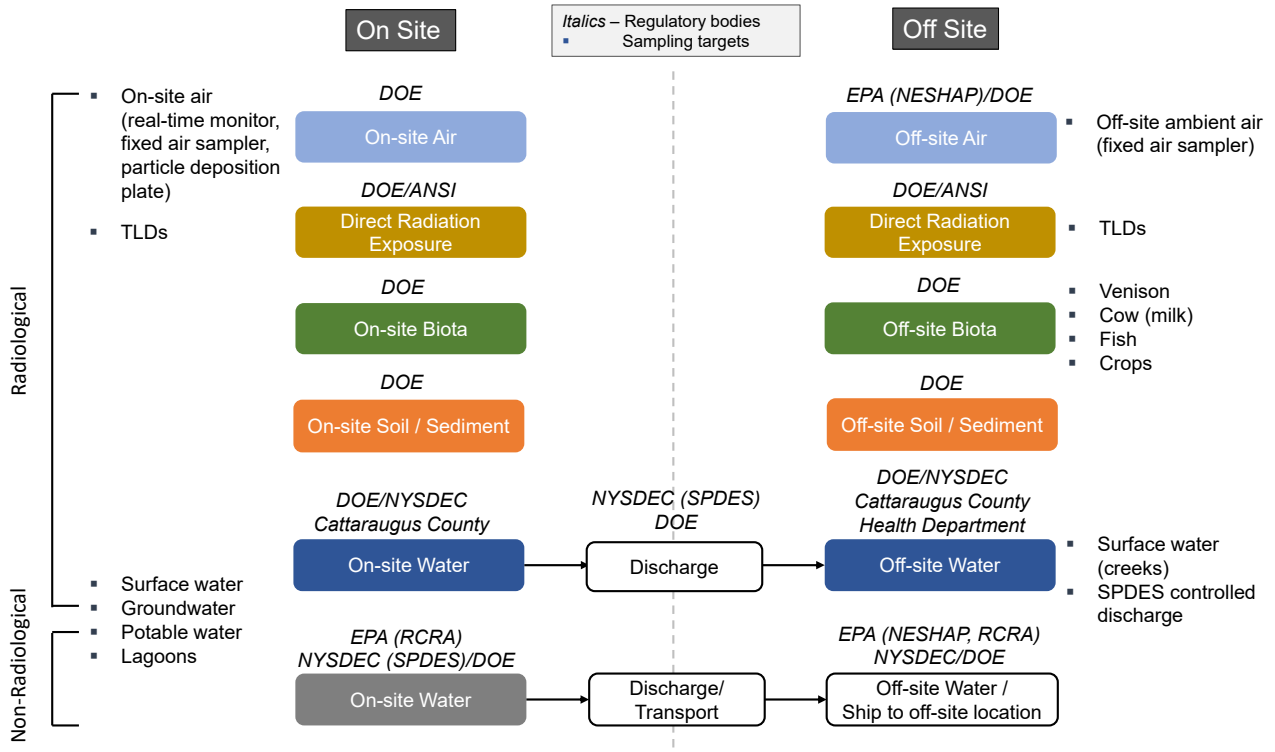
At the WVDP, on-site and off-site air and surface water, drinking water, sediment, soil, venison (white-tailed deer), fish, milk, and food crop samples are collected under the WVDP EMP. Those sampling locations were carefully selected based on historical data reviews and consultations with regulatory agencies. These samples are analyzed for radiological and chemical constituents and water quality parameters. Selected off-site locations (called background or control locations) are distant enough not to be affected by the WVDP activities and are typically located upwind of the site or upstream for surface water samples.

The groundwater monitoring program and potential exposure pathways from the groundwater are discussed separately in Chapter 6. Figure 4-1 displays the overview of the WVDP environmental monitoring program. A description of the sampling schedule at each location, monitoring program drivers and rationale, as well as maps showing the sampling locations, are presented in Appendix A.

On-Site Airborne Emissions Monitoring Program

Point source emissions. The WVDP currently maintains required EPA approvals for radiological releases from three active air emission points from building ventilation systems (otherwise referred to as "stacks"). This includes the Supernatant Treatment System (STS) stack (ANSTSTK), the Remote Handled Waste Facility (RHWF) stack (ANRHWFK), and the Replacement Ventilation System (RVS) stack (ANRVEU1). The ANRVEU1 stack was shut down in 2022. The Container Sorting and Packaging Facility (CSPF) stack (ANCSPFK) that does not require EPA approval is intermittently operated and did not operate in 2024.

FIGURE 4-1
Overview of the WVDP Environmental Monitoring Programs and Regulatory Bodies



The WVDP also has EPA approval for radiological releases from up to 15 portable ventilation units (PVUs) at one time. Locations of PVUs may change throughout the year depending on operational needs. Eight PVUs were active during 2024.

Radiological air emissions are regulated by the EPA NESHAP, which specifies that total annual airborne emissions from WVDP sources shall not exceed a dose of 10 mrem/year to any member of the public. Exhaust from each EPA-approved ventilation system at the WVDP is continuously filtered before being released to the atmosphere. Emissions are sampled for radioactivity in both particulate (e.g., cesium-137, strontium-90, and plutonium-239/240) and gaseous forms (e.g., iodine-129) at the building stacks, PVUs, and off-site ambient air samplers. Iodine-129 is not sampled and analyzed for at the PVUs. The doses from radiological air releases are evaluated and reported to the EPA in the annual NESHAP report and are discussed in Chapter 5, "Dose Assessment" in this document.

Possible diffuse emissions from deconstruction activities are evaluated before deconstruction work is performed based on the measured source terms (radioisotope inventory) within a structure using calculation methods dictated in the NESHAP regulations. Emissions during deconstruction activities on site are measured by the off-site ambient air monitoring network. (See Figure A-7 in Appendix A.)

Diffuse source emissions. Diffuse emissions to air from surface water evaporation off the on-site lagoons are estimated each year based on the annual average concentrations of radioisotopes in the lagoons. Radioisotope concentrations in the lagoons in 2024 were similar to those in previous years.

Nonradiological Air Emissions. The WVDP maintains an Air Facility Registration Certificate and routinely evaluates new potential sources of nonradiological emissions to determine if any new sources need to be added to the registration, or any new monitoring or permitting is required. The only emissions currently covered under the Air Facility Registration Certificate are fugitive emissions from the use of spray foam sealants, which are far below the permitting threshold. The site's diesel and natural gas emergency generators and fire pumps are operated less than 500 hours per year and thus are exempt from permitting. Only low-sulfur diesel fuel is used on site. All asbestos removal activities are routinely monitored for asbestos emissions. No other nonradiological monitoring or nonradiological air emissions permits are required at the WVDP.

On-Site Active Ventilation and Emissions Systems

Ventilation of the underground HLW tanks by the Tank and Vault Drying System (T&VDS)

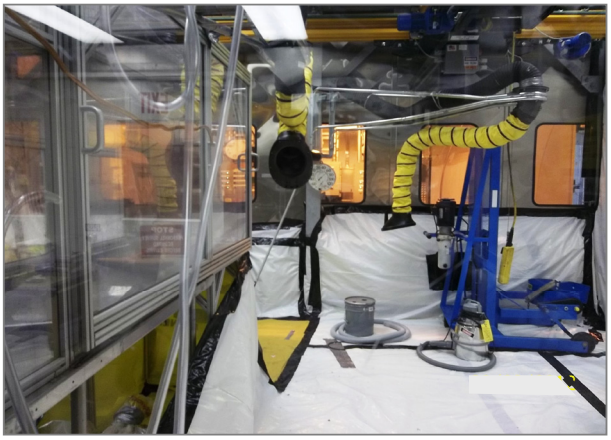
Supernatant Treatment System (STS) Stack (ANSTSTK)

Airborne effluents are monitored from the T&VDS that ventilates the below ground HLW tanks (8D-1, 8D-2, 8D-3, and 8D-4), one of which contains STS components. Dry conditions are being maintained by this system in three of the four HLW tanks and residual liquid in the fourth tank is being slowly reduced by evaporation.

A Remote-Controlled Vacuum inside the Remote Handled Waste Facility (RHWF)

Remote Handled Waste Facility (RHWF) Stack (ANRHWFK)

The work areas inside the RHWF, where radioactive waste is remotely size-reduced, are also ventilated by a permanent stack. The RHWF stack has been in operation since 2004 when construction of the RHWF was completed.



Container repackaging in the Container Sorting and Packaging Facility (CSPF)

Container Sorting and Packaging Facility (CSPF) Stack (ANCSPFK)

Intermittent ventilation of the CSPF in the LSA #4 storage building also occurs through a permanent stack that is monitored at sampling location ANCSPFK when there is repackaging activity.

Portable Ventilation Unit (PVU)

Portable Ventilation Units (PVUs)

PVUs provide temporary ventilation necessary for personnel safety while working with radioactive materials in areas outside permanently ventilated facilities or in areas where permanent ventilation must be augmented. Air samples from PVUs are collected routinely while work is being performed. The data collected is included in annual evaluations of airborne emissions.

Meteorological Monitoring

The on-site meteorological tower continuously monitors wind speed, wind direction, and temperature at the 33-ft (10-m) and 197-ft (60-m) elevations. (See Figure A-1 for the location.) The meteorological tower sends data to the digital and analog data acquisition system on site. The systems are provided with backup power in the event of site power failures. Documentation, such as meteorological system calibration records, site log books, and analog strip charts, are stored in protected archives.

In 2024, the data recovery rate (the percentage of valid recorded data per sampling period) was 94.0%. This meteorological monitoring at the WVDP provides representative and verifiable data that characterize the local climatology. These data are used to assess the potential effects of routine and nonroutine releases of airborne radioactivity and to provide input data to airborne dispersion models (e.g., CAP88-PC), which can be used to calculate doses to off-site residents. These data can also be used by the Emergency Response Organization (ERO) at the WVDP to predict the direction of plume migration if an unplanned air release occurs.

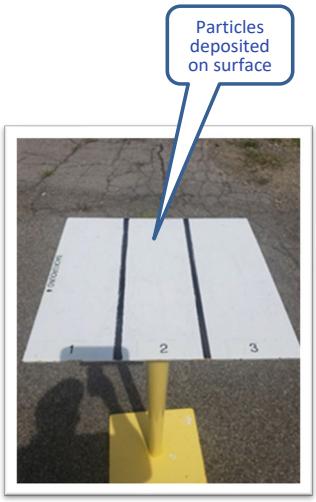
On-Site Air Monitoring in Deconstruction Work Areas

On-site deconstruction work and radioactivity in the air are monitored on cameras and digital displays in an on-site control room in real time. When an anomaly is detected, the finding is promptly communicated to on-site operational personnel. Additionally, layers of air monitoring samplers are installed close to the work area to protect the health and safety of workers during the deconstruction of radiologically contaminated facilities. These work area samplers provide early indication of unexpected elevated readings to allow action to be taken, such as pausing deconstruction operations, before the site workers and the public are exposed to risk.

Air monitors and samplers like the ones shown below are used at the WVDP site. Continuous Air Monitors (CAMs) placed near the deconstruction work area detect elevated levels of radioactivity and provide an early warning should adjustments to deconstruction activities be necessary. Radiation Protection personnel have continuous, direct access to the CAM readings from the operations control room. The Fixed Air Samplers (FASs) are routinely analyzed by the on-site laboratory during all worker activities. Radiation Protection personnel also survey designated surfaces and particle deposition plates for radioactivity many times daily during deconstruction and waste management activities.

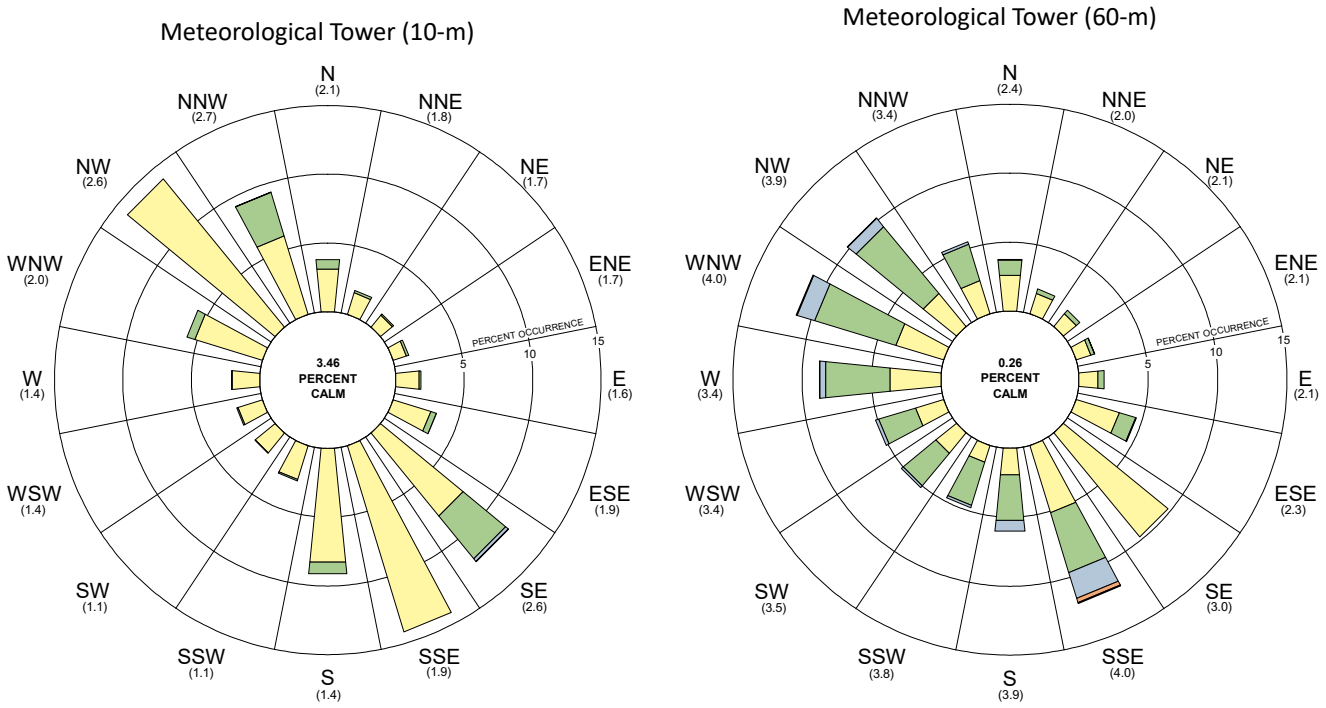
Continuous Air Monitor (CAM)

Fixed Air Sampler (FAS)



Particle Deposition Plate

FIGURE 4-2
Wind Frequency and Speed From the Meteorological Tower January 1-December 31, 2024



Key: Numbers indicate sector mean wind speed (m/sec). Sectors show the direction from which the wind blew.

Wind Speed (m/sec)

- 0.5-3.0
- 3.0-6.0
- 6.0-9.0
- 9.0-12.0
- >12.0

TABLE 4-1
WVDP 2024 Monthly Precipitation Totals and Monthly Average Temperature

Month	2024 Monthly Precipitation Total (inches)[a]	10-Year (2014-2023) Monthly Average Precipitation (inches)[a]	2024 Monthly Average Temperature (°F)[b]	10-Year (2014-2023) Monthly Average Temperature (°F)[b]
January	3.56	3.00	25.8	22.8
February	1.90	2.49	30.6	24.8
March	3.08	2.74	35.9	32.1
April	6.38	3.64	45.6	44.2
May	2.72	3.10	58.6	56.0
June	4.62	3.91	64.7	63.7
July	4.44	4.60	67.4	68.3
August	3.73	4.39	65.0	67.0
September	2.95	3.42	61.9	61.5
October	3.11	5.20	49.4	50.8
November	3.73	4.62	41.2	37.7
December	3.74	3.59	27.0	31.2
Total (in)	**43.96**	**43.54**[c]		
Total (cm)	112	110		

[a] Data source: The WVDP meteorological monitoring tower.
[b] Data source: National Center for Environmental Information (NCEI) (https://www.ncei.noaa.gov/). Cattaraugus County, NY datasets.
[c] The sum of the 10-year monthy averages differs from the 10-year annual total due to differences of sampling start and end dates among the years.

The prevalent wind directions measured in 2024 at the meteorological tower are shown by the wind roses on Figure 4-2 on the previous page. In 2024, the average wind speed at the 33-ft (10-m) elevation was 2.02 m/s (4.52 mph), and the average wind speed at the 197-ft (60-m) elevation was 3.37 m/s (7.53 mph). The wind direction is influenced by the topography around the site. The WVDP is located in a northwest-southeast trending valley as evidenced by the direction of the prevailing wind at the site. Total precipitation in 2024 was 43.96 inches (112 cm), very close to the 43.54 inches (110 cm) 10-year annual average. (See Table 4-1. on the previous page) Site barometric pressure is also measured on the meteorological tower at ground level.

On-Site Airborne Emissions Monitoring Update for 2024

The deconstruction of the MPPB began in September 2022 and the emissions from the deconstruction activities continued to be monitored closely throughout 2024. Tables C-1 to C-4 in Appendix C presents total radioactivity released for specific radionuclides at each of the on-site air emission point sources. The on-site air emission concentrations from the stacks were compared to the background sampling results in Great Valley, NY (location code AFGRVAL), approximately 18 miles (29 km) south of the site. (See Figure A-14 for the background location.) This background location has sampled regional air with very low potential to be affected by radiological releases from the WVDP for decades and provides a good indicator of background concentrations at the WVDP as well. Gross alpha and gross beta results from 2024 at AFGRVAL are presented in Table C-5.

The background comparison results, including on-site and off-site air, surface water, food, and the TLD measurements, are summarized in Table 4-2 on pages 4-23 and 4-24. In 2024, no radiological constituents measured at ANSTSTK and ANRHWFK were statistically higher than background measurements. (Please refer to Chapter 8, "Radiation and Environmental Standards" for more details about background comparison.)

T&VDS emissions (ANSTSTK): The concentrations measured in 2024 from the STS stack that monitors the T&VDS were in the historical range; average concentrations of radioisotopes were several orders of magnitudes lower than the DCSs (Table C-1).

RHWF emissions (ANRHWFK): Remote size-reduction to segregate and repackage waste continued in the RHWF throughout 2024. The monitoring results in Table C-2 show that there were only very low levels of radioactivity emissions from this unit in 2024, all well below the DCSs.

CSPF emissions (ANCSPFK): No container sorting and packaging have been performed in the CSPF since 2021.

PVU emissions: PVUs were used in eight locations during 2024, the majority of which were inside the MPPB. The sum of the emissions from all of the PVUs used in 2024 was well below the DCSs, as seen in Table C-4.

The levels of diffuse source emissions from lagoons in 2024 were similar to the results in the previous years. (See Chapter 5 for estimated annual doses to the public.)

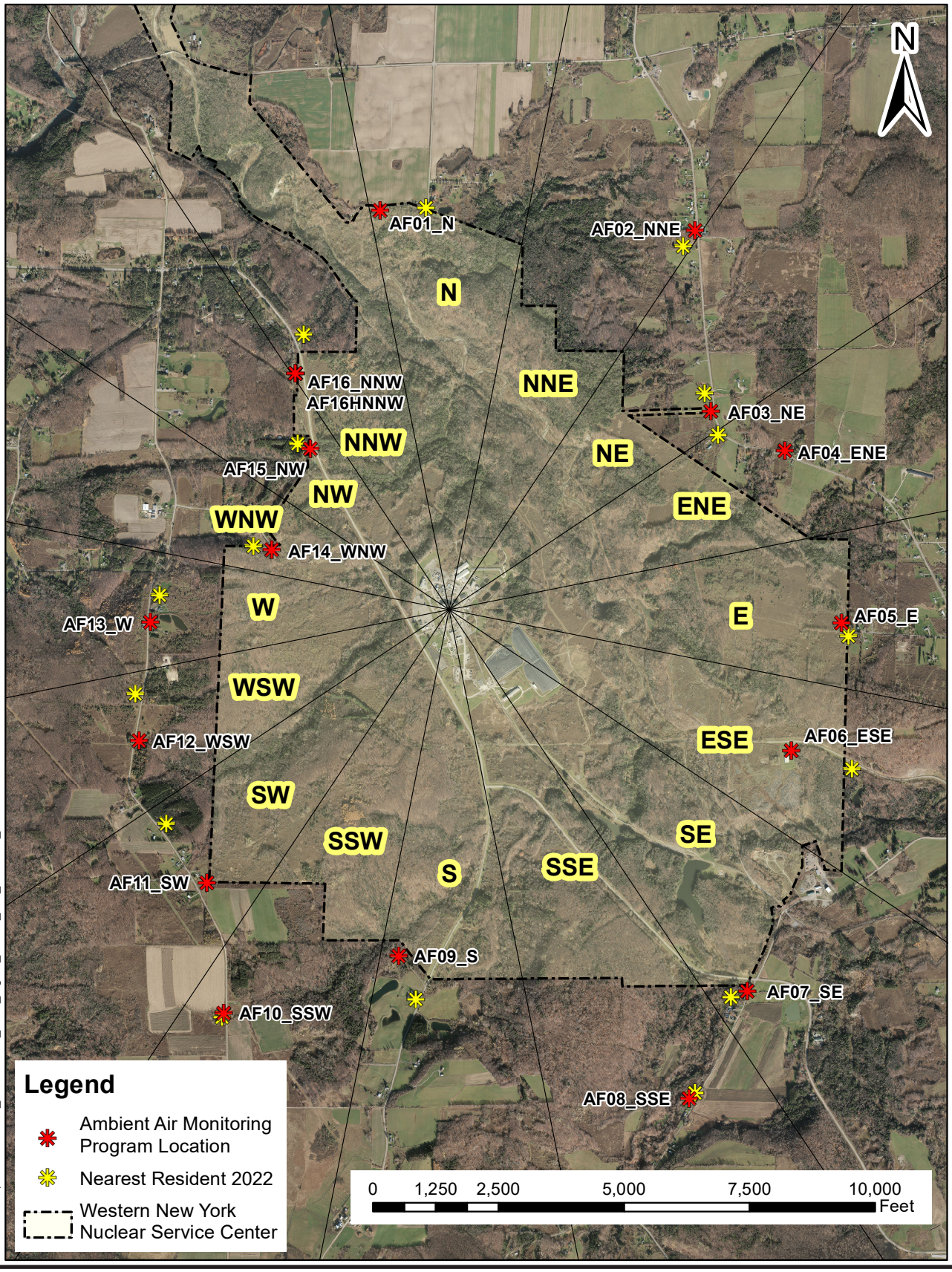
Off-Site Ambient Air Monitoring Program

Seventeen ambient air samplers (one sampler in each of 16 compass direction and an additional sampler in the NNW direction) surround the WNYNSC within approximately one or two miles of the WVDP property boundary for off-site environmental surveillance. (See Figure 4-3 on page 4-7.) The current ambient air monitoring network (AAMN) was installed in October 2012, and routine ambient air monitoring at these samplers began in 2013. One of the samplers is a high-volume sampler (AF16HNNW) located downwind in the prevailing wind direction which is the direction of the hypothetical maximum potential exposure.

(*continued on page 4-8*)

On-site meteorological monitoring tower undergoing inspection with oversight by the full-time on-site meteorological monitoring engineer

FIGURE 4-3
Ambient Air Sampling Locations



(continued from page 4-6)

The high-volume sampler (AF16HNNW) operates at a flow rate more than five times that of the other low-volume samplers and was installed to confirm the results of the lower volume sampling. The low-volume sampling system is able to detect radioisotope concentrations to approximately 1% of each radioisotope's environmental regulatory compliance level.

The high-volume sampler can detect particulate radioisotopes down to approximately 0.1% to 0.2% of the compliance level. (Although the high-volume sampler does not include a sample for iodine-129, the co-located low-volume sampler does measure iodine-129.)

Ambient air sampler in the north-northwest direction
(photo credit: S. Wedvik)

Off-site filter samples are collected biweekly for gross alpha and gross beta screening and charcoal cartridges are collected monthly for iodine-129 screening analysis. These samples, collected on a biweekly or monthly basis, go through an on-site screening to promptly detect any anomaly. Then the biweekly filters are composited quarterly and sent to an analytical laboratory for detailed isotopic analysis. The isotopes tested are strontium-90, iodine-129, cesium-137, uranium-232, plutonium-238, plutonium-239/240, and americium-241, which are radioisotopes that were determined to have existed on the site when this monitoring program was designed. The same tests are performed on samples collected at a background ambient air sampler located in Great Valley. Both off-site and background samples include naturally occurring radioisotopes such as radon decay products that are detected in gross alpha and beta measurements.

The off-site ambient air samplers are visited once a week for inspection and maintenance. A remote power surveillance system monitors the power at the ambient air sampling stations. When power is lost, such as during a storm or when components malfunction, the system automatically sends a text message to the Environmental Services (ES) air sampling technician, who will quickly check and repair the sampling system.

The ability to immediately respond to power outages minimizes down-time, helping to ensure the ambient air surrounding the site is sampled in all sectors continuously. However, power outages could result in the loss of up to a week of air monitoring data, particularly after a severe storm. The ambient air samplers ran 98.7% of the year in 2024.

Off-Site Ambient Air Monitoring Update for 2024

The radioisotopic data from the ambient air samplers are used to demonstrate compliance with EPA air emissions standards for exposure to the public and are compared with the NESHAP concentration levels for environmental compliance.

During 2024, very low levels of several isotopes were positively detected at the ambient air monitoring samplers, primarily in the prevailing wind directions. Annual average americium-241, cesium-137, and strontium-90 at AF14 WNW (west northwest) statistically exceeded the annual averages at the background air monitoring location in Great Valley. However, annual averages of quarterly samples through the full year showed that the concentrations at all ambient air monitoring locations were far below the NESHAP compliance concentrations.

Off-site air monitoring data in 2024 are summarized in Tables C-5 and C-6 in Appendix C.

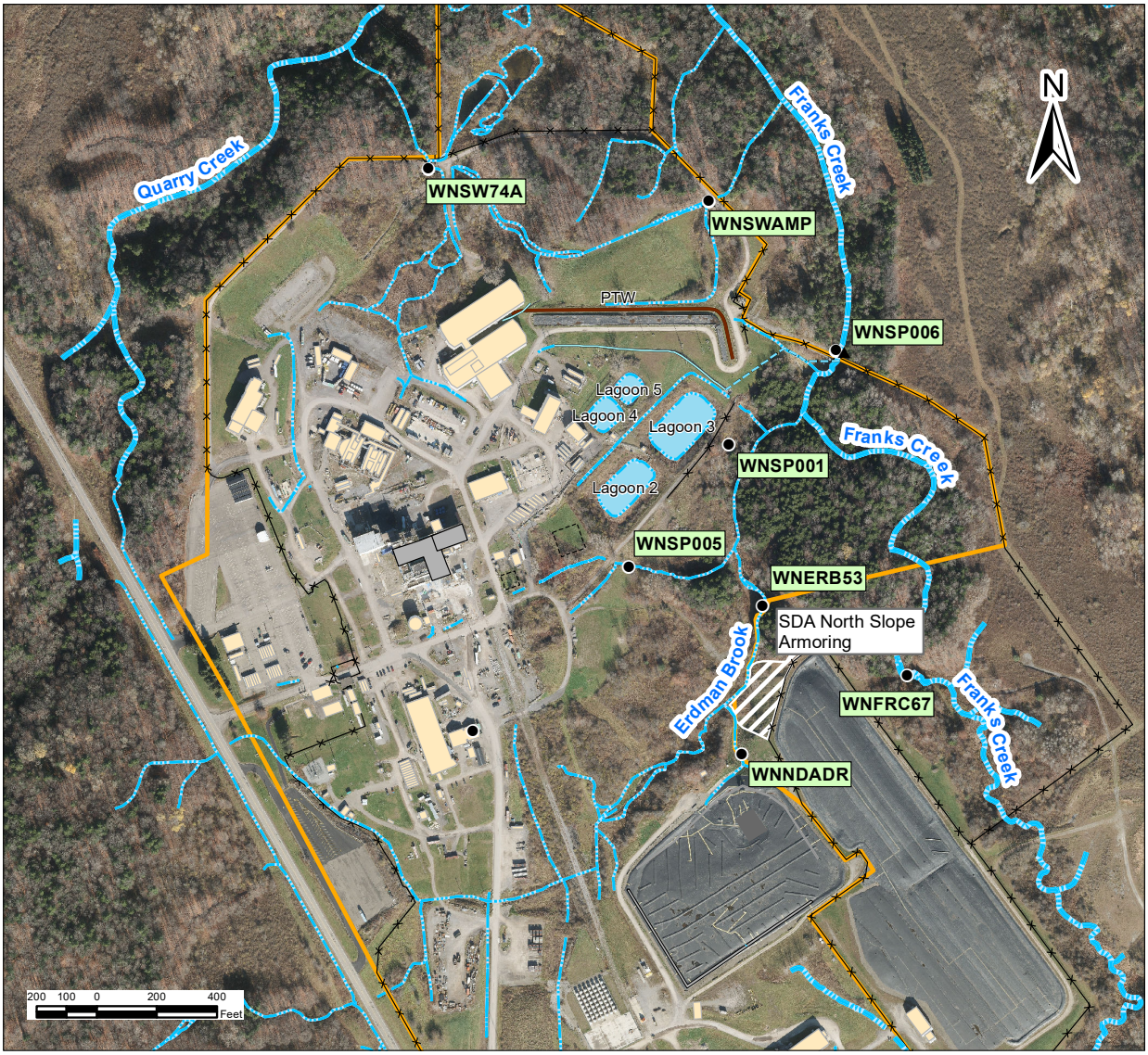
The estimated total effective dose equivalents (EDEs) from the isotopic concentrations on the ambient air samplers for the maximally exposed off-site individual (MEOSI) and the population in a 50-mile (80-km) radius from the site and are reported in Chapter 5.

Surface Water Monitoring Program

The WVDP site is drained by several small streams flowing off site. Franks Creek enters from the south and receives drainage from the south plateau. As it flows northward, Franks Creek is joined by Erdman Brook, which receives effluent from the LLW treatment building (LLW2) through the lagoon system. After leaving the site at the security fence, Franks Creek receives drainage from the northeast swamp areas on the north plateau and from Quarry Creek, which receives drainage from the north swamp location, WNSW74A. (See Figure 4-4 for the location.) Franks Creek then flows into Buttermilk Creek, which, after flowing northward through the WNYNSC, enters Cattaraugus Creek and flows westward away from the WNYNSC. Cattaraugus Creek ultimately drains into Lake Erie to the northwest. (See also Figure A-14.)

The primary releases from the site to surface waters occur at three locations, the lagoon 3 weir which discharges at outfall 001 ([sampling location code WNSP001] on Figure 4-4), the northeast swamp drainage ditch (WNSWAMP) by natural drainage, and the north swamp drainage ditch (WNSW74A), also by natural drainage.

FIGURE 4-4
Surface Water Sampling Locations



Controlled SPDES discharges occur from the lagoon system. Lagoon 3 is seen on the top of the photo (outfall 011 discharge point is located on the other side of the walkway)

Members of the public do not have access to the WVDP premises and therefore do not have any potential of direct exposure to surface water on site. The first point of public access to surface water potentially impacted by the site is on Cattaraugus Creek downstream of the WVDP at Felton Bridge (location code WFFELBR) shown on Figure 4-8 on page 4-17.

State Pollutant Discharge Elimination System (SPDES) Permit Required Monitoring

Liquid discharges from the WVDP site are regulated under a NYS SPDES permit. The permit lists compliance points from which liquid effluents are released to Erdman Brook and specifies the sampling and analytical requirements for each. The conditions and requirements of the current SPDES permit include monitoring of four wastewater discharge outfalls (only one of which, outfall 001, is an active discharge point) and 19 stormwater discharge outfalls.

Stormwater. Rain and snow-melt events flowing over land or impervious surfaces (e.g., paved streets, parking lots, and building rooftops) generate stormwater runoff. The runoff flows on the surface, potentially transferring pollutants to surface water, groundwater, and soil. Runoff can also move surface soils and sediment downgradient, which can lead to increased surface soil erosion and sedimentation in creeks.

Requirements of the SPDES permit for monitoring stormwater runoff include water quality assessment at specific stormwater discharge locations. (See Figures A-3 and A-4 for the outfall locations.) The amount of rainfall, the storm event duration, volume discharged, and the maximum flow rate must also be reported at each stormwater outfall. The WVDP stormwater outfalls are grouped into eight representative drainage basins that could potentially be influenced by industrial, construction, or deconstruction activity runoff. One representative outfall from each group must be sampled on a semiannual basis. Stormwater samples are not required to be analyzed for radiological parameters under the SPDES permit but are screened for gross alpha and gross beta radioactivity at the WVDP on-site laboratory. The stormwater sampling results are provided in Appendix B-3.

The original SPDES Discharge Monitoring Reports (DMRs) are posted on the WVCA website (https://www.westvalleycleanup.com/).

Radiological Data Evaluation

Derived Concentration Standards (DCSs). "DCSs are radiological quantities, used in the development and conduct of environmental and public radiation protection programs implemented at DOE sites and for DOE activities. A DCS for exposure to a radionuclide in a specified environmental medium (e.g., air or water) represents the concentration of the radionuclide in that medium that would result in an effective dose of 1 millisievert (mSv) [100 millirem (mrem)] to a reference member of the population based on continuous exposure for one year (e.g., the concentration in water consumed over a year that would cause 1 mSv)." as defined in DOE-STD-1196-2022. The intended applications of DCSs are as follows:

- Defining criteria for applying Best Available Technology (BAT) at the point of discharge for liquid effluent streams (in accordance with DOE Order 458.1, "Radiation Protection of the Public and the Environment.")
- Relative ranking of the importance of radionuclides within a waste stream.
- Relative ranking of multiple effluent streams to air or water.

The DCSs were developed with consideration of only three exposure modes (ingestion of water, inhalation of air, and air submersion). In 2021, ingestion of milk was added to these exposure modes. While they provide relative guidance for the ranking of potential radionuclides in effluent streams released from facilities, they are not intended to be used to infer the dose to members of the public nor to demonstrate compliance with DOE radiation protection dose limits. "The DCS values represent concentrations at the point of discharge and do not account for attenuation along the pathway before reaching the receptor. Typically, more complex environmental pathways are involved. A detailed pathway analysis is required for calculating public radiation doses resulting from DOE activities." (DOE-STD-1196-2022).

DCSs applicable to the radionuclides present at the WVDP are presented in Table 8-4 in Chapter 8, "Radiation and Environmental Standards" of this report. When only gross alpha and beta measurements are available in WVDP air sample results, activity is assumed to come from plutonium-239/240 and strontium-90, respectively, because the DCSs for these radionuclides are the most limiting for major WVDP particulate emissions. For water effluents, when only gross alpha and beta measurements are available, activity is assumed to come from uranium-232 for gross alpha, and strontium-90 for gross beta, also because their DCSs are the most limiting for major WVDP waterborne exposures.

Sum of Ratios. Environmental sampling results at the WVDP are assessed to determine whether the constituents of interest are present and, if so, their concentrations are compared with DCSs as guidelines for controlling potential exposure to the public. To evaluate the radioactivity released from each location with respect to the DCSs, the annual average radionuclide concentration measured for each nuclide was divided by its respective DCS and the ratios from all nuclides are summed. If the sum of the ratios (also called the "sum of fractions") exceeds 1.0, or if expressed as the sum of percentages, exceeds 100%, then the total radioactivity released from that location during the current year exceeds DCSs and further evaluation is required.

This comparison to DCSs is a very conservative method of evaluating the concentration data because it assumes a continuous exposure by drinking the water or inhaling the air, at this concentration, at the point of measurement, which may be at an on-site location where no public exposure is possible and where no water is ingested. DCSs are therefore used as a precaution to ensure releases/emissions are not approaching levels that could cause dose limits to be exceeded off site. The regulatory limit is based on the modeled/measured total annual off-site dose, not this comparison to DCSs.

Statistical Comparison to Background. Data from near-site locations are compared with background concentrations using standard statistical methods to assess possible site impacts on the environment. Refer to Chapter 7, "Quality Assurance", and Chapter 8, "Radiation and Environmental Standards" for more discussions on measurement result analysis. Results from each location are also compared to the current year and/or historical data from the backgound locations to determine if any trends (e.g., increasing constituent concentrations) are occurring. (See Table 4-2.)

Whole Effluent Toxicity (WET) Testing. The SPDES permit also includes periodic special studies, such as discharge effluent toxicity testing every five years. This test involves sending samples of the SPDES discharge waters from the site to a bioassay laboratory where vertebrate (fathead minnow) and invertebrate (water flea) freshwater species are tested and evaluated for survival rate, growth rates, and rates of reproduction. The Chapter 2, "Environmental Compliance Summary" describes the WET testing for 2024.

Stormwater Discharge Compliance. The DOE DCSs are used for reviewing the compliance of radioisotope concentrations in discharge and surface water. Regulatory limits for chemical constituents in discharges to surface water under the SPDES program, and additional water quality and potable water standards are listed in Appendix B-1.

Waterborne Radiological Releases. Controlled SPDES discharges from outfall 001 contain radioactivity and must be pre-approved for release by NYSDEC. Pre-discharge radiological data are compared to DOE DCSs and provided to NYSDEC to facilitate this approval, as required by the SPDES permit.

Radiological Data Evaluation. The curies released from the discharge points are summarized in Appendix B-2A, B-4A and B-4B for the three on-site discharge points. Annual curies at outfall 001 (WNSP001) and WNSWAMP are summarized using flow-weighted mean concentrations (FWMCs) because of the batch nature of discharges from outfall 001 and elevated isotope concentrations at WNSWAMP (See the inset box "Calculating Flow-Weighted Mean Concentrations" below.) The annual average for each radioisotope at each location is compared to the DCS to determine a ratio. These ratios are then summed. A sum of ratios less than 1.0 indicates that the annual average concentration from the water discharged from this location was less than DCSs.

2024 Update for SPDES Required Monitoring

SPDES Outfall Results. There were no SPDES effluent limit exceedances and no SPDES noncompliance events during 2024. The 2024 toxicity testing results are reported in Table B-2K in Appendix B-2.

Outfall 001 (WNSP001). During MPPB deconstruction, water used for dust suppression is captured by the site water management system. This water is evaluated to determine if it can be treated in the LLW treatment system and discharged through outfall 001 or requires off-site disposal. Three batch releases totaling approximately 5.8 million gallons (22.1 million L) were discharged from outfall 001 in 2024, which was about 1.7 times the discharge volume in 2023. Usually, three or four discharges from outfall 001 are conducted in a year. The sum of isotope concentration/DCS ratios for the release from outfall 001 in 2024 was 0.25 (or 25% of the DCSs as shown in Table B-2A. The sum of the ratios at this location has continued to decrease over the years.

The isotopic distribution in discharge from 001 was similar to recent years in mean concentrations. The largest contributor to the sum of ratios at outfall 001 in 2024 was strontium-90 (0.23 of the 0.25 total). The ratio of strontium-90 was 0.27 out of the total ratio of 0.29 in 2023. For other isotopes, the ratio of cesium-137 increased and the ratio of uranium-232 decreased compared with last year, however, both changes were minor (a change of approximately 1.00E-03 or less.)

Calculating Flow-Weighted Mean Concentrations

Flow-weighted mean concentrations (FWMC) are concentrations that are adjusted for the variability in stream flow over a given period of time (e.g., monthly or annually). FWMC is useful for estimating the typical concentration of a contaminant adjusting for stream flow. This allows for comparisons between streams with different flow volumes between years.

$$\text{Flow-weighted mean concentration is defined as} = \frac{\text{Total Load (kg or Ci)}}{\text{Total Stream Flow Volume } (m^3)}$$

where the total load (kg or Ci) is divided by the total stream volume (m^3) for a given time period (e.g., year or month). By calculating FWMC on a monthly or annual basis, variability due to seasonal and historical sampling frequency fluctuations and missing data can be reduced.

On-Site Liquid Effluent/Surface Water Monitoring

Natural surface water drainage to Franks Creek from WNSWAMP largely consists of emergent groundwater supplemented by surface water runoff. (See Figure 4-4 for the location.) Elevated gross beta concentrations in surface water were first measured at WNSWAMP in 1993. Subsequent investigations delineated a plume of strontium-90-contaminated groundwater on the north plateau that discharges to the surface water flowing through the WNSWAMP location (See Chapter 6, "Groundwater Protection Program" for detail about the groundwater gross beta/strontium-90 plume.) Strontium-90 contaminated surface water from the WNSWAMP drainage ditch flows into Franks Creek, then into Buttermilk Creek, and ultimately into Cattaraugus Creek, where it is sampled at Felton Bridge (WFFELBR), the first point of public access.

Natural surface water drainage to Quarry Creek is sampled at WNSW74A (Figure 4-4). Concentrations of radionuclides are generally lower at this location than at WNSWAMP. Surface water from this drainage has historically contributed a small fraction of the total waterborne dose from the site.

Potential Surface Water Contamination Sources on the North Plateau. On the north plateau, possible contaminant sources, other than the planned discharges at outfall 001 and the groundwater plume, to surface water include the Waste Tank Farm (WTF), MPPB deconstruction activities, the lagoon system associated with the LLW2, and waste handling and storage facilities. North plateau surface water sampling locations that monitor these potential sources include locations WNSP005 and WNSP006, in addition to WNSWAMP and WNSW74A.

Potential Surface Water Contamination Sources on the South Plateau. On the south plateau, the two inactive underground radioactive waste disposal areas (the NRC-licensed disposal area [NDA] and NYS-licensed disposal area [SDA]), the 56 Vertical Storage Casks (VSCs) (stored on the interim HLW Cask Storage Pad), the drum cell (a building formerly used to store drums of processed LLW), and waste management activities are all potential, although not anticipated sources of contamination.

Surface water drainage across the south plateau is monitored at locations WNNDADR, WNERB53, and WNFRC67 (Figure 4-4). Drainage is directed around the NDA and SDA by stormwater drainage pipes, culverts, and drop inlets.

The on-site surface water drainage is routinely sampled for pH and radiological parameters at several other points on the north and south plateaus. These monitoring points are sited at locations where releases from potential source areas on the north and south plateaus could be detected. This vigilance allows site operations to be modified as needed if anomalous concentrations are detected in the surface water.

Environmental Compliance Limits for Potential Surface Water Contamination. The regulatory limit for radioactivity in waterborne releases from DOE facilities is the dose limit of 100 mrem/year (1 millisievert [mSv]/year) to an off-site individual from all pathways, per DOE Order 458.1.

2024 Update for Liquid Effluent/Surface Water

WNSWAMP. Natural drainage flow through the WNSWAMP location in 2024 was approximately 12.4 million gallons [gal] (46.9 million liters [L]). The sum of ratios of radioisotopes discharged from WNSWAMP against the DCSs was 0.25 (or 25% of DCSs) in 2024, as shown in Table B-4A in Appendix B-4. The sum of ratios was lower than the 2023 sum of 0.31 (or 31%). As in past years, the sum of ratios at WNSWAMP was almost entirely attributable to strontium-90. In 2024, gross alpha, gross beta, and strontium-90 measurements at WNSWAMP statistically exceeded background measurements at the upstream sampling location on Buttermilk Creek (location code WFBCBKG on Figure A-5 in Appendix A). (See Table 4-2.) However, the strontium-90 concentration remained below the DCS.

WNSW74A. Natural drainage flow through the WNSW74A location in 2024 was estimated to be 12.3 million gal (46.7 million L), similar to the volume in 2023. The sum of ratios of radioisotopes discharged from WNSW74A was 0.023 (or 2.3% of DCSs), identical to the sum in 2023, and was less than one-tenth of that observed at WNSWAMP. (See Table B-4B on Appendix B-4.)

The majority of the radioactivity at WNSW74A in 2024 was attributable to strontium-90 (0.021 in the ratio), as it has been historically. In 2024, gross alpha, gross beta, and strontium-90 results at WNSW74A statistically exceeded the background measurements; however, the results were more than an order of magnitude below the DCS values.

A historical comparison of the annual average strontium-90 concentrations from WNSWAMP and WNSW74A is shown in Figure 4-5 below. As seen in this figure, the concentrations observed at WNSW74A that flows into Quarry Creek are much lower than the concentrations at WNSWAMP, which flows into Franks Creek. Gross beta increased slightly around 2010 due to a change in the site water management system. The change lowered the volume of clean surface water flowing through the ditches which led to less diluted water flow and increased concentrations of strontium-90. The concentrations began decreasing again afterward with the reduction of strontium-90 in groundwater toward these directions. (See Chapter 6, "Groundwater Protection Program", for more details of the groundwater strontium-90 plume.)

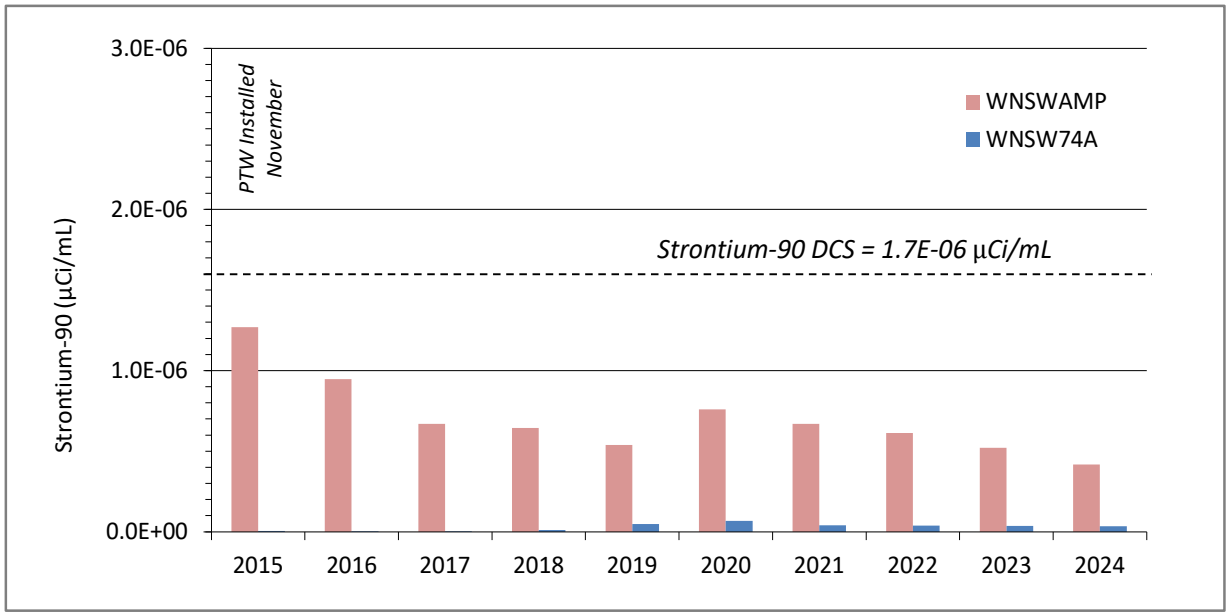
North Plateau (WNSP005 and WNSP006). WNSP005 is located east of the MPPB, downgradient of former lagoon 1 and other areas of localized contamination (e.g., Solvent Dike). (Lagoon 1 was one of the five open lagoons in the LLW2 area and was contaminated with tritium. Lagoon 1 was taken out of service, backfilled, and capped in the 1980s.) Although the flow volume through the WNSP005 drainage ditch is very small, these areas of localized contamination impact the groundwater that discharges into the drainage ditch leading to WNSP005.

In 2024, five radiological isotopes were analyzed at WNSP005. Gross alpha, gross beta, and strontium-90 were positively detected at WNSP005 in 2024 based on the annual average concentrations. (See Table B-4C.) And those concentrations exceeded the background measurements. The gross beta annual average exceeded the DCS standard by about 31%. The concentration of gross alpha was approximately an order of magnitude below the DCS (DCS of uranium-232), and the strontium-90 concentration was slightly less than the DCS value.

WNSP006 discharges site surface water to Franks Creek on the eastern edge of the north plateau. As in previous years, concentrations at WNSP006 for gross alpha/beta and strontium-90 in 2024 were lower than those at WNSP005, well below DCSs. Sixteen analytes were tested at this drainage location. (See Table B-4D.) In 2024, gross beta and strontium-90 statistically exceeded background.

South Plateau (WNNDADR, WNERB53, and WNFRC67). Although gross beta concentrations continue to be measured above background at WNNDADR and WNERB53 (Figure 4-4), gross beta concentrations at these locations have decreased since 2008, when the geomembrane cap and slurry wall were constructed at the NDA. (See Figure 4-6 on page 4-16.) The average gross beta concentrations at WNNDADR and WNERB53 have decreased by 94% and 82%, and the strontium-90 concentrations have decreased by 96% and 90% respectively, since 2008. The cap and slurry wall surrounding the NDA have effectively reduced surface water infiltration and groundwater migration through the

FIGURE 4-5
Flow-Weighted 10-Year Annual Average Strontium-90 Concentrations at WNSWAMP and WNSW74A



Culvert flowing into surface water sampling location WNSW74A on a drainage of Quarry Creek

Surface water sampling location WNSP005 on a drainage of Erdman Brook

Franks Creek during period of high run-off - upstream of WNSP006 sampling location

NDA, and have significantly reduced the discharge of gross beta and strontium-90 contaminated groundwater into the surface water drainage downstream of the NDA.

The annual average strontium-90 concentrations continued to exceed background at WNNDADR but remain well below the DCSs. (See Tables B-4E.) Residual soil contaminations from past waste burial activities is thought to be the source of this radioactivity at these locations.

Figure 4-7 on the next page shows that the tritium concentrations at WNNDADR have been decreasing overall for the last 20 years with periodic fluctuations. When tritium monitoring began at WNNDADR in 1992, the concentration level was 1.79E-05 µCi/mL. The annual average concentration of tritium in 2024 was 4.75E-08 µCi/mL (Table B-4E), three orders of magnitude smaller and well below the tritium DCS of 2.6E-03 µCi/mL. Since tritium's half-life is 12.43 years, these decreasing tritium concentrations in the last three decades are partly attributable to radioactive decay.

All of the radiological results from sampling location WNFRC67 on Franks Creek east of the SDA were three to five orders below the DCSs and no isotopes measured at WNFRC67 were statistically above background measurements. (See Table B-4G.)

Appendix B-4 presents the 2024 surface water monitoring results for the above monitoring locations. Reference values, including background water monitoring data and/or pertinent DCS standards and guidelines, are provided along with the current year monitoring data.

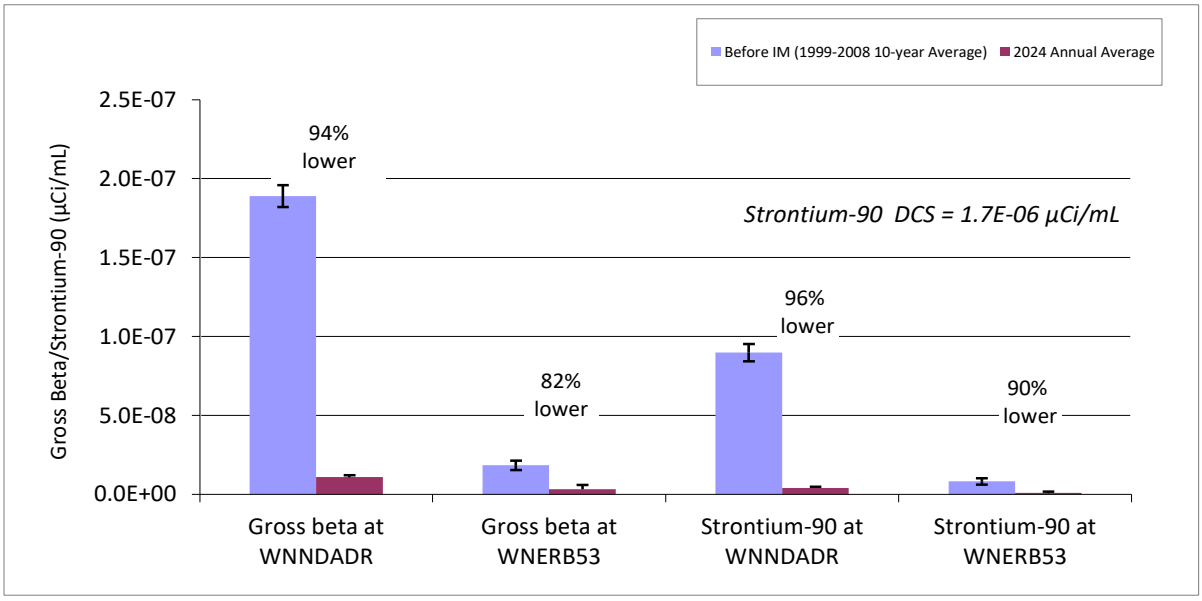
Off-Site Surface Water Monitoring

The aerial photograph of the major creeks downstream of the site (Figure 4-8), shows the northern end of the WNYNSC where Buttermilk Creek and Cattaraugus Creek meet. Surface water samples are collected at three off-site locations:

- One location on Buttermilk Creek upstream of the WVDP (WFBCBKG on Figure A-5).
- One downstream location on Buttermilk Creek at Thomas Corners Bridge (WFBCTCB on Figure 4-8), just before Buttermilk Creek flows into Cattaraugus Creek.

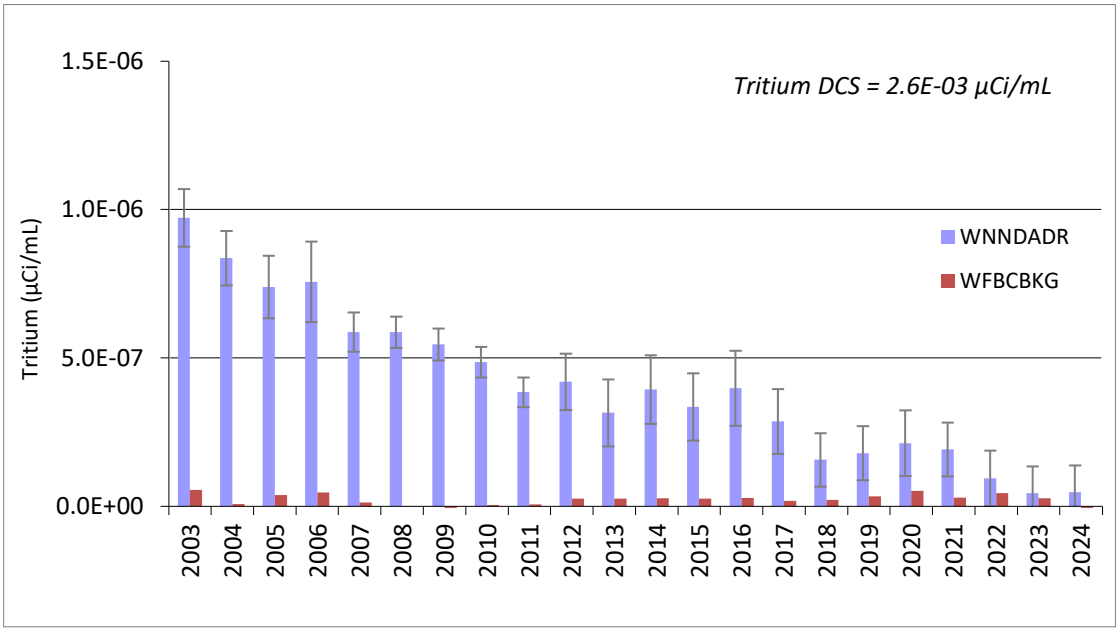
(continued on page 17)

FIGURE 4-6
Average Gross Beta and Strontium-90 Concentrations in Surface Water on the South Plateau at WNNDADR[a] and WNERB53[b] Before and After the NDA Interim Measure (IM) was Installed



Note: Two sigma uncertainty is indicated with each point. Average gross beta and strontium-90 background concentrations in Buttermilk Creek (WFBCBKG) in CY 2023 were 1.69±0.99E-09 and 0.60±1.08E-09 µCi/mL, respectively.
[a] Sample point WNNDADR is located downstream, immediately north of the NDA.
[b] Sample point WNERB53 is located farther downstream, on Erdman Brook.

FIGURE 4-7
Average Concentration of Tritium in Surface Water at WNNDADR Compared Against Background (WFBCBKG) 2003-2024



Note: The upper limit of the uncertainty term is indicated with each point.

FIGURE 4-8
Surface Water Sampling Locations Downstream of the WVDP on Cattaraugus Creek and Buttermilk Creek

(*continued from page 4-15*)

- One further downstream location on Cattaraugus Creek at Felton Bridge (WFFELBR on Figure 4-8), the first point of public access to surface water downstream of both the WNYNSC and the WVDP.

Background samples were also historically collected at Bigelow Bridge on Cattaraugus Creek located on Route 240 (location code WFBIGBR), upstream of the confluence of Buttermilk Creek and Cattaraugus Creek. (See Figure A-5.) Historical data from WFBIGBR from 1991 through 2007 have been used to establish upstream background concentrations for Cattaraugus Creek to compare them with the samples collected at WFFELBR. All other on-site and off-site surface water monitoring data are compared with the current year monitoring results at WFBCBKG. Timed, continuous composite samples from these locations are analyzed for gross alpha, gross beta, tritium, strontium-90, and cesium-137 radioactivity.

2024 Update for Off-Site Stream Monitoring

Felton Bridge (WFFELBR). Sampling point WFFELBR is a favorite launch point for kayakers. The composite samples compiled monthly at WFFELBR in 2024. The 2024 monitoring results are tabulated in Table B-4I. Only gross beta exceeded the historical background measurements at WFBIGBR in 2024. Gross beta is frequently detected in clean areas due to minor amounts of natural gross beta (geological source) in the sediment entrained in the creek water samples.

The maximum gross alpha concentration seen in 2024 at WFFELBR was 0.82% of the uranium-232 DCS guidance value. The maximum beta concentration was 0.42% of the DCS, and the maximum strontium-90 concentration was only 0.05% of the DCS.

Thomas Corners Bridge (WFBCTCB). Sampling point WFBCTCB on Buttermilk Creek is within the WNYNSC property and downstream of the WVDP. The composite samples are collected semiannually at this location. In 2024, gross beta collected at WFBCTCB statistically exceeded the background concentrations on Buttermilk Creek (WFBCBKG) as in previous years. As stated above, gross beta is largely naturally occurring and is typically detected in samples both upstream and downstream of the WVDP. The maximum gross beta concentration at WFBCTCB was 0.53% of the strontium-90 DCS. (2024 data are summarized in Table B-4H.)

Sediment and Soil Monitoring Program

Airborne particulates may be deposited onto soil by wind or precipitation. Particulate matter in streams can adsorb radiological constituents in liquid effluents and settle on the stream bottom as sediment. Soils and sediment may subsequently be eroded or resuspended, especially during periods of high winds or high stream flow. Those soil particles provide a pathway for radiological constituents to reach humans either directly via exposure or indirectly through the food and water ingestion pathway.

Soil and sediment samples were last collected in 2022 and are scheduled for their next collection in 2027 as part of the five-year schedule. On-site sediment/soil samples were collected at three locations on the north plateau where drainage has the potential to be contaminated. Those three locations are SNSP006, SNSWAMP, and SNSW74A. (See Figure A-2.) Soil samples were also collected off-site at one background location (SFGRVAL, shown on Figure A-14) and at three off-site locations coinciding with the off-site air sampling locations (SFRSPRD, SFFXVRD, and SFRT240, shown on Figure A-5). Additional off-site sediment samples were collected at one background location on Buttermilk Creek (SFBCSED) and at three downstream locations: one on Buttermilk Creek (SFTCSED) and two on Cattaraugus Creek (SFCCSED and SFSDSED). (See Figure A-5.)

Drinking Water Monitoring Program

The WVDP maintains a nontransient noncommunity drinking water supply that is used only by site employees, primarily for showering. Project drinking water (potable water) and industrial water have been supplied by two bedrock wells since 2014, and the wells are monitored as part of the source water protection and drinking water monitoring plans. Additionally, bottled water is provided to site employees for consumption. Supplemental water needed for SPDES flow augmentation water continues to be supplied by the lakes south of the MPPB.

Drinking water continues to be monitored for both radiological and chemical constituents. Monitoring is conducted at the distribution entry point and at several site tap water locations to verify compliance with EPA, NYSDOH, and Cattaraugus County Health Department (CCHD) regulations. In 2021, the WVDP began monitoring per- and polyfluoroalkyl substances (PFAS) compounds for the site drinking water per CCHD requirements.

2024 Drinking Water Update

Monitoring results from 2024 indicated that the WVDP site's drinking water continued to remain below the local, state, and federal MCLs and drinking water standards for chemical contaminants. Radiological measurements for the two supply wells and the nearby bedrock wells were similar to previous years, a few orders of magnitude smaller than the DCSs. The sampling results for the potable water supply system and sentinel well water are presented in Appendix B-5.

In 2024, according to the updated EPA guidance on PFAS compounds in the drinking water supply (described in the inset on the next page,) one drinking water supply well on the WVDP premises was sampled according to the sampling schedule set by the CCHD. The results of six PFAS compounds as well as 1,4-dioxane with individual MCLs, are reported in Tables B-5I and B-5J. Additionally, a hazard index was calculated for PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS. (See Table B-5J.) The sampling results were all nondetects, and the hazard index was 0.2, less than the MCL violation threshold of 1.

Food Source Monitoring Program

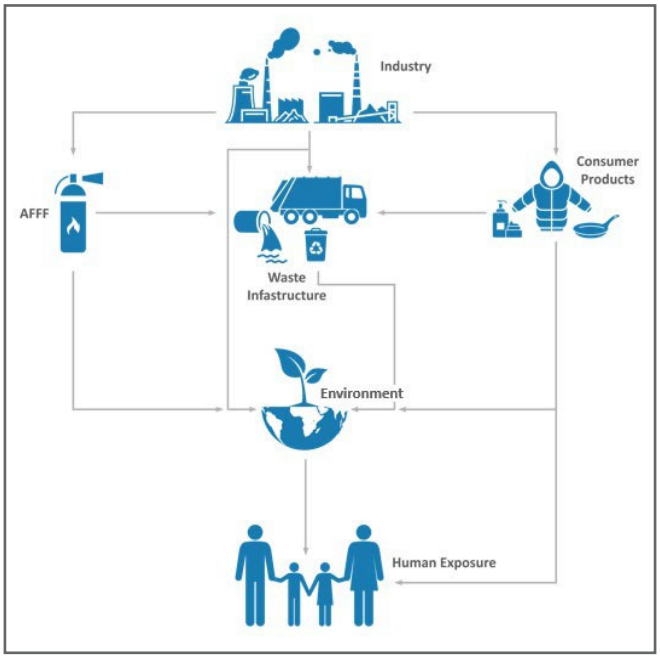
Food samples are collected from locations near the site and from remote locations for comparison purposes. The near-site samples are collected at the locations where plants and animals could potentially be impacted by site activities. (See Figure A-11.) Background samples are collected far from the site at the locations where no contamination from the site could occur. (See Figure A-14.)

Corn, apples, and beans are collected at harvest time (>1 kg or 2.2 lb). Venison (deer meat) samples are typically collected during the fall when deer are most active, and fish may be collected at any time of the year but are not usually collected during the winter. Only the edible portions of the deer and fish are sampled and analyzed for radionuclides. Milk and venison (deer) samples are collected every year and fish, apples, beans, and corn are collected every five years. They were last sampled in 2022.

Per- and Polyfluoroalkyl Substances (PFAS) Sampling

Background

A group of man-made chemicals known as per- and polyfluoroalkyl substances (PFAS) were first manufactured in the 1940s. PFAS include chemicals such as perfluorooctanoic acid (PFOA), which is used to make coatings for items such as water-repellent clothing and heat-resistant nonstick cookware. Another compound, perfluorooctane sulfonate (PFOS), was used in fire-fighting foam. The reason why PFAS are known as "forever chemicals" is that they do not breakdown easily and bioaccumulate over time. PFAS have been detected in surface water and groundwater across the country and are linked to cancer, thyroid disease, and other health ailments. The EPA designated PFAS as one of the emerging contaminants of concern in 2016, and the Agency for Toxic Substances and Disease Registry (ATSDR) designated PFAS as a public health concern.



"Pre- and polyfluoroalkyl substances (PFAS)" (DOE. 2023)

DOE Actions

Following the EPA designation, the DOE, led by the Office of Environment, Health, Safety, and Security (EHSS), conducted its initial assessment of the PFAS presence at the DOE sites, including nuclear sites. An initial historical site information survey at the WVDP suggests that PFOA, PFOS, or other PFAS substances were *not* used or produced at the WVDP. The results of the initial assessment can be seen at https://shorturl.at/JDqhZ.

In December 2024, DOE memo, "Managing Emerging Environmental Issues at the Department of Energy," was signed and relieved the DOE of its responsibility to define PFAS-bearing wastes. However, the DOE sites continue to follow applicable state and federal regulations pertaining to PFAS storage and disposal. DOE sites are advised to continue their efforts to eliminate the use of PFAS-containing products and to minimize environmental releases of PFAS substances.

EPA Final Ruling

The WVDP began sampling and analysis for PFOA, PFOS, and 1,4-dioxane in January 2021 under the direction of the Cattaraugus County Health Department (CCHD), New York. In April 2024, the EPA established legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six categories of PFAS in drinking water: PFOA, PFOS, PFHxS, PFNA, and HFPO-DA as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water.

New York State Actions

In August 2020, NYSDOH adopted a drinking water MCL of 10 parts per trillion (ppt) for PFOA and PFOS and 1.0 parts per billion (ppb) for 1,4-dioxane and issued requirements that water supply systems begin sampling for these constituents. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, the NYSDEC's Division of Environmental Remediation (DER) has developed a sampling and analysis guidance document that summarizes currently accepted procedures to be used for all PFAS sampling plans submitted to NYSDEC under 6 NYCRR Part 375 remedial programs. ("*Sampling, Analysis, and Assessment of Per and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs*" [April 2023]) (https://www.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf).

(continued on page 4-20)

(continued from page 4-19)

PFAS Sample Analysis

Currently, more than a few PFAS analysis methods exist, and each method is tailored for a particular matrix (media), utilizing a specific analysis technology. The PFAS samples collected at the WVDP are analyzed using the method, EPA 533, for drinking water at an EPA 533-certified analytical laboratory. The EPA 533 utilizes analytical techniques such as isotope dilution, anion exchange, solid phase extraction (SPE), and liquid chromatography/tandem mass spectrometry. The laboratory analyzed drinking water for 25 PFAS substances and PFAS mixtures in 2024. For more information about the status of PFAS regulations and sampling, please refer to the websites below.

EPA
https://www.epa.gov/pfas
https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

DOE
https://www.energy.gov/pfas/pfas-and-polyfluoroalkyl-substances
https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/pfassampanaly.pdf

New York State
https://dec.ny.gov/environmental-protection/site-cleanup/pfas

2024 Food Monitoring Update

A low level of cesium-137 was detected in one of the venison background samples in 2024. Also, a low level of strontium-90 was detected in one of the near-site venison samples. However, the concentration levels of both positive detections were in the ranges of historical measurements of background venisons and were not statistically different from these. Tritium was not detected in any venison (background or near-site) in 2024. Because of the fallout from nuclear weapons tests and from nuclear accidents, cesium-137 and strontium-90 could be found in the bodies of wild animals through ingesting wild plants, and positive detections of these isotopes are not unexpected (Savannah River Ecology Laboratory 1999).

Neither cesium-137, strontium-90, nor tritium was detected in a near-site milk sample (location code BFMSCHT on Figure A-11). Naturally occurring potassium-40 is nearly always detected in milk and was detected in the near-site milk sample this year as well. Measurement data from 2024 for milk and venison samples are provided in Appendix E.

Milk samples are collected annually at near-site and off-site dairy farms

Venison samples are collected annually from deer near the site (photo credit: M. Regan)

Direct Radiation Monitoring

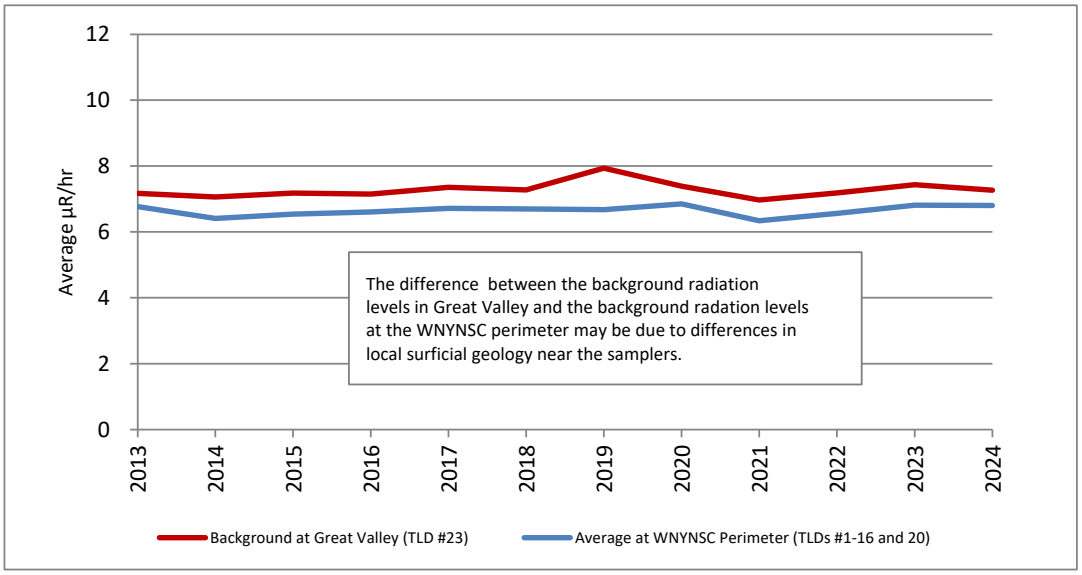
Thermoluminescent Dosimeters (TLDs) directly measure radiation (mostly gamma and beta radiation) in the environment. On site, TLDs are placed at selected solid waste management units (SWMUs) and on the WVDP security fence. Off site, TLDs are placed around the WNYNSC perimeter, the access road, and in Great Valley, the background sampling location. On-site TLD locations are shown on Figure A-12, and the locations of TLDs around the WNYNSC perimeter are shown on Figure A-13. The location of the TLD in Great Valley is shown on Figure A-14. TLDs are collected and measured twice a year with the unit of mR (milliroentgen per quarter). An average exposure rate in 2024 at the background location (TLD #23) in Great Valley was about 16 mR/quarter. No changes were made to the locations of TLDs this year.

Direct Radiation Update for 2024

Figure 4-9 presents the average annual exposure rates (the unit converted to microroentgen [µR] per hour) over the last 10 years at the WNYNSC perimeter and the background location in Great Valley. The average results at the WNYNSC perimeter TLDs (TLDs #1-16 and 20) have always been slightly lower than the background TLD measurements (TLD #23) (Figure A-14). It is assumed that TLD measurements are higher at the background location due to geological characteristics in the area such as natural uranium, thorium, radon, etc. No particular temporal trends have been observed for either data groups except for a slight increase in background measurements in 2019. All 2024 TLD data are presented in Appendix F in units of milliroentgen (mR)/quarter.

In 2024, elevated exposure rates were observed on site at TLDs #24 (on the northern edge of the site fence), #35 (near the Drum Cell), #38 (west side of the MPPB), and #40 (near the WTF); similar locations on the north plateau that have had elevated rates in previous years. The annual averages at these locations were statistically above the background location (#23 in Great Valley). The exposure rates at TLDs #24 and #35 were approximately twice to four times that of the background. However, the exposure rates at these two locations decreased in 2024 compared with 2023 measurements. The exposure rates at #38 remained elevated in 2024 (143±17 mR/quarter and 322±32 mR/quarter). These exposure rates were identical to the 2023 readings when averaged. TLD #35 is located near the on-site rail line where the packaged wastes are staged prior to off-site shipment. TLD #38 is located on the west side of the MPPB where packages with elevated radioactivity are staged before packing and off-site shipment. The exposure rates at these two locations are affected by waste management/shipping activities.

FIGURE 4-9
10-Year Trends of Environmental Radiation Levels at Perimeter and Background Thermoluminescent Dosimeters (TLDs)



The highest on-site radiation exposure rates, 505±7 and 525±40 mR/quarter, in 2024 were measured at TLD #40, as in the past two years. This TLD is located near the WTF where high-level liquid wastes were stored previously and the ventilating system is operating.

Although the results at these four on-site TLDs locations were higher than background, the values were well below the 5 mrem/hour rate requiring on-site posting and within the DOE occupational dose limit (5 rem/year) for the total effective dose equivalent (TEDE) (Note: 1 roentgen = 0.877 rem).

Environmental Monitoring Summary

The WVDP continued the open-air deconstruction of the MPPB throughout CY 2024. The WVDP's environmental monitoring programs maintained its effectiveness and detected even minor changes in the air, water and biota near the WVDP site. This rigorous surveillance ensured that MPPB deconstruction activities would not adversely affect the nearby environment and the public's health. The concentrations found to be above background concentrations were far below the standards, often by multiple orders of magnitudes. As of the end of 2024, the MPPB deconstruction was about 75% complete with no incidents of accidental release above standards or guidance levels. The WVDP environmental monitoring will continue in 2025 with the same level of diligence to complete the last steps of the MPPB deconstruction in early summer 2025.

A video created in 2021 describing the WVDP environmental monitoring program is available for viewing at:

https://www.youtube.com/watch?v=R0tU4XQ5Irc

A TLD on the site fence (photo credit: M. Regan)

TABLE 4-2
2024 Environmental Monitoring Locations
with Results Greater than Applicable Limits or Background

Sample Type	Total Number of Sampling Locations and Description[a]	Results Greater than Applicable Limits or Screening Levels[b]	Locations and Isotopes with Annual Results Statistically Greater than Background	Statistical Method
Air			**Background location: AFGRVAL**	
On-site air emission points	3 HLW Tanks (ANSTSTK), RHWF (ANRHWFK), CSPF (ANCSPF)[c]	None	None	RER[d]
On-site portable ventilation units (PVUs)	8 Eight PVUs	None	None	RER
Off-site ambient air network	16 In each compass direction on WVDP site perimeter and in Great Valley	None	AF14 WNW (Am-241, Cs-137, Sr-90)	RER
Surface water			**Background locations:** **WFBIGBR on Cattaraugus Creek for WFFELBR** **WFBCKBG on Buttermilk Creek for WFBCTCB**	
On-site surface water effluent and natural drainage	8 001 Outfall, Franks Creek downstream of 001, MPPB ditch, northeast SWAMP drainage, north SWAMP drainage, north of the NDA, Erdman Brook, Franks Creek upstream of 001	WNSP005 (Gross beta)	**WNSP001** (Gross alpha, Gross beta, H-3, Sr-90, Cs-137, U-232, U-233/234, U-238) **WNSW74A** (Gross alpha, Gross beta, Sr-90) **WNSP005** (Gross alpha, Gross beta, Sr-90) **WNSP006** (Gross beta, Sr-90) **WNSWAMP** (Gross alpha, Gross beta, Sr-90) **WNERB53** (Gross beta) **WNNDADR** (Gross beta, Sr-90)	KS[e] Test, RER
Off-site downstream surface water	2 Thomas Corners Bridge, Felton Bridge	None	**WFBCTCB** (Gross beta) **WFFELBR** (Gross beta)	KS Test, RER

[a] Sampling locations are shown on maps in Appendix A. Refer to Table A-2 for isotope analytes at each sampling location.

[b] Applicable regulatory, guidance, or screening limits are listed in Table 6-4 (radionuclides in air and water), and Appendix B-1 (water).

[c] Did not operate in 2024.

[d] Relative Error Ratio.

[e] Kolmogorov–Smirnov test.

TABLE 4-2 *(concluded)*
2024 Environmental Monitoring Locations
with Results Greater than Applicable Limits or Background

Sample Type	Total Number of Sampling Locations and Description[a]	Results Greater than Applicable Limits or Screening Levels[b]	Locations with Radiological Results Statistically Greater than Background (Isotope)	Statistical Method
Food		**background locations = BFMCTLS milk, BFDCTRL venison, BFFCTRL fish, and BFVCTRL crops**		
Near-site milk sample	1 From a local producer as shown on Figure A-11	None	None	RER
Near-site and control venison samples	6 Sampling locations vary by year based on the sample availability	None	None	RER
Environmental radiation			**background location = DNTLD23**	
On-site dosimeters near WVDP facilities	10 Near HLW Tanks, MPPB, NDA, SDA, HLW Cask Storage, Drum Cell, and on WVDP property fence	None	DNTLD #24, 35, 38, 40	ANOVA[d]
Off-site perimeter dosimeters	17 In each direction on NYSERDA site perimeter and in Great Valley	None[e]	None	ANOVA

[a] Sampling locations are shown on maps in Appendix A. Refer to Table A-2 for isotope analytes at each sampling location.

[b] Applicable regulatory, guidance, or screening limits are listed in Table 6-4 (radionuclides in air and water), and Appendix B-1 (water).

[c] Relative Error Ratio.

[d] Analysis of Variance.

[e] Within the DOE occupational dose limit (5 rem/year).

CHAPTER 5
DOSE ASSESSMENT

2024 Highlights

Total Dose from All Pathways. The 2024 total estimated dose from the WVDP activities to a maximally exposed off-site individual (MEOSI) was 0.184 mrem (0.00184 mSv), 0.18% of the DOE's annual public dose limit, 100 mrem, from all pathways in a calendar year.

Dose from the Air Pathway. Annual air emissions of radionuclides are regulated by the EPA and limited to 10 mrem during a calendar year at the MEOSI. The total estimated annual dose from the WVDP activities in 2024 was 0.18 mrem (0.0018 mSv), well below the 10 mrem annual limit. There were three radioisotopes measured at a sampler in the west-northwest direction that were statistically higher than the background location. However, the measured concentrations were very low compared with the EPA standards. The total airborne collective population dose in 2024 was 0.069 person-rem (0.00069 person-Sv), far below the DOE's 100 person-rem guidance for the routine environmental surveillance.

Dose from the Water Pathway. The estimated dose from the surface water exposure pathway is evaluated against the DOE's total all pathway dose limit of 100 mrem per year. The total estimated dose from surface water releases from the WVDP site in 2024 was 0.004 mrem (0.00004 mSv), a very small fraction of the 100 mrem DOE dose limit. The total waterborne collective population dose in 2024 was 0.038 person-rem (0.00038 person-Sv). Groundwater is not considered an exposure pathway because no off-site public water supplies are drawn from aquifers potentially affected by the WVDP premises.

Dose to Biota. The results of biota dose modeling for 2024 indicated that the plants and animals living on the WNYNSC premises are not being exposed to doses in excess of the DOE biota dose standard of 1 rad/day (radiation absorbed dose) for aquatic animals and terrestrial plants, and 0.1 rad/day for riparian and terrestrial animals.

Minimizing Potential Dose to the Public and the Environment

DOE Order 458.1, "Radiation Protection of the Public and the Environment," establishes requirements to protect the public and the environment against undue risk from radiation. This order ensures DOE operations are conducted in a manner that limits any potential radiation exposures to ***A***s ***L***ow ***A***s ***R***easonably ***A***chievable (ALARA). ALARA principles advocate controlling or managing exposures to as low as technical and practical considerations permit, and as far below the applicable limits of the order as practicable. Deliberate efforts are made at every level of the work to minimize exposure time, maximize distance from the potential source, and to utilize shielding whenever possible. ALARA radiological controls protect the worker and, as a result, also protect the public and the environment.

Radiation Sources at the WVDP

Members of the public are routinely exposed to natural and artificial ionizing radiation that can be absorbed by living tissue. (See the inset on page 5-4 for discussions of "Radiation Dose" and "Units of Dose Measurement.") In 2006, a typical individual living in the U.S. was estimated to receive an average annual effective dose equivalent (EDE) of about 620 mrem (6.2 mSv) (National Council on Radiation Protection and Measurements [NCRP] Report 160, 2009). NCRP Report No. 184 (2019), an update of the medical exposure section of NCRP Report No. 160, indicates there has been a 15-20% reduction in the non-therapeutic medical radiation dose to the U.S. population in the decade between 2006 and 2016. This reduction effectively reduces the NCRP Report No. 160 estimate to about 560 to 580 mrem (5.6 to 5.8 mSv). (See Figure 5-1 for dose distribution of 620 mrem.)

Of the typical radiation dose to a member of the public, approximately 310 mrem/year is from natural background sources, including cosmic radiation (from outer space) and terrestrial radiation and radon (from the earth's subsurface). The remainder is derived from artificial sources, including consumer products and medical diagnostic procedures. (See Chapter 8, "Radiation

and Environmental Standards" of this report for discussions of ionizing radiation.) The estimated (all pathway) maximum individual dose from the WVDP in 2024 was 0.184 mrem (0.00184 mSv). Figure 5-1 below shows the estimated dose from the WVDP in 2024 compared with the average annual dose a U.S. resident receives from artificial and natural background sources.

Exposure Pathways

Human beings are exposed to natural radiation and artificial radiation sources through various exposure pathways. Various environmental media act as pathways that transfer contaminants from a source to a receptor. Potential exposure pathways include: inhalation of gases and particulates, ingestion of locally grown food products and game, and exposure to external penetrating radiation emitted from contaminated materials, as shown in Figure 5-2.

Table 5-1 summarizes the potential exposure pathways from the WVDP site to the local off-site population and describes the rationale for including or excluding each pathway when calculating dose from the WVDP.

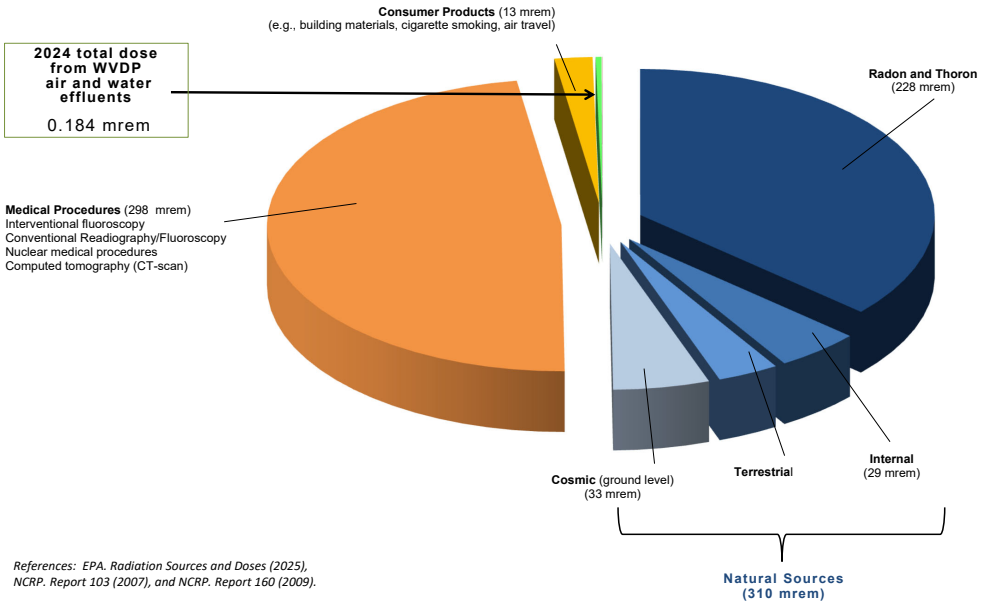
Background Corrections

The WVDP uses the environmental monitoring measurement results returned from qualified analytical laboratories for statistical analysis and dose calculations. The WVDP does not correct measurement results for the natural radioactivity. Also, the results are not corrected for locational background radioactivity (e.g., the WVDP does not subtract off-site airborne radioactivity from on-site airborne activity.) Instead of applying background corrections, the WVDP conducts sample versus background (control) comparisons and compares on-site and near-site results against those from off-site samples, which are not affected by the WVDP activities.

Dose from Airborne Emissions

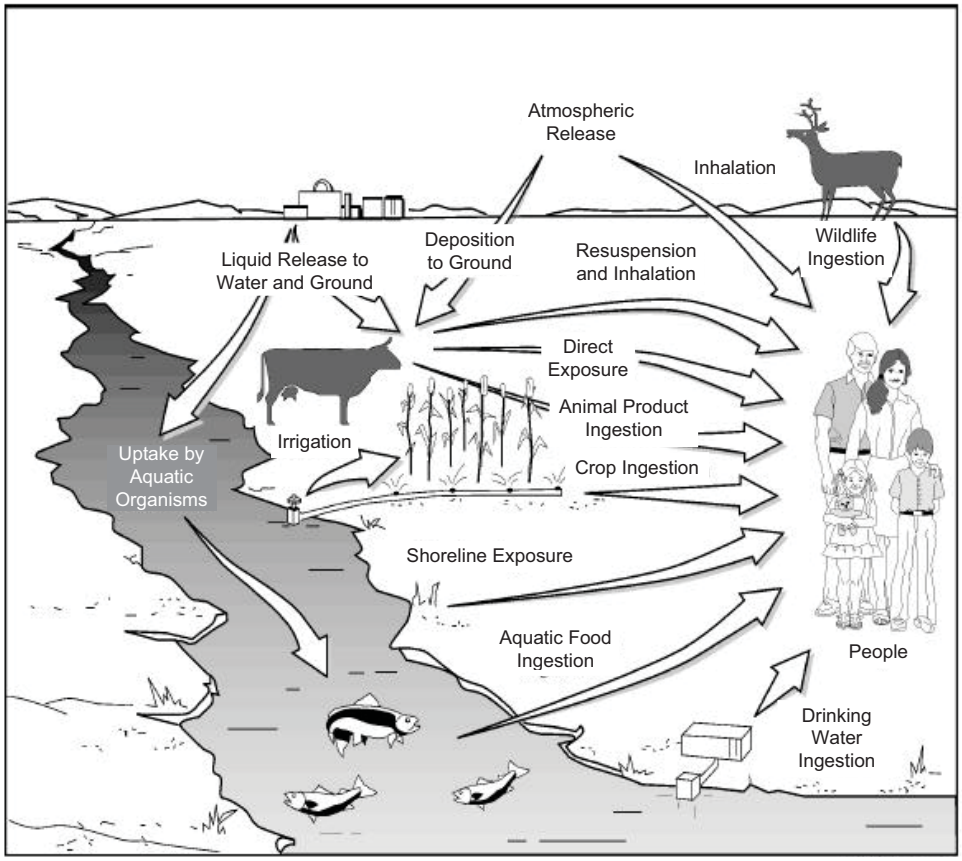
For details of the WVDP air monitoring program, please refer to Chapter 4, "Environmental Monitoring." Please refer to Table A-2 in Appendix A for a list of isotopes analyzed at the on-site stacks and on the off-site ambient air monitoring samplers.

FIGURE 5-1
Comparison of Doses from Natural and Artificial Sources to the Dose from 2024 WVDP Effluents



References: EPA. Radiation Sources and Doses (2025), NCRP. Report 103 (2007), and NCRP. Report 160 (2009).

FIGURE 5-2 Potential Radiation Exposure Pathways to Man



Reference: DOE-HDBK-1216-2015

TABLE 5-1
Potential Exposure Pathways from the WVDP to the Local Off-Site Population

Exposure Pathway and Transporting Medium	*Reason for Including/Excluding*
Inhalation of gases and particulates in air (included)	Off-site transport of contaminants from stacks, vents, diffuse sources, or resuspended particulates from soil or water.
Ingestion of vegetables, cultivated crops, venison, milk, and fish (included)	Local agricultural products irrigated with potentially contaminated surface or groundwater; airborne deposition on leaves and uptake of deposited contaminants; venison and milk from animals that have inhaled or ingested contaminants; fish that have been exposed to or ingested contaminants in surface water and sediment.
Ingestion of surface and groundwater (excluded from individiual dose pathways; included in population dose pathways)	No documented use of local surface water or downgradient groundwater wells as drinking water by nearby residents. Water withdrawn from Lake Erie water is used for drinking water in the 50-mile (80-km) radius.
External exposure to radiation from particulates and gases directly from air or surface water or indirectly from surface deposition (included)	Transport of air particulates and gases to off-site receptors; transport of contaminants in surface water and direct exposure when swimming, wading, boating, or fishing.

Radiation Dose

The energy released from a radionuclide is eventually deposited in matter encountered along the path of the radiation. The ionizing radiation energy absorbed by a unit mass of material is referred to as the absorbed dose. The absorbing material can be either inanimate matter or living tissue.

Alpha particles are unable to penetrate the human body beyond the skin layer but leave a dense track of ionization in human cells as they travel through tissue and thus deliver the most dose, or harm, per unit path-length. Because alpha particles are not penetrating, they must be taken into the body by inhalation or ingestion to cause harm to internal organs. Beta and gamma radiation can penetrate the protective skin layer from the outside, resulting in exposure of the internal organs to radiation.

Considering the different biological effects of different kinds of radiation, the absorbed dose is multiplied by a quality factor specific to the isotope to yield a unit called the dose equivalent. A radiation dose expressed as a dose equivalent, rather than as an absorbed dose, allows for the comparison of risks from different types of radiation exposure (e.g., exposure to alpha radiation versus exposure to gamma radiation). For this reason, regulatory agencies limit the dose to individuals in terms of total dose equivalent. Refer to the Chapter 8, "Radiation and Environmental Standards" for further discussion of ionizing radiation.

Units of Dose Measurement

The unit for dose equivalent commonly used in the U.S. is the rem. The international unit of dose equivalent is the sievert (Sv), which is equal to 100 rem. The millirem (mrem) and millisievert (mSv), used more frequently to report the low dose equivalents encountered in environmental exposures, are equal to one-thousandth of a rem or sievert, respectively.

The effective dose equivalent (EDE), also expressed in units of rem or Sv, provides a means of combining unequal organ and tissue doses into a single "effective" whole body dose that represents a comparable risk probability. The effective dose is a weighted sum of equivalent (organ-specific) doses to radiosensitive tissues, representing the relative contribution of the different tissues to the total risk for the idealized case of uniform irradiation of the whole body (DOE STD-1196-2022). The probability that a given dose will result in the induction of a fatal cancer is referred to as the risk ('cancer risk') associated with that dose. In this document, for waterborne releases, the EDE is calculated by dosimetry models recommended by the International Commission on Radiological Protection (ICRP) in Publications 26, 30, 48, and 56 through 72 (as stated in the GENII version 2 User's Guide) and risk factors in Federal Guidance Report (FGR) 15 (2019). For airborne emissions, the EDE calculation is based on the ICRP Report Number 72 (1995) and risk factors in FGR 13 (2019). Nuclear decay data are based on the ICRP Publication 107 (2008).

A collective population dose is expressed in units of person-rem or person-sievert because the individual doses are summed over the entire potentially exposed population (persons). The 50-mile (80-km) radius collective dose is the sum of all doses to all individual members of the public within 50 miles of the WVDP. Dividing the person-rem by the population gives an average person-rem per person.

DOE Ionizing Dose Ranges Chart

The DOE Office of Public Radiation Protection issued a chart that provides an "order of magnitude" reference for various levels of radiation exposure (December 2017). This comprehensive chart provides perspective on the estimated dose from the WVDP compared to other types of radiation dose familiar to the public, such as the dose used for cancer treatments. (See Figure 8-1 in the Chapter 8, "Radiation and Environmental Standards" of this report to view the chart.)

On-Site Stacks

The EPA regulates airborne radionuclide emissions under the Clean Air Act (CAA). The DOE facilities are subject to 40 CFR 61, Subpart H, National Emission Standards for Hazardous Air Pollutants (NESHAP), which is part of the CCA and contains the national standards for emissions of radionuclides other than radon from DOE facilities. The applicable standard is a maximum of 10 mrem (0.1 mSv) EDE to any member of the public in any year.

The number of point-sources (e.g., stacks) at the WVDP has decreased in recent years. Two stacks were active during 2024, the supernatant Treatment System stack (ANSTSTK), which ventilates the HLW tanks, and the Remote Handled Waste Facility stack (ANRHWF). Eight PVUs were used in select work areas to ventilate the MPPB during 2024 decommissioning activities. In recent years, diffuse sources, such as airborne releases from deconstruction and natural evaporation from the lagoons, have become the largest potential contributors to airborne dose, which was the case in 2024.

Breakdowns of the radioisotopes emitted from these stacks and PVUs in 2024 are shown in Tables C-1 to C-4 in Appendix C. The concentrations of emitted radioisotopes were all below the DCSs. According to the real-time monitoring systems of on-site air, on-site airborne radioactivity did not exceed the radiation exposure limits for site workers.

Ambient Air Monitoring Network (AAMN)

Since 2014, radioactivity samples for estimating off-site dose have been collected from 16 low-volume ambient air samplers encircling the WVDP, covering 16 compass sectors. For the details of the AAMN program, please refer to "Off-Site Ambient Air Monitoring Program" section in Chapter 4, "Environmental Monitoring."

Airborne Dose Compliance Assessment

The airborne dose calculated from ambient air monitoring results is evaluated by comparing the measured radioactivity with EPA standards using a sum-of-ratio analysis.

The 40 CFR 61, subpart H, Appendix E includes a tabulation of hypothetical radionuclide concentrations that would result in a 10 mrem/year dose if a person were exposed to that concentration for a full year. A ratio (or %) of the average annual concentration of each isotope against the EPA standard for the isotope is calculated, and the ratios of all isotopes are summed by compass sector. Compliance is demonstrated if the sum of these ratios for all the isotopes measured at each sampling location is less than 1 (the annual 10 mrem dose standard.)

Table C-6 in Appendix C shows the results of this calculation in the column titled "Compliance Ratio." The largest ratio observed in 2024 was 0.136 in the west-northwest direction. This result demonstrates that the WVDP was in compliance with EPA regulations for airborne radionuclide emissions in 2024.

2024 Maximum Airborne Dose to an Off-Site Individual

The potential maximum annual airborne dose to a maximally exposed off-site individual (MEOSI) residing near the site boundary all year was computed using CAP88-PC v4.1. CAP88 is the EPA-approved air dose modeling software used to demonstrate NESHAP compliance.

During 2024, very low levels of positive detections were observed at the AAMN samplers. These detections are attributed to the MPPB deconstruction work, which continued throughout 2024. These detections, or any anomaly, were promptly evaluated on site and then closely analyzed at a certified laboratory.

Low-volume (left) and high-volume (right) samplers located in the historical predominant downwind direction from the site

Based on the annual average concentrations of the seven isotopes, the annual airborne dose to the MEOSI in 2024 was 0.18 mrem (0.0018 mSv) (Table 5-2), detected at the west-northwest (WNW) sampler. This annual dose is nine times that in 2023, and three isotopes (americium-241, cesium-137, and strontium-90) were detected at higher levels than the background location. (See Table 4-2). However, the concentrations of those isotopes were very small fractions of the NESHAP compliance levels. 0.18 mrem is only 1.8% of the NESHAP 10 mrem limit. (See Table C-6.)

Figure 5-3 below shows that the historical ambient air concentrations at the samplers approximately one mile from the site have not changed and remain similar to concentrations at the background sampler 18 miles away.

For information about airborne dose calculation methods, refer to the inset box titled, "Airborne Dose Estimates Using CAP88-PC at the WVDP" on the next page.

Vent Washer Removal in 2024. The MPPB deconstruction was carefully planned and executed safely

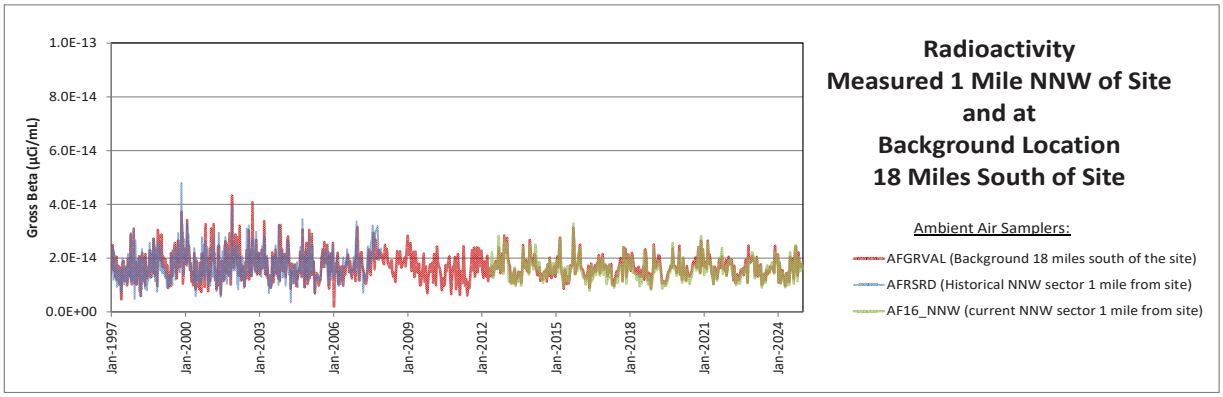
2024 Collective Population Airborne Dose

Population Data. Population information is required when using computer models for annual dose assessments for a community. Figure A-15 presents the population around the WVDP by sector and distance. The population is based on the CY 2020 U.S. census and the 2021 Canadian census. An estimated 1.65 million people live within 50 miles (80 km) of the site, including approximately 145,000 Canadians. In 2008, a field verification of the residents within a 3.1-mile (5-km) radius from the site was conducted. The location of the nearest receptor (resident) in each sector is confirmed annually.

Collective Population Dose. The annual collective population dose is the sum of the dose to each individual living within 50-mile (80-km) radius. This population receives approximately 511,907 person-rem/year from natural sources, calculated by multiplying 310 mrem/year (the individual annual dose from natural sources) by 1,651,312 people living within a 50-mile radius. The DOE-HDBK-1216-2015, "Environmental Radiological Effluent Monitoring and Environmental Surveillance," sets a 100 person-rem collective effective dose to the affected population (e.g., within a radius of 80 km of a central point in the site) as a guideline for the need to perform routine environmental pathway surveillance.

The collective population dose from WVDP activities was calculated using CAP88-PC version 4.1.1. The computed collective airborne dose in 2024 was 0.069 person-rem (0.00069 person-Sv) (Table 5-2), far below the 100 person-rem/year guideline.

FIGURE 5-3
The Historical Comparison of Gross Beta Concentrations Between Background Sampling and Near-Site Locations



Airborne Dose Estimates Using CAP88-PC at the WVDP

History. The CAP88-PC model is widely used for evaluating doses and radiological risks when planning work activities that have the potential to release airborne radioactivity. This model estimates the human absorbed dose via ingestion, inhalation, air immersion, and ground surface pathways. The resulting dose is then used to demonstrate compliance with 40 CFR 61, Subpart H (the NESHAP regulations). Version 4.1.1 of CAP88-PC (Trinity Engineering Associates, Inc., June 2021) is the most recent version approved by the EPA for demonstrating NESHAP compliance. However, any previous versions approved by the EPA can also be used for compliance.

Previously, doses from airborne radioactive materials released from stacks and diffuse sources on the WVDP property were modeled using CAP88-PC to demonstrate compliance with the NESHAP. The off-site ambient air monitoring network (AAMN) was installed in 2012 in anticipation of future structure deconstruction work. In the following year, the dose estimate based on measurements at the AAMN samplers was compared against the dose estimate based on on-site sources to test the validity of the AAMN measurement method. The EPA reviewed both methods and granted the WVDP final approval to use the AAMN measurements to evaluate compliance with the 10 mrem NESHAP standard, as outlined in 40 CFR 61, subpart H, Appendix E concentration values. A sum of ratios is calculated by dividing annual concentrations for each measured isotope by the Appendix E concentration values and summing these ratios for all the isotopes measured. Ratios of <1 demonstrate compliance with the NESHAP standard.

Until September 2022, when the MPPB deconstruction began, most of the concentrations of radioisotopes measured at the AAMN samplers were nondetects (below the detection limits, or the uncertainty was larger than the result). To make conservative dose estimates from mostly nondetect results, the WVDP used the measurements (the larger of the result and its uncertainty) from the prevalent wind direction (NNW [north-northwest]) and applied CAP88 dose factors to them. For uncertainty associated with radiological analysis, refer to Chapter 8, "Radiation and Environmental Standards."

Since the start of MPPB deconstruction work, very low positive detections were observed on the AAMN samplers, and the dose modeling method was updated to estimate annual doses better. An overview of this updated process is described below.

Individual dose calculation method. CAP88-PC was used to calculate a unit dose conversion factor (UDCF) at each AAMN location (compass direction and distance), using site-specific five-year average meteorological data. (See Chapter 4, "Meteorological Monitoring" section.) With site-specific meteorological data, CAP88-PC calculates radiological concentration, dose, and dispersion (CHI/Q) factors given unit (1) input for each isotope at all AAMN locations. The calculated dose conversion factor is then used to compute the dose at each AAMN location based on the annual average concentration of each isotope at all locations. If positive detections are observed for more than one isotope at a given AAMN location, the resulting doses are summed to achieve the annual total dose at that AAMN location.

Population dose calculation method. Because positive detections may be recorded at AAMN samplers in specific compass directions, the WVDP population dose calculation adopted direction-based methodology. Using the CAP88-PC dispersion factors, a site source-term in curies (Ci) can be determined for locations where positive detections were observed. With the source term established for a given isotope at the AAMN location, the population dose can be calculated for the directional sector through a 50-mile (80-km) radius. Population dose values are then summed for all sectors, where positive results were observed, and for all isotopes to produce the annual collective population dose out to a radius of 50 miles from the site.

Dose from Waterborne Releases

Surface Water Standards. Currently, there are no waterborne dose standards set by the EPA or DOE for an individual (MEOSI). DOE Order 458.1, "Radiation Protection of the Public and the Environment," requires DOE facilities to limit annual radiological exposure to the public to less than 100 mrem from all sources. For collective (population) dose, the DOE sets 100 person-rem as a guideline, or a threshold, that a facility needs to perform routine environmental pathway surveillance.

Drinking Water Standards. EPA standards also establish limits on the radiation dose to members of the public from liquid effluents through the National Primary Drinking Water Regulations (40 CFR Part 141). NYSDOH sets the limits for community water supplies in the New York State Sanitary Code (10 NYCRR 5-1). The EPA and NYSDOH drinking water limit is 4 mrem/year.

For the WVDP's dose estimate from drinking water is described in the following "Waterborne Dose Assessment Methodology" section.

Waterborne Dose Assessment Methodology

Potential doses to near-site residents and the local population from the waterborne pathway are estimated using software, GENII v2, a DOE-approved dose modeling software. The WVDP uses a chronic surface exposure model provided by GENII. The dose from the WVDP activities through the water pathway to a hypothetical MEOSI is estimated at Felton Bridge, the first point of public access to Cattaraugus Creek downstream of the WVDP. For the waterborne collective dose, the total dose is estimated for the population within a 50-mile (80-km) radius from the WVDP. GENII incorporates multiple exposure pathways into its radiation exposure models, including food (meat, fish, vegetables, fruits, grains, and eggs), milk consumption, exposure from water sports activities, and exposure from soil. Although the individual waterborne model does not include drinking water ingestion from Cattaraugus Creek water, the collective dose model incorporates drinking water ingestion from Lake Erie. Lake Erie is the major drinking water source for the residents of western New York.

In waterborne dose modeling, annual averages of radioisotope concentrations at three on-site discharge points are used as source terms (source concentrations.) One is the SPDES outfall 001 (sampling location WNSP001 on lagoon 3), which is a controlled discharge point. The other two discharge points are the northeast swamp drainage (sampled at WNSWAMP) and north swamp drainage (sampled at WNSW74A); both are natural drainages.

According to the model results, the most important waterborne exposure pathway for a nearby individual is the consumption of fish from Cattaraugus Creek, followed by the consumption of vegetables and milk. The major source of waterborne exposure for the population is drinking water, followed by the consumption of milk and fish.

2024 Potential Maximum Waterborne Dose to an Off-Site Individual

Controlled discharges with low levels of radioactivity from SPDES outfall 001 (lagoon 3 discharges) and natural discharge from WNSW74A and WNSWAMP continued in 2024. The concentrations of discharged isotopes and flow volumes from these discharges are reported in Tables B-2A, B-4A ,and B-4B. The radioactivity of the discharged isotopes was multiplied by the Unit Dose Factors (UDFs) to calculate the dose to the MEOSI and the dose to the population. Additional details about the surface waterborne dose modeling and the UDFs used in the modeling are described in the inset box, "Using Dose Conversion Factors to Estimate Waterborne Dose" on page 5-10.

In 2024, a hypothetical MEOSI could have received a maximum waterborne dose of 0.004 mrem (0.00004 mSv) from the isotopes discharged from those three discharge points, a 57% reduction compared with 2023. The annual dose from the radioactivity in controlled discharges from the outfall 001 was 0.0013 mrem (0.000013 mSv,) and the annual dose from other two natural drainages was 0.0026 mrem (0.000026 mSv.) In 2024, the total curies discharged from outfall 001 increased compared with 2023; however, the total curies discharged from WNSWAMP and WNSW74A decreased, leading to a 30% decrease in the total curies with all isotopes combined.

Strontium-90 contributed approximately 57% of the total dose generated from the outfall 001 discharges in 2024, followed by cesium-137, which contributed 27% of the total dose. Most of the dose from those natural drainages was attributable to strontium-90 from the WNSWAMP (82% of the total dose from WNSWAMP) and WNSW74A (24% of the total dose from WNSW74A) and cesium-137 from WNSW74A (3% of the total dose from WNSW74A).

Distributions of radioisotope contributions in the waterborne dose in 2024 are summarized in Figure 5-4. As in previous years, strontium-90 and cesium-137 were the two major sources of waterborne dose. Compared with the distributions in previous years, the proportion of 'All others' increased in 2024. Among 'All others,' the isotope that showed the largest percent increase in 2024 was carbon-14 (an annual total of 9.13E-04 mrem and about 23% of the total waterborne dose). The increases are attributed to the GENII model setting update described in the inset, "Using Dose Conversion Factors to Estimate Waterborne Dose" on page 5-10. Carbon-14 emits low-energy beta radiation and is produced naturally in the atmosphere and during nuclear energy generation and nuclear weapons tests. The annual mean concentrations of carbon-14 at the three discharge points were about four orders of magnitude smaller than the DCS concentration.

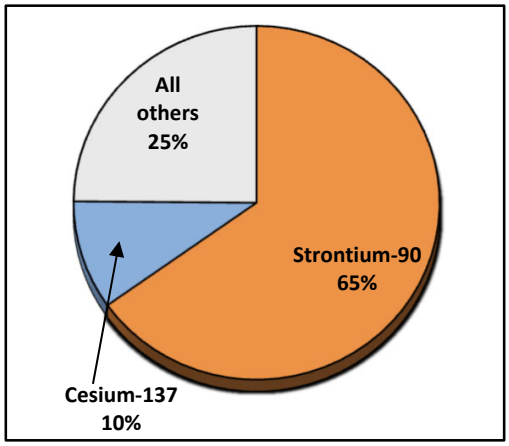
2024 Collective Population Dose (Waterborne)

The collective dose to the population living within a 50-mile (80-km) radius of the WVDP was 0.038 person-rem (0.00038 person-Sv) in 2024. This is a very small fraction of the DOE's annual 100 person-rem dose guidance. The waterborne collective dose decreased by 16% compared with the collective dose in 2023.

Figure 5-5 on page 5-12 illustrates the model-estimated dose from the water pathway alone over the past 20 years. The estimated waterborne dose has decreased due to the reduction of strontium-90 concentrations in the WNSWAMP after the PTW installation in 2010, as well as the water management update, which reduced the volume of industrial water flowing into lagoon 3 (and discharged from outfall 001).

Radon

FIGURE 5-4
Dose Percent by Radionuclide from Waterborne Releases in 2024



According to the NCRP, on average, naturally occurring radon (radon-222) and thoron (radon-220) contribute 37% (228 mrem) of the total natural and artificial dose to a member of the public. (See Figure 5-1.) Thoron (radon-220) has historically been detected in the airborne emissions from the WVDP due to the thorium reduction extraction (THOREX) process that was performed in the MPPB during NFS operations. Thoron levels increased during the startup of HLW vitrification in 1996. During that time, an average of approximately 12 curies per day (Ci/day) was assumed to have been released, based on an estimate of thoron released during each waste concentration cycle of the vitrification process. Radon-220 is also a naturally occurring gaseous decay product of thorium-232.

Monitoring for radon-220 is no longer performed at the WVDP site. However, the thoron emissions from the MPPB have likely decreased substantially in recent years due to the removal of the source material during decontamination and deconstruction. The on-site radon exposure rate was reviewed and updated in 2024 to reflect the changes in radon sources. The reevaluation concluded that the current radon exposure is approximately one-tenth that of the previous value, 0.24 Ci/day.

CAP88-PC modeling results indicate the annual dose from the radon source on the site to the MEOSI would be 4.8E-07 mrem (4.8E-09 mSv), significantly below the 10-mrem NESHAP standard. The collective dose to the population within a 50-mile (80-km) radius from radon source would be 6.2E-02 person-rem (6.2E-04 person-Sv).

Using Dose Conversion Factors To Estimate Waterborne Dose

The environmental dosimetry computer code, GENII version 2.10.2b, is used to calculate site-specific Unit Dose Factors (UDFs) for waterborne radioactivity releases and dispersion of these effluents from the WVDP. The annual waterborne dose from the WVDP activities is estimated by multiplying the radioactivity in curies discharged from on-site discharge points by their respective isotope UDFs, and summing the dose contribution from each isotope.

The annual individual (MEOSI) dose and collective (population) dose were calculated using the site-specific parameters as well as GENII recommended parameters. Those parameters include, but are not limited to: local food consumption data, local farming/food production data, water sports activities in the area, soil characteristics, and climate data. The MEOSI dose modeling point is at Felton Bridge on Cattaraugus Creek, the first public access point to the creek water downstream of the WVDP site. The collective dose was estimated at the Main Bridge on Cattaraugus Creek in Gowanda, NY, for the population (approximately 1.6 million) within a 50-mile (80-km) radius of the WVDP. The MEOSI model does not include drinking water consumption because water from Cattataugus Creek is not used for public potable water. The collective dose model includes drinking water consumption because water in Lake Erie is the major source of drinking water for the residents in Western New York.

The annual average concentrations of three isotopes at three on-site discharge points (outfall 001 [WNS001], WNSAMP, and WNS74A) are used to calculate radioactivity in curies discharged during the year.

The liquid effluents from those discharge points travel to Erdman Brook and Franks Creek on site, then leave the WVDP premises and flow into Buttermilk Creek east of the site. Buttermilk Creek merges into Cattaraugus Creek north of the WVDP, and then Cattaraugus Creek discharges into Lake Erie. Felton Bridge on Cattaraugus Creek is approximately three miles (4.8 km) from the WVDP; the Main Bridge in Gowanda on Cattaraugus Creek is approximately 12 miles (19 km), Lake Erie is about 28 miles (45 km) downstream. For dose calculations, dilution factors for interim streams between the WVDP and Cattaraugus Creek as well as the dilution factor in Lake Erie are not considered. Thus the waterborne dose modeling results are considered to be conservative.

At the WVDP, GENII version 1 was used for waterborne dose modeling through 2023. In 2024, the software version was updated to version 2, along with the aforementioned input values, as well as the population for the collective dose calculation. GENII's internal conversion factors were updated to match DOE DCS 2022 water ingestion effective dose coefficients. When the actual data is not available, recommended values are used (PNNL 2013).

Due to these updates, the dose conversion factors per unit curie (Ci) inputs were adjusted, resulting in reduced MEOSI and collective dose reductions that exceed the actual reductions of the source curies described in the body text and presented in Figure 5-5.

A beach at Lake Erie (photo credits: A. Carr)

Dose From Air and Water Pathways

The total estimated potential dose from the WVDP in 2024 is a combination of a dose from airborne exposure based on measurements from the AAMN and a modeled dose from water exposure.

2024 Total Dose (Air and Water)

Table 5-2 summarizes the dose from both the air and water exposure pathways. The potential individual dose to the public from both airborne and liquid effluents released from the WVDP activities in 2024 was 0.184 mrem (0.00184 mSv), 0.18 mrem from the air pathway, plus 0.004 mrem from the water pathway. This dose is 0.18% of the 100-mrem (1-mSv) annual limit in DOE Order 458.1.

Table 5-3 on page 5-13 presents the total curies (and in Becquerels) by radionuclide types released to air and water from all sources at the WVDP. The air dose total is computed from measured air concentrations at the on-site stacks and from estimated diffuse sources such as the evaporation from the lagoons and facility deconstruction. The water total is computed from measured concentrations of controlled surface water discharges and natural drainage. Excluding radon (Rn-220), Table 5-3 shows that in 2024, the total curies released to surface water were greater than the total curies released to the air.

Dose from Food Samples

The dose from local food consumption is estimated based on actual food samples collected near the WVDP. Vegetables, fruit, milk, venison, and fish samples from the WVDP vicinity are collected and analyzed for radiological constituents. (Biological sampling locations are shown on Figures A-11 and A-14.) As stated in Chapter 4, "Environmental Monitoring," milk and venison (deer meat) samples are collected every year and fish, apples, beans, and corn are collected every five years. The five-year interval samples were last sampled in 2022. The DOE has developed Ingestion Dose Conversion Factors (DCFs) for DOE sites to convert measured radioactivity concentrations in food into dose. The ingested radioactivity in food multiplied by these DCFs provides the estimated maximum potential dose from the food only pathway. (Note: The estimated dose from the food pathway for 2024 uses the DCFs from DOE/EH-0071. The DCFs for the radioisotopes used in the food dose provided in DOE/EH-0071 are very similar to, and more conservative than the more recent DCFs for these isotopes for ingested water and milk in DOE-STD-1196-2022.)

2024 Estimated Dose from Food

The estimated ingestion dose from food items, including 2024 samples of milk and venison and 2022 samples of fish, fruit, and crops, was 0.4 mrem/year for an individual residing in the regions of the WVDP. It was 0.1% of natural radiation that a U.S. resident would receive annually (310 mrem/year). Although strontium-90 and cesium-137 were positively detected in venison samples, those concentrations were statistically indistinguishable from the concentrations in the background samples. (See "2024 Food Monitoring Update" section in Chapter 4, for more details.)

Dose to Biota

Radionuclides from both natural and artificial sources may be found in environmental media such as water, sediments, and soils. Radiological controls sufficient to protect humans may not adequately protect other living organisms because plant and animal populations residing in or near these media or taking food or water from these media may be exposed to a greater extent than are humans.

DOE Order 458.1 requires protection of the local biota from potential adverse effects from radioactivity released from DOE site operations and has established dose rate limits to assist in evaluating the effects. A description of the biota dose standard is provided in the inset box, "Biota Dose Modeling Methodology using RESRAD-BIOTA" on page 5-15. The technical standard, DOE-STD-1153-2002, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" was streamlined and reissued in early 2019 as DOE-STD-1153-2019, of the same title.

FIGURE 5-5
Historical Waterborne Dose
Based on Surface Water Measurements and Modeled Dose Conversion Factors (DCFs)

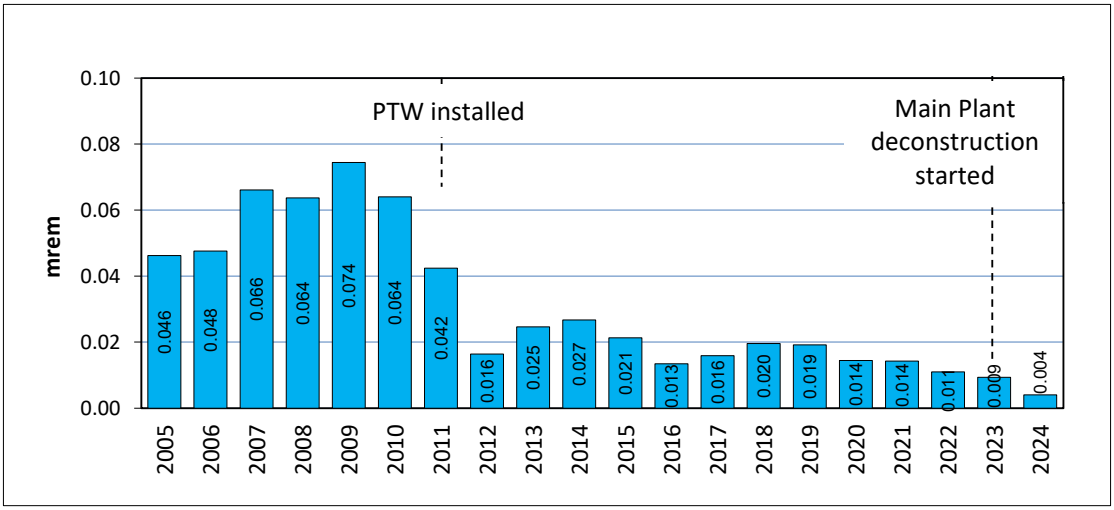


TABLE 5-2
Summary of Annual Total Effective Dose Equivalents (EDEs) to an Individual and Collective Population From WVDP Releases in 2024

Exposure Pathways	*Annual Individual Dose*			*Estimated Collective Population Dose* [b] *(1,651,312 people live within 80 km)*
	Critical Receptor/MEOSI [a]	*Comparison to EPA and DOE Standards*	*Comparison to Natural Background Radiation*	
Airborne Releases[c]				
Total Airborne Dose (measured at the ambient air monitoring network)	**0.18 mrem** (0.0018 mSv)	**1.8 %** of 10 mrem EPA standard for air (0.1 mSv)	**0.06 %** of 310 mrem (3.1 mSv) Natural Background Radiation	**0.069 person-rem** (0.00069 person-Sv)
Waterborne Releases[d]				
Total Waterborne Dose (effluents and natural drainage)	**0.004 mrem** (0.00004 mSv)	*There are no EPA or DOE dose standards for the water only pathway.*	**0.001 %** of 310 mrem (3.1 mSv) Natural Background Radiation	**0.038 person-rem** (0.00038 person-Sv)
Total From All Pathways	**0.184 mrem** (0.00184 mSv)	**0.18 %** of 100 mrem DOE standard for air and water combined (1 mSv)	**0.06 %** of 310 mrem (3.1 mSv) Natural Background Radiation	**0.107 person-rem** (0.00107 person-Sv) vs. the Background Population Dose of 511,907 person-rem[e]

[a] The critical receptor applies to the airborne dose. The MEOSI applies to the waterborne dose.
[b] The 80-km collective dose is the sum of all doses to all indvidual members of the public within 80 km of the WVDP. A population of 1.65 million (U.S. Census 2020, Canadian Census 2021) is estimated to reside in the U.S. and Canada within 50 mi (80 km) of the site.
[c] Releases are from atmospheric nonradon point and diffuse sources.
[d] Dose calculated according to "Manual for Radiological Assessment of Environmental Releases at the WVDP" (CHBWV, 2018).
[e] The background population dose = 1.65 million x 0.310 rem (from natural sources) = approximately 511,907 person-rem.

TABLE 5-3
WVDP Radiological Dose and Release Summary

WVDP Radiological Atmospheric Emissions[a] CY 2024 in Curies and (Becquerels)										
Tritium	**Kr-85**	**Noble Gases ($T_{1/2}$<40 days)**	**Short-Lived Fission and Activation Products ($T_{1/2}$<3 hr)**	**Fission and Activation Products ($T_{1/2}$>3 hr)**	**Total Radio-iodine**	**Total Radio-strontium**	**Total Uranium[b]**	**Total Plutonium**	**Total Other Actinides**	**Other (Rn-220)**
1.15E-03 4.27E+07	NA	NA	NA	2.31E-02 (8.55E+08)	1.76E-04 (6.50E+06)	6.02E-03 (2.23E+08)	4.06E-08 (1.50E+03)	4.64E-03 (1.72E+08)	2.94E-03 (1.09E+08)	8.76+01 (3.24E+12)

WVDP Liquid Effluent Releases[c] of Radionuclide Material - CY 2024 in Curies and (Becquerels)						
Tritium	**Fission and Activation Products ($T_{1/2}$>3 hr)**	**Total Radioiodine**	**Total Radiostrontium**	**Total Uranium[d]**	**Total Plutonium**	**Total Other Actinides**
8.12E-03 -3.00E+08	1.98E-03 -7.34E+07	6.42E-05 -2.38E+06	2.99E-02 -1.11E+09	8.54E-05 -3.16E+06	3.91E-06 -1.45E+05	4.47E-06 -1.65E+05

Note: There are no known significant discharges of radioactive constituents from the site other than those reported in this table.
NA - Not applicable
[a] Air releases are from point and diffuse sources.
[b] Total uranium (airborne) (g) = 4.32E-02, includes uranium contribution from glass fiber filter matrix.
[c] Water releases are from both controlled liquid effluent releases and from well-characterized site drainages.
[d] Total uranium (waterborne) (g) = 7.27E+01.

The RESRAD-BIOTA model uses Biota Concentration Guides (BCGs) to convert measured concentrations in environmental media to dose to the biota. BCGs are defined as the maximum concentration of a radionuclide in soil, sediment, or water that would not result in an exceedance of the protective dose limit for aquatic and terrestrial biota. The methodology for estimating dose to biota involves comparing measured concentrations in the environment with modeled concentrations at which known dose effects have been predicted for specific plants and animals. The model approach is termed 'graded' (or 'tiered') because it applies multiple levels of screening to provide refinements and additional capabilities desired by a broad range of model users (Yu et al., 2003). The model outputs annual doses to aquatic biota (aquatic animal and riparian animal) and terrestrial biota (terrestrial plant and terrestrial animal).

Calculated doses in each level of screening are assessed with the DOE standard presented in DOE-STD-1153-2019, Table 1-1, for compliance:

<1.0 rad/d for aquatic animals;
<0.1 rad/d for riparian animals;
<1.0 rad/d for terrestrial plants; and
<0.1 rad/d for terrestrial animals.

(Note that the absorbed dose unit [rad] is used for biota instead of the units used for indicating human risk [rem]).

TABLE 5-4
Evaluation of Dose to Aquatic and Terrestrial Biota

AQUATIC SYSTEM EVALUATION							
Nuclide	**Water BCG[a] (pCi/L)**	**Mean Water Value (pCi/L)**	**Ratio**	**Sediment BCG[a] (pCi/g)**	**Mean Sediment Value (pCi/g)**	**Ratio**	**Water and Sediment Sum of Fractions**
Cesium-137	42.7	3.22	7.54E-02	3,130	4.397	1.41E-03	7.67E-02
Strontium-90	279	36.5	1.31E-01	583	18.846	3.23E-02	1.63E-01
All Others	NA	NA	2.60E-03	NA	NA	4.90E-04	3.30E-03
Sum of Fractions			2.09E-01			3.42E-02	**2.43E-01**
Estimated upper bounding dose to an aquatic animal = **0.0120 rad/day**; to a riparian animal = **0.243 rad/day**.							
TERRESTRIAL SYSTEM EVALUATION							
Nuclide	**Water BCG[a] (pCi/L)**	**Mean Water Value (pCi/L)**	**Ratio**	**Soil BCG[a] (pCi/g)**	**Mean Soil Value (pCi/g)**	**Ratio**	**Water and Soil Sum of Fractions**
Cesium-137	599,000	3.22	5.37E-06	20.8	4.362	2.10E-01	2.10E-01
Strontium-90	54,500	36.5	6.70E-04	22.5	8.112	3.60E-01	3.61E-01
All Others	NA	NA	8.63E-06	NA	NA	1.00E-03	7.66E-04
Sum of Fractions			6.84E-04			5.71E-01	**5.71E-01**
Estimated upper bounding dose to a terrestrial plant = **0.00432 rad/day**; to a terrestrial animal = **0.572 rad/day**.							

NA - Not applicable

[a] The BCGs are calculated values. All values are expressed to three signficant digits.

2024 Biota Dose Modeling Results

The RESRAD-BIOTA model was run using WVDP site-specific input concentrations of surface water, soil, and sediment to assess radiation exposure to biota on the WVDP site. For 2024, the surface water data measured in 2024 and soil and sediment data up to 2022 were used in the model. (Soil and sediment samples are collected every five years.)

Following the graded approach, the maximum potential biota dose was first modeled using the maximum of measured radionuclide concentrations from surface waters, sediments, and soils. The resulting dose exceeded applicable limits for both aquatic and terrestrial evaluations in 2024.

Then, the biota dose model was run again using estimates of average radionuclide concentrations derived from measurements from the same medium used for the maximum biota dose assessment. Average concentrations more closely represent actual environmental conditions. The resulting doses using average concentrations were below limits and are summarized in Table 5-4. The measurements of 12 radioisotopes are input in the RESRAD-BIOTA model. However, only the results for cesium-137 and strontium-90 are shown in Table 5-4 because these two isotopes contribute the largest components of both aquatic and terrestrial doses to biota, based on air and water monitoring data at the WVDP.

Table 5-4 shows that the sums of fractions for the aquatic and terrestrial evaluations were 2.43E-01 and 5.71E-01, respectively, compared with the BCGs, with the higher dose occurring in the terrestrial system. The sum of fractions for both the aquatic and terrestrial evaluations was less than 1.0, indicating that applicable BCGs were not exceeded; therefore populations of aquatic and terrestrial biota (both plants and animals) on the WNYNSC premises are not being exposed to doses above DOE standards.

Biota Dose Modeling Methodology Using RESRAD-BIOTA

The DOE has prepared a technical standard that provides methods and guidance to be used to evaluate doses of ionizing radiation to populations of aquatic animals, riparian animals, terrestrial plants, and terrestrial animals. Methods in this technical standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota" (DOE-STD-1153-2019, February 2019), are used to evaluate radiation doses to aquatic and terrestrial biota within the confines of the WNYNSC, which includes the WVDP.

RESRAD-BIOTA (version 1.8, April 2016), a calculation tool provided by the DOE for implementing the technical standard, is used to compare existing radionuclide concentration data from environmental sampling with Biota Concentration Guide (BCG) screening values and to estimate upper bounding doses to biota.

Average and maximum concentration data of soil, sediment, and surface water concentrations from the target area are input into RESRAD-BIOTA to perform the graded surveillance of dose to biota. At the WVDP, surface water data obtained from the current year and soil and sediment data from multiple years are used for modeling. Surface water is sampled with the frequencies determined by the WVDP sampling program for each location. The soil and sediment sampling frequency was changed from annually to every five years in 2007. Therefore, for 2024, the most recent sediment samples included samples collected from 2005–2007, 2012, 2017 and 2022 and the most recent routine on-site surface soil sampling includes samples collected from 1995–2007, 2012, 2017 and 2022. Historical on-site surface soil sampling data from several special projects were also used. A longer sampling interval is used for soil and sediment because radionuclide concentrations change more rapidly over time in surface waters than in sediments and soils.

The concentration for each radionuclide in each medium is divided by its corresponding BCG to calculate a partial fraction for each nuclide in each medium. Partial fractions for each medium were added to produce a sum of fractions. Exposures from the aquatic pathway may be assumed to be less than the aquatic dose limit from DOE-STD-1153-2019 if the sum of fractions for the water medium plus that for the sediment medium is less than 1.0. Similarly, exposures from the terrestrial pathway may be assumed to be less than the proposed dose limits for both terrestrial plants and animals if the sum of fractions for the water medium plus that for the soil medium is less than 1.0.

The populations of organisms most sensitive (most likely adversely affected) to strontium-90 and cesium-137 via the aquatic and terrestrial pathways were riparian animals (such as the raccoon [aquatic dose]) and terrestrial animals (such as the woodchuck [terrestrial dose]). Populations of both animals are found on the WNYNSC.

Release of Materials Containing Residual Radioactivity

In addition to discharges to the environment, the release of property containing residual radioactive materials is considered a potential contributor to the dose received by the public, as set forth in DOE Order 458.1.

The DOE sites are authorized to release and clear scrap metals, including materials possibly contaminated with radioactivity. However, the release procedure has to adhere to the requirements outlined in DOE Order 458.1, "Radiation Protection of the Public and the Environment." Programs to ensure the safe release of materials from the DOE sites have been established, including radiological assessment and survey procedures. A release of scrap metals is permitted only when it is assured that the release does not incur adverse effects on either the public or the environment. No potentially radiologically contaminated scrap metals were released from the WVDP in 2024.

Risk Assessment

Very high doses of radiation are known to cause adverse health effects, including cancer in humans and other organisms. For example, 50 rem (50,000 mrem) of radiation exposure causes damage to blood cells. 50,000 mrem is about five million times the radiation a patient is exposed to for a chest x-ray (0.01 rem) (The U.S. CDC [U.S. Centers for Disease Control and Prevention],

2024). Over the past several decades, the radiation health physics community has conducted considerable research into the biological effects of a prolonged exposure to low-dose radiation to develop risk estimates for cancer and other health effects. 'low-dose radiation' refers to radiation levels of near zero to 10 rem (10,000 mrem) or dose rates of less than 500 mrem per hour (National Academies of Science, Engineering, and Medicine, 2022).

The BEIR VII Phase 2 report, "Health Risks from Exposure to Low Levels of Ionizing Radiation" (NRC, 2006) estimated that, assuming a sex and age distribution similar to that of the entire U.S. population, on average, approximately 1 person in 100 would be expected to develop cancer from a radiation dose of 10,000 mrem (100 mSv), while approximately 42 of the 100 individuals would be expected to develop cancer from all other causes. The Interagency Steering Committee on Radiation Standards of the EPA (ISCORS, 2002) and DOE guidance estimate that the probability of fatal cancer occurring from exposure to radioactivity is between one and six cancer cases per 10,000 people who are each exposed to one rem (1,000 mrem [10 mSv]) (i.e., a risk coefficient of between 0.0001 and 0.0006). These assumptions are often based on a cancer risk model known as the linear no-threshold (LNT) model.

Discussions about and a validation study of the LNT model are ongoing (Trabalka et al., 2017). Some scientists argue that the cancer risk is not linearly correlated to exposure to low levels of radiation, citing human cells' natural ability to cure minor damage, or citing the beneficial effect, homesis, on organisms of low-dose radiation (Agathokleous, 2024). Some research suggests that researchers should consider various cancer triggers (or causes), including historical data, to estimate cancer risk from radiation exposure (Bencko, 2011, Kellerer, 2000).

The radiological effluents from the WVDP are very low in radioactivity in all media. The predicted dose from all pathways in 2024 from the WVDP activities was 0.184 mrem or 0.00184 mSv. Employing the ISCORS' probability of fatal cancer from radiation of six persons per 10,000 people per one rem, a cancer risk from the WVDP activities in 2024 was 11 cases per 100 million people. Figure 5 -1, earlier in this chapter, provides a more generic perspective on the small level of the emissions from the WVDP activities.

Dose Assessment Summary

The 2024 estimated dose (0.184 mrem [0.00184 mSv]) from the WVDP activities to an off-site resident is far below the federal standard of 100 mrem for dose from all pathways allowed from any DOE site operations in a calendar year, confirming that efforts at the WVDP to minimize radiological releases are consistent with the ALARA philosophy of radiation protection.

The collective population dose was also assessed and found to be orders of magnitude below the natural background radiation dose. The estimated risk to an individual residing near the WVDP from airborne and waterborne releases is well below the range considered by the ICRP to be a reasonable risk for any member of the public. Radioactivity concentrations in milk and venison samples were not distinguishable from those of background. Biota dose estimates indicated that populations of plants and animals at the WVDP are only exposed to a fraction of the DOE standards for dose to biota.

Based on the overall dose assessment, the WVDP was found to be in compliance with applicable effluent radiological guidelines and standards during 2024.

Wild Animals We Protect in Western New York

(photo credits: top left; bottom left R. McCloud; top right M. Regan; bottom right S. Wedvik)

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CHAPTER 6
GROUNDWATER PROTECTION PROGRAM

2024 Highlights

- **Overall program summary.** Groundwater Monitoring Program (GMP) activities at the WVDP were performed in compliance with requirements throughout the calendar year 2024.
- **PTW performance.** The Permeable Treatment Wall (PTW) installed in 2010 continued to remove strontium-90 from the groundwater plume as the groundwater passes through the wall.
- **North Plateau Plume.** The continued use of a sand/salt deicing material during the 2023-2024 winter resulted in lower, stabilized strontium-90 concentration levels in the north plateau plume.
- **Other Areas of North Plateau.** Downgradient of the Construction and Demolition Debris Landfill (CDDL), concentrations of VOCs have decreased to nondetectable levels.
- **South Plateau and NDA.** The interim measures installed at the NDA on the south plateau continue to work effectively. The geomembrane cover and upgradient slurry wall have minimized the infiltration and migration of water into the NDA and have significantly reduced the volume of water collecting in the interceptor trench.
- **Emerging Contaminants of Concern.** Samples for analysis of per- and polyfluoroalkyl (PFAS) substances and emerging chemicals were collected from the drinking water supply well in 2024, and the results were nondetect.
- **Next Decommissioning Phase.** Plans for activities during the next phase (Phase 1B) of WVDP decommissioning are being shared with stakeholders.

WVDP Groundwater Monitoring Program Overview

The WVDP groundwater monitoring program (WVDP GMP) consists of three areas of focus, based on compliance requirements, specific physical locations, and monitoring purposes.

1. Groundwater Monitoring Program (GMP) – Site-wide monitoring/environmental surveillance per DOE Orders and RCRA §3008(h) Compliance using wells located across the north and south plateaus.
2. Permeable Treatment Wall Performance Monitoring Program (PTWPMP) – Monitoring of the PTW using dedicated wells, which are located adjacent to and within the PTW.
3. North Plateau Groundwater Monitoring Program (NPGMP) – Supplements the PTWPMP using additional wells located further upgradient and downgradient of the PTW.

This chapter outlines the program details and presents the monitoring results for calendar year 2024. Monitoring results for the PTWPMP and NPGMP are discussed together.

Geology and Hydrogeology at the WVDP

The WNYNSC is situated upon a layered sequence of glacial sediments that fill a steep-sided bedrock valley composed of interbedded shales and siltstones (Rickard, 1975). The glacial sediments overlying the bedrock consist of three silt- and clay-rich glacial tills of Lavery, Kent, and possibly Olean deposits, which are separated by stratified fluvio-lacustrine deposits (silty or silty/sandy lakebed sediments). (See Table 6-1 for a detailed description of each geologic layer.)

Listed in progression from bottom to top, the bedrock beneath the WVDP is overlain by the Kent till (KT), followed by the Kent Recessional Sequence (KRS) (layers of clay or silty clay topped by coarser sands and gravels), and the unweathered Lavery Till (ULT). See Figure 6-1 and Table 6-1 for the geographic distribution and additional description of these units.

Erdman Brook traverses the WVDP site, dividing it into a north and south plateau. The uppermost surficial sediments covering the north and south plateaus are quite different. On the south plateau, the ULT is exposed at the surface, where it is weathered and fractured, and is referred to as the weathered Lavery Till (WLT). On the north plateau, the ULT is covered by an alluvial sand and gravel (S&G) unit, composed of silty sands and gravels. It can be further divided into two subunits: the thick-bedded unit (TBU), a thick bed of silty sands and gravels, and the slackwater sequence (SWS), composed of thin layered silts and fine sands. Within the ULT on the north plateau is a smaller unit called the Lavery Till sand (LTS), an isolated sandy unit entirely contained within the till (WVNSCO, January 1993; WVNSCO, February 1993).

The MPPB, WTF, and lagoons are located on the north plateau. The drum cell, NDA, and SDA are located on the south plateau. The ULT and Kent till have relatively low permeability, and groundwater from the S&G and WLT must flow through the ULT to reach the KRS and deeper underlying geologic units. Therefore, the ULT, KRS, Kent till, and bedrock do not provide predominant pathways for contaminant movement from the WVDP and are not discussed here. The S&G unit and the WLT are generally regarded as the predominant routes for contaminant migration from the WVDP via groundwater.

The majority of groundwater migrating across the site discharges from the S&G and WLT into the surrounding streams, which eventually flow into Cattaraugus Creek and then into Lake Erie. Past surveys determined that no community public water supplies are drawn from groundwater downgradient of the site or from Cattaraugus Creek downstream of the WVDP. Upgradient of the site, groundwater is used as a public and private drinking water supply by local residents.

Site Groundwater Use

Since 2014, two bedrock water supply wells, WNDWELL 1 and WNDWELL 2, have been used to provide the site's primary water supply. These two wells are located upgradient of the site facilities and areas of contamination. (See Figure A-8.) Chemical and radiological sampling is performed routinely, and sampling results for drinking water quality parameters are provided to the Cattaraugus County Health Department (CCHD). Site groundwater in the shallow, unconsolidated glacial sediments located above the bedrock is not used for drinking or operational purposes, nor is WVDP effluent discharged directly to groundwater. Drinking water data are presented in Appendix B-5.

Groundwater Monitoring Program (GMP)

The WVDP GMP was designed to comply with DOE Order 458.1, Section 4.i.2, which states that "Groundwater must be protected from radiological contamination to ensure compliance with dose limits in the Order and consistent with ALARA process requirements. DOE sites must ensure that: baseline conditions of the groundwater quantity and quality are documented; possible sources of, and potential for, radiological contamination are identified and assessed; strategies to control radiological contamination are documented and implemented; monitoring methodologies are documented and implemented; and groundwater monitoring activities are integrated with other environmental monitoring activities."

The GMP also complies with the requirements of RCRA §3008(h) Administrative Order on Consent and the conclusions in the RFI reports, which require routine monitoring of certain analytes at specified groundwater monitoring locations.

Groundwater conditions are monitored in the subsurface geologic units that represent potential routes of contaminant migration. The monitoring analytes and frequency are tailored for each well, depending upon location, nearby historical site operations, and the potential for contaminant migration.

Results are evaluated to identify current conditions and historical trends, and final conclusions are reported to both state and federal agencies in addition to the discussions in this report. Methods for evaluating groundwater data are described in Appendix D. Highlights of the site groundwater monitoring history and the evolution of the GMP are summarized at the end of this chapter in Table 6-6.

FIGURE 6-1
Geologic Cross Sections of the North and South Plateaus at the WVDP

J:/GIS/ArcMap/ASER/ASER_2010/ASER_2010_Fig4-1_20110602.mxd FJC/skw

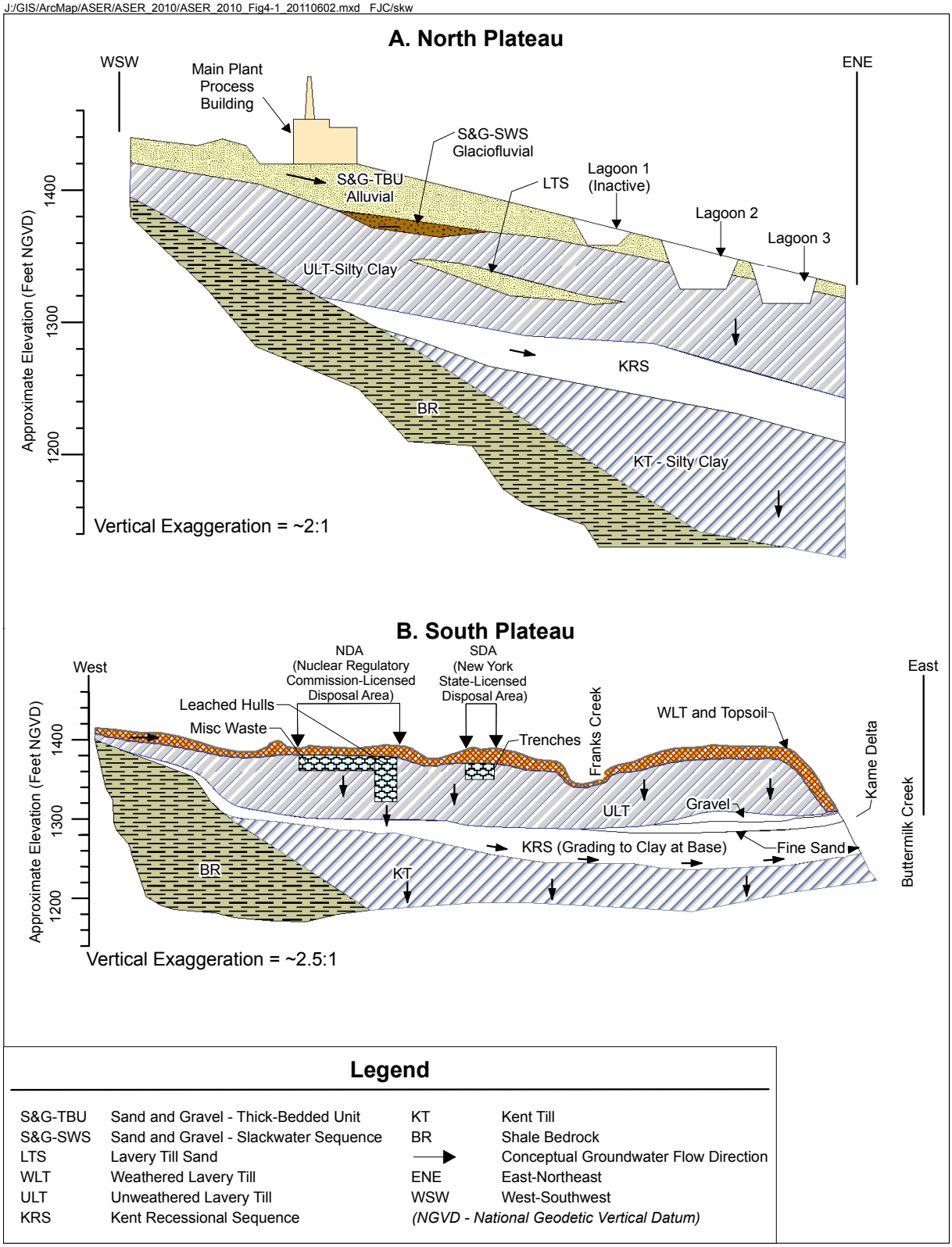


TABLE 6-1
Summary of Hydrogeology at the WVDP

Geologic Unit and Location	*Description*	*Groundwater Flow Characteristics*	*Hydraulic Conductivity* [a]
S&G; Thick-Bedded Unit (TBU): North Plateau (also includes Backfill)	Surficial unit on the north plateau; silty sand and gravel layer; in many areas the TBU is covered by silty, gravelly backfill excavated from other parts of the north plateau, and which has similar characteristics	Flow is generally northeast across the plateau toward Franks Creek; near the northwestern and southeastern margins, flow is radially outward toward Quarry Creek and Erdman Brook. Some flow is vertically downward recharging the underlying SWS and ULT.	9 ft/day (3.2E-03 centimeters [cm]/second [sec])
S&G; Slackwater Sequence (SWS): North Plateau	Interbedded silty sand and gravel layers; underlies and is partially separated from the TBU by a discontinuous silty clay interval	Flow is to the northeast through gravelly layers toward Franks Creek with some flow vertically downward recharging the ULT.	17 ft/day (5.9E-03 cm/sec)
Weathered Lavery Till (WLT): South Plateau	Surficial unit on the south plateau: consists of the upper 16 ft (4.9 m) of the Lavery till that is exposed at the ground surface; weathered and fractured which increases its conductivity	Flows both horizontally towards the northeast, discharging to nearby incised stream channels; and vertically downward, recharging the ULT.	0.07 ft/day (2.4E-05 cm/sec); variable with highest conductivity within dense fracture zones.
Lavery Till Sand (LTS): North Plateau	Thin, sandy unit of limited areal extent and variable thickness within the Lavery Till beneath the southeastern portion of the north plateau	The hydraulic head gradient slopes to the east-southeast. The LTS is a confined unit, contained in and surrounded by the ULT.	0.2 ft/day (8.6E-05 cm/sec)
Unweathered Lavery Till (ULT): North and South Plateaus	Olive gray silty clay with intermittent lenses of silt and sand; ranges up to 130 ft (40 m) in thickness	Flow is vertically downward at a relatively slow rate; unit is considered an aquitard.	0.002 ft/day (8.1E-07 cm/sec)
Kent Recessional Sequence (KRS): North and South Plateaus	Interbedded clay and silty clay layers locally overlain by coarser-grained sands and gravels; pinches out near the east side of Rock Springs Road	Flow is to the northeast; discharges into Buttermilk Creek.	0.01 ft/day (4.3E-06 cm/sec)
Kent Till (KT): North and South Plateaus	Dark olive-gray clay and silt with intermittent lenses of coarse silt	Flow is vertically downward at a relatively slow rate.	Presumed to be similar to the ULT

Note: Hydrologic conditions of the site are more fully described in "Environmental Information Document, Volume III: Hydrology, Part 4" (West Valley Nuclear Services Co. [WVNSCO], March 1996) and in the "RCRA Facility Investigation Report (RFI) Vol. 1: Introduction and General Site Overview" (WVNSCO and Dames & Moore, July 1997).

[a] Hydraulic conductivity values represent an average of testing results measured from 1987 to 2012.

TABLE 6-2
Groundwater Wells Used for RCRA SSWMU and Environmental Surveillance Monitoring

SSWMU: "Super" Solid Waste Management Unit	Wells Used for RCRA SSWMU Monitoring
SSWMU #1: Low Level Waste Treatment Facility (LLWTF)	RCRA: **110**, **111**, **8605** Env. Surveillance: **103**, 104, **105**, **106**, **107**, **108**, 116, 8604
SSWMU #2: Miscellaneous Small Units	Env. Surveillance: 204**, 205, 206, 8605**
SSWMU #3: Liquid Waste Treatment System (LWTS) and Sealed Rooms	RCRA: **103**, **204**, 301, 401, **408**, **8609**, **MP-01, MP-02, MP-03, MP-04** Env. Surveillance: 302
SSWMU #4: High-Level Waste (HLW) Storage and Processing Area	RCRA: **406**, **408**, **8607**, **8609** Env. Surveillance: 401, 402, 403, **405**, **409**
SSWMU #5: Maintenance Shop Leachfield	RCRA: 501, **502**
SSWMU #6: Low-Level Waste (LLW) Storage Area	Env. Surveillance: 406, **602A, 604, 605, 801, 8607**, **8609**
SSWMU #7: Chemical Process Cell (CPC) Waste Storage Area	RCRA: 706 Env. Surveillance: **704**, **707**
SSWMU #8: Construction and Demolition Debris Landfill (CDDL)	RCRA: 116, 801, **803**, **804**, **8612** Env. Surveillance: **802, 8603**
SSWMU #9: NRC-Licensed Disposal Area	RCRA: 901, 902, **903**, **906**, 908R, **909**, **910R**, *1005* , *1006* , 1008C, **8610, 8611, trench sump NDATR**
SSWMU #10: Radwaste Treatment System Drum Cell	Env. Surveillance: 1005, 1006, 1008B, 1008C
SWMU #47: Remote Handled Waste Facility	Env. Surveillance: 1301, 1302, **1303, 1304**

Note: Bolded wells monitor downgradient conditions for the listed facility. Wells in italic are crossgradient.

Routine Groundwater Monitoring

Groundwater Monitoring Network

Groundwater is monitored across the north and south plateaus using wells installed in the first six of the seven geologic units described in Table 6-1. In 2024, GMP samples were collected from 64 on-site, routine groundwater monitoring locations, which included:

- 58 monitoring wells located across the north and south plateaus;
- five groundwater seepage points, located along the northeast edge of the north plateau, where groundwater from the S&G unit discharges to the ground surface along the banks of Franks Creek; and
- the trench sump (NDATR) located within the interceptor trench installed at the NDA .

Well locations are displayed on Figures A-9 and A-10 in Appendix A. Many of the wells are also used for monitoring releases from one or more of the SWMUs or Super SWMUs (SSWMUs) on site (See Table 6-2) per the RCRA §3008(h) Consent Order

and the conclusions in the RFI reports requiring routine monitoring of certain analytes at specified groundwater monitoring locations. For RCRA discussions, refer to Chapter 2, "Environmental Compliance Summary" and the groundwater schedule in Table A-2. No wells were installed or decommissioned during 2024.

Groundwater Elevation Monitoring

Groundwater elevations are measured in the monitoring network wells in conjunction with the quarterly analytical sampling. These data are used to map groundwater flow directions. Long-term trend graphs are used to evaluate variations in groundwater elevations over time, which may result from cyclical seasonal fluctuations or on-site operations such as installing water diversions (e.g., geomembrane covers, trenches, or slurry walls), and the groundwater treatment systems (e.g., the full-scale PTW).

Groundwater elevation mapping of the WLT on the south plateau helps evaluate the effectiveness of the NDA interceptor trench, the slurry wall, and geomembrane cover. (See "South Plateau and NDA Groundwater Monitoring" in this chapter.)

North Plateau Strontium-90 Plume

The groundwater well sampling network on the north plateau monitors potential and existing sources of chemical and radiological contaminants. This includes areas of previously detected contamination such as the CDDL and the former lagoon 1 area. The current focus of radiological groundwater monitoring on the north plateau is the gross beta groundwater plume.

Routine groundwater monitoring in the north plateau S&G unit is provided by 36 monitoring wells and five groundwater seepage locations. Elevated gross beta activity has been detected in groundwater from the S&G unit, the shallowest geologic unit on the north plateau, since 1993. Historical monitoring of groundwater has established that strontium-90 is the predominant beta emitter found in the groundwater plume. Strontium-90 accounts for approximately one-half of the gross beta activity because the gross beta activity includes both strontium-90 and its daughter product, yttrium-90. Therefore, monitoring wells are routinely sampled only for gross beta concentrations, supported by periodic sampling at select wells for strontium-90 analysis.

For the discussions about gross beta and strontium-90 in this report, the strontium-90 DCS is used as a comparison level for both gross beta and strontium-90 concentrations. (See Chapter 8, "Radiation and Environmental Standards" for a discussion of the DOE Derived Concentration Standards [DCSs], and Table 8-4 for a list of the DCSs for radionuclides of interest at the WVDP.)

Updates for 2024 GMP

Historical Extents of Groundwater Plume

Figure 6-2 on page 6-8 illustrates the extent of the groundwater plume in the S&G unit, as defined by the 1.0E-06 µCi/mL gross beta isopleth, at three time intervals (1994, 2010, and 2024). Both the NYSDEC TOGS.1.1.1 Class GA Groundwater Quality Standard, and the former DOE Derived Concentration Guide (DCG) for strontium-90 are set to 1.0E-06 µCi/mL. The WVDP Groundwater Screening Level (GSL) for strontium-90 is also based on the NYSDEC TOGS Standard (Table D-1A). The 1994 isopleth shows the results of the subsurface characterization program that measured gross beta concentrations to define the outline of the plume discovered in 1993. The plume originated from beneath the MPPB. (See the "1994" row in Table 6-6). The 2010 isopleth shows the furthest extent of the plume's northeastward migration before the installation of the PTW in 2010. The 2024 isopleth shows the current extent of the plume at the 1.0E-06 µCi/mL level.

As shown in Figure 6-2, while the plume's western boundary has not changed significantly since 1994, the plume has continued to migrate to the northeast and east across the north plateau, extending its spatial extent toward those directions. The leading edge of the plume divided into three narrow lobes as a result of the uneven distribution of coarse and fine soils within the S&G unit, which creates preferential pathways for groundwater flow.

A comparison of the 1.0E-06 µCi/mL gross beta isopleths for 2010 and 2024 shows that the 2024 isopleths in the western and central lobes have elongated as a result of the northeastward flow of groundwater across the north plateau. In general, the portion of the plume shown downgradient of the PTW is due to residual gross beta activity from groundwater that had previously migrated past the location of the PTW prior to its installation and has been partially attenuated and migrated off-site. Some

gross beta activity in groundwater migrating into the PTW has intermittently begun to exit the PTW in certain areas over the past few years, resulting in increased activity at a few locations on the downgradient side.

On Figure 6-2, flow arrows show groundwater flow directions across the north plateau. Groundwater generally flows northeast across most of the north plateau; however, in the area directly south of the central portion of the PTW, groundwater flows eastward. Some of the groundwater entering the PTW flows eastward within the PTW, diverting upgradient groundwater to the east. This eastward flow has facilitated the migration of the groundwater plume to the eastern edge of the plateau.

Gross beta concentration trends over the last 10 years at selected monitoring wells located within the plume are shown on Figures 6-4 through Figures 6-8. These data are plotted on a log scale; therefore, an increase from one gridline to the next represents a 10-fold increase in concentration. The log scale was used to enable comparison between data from background locations (with concentrations in the 1.0E-09 µCi/mL range) and data from the central plume (with concentrations in the 1.0E-04 µCi/mL range, 100,000 times higher than the background).

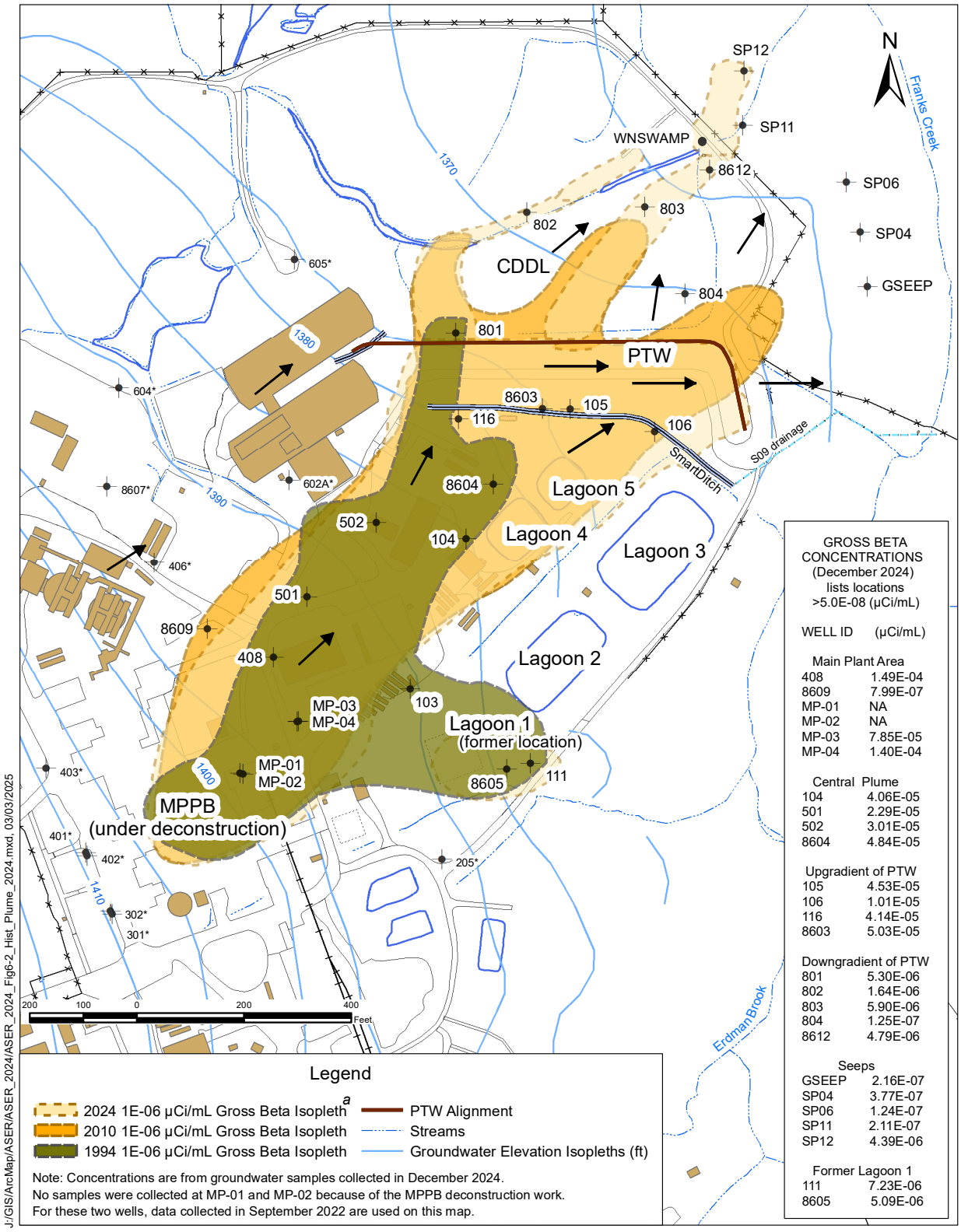
2024 Groundwater Plume Concentrations

Figure 6-3 shows the current, complete north plateau groundwater plume based upon sampling results from December 2024. Each colored area represents a 10-fold increase in gross beta concentration, ranging from 1.0E-08 to 1.0E-04 µCi/mL. The highest concentration range (≥1.0E-04 µCi/mL) is the area that originates beneath the former MPPB and extends to the northeast towards the PTW, where it begins to divide into narrow lobes, presumably flowing along preferential pathways within the subsurface sediments. The next highest range includes concentrations between 1.0E-4 and 1.0E-05 µCi/mL; this range extends from the source area up to the PTW, where its further migration is mostly halted by being treated within the zeolite of the PTW.

As mentioned earlier, some gross beta activity intermittently is able to migrate through the PTW and exit from the downgradient side in areas where the zeolite is becoming saturated with strontium-90 and other positively charged ions.

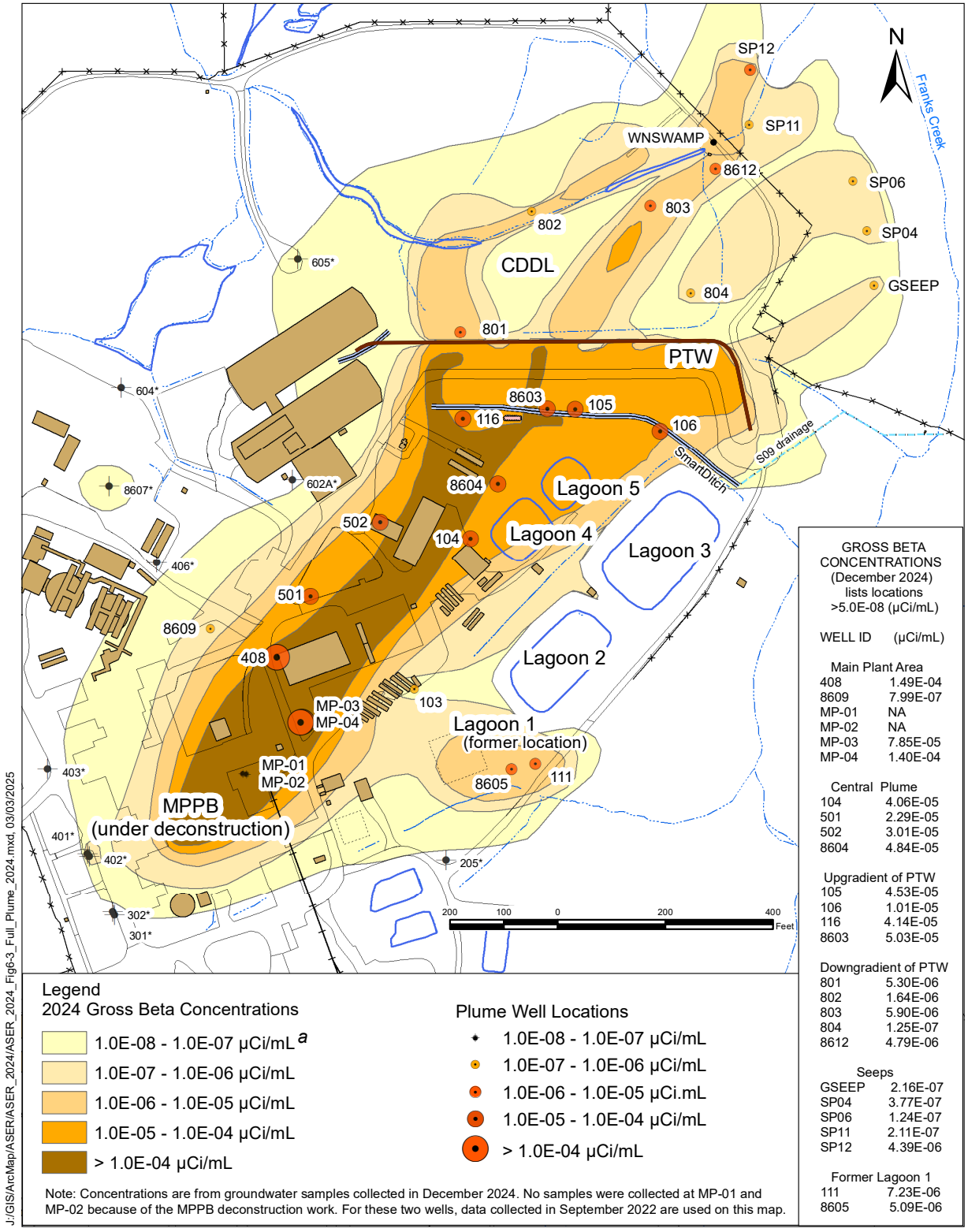
(photo credit: M. Regan)

FIGURE 6-2
Current and Historical Dimensions of the Groundwater Plume in the North Plateau S&G Unit



a 1E-06 µCi/mL - Gross beta TOGS. Gross beta isopleths primarily reflect GMP sampling results supplemented with NPGMP and PTWPMP sampling results. The 2024 data for the GMP wells with higher gross beta concentrations are tabulated on this figure. The 2024 data for all of the GMP wells are provided in Appendix D, including the data for the wells with lower gross beta concentrations that are labeled with an asterisk (*) on the map.

FIGURE 6-3
Average Gross Beta Concentrations in 2024 in the North Plateau S&G Unit

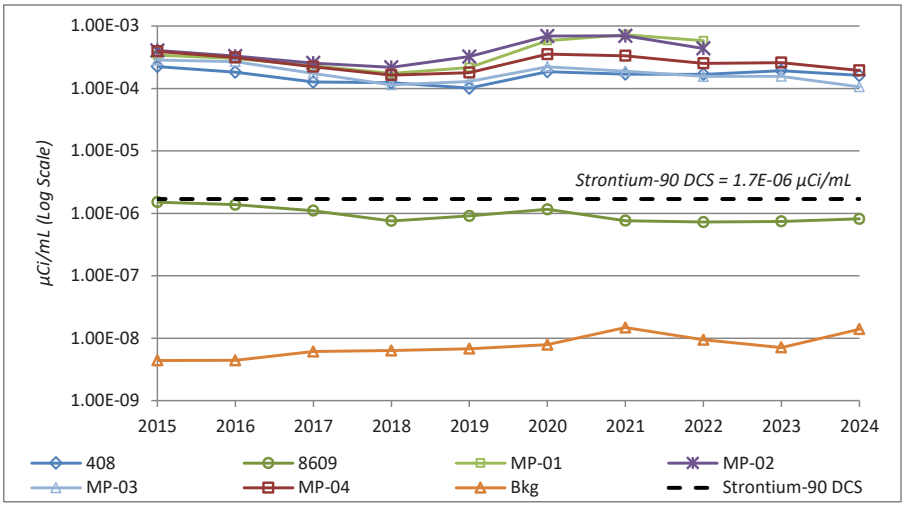


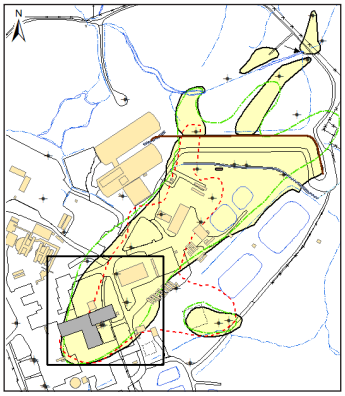
a Gross beta isopleths primarily reflect GMP sampling results supplemented with NPGMP and PTWPMP sampling results. The 2024 data for the GMP wells with higher gross beta concentrations are tabulated on this figure. The 2024 data for all of the GMP wells are provided in Appendix D, including the data for the wells with lower gross beta concentrations that are labeled with an asterisk (*) on the map.

2024 Monitoring Results of the Plume Close to the Source

Figures 6-4 through 6-6 illustrate the annual average gross beta concentrations in wells monitoring the groundwater plume in the main portion of the north plateau, from the source area up to the PTW. The background concentrations (orange lines) on these graphs represent the averages of monitoring results at wells 301, 401, 706, and 1302, which are located upgradient (on the west side) of the MPPB. Figure 6-4 illustrates the annual average gross beta concentrations in groundwater wells located immediately downgradient of the MPPB and along the western edge of the plume (at well 8609). Well 408 and the four MPPB wells (MP-01, -02, -03, and -04), located northeast of the MPPB closest to the source area, historically exhibit the highest gross beta concentrations of any routinely monitored wells in the GMP. MP-01 and -02 have not been sampled since MPPB deconstruction started. The gross beta concentrations decreased moderately between 2015 and 2019, then increased from 2019 through 2021. Beginning in 2021, strontium-90 concentrations, which counts for about half of gross beta, observed in the wells

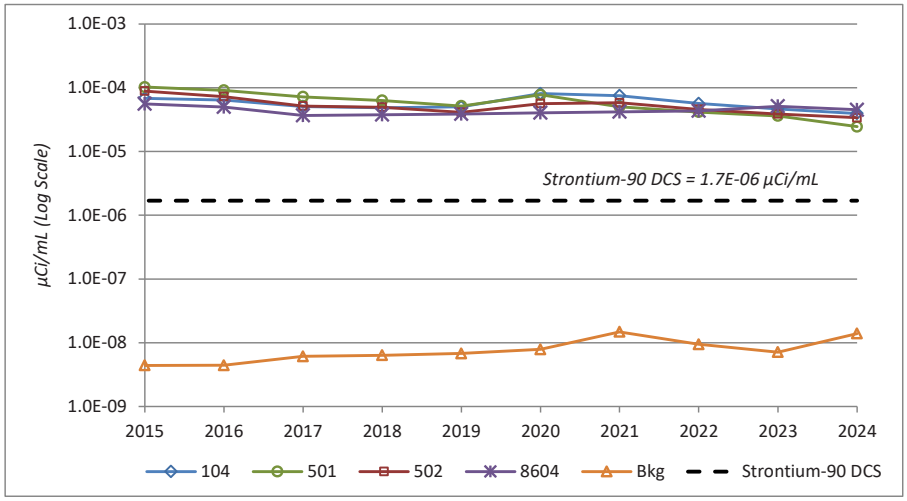
FIGURE 6-4
Annual Average Gross Beta Concentrations at Monitoring Wells Downgradient of the Groundwater Plume Source Area on the North Plateau

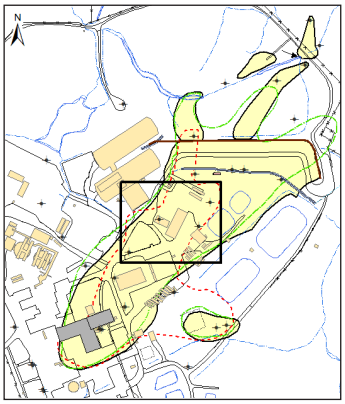




Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison. No samples were collected at MP-01 and MP-02 in 2024 because of the MPPB deconstruction work.

FIGURE 6-5
Annual Average Gross Beta Concentrations at Monitoring Wells Centrally Located Within the Groundwater Plume on the North Plateau



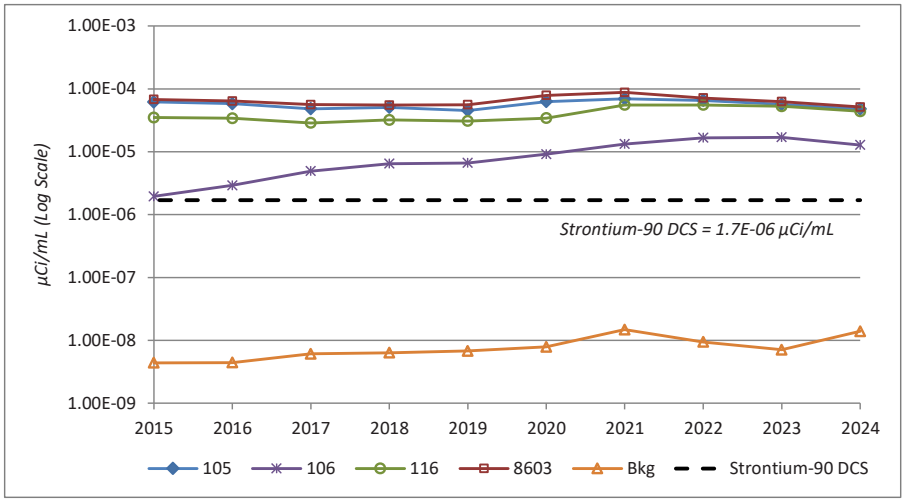


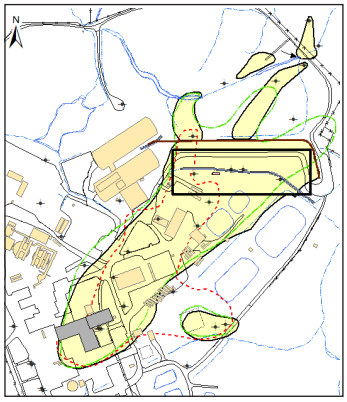
Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison.

upgradient, inside, and downgradient of the PTW began to increase. An investigation found that a 100% sodium chloride (100% salt) deicing material applied during the 2019-2020 and 2020-2021 winters was the cause of the increase and the material was changed to 3:1 sand/salt during the 2021-2022 winter. Strontium-90 levels in those wells have stabilized or decreased since then. During 2024, gross beta at well 8609 slightly increased, compared to 2023, and the trend is being monitored.

Within the central area of the plume (Figure 6-5), gross beta concentrations have remained relatively consistent with only minimal changes from year to year. Closer to the PTW, as shown in Figure 6-6, annual average gross beta concentrations of three monitoring wells (105 and 116, and 8603) have exhibited decreasing trends since 2021, and the concentration at well 106 peaked in 2023. Well 106 is located in the eastern corner of the north plateau, north of lagoon 3. Gross beta concentrations had increased at well 106 by an order of magnitude through 2023 as the plume migrated northeast and eastward into this area of the north plateau. However, the average 2024 concentration represents a decrease from the previous year.

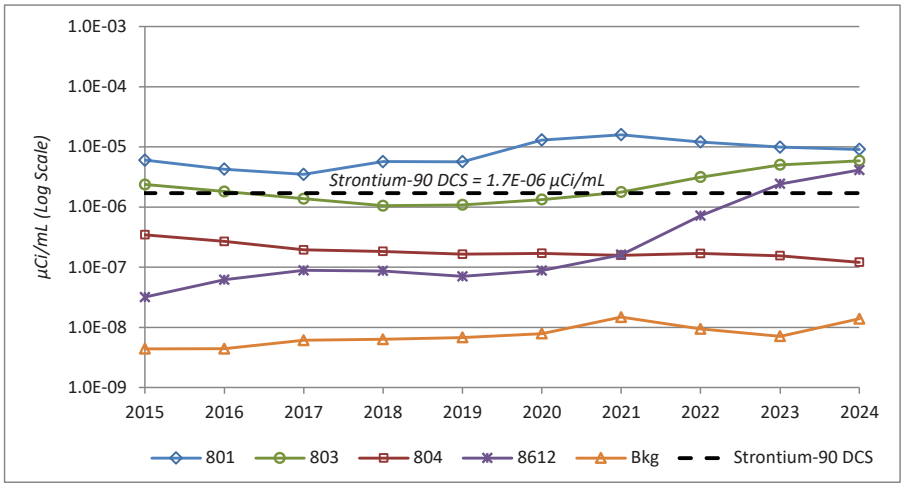
FIGURE 6-6
Annual Average Gross Beta Concentrations at Monitoring Wells Upgradient of the PTW

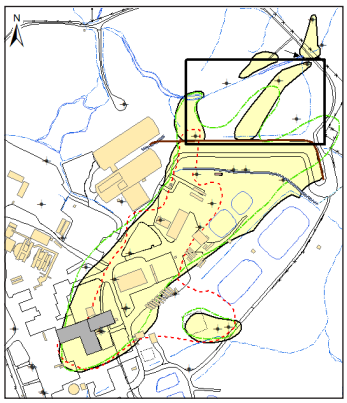




Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison.

FIGURE 6-7
Annual Average Gross Beta Concentrations at Monitoring Wells Downgradient of the PTW



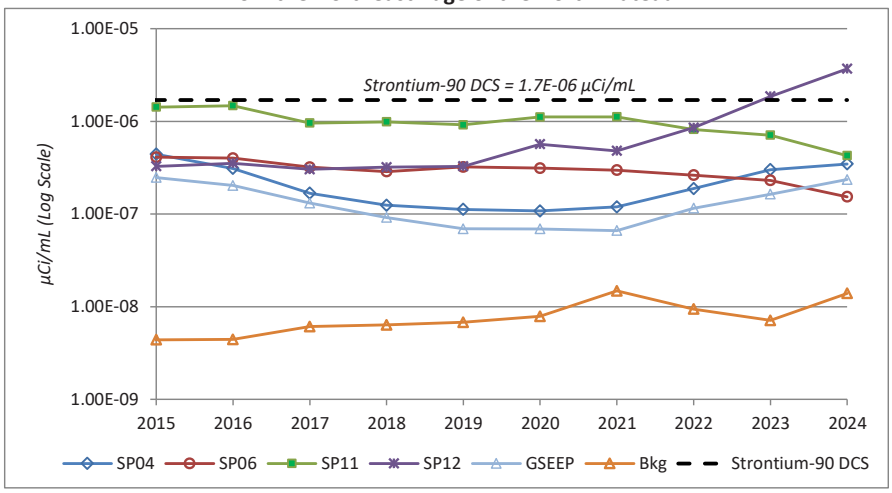


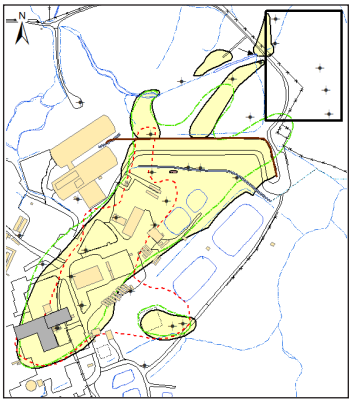
Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison.

2024 Monitoring Results of Downgradient of the PTW

Figure 6-7 on the previous page illustrates gross beta concentrations at monitoring wells 801, 803, 804, and 8612, downgradient of the PTW. In 2024, Gross beta concentrations increased at wells 803 and 8612 as compared to 2023. Wells 803 and 8612 are in the central lobe of the plume where gross beta activity had migrated past the PTW before it was installed in 2010, as indicated on Figure 6-2. These increasing trends have been observed since 2020. Gross beta concentrations at well 8612 exceeded the strontium-90 DCS (1.7E-06 µCi/mL) for the first time in 2023. An investigation to evaluate options for improving the PTW effectiveness and increasing its longevity was completed in 2024, and potential further actions are being evaluated. (For further discussion of the PTW performance evaluation, refer to "Permeable Treatment Wall Performance Monitoring Program (PTWPMP)" on page 6-18.) At well 801, immediately downgradient of the PTW, the figure suggests that gross beta concentrations began to decrease through 2024.

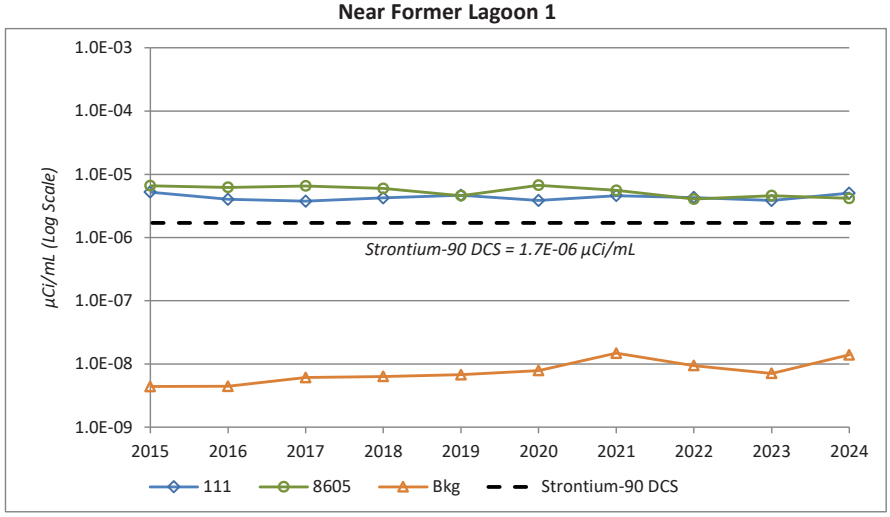
FIGURE 6-8
Annual Average Gross Beta Concentrations at Seeps From the Northeast Edge of the North Plateau

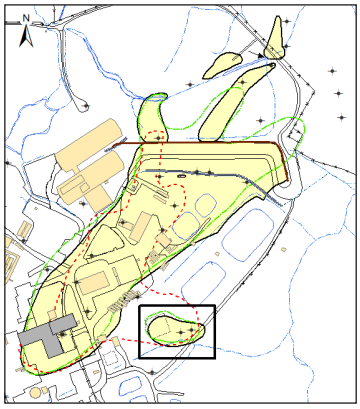




Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison.

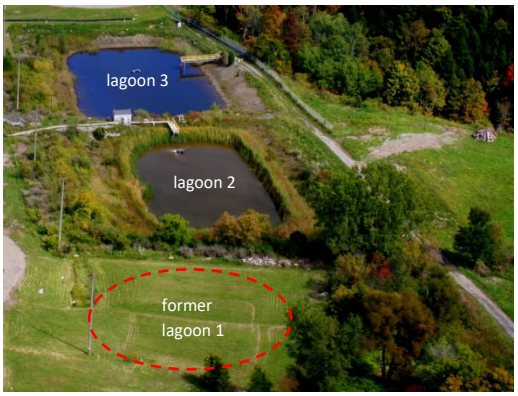
FIGURE 6-9
Annual Average Gross Beta Concentrations at Monitoring Wells Near Former Lagoon 1





Note: S&G background (Bkg) wells 301, 401, 706, and 1302 are averaged for this comparison.

Monitoring results of gross beta concentrations at seepage points along the northeast edge of the north plateau demonstrated mixed trends since 2021 (Figure 6-8). Seepage point SP-12, which has shown a constant increasing trend since 2021, is located at the farthermost reach of the 1E-06 µCi/mL gross beta isopleth (Figure 6-2). In 2024, the gross beta concentrations at SP-12 exceeded the strontium-90 DCS of 1.7E-06 µCi/mL. The increased seep concentrations are primarily the result of the continued migration of the remnant groundwater plume that was present in this area prior to the PTW's installation. Seepage points SP04 and GSEEP are located on the west side of Franks Creek and have shown steady increases of gross beta since 2021, while at lower concentrations than SP-12. These increases appear to be influenced by localized preferential underground flows of the remnant gross beta plume beyond the PTW.



Other Radiological Monitoring on the North Plateau

Monitoring Near Former Lagoon 1

Elevated gross beta concentrations have been documented in groundwater downgradient of former lagoon 1, which was backfilled in 1984. (The location of former lagoon 1 is shown in the aerial photograph above.) The source of the gross beta activity at this location is assumed to be residual contaminated sediment within former lagoon 1 and the radiologically contaminated material removed from other on-site areas that was later used as backfill. The annual average gross beta concentrations at wells

TABLE 6-3

2024 Maximum Concentrations of Radionuclides[a] in Groundwater at the WVDP Compared With WVDP Groundwater Screening Levels[b] (GSLs)

Radionuclide	*Well ID With Maximum Concentration*	*Maximum Concentration (µCi/mL)*	*Flag[c]*	*Well ID With Maximum Concentration*	*Maximum Concentration (µCi/mL)*	*Flag[c]*	*GSL (µCi/mL)*
	North Plateau			*South Plateau*			
Tritium	MP-03	**3.72E-07**		909	**4.18E-07**		1.78E-07
Strontium-90	MP-04	**1.09E-04**		NDATR	1.09E-07	J1	5.90E-09
Technetium-99	MP-03	4.47E-09	UJ1	909	8.23E-10	UJ1	5.02E-09
Iodine-129	MP-04	**2.42E-08**		909	**8.94E-09**		9.61E-10
Radium-226[d]	401	**1.58E-09**		NDATR	4.26E-10	J1	1.33E-09
Radium-228[d]	104	**2.23E-08**	UJ2	909	9.85E-10	J1	2.16E-09
Uranium-233/234[d]	MP-04	**2.04E-09**		NDATR	**1.95E-09**		6.24E-10
Uranium-235/236	MP-04	**3.03E-10**	J1	NDATR	**1.42E-10**	J1	8.07E-11
Uranium-238[d]	MP-04	**1.46E-09**		NDATR	**1.30E-09**		4.97E-10
Plutonium-239/240	ND	ND		NA	NA		NE
Americium-241	MP-04	5.32E-10		NA	NA		NE
Total Uranium[d] (µg/mL)	MP-04	**4.40E-03**		NDATR	**4.47E-03**		1.34E-03

Note: Bolding indicates that the radionuclide exceeds the GSL.

ND = No positive detections for this radionuclide were reported during 2024.

NA = Not Applicable. No samples were collected for this radionuclide during 2024.

NE = Not Established. No GSL screening level has been established for plutonium-239/240 or americium-241.

[a] The table presents the maximum concentrations of radionuclides that were positively identified in groundwater at the WVDP. Radionuclides not listed were either not positively identified, or were not analyzed for in the site groundwater.

[b] GSLs for radiological constituents are set equal to the larger of the background concentrations or NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

[c] The "J" flag indicates the result is an estimated value.

[d] Radium-226, radium-228, uranium-233/234, uranium-238 and total uranium occur naturally in the environment.

111 and 8605 are above the strontium-90 DCS. Over the last ten years, the average gross beta concentrations have remained relatively consistent from year to year, and typically range between 1.0E-06 µCi/mL and 1.0E-05 µCi/mL. (See Figure 6-9 and Table D-2A.) The soils and other material in former lagoon 1 will be removed as part of the lagoon system closure under Phase 1B of the site decommissioning activities.

Tritium in North Plateau Groundwater

Tritium, a fission product of the nuclear power fuel cycle, has historically been detected on the north plateau. Elevated tritium concentrations have been observed downgradient of the MPPB and adjacent to and downgradient of the lagoon system. The tritium activities are attributed to residual tritium in the nuclear fuel that was reprocessed on the site by NFS.

As shown in Table 6-3, the maximum tritium concentration measured in groundwater from the north plateau in 2024, 3.72E-07 µCi/mL, occurred at well MP-03, located on the east side of the MPPB and northeast of the former lagoon 1. The concentration was four orders of magnitude below the DOE DCS. (See Figure 6-2 for the well location) and was lower than the maximum concentration in 2023. Overall, the maximum tritium concentrations among wells have decreased over the years.

Radioisotopic Sampling Results on the North Plateau

Several groundwater monitoring wells in the north plateau S&G unit were analyzed for a select list of radionuclides in 2024, in addition to gross alpha, gross beta, tritium, and strontium-90. (See Table A-2 for sampling program details.) The maximum concentrations of radionuclides, other than tritium, were detected at either 104, 401, MP-03, or MP-04 on the north plateau. Plutonium-239/240 were not detected in 2024; however, iodine-129 was detected at MP-04 with the maximum concentration of 2.42E-08 µCi/mL, which is above the GSL but below the DCS value (5.7E-07 µCi/mL). The presumed source areas, from which low levels of iodine-129 periodically migrate, will be removed under the EIS Phase 1B soil remediation activities.

"South Plateau and NDA Groundwater Monitoring," later in this chapter, provides discussion of sampling results on the south plateau.

Groundwater Monitoring Downgradient of the Waste Tank Farm (WTF)

Liquid radioactive waste remaining in the underground HLW tanks after the completion of the vitrification process is being stabilized by the T&VDS, which reduces the liquid volume in the tanks and vaults through evaporation. Three of the tanks have become dry, and the liquid levels in the fourth tank are decreasing. (See Chapter 2, "Environmental Compliance Summary" for additional information.)

Throughout and after waste processing activities at the WTF, groundwater controls have been implemented by periodic pumping of a dewatering well located adjacent to the tank vaults. Pumping of the well reduces the upward hydrostatic pressure on the tanks, and maintains an inward hydraulic gradient toward the tanks, thereby inhibiting migration of potential leaks from the tanks.

At groundwater monitoring well 8607 near the WTF, elevated gross beta concentrations have been observed since 1994. (See the location of well 8607 on Figure 6-3.) The concentrations have oscillated between below 1.00E-08 and 5.00E-08 except for a few short-term concentration spikes due to the activities at the WTF area. The maximum gross beta concentration at well 8607 in 2024 was 3.07E-08 µCi/mL in June.

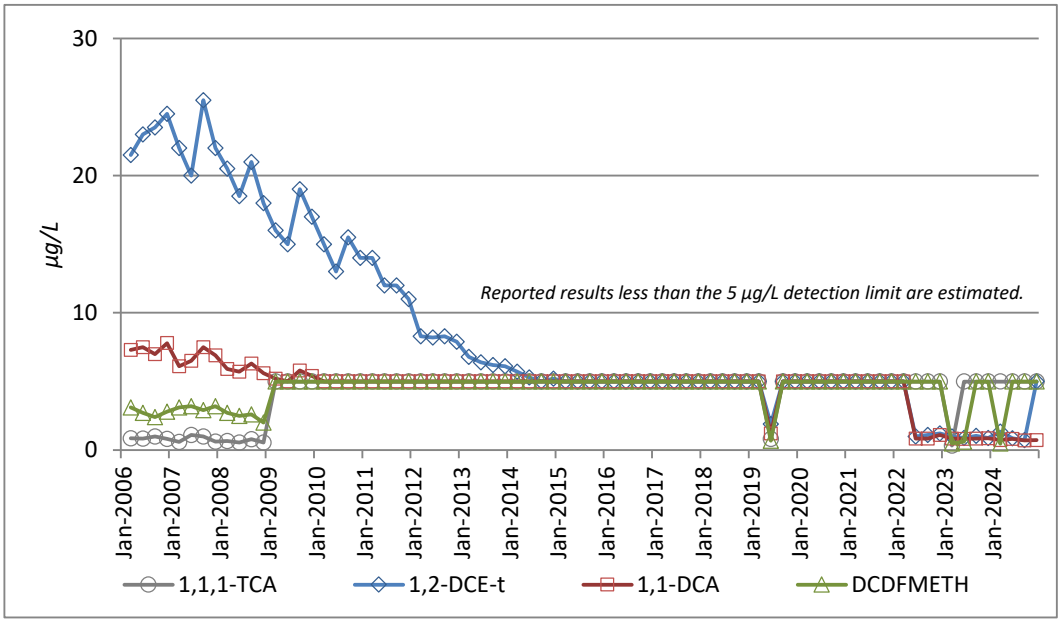
Nonradiological Monitoring on the North Plateau

2024 Results for Volatile and Semivolatile Organic Compounds (VOCs and SVOCs)

Per the 3008(h) Consent Order, select wells within the S&G unit are monitored for VOCs and SVOCs because concentrations of these compounds, exceeding the Series (TOGS) 1.1.1 Class GA Groundwater Quality Standards, were detected in some groundwater samples collected during the RFI.

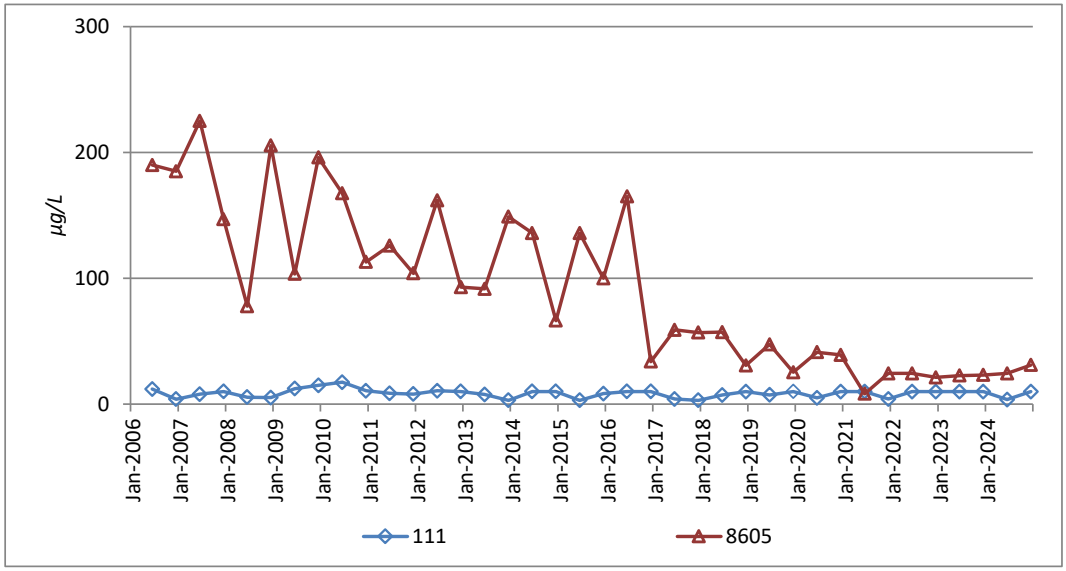
The only S&G unit monitoring location with previously consistent positive VOC detections was well 8612 (Figure 6-3), located northeast and downgradient of the CDDL. Figure 6-10 provides a summary of the concentration ranges of four VOCs that have

FIGURE 6-10
Concentrations of 1,2-DCE-t, 1,1,1-TCA, 1,1-DCA, and DCDFMeth at Well 8612 in the S&G Unit



Note:
1,2-DCE-t = 1,2-Dichloroethylene (total) 1,1-DCA = 1,1-Dichloroethane
1,1,1-TCA = 1,1,1-Trichloroethane DCDFMeth = Dichlorodifluromethane

FIGURE 6-11
Concentrations of TBP at Monitoring Wells Near Former Lagoon 1 in the S&G Unit



been historically detected at well 8612. None of these VOCs have been detected above the Practical Quantitation Limit (PQL) for over seven years. The presumed source of the VOCs previously detected in well 8612 is from wastes buried in the CDDL.

Tributyl phosphate (TBP), an SVOC, has been detected in groundwater from well 8605 (Figure 6-3), located downgradient of the former lagoon 1 and solvent dike. (See Figure 6-11 on the previous page.) The presence of TBP is thought to be caused by residual contamination from liquid waste management activities in the former lagoon 1 area during nuclear fuel reprocessing. The concentration levels have steadily decreased and have stayed below about 50.0 µg/L since 2017. The maximum TBP concentration measured in 2024 at well 8605 was 31.1micrograms per liter [µg/L]. Low levels of TBP were also detected at well 111, located downgradient of the former lagoon 1 in 2004. A TOGS 1.1.1 water quality standard has not been established for TBP. There were no other organics above detection limits in 2024.

The EPA's emerging contaminants of concern currently include organic chemicals such as 1,4-dioxane and 1,2,3-trichloropropane (TCP), as well as PFAS substances. On April 10, 2024, the EPA announced the final National Primary Drinking Water Regulation (NPDWR) for six PFAS substances and PFAS mixtures. 1,4-dioxane and 1,2,3-trichloropropane were not detected in the samples collected from site's groundwater monitoring wells in 2024. Samples collected from the WVDP drinking water supply wells for the analysis of PFAS substances were also nondetect. (See Appendix B-5).

2024 Results for Metals Sampling

During 2024, routine metals sampling continued to be performed, as outlined in the GMP. The sampling results were compared with the established GSLs and background levels. The only metals detected above background in groundwater in 2024 were chromium and nickel at two locations, wells 405 and 706 (See Figure A-9 for the locations.) (See Table 6-4 and Appendix D-2F tables.) Wells 405 and 706 are stainless steel wells that have historically shown evidence of corrosion. Chromium and nickel can leach from the corroding well screen and become adsorbed to fine sediments within the wells which are then entrained in the groundwater samples collected for analysis.

In 2005, 2007, and 2008, select groundwater wells were sampled to evaluate metals concentrations in groundwater impacted by the groundwater plume migrating from the MPPB source area. None of the metals listed in 6 NYCRR 373-2 Appendix 33 have been determined to be associated with the groundwater plume. (See Table D-1B.)

FIGURE 6-12

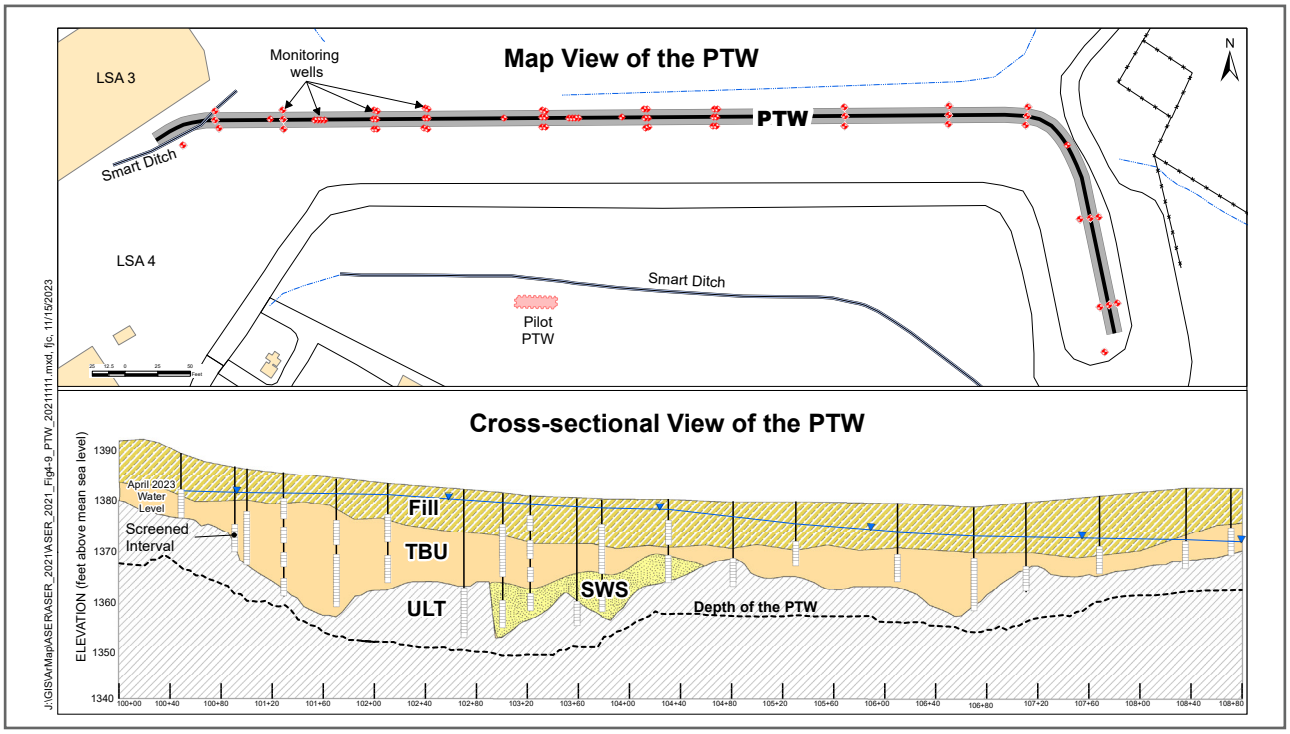


TABLE 6-4

2024 Groundwater Monitoring Results Exceeding GSLs and Background Levels[a]

Analytes	*Groundwater Sampling Location*
	North Plateau (total 50 wells)
Gross Alpha	**111, 8605**
Gross Beta	GSEEP, SP04, SP06, SP11, **SP12**, **104**, **105**, **106**, 107, **111**, **116**, 205, 301, 401, **408**, **501**, **502**, 605, **801**, **802**, **803**, 804, 1304, **8603**, **8604**, **8605**, 8607, 8609, **8612**, **MP-03**, **MP-04**
Tritium	**106**, **110**, **408**, **MP-03**, **MP-04**
Sr-90	**104**, **401**, **408**, **501**, **502**, **801**, **8609**, **MP-03**, **MP-04**
Tc-99	
I-129	**104**, **105**, **106**, **408**, **501**, **502**, **8603**, **8604**, **MP-03**, **MP-04**
U-233/234[b]	**104**, **408**, **MP-03**, **MP-04**
U-235/236	**MP-03, MP-04**
U-238[b]	**104**, **408**, **MP-03**, **MP-04**
Total U[b]	**104**, **408**, **MP-03**, **MP-04**
	Metals[c]
Chromium (total)	**405, 706**
Nickel (total)	**405, 706**
	Volatile and Semivolatile Organics
Tributyl phosphate (TBP)	**8605** (No TOGs[d] *established. Results > DL*)
	South Plateau (total 14 wells)
Gross Alpha	910R
Gross Beta	901, 909, NDATR
Tritium	**909**
Sr-90	**909**, **NDATR**
I-129	**909**, **NDATR**
u-233/234[b]	**NDATR**
U-235/236	**NDATR**
U-238[b]	**NDATR**
Total U[b]	**NDATR**

Note: Bolded wells indicate results that exceed GSLs. Unbolded wells indicate results that exceeded background.

Key: DL - Detection Limit
GSL - Groundwater Screening Level

[a] See Appendix D, Tables D-1A and D-1B, for a discussion of calculating GSLs and Background values. Organic constituents were compared directly with NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards.

[b] Uranium-233/234, uranium-238 and total uranium occur naturally in the environment.

[c] 6 NYCRR 373-2.

[d] No TOGS 1.1.1 standard has been established for tributyl phosphate. The concentration is compared to the analytical detection limit (DL).

Permeable Treatment Wall Performance Monitoring Program (PTWPMP)

History of the PTW and the PTW Structure

The PTW on the north plateau (Figure 6-12) is an underground wall with granular clinoptilolite (i.e., zeolite), a natural mineral with a porous structure. The zeolite traps positively charged ions, including strontium-90, by ion exchange while allowing the groundwater to pass through. Prior to the full-scale PTW installation in 2010, a pilot-scale PTW was installed in 1999, which helped determine that the planned PTW technology was an effective remediation method for treating strontium-90-contaminated groundwater.

The full-scale PTW was constructed by excavating an 860-foot-long trench through the entire thickness of the S&G unit (including the TBU and the SWS, where present), and keying into the underlying, low-permeability ULT. The excavation was then filled with zeolite. A lined stormwater drainage ditch (Smart-Ditch™) was also installed in 2010, south of the PTW, to intercept stormwater from upland site areas and route it around the PTW to Franks Creek. A map view of the PTW location, along with a vertical cross-section showing the geology excavated for the PTW installation, is presented in Figure 6-12.

The design of the PTW addressed three remedial action objectives (RAOs): reduce or eliminate Sr-90 in seepage leaving the north plateau; minimize the future expansion of the plume beyond its mapped limits at the time of the PTW installation; and not preclude any strategies for future plume management during site decommissioning.

The PTW placement was chosen not to transect the CDDL and to limit the expansion of groundwater impacted by strontium-90. At the time of the PTW installation, the strontium-90 concentration in the plume approaching the PTW was at about 1.0E-05 µCi/mL (10,000 pCi/L) level. One of the design requirements of the PTW was to limit the expansion of the plume at or above this concentration level. The full-scale PTW, by design, did not capture the plume's leading edge downgradient of the PTW structure as it existed in November 2010. Strontium-90 concentrations in the area were expected to increase for a period of time, and then eventually decrease when groundwater treated by the PTW begins to reach these downgradient areas. North plateau groundwater monitoring after the PTW installation has shown that groundwater exiting the PTW has lower strontium-90 concentrations than were observed at the time of PTW installation, proving the effectiveness of the PTW treatment.

Removal of the MPPB and excavating subsurface soils in the plume source area are components of the DOE's Phase 1 for decommissioning activities for the WVDP. Long-term strategies for managing the nonsource area of the plume, including the PTW, will be evaluated as part of the Phase 2 decision-making process for the WVDP and the WNYNSC.

Updates for 2024 PTW Monitoring

PTW performance monitoring data collected during 2024, indicate the following:

- Groundwater flow patterns in the PTW area are similar to flow patterns observed prior to PTW construction. As mentioned earlier, some groundwater flows parallel within the central portion of the PTW and causes some of the upgradient groundwater to be diverted to the east, entering the eastern section of the wall.

PTW Smart Ditch™

One of the PTW monitoring wells

- The PTW prevented the migration of strontium-90 activities above 1.0E-05 µCi/mL from flowing past the wall during 2024.
- Geochemical differences (i.e., decreases in the concentrations of strontium-90 and certain other cations) observed in groundwater that has migrated into or through the zeolite also indicate that ion exchange is occurring.
- Significant increases in concentrations of cations and anions were noted following the 2019-2020 and 2020-2021 winters which appeared to be caused by 100% sodium chloride deicing material. Those concentrations have decreased and stabilized after the deicing material was changed to calcium magnesium acetate salt in 2023. The decrease in cation and anion concentrations is also believed to be the result of the site reverting to a sand and salt mixture for parking lots and roadways.
- Since 2023, elevated strontium-90 activity has been detected in a few zeolite wells where the activity was nondetect or at much lower concentrations before. Strontium-90 has been detected in the western, central, and eastern sections of the PTW and in a few wells downgradient of the PTW. These measurements have indicated that some isolated areas of the PTW are not functioning at the levels they once did and are less effective at limiting the expansion of the plume above the 1.0E-05 µCi/mL strontium-90 concentration level. A study to identify methods to enhance the effectiveness and increase the longevity of the PTW, including the collection of soil, zeolite, and groundwater for laboratory testing, was completed in 2024. It provided several recommendations that are being evaluated for future implementation.

Despite increases in strontium-90 activities in select locations, overall strontium-90 activity in groundwater immediately downgradient of the PTW remained lower than upgradient levels in 2024.

The NPGMP was revised in 2010 to utilize previously existing wells for monitoring groundwater plume migration farther upgradient and downgradient of the areas monitored by the PTWPMP. Under the NPGMP, quarterly gross beta sampling and water level measurements supplement the PTWPMP well data for evaluating plume conditions. However, these data are not reported in this ASER.

2024 Monitoring Results at the Northeast Swamp Drainage

The western and central lobes of the plume downgradient of the PTW are partially intercepted by the northeast swamp drainage ditch flowing west to east across the plume's leading edge. These waters ultimately flow into Franks Creek, then, into Buttermilk Creek north of the site. (See Figure 6-2.) Strontium-90 concentrations at WNSWAMP have decreased since 2010, when the PTW was installed. Figure 4-5 in Chapter 4, "Environmental Monitoring" shows the flow-weighted annual average strontium-90 concentration at WNSWAMP. The annual average strontium-90 concentrations at WNSWAMP have been below the DCS since 2015.

The seeps and the swamp drainage leave the site premises over time and enter surface water pathways (creeks). The releases through WNSWAMP and WNSW74A, mostly consisting of strontium-90, accounted for an annual estimated waterborne dose of 0.004 mrem in 2024 to a hypothetical off-site individual on Cattaraugus Creek at Felton Bridge (sampling location WFFELBR), the first downstream location accessible to the public. (See "2024 Potential Maximum Waterborne Dose to an Off-Site Individual" in Chapter 5, "Dose Assessment.")

South Plateau and NDA Groundwater Monitoring

Interim Measures (IMs)

In accordance with RCRA §3008(h) Administrative Order on Consent, an IM including a trench system, was constructed in 1990 through the WLT along the northeast and northwest sides of the NDA to intercept to collect potentially contaminated groundwater. The sampling location NDATR (Figure A-10) is a sump located at the lowest point of the interceptor trench. Groundwater is collected at NDATR and transferred to the LLWTF for processing.

A second IM was completed in December 2008, aiming to improve the stability of the earthen cap and to limit the infiltration of groundwater, surface water, and precipitation into the NDA. The NDA is located on the south plateau and is adjacent to the SDA, which is owned and managed by NYSERDA. These measures included installing a geosynthetic cap over the

NDA, a low-permeability upgradient slurry wall, and surface water drainage diversions. In 2019, the Liquid Pretreatment System (LPS) in the northern portion of the NDA was deactivated and removed. A geomembrane patch was then applied over the area and attached to the existing geomembrane cover.

In 2021, NYSERDA installed an additional section of barrier wall that was connected to their existing SDA barrier wall on the upgradient side of SDA Trench 14 and northeast of the NDA. NYSERDA also extended their geomembrane cover northwest of SDA Trench 14 to further minimize water infiltration into the SDA. (See Figure 1-2.) The SDA trenches are described in NYSERDA's State-Licensed Disposal Area at West Valley Annual Reports.

Geomembrane covers placed over the NDA on the left and the SDA stretching across the photo

2024 Update of NDA Interim Measure (IM) Monitoring

Groundwater elevations are monitored quarterly in and around the NDA and the interceptor trench to ensure that an inward gradient is maintained. Figure 6-13 shows the reduced water volume collected from the interceptor trench since the geomembrane cap and barrier wall were installed, indicating that the IM is effectively reducing flow through the NDA. The removal of the LPS and the patching of the geomembrane cap in 2019 further decreased water infiltration into the NDA. The total volume pumped from the NDA trench in 2024 (10,732 gal [40,625 L]) represented an 81% reduction from the volume reported before 2019 and was less than 2% of the volume reported prior to the 2008 IM.

Water level data from piezometers installed to monitor the effects of the NDA IM indicate that the slurry wall and geomembrane cover continued to limit the inflow of precipitation and groundwater to the NDA in 2024, resulting in the WLT become dry in some areas. Refer to Chapter 2, "Environmental Compliance Summary" in this report for further discussion of the RCRA §3008(h) Administrative Order.

Radiological and Chemical Sampling Results on the South Plateau

Gross beta concentrations at wells 909, 910R, and NDATR exceeded the background level during 2024, the same as in the previous years. Similar to the north plateau, strontium-90 is the main contributing radioisotope to the measured gross beta activity in the NDA trench water, which is attributable to the wastes buried in the NDA. Figure 6-14 shows that the annual average gross beta concentrations at wells 909 and 910R have decreased since 2008 and have remained below the GSL of 1.0E-06 µCi/mL. Wells 909 and NDATR monitor activities in the WLT geologic unit, while well 910R monitors groundwater in the ULT geologic unit, downgradient of the NDA. Gross beta concentrations at 910R are 10X lower than those in well 909 and NDATR, and are only slightly above background. The very low hydraulic conductivity in the ULT (Table 6-1) limits the flow of groundwater into this unit, thereby restricting the migration of contaminants, including gross beta activity, in groundwater in this geologic unit. The groundwater in the overlying WLT tends to migrate horizontally through the WLT rather than downward into the ULT.

Well 909 exceeded the GSL level for tritium in 2024. (See Table 6-3.) The tritium concentrations have been decreasing over the last three to four years and are currently four orders of magnitude below the DOE DCS for tritium of 2.6E-03 µCi/mL.

Several other radionuclides exceeded background levels and GSLs at well 909 and at NDATR in 2024, including iodine-129 and uranium series. (See Table 6-3.) Iodine-129 concentrations have been above background and the GSL for several years. These concentrations may be the result of less attenuation of the radiological activity in the groundwater due to the decreased groundwater flow volume after the 2008 slurry wall and geomembrane installation. These elevated iodine-129 concentrations decreased after 2020, returning to levels similar to those before 2008.

Wells 909 and NDATR are also sampled for VOCs, SVOCs, TBP, and metals. TPB was detected at an estimated concentration below the MDL in well 909 during 2024. This is the first time TBP has been detected in this well, and it is likely the result of residual contamination in the soils around this well. The majority of metals sampling results were nondetect; the few metals results that were positively detected were within the site background and below the GSLs.

FIGURE 6-13
Volume of Water Pumped from the NDA Interceptor Trench

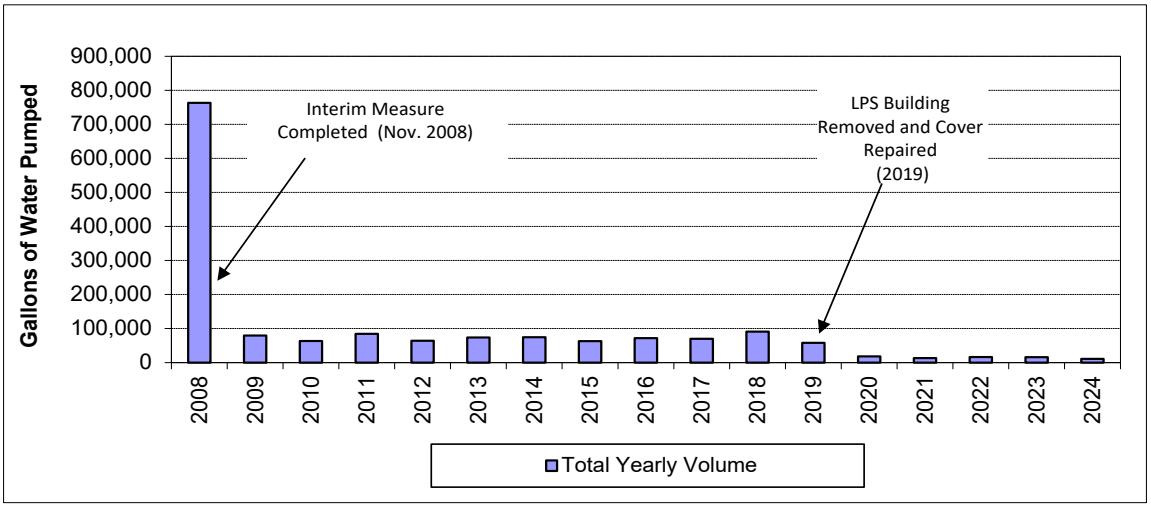
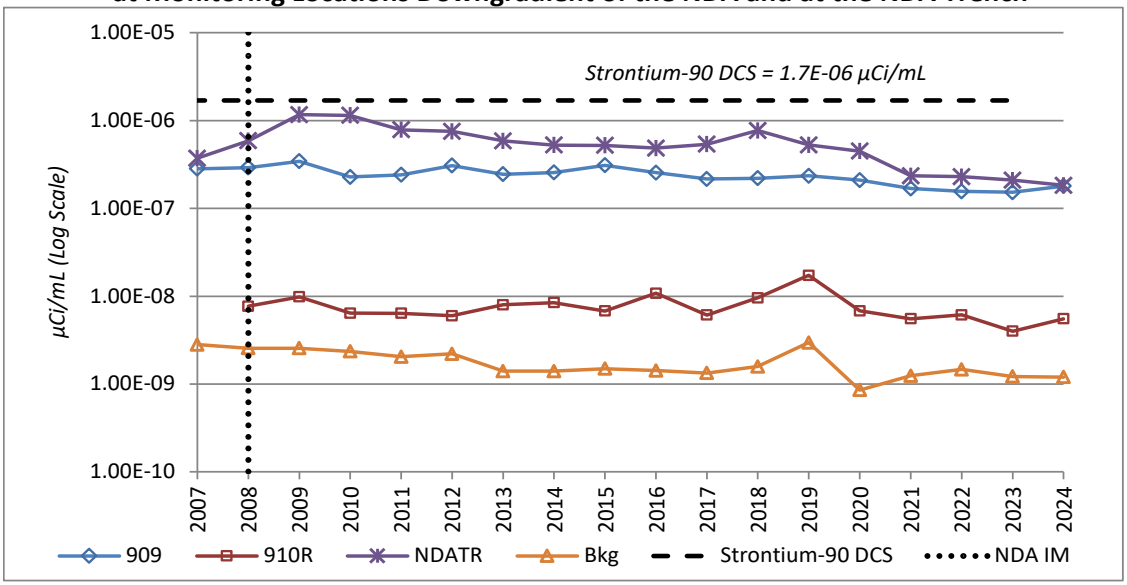


FIGURE 6-14
Annual Average Gross Beta Concentrations
at Monitoring Locations Downgradient of the NDA and at the NDA Trench



Notes: WLT background well for the south plateau is 1008C.

General Groundwater Level Trends

Water level is an important indicator for understanding the underground flow patterns of both chemical and radiological contaminants. At the WVDP, water levels are monitored at a total of 263 wells, including regular monitoring wells and PTW wells, according to the sampling schedule set by the WVDP monitoring programs. In 2024, Western New York received less precipitation than average in the early summer and fall. However, the annual total precipitation (43.96 in) was very similar to that of previous years. Groundwater levels at monitoring wells displayed lower levels in those dry periods, which recovered over the following fall and winter. Those water levels fell within the range of historical seasonal oscillation patterns and did not significantly impact the concentrations of analytes in 2024.

WVDP Source Water Protection Monitoring

WVDP Water Supply Wells

Since 2014, the WVDP's drinking and operations water has been provided by two bedrock wells installed approximately 700 feet to the southwest of the MPPB. Sample results indicate that the on-site drinking water continues to remain below the local, state, and federal maximum contaminant levels (MCLs) and drinking water standards. In addition to monitoring the drinking water, three additional bedrock wells are monitored under the site's water protection plan to provide further assurance that there is no radiological contamination in the bedrock groundwater flowing towards and into the drinking water supply wells. Analytical data for 2024 from these three wells, presented in Table B-5H, show that radiological indicator results (gross alpha and gross beta) are within site background concentrations.

Groundwater Protection Program Summary

The PTW installed in 2010 continued to remove strontium-90 from groundwater passing through the wall in 2024. In recent years, monitoring data indicate that the strontium-90 treatment performance of the PTW has declined in localized areas. The

TABLE 6-5
2024 Groundwater Monitoring Overview

2024 Groundwater Monitoring Overview by Geographic Area [a]			
Number of…	***Total***	***North Plateau***	***South Plateau***
Monitoring Points Sampled - Analytical	64	50	14
Monitoring Events	4	4	4
Individual Analytical Results	6,472	5,278	1,194
Percent of results below detection limits[b]	84%	83%	89%
2024 Groundwater Monitoring Overview by Monitoring Purpose [a]			
Number of…	***Total***	***RCRA Wells*** [c]	***Non-RCRA Wells*** [d]
Monitoring Points Sampled - Analytical	64	36	28
Monitoring Events	4	4	4
Individual Analytical Results	6,472	5,562	810
Percent of results below detection limits[b]	84%	90%	60%

[a] Does not include PTW performance monitoring.
[b] Parameters where detection limits are not applicable (i.e., pH, conductivity, and turbidity) were omitted from this statistic.
[c] RCRA wells are monitored under Regulatory Compliance/Waste Management requirements per the Consent Order and the findings of the RFI Reports.
[d] Non-RCRA wells include all other wells which are monitored per the DOE Orders for Environmental Monitoring and Surveillance.

investigation into methods to enhance the effectiveness of the PTW and to increase the longevity of the wall was completed in 2024, and several recommendations were evaluated, which are being considered for future implementation.

Other localized areas of groundwater contamination, as measured by radiological or chemical parameters, remained similar to those of previous years for the locations and contaminant levels. Measures implemented at the NDA to reduce water infiltration and collect groundwater moving through the subsurface have effectively reduced the potential for groundwater contamination flowing out of the NDA. The WVDP GMP remains effective in monitoring groundwater during the deconstruction activity and across the project premises.

Future longer-term measures to reduce potential groundwater contamination are described in Phase 1B of the EIS. The complete list of tasks to be completed under the WVDP Phase 1B contract is too long to summarize here. However, some of the projects that will provide the greatest positive impact to the future protection of the site's groundwater include:

- removal of the remaining aboveground portion of the MPPB;
- removal of the belowground portion of the MPPB and adjacent soils (i.e., the source area of the north plateau plume);
- removal of the LLWTF lagoons and adjacent soils;
- development and implementation of a PTW performance and longevity improvement plan;
- removal of additional miscellaneous smaller facilities and impacted soils across the site; and
- changes in groundwater flow patterns due to Phase 1B activities.

TABLE 6-6
Highlights of Groundwater Monitoring History at the WVDP and the WNYNSC

Year	*Highlight*
1961–1980	From the time the WNYNSC was established in 1961, to passage of the WVDP Act in 1980, groundwater at the WVDP was periodically sampled by NFS, the New York State Geological Survey, and the United States Geological Survey during construction of the MPPB, for spill investigations, and for post-NFS research studies.
1982-1986	Groundwater monitoring at the WVDP began in 1982 under DOE and the site subcontractor, West Valley Nuclear Services (WVNS), utilizing a network which by 1986 included approximately 53 wells across the north and south plateaus.
1990–1991	Ninety-six wells were installed upgradient and downgradient of the WVDP SWMUs for DOE and RCRA monitoring programs. (The total included wells at the SDA area.)
1992	The RCRA §3008(h) Order on Consent was signed.
1993	Elevated gross beta activity was discovered in groundwater from the S&G unit on the north plateau. Subsequent investigation delineated a plume of strontium-90-contaminated groundwater originating beneath the MPPB, extending northeast.
1993–1994	An RFI expanded characterization program was conducted to assess potential releases of hazardous constituents from on-site SWMUs. Results from the RFI influenced decisionmaking for the GMP.
1994	A Geoprobe® investigation of groundwater and soil beneath and downgradient of the MPPB was performed to characterize the elevated gross beta activity in the S&G unit. The presumed source was found to be near the southwest corner of the MPPB. The primary isotopes responsible for the beta activity were strontium-90 and its daughter product yttrium-90.
1995	The GMP was evaluated and analytical constituents were tailored to each sampling point for a more focused and cost-effective program. The NPGRS was installed near the leading edge of the main lobe of the strontium-90 plume to minimize migration, which consisted of three extraction wells to recover groundwater for treatment by ion exchange.
1996	Several groundwater seeps on the northeast edge of the north plateau were added to the monitoring program.
1997-1998	A Geoprobe® soil and groundwater sampling program was conducted to delineate the leading edge of the strontium-90 plume, and another program was carried out to further characterize the core area of the plume.
1999	A pilot-scale PTW was installed in the eastern lobe of the plume to test this passive in-situ remediation technology. Well points were installed near the pilot-scale PTW.
2000–2001	Additional wells and well points were installed across the leading edge of the strontium-90 plume to monitor the plume's movement and assess the effectiveness of the pilot PTW.
2003	Four new wells were installed to monitor groundwater upgradient and downgradient of the newly constructed RHWF.
2005-2007	The GMP was evaluated, considering current site conditions, activities, and environmental exposure pathways. The analytes and sampling frequencies at 34 monitoring points were reduced and sampling at four wells was discontinued. Off-site drinking water sampling was also discontinued after an evaluation of historical data had confirmed that site operations had no impact on off-site downgradient groundwater.
2008	Two replacement wells, and 21 piezometers, were installed near the NDA during installation of a slurry wall and geomembrane cover at the NDA. On the north plateau, three subsurface investigations were performed upgradient, within, and downgradient of the strontium-90 plume.
2010	An approximately 860-ft-long full-scale PTW was installed along the leading edges of the strontium-90 plume. Sixty-six groundwater monitoring wells were installed upgradient, downgradient, and within the PTW to monitor wall performance. Four new wells were installed downgradient of the MPPB to supplement the strontium-90 source area monitoring.
2013	Based on groundwater plume remediation provided by the PTW, the NPGRS was shut down.
2018	Closure of the NPGRS was completed in accordance with SPDES closure requirements, and the inactive NPRGS wells were decommissioned.
2019	Sampling of well points WP-A, WP-C, and WP-H was discontinued after 2019.
2022	Sampling of wells MP-01 and MP-02 was temporarily discontinued after September 2022 because they are located inside the MPPB deconstruction safety barriers and cannot be accessed.
2023-2024	Groundwater monitoring continued during CY 2023 and 2024 per the GMP, the "PTW Performance Monitoring Plan," and the "North Plateau Groundwater Monitoring Plan." There were no significant changes to the monitoring programs.

CHAPTER 7
QUALITY ASSURANCE

The WVDP implements a comprehensive environmental monitoring QA program that complies with all federal and NYS regulations, including:

- 10 CFR Part 830, Subpart A, "Quality Assurance Requirements."
- DOE Order 414.1D Chg2, "Quality Assurance."
- DOE Order 435.1, "Radioactive Waste Management."
- Nuclear Quality Assurance, Level 1 (NQA-1)-2008 with NQA-1a-2009 Addenda, "Quality Assurance Requirements for Nuclear Facility Applications."

Environmental Sampling QC

Field QC. Special field QC samples are collected and analyzed to assess the sampling process. Duplicate field samples are used to assess sample homogeneity and sampling precision. Laboratory, field and trip blanks (laboratory deionized water in sample containers, or other media such as filters) are used to detect contamination potentially introduced during sampling, shipping or analysis. Environmental background samples (samples of air, water, vegetation, venison, and cow milk taken from locations remote from the WVDP) are collected and analyzed to provide baseline information for comparison with on-site or near-site samples so that the site's influences on the nearby environment and biota can be evaluated.

Calibration. Equipment and other items affecting the quality of environmental data must be identified, inspected, calibrated, and tested before use. Calibration status must be clearly indicated, and equipment must be re-calibrated on a routine schedule as appropriate.

Documentation. Records of all activities must be kept to document what was done and by whom. Records must be clearly traceable to an item or activity. Records such as field data sheets, chain-of-custody forms, requests for analysis, sample shipping documents, sample logs, data packages, training records, and weather measurements, in addition to other records in both paper and electronic form, are maintained as documentation for the environmental monitoring program.

DOE Analytical Service Program

The DOE Analytical Services Program (ASP) is consists of several components which provide environmental management-related services and products. The Department of Energy Consolidated Audit Program (DOECAP) is one such program that CHBWV finds invaluable. DOECAP consists of two separate and distinct programs, which are the DOECAP Treatment, Storage, and Disposal Facility (TSDF) Audit Program and the DOECAP-Accreditation Program (AP). Both programs are a cooperative effort across the DOE Complex to combine resources and reduce unnecessary expenditures.

The DOECAP TSDF Audit Program conducts regularly scheduled audits of commercial waste facilities. The audit teams are comprised of subject matter experts (SMEs) from the DOE and DOE contractors across the complex, which in turn reduces workforce burden and provides cost efficiencies by eliminating audit redundancies. Qualified CHBWV auditors participate in these audit teams.

Under the DOECAP-AP, commercially operated analytical environmental laboratories are assessed by third-party accrediting bodies (ABs) with the support of DOE federal employees and contractor staff, ultimately reducing risk and liability. The result benefits the DOE and commercial suppliers alike, as the final audit reports from TSDF and laboratory audits are shared throughout the complex, saving time and cost across the board.

In addition to reviewing the audit reports, CHBWV Quality Assurance personnel perform triennial supplier evaluations on suppliers contracted at the WVDP. The evaluation includes document review to ensure that environmental sample analyses are

performed using proven methods and provide valid, reliable, and defensible data and that TSDFs continue to be compliant with DOE Order 414.D Chg2. Individual sites may perform supplemental audits of laboratories and TSDFs to provide an additional level of quality control and oversight if needed.

DOE Mixed Analyte Performance Evaluation Program (MAPEP) and EPA Discharge Monitoring Report Quality Assurance (DMR-QA)

The WVDP and its subcontract laboratories also participate in the DOE Radiological Environmental Sciences Laboratory MAPEP, which provides performance evaluation samples for both radiological and nonradiological constituents, and in the EPA DMR-QA study required of major and select minor SPDES permit holders.

2024 Quality Assurance Update

The WVDP maintained contracts in 2024 with the laboratories and TSDFs listed below. This list includes laboratories that analyze data for the waste management and safety departments as well as the laboratories used for environmental samples.

Laboratories:

ALS Environmental
Cattaraugus County Laboratory Services
Environmental Dosimetry Co. (ED)*
GEL Laboratories, LLC (GEL)*
New England Bioassay (subcontracted)*
Southwest Research Institute (SwRI)
Tri-Air Testing
Biotrax Testing Lab (subcontracted)*
EMSL Analytical, Inc.
SGS North America, formerly Galson Laboratories
Landauer, Inc.
Paradigm Environmental Services
Eurofins Buffalo*

*Note: The laboratories listed with an * were used in 2024 to analyze the 2024 environmental data.*

TSDFs:

Alaron Nuclear Services
Perma Fix of Florida
Veolia North America
Waste Control Specialists
Energy Solutions, Utah
Diversified Scientific Services, Inc. (DSSI)

In 2024, ten TSDFs were assessed under the DOECAP TSDF Audit Program, of which, six are currently on CHBWV's approved suppliers list.

The majority of the environmental samples presented in the ASER were analyzed by GEL, in Charleston, South Carolina, or Eurofins Buffalo, in Buffalo, NY. The Thermoluminescent Dosimeters (TLDs) were analyzed by Environmental Dosimetry Co. (ED), in Sterling, Massachusetts and the WET testing was performed by New England Bioassay, in Manchester, Connecticut. Biotrax, in Buffalo, NY, analyzed for coliform where required in some of the potable water samples.

The WVDP maintains on-site capabilities to perform limited radiological analysis of air and water samples. This capability provides analytical results needed for shipping samples off site and for evaluating anomalies, or investigating unique environmental circumstances. The analyses performed on site include quick turnaround-time water sample analysis (for gross alpha, gross beta, strontium-90, and gamma emitters) in support of site operations, and analysis of air samples (for gross alpha, gross beta, select gamma-emitters, and iodine-129) in support of the environmental monitoring program. Analyses requiring NYSDOH Environmental Laboratory Accreditation Program (ELAP) certification are performed by off-site subcontract laboratories. On-site ELAP certification was relinquished in 2012.

During 2024, CHBWV QA confirmed that none of the environmental laboratories or TSDFs utilized by the site had any findings reported by the complex-wide DOECAP accreditation program that would compromise the integrity of the environmental data presented in this report or in the disposal services provided.

Additionally, an external supplier audited Landauer, Inc. for its dosimetry program. The external audit was a comprehensive triennial assessment of Landauer's manufacturing and testing laboratory, which analyzes the dose measured on personnel thermoluminescent dosimeters (TLD) worn by CHBWV radiation workers on site. Landauer was approved for continued use.

Laboratory Proficiency Testing. The 2024 MAPEP and DMR-QA study results are presented in Appendix G. These laboratory proficiency tests are summarized in Table 7-1 showing that 96.9% of the crosschecks performed in 2024 were acceptable.

TABLE 7-1
Summary of Crosschecks Completed in 2024

Type	*Number Reported*	*Number Within Acceptance Limits*	*Percent Within Quality Control Limits*
Radiological	80	79	98.8%
Nonradiological	115	110	95.7%
All types	195	189	96.9%

Equipment, Procedures and Reporting. Additional integral components of the WVDP environmental monitoring QA program include:

- routine calibration and inspection of equipment and instrumentation;
- environmental procedure audits and self-assessments;
- independent validation of data packages received from the off-site laboratories; and
- peer review and verification of data summaries in all environmental reports.

These QA activities help to ensure the accuracy of the environmental data collected and reported at the WVDP.

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CHAPTER 8
Radiation and Environmental Standards

This section provides background information that may be useful to the reader. First, it presents brief summaries of concepts pertaining to radiation and radioactivity, including:

- radioactive decay;
- types of ionizing radiation;
- measurement of radioactivity and dose;
- dose standards;
- background radiation; and
- potential health effects of radiation.

Then this section describes how data are presented in the ASER and limits applicable to environmental media. Chronological histories of the WNYNSC and WVDP and NEPA documentation are presented at the end of this chapter.

Radiation and Radioactivity

Radioactivity is a property of atoms with unstable nuclei. The unstable nuclei spontaneously decay by emitting radiation in the form of energy (such as gamma rays) or particles (such as alpha and beta particles) (see inset on following page). If the emitted energy or particle has enough energy to break a chemical bond or to knock an electron loose from another atom, a charged particle (an "ion") may be created. This radiation is known as "ionizing radiation."

As used in this ASER, the term "radiation" refers only to ionizing radiation and does not include nonionizing forms of radiation such as visible light, radio waves, microwaves, infrared light, or ultraviolet light.

Radioactive Decay

An atom is the smallest component of an element having the chemical properties of the element. An atom consists of a central core (the *nucleus*), composed of positively charged particles (*protons*) and particles with no charge (*neutrons*), surrounded by negatively charged particles (*electrons*) that revolve in orbits in the region surrounding the nucleus. The protons and neutrons are much more massive than the electrons; therefore, most of an atom's mass is in the nucleus.
An element is defined by the number of protons in its nucleus, its atomic number. For example, the atomic number of hydrogen is one (one proton), the atomic number of strontium is 38 (38 protons), and the atomic number of cesium is 55 (55 protons).

The mass number of an atom, its *atomic weight*, is equal to the total number of protons and neutrons in its nucleus. For example, although an atom of hydrogen will always have one proton in its nucleus, the number of neutrons may vary. Hydrogen atoms with zero, one, or two neutrons will have atomic weights of one, two, or three, respectively. These atoms are known as *isotopes* (or *nuclides*) of the element hydrogen. Elements may have many isotopes. For instance, the elements strontium and cesium have more than 30 isotopes each.

Isotopes may be stable or unstable. An atom from an unstable isotope will spontaneously change to another atom. The process by which this change occurs, that is, the spontaneous emission of alpha or beta particles, often accompanied by gamma radiation, is known as *radioactive decay*. Depending upon the type of radioactive decay, an atom may be transformed to another isotope of the same element or, if the number of protons in the nucleus has changed, to an isotope of another element.

Isotopes (nuclides) that undergo radioactive decay are called *radioactive* and are known as *radioisotopes* or *radionuclides*. Radionuclides are customarily referred to by their atomic weights. For instance, the radionuclides of hydrogen, strontium, and cesium measured at the WVDP are hydrogen-3 (also known as tritium), strontium-90, and cesium-137. For some radionuclides, such as cesium-137, a short-lived intermediate isotope is formed that decays by gamma emission. This intermediate

Types of Ionizing Radiation

Alpha Particles. An alpha particle is a positively charged particle consisting of two protons and two neutrons. Compared to beta particles, alpha particles are relatively large and heavy and do not travel very far when ejected by a decaying nucleus. Therefore, alpha radiation is easily stopped by a few centimeters of air or a thin layer of material, such as paper or skin. However, if radioactive material is ingested or inhaled, the alpha particles released inside the body can damage soft internal tissues because their energy can be absorbed by tissue cells in the immediate vicinity of the decay. An example of an alpha-emitting radionuclide is the uranium isotope with an atomic weight of 232 (uranium-232). Uranium-232 was in the HLW mixture at the WVDP as a result of a thorium-based nuclear fuel reprocessing campaign conducted by Nuclear Fuel Services, Inc. Uranium-232 has been detected in liquid waste streams at the WVDP.

Beta Particles. A beta particle is an electron emitted during the breakdown of a neutron in a radioactive nucleus. Compared to alpha particles, beta particles are smaller, have less of a charge, travel at a higher speed (close to the speed of light), and can be stopped by wood or a thin sheet of aluminum. If released inside the body, beta particles do much less damage than an equal number of alpha particles because beta particles deposit energy in tissue cells over a larger volume (or dispersed) than alpha particles. Strontium-90, a fission product found in the liquids associated with the HLW, is an example of a beta emitting radionuclide.

Gamma Rays. Gamma rays are high-energy "packets" of electromagnetic radiation, called photons, that are emitted from the nucleus. Gamma rays are similar to x-rays, but are generally more energetic. If an alpha or beta particle released by a decaying nucleus does not carry off all the energy generated by the nuclear disintegration, the excess energy may be emitted as gamma rays. If the released energy is high, a very penetrating gamma ray is produced that can be effectively reduced only by shielding consisting of several inches of a dense material, such as lead, or of water or concrete several feet thick. Although large amounts of gamma radiation are dangerous, gamma rays are also used in lifesaving medical procedures. An example of a gamma-emitting radionuclide is barium-137m a short-lived daughter product of cesium-137. Both barium-137m and its precursor, cesium-137, are major constituents of the WVDP HLW.

radionuclide may be designated by the letter "m" (for metastable) following the atomic weight. For cesium-137, the intermediate radionuclide is barium-137m, with a half-life of less than three minutes.

The process of radioactive decay will continue until only a stable, nonradioactive isotope remains. Depending on the radionuclide, this process can take anywhere from less than a second to billions of years. The time required for half of the radioactivity to decay is called the radionuclide's *half-life*. Each radionuclide has a unique half-life. The half-life of hydrogen-3 is slightly more than 12 years, both strontium-90 and cesium-137 have half-lives of approximately 30 years, and plutonium-239 has a half-life of more than 24,000 years.

Knowledge of radionuclide half-lives is often used to estimate past and future inventories of radioactive material. For example, a 1.0 millicurie source of cesium-137 in 2006 would have measured 2.0 millicuries in 1976 and will be 0.5 millicuries in 2036. For a list of half-lives of radionuclides applicable to the WVDP, see Table 8-4.

Measurement of Radioactivity

As they decay, radionuclides emit one or more types of radiation at characteristic energies that can be measured and used to identify the radionuclide. Detection instruments measure the quantity of radiation emitted over a specified time. From this measurement, the number of decay events (nuclear transformations) over a fixed time can be calculated.

Radioactivity is measured in units of curies (Ci) or becquerels (Bq). One Ci (based on the rate of decay of one gram of radium-226) is defined as the "quantity of any radionuclide that undergoes an average transformation rate of 37 billion transformations per second." In the International System of Units (SI), one Bq is equal to one transformation per second. In this ASER, radioactivity is customarily expressed in units of Ci followed, and in some cases with the equivalent SI unit (Bq) value.

In this report, measurements of radioactivity in a defined volume of an environmental media, such as air or water, are presented in units of concentration. Since levels of radioactivity in the environment are typically very low, concentrations may be expressed in µCi/mL or in Bq/L. (One microcurie is equal to one millionth of a curie.)

Measurement of Dose

The amount of energy absorbed by a material that receives radiation is measured in rads. A rad is 100 ergs of radiation energy absorbed per gram of material. (An erg is the approximate amount of energy necessary to lift a mosquito one-sixteenth of an inch.) "Dose" is a means of expressing the amount of energy absorbed, taking into account the effects of different kinds of radiation.

Alpha, beta, and gamma radiation affect the body to different degrees. Each type of radiation is given a quality factor that indicates the extent of human cell damage it can cause compared with equal amounts of other ionizing radiation energy. Alpha particles cause 20 times as much damage to internal tissues as x-rays, so alpha radiation has a quality factor of 20, compared to gamma rays, x-rays, or beta particles, each of which have a quality factor of one.

The unit of dose measurement to humans is the *rem*. The number of rem is equal to the number of rads multiplied by the quality factor for each type of radiation. In the SI system, dose is expressed in sieverts. One Sv equals 100 rem. One rem equals 1,000 mrem, the unit used to express standards for dose to man from air and water sources, as applicable to this ASER. This ASER expresses dose in standard units, followed by equivalent SI units in parentheses, as follows: 1 mrem (0.01 millisievert [mSv]).

Dose Standards

The two dose standards, against which releases at the WVDP are assessed, are those established by the EPA for air emissions, and those established by the DOE regarding all exposure modes from DOE activities.

Radiological air emissions other than radon from DOE facilities are regulated by EPA under the NESHAP regulation (40 CFR 61, Subpart H), which establishes a standard of 10 mrem/year effective dose equivalent (EDE) to any member of the public. Compliance with these regulations can be demonstrated by direct ambient air measurement or by modeling. The annual average of the measured radionuclide concentrations shall be compared to the concentration levels in 40 CFR 61, Subpart H, Appendix E Table 2 to determine compliance with the NESHAP standard. See "Airborne Dose Estimates Using CAP-88-PC at WVDP" inset in Chapter 5.

DOE Order 458.1 sets the DOE primary standard of 100 mrem/year EDE for members of the public considering all exposure modes from DOE activities. (Currently there are no EPA standards establishing limits on the radiation dose to members of the public from liquid effluents except for drinking water.)

For community water supplies, the EPA has established a drinking water limit of 4-mrem/year (0.04-mSv/year) (40 CFR Parts 141, National Primary Drinking Water Regulations). However, there are no community drinking water supplies drawn from groundwater downgradient of the site or from surface waters within the Cattaraugus Creek drainage basin downstream of the WVDP. The WVDP on-site drinking water, currently supplied by a deep bedrock groundwater aquifer, is a nontransient, non-community water supply system that is subject to site-specific drinking water monitoring regulated by the NYSDOH. Applicable Maximum Contaminant Limits (MCLs) for the WVDP permitted drinking water system are set by NYS Sanitary Code (10 NYCRR 5-1). Radiological monitoring requirements are established in the CCHD/NYSDOH approved WVDP drinking water monitoring plan.

DOE Derived Concentration Standard (DCS)

A DCS is defined as the concentration of a radionuclide in air or water that, under conditions of continuous exposure by one exposure mode (i.e., ingestion of water, immersion in air, or inhalation) for one year, would result in an EDE of 100 mrem (1 mSv) to a "reference man" (DOE Order 458.1). DCSs for radionuclides measured at the WVDP are listed in Table 8-4. At the WVDP, DCSs are used as a screening tool for evaluating liquid effluents and airborne emissions. (DCSs are not used to estimate dose.)

Background Radiation

Background radiation is always present, and everyone is constantly exposed to low levels of such radiation from both naturally occurring and artificial sources. In the U.S., the average total annual exposure to low-level background radiation is estimated to be approximately 310 mrem (3.1 mSv) from natural sources. (See the DOE dose ranges chart at the end of this chapter.) NCRP Report No. 160 (2009) estimated the average person also receives about 310 mrem [3.1 mSv] from medical procedures, consumer products, and other artificial sources. NCRP Report No. 184 (2019), an update of medical exposure section of NCRP Report No. 160, indicates there has been a 15-20% reduction in the nontherapeutic medical radiation dose to the U.S. population in the decade between 2006 and 2016, lowering the artificial radiation estimate by about approximately 80 mrem.

Background radiation includes cosmic rays; the decay of natural elements, such as potassium, uranium, thorium, and radon; and radiation from sources such as chemical fertilizers, smoke detectors, and cigarettes. Actual doses vary depending on such factors as geographic location, building ventilation, and personal habits.

Potential Health Effects of Radiation

The three primary pathways by which people may be exposed to radiation are: direct exposure, inhalation, and ingestion. Exposure from radiation may be from a source outside the body (external exposure) or from radioactive particles that have been taken in by breathing or by eating and have become lodged inside the body (internal exposure). Radionuclides that are taken in are not distributed in the same way throughout the body. Radionuclides of strontium, plutonium, and americium concentrate in the skeleton, while radioisotopes of iodine concentrate in the thyroid. Radionuclides such as hydrogen-3 (tritium), carbon-14, or cesium-137, however, will be distributed more uniformly throughout the body.

Living tissue in the human body can be damaged by ionizing radiation. The severity of the damage depends upon several factors, among them the amount of exposure (low or high), the duration of the exposure (long-term [*chronic*] or short-term [*acute*]), the type of radiation (alpha, beta, and gamma radiations of various energies), and the sensitivity of the human (or organ) receiving the radiation. The human body has mechanisms that repair damage from exposure to radiation; however, repair processes are not always successful.

Biological effects of exposure to radiation may be either somatic or genetic. *Somatic* effects are limited to the exposed individual. For example, a sufficiently high exposure could cause clouding of the eye lens or a decrease in the number of white blood cells. *Genetic* effects may show up in future generations. Radiation could damage chromosomes, causing them to break or join incorrectly with other chromosomes. Radiation-produced genetic defects and mutations in the offspring of an exposed parent, while not positively identified in humans, have been observed in some animal studies.

Assessing the biological damage from low-level radiation is difficult because other factors can cause the same symptoms as radiation exposure, making statistical evaluations challenging. Moreover, the body is able to repair damage caused by exposure to radiation. BEIR VII (2005) concludes that the smallest dose has the potential to cause a small increase in cancer risk to humans. Cancer risk from exposure to low-level radiation is under continued discussion. (For further discussion of health risk from radiation exposure, please see the "Risk Assessment" section in Chapter 5.)

Data Reporting

In the ASER text, common radiological units (e.g., rem, rad, curie) are presented first, followed by the SI equivalent in parentheses. Nonradiological measurements are presented in English units, followed by the metric unit equivalent in parentheses. Where results are very large or very small, scientific notation is used. Numbers greater than 10 are expressed with

TABLE 8-1
Unit Prefixes Used in this ASER

Multiplication factor			
Scientific notation	**Decimal form**	**Prefix**	**Symbol**
1.0E+06	1000000	mega	M
1.0E+03	1000	kilo	k
1.0E-02	0.01	centi	c
1.0E-03	0.001	milli	m
1.0E-06	0.000001	micro	µ
1.0E-09	0.000000001	nano	n
1.0E-12	0.000000000001	pico	p

TABLE 8-2
Units of Measure Used in this ASER

Type	Measurement	Symbol	Type	Measurement	Symbol
Length	meter	m	**Dose**	rad (absorbed dose)	rad
	centimeter	cm		rem (dose equivalent)	rem
	kilometer	km		millirem	mrem
	inch	in		sievert	Sv
	foot	ft		millisievert	mSv
	mile	mi		gray	Gy
Volume	gallon	gal	**Exposure**	roentgen	R
	liter	L		milliroentgen	mR
	milliliter	mL		microroentgen	µR
	cubic feet	ft^3		parts per billion	ppb
Area	acre	ac		parts per trillion	ppt
	hectare	ha		milligrams per L (ppm)[a]	mg/L
	square meter	m^2		micrograms per L (ppb)[a]	µg/L
	square foot	ft^2		nanograms per L (ppt)[a]	ng/L
Temperature	degrees Fahrenheit	^oF		milligrams per kg (ppm)	mg/kg
	degrees Celsius	^oC		micrograms per g (ppm)	µg/g
Mass	gram	g		micrograms per mL (ppm)[a]	µg/mL
	kilogram	kg		milliliters per L	mL/L
	milligram	mg		microcuries per mL	µCi/mL
	microgram	µg		picocuries per L	pCi/L
	nanogram	ng		microcuries per g	µCi/g
	pound	lb		becquerels per L	Bq/L
	tonne (metric ton)	t		nephelometric turbidity units	NTU
	ton, short	T		standard units (pH)	SU
Radioactivity	curie	Ci	**Flow rate**	gallons per day	gpd
	millicurie	mCi		gallons per minute	gpm
	microcurie	µCi		million gallons per day	mgd
	nanocurie	nCi		cubic feet per minute	cfm
	picocurie	pCi		liters per minute	lpm
	becquerel	Bq		meters per second	m/sec

[a] Equivalency of ppm, ppb, and ppt with the concentrations listed above assumes pure water at standard temperature and pressure.

TABLE 8-3
Conversion Factors Used in this ASER

To convert from	to	Multiply by
miles	kilometers	1.609344
feet	meters	0.3048
inches	centimeters	2.54
acres	hectares	0.4046873
pounds	kilograms	0.45359237
gallons	liters	3.785412
curies	becquerels	3.7E+10
rad	gray	0.01
rem	sievert	0.01

Note: To convert from the units in column two to the units in column one, divide by the conversion factor.

a positive exponent. See Tables 8-1, Table 8-2, and Table 8-3 for a summary of unit prefixes, units of measurement, and basic conversion factors used in this ASER.

The number of significant digits reported depends on the precision of the measurement technique. Calculated values are customarily reported to three significant figures. Dose estimates are usually reported to two significant figures. All calculations are completed before values are rounded.

In general, the detection limit is the minimum amount of a constituent that can be detected, or distinguished from background, by an instrument or a measurement technique. If a result is preceded by the 'less than' symbol "<" (i.e., <5 parts per million [ppm]), the constituent was not measurable below the detection limit (in this example, 5 ppm).

Uncertainty and Negative Results with Radiological Analysis

Radiological data are reported as a result plus or minus (±) an associated uncertainty, customarily the 95% confidence interval. The uncertainty is in part due to the random nature of radioactive decay. Sources of uncertainty may include random components (e.g., radiological counting statistics) or systematic components (e.g., sample collection and handling, measurement sensitivity, or bias). Generally, the relative uncertainty in a measurement increases as the amount of radioactivity being sampled decreases. For this reason, low-level environmental analyses for radioactivity are especially prone to significant uncertainty in comparison with the result.

The actual (total propagated) uncertainty of such values would be larger if other components of uncertainty were available and included in these estimates. The radiological constituent is considered to be detected if the result is larger than the associated uncertainty (i.e., a "positive" detection). Analytical laboratories analyze radiological samples using both sample counts and background counts. If the background count is greater than the sample count, a negative result will be reported.

When uncertainty is larger than the reported result, the WVDP considers that the result was a nondetect. However, when conducting dose estimates and ratio calculations against the NESHAP standards and the DOE DCSs, the larger of the result and the uncertainty is used to present conservative results to the public.

When radiological data are assessed, the parameters used in the calculation other than radioactivity (e.g., air volumes, water volumes) typically do not have an associated uncertainty value available. Nonradiological data are not reported with an associated uncertainty.

Background Comparison

In environmental radiological analysis, sample results are compared against the results from background locations, or control samples, to determine whether the sample results statistically exceed the background. If a sample result shows a statistically significant difference from the background (elevated radioactivity), the necessity for mitigation measures may need to be evaluated.

In this report, multiple statistical methods are used to determine the sample vs. background differences, depending on the frequency of sampling and the balance of the number of current year samples and the number of historical samples. Those analysis methods include descriptive statistics, error ratio and percent differences between the two datasets (e.g., RER [Relative Error Ratio], RPD [Relative Percentage Difference]), parametric tests (e.g., t-test, ANOVA), and nonparametric tests (e.g., KS Test [Kolmogorov-Smirnov Test]). All measurements, including negative (-) results are included in these statistical analysis according to the guidance in DOE-HDBK-1216-2015.

Limits Applicable to Environmental Media

SPDES Permit Requirements

On July 1, 2011, the current SPDES permit for the WVDP became effective. Requirements of the CY 2011 SPDES permit are summarized in Appendix B-1. On July 28, 2015 a modification to the permit was issued to address relocation of the S09 stormwater

outfall. The site's SPDES permit defines points where sampling must be conducted, sampling frequency, the type of samples to be collected, nonradiological constituents for which samples must be analyzed, and the limits applicable to these constituents. Results are reported monthly to the NYSDEC in DMRs.

Radionuclides are not regulated under the SPDES permit. However, special requirements in the permit specify that the concentration of radionuclides in the discharge is subject to the requirements of DOE Order 458.1, "Radiation Protection of the Public and the Environment," and these are reported in the ASER.

Water Quality Classifications, Standards, and Limits for Ambient Water

The objective of the Clean Water Act (CWA) of 1972 is to restore and maintain the integrity of the nation's waters and ensure that, wherever attainable, waters be made useful for fishing and swimming. To achieve this goal, NYS is delegated with authority under Sections 118, 303, and 510 of the CWA to (1) classify and designate the best uses for receiving waters, such as streams and rivers, within its jurisdiction, and (2) establish and assign water quality standards — goals for achieving the designated best uses for these classified waters.

The definitions for best usage classification of New York's jurisdictional waters and the water quality standard goals for these classifications are provided in 6 NYCRR Parts 701–704. Mapping of the Cattaraugus Creek drainage basin and assignment of best usage designations and classification to each receiving water segment within this drainage basin are described in 6 NYCRR Part 838.

According to these regulations, Franks Creek, Quarry Creek, and segments of Buttermilk Creek under the influence of water effluents from the WVDP are identified as Class "C" receiving waters with a minimum designated best usage for fishing with conditions suitable for fish propagation and survival.

Cattaraugus Creek, in the immediate downstream vicinity of the WNYNSC, is identified as a Class "B" receiving water with best designated usages for swimming and fishing. All fresh (nonsaline) groundwaters within New York are assigned a "GA" classification with a designated best usage as a potable water supply source.

Refer to Appendix B-1 for a summary of the water quality standards, guidelines, and MCLs assigned to these water classifications for those constituents that are included in the WVDP environmental monitoring program for ambient water.

Potable Water Standards. The NYSDOH and EPA have classified its jurisdictional waters and established ambient water standards, guidelines, and MCLs or MCL goals to achieve the objectives of the Safe Drinking Water Act. Primary drinking water standards, expressed as MCLs or MCL goals, provide for enforceable health-based limits. See Appendix B-1 for a summary of these levels.

Soil and Sediment Concentration Guidelines. Contaminants in soil are potential sources for contamination of groundwater, surface water, ambient air, and plants and animals. Routine soil and sediment sampling is performed every five years.

The NRC and the EPA, in a 2002 memorandum of understanding pertaining to decommissioning and decontamination of contaminated sites, agreed upon concentrations of residual radioactivity in soil that would trigger consultation between the two agencies. Consultation "trigger" levels for radioactive contamination for nuclides applicable to the WVDP in both residential and industrial soil are reported in the ASER every fifth year with the soil and sediment sampling results for that year.

In 2006, the NRC, in a decommissioning guidance document (NUREG-1757, Vol. 2, 2006), provided concentration screening values for common radionuclides in soil that could result in a dose of 25 mrem/year.

In 2009, soil cleanup goals were developed from site-specific data for the "Phase 1 Decommissioning Plan for the WVDP," Rev. 2, December 2009. These criteria are presented in Table 5-14 of the DP.

Evaluation of Monitoring Data with Respect to Limits

Monitoring data for this report were evaluated against the standards and limits presented in Table 8-4, and in the Appendices. Those locations with results exceeding background, limits, standards, and screening levels are listed in Chapter 4, Table 4-2, and in Tables 6-3 and 6-4 in Chapter 6.

Historic Timeline of the WNYNSC and the WVDP

Table H-1, depicts a historic timeline for the WNYNSC and the WVDP beginning with the establishment of the WNYNSC as a commercial nuclear fuel reprocessing facility, to the creation of the WVDP, to the current Project mission. The summary includes significant legal directives, major activities, and accomplishments.

Historic Record of NEPA Activities

Table 2-8 in Chapter 2 provides a history of the significant NEPA activities and NEPA documents since the project began.

Ionizing Radiation Dose Ranges Chart

Figure 8-1 is the Ionizing Radiation Dose Ranges Chart developed by the DOE Office of Public Radiation Protection that was published in December 2017.

This chart was constructed with the intention of providing a single, user-friendly, “order-of-magnitude” reference for radiation exposure of interest to scientists, managers, and the general public. It is available on the DOE website shown below, together with an Information Brief that explains the chart for those not completely familiar with the concepts it presents.

(Source of Figure 8-1 on the next page: https://www.energy.gov/ehss/downloads/doe-ionizing-radiation-dose-ranges-chart)

TABLE 8-4
U.S. Department of Energy Derived Concentration Standards (DCSs)[a]
for Inhaled Air or Ingested Water (µCi/mL)

Radionuclide	*Half-life (years)[b]*	*DCSs in Inhaled Air*	*Selected DCS Absorption Type (Inhaled Air)[c]*	*DCSs in Ingested Water*
Gross Alpha[d]	NA	1.5E-13 (as Pu-239/240)	NA	2.1E-07 (as U-232)
Gross Beta[d]	NA	1.1E-10 (as Sr-90)	NA	1.7E-06 (as Sr-90)
Tritium (H-3)	1.23E+01	1.3E-07[e]	water vapor	2.6E-03
Carbon-14 (C-14)	5.69E+03	2.9E-07[f]	dioxide	3.3E-04
Potassium-40 (K-40)	1.25E+09	3.4E-10	M	1.6E-05
Cobalt-60 (Co-60)	5.27E+00	3.4E-10	M	1.4E-05
Strontium-90 (Sr-90)	2.89E+01	1.1E-10	M	1.7E-06
Technetium-99 (Tc-99)	2.11E+05	2.0E-09	M	3.9E-04
Iodine-129 (I-129)	1.61E+07	4.0E-11	vapor	5.7E-07
Cesium-137 (Cs-137)	3.00E+01	7.0E-10	F	4.1E-06
Europium-154 (Eu-154)	8.59E+00	9.9E-11	M	6.8E-05
Uranium-232 (U-232)	6.89E+01	6.9E-13	M	2.1E-07
Uranium-233 (U-233)	1.59E+05	1.5E-12	M	1.2E-06
Uranium-234 (U-234)	2.46E+05	1.5E-12	M	1.2E-06
Uranium-235 (U-235)	7.04E+08	1.7E-12	M	1.3E-06
Uranium-236 (U-236)	2.34E+07	1.6E-12	M	1.3E-06
Uranium-238 (U-238)	4.46E+09	1.8E-12	M	1.4E-06
Plutonium-238 (Pu-238)	8.77E+01	1.6E-13	M	4.3E-07
Plutonium-239 (Pu-239)	2.41E+04	1.5E-13	M	4.0E-07
Plutonium-240 (Pu-240)	6.56E+03	1.5E-13	M	4.0E-07
Americium-241 (Am-241)	4.33E+02	2.5E-13	M	7.4E-07

S = slow, M = medium, F= fast

[a] DCSs are defined as the concentration of a radionuclide that, under conditions of continuous exposure for one year by one exposure mode, would result in an effective dose equivalent of 100 mrem (1 mSv).

[b] Nuclear Wallet Cards. October 2023. National Nuclear Data Center. Brookhaven National Laboratory. Upton, New York. https://www.nndc.bnl.gov/nudat3/indx_sigma.jsp.

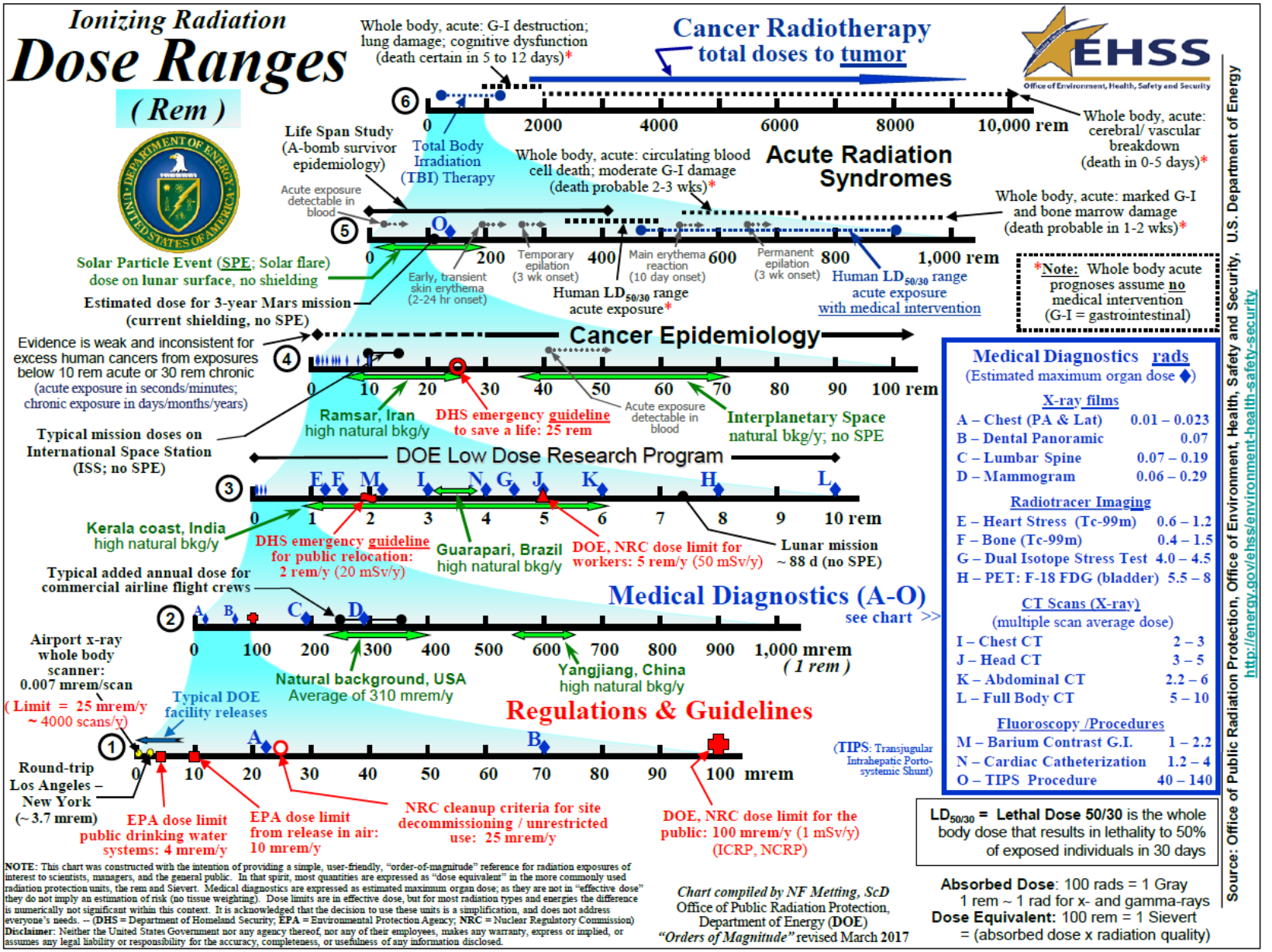
[c] Absorption type is applicable to air only and is based on guidance from ICRP-72. Radionuclides associated with particulate material of Type F undergo fast dissolution in the respiratory tract and show a high rate and level of absorption to blood. Type M represents an intermediate rate of dissolution in the respiratory tract and an intermediate rate and level of absorption to blood. Type S represents slow dissolution in the respiratory tract and a low rate and level of absorption to blood (DOE-STD-1196-2022). Exceptions are shown in this table by the additional footnotes.

[d] Because there are no DCSs for gross alpha and gross beta concentrations, the values for the most restrictive alpha and beta emitters at the WVDP (Pu-239/240 for alpha in air, U-232 for alpha in water, and Sr-90 for both air and water gross beta concentrations) are used as a conservative basis for comparison at locations for which there are no radionuclide-specific data, in which case a more appropriate DCS may be applied.

[e] The DCS for tritium represents the water vapor standard, selected from Table 8, DOE-STD-1196-2022.

[f] The DCS for carbon-14 represents the dioxide chemical form, selected from Table 8, DOE-STD-1196-2022.

FIGURE 8-1
The DOE Ionizing Dose Ranges Chart (December 2017)



GLOSSARY

__A_____

accuracy - The degree of agreement between a measurement and its true value. The accuracy of a laboratory data set is assessed by evaluating results from standards or sample spikes containing known quantities of an analyte.

aquifer - A water-bearing unit of permeable rock or soil that will yield water in usable quantities via wells. Confined aquifers are bounded above and below by less permeable layers. Groundwater in a confined aquifer may be under a pressure greater than the atmospheric pressure. Unconfined aquifers are bounded below by less permeable material but are not bounded above. The pressure on the groundwater at the surface of an unconfined aquifer is equal to that of the atmosphere.

aquitard - A low-permeability geologic unit that can store groundwater and can transmit groundwater at a very slow rate.

as low as reasonably achievable (ALARA) - An approach to radiation protection that advocates controlling or managing exposures (both individual and collective) to the work force and the general public and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in United States (U.S.) Department of Energy (DOE) Order 458.1, ALARA is not a dose limit but, rather, a process that has as its objective the attainment of dose levels as far below the applicable limits of the order as practicable.

__B_____

background radiation - Natural and artificial radiation such as: cosmic radiation, radiation from naturally radioactive elements, and radiation from commercial sources and medical procedures.

becquerel (Bq) - A unit in the International System of Units (SI) of radioactivity equal to one disintegration per second. 37 billion (3.7×10^{10}) Bq equals 1 curie (Ci).

biweekly - Occurring at a frequency of every two weeks.

__C_____

categorical exclusion (CX) - A proposed action that the DOE has determined does not individually or cumulatively have a significant effect on the human environment. See 10 Code of Federal Regulations (CFR) 1021.410.

Class A, B, C, and Greater-than-Class-C (GTCC) low-level waste (LLW) - Waste classifications from the Nuclear Regulatory Commission's 10 CFR Part 61 rule. Maximum concentration limits are set for specific isotopes. Class A waste disposal is minimally restricted with respect to the form of the waste. Class B waste must meet more rigorous requirements to ensure physical stability after disposal. Higher radionuclide concentration limits are set for Class C waste (the most radioactive), which also must meet physical stability requirements. Moreover, special measures must be taken at the disposal facility to protect against inadvertent intrusion.

Some LLW, referred to by the DOE as "Greater-than-Class-C waste," may not be acceptable for near-surface disposal, and may, for example need to be disposed of in a geologic repository.

confidence interval - The range of values within which some parameter may be expected to lie with a stated degree of confidence. For example, a value of 10 with an uncertainty of 5 calculated at the 95% confidence level (10±5) indicates there is a 95% probability that the true value of that parameter lies between 5 and 15.

consistency - The condition of showing steady conformity to practices. In the environmental monitoring program, approved procedures are in place so that data collection activities are carried out in a uniform manner to minimize variability.

Core Team - The "core team approach" is a formalized, consensus-based process in which those individuals with decision-making authority, including the DOE, the U.S. Environmental Protection Agency (EPA), and State remedial project managers, work together to reach agreement on key remediation decisions (DOE/EH-413-9911, October 1999). In August 2006, the DOE-West Valley Demonstration Project (DOE-WVDP) requested that the New York State Department of Health (NYSDOH), the U.S. Nuclear Regulatory Commission (NRC), the EPA (Region 2), the New York State Department of Environmental Conservation (NYSDEC), and the New York State Energy Research and Development Authority (NYSERDA) participate in a collaborative process (i.e., Core Team) to resolve technical issues associated with the "Draft Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center" (DEIS).

critical receptor - An off-site individual who is estimated to receive the highest radiation dose from a potential air effluent release based on ambient air radioactivity measurements.

cosmic radiation - High-energy subatomic particles from outer space that bombard the earth's atmosphere. Cosmic radiation is part of natural background radiation.

curie (Ci) - A unit of radioactivity equal to 37 billion (3.7×10^{10}) disintegrations per second.

__D_____

dataset - A group of data (e.g., factual information such as measurements or statistics) used as a basis for reasoning, discussion, or calculation.

decay (radioactive) - Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles and/or photons or by spontaneous fission.

derived concentration standard (DCS) - The concentration of a radionuclide in air and water that, under conditions of continuous human exposure for one year by one exposure mode (i.e., ingestion of water, ingestion of milk, inhalation of air, and exposure from air submersion), would result in an effective dose equivalent of 100 millirem (mrem) (1 millisievert [mSv]). See Table 8-4 in Chapter 8, "Radiation and Environmental Standards" of this report.

detection limit or level (DL) - This term may also be expressed as "method detection limit" (MDL). The smallest amount of a substance that can be distinguished in a sample by a given measurement procedure at a given confidence level. (See *lower limit of detection*.)

dispersion (airborne) - The process whereby particulates or gases are spread and diluted in air as they move away from a source.

dispersion (groundwater) - The process whereby solutes are spread or mixed as they are transported by groundwater as it moves through the subsurface.

dosimeter - A portable device for measuring the total accumulated exposure to ionizing radiation.

dose - (See *radiation dose*)

downgradient - The direction of water flow from a reference point to a selected point of interest at a lower elevation than the reference point. (See *gradient.*)

__E_____

effective dose - (See *effective dose equivalent* under *radiation dose*.)

effluent - Any treated or untreated air emission or liquid discharge to the environment.

effluent monitoring - Sampling or measuring specific liquid or gaseous effluent streams for the presence of pollutants to determine compliance with applicable standards, permit requirements, and administrative controls.

environmental assessment (EA) - An evaluation that provides sufficient evidence and analysis for determining whether an environmental impact statement is required, or a finding of no significant impact should be issued. See 10 CFR 1021.

environmental impact statement (EIS) - A detailed statement that includes the environmental impact of the proposed action, any adverse environmental effects that cannot be avoided should the proposal be implemented, and alternatives to the proposed action. Detailed information may be found in Section 10 CFR 1021.

environmental management system (EMS) - The systematic application of business management practices to environmental issues, including defining the organizational structure, planning for activities, identifying responsibilities, and defining practices, procedures, processes, and resources.

environmental monitoring - The collection and analysis of samples or the direct measurement of environmental media. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance.

environmental surveillance - The collection and analysis of samples or the direct measurement of air, water, soil, foodstuff, and biota in the environs of a facility of interest to determine compliance with applicable standards and to detect trends and environmental pollutant transport.

exposure - The subjection of a target (usually living tissue) to radiation.

__F_____

finding - A DOE compliance term. A finding is a statement of fact concerning a condition in the Environment, Health, Safety, and Security (EHSS) program that was investigated during an appraisal. Findings include best management practice findings, compliance findings, and noteworthy practices. A finding may be a simple statement of proficiency or a description of deficiency (i.e., a variance from procedures or criteria). (See also *self-assessment*.)

fission - The act or process of splitting into parts. A nuclear reaction in which an atomic nucleus splits into fragments (i.e., fission products, usually fragments of comparable mass) with the evolution of hundreds of million electron volts of energy, typical of 200 million electro volts (MeV).

__G_____

gamma isotopic (also *gamma scan*) - An analytical method by which the quantity of several gamma ray-emitting radioactive isotopes may be determined simultaneously. Typical nuclear fuel cycle isotopes determined by this method include, but are not limited to, cobalt-60, zirconium-95, ruthenium-106, silver-110m, antimony-125, cesium-134, cesium-137, and europium-154. Naturally occurring isotopes for which samples may be analyzed are beryllium-7, potassium-40, radium-224, and radium-226.

gradient - Change in value of one variable with respect to another variable, such as a vertical change over a horizontal distance.

groundwater - Subsurface water in the pore spaces and fractures of soil and bedrock units.

__H_____

half-life - The time in which half the atoms of a radionuclide disintegrate into a different form of atom. The half-life may vary from a fraction of a second to billions of years.

hazardous waste - A waste or combination of wastes that because of quantity, concentration, or physical, chemical, or infectious characteristics may: a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

high-level radioactive waste (HLW) - The highly radioactive waste material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and solid waste derived from the liquid, that contains a combination of transuranic waste and fission products in concentrations sufficient to require permanent isolation. (See also *transuranic waste*.)

hydraulic conductivity - The ratio of flow velocity to the driving force (hydraulic gradient) for viscous flow under saturated conditions of a specified liquid in a porous medium; the ratio describing the rate at which water can move through a permeable medium.

I

integrated safety management system (ISMS) - A process that describes the programs, policies, and procedures used at the WVDP to ensure the establishment of a safe workplace for the employees, the public, and the environment. The guiding principles of ISMS are line management responsibility for safety; clear roles and responsibilities; competence commensurate with responsibilities; balanced priorities; identification of safety standards and requirements; hazard controls; and operations authorization.

interim status - The status of any currently existing facility that becomes subject to the requirement to have a Resource Conservation and Recovery Act (RCRA) permit because of a new statutory or regulatory amendment to RCRA.

ion - An atom or group of atoms with an electric charge.

ion exchange - A process in which cations or anions in a liquid medium are exchanged with cations or anions on a solid sorbent.

ISO (International Organization for Standardization) - An international network of nongovernmental standards institutes that forms a bridge between the public and private sectors and is the largest standards organization in the world. ISO enables a consensus to be reached on solutions that meet both the requirements of business and the broader needs of society.

ISO 14001:2004 and 2015 - Standards for an EMS, which require an organization to:

- Determine the organization's impact on the environment and relevant regulations to the operations of the business;
- Create a plan to control the organization's processes to minimize the environmental impact;
- Monitor the effectiveness of the system at meeting objectives, as well as legal and other; and
- Continually analyze the results and improve the organization's systems.

isotope - Different forms of the same chemical element that are distinguished by having the same number of protons but a different number of neutrons in the nucleus. An element can have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium, with one, two, and three neutrons in the nucleus, respectively.

L

land disposal restrictions (LDR) - Regulations promulgated by the EPA (and by NYSDEC in New York State) governing the land disposal of hazardous wastes. The wastes must be treated using the best demonstrated available technology or must meet certain treatment standards before being disposed.

lower limit of detection (LLD) - The lowest limit of a given parameter that an instrument is capable of detecting. A measurement of analytical sensitivity.

low-level radioactive waste (LLW or LLRW) - Radioactive waste not classified as high-level radioactive waste, transuranic waste, spent fuel, or uranium mill tailings. (See *Class A, B, C, and GTCC low-level waste*.)

__M_____

maximally exposed individual (MEI) - An on-site (occupational) or off-site (nonoccupational) individual who, because of realistically assumed proximity, activities, and living habits, would receive the highest radiation dose, taking into account all pathways, from a given event, process, or facility.

maximally exposed off-site individual (MEOSI) - Member of the general off-site public at a known residence who would receive the highest dose from an effluent release.

mean - The average value of a series of measurements.

metastable (state) - Indicated by the letter "m" immediately following the mass number (e.g., Cs-137m). "metastable" indicates that an atom is in an excited state in which the atom emits higher energy than that in a ground state (the lowest energy level).

metric ton - (See *ton, metric*.)

millirem (mrem) - A unit of radiation dose equivalent that is equal to one one-thousandth of a rem. An individual member of the public can receive up to 100 mrem per year according to DOE standards. This limit does not include the roughly 620 mrem, on average, that people in the U.S. receive annually from natural and artificial background radiation.

minimum detectable concentration (MDC) or **method detection limit (MDL) -** Depending on the sample medium, the smallest amount or concentration of a radioactive or nonradioactive analyte that can be reliably detected using a specific analytical method. Calculations of the minimum detectable concentrations are based on the lower limit of detection.

mixed waste (MW) - A waste that is both radioactive and RCRA hazardous.

__N_____

n-Dodecane/tributyl phosphate - An organic solution composed of 30% tributyl phosphate (TBP) dissolved in n-dodecane used to first separate the uranium and plutonium from the fission products in dissolved nuclear fuel and then to separate the uranium from the plutonium.

neutron - An electrically neutral subatomic particle in the baryon family with a mass 1,839 times that of an electron, stable when bound in an atomic nucleus, and having a mean lifetime of just under 15 minutes as a free particle.

nucleus - The positively charged central region of an atom, made up of protons and neutrons and containing almost all of the mass of the atom.

__O_____

outfall - The discharge end of a drain or pipe that carries wastewater or other liquid effluents into a ditch, pond, or river.

__P_____

parameter - Any of a set of physical properties whose values determine the characteristics or behavior of something (e.g., temperature, pressure, density of air). In relation to environmental monitoring, a monitoring parameter is a constituent of interest. Statistically, the term "parameter" is a calculated quantity, such as a mean or variance, that describes a statistical population.

particulates - Solid particles and liquid droplets small enough to become airborne.

person-rem - The sum of the individual radiation dose equivalents received by members of a certain group or population. It may be calculated by multiplying the average dose per person by the number of persons exposed. For example, a thousand people each exposed to one millirem (mrem) would have a collective dose of one person-rem.

plume - The distribution of a pollutant in air or water after being released from a source.

practical quantitation limits (PQLs) - The PQL is the minimum concentration of an analyte that can be measured within specified limits of precision during routine laboratory operations (NYSDEC, 1991).

precision - The degree of reproducibility of a measurement under a given set of conditions. Precision in a dataset is assessed by evaluating results from duplicate field or analytical samples.

proton - A stable, positively charged subatomic particle in the baryon family with a mass 1,836 times that of an electron.

pseudo-monitoring point - Not a physical monitoring location. At the WVDP, total dissolved solids (TDS) at the SPDES monitoring point WNSP116 is calculated based on the source-flow inputs, TDS concentrations at upstream monitoring locations, and the volume of flow augmentation water to demonstrate compliance with the SPDES permit limit of TDS during the lagoon 3 discharge (WNSP001).

__Q_____

quality factor (QF) - The extent of tissue damage caused by different types of radiation of the same energy. The greater the damage, the higher the quality factor. More specifically, the factor by which absorbed doses are multiplied to obtain a quantity that indicates the degree of biological damage produced by ionizing radiation. (See *radiation dose*.) The factor is dependent upon radiation type (alpha, beta, gamma, or x-ray) and exposure (internal or external).

__R_____

rad - Radiation absorbed dose. One hundred ergs of energy absorbed per gram of solid material.

radiation - The process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

***alpha radiation* -** The least penetrating type of radiation. Alpha radiation (similar to a helium nucleus) can be stopped by a sheet of paper or the outer dead layer of skin.

***beta radiation* -** Electrons emitted from a nucleus during fission and nuclear decay. Beta radiation can be stopped by an inch of wood or a thin sheet of aluminum.

***gamma radiation* -** A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding such as lead, concrete, or steel to be effectively attenuated.

***internal radiation* -** Radiation originating from a source within the body as a result of the inhalation, ingestion, or implantation of natural or artificial radionuclides in body tissues.

radiation dose:

***absorbed dose* -** The amount of energy absorbed per unit mass in any kind of matter from any kind of ionizing radiation. Absorbed dose is measured in rads or grays.

collective dose equivalent **-** The sum of the dose equivalents for all the individuals comprising a defined population. The per capita dose equivalent is the quotient of the collective dose equivalent divided by the population. The unit of collective dose equivalent is person-rem or person-sievert.

collective effective dose equivalent **-** The sum of the effective dose equivalents for the individuals comprising a defined population. Units of measurement are person-rem or person-sievert. The per capita effective dose equivalent is obtained by dividing the collective dose equivalent by the population. Units of measurement are rem or sievert.

committed dose equivalent **-** A measure of internal radiation. The predicted total dose equivalent to a tissue or an organ over a 50-year period after a known intake of a radionuclide into the body. It does not include contributions from sources of external penetrating radiation. Committed dose equivalent is measured in rem or sievert.

committed effective dose equivalent **-** The sum of the committed dose equivalents to various tissues in the body, each multiplied by the appropriate weighting factor. Committed effective dose equivalent is measured in rem or sievert.

dose equivalent **-** A measure of the biological damage to living tissue as a result of radiation exposure. Also known as the "biological dose," the dose equivalent is calculated as the product of absorbed dose in tissue multiplied by a quality factor and then sometimes multiplied by other necessary modifying factors at the location of interest. The dose equivalent is expressed numerically in rems or sieverts (Sv).

effective dose equivalent **-** The sum of the products of the dose equivalent to the organ or tissue and the weighting factors applicable to each of the body organs or tissues that are irradiated.

total effective dose equivalent **-** The summation of the products of the dose equivalent received by specified tissues of the body and the appropriate weighting factors. It explicitly includes the dose from radiation sources internal and/or external to the body.

The effective dose equivalent is expressed in units of rem or sievert.

radioactivity - A property possessed by some elements (such as uranium) of spontaneously emitting energy in the form of radiation.

radioisotope - A radioactive isotope of a specified element. Carbon-14 is a radioisotope of carbon. Tritium is a radioisotope of hydrogen. (See *isotope*.)

radionuclide - A radioactive nuclide. Radionuclides are variations (isotopes) of elements. They have the same number of protons and electrons but different numbers of neutrons, resulting in different atomic masses. There are hundreds of known nuclides, both artificial and naturally occurring.

reference man - A hypothetical aggregation of human physical and physiological characteristics arrived at by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base.

rem - An acronym for Roentgen Equivalent Man. A unit of radiation exposure that indicates the potential effect of radiation on human cells.

remote-handled waste - Waste contained material that requires shielding for handling (i.e., container has a contact exposure rate greater than or equal to 200 mrem/hr).

roentgen - A unit of exposure to ionizing radiation. It is that quantity of gamma or x-rays required to produce ions carrying one electrostatic unit of electrical charge in one cubic centimeter of dry air under standard conditions. The unit is named after Wilhelm Roentgen, German scientist who discovered x-rays in 1895.

__S_____

self-assessment - Appraisals of work at the WVDP by individuals, groups, or organizations responsible for overseeing and/or performing the work. Self-assessments are intended to provide an internal review of performance to determine that specific functional areas are in programmatic and site-specific compliance with applicable DOE directives, WVDP procedures, and regulations.

finding **-** A direct and significant violation of applicable DOE, regulatory, or other procedural or programmatic requirements. A finding requires documented corrective action.

observation **-** A condition that, while not a direct and significant violation of applicable DOE, regulatory, or other procedural or programmatic requirements, could result in a finding if not corrected. An observation may require documented corrective action.

good practice **-** A statement of proficiency or confirmed excellence worthy of documenting.

sievert - A unit of dose equivalent in the International System of Units (SI). Equal to one joule per kilogram.

solid waste management unit (SWMU) - Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released or created. (See also *super solid waste management unit*.)

source term - Types and amounts of radioactive or hazardous material released to the environment.

spent fuel - Nuclear fuel that has been used in a nuclear reactor; this fuel contains uranium, activation products, fission products, and plutonium.

spill - A spill or release is defined as "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or otherwise disposing of substances from the ordinary containers employed in the normal course of storage, transfer, processing, or use," outside of the intended procedural action.

stakeholder - A person or group that has an investment in, share, or interest in something. At the WVDP stakeholders include Project management, scientists, other employees, politicians, regulatory agencies, local and national interest groups, and members of the general public.

standard deviation - An indication of the dispersion of a set of results around their average. In statistics, the square root of the variance.

super solid waste management unit (SSWMU) - Individual solid waste management units that have been grouped and ranked into larger units – super solid waste management units – because some individual units are contiguous or so close together as to make monitoring of separate units impractical. This terminology is unique to the WVDP and is not an official regulatory term. (See also *solid waste management unit*.)

surface water - Water that is exposed to the atmospheric conditions of temperature, pressure, and chemical composition at the surface of the earth.

surveillance - The act of monitoring or observing a process or activity to verify conformance with specified requirements.

__T_____

thermoluminescent dosimeter (TLD) - A device that luminesces upon heating after being exposed to radiation. The amount of light emitted is proportional to the amount of radiation to which the luminescent material has been exposed.

ton, metric (also *tonne*) **-** A unit of mass equal to 1,000 kilograms. (See also Table 8-2, "Units of Measure Used in This ASER.")

ton (*short ton*) **-** A unit of weight equal to 2,000 pounds or 907.1847 kilograms. (See also Table 8-2, "Units of Measure Used in This ASER.")

transuranic (TRU) waste - Waste containing transuranic elements, that is, those elements with an atomic number greater than 92, including neptunium, plutonium, americium, and curium.

__U_____

unit dose conversion factor (UDCF) - Also called a dose conversion factor or a dose coefficient. Converts an intake of specific radionuclide via a specific pathway into a measure of effective or equivalent dose to an organ or the whole body.

unit dose factor (UDF) - Also called a dose coefficient. The unit dose factor is the annual effective dose equivalent for a unit release rate for a specific radionuclide at a specific location, incorporating exposure pathways and real-world exposure scenarios.

universal wastes - Wastes subject to special management provisions that are intended to ease the management burden and facilitate recycling of such materials. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste thermostats, and hazardous waste lamps.

upgradient - Referring to the flow of water or air, "upgradient" is analogous to upstream. Upgradient is a point that is "before" an area of study and that is used as a baseline for comparison with downstream or downgradient data. (See *gradient* and *downgradient*.)

__V_____

vitrification - A waste treatment process that encapsulates or immobilizes radioactive wastes in a glassy matrix to prevent them from reacting in disposal sites. Vitrification involves adding chemicals, glass formers, and waste to a heated vessel and melting the mixture into a glass that is then poured into a canister.

__W_____

watershed - The area of land contained within a drainage divide that drains rainfall, snowmelt, and runoff into a common outlet.

water table - The upper surface in a body of groundwater; the surface in an unconfined aquifer or confining bed at which the pore water pressure is equal to atmospheric pressure.

well point - A small-diameter well that is hammer-driven rather than placed into a pre-drilled borehole.

__X_____

x-ray - Penetrating electromagnetic radiations having wave lengths shorter than those of visible light. They are usually produced by bombarding a metallic target with fast electrons in a high vacuum. In nuclear reactions it is customary to refer to photons originating in the nucleus as gamma rays and those originating in the extranuclear part of the atom as x-rays. These rays are sometimes called Roentgen rays after their discoverer, W.C. Roentgen.

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ACRONYMS AND ABBREVIATIONS

Note: For abbreviations of units of measure, see Table 8-2, "Units of Measure Used in This ASER," in Chapter 8, "Environment and Radiation Standards."

A

A&PC - Analytical and Process Chemistry
AAMN - Ambient Air Monitoring Network
ACM - Asbestos-Containing Material
AEA - Atomic Energy Act
ALARA - As Low As Reasonably Achievable
alpha-BHC - alpha-hexachlorocyclohexane
ANOVA - Analysis of variance
ANSI - American National Standards Institute
AP - Accreditation Program
ASER - Annual Site Environmental Report
ASP - Analytical Service Program
AST - Aboveground Storage Tank
ATSDR - Agency for Toxic Substances & Disease Registry

B

BAT - Best Available Technology
BCG - Biota Concentration Guide
BEIR - Biological Effects of Ionizing Radiation
BKG - Background
BOD_5 - Biological Oxygen Demand (5-day)

C

CA - Contamination Area
CAA - Clean Air Act
CAM - Continuous Air Monitor
CBS - Chemical Bulk Storage
CCHD - Cattaraugus County Health Department
C&D - Construction & Demolition
CDDL - Construction and Demolition Debris Landfill
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
CHBWV - CH2M HILL BWXT West Valley, LLC
CMS - Corrective Measures Study
COA - Chemical Operating Aisle
CPC - Chemical Process Cell
CSAP - Characterization Sampling and Analysis Plan
CSPF - Container Sorting and Packaging Facility
CSRF - Contact Size-Reduction Facility
CT scan - Computed Tomography scan
CTF - Citizen Task Force
CWA - Clean Water Act
CX - Categorical Exclusion
CY - Calendar Year

D

D&D - Decontamination and Decommissioning
DBCP - Dibromochloropropane
DCF - Dose Conversion Factor
DCG - Derived Concentration Guide
DCS - Derived Concentration Standard
DEIS - Draft Environmental Impact Statement
DER - Division of Environmental Remediation
DL - Detection Limit
DMR - Discharge Monitoring Report
DO - Dissolved Oxygen
DOE - (U.S.) Department of Energy
DOE-EM - Department of Energy, Environmental Management
DOE-HQ - Department of Energy, Headquarters Office
DOE-WVDP - Department of Energy, West Valley Demonstration Project (title as of June 2006)
DOECAP - DOE Consolidated Audit Program
DOELAP - DOE Laboratory Accreditation Program
DOT - (U.S.) Department of Transportation
DP - Decommissioning Plan
DSSI - Diversified Scientific Services, Inc.

E

EA - Environmental Assessment
EAC - Energy Attribute Certificate
ECL - (New York State) Environmental Conservation Law
ECS - Environmental Compliance Summary
ED - Environmental Dosimetry Co.
EDB - Ethylene dibromide
EDE - Effective Dose Equivalent
EDR - Equipment Decontamination Room
EHSS - Environment, Health, Safety, Security
EIS - Environmental Impact Statement

ELAP - Environmental Laboratory Approval Program
EMS - Environmental Management System
EO - Executive Order
EPA - (U.S.) Environmental Protection Agency
EPCRA - Emergency Planning and Community Right-to-Know Act
EPD - Environmental Protection Department
EPEAT - Electronic Product Environmental Assessment Tool
ERO - Emergency Response Organization
ES - Environmental Services (within Regulatory Strategy Group)
ESRB - Executive Safety Review Board

F

FAS - Fixed Air Sampler
FEIS - Final Environmental Impact Statement
FFCA - Federal Facilities Compliance Act
FONSI - Finding of No Significant Impact
FR - Federal Register
FRS - Fuel Receiving and Storage
FSSP - Final Status Survey Plan
FWMC - Flow-Weighted Mean Concentrations
FY - Fiscal Year

G

GAO - Government Accounting Office
GEL - General Engineering Lab
GMP - Groundwater Monitoring Program
gpd - gallon per day
GRR - galvanized requiring replacement
GSL - (Site-Specific) Groundwater Screening Levels
GTCC - Greater Than Class C

H

HEPA - High Efficiency Particulate Air (filter)
HFPO-DA - Hexafluoropropylene oxide dimer acid
HIC - High Integrity Container
HLW - High-Level (radioactive) Waste
HPS - Health Physics Society
HQ - Headquarters
HWSL - Hazardous Waste Storage Locker

I

IAEA - International Atomic Energy Agency
IAP - Integrated Assessment Program
ICRP - International Commission on Radiological Protection
ILA - Industrial, Landscaping, and Agricultural
IM - Interim Measure
IM - Intermodal
INEEL - Idaho National Engineering and Environmental Laboratory (1997 to 2005) now known as Idaho National Laboratory
IRTS - Integrated Radwaste Treatment System
ISCORS - Interagency Steering Committee on Radiation Standards
ISMS - Integrated Safety Management System
ISO - International Organization for Standardization

K

KRS - Kent Recessional Sequence
KT - Kent Till

L

LAS - Linear Alkylate Sulfonate
LCR - Lead & Copper Rule
LDR - Land Disposal Restrictions
LILO - Load-In/Load-Out
LLW - Low-Level (radioactive) Waste
LLW2 - Low-Level Waste Treatment Building
LLWTF - Low-Level Waste Treatment Facility (SSWMU #1)
LOTO - Lockout/Tagout
LPS - Liquid Pretreatment System
LSA - Lag Storage Area
LTS - Lavery Till Sand
LWC - Liquid Waste Cell
LWTS - Liquid Waste Treatment System
LXA - Lower Extraction Aisle

M

MAPEP - Mixed Analyte Performance Evaluation Program
MCF - One thousand cubic feet
MCL - Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal
MDC - Minimum Detectable Concentration
MEOSI - Maximally Exposed Off-Site Individual
MGD - Million Gallons per Day
MOA - Mechanical Operating Aisle

MOU - Memorandum of Understanding
MPPB - Main Plant Process Building
MSDS - Material Safety Data Sheet
MSL - Mean Sea Level
MTBE - Methyl-tertiary-butyl-ether

N

NA - Not Applicable
NCEI - National Center for Environmental Information
NCRP - National Council on Radiation Protection and Measurements
ND or nd - no data
NDA - NRC-Licensed Disposal Area
NE - Not Established
NEPA - National Environmental Policy Act
NESHAP - National Emission Standards for Hazardous Air Pollutants
NFS - Nuclear Fuel Services, Inc.
NGVD - National Geodetic Vertical Datum
NH_3 - Ammonia
NNSA - National Nuclear Security Administration
NNSS - Nevada Nuclear Security Site
NOAA - National Oceanic Atmospheric Administration
NOI - Notice of Intent
NO_2-N - Nitrite (as N)
NO_3-N - Nitrate (as N)
NPDES - National Pollutant Discharge Elimination System
NPDWR - National Primary Drinking Water Regulation
NPGMP - North Plateau Groundwater Monitoring Plan
NPGRS - North Plateau Groundwater Recovery System
NQA-1 - Nuclear Quality Assurance, Level 1
NRC - (U.S.) Nuclear Regulatory Commission
NUREG - (U.S.) NRC Regulation
NY - New York
NYCRR - New York State Official Compilation of Codes, Rules, and Regulations
NYS - New York State
NYS ECL - New York State Environmental Conservation Law
NYSDEC - New York State Department of Environmental Conservation
NYSDOH - New York State Department of Health
NYSDOL - New York State Department of Labor
NYSERDA - New York State Energy Research and Development Authority

O

ORP - Occurrence Reporting and Processing
ORPS - Occurrence Reporting and Processing System
OSTI - Office of Scientific and Technical Information
OVE - Outdoor Ventilated Enclosures

P

PBS - Petroleum Bulk Storage
PCB - Polychlorinated Biphenyl
PEIS - Programmatic Environmental Impact Statement
PFAS - Per- and Polyfluoroalkyl Substances
PFBS - Perfluorobutane sulfonic acid
PFHxS - Perfluorohexanesulfonic acid
PFNA - Perfluorononanoic acid
PFOA - Perfluorooctanoic Acid
PFOS - Perfluorooctane sulfonate
PMC - Process Mechanical Cell
PNL - Pacific Northwest Laboratory
PPA - Probabilistic Performance Assessment
PPB - Parts Per Billion
PPC - Product Purification Cell-
PPM - Parts Per Million
PPT - Parts Per Trillion
PQL - Practical Quantitation Limit
PSO - Plant Systems Operators
PTW - Permeable Treatment Wall
PTWPMP - Permeable Treatment Wall Performance Monitoring Plan
PVC - Polyvinyl chloride
PVS - Permanent Ventilation System
PVU - Portable Ventilation Unit

Q

QA - Quality Assurance
QC - Quality Control
QPM - Quarterly Public Meeting

R

RAO - Remedial Action Objectives
RA - Radiological Area
RCRA - Resource Conservation and Recovery Act
REC - Renewable Energy Credits
RER - Relative Error Ratio
RFI - RCRA Facility Investigation
RFP - Request for Proposal
RHWF - Remote Handled Waste Facility
ROD - Record of Decision
RPD - Relative Percentage Difference
RVS - Replacement Ventilation System

S

S&G - Sand and Gravel Unit
SAPA - State Administrative Procedure Act
SARA - Superfund Amendments and Reauthorization Act
SDA - (New York) State-Licensed Disposal Area
SDS - Safety Data Sheet
SEIS - Supplemental Environmental Impact Statement
SEQRA - (New York) State Environmental Quality Review Act
SI - Systeme Internationale (International System of Units)
SME - Subject Matter Expert
SNF - Spent Nuclear Fuel
SOC - Specific Organic Chemicals (NYSDOH). Also referred to as Synthetic Organic Chemicals by EPA.
SOP - Standard Operating Procedure
SPA - Special Package Authorization
SPE - Solid Phase Extraction
SPDES - (New York) State Pollutant Discharge Elimination System
SSC - Sample Storage Cell
SSWMU - Super Solid Waste Management Unit
STD - Standard
STP - Site Treatment Plan
STS - Supernatant Treatment System
SU - Standard Unit
Sv - Sievert
SVOC - Semivolatile Organic Compound
SWMU - Solid Waste Management Unit
SWPPP - Stormwater Pollution Prevention Plan
SwRI - Southwest Research Institute
SWS - Slackwater Sequence

T

T&VDS - Tank and Vault Drying System
TBP - Tributyl Phosphate
TBU - Thick-Bedded Unit
TCP - Trichloropropane
TDS - Total Dissolved Solids
TED - Total Effective Dose
TER - Technical Evaluation Report
THOREX - Thorium Reduction Extraction
TI/RE - Toxic Inventory/Reduction Evaluation
TKN - Total Kjeldahl Nitrogen
TLD - Thermoluminescent Dosimeter
TOGS - Technical and Operational Guidance Series
TRU - Transuranic
TSDF - Treatment Storage and Disposal Facility
TSS - Total Suspended Solids

U

U.S. - United States
UCL - Upper Confidence Limit
UDF - Unit Dose Factor
ULT - Unweathered Lavery Till
UOD - Ultimate Oxygen Demand
UPC - Uranium Product Cell
URS - URS - Energy & Construction Division (historical)
USACE - U.S. Army Corps of Engineers
USC - United States Code
UST - Underground Storage Tank
UXA - Upper Extraction Aisles

V

VARP - Vulnerability Assessment and Resilience Plan
VF - Vitrification Facility
VIT - Vitrification
VOC - Volatile Organic Compound
VSC - Vertical Storage Cask
VWR - Vent Washroom

W

WCS - Waste Control Specialists LLC
WET - Whole Effluent Toxicity
WIP - Work Instruction Package
WIR - Waste Incidental to Reprocessing
WLT - Weathered Lavery Till
WMA - Waste Management Area
WNYNSC - Western New York Nuclear Service Center
WTF - Waste Tank Farm
WVDP - West Valley Demonstration Project
WVES - West Valley Environmental Services LLC (historical)
WVNS - West Valley Nuclear Services (historical)
WVNSCO - West Valley Nuclear Services Company (historical)

X

XC - Extraction Cell

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D. Schweikert	Supervisor, Town of Concord
C. Drake	Deputy Supervisor, Town of Concord
T. Michaels	Mayor, Village of Springville
R. Belscher	Deputy Mayor, Village of Springville
J. Pillittere	West Valley Chamber of Commerce
H. Klahn	West Valley Central School Board of Education
D. Amodeo	Superintendent, West Valley Central School
S. Wedvik	West Valley Volunteer Hose Co., Inc.
R. Raffel	International Association of Machinists and Aerospace Workers
E. Giardini	Laborers Local #621, Olean

Citizen Task Force Membership and Alternates

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REGULATORY STRATEGY, WVCA* ASER WORKING GROUP

Lowes, E.A., Manager, Environmental, Safety, Heath, Quality and Regulatory
Michalczak, L. M., Manager, Regulatory Strategy

Chapter and Content Principal Contributors and Reviewers

Ch. 1 Introduction	Regulatory Strategy Group
Ch. 2 Environmental Compliance Summary	Regulatory Strategy Group
Ch. 3 Environmental Management System	Sansone, J.E. and McNeil, H.A. (RCRA)
Ch. 4 Environmental Monitoring	Regulatory Strategy Environmental Services Group
Ch. 5 Dose Assessment	Pendl, M.P. and Schinzel, J.R.
Ch. 6 Groundwater Protection Program	Cohen, F.J. and Regan, M.P.
Ch. 7 Quality Assurance	Pendl, M.P., Schinzel, J.R., and Wrotniak, C.M.
Environmental Data Management/QA/Validation	Pendl, M.P., Wrotniak, C.M., Schinzel, J.R., and Wedvik, S.K.
Dose Modeling/Review Support	Macauley, I.P.

Environmental Services Group

Steiner, R.E., Manager, Environmental Services Group

Carr, A.V., Kean, W.N., Pendl, M.P., Regan, M.P., Schinzel, J.R., Wedvik, S.K., Zientek, J.J., Weaver, C.N., and Wrotniak, C.M.

Editorial

Authoring/Editing, Statistics	Yasumiishi, M.
Technical Editing	Pendl, M.P., Schinzel, J.R., and Werchowski, B.L.
Desktop Publishing, Records	Varner, M.L. and Werchowski, B.L.

REVIEWERS

WVCA

Casper, J.L., Cherry, S.A., Loop, P.B., Lowes, E.A., Martinet, D.M., Michalczak, L. M., O'Connell, C.A., Pillittere, J.T., Sansone, J.E., Stevens, D.A., Wolniewicz, J.C., and Wade, R.L.

Department of Energy (DOE) Office of Environmental Management (EM) West Valley Demonstration Project (WVDP)

Bernicker, W.R., Berta, L.S., Bousquet, S.M., D'Agostino, J.M., Dundas, J.M., Mowery, K.A., Miller, J.A., Prowse, J.J., Steiner, A.M., Taylor, T.L., and Bower, B.C.

New York State Energy Research and Development Authority (NYSERDA)

Gordon, L.M., Pietraszek, J.E., and Vlad, P.M.

* West Valley Cleanup Alliance, LLC.

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APPENDIX A
2024 Environmental Monitoring Program

Environmental Monitoring Program Drivers and Sampling Rationale

The index and tables on the following pages describe the WVDP routine environmental monitoring program for 2024. The 2024 program meets the requirements of DOE Order 458.1, "Radiation Protection of the Public and the Environment," and DOE-HDBK-1216-2015, "DOE Handbook, Environmental Radiological Effluent Monitoring and Environmental Surveillance" (October 2022). Specific methods and monitoring program elements were based on DOE/EP-0096, "A Guide for Effluent Radiological Measurements at DOE Installations," and DOE/EP-0023, "A Guide for Environmental Radiological Surveillance at U.S. Department of Energy Installations." Additional monitoring was mandated by air and water discharge permits (under the NESHAP regulations in 40 CFR 61, Subpart H, and the SPDES, respectively). Specific groundwater monitoring is required by the RCRA §3008(h) Administrative Order on Consent.

Permits, agreements, and/or programs may require formal reports of monitoring results. Radiological air emissions from the WVDP are reported annually in the NESHAP report to EPA. Nonradiological releases in water effluent and stormwater drainage points covered under the SPDES permit are reported monthly to NYSDEC in a DMR. Groundwater monitoring results are reported quarterly to NYSDEC. Annual results from the monitoring program, as a whole, are evaluated and discussed in this ASER, which is prepared as directed in DOE Order 231.1B, "Environment, Safety, and Health Reporting," and associated guidance.

Table A-1 summarizes programmatic drivers and guidance applicable to each environmental medium measured or sampled as part of the WVDP Environmental Monitoring Program.

Sampling Schedule

Sampling locations are assigned a specific identifier, the location code, which is used to schedule sampling, track samples and trace analytical results. Table A-2 provides the details of the sampling schedule for each location monitored in 2024. Routine sampling locations are shown on Figures A-2 through A-14. Table headings in the sampling program described in Table A-2 are as follows:

- **Sample Location Code**. This code describes the physical location where the sample is collected. The code consists of seven or eight characters: The first character identifies the sample medium as Air, Water, Soil/sediment, Biological, or Direct measurement. The second character specifies oN-site or oFf-site. The remaining characters describe the specific location (e.g., AFGRVAL is Air oFf-site at GReat VALley). Distances noted at sampling locations are as measured in a straight line from the former ventilation stack of the MPPB (ANSTACK). Groundwater and stormwater sampling points (e.g., WNW0408, WNNDATR, WNSO04) are often abbreviated in figures or data tables (i.e., "408," "NDATR," "S04").

- **Sampling Type/Medium**. Describes the collection method and the physical characteristics of the medium or sample.

- **Collection Frequency/Total Annual Samples.** Indicates how often the samples are collected or retrieved and the total number of each type of sample processed in one year.

- **Measurements/Analyses**. Notes the type of measurement taken from the sampling medium and/or the constituents of interest, and (in some instances) the type of analysis conducted.

There were no major changes to the overall environmental monitoring program in 2024.

Index of Environmental Monitoring Program Sampling Locations

Sample Location	Description of Monitoring Point	Location shown on Figure
Air Effluent		
ANSTSTK	Supernatant Treatment System	Figure A-6
ANCSPFK	Container Sorting and Packaging Facility	Figure A-6
ANRHWFK	Remote-Handled Waste Facility	Figure A-6
OVEs/PVUs[a]	Outdoor Ventilated Enclosures/Portable Ventilation Units	not shown
Liquid Effluent and On-Site Water		
WNSP001	Lagoon 3 Weir Point	Figure A-2
WNSP01B[a] (inactive)	Internal Process Monitoring Point	not shown
WNSP116	Pseudo-Monitoring Point Outfall 116	Figure A-2
WNSP007 (inactive)	Sanitary Waste Discharge	Figure A-2
WNURRAW	Augmentation Water	Figure A-2
NDA MANHOLE #4	NDA Trench Extraction Point	Figure A-2
On-Site Surface Water		
WNSWAMP	Northeast Swamp Drainage Point	Figure A-2
WNSW74A	North Swamp Drainage Point	Figure A-2
WNSP005	South Facility Drainage	Figure A-2
WNSP006	Facility Main Drainage, Franks Creek at Security Fence	Figure A-2
WNFRC67	Franks Creek East	Figure A-2
WNERB53	Erdman Brook	Figure A-2
WNNDADR	Disposal Area Drainage	Figure A-2
Off-Site Surface Water		
WFBCBKG	Buttermilk Creek Near Fox Valley, Background	Figure A-5
WFFELBR	Cattaraugus Creek at Felton Bridge	Figure A-5
WFBCTCB	Buttermilk Creek at Thomas Corners	Figure A-5
Stormwater Outfalls		
GROUP 1		
S04 (WNSO04)	North Swamp Drainage (WNSW74A)	Figure A-3
GROUP 2		
S06 (WNSO06)	Northeast Swamp Drainage (WNSWAMP)	Figure A-3
S33 (WNSO33)	LAG Storage Drainage	Figure A-3
GROUP 3		
S09 (WNSO09)	Smartditch®	Figure A-3
S12 (WNSO12)	South Facility Drainage (WNSP005)	Figure A-3

Index of Environmental Monitoring Program Sampling Locations *(continued)*

Sample Location	Description of Monitoring Point	Location shown on Figure
Stormwater Outfalls *(continued)*		
GROUP 4		
S34 (WNSO34)	Rail Spur Culvert	Figure A-3
GROUP 5		
S14 (WNSO14)	NDA Service Road Drainage North	Figure A-3
S17 (WNSO17)	NDA Service Road Drainage South	Figure A-3
S28 (WNSO28)	Drum Cell West Road	Figure A-3
GROUP 6		
S36 (WNSO36)	Live-Fire Range Wetland Drainage	Figure A-4
S37 (WNSO37)	Pump House Roadway	Figure A-4
S38 (WNSO38)	Lake Two Roadway North	Figure A-4
S39 (WNSO39)	Lake Two Roadway South	Figure A-4
S41 (WNSO41)	Lake One Roadway	Figure A-4
S42 (WNSO42)	Pre-Railroad Spur Wetland Area (Near WFBCBKG)	Figure A-4
S43 (WNSO43)	Live-Fire Range Drainage East	Figure A-4
GROUP 7		
S20 (WNSO20)	Disposal Area Drainage (WNNDADR)	Figure A-3
GROUP 8		
S27 (WNSO27)	Drum Cell Drainage West	Figure A-3
S35 (WNSO35)	Drum Cell Drainage East	Figure A-3
Stormwater Precipitation pH Measurement Location		
WNSWR01	Near the Site Rain Gauge	Figure A-3
Soil and Sediment		
On-Site Soil/Sediment		
SNSW74A	Soil/Sediment at North Swamp Drainage Point	Figure A-2
SNSWAMP	Soil/Sediment at Northeast Swamp Drainage Point	Figure A-2
SNSP006	Soil/Sediment at Facility Main Drainage (Franks Creek)	Figure A-2
Off-Site Soil (collected at historical off-site air sampler locations)		
SFFXVRD	Surface Soil South-Southeast at Fox Valley	Figure A-5
SFRT240	Surface Soil Northeast on Route 240	Figure A-5
SFRSPRD	Surface Soil Northwest on Rock Springs Road	Figure A-5
SFGRVAL	Surface Soil South at Great Valley, Background	Figure A-14
Off-Site Sediment		
SFCCSED	Cattaraugus Creek at Felton Bridge, Sediment	Figure A-5
SFSDSED	Cattaraugus Creek at Springville Dam, Sediment	Figure A-5
SFTCSED	Buttermilk Creek at Thomas Corners, Sediment	Figure A-5
SFBCSED	Buttermilk Creek at Fox Valley Road, Background Sediment	Figure A-5

Index of Environmental Monitoring Program Sampling Locations *(continued)*

Sample Location	Description of Monitoring Point	Location shown on Figure
On-Site Groundwater and Seeps		
SSWMU #1	LLW2 Wells	Figure A-9
SSWMU #2	Miscellaneous Small Units Wells	Figure A-9
SSWMU #3	Liquid Waste Treatment System Wells	Figure A-9
SSWMU #4	HLW Storage and Processing Tank Wells	Figure A-9
SSWMU #5	Maintenance Shop Leach Field Wells	Figure A-9
SSWMU #6	LLW Storage Area Wells	Figure A-9
SSWMU #7	Chemical Process Cell - Waste Storage Area Wells	Figure A-9
SSWMU #8	CDDL Wells	Figure A-9
SSWMU #9	NDA Unit Wells and NDATR	Figure A-10
SSWMU #10	IRTS Drum Cell Wells	Figure A-10
RHWF	RHWF Wells	Figure A-9
MPPB Wells	MPPB Downgradient Wells	Figure A-9
North Plateau Seeps	Northeastern Edge of North Plateau	Figure A-9
Surface Elevation	Surface Water Elevation Hubs (i.e., SE009)	Figure A-9
On-Site Potable (Drinking) Water (supplied by groundwater wells)		
Supply Wells		
WNDWELL1	Drinking Water Well #1 (at wellhead)	Figure A-8
WNDWELL2	Drinking Water Well #2 (at wellhead)	Figure A-8
WNDRAW1/2	Raw, Untreated Groundwater (at water treatment intake)	Figure A-8
Groundwater Treatment System (Potable Water Point of Entry)		
WNDFIN	Treated Groundwater (from supply line after treatment)	Figure A-8
Sentinel Monitoring Wells		
WNEHMKE	Bedrock Well South of Main Plant	Figure A-8
WWCOURT	Bedrock Well South of former Annex	Figure A-8
WNCT272	Bedrock Well Southeast of Warehouse	Figure A-8
Potable Water Distribution System		
WNDNURSE	Nurse’s Office Sink	Figure A-8
WNDNKRH	RHWF Kitchenette Sink	Figure A-8
WNDNK15	Parking Lot Men’s Room Sink	Figure A-8
WNDNK23	10-Plex Men’s Room Sink	Figure A-8
WNDNK25	RHWF Men’s Room Sink Room Sink	Figure A-8
WNDNK26	New Womens Locker Room	Figure A-8
WNDNK29	New Guardhouse Bathroom Sink	Figure A-8
WNDNK30	New Mens Locker Room	Figure A-8

Index of Environmental Monitoring Program Sampling Locations *(concluded)*

Sample Location	Description of Monitoring Point	Location shown on Figure
Off-Site Ambient Air		
AF01_N	Bond Road	Figure A-7
AF02_NNE	Route 240	Figure A-7
AF03_NE	Route 240	Figure A-7
AF04_ENE	Route 240	Figure A-7
AF05_E	Heinz Road	Figure A-7
AF06_ESE	Buttermilk Road	Figure A-7
AF07_SE	Fox Valley Road	Figure A-7
AF08_SSE	Fox Valley Road	Figure A-7
AF09_S	Rock Springs Road	Figure A-7
AF10_SSW	Dutch Hill Road	Figure A-7
AF11_SW	Dutch Hill Road	Figure A-7
AF12_WSW	Dutch Hill Road	Figure A-7
AF13_W	Dutch Hill Road	Figure A-7
AF14_WNW	Boberg Road	Figure A-7
AF15_NW	Rock Springs Road	Figure A-7
AF16_NNW	Rock Springs Road, historical MEOSI location	Figure A-7
AF16HNNW	Co-located with AF16_NNW, High Volume Sampler	Figure A-7
AFGRVAL	Great Valley Sampler, Hungry Hollow Road, Background	Figure A-14
Off-Site Biological		
BFMBLSY	Milk, West-Northwest	Figure A-11
BFMSCHT	Milk, South	Figure A-11
BFMCTLS	Milk, Background	Figure A-14
BFDNEAR	Deer, Near-Site	Figure A-11
BFDCTRL	Deer, Background	Figure A-14
BFVNEA()[a]	Produce, Near-Site	Figure A-11
BFVCTRL[a]	Produce, Background	Figure A-14
BFFCATC	Fish, Cattaraugus Creek, Downstream	Figure A-11
BFFCATD	Fish from Cattaraugus Creek, Downstream of Springville Dam	Figure A-11
BFFCTRL	Fish from Cattaraugus Creek, Background	Figure A-14
Direct Measurement Dosimetry (Figures A-12 through A-14)		
DNTLD Series	On-Site/Near-Site Direct Radiation	Figure A-12
DFTLD Series	Off-Site Direct Radiation	Figure A-13
DFTLD23	Background Direct Radiation (more than 5 km from the WVDP)	Figure A-14

[a] Produce samples (corn, apples, and beans) are identified by vegetable/fruit sampled as follows:
Near site: corn = BFVNEAC; apples = BFVNEAAF; beans = BFVNEAB
Background: corn = BFVCTRC; apples = BFVCRA; beans = BFVCTRB.

TABLE A-1
WVDP Environmental Program Drivers and Sampling Rationale

Programmatic Drivers	*Sampling Rationale*
On-Site Air Emissions	
40 CFR 61, Subpart H (radiological air emissions); DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Chapter 4.0 (airborne radiological effluent monitoring and sampling); DOE/EP-0096, Section 3.3 (criteria for effluent measurements)
Ambient Air	
40 CFR 61, Subpart H (radiological air emissions); DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Section 6.7.2 (air measurements, sampling locations); DOE/EP-0023, Section 4.2.3 (air sampling locations and measurement techniques)
On-Site Liquid Effluents and Stormwater	
New York State SPDES Permit No. NY 0000973 (nonradiological; specified points only), DOE Order 458.1, Change 4 (radiological)	DOE-HDBK-1216-2015, Section 3.4.4 (liquid effluent monitoring, sampling locations); New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certification for nonpotable water
Surface Water	
DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Section 6.10.1 (water sampling locations); NYSDOH ELAP certification for nonpotable water
Potable (Drinking) Water	
DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Section 6.10.4 (drinking water sampling); NYSDOH ELAP certification for potable water
On-Site Groundwater	
RCRA §3008(h) Order on Consent (nonradiological); DOE Order 458.1, Change 4 (radiological)	DOE-HDBK-1216-2015, Section 6.10.5 (groundwater sampling); NYSDOH ELAP certification for nonpotable water
Soil and Sediment	
DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Sections 6.9 (basis for sampling soil) and 6.12 (basis for sampling sediment)
Biological	
DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Sections 6.8 (sampling of terrestrial foodstuffs) and 6.11 (basis for sampling aquatic foodstuffs)
Direct Radiation	
DOE Order 458.1, Change 4	DOE-HDBK-1216-2015, Section 6.6 (direct radiation measurement); DOE/EP-0023, Section 4.6 (external radiation)

TABLE A-2 ***(page 1 of 12)***
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Air Emissions			
ANSTSTK[a] STS ventilation exhaust **ANRHWFK**[a] RHWF exhaust	Continuous on-line air particulate monitors	Continuous measurement of fixed filter; replaced biweekly; held as backup	Real-time monitoring - CAM
ANCSPFK[a,b] Container sorting and packaging facility exhaust	Continuous off-line air particulate filters	Biweekly; 26 each location	Gross alpha/beta, gamma isotopic[c] upon collection, flow
	Composite of biweekly particulate filters	Semiannually; 2 each location	Sr-90, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241, gamma isotopic, flow
	Continuous off-line charcoal cartridges	Cartridges collected biweekly and composited into 2 semiannual samples at each location	I-129
OVEs/PVUs[a] Outdoor ventilated enclosures/portable ventilation units	Composite of filters	Semiannually	Sr-90, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241, gamma isotopic, flow

[a] Required by 40 CFR 61, Subpart H. Results reported in the Annual NESHAP Report and evaluated in the ASER.
[b] No repackaging activities occurred in the CSPF in 2024. Therefore, the CSPF system was not operated or sampled in 2024.
[c] Gamma isotopic analysis done only if gross alpha/beta activity rises significantly.

Note: ANRVEU1 MPPB replacement ventilation unit exhaust was shut down in 2022.

TABLE A-2 *(continued, page 2 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Liquid Effluents			
WNSP001[a] outfall 001 Lagoon 3 discharge weir	Continuous	Daily during discharge. Lagoon 3 is discharged 2 to 8 times per year, averaging 6 to 7 days per discharge; 12–56 days per year	Daily flow, hold for flow-weighted composite
	Grab	Twice during discharge; 4–16 per year	Gross alpha/beta, H-3, Sr-90, gamma isotopic
	Flow-weighted composite of daily samples for each discharge	2 to 8 per year	Gross alpha/beta, H-3, C-14, Sr-90, Tc-99, I-129, gamma isotopic, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241
	Grab	Twice during discharge; 4–16 per year	Settleable solids, Total Dissolved Solids (TDS), Dissolved Oxygen (DO)
	24-hour composite	Twice during discharge; 4–16 per year	5-day Biological Oxygen Demand (BOD_5), Total Suspended Solids (TSS), Ammonia (as NH_3), TKN (as N), total Fe
	Grab	Once during discharge; 2–8 per year	Total Hg (method 1631), pH, total recoverable Co, Se, V, total residual chlorine, oil & grease, surfactant (as LAS)
	24-hour composite	Once during discharge; 2–8 per year	Total Al, total recoverable As, dissolved sulfide, NO_3-N, NO_2-N, SO_4
	24-hour composite	Quarterly; 4 per year, every five years[b]	Whole Effluent Toxicity (WET) Testing
	Grab	Semiannually; 2 per year	Cyanide amenable to chlorination, Heptachlor
	24-hour composite	Semiannually; 2 per year	Bromide, B, total Mn, Ni, total recoverable Cu, Cr, Pb, Ti, Zn
	Grab	Annually; 1 per year	Total recoverable Cr+6, Dichlorodifluoromethane, trichlorofluoromethane, 3,3-dichlorobenzidine, tributyl phosphate, xylene, hexachlorobenzene, 2-butanone, alpha-BHC, chloroform
	24-hour composite	Annually; 1 per year	Total Ba, Sb, total recoverable Cd
	Calculated from BOD_5 and Total Kjeldahl Nitrogen (TKN)	Twice during discharge; 4–16 per year	Ultimate Oxygen Demand (UOD)
WNSP01B[a,c] Internal process monitoring point	Continuous	Recorded when operating	Total flow, elapsed flow time
	Grab liquid	Twice per month when operating; 0–24 per year	Total Hg (method 1631)
WNSP116[a] outfall 116 Pseudo-monitoring point	Calculated	Twice per lagoon discharge; 4–16 per year	TDS

[a] Required by SPDES Permit #NY0000973. Results reported in the SPDES DMR and evaluated in the ASER.

[b] WET testing is performed quarterly every 5 years, beginning with year 2012 in accordance with the SPDES permit. The 2017 quarterly testing has been repeated, including in 2024, at the request of NYSDEC due to 2017 performance and ongoing investigations to understand the WET testing results.

[c] WNSP01B is no longer operated.

TABLE A-2 *(continued, page 3 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Liquid Effluents			
WNSP007[a,b] (inactive) Sanitary waste discharge	24-hour composite	Monthly, when discharging	Gross alpha/beta, H-3
	Composite of monthly samples	Annually, if discharged during the year	Sr-90, gamma isotopic
	Grab	2 per month; when discharging	pH, settleable solids, TDS, DO, oil & grease
	24-hour composite	2 per month; when discharging	TSS, BOD_5, ammonia (as NH_3), total Fe
	Grab	Monthly, when discharging	Total residual chlorine, total Hg (method 1631)
	24-hour composite	Monthly, when discharging	TKN (as N), NO_2-N
	24-hour composite	2 per month; when discharging	Flow rate (gpm)
	Calculated from BOD_5 and TKN	Monthly, when discharging	UOD
	24-hour composite	Quarterly; 4 per year , once every 5 years[c]	WET Testing
	Grab	Annually, if discharged during the year	Chloroform
WNURRAW[a] Augmentation water from the reservoirs	Grab	Three per lagoon discharge: pre-discharge, near beginning, at end, 6-24 per year	TDS, flow rate
WNSP006 Franks Creek at the security fence	Timed continuous composite	Biweekly, 26 per year	Gross alpha/beta
	Composite of biweekly samples	Monthly; 12 per year	H-3, Sr-90 and gamma isotopic
	Composite of biweekly samples	Quarterly; 4 per year	C-14, Tc-99, I-129, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241
	Grab	Three per lagoon discharge: pre-discharge, near beginning, at end, 6-24 per year	TDS, flow rate
Stormwater Outfalls			
Group 1[a] **WNSO04 (S04)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, Cd, Cr, Cr+6, Se, V, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, total nitrogen (as N)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease
Group 2[a] **WNSO06 (S06)** **WNSO33 (S33)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, surfactant (as LAS)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease

[a] Required by SPDES Permit #NY0000973. Stormwater reports will be appended to the June and December SPDES DMRs

[b] The waste treatment facility was shutdown in November 2014. WNSP007 is not sampled if there is no discharge.

[c] WET testing at WNSP007 is not required since discharges from this location have been discontinued

TABLE A-2 *(continued, page 4 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Stormwater Outfalls			
Group 3[a] **WNSO09 (S09) WNSO12 (S12)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, Hg (method 1631), total recoverable Cu, Pb, Zn, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, alpha-BHC, total nitrogen (as N)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents (except for pH, oil & grease, and Hg [method 1631])
Group 4[a] **WNSO34 (S34)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, surfactant (as LAS)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease
Group 5[a] **WNSO14 (S14) WNSO17 (S17) WNSO28 (S28)**	First flush grab	Semiannually; 2 per year[b]	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, V, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, surfactant (as LAS), sulfide, settleable solids, total nitrogen (as N)
	Flow-weighted composite	Semiannually; 2 per year[b]	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease
Group 6[a] **WNSO36 (S36) WNSO37 (S37) WNSO38 (S38) WNSO39 (S39) WNSO41 (S41) WNSO42 (S42) WNSO43 (S43)**	First flush grab	Semiannually; 2 per year[b]	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, V, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, surfactant (as LAS), sulfide, settleable solids, total nitrogen (as N)
	S43 only, grab	Semiannually; 2 per year	Total recoverable Pb
	Flow-weighted composite	Semiannually; 2 per year[b]	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease
Group 7[a] **WNSO20 (S20)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, surfactant (as LAS), sulfide, total nitrogen (as N)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease

[a] Required by SPDES Permit # NY0000973. Stormwater reports will be appended to the June and December SPDES DMRs.

[b] For groups containing more than two outfalls, outfalls should be sampled in a rotational sequence until all outfalls in that group have been sampled.

TABLE A-2 *(continued, page 5 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Storm Water Outfalls *(continued)*			
Group 8[a] **WNSO27 (S27)** **WNSO35 (S35)**	First flush grab	Semiannually; 2 per year	pH, oil & grease, BOD_5, TSS, TDS, total P, Al, Fe, total recoverable Cu, Pb, Zn, TKN (as N), ammonia (as NH_3), NO_3-N, NO_2-N, surfactant (as LAS), total nitrogen (as N)
	Flow-weighted composite	Semiannually; 2 per year	Maximum flow, total flow, plus all of the above constituents except for pH and oil & grease
WNSWR01[a] Site rain gauge	Field measurement of precipitation	1 each storm water sampling event	inches of precipitation, pH
On-Site Surface Water			
WNSWAMP Northeast swamp drainage	Timed continuous composite liquid	Biweekly; 26 per year	Gross alpha/beta, pH, flow (flow at WNSWAMP only)
WNSW74A North swamp drainage	Composite of biweekly samples	Monthly; 12 per year	H-3, Sr-90 and gamma isotopic
	Composite of biweekly samples	Semiannually; 2 per year	C-14, I-129, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241
WNSP005 Facility yard drainage	Grab liquid	Monthly; 12 per year	Gross alpha/beta, H-3, pH, Sr-90 and gamma isotopic
WNFRC67 Franks Creek east of SDA	Grab liquid	Quarterly; 4 per year	Gross alpha/beta, H-3, pH
WNERB53 Erdman Brook north of disposal areas	Composite of quarterly samples	Semiannually; 2 per year	Sr-90 and gamma isotopic
WNNDADR Drainage between NDA and SDA	Timed continuous composite liquid	Biweekly; 26 per year	Hold for composite
	Composite of biweekly samples	Monthly; 12 per year	Gross alpha/beta, H-3, gamma isotopic
	Composite of biweekly samples	Semiannually; 2 per year	Sr-90 and I-129
NDA MH#4[b] NDA trench water extraction from manhole #4	Grab liquid	Monthly; 12 per year	Gross alpha/beta, TOC, pH

[a] Required by SPDES Permit # NY0000973. Storm water reports will be appended to the June and December DMRs.
[b] NDA manhole #4 is also identified as WNNDATR under the groundwater program. EMP sampling at this location began November 9, 2017.

TABLE A-2 *(continued, page 6 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Potable (Drinking) Water: Groundwater Supply			
WNDWELL1 and WNDWELL2 Raw water at wellheads	Grab liquid	As needed[a]	Total coliform, E. coli
WNDRAW1, WNDRAW2 Raw untreated groundwater [*collected in treatment building]*	Grab liquid	Monthly; 12 per year	Gross alpha/beta, H-3
		Annually; 1 per year	PFAS (EPA 533)[b] and 1,4-dioxane
		Annually; 1 per year	I-129, gamma isotopic
WNDFIN Treated potable water *[collected in treatment building]*	Grab liquid	Daily; 365 per year	Residual chlorine
		Annually; 1 per year	Na, NO_3-N[c], POCs, MTBE, and vinyl chloride
		Once every 3 years[f]	Ag, As, Ba, Be, Cd, Cr, Hg, Na, Ni, Sb, Se, Tl, cyanide (as free), fluoride, SOCs
WNDNKRH RHWF drinking water	Grab liquid	Once every 3 years[f]	Total haloacetic acids and total trihalomethanes
Sinks sampled in 2024 for water quality[d] : WNDNK23, WNDNK29, WNDNURSE, and WNDFIN	Grab liquid	Quarterly[e] ; 4 per year	Total coliform, E. coli, residual chlorine
Sinks typically sampled for Copper and Lead: WNDNK23, WNDNK25, WNDNK29, WNDNK30, WNDNURSE, and WNDNKRH		Once every 3 years[f]	Cu and Pb
On-Site Potable (Drinking) Water: Source Water Protection Monitoring for Groundwater Supply			
Bedrock monitoring wells: WNEHMKE (EHMKE) **S**outh of MPPB **WWCOURT (WWCOURT)** South of former Annex **WNCT272 (60CT272)** Southeast of warehouse	Grab liquid	Biweekly; 26 per year	Gross alpha/beta, pH and conductivity

[a] Samples are collected at the wellheads only if bacteriological parameters are detected in the distribution system.
[b] Sampling and analysis method used.
[c] Nitrate (NO_3-N) is sampled for and analyzed by CCHD. Sodium is sampled by the WVDP.
[d] Distribution system sinks sampled for total coliform, E. coli, and residual chlorine in 2023 include: New guardhouse (WNDNK29), 10-plex men's room sink (WNDNK23), Nurse's office (WNDNURSE) and the treated water supply (WNDFIN).
[e] One sample is collected by CCHD for bacteriological sampling from one of the four sinks in the left column on a rotational basis each quarter.
[f] To be sampled for again in 2027.

TABLE A-2 *(continued, page 7 of 12)*
2024 Environmental Monitoring Program

Sample Location Code [a]	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Groundwater			
RCRA Wells: 204, 301, 901, 902, 903, 906, 908R, 910R, 1005, 1006, 1008C, 8610, 8611 **Non-RCRA Wells:** 104, 105, 106, 107, 108, 205, 206, 302, 402, 403, 409, 602A, 604, 605, 704, 707, 1008B, 1301 (often dry), 8603, 8604	Grab liquid	Annually, semiannually or quarterly; 1, 2 or 4 per year	Gross alpha/beta, H-3
	Direct field measurement	Twice each sampling event; 2, 4 or 8 per year	Conductivity, pH
RCRA Well: 401, 706 **Non-RCRA Wells:** 405, 802, 1302, 1303, 1304	Grab liquid	Annually or semiannually; 1 or 2 per year	Metals[b] (405, 706, 1302, 1303, 1304)
	Grab liquid	Semiannual; 2 per year	Volatile organic compounds (VOCs[c]) (802 only)
	Grab liquid	Annually; 1 per year	Radioisotopic[d] analyses (401 and 1304 only)
	Grab liquid	Annually or quarterly; 1 or 4 per year	Gross alpha/beta, H-3
	Direct field measurement	Twice each sampling event; 2 or 8 per year	Conductivity, pH
RCRA Wells: 103, 110, 111, 116, 803, 804, 8605, 8607, 8612 **Non-RCRA Wells:** 802	Grab liquid	Annually, semiannually or quarterly; 1, 2, or 4 per year	Volatile organic compounds (VOCs)
	Grab liquid	Annually, or semiannually; 1 or 2 per year	Semivolatile organic compounds (SVOCs[e]) (111, 803, 8605, and 8612 only)
	Grab liquid	Annually; 1 per year	Metals (111 and 8605 only)
	Grab liquid	Semiannually or quarterly; 2 or 4 per year	Gross alpha/beta, H-3
	Direct field measurement	Twice each sampling event; 4 or 8 per year	Conductivity, pH
RCRA Wells: 406, 408, 501, 502, 801, 8609	Grab liquid	Anually; 1 per year	Radioisotopic analyses or Strontium-90
	Grab liquid	Annually or semiannual; 1 or 2 per year	Volatile Organic Compounds (VOCs)
	Grab liquid	Semiannually or quarterly; 2 or 4 per year	Gross alpha/beta, H-3
	Direct field measurement	Twice each sampling event; 4 or 8 per year	Conductivity, pH
RCRA Wells and Trench Sump: 909, MP-01[g], MP-02[g], MP-03, MP-04, NDATR	Grab liquid	Annually, semiannually, or quarterly; 1, 2, or 4 per year	Radioisotopic analyses (MP[f]), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals
	Grab liquid	Semiannually or quarterly; 2 or 4 per year	Gross alpha/beta, H-3
	Direct field measurement	Twice each sampling event; 4 or 8 per year	Conductivity, pH
	Direct field measurement	Once each sampling event; 4 per year	Turbidity (MP wells only)

[a] **Wells monitored for only groundwater levels are not included in this table. Water levels are monitored at all sampling locations listed on this page.**

[b] 6 NYCRR Appendix 33 Metals, see Table D-1C for list

[c] 6 NYCRR Appendix 33 VOCs, see Table D-1C for list

[d] Radioisotopic Analyses: C-14, Sr-90, Tc-99, I-129, Cs-137, Ra-2236, Ra-228, U-232, U-233/234, U-235/236, U-238, Total U

[e] 6 NYCRR Appendix 33 SVOCs, see Table D-1C for list

[f] Radioisotopic Analyses-MP: C-14, K-40, Co-60, Sr-90, Tc-99, I-129, Cs-137, Eu-154, Np-237, Pu-238, Pu-239/240, Pu-241, U-232, U-233/234, U-235/236, U-238, Am-241, Cm-243/244

[g] Sampling at MP-01 and MP-02 has been temporarily discontinued since 2022 due to MPPB demolition activities.

TABLE A-2 *(continued, page 8 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
On-Site Groundwater			
North plateau seeps (not in a SSWMU): (points GSEEP, SP04, SP06, SP11, SP12)	Grab liquid	Semiannually (quarterly at GSEEP); 2 (or 4) per year	Gross alpha/beta, H-3 (also VOCs at GSEEP and SP12)
	Direct field measurement of sampled water	Semiannually at SP12 (quarterly at GSEEP); 2 (or 4) per year	pH, conductivity
PTWPMP wells[a] : (66 PTW platform wells at stations 1-12, installed in 2010 [i.e., PTW-S1A] and 20 pre-existing full network wells [i.e., WP02, MW-5])	Grab liquid	Quarterly (annually at full network wells); 4 (or 1) per year at each location	Sr-90
	Grab liquid	Annually; 1 per year at each location	Geochemical parameters: Na, K, Ca, Mg, carbonate, bicarbonate, SO_4, Cl
	Direct field measurement	Twice each sampling event; 8 per year (if quarterly), 2 per year (if annually)	Conductivity, pH, temperature, oxidation-reduction potential, dissolved oxygen, and turbidity
NPGMP Wells[a] **:** (25 north plateau wells)	Grab liquid	Quarterly; 4 per year at each location	Gross beta
Surface water elevation points[a] **:** (SE007, SE008, SE009, SE011)	Direct field measurement	Quarterly; 4 per year at each location	Water level
SDA (SSWMU #11)	Groundwater wells in SSWMU #11 are sampled by NYSERDA under a separate program. For information, see the NYSERDA website at www.nyserda.ny.gov.		
On-Site Soil/Sediment			
SN on-site soil series: SNSW74A (near WNSW74A), **SNSWAMP** (near WNSWAMP), and **SNSP006** (near WNSP006)	Surface plug composite soil/sediment	1 each location every five years (sampled in 2022)	Gross alpha/beta, gamma isotopic, Sr-90, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241
Off-Site Soil			
SF off-site soil series (collected at historical air sampling location[s]); **SFFXVRD, SFRT240, SFRSPRD, SFGRVAL**	Surface plug composite soil	1 each location every five years (sampled in 2022)	Gross alpha/beta, Sr-90, gamma isotopic, Pu-238, Pu-239/240, Am-241. At nearest site (**SFRSPRD**) and background (**SFGRVAL**), also U-232, U-233/234, U-235/236, U-238, and total U

[a] Water levels are monitored at all sampling locations listed in the category.

TABLE A-2 *(continued, page 9 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Off-Site Sediment			
SFCCSED Cattaraugus Creek at Felton Bridge **SFSDSED** Cattaraugus Creek at Springville Dam **SFTCSED** Buttermilk Creek at Thomas Corners Road **SFBCSED** Buttermilk Creek at Fox Valley Road (background)	Grab stream sediment	1 each location every five years (sampled in 2022)	Gross alpha/beta, gamma isotopic, Sr-90, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241
Off-Site Surface Water			
WFBCBKG Buttermilk Creek near Fox Valley (background)	Timed continuous composite liquid	Biweekly; 26 per year	Hold for composite
	Composite of biweekly samples	Monthly; 12 per year	Gross alpha/beta, H-3
	Composite of biweekly samples	Semiannually; 2 per year	C-14, Sr-90, Tc-99, I-129, U-232, U-233/234, U-235/236, U-238, total U, Pu-238, Pu-239/240, Am-241, gamma isotopic
WFFELBR Cattaraugus Creek at Felton Bridge (downstream of confluence with Buttermilk Creek); nearest point of public access to waters receiving WVDP effluents	Timed continuous composite liquid	Biweekly; 26 per year	Gross alpha/beta, pH, flow
	Flow-weighted composite of biweekly samples	Monthly; 12 per year	Gross alpha/beta, H-3, Sr-90, and gamma isotopic
WFBCTCB Buttermilk Creek at Thomas Corners Road, downstream of WVDP and upstream of confluence with Cattaraugus Creek	Timed continuous composite liquid	Biweekly; 26 per year	Hold for composite
	Composite of biweekly samples	Monthly; 12 per year	Gross alpha/beta, H-3
	Composite of biweekly samples	Semiannually; 2 per year	Sr-90, gamma isotopic

TABLE A-2 *(continued, page 10 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Off-Site Ambient Air			
AF01_N North at Bond Road **AF02_NNE** North-northeast at Rt. 240 **AF03_NE** Northeast at Rt. 240 **AF04_ENE** East-northeast at Rt. 240	Glass fiber filters for air particulates	Biweekly; 26 per year	Gross alpha/beta screening, flow; Hold for composite
AF05_E East at Heinz Road **AF06_ESE** East-southeast at Buttermilk Road **AF07_SE** Southeast at Fox Valley Road **AF08_SSE** South-southeast at Fox Valley Road	Charcoal cartridge for iodine	Monthly; 12 per year	I-129 screening, flow; Hold for composite
AF09_S South at Rock Springs Road **AF10_SSW** South-southwest at Dutch Hill Road **AF11_SW** Southwest at Dutch Hill Road **AF12_WSW** West-southwest at Dutch Hill Road	Composite of biweekly glass fiber filters	Quarterly; 4 per year	Sr-90, gamma isotopic, U-232, Pu-238, Pu-239/240, Am-241, flow
AF13_W West at Dutch Hill Road **AF14_WNW** West-northwest at Boberg Road **AF15_NW** Northwest at Rock Springs Road **AF16_NNW** North-northwest at Rock Springs Road (Low volume sampler at historical MEOSI location)	Composite of monthly charcoal	Quarterly; 4 per year	I-129, flow

TABLE A-2 *(continued, page 11 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Off-Site Ambient Air			
AF16HNNW North-northwest at Rock Springs Road (High volume sampler at historical MEOSI location)	Glass fiber filters for air particulates	Biweekly; 26 per year	Gross alpha/beta screening, flow; Hold for composite
	Composite of biweekly glass fiber filters	Quarterly; 4 per year	Sr-90, gamma isotopic, U-232, Pu-238, Pu-239/240, Am-241, flow
AFGRVAL 29 km south at Great Valley (background)	Glass fiber filter for air particulates	Biweekly; 26 per year	Gross alpha/beta screening, flow; Hold for composite
	Charcoal cartridge for iodine	Monthly; 12 per year	I-129 screening, flow; Hold for composite
	Composite of monthly charcoal	Quarterly; 4 per year	I-129, flow
	Composite of biweekly glass fiber filters	Quarterly; 4 per year	Sr-90, gamma isotopic, U-232, Pu-238, Pu-239/240, Am-241, flow
Off-Site Biological			
BFMSCHT Dairy farm 4.9 km southeast of WVDP	Grab milk sample	Annual; 1 per year	Sr-90, I-129, gamma isotopic
BFMCTLS Control location 22 km south (background) **BFMBLSY** Dairy farm 5.5 km west-northwest	Grab milk sample	Each location and background, once every five years (sampled in 2022)	Sr-90, I-129, gamma isotopic
BFDNEAR Deer in the vicinity of the WVDP **BFDCTRL** Control deer 16 km or more from the WVDP	Individual collection of samples, usually from deer killed in collisions with vehicles	Six deer collected annually (3 near-site, 3 background)	Gamma isotopic and Sr-90 in edible portions of meat, % moisture, H-3 in free moisture
BFVNEAAF (apples), **BFVNEAB** (beans), **BFVNEAC** (corn) Food crops from locations near the WVDP **BFVCTRL** Control food crops (apples, beans, and corn) from locations far from the WVDP	Grab biological	Each food crop and background, once every five years at time of harvest (sampled in 2022)	Gamma isotopic and Sr-90 in edible portions, % moisture, H-3 in free moisture

TABLE A-2 *(concluded, page 12 of 12)*
2024 Environmental Monitoring Program

Sample Location Code	*Sampling Type/ Medium*	*Collection Frequency/ Total Annual Samples*	*Measurements/Analyses*
Off-Site Biological			
BFFCATC Fish from Cattaraugus Creek downstream of its confluence with Buttermilk Creek **BFFCATD** Fish from Cattaraugus Creek downstream of the Springville Dam **BFFCTRL** Control fish sample from nearby stream not affected by WVDP (7 km or more upstream of site effluent point); background	Individual collection of fish	Once every 5 years; 10 fish from each location (sampled in 2022)	Gamma isotopic and Sr-90 in edible portions, % moisture
Off-Site Direct Radiation			
DFTLD Series: Off-site environmental thermoluminescent dosimeters (TLDs): **#1 through #16**, at each of 16 compass sectors at nearest accessible perimeter point **#20:** 1,500 m northwest (downwind receptor) **#23:** 29 km south, Great Valley (background)	Integrating TLD	Semiannually; 2 per year at each location	Gamma radiation exposure
On-Site/ Near-Site Direct Radiation			
DNTLD Series: On-site TLDs **#33**: Corner of the SDA **#24, #28, #44**: Security fence around the WVDP **#32, #35, #36**: Drum Cell road, Drum Cell south fence, and north of Drum Cell **#38, #40**: Near operational areas on-site **#43**: SDA west perimeter fence	Integrating TLD	Semiannually; 2 per year at each location	Gamma radiation exposure

FIGURE A-1
West Valley Demonstration Project (WVDP) Base Map

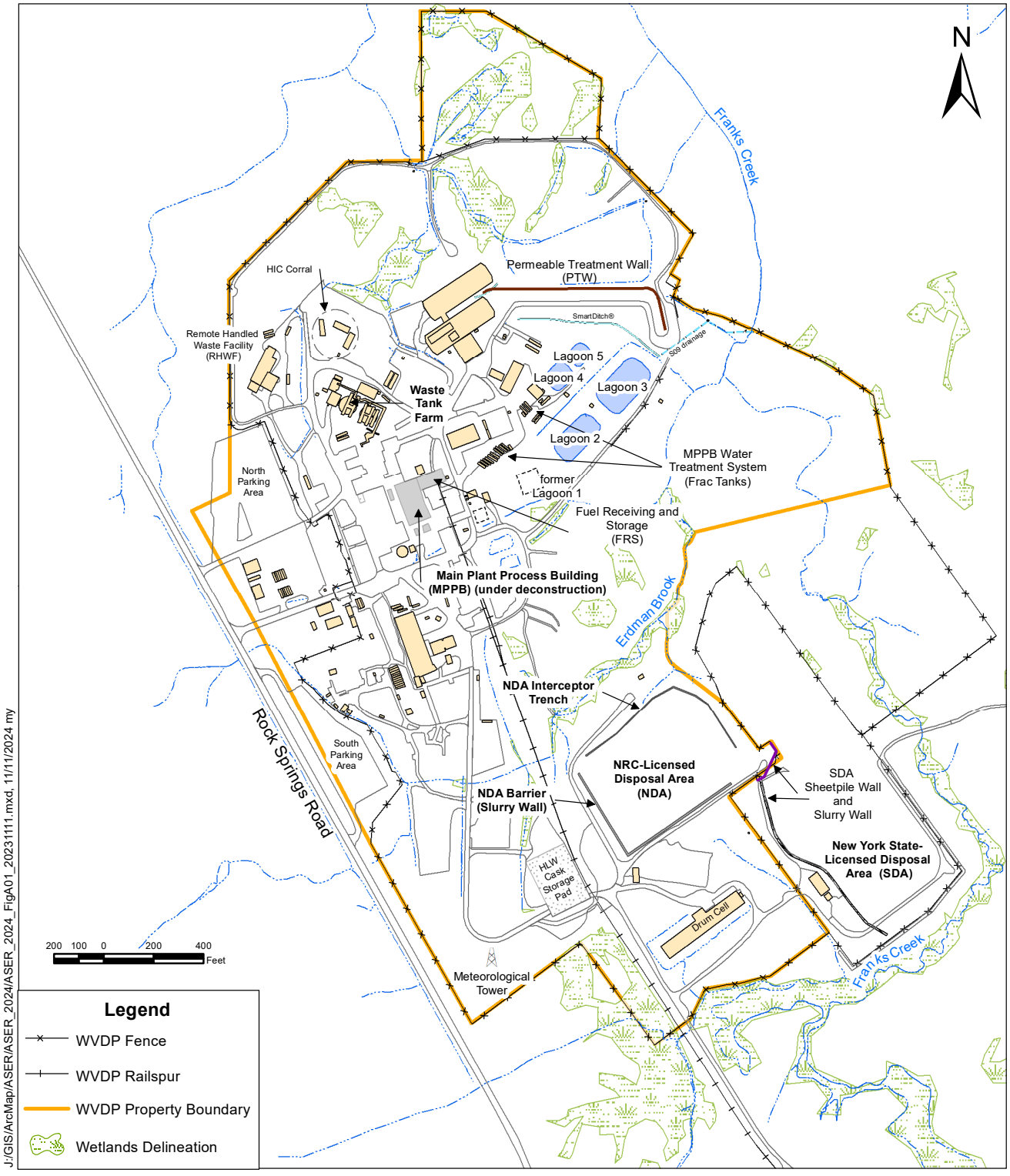


FIGURE A-2
On-Site Liquid Effluent, Surface Water and Soil/Sediment Sampling Locations

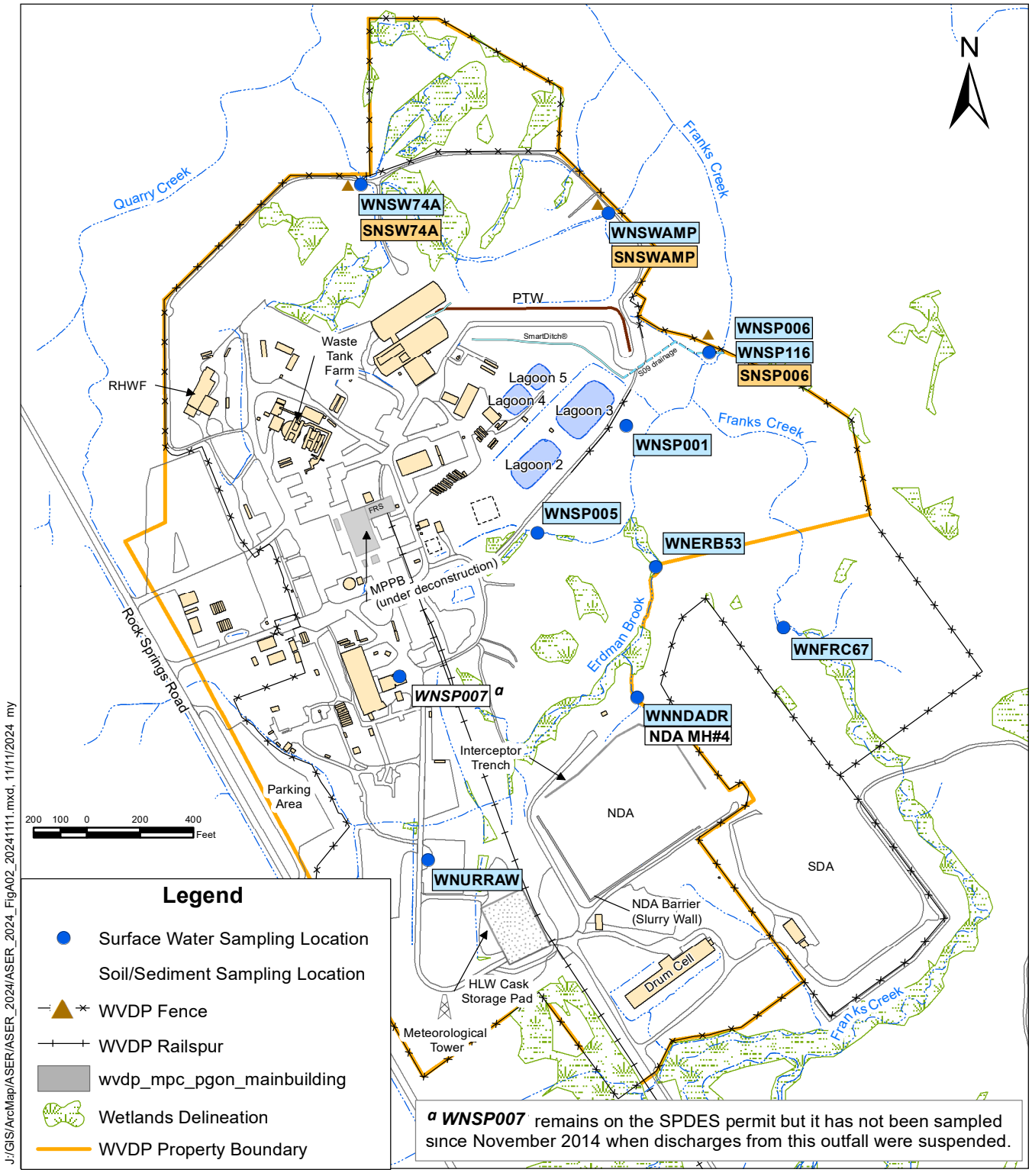


FIGURE A-3
On-Site Stormwater Outfalls

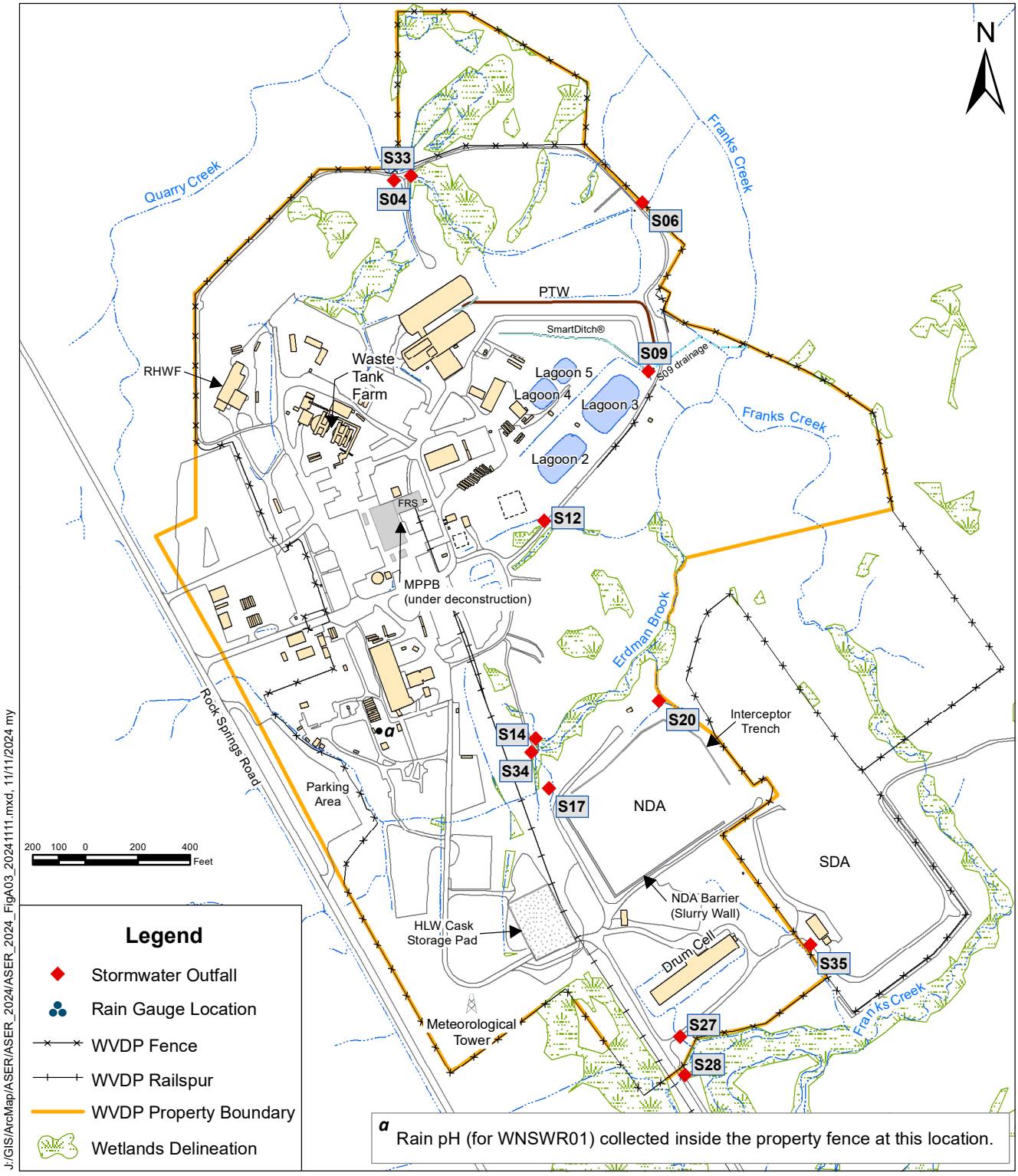


FIGURE A-4
Rail Spur Stormwater Outfalls

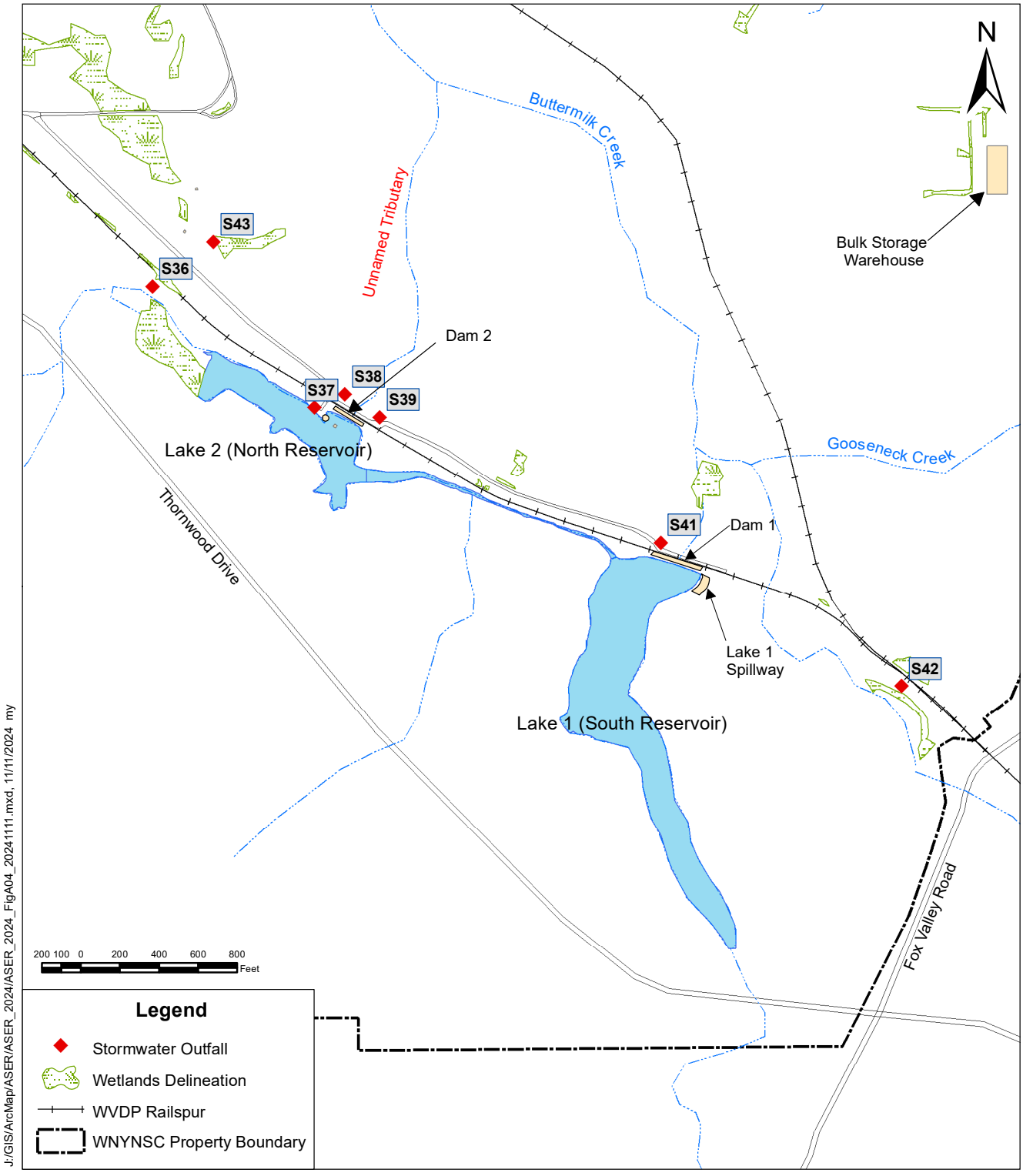


FIGURE A-5
Off-Site Surface Water and Soil/Sediment Sampling Locations

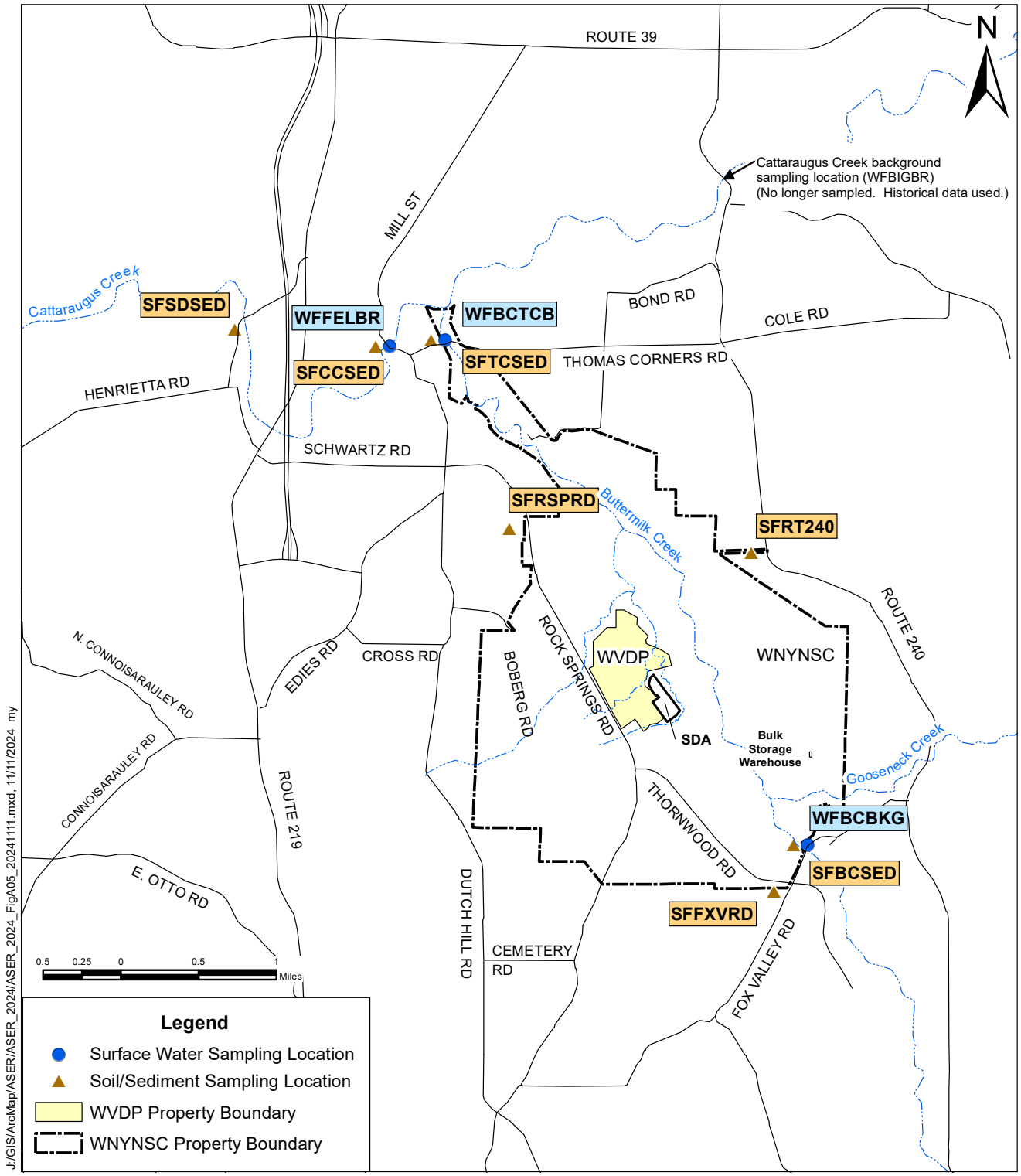
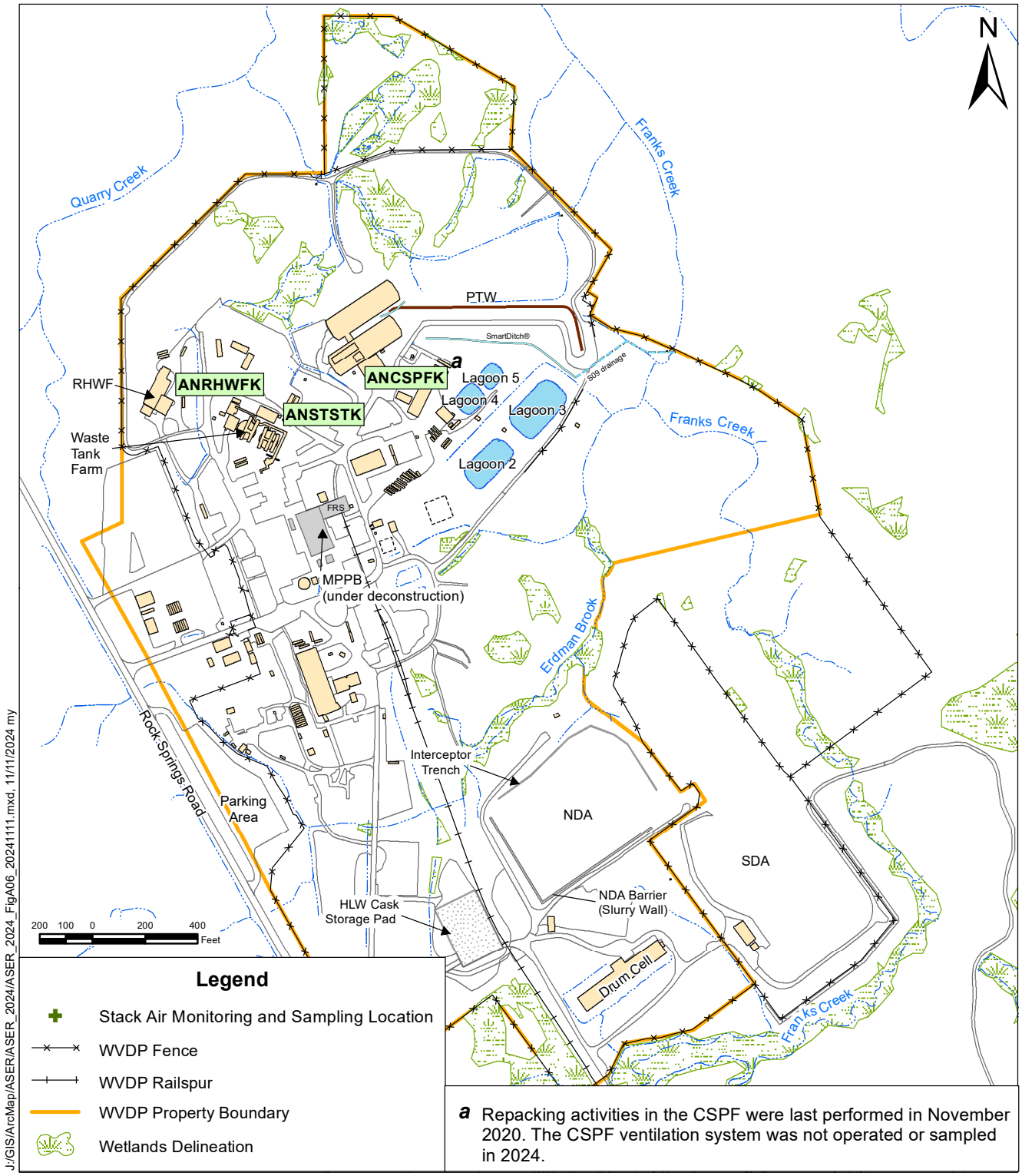


FIGURE A-6
On-Site Air Monitoring and Sampling Locations



a Repacking activities in the CSPF were last performed in November 2020. The CSPF ventilation system was not operated or sampled in 2024.

FIGURE A-7
Off-Site Ambient Air Monitoring and Sampling Locations

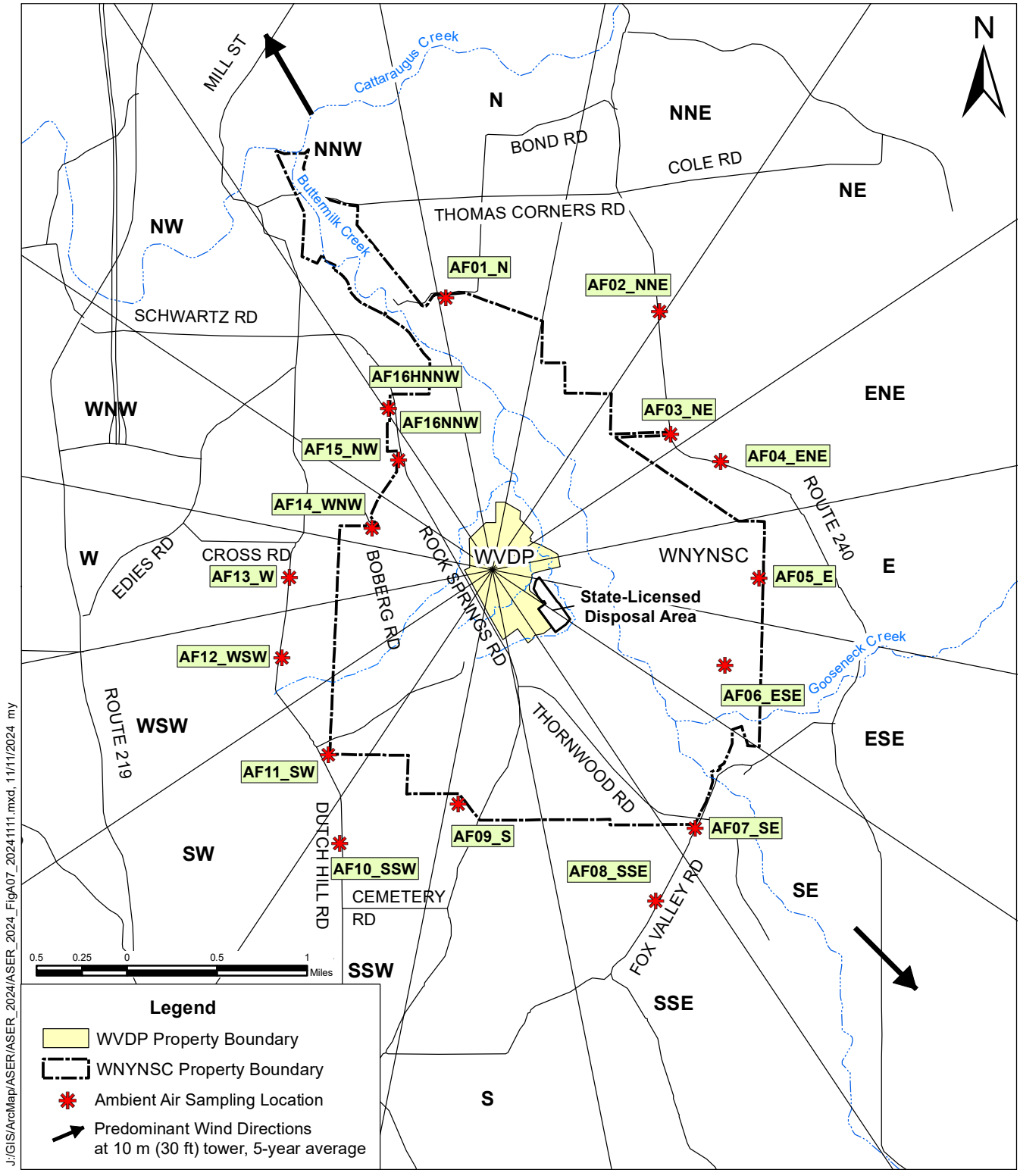


FIGURE A-8
Drinking Water Supply Wells and Source Water Protection Monitoring Network

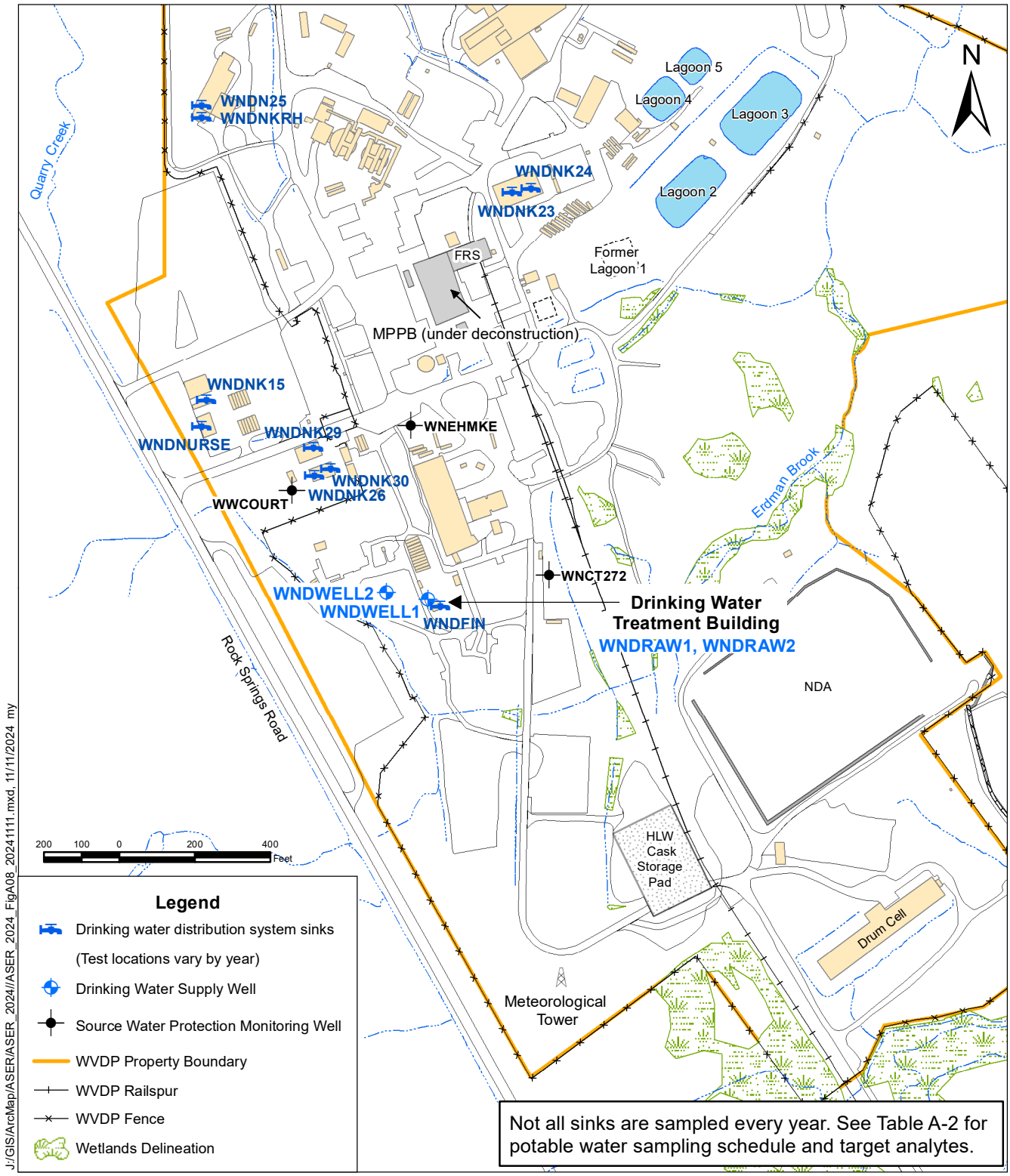


FIGURE A-9
North Plateau Groundwater Monitoring Network

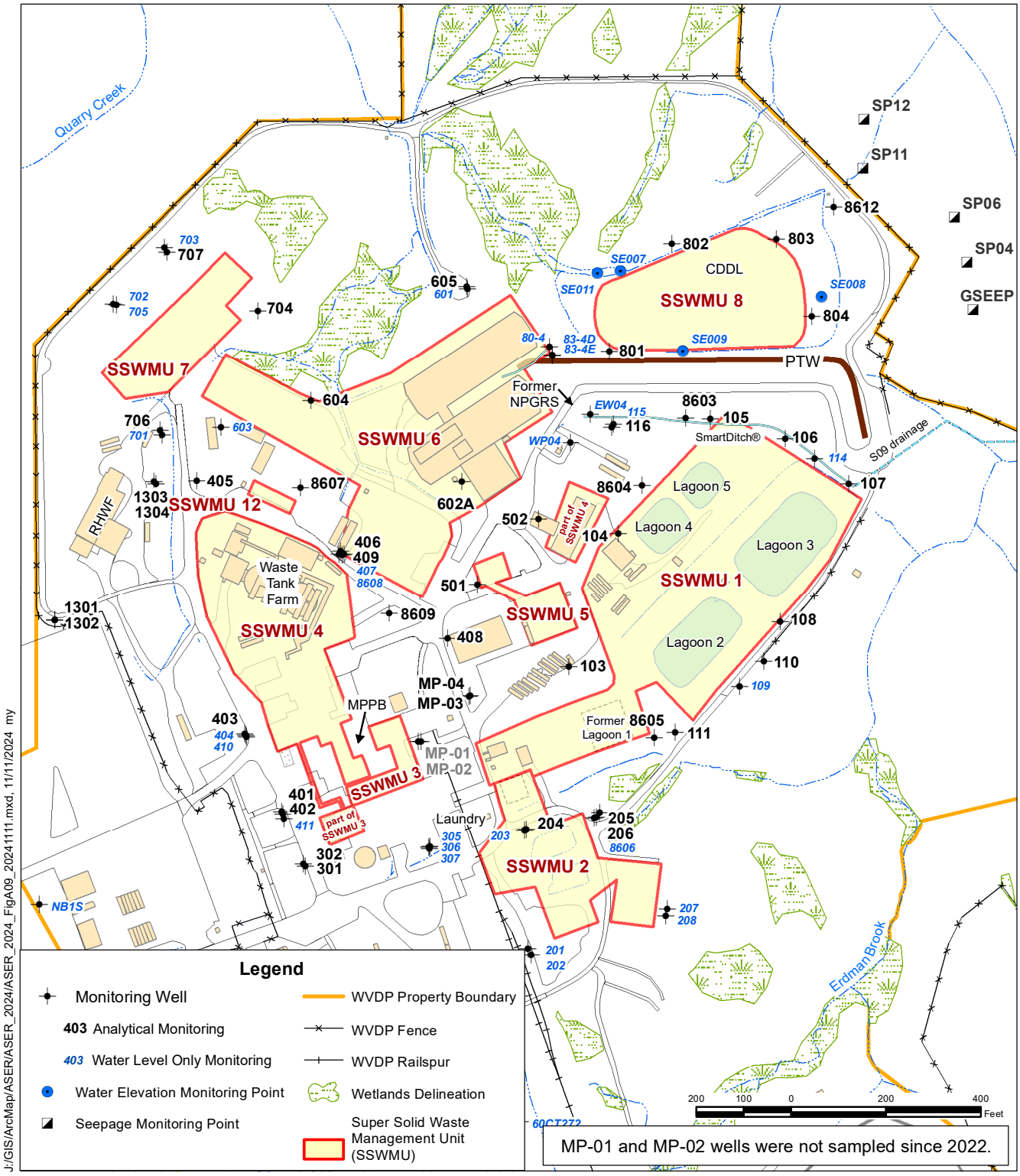


FIGURE A-10
South Plateau Groundwater Monitoring Network

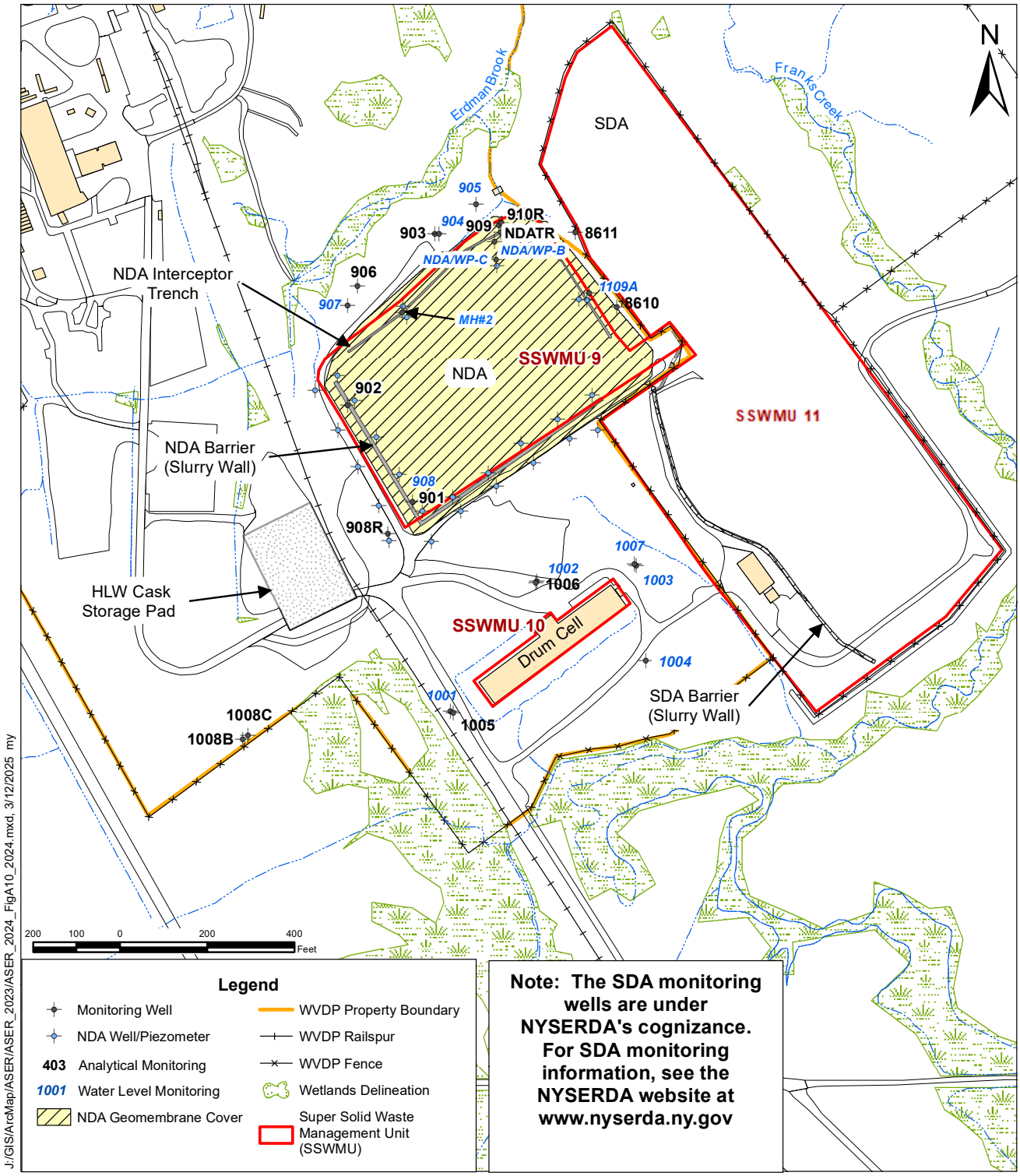


FIGURE A-11
Biological Sampling Locations

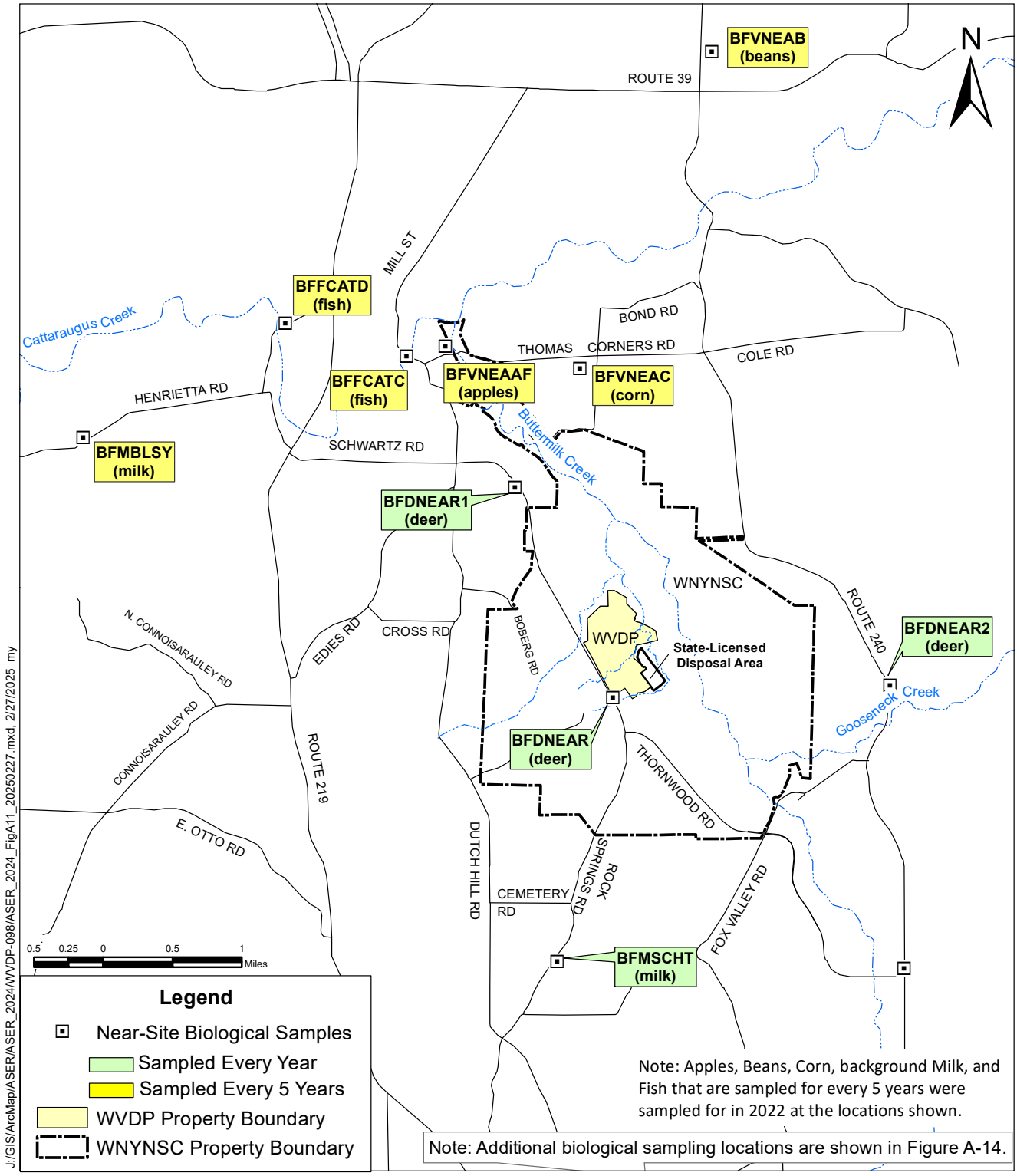


FIGURE A-12
Location of On-Site / Near-Site Thermoluminescent Dosimeters (TLDs)

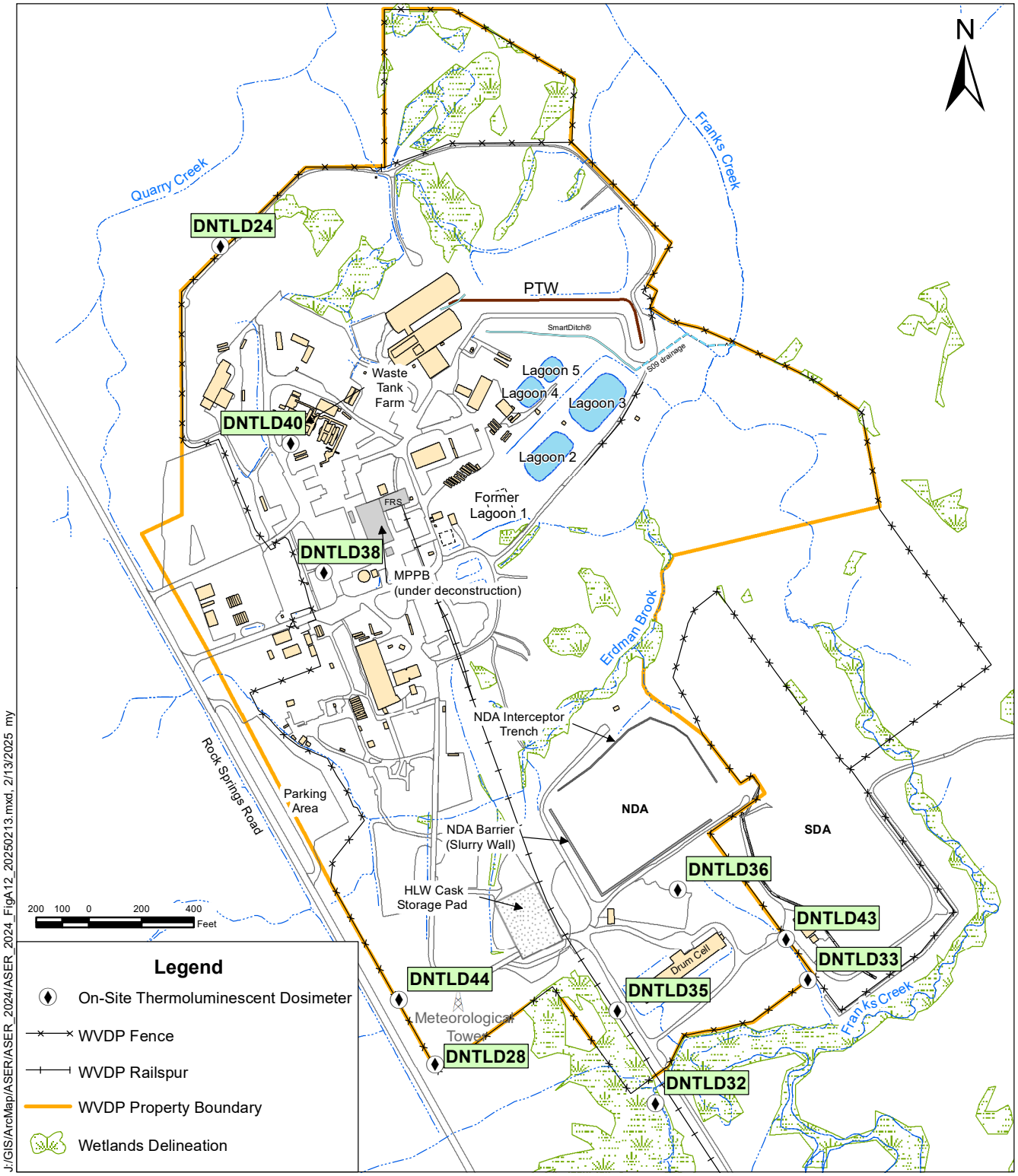


FIGURE A-13
Location of Off-Site Thermoluminescent Dosimeters (TLDs) Within 5 Kilometers of the WVDP

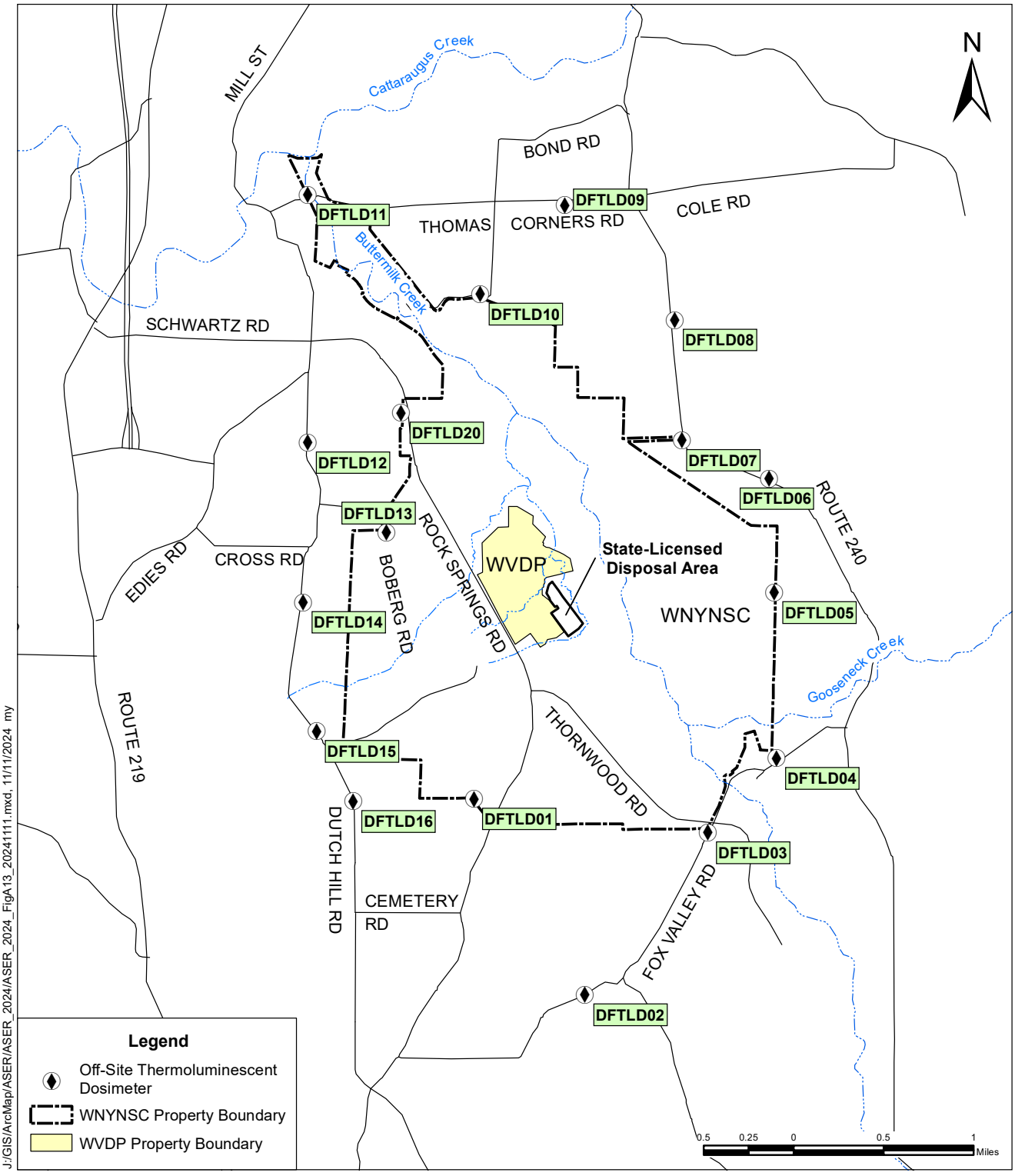


FIGURE A-14
Environmental Sampling Locations More Than 5 Kilometers From the WVDP

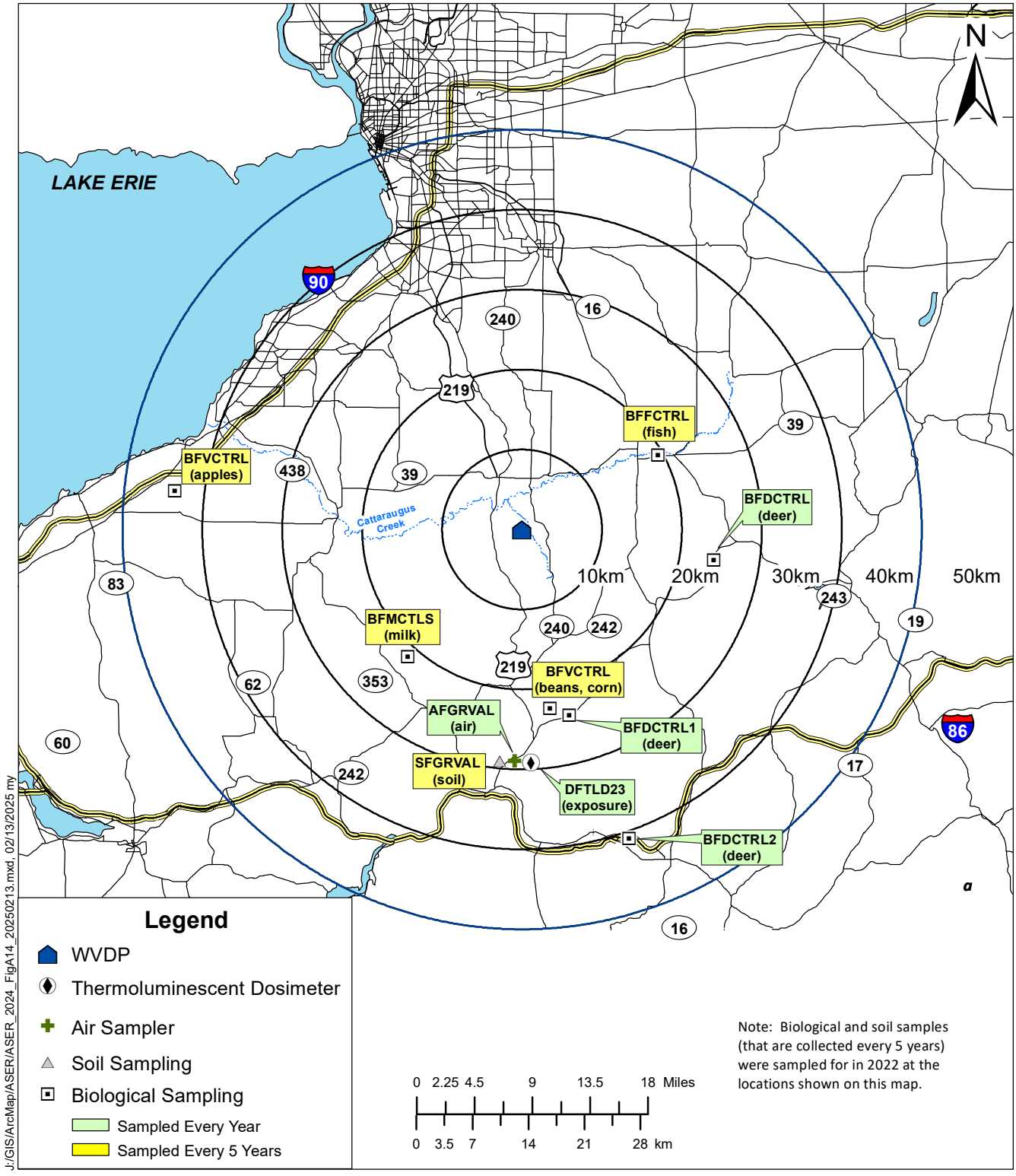
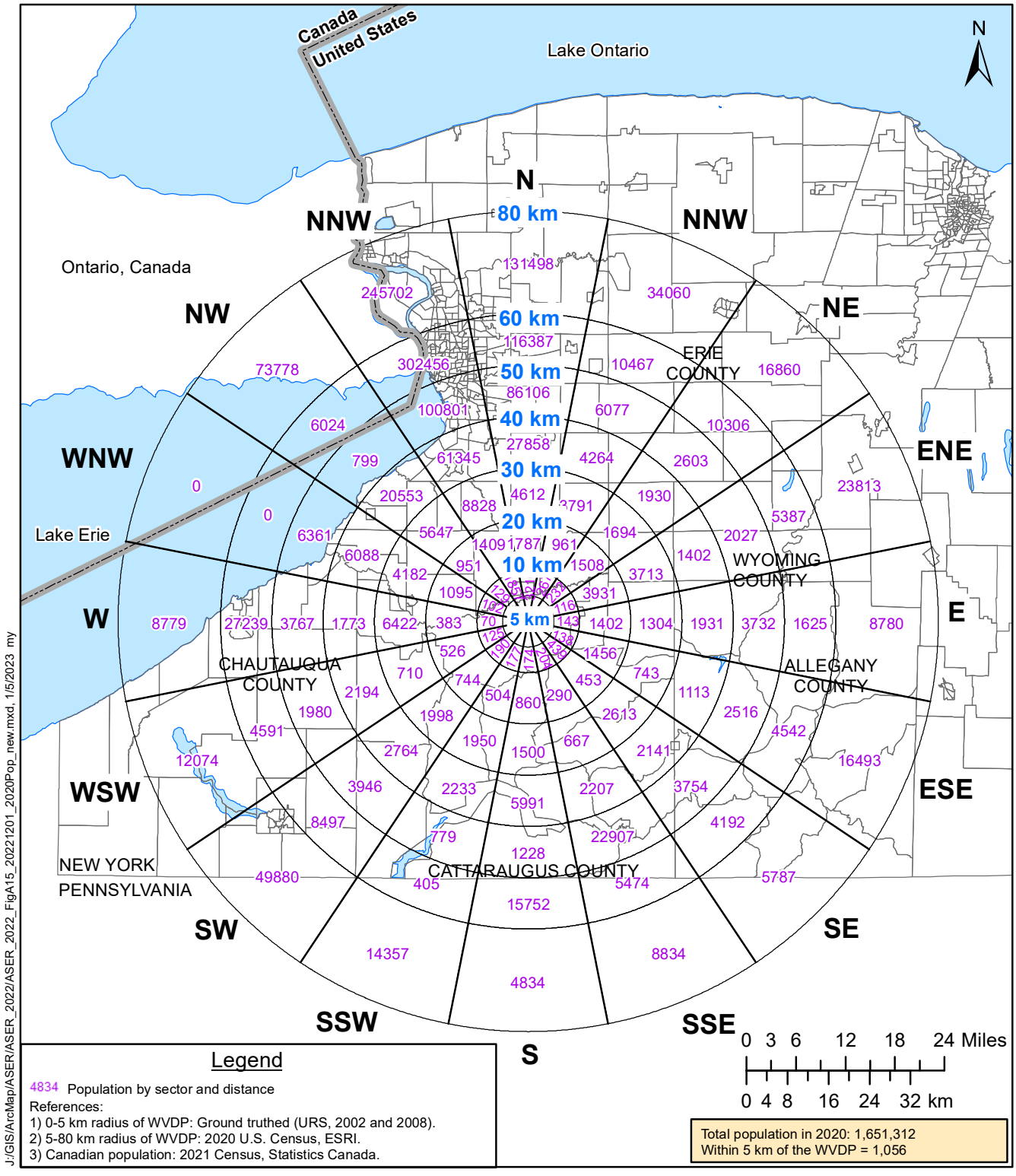


FIGURE A-15
Population by Sector Within 80 Kilometers of the WVDP



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APPENDIX B-1

Summary of Water Limits, Guidelines, and Standards

TABLE B-1A
West Valley Demonstration Project (WVDP)
State Pollutant Discharge Elimination System (SPDES) Sampling Program

Outfall 001	*Parameter*	*Effluent Limit*	*Sample Frequency*
001; Process and Storm Wastewater	Flow	Monitor - MGD	2/batch
	Aluminum	4.0 mg/L	1/batch
	Ammonia as (NH_3)	2.1 mg/L	2/batch
	pH	6.5–8.5 SU	1/batch
	Dissolved Oxygen (DO)	3.0 mg/L (minimum)	2/batch
	Oil and grease	15.0 mg/L	1/batch
	Solids, total suspended	45 mg/L	2/batch
	Solids, Settleable	0.3 mL/L	2/batch
	Solids, Total dissolved	Monitor	2/batch
	BOD_5	10.0 mg/L	2/batch
	TKN (as N)	Monitor	2/batch
	Nitrate (as N)	Monitor	1/batch
	Nitrite (as N)	0.1 mg/L	1/batch
	Ultimate oxygen demand (UOD)	22.0 mg/L	2/batch
	Chlorine, total residual	0.1 mg/L	1/batch
	Arsenic, total recoverable	0.15 mg/L	1/batch
	Cadmium, total recoverable	0.002 mg/L	1/year
	Iron, total	Monitor	2/batch
	Chromium, total recoverable	0.11 mg/L	2/year
	Chromium, hexavalent, total recoverable	0.011 mg/L	1/year
	Copper, total recoverable	0.014 mg/L	2/year
	Cyanide, amenable to chlorination	0.005 mg/L	2/year
	Manganese, total	2.0 mg/L	2/year
	Lead, total recoverable	0.006 mg/L	2/year
	Nickel, total	0.079 mg/L	2/year
	Selenium, total recoverable	0.004 mg/L	1/batch
	Sulfate	Monitor	1/batch
	Sulfide, dissolved	0.4 mg/L	1/batch
	Cobalt, total recoverable	0.005 mg/L	1/batch
	Vanadium, total recoverable	0.014 mg/L	1/batch
	Zinc, total recoverable	0.13 mg/L	2/year
	Dichlorodifluoromethane	0.01 mg/L	1/year
	Trichlorofluoromethane	0.01 mg/L	1/year
	3,3-Dichlorobenzidine	0.01 mg/L	1/year
	Tributylphosphate	0.1 mg/L	1/year
	Heptachlor	0.01 µg/L	2/year
	Surfactant (as LAS)	0.04 mg/L	1/batch
	Xylene	0.05 mg/L	1/year
	2-butanone	0.5 mg/L	1/year
	Hexachlorobenzene	0.2 µg/L	1/year
	Mercury, total	50 ng/L	1/batch
	Alpha - BHC	0.01 µg/L	1/year

TABLE B-1A (*continued*)
West Valley Demonstration Project (WVDP)
State Pollutant Discharge Elimination System (SPDES) Sampling Program

Outfall 001	*Parameter*	*Action Levels*	*Sample Frequency*
001; Process and Storm Wastewater	Antimony	1.0 mg/L	1/year
	Barium	0.5 mg/L	1/year
	Boron	2.0 mg/L	2/year
	Bromide	5.0 mg/L	2/year
	Chloroform	0.3 mg/L	1/year
	Titanium	0.65 mg/L	2/year
	Whole Effluent Toxicity (WET) Testing[a]		
	Parameter	***Action Levels***	***Sample Frequency***
	WET - Acute Invertebrate	0.3 TUa	Quarterly
	WET - Acute Vertebrate	0.3 TUa	Quarterly
	WET - Chronic Invertebrate	1.0 TUc	Quarterly
	WET - Chronic Vertebrate	1.0 TUc	Quarterly

Outfall 007	*Parameter*	*Effluent Limit*	*Sample Frequency*
007[b]; Sanitary and Utility Wastewater	pH	6.5–8.5 SU	2/month
	Dissolved oxygen (DO)	3.0 mg/L (minimum)	2/month
	Flow	Monitor - MGD	1/month
	Oil and Grease	15.0 mg/L	2/month
	Solids, total suspended	45 mg/L	2/month
	Solids, settleable	0.3 mL/L	2/month
	Solids, total dissolved	Monitor	2/month
	BOD_5	10.0 mg/L	2/month
	Ammonia (as NH_3)	2.1 mg/L	2/month
	TKN (as N)	Monitor	Monthly
	Nitrite (as N)	0.1 mg/L	Monthly
	Ultimate oxygen demand (UOD)	22.0 mg/L	Monthly
	Iron, total	Monitor	2/month
	Chlorine, total residual	0.1 mg/L	Monthly
	Mercury, total	50 ng/L	Monthly
	Chloroform	0.20 mg/L	1/year
	Whole Effluent Toxicity (WET) Testing[a]		
	Parameter	***Action Levels***	***Sample Frequency***
	WET - Acute Invertebrate	0.3 TUa	Quarterly
	WET - Acute Vertebrate	0.3 TUa	Quarterly
	WET - Chronic Invertebrate	1.0 TUc	Quarterly
	WET - Chronic Vertebrate	1.0 TUc	Quarterly

Outfall 01B	*Parameter*	*Effluent Limit*	*Sample Frequency*
01B[b]; Mercury Pre-Treatment Process	Flow	Monitor - GPD	Weekly
	Mercury, total	50 ng/L	2/batch

Sum of Outfalls	*Parameter*	*Effluent Limit*	*Sample Frequency*
001 and 007	Iron, total	1.0 mg/L	Monthly

[a] WET testing is required every five years unless otherwise directed by NYSDEC.
[b] WNSP01B and WNSP007 are no longer in operation.

TABLE B-1A (*concluded*)
West Valley Demonstration Project
State Pollutant Discharge Elimination System (SPDES) Sampling Program

Monitoring Point	*Parameter*	*Effluent Limit*	*Sample Frequency*
116	Solids, total dissolved	500 mg/L	2/discharge event

Monitoring Point	*Parameter*	*Compliance Limit*	*Sample Frequency*
Stormwater Outfalls (All)	Oil & grease	<15 mg/L	1/event
Outfall S43	Lead, total recoverable	0.006 mg/L	1/event

TABLE B-1B

New York State Water Quality Standards and Guidelines[a]

Parameter	*Units*	*Class A*	*Class B*	*Class C*	*Class D*	*Class GA*
Gross Alpha[b]	pCi/L (µCi/mL)	15 (1.5E-08)	--	--	--	15 (1.5E-08)
Gross Beta[c]	pCi/L (µCi/mL)	1,000 (1E-06)	--	--	--	1,000 (1E-06)
Tritium (H-3)	pCi/L (µCi/mL)	20,000 (2E-05)	--	--	--	--
Strontium-90	pCi/L (µCi/mL)	8 (8E-09)	--	--	--	--
Alpha BHC	mg/L	0.000002	0.000002	0.000002	0.000002	0.00001
Aluminum, Ionic	mg/L	0.10	0.10	0.10	--	--
Aluminum, Total	mg/L	--	--	--	--	--
Ammonia, Total as N	mg/L	0.09–2.1	0.09–2.1	0.09–2.1	0.67–29	2.0
Antimony, Total	mg/L	0.003	--	--	--	0.003
Arsenic, Dissolved	mg/L	0.050	0.15	0.15	0.34	--
Arsenic, Total	mg/L	0.050	--	--	--	0.025
Barium, Total	mg/L	1.0	--	--	--	1.0
Beryllium, Total	mg/L	0.003	[d]	[d]	--	0.003
Boron, Total	mg/L	10	10	10	--	1.0
Bromide	mg/L	2.0	--	--	--	2.0
Cadmium, Dissolved[e]	mg/L	--	--	--	--	--
Cadmium, Total	mg/L	0.005	--	--	--	0.005
Calcium, Total	mg/L	--	--	--	--	--
Chloride	mg/L	250	--	--	--	250
Chromium, Dissolved[e]	mg/L	--	--	--	--	--
Chromium, Total	mg/L	0.05	--	--	--	0.05
Cobalt, Total[f]	mg/L	0.005	0.005	0.005	0.11	--
Conductivity	µmhos/cm@25°C	--	--	--	--	--
Copper, Dissolved[e]	mg/L	--	--	--	--	--
Copper, Total	mg/L	0.20	--	--	--	0.20
Cyanide	mg/L	0.0052	0.0052	0.0052	0.022	0.200
Dissolved Oxygen (minimum)	mg/L	4.0	4.0	4.0	3.0	--
Fluoride[e]	mg/L	--	--	--	--	1.5
Hardness	mg/L	--	--	--	--	--
Iron and Manganese (sum)	mg/L	--	--	--	--	0.50
Iron, Total	mg/L	0.30	0.30	0.30	0.30	0.30

-- No applicable guideline or reference standard available.

Note: All water quality and metals standards are presented in mg/L (ppm) to provide consistency in comparisons.

[a] Source: 6 NYCRR Part 702 - 704; The most stringent applicable pathway (e.g., wildlife, aquatic, human health) values are reported.

[b] Gross alpha standard excludes radon and uranium, however WVDP results include uranium.

[c] Gross beta standard excludes strontium-90 and alpha emitters, however WVDP results include these isotopes.

[d] Beryllium standard for classes "B" and "C" are based on stream hardness values.

[e] Standards for these constituents vary according to stream location hardness values.

[f] Standards for cobalt, thallium, and vanadium are applicable to the acid soluble fraction.

TABLE B-1B *(concluded)*

New York State Water Quality Standards and Guidelines[a]

Parameter	*Units*	*Class A*	*Class B*	*Class C*	*Class D*	*Class GA*
Lead, Dissolved[e]	mg/L	--	--	--	--	--
Lead, Total	mg/L	0.050	--	--	--	0.025
Magnesium, Total	mg/L	35	--	--	--	35
Manganese, Total	mg/L	0.30	--	--	--	0.30
Mercury, Dissolved	mg/L	0.0000007	0.0000007	0.0000007	0.0000007	--
Mercury, Total	mg/L	0.0007	--	--	--	0.0007
Nickel, Dissolved[e]	mg/L	--	--	--	--	--
Nickel, Total	mg/L	0.10	--	--	--	0.10
Nitrate-N	mg/L	10	--	--	--	10
Nitrate + Nitrite	mg/L	10	--	--	--	10
Nitrite-N	mg/L	0.10	0.10	0.10	--	1.0
Oil & Grease	mg/L	No residue nor visible oil film nor globules of grease.				
pH	SU	6.5–8.5	6.5–8.5	6.5–8.5	6.0–9.5	6.5–8.5
Potassium, Total	mg/L	--	--	--	--	--
Selenium, Dissolved	mg/L	0.0046	0.0046	0.0046	--	--
Selenium, Total	mg/L	0.01	--	--	--	0.01
Silver, Total	mg/L	0.05	--	--	--	0.05
Sodium, Total	mg/L	--	--	--	--	20
Solids, Total Dissolved	mg/L	500	500	500	--	500
Solids, Total Suspended	mg/L	None that will cause deposition or impair waters for best usage.				
Sulfate	mg/L	250	--	--	--	250
Sulfide (undissociated form)	mg/L	0.002	0.002	0.002	--	0.050
Surfactants (as LAS)	mg/L	0.04	0.04	0.04	--	--
Thallium, Total[f]	mg/L	0.0005	0.008	0.008	0.020	0.0005
Titanium, Total	mg/L	--	--	--	--	--
Vanadium, Total[f]	mg/L	0.014	0.014	0.014	0.19	--
Zinc, Dissolved[e]	mg/L	--	--	--	--	--
Zinc, Total	mg/L	2.0	--	--	--	2.0

-- No applicable guideline or reference standard available.

Note: All water quality and metals standards are presented in mg/L (ppm) to provide consistency in comparisons.

[a] Source: 6 NYCRR Part 702 - 704; The most stringent applicable pathway (e.g., wildlife, aquatic, human health) values are reported.

[b] Gross alpha standard excludes radon and uranium, however WVDP results include uranium.

[c] Gross beta standard excludes strontium-90 and alpha emitters, however WVDP results include these isotopes.

[d] Beryllium standard for classes "B" and "C" are based on stream hardness values.

[e] Standards for these constituents vary according to stream location hardness values.

[f] Standards for cobalt, thallium, and vanadium are applicable to the acid soluble fraction.

TABLE B-1C
New York State Department of Health Potable Water MCLs
for a Groundwater Supply

Parameter	*Units*	*NYSDOH MCL* [a]
Inorganic Chemicals (IOCs)		
Metals		
Asbestos	7.0 million fibers/liter (MFL) (>10 microns)	
Antimony, Total	mg/L	0.006
Arsenic, Total	mg/L	0.010
Barium, Total	mg/L	2.00
Beryllium, Total	mg/L	0.004
Cadmium, Total	mg/L	0.005
Chromium, Total	mg/L	0.10
Copper, Total	mg/L	1.3[c]
Lead, Total	mg/L	0.015[c]
Mercury, Total	mg/L	0.002
Nickel, Total	mg/L	NA
Selenium, Total	mg/L	0.05
Silver, Total	mg/L	0.1
Thallium, Total	mg/L	0.002
Other Inorganic Chemicals		
Cyanide (as free cyanide)	mg/L	0.2
Fluoride	mg/L	2.2
Nitrate-N	mg/L	10
Sodium	mg/L	20 / 270 [d]
Organic Chemicals		
POC (Principal Organic Contaminant)	mg/L	0.005
SOC (Specific Organic Chemicals)		
Alachlor	mg/L	0.002
Aldicarb	mg/L	0.003
Aldicarb sulfone	mg/L	0.002
Aldicarb sulfoxide	mg/L	0.004
Atrazine	mg/L	0.003
Benzo(a)pyrene	mg/L	0.0002
Carbofuran	mg/L	0.04
Chlordane	mg/L	0.002
Di(2-ethylhexyl)phthalate	mg/L	0.006
Dibromochloropropane(DBCP)	mg/L	0.0002
2,4-D	mg/L	0.05
Dinoseb	mg/L	0.007
Diquat	mg/L	0.02
Endrin	mg/L	0.002
Ethylene dibromide(EDB)	mg/L	0.00005
Heptachlor	mg/L	0.0004
Heptachlor epoxide	mg/L	0.0002
Hexachlorobenzene	mg/L	0.001
Lindane	mg/L	0.0002

[a] MCL - Maximum Contamination Level. Listed in NYSDOH 10 NYCRR Part 5, Subpart 5-1, Section 5-
[b] Sampled every nine years.
[c] Values shown for copper and lead are the EPA 90th percentile Action Levels per 40 CFR Chapter I,
[d] Although there is no designated limit for sodium, recommended limits are provided for people on severely and moderately sodium restricted diets.

TABLE B-1C *(concluded)*
New York State Department of Health Potable Water MCLs
for a Groundwater Supply

Parameter	***Units***	***NYSDOH MCL***	
Organic Chemicals (continued)			
SOC (Specific Organic Chemicals) *continued*			
Methoxychlor	mg/L	0.04	
Methyl-tertiary-butyl-ether(MTBE)	mg/L	0.010	
Pentachlorophenol	mg/L	0.001	
Polychlorinated biphenyls (PCBs)	mg/L	0.0005	
Propylene glycol	mg/L	1.0	
Simazine	mg/L	0.004	
Toxaphene	mg/L	0.003	
2,4,5-TP (Silvex)	mg/L	0.01	
2,3,7,8-TCDD (dioxin)	mg/L	0.00000003	
Vinyl chloride	mg/L	0.002	
Per-and Polyfluoroalkyl Substances (PFAS) and 1,4-Dioxane[b]			
Perfluorooctanoic acid (PFOA)	ng/L	10	
Perfluorooctane sulfonic acid (PFOS)	ng/L	10	
1,4-Dioxane	µg/L	1	
Parameter	***Units***	***Standard***	
Disinfectant and Disinfection Byproducts			
Free Residual Chlorine	mg/L	0.2 to 4.0	
Haloacetic Acids-Five (5)	mg/L	0.06	
Total Trihalomethanes	mg/L	0.08	
Microbiological Contamination			
E. Coli	NA	no positive samples	
Total Coliform	NA	no positive samples	
SPECIAL WVDP MONITORING: Radiological Parameters			
Parameter	***Units***	***Guidance***	***Background***[c]
Gross Alpha	µCi/mL	1.5E-08[d]	7.61E-09
Gross Beta	mrem/year	4[d]	NA
Gross Beta (screening level)	µCi/mL	1.5E-08[e]	1.56E-08
Combined Ra-226 and Ra-228	µCi/mL	5.0E-09	NA
Tritium	µCi/mL	2.0E-05[f]	1.78E-07
Cesium-137	µCi/mL	2.0E-07[f]	ND
Iodine-129	µCi/mL	1.0E-09[g]	ND

NA - No applicable guideline or reference standard available. ND - Nondetect

[b] In August 2020, NYS adopted a state drinking water MCL of 10 ppt (10 ng/L) for PFOA and PFOS, and 1 part per billion (ppb) (1 µg/L) for 1,4-dioxane.

[c] Background concentrations for groundwater (provided in Table D-1A) are used for screening gross alpha, gross beta and tritium in the groundwater supply and source water protection plan wells.

[d] NYSDOH 10 NYCRR Part 5, Subpart 5-1, Public Water System Table 7 Radiological MCL (applicable to community water systems).

[e] Gross beta screening level established in site-specific drinking water monitoring plan. (1.5E-08 µCi/mL is from Table 12 Radiological Monitoring, NYSDOH 10 NYCRR Part 5, Subpart 5-1.)

[f] Standard used for screening radionuclides are from the EPA Safe Drinking Water Act Implementation Guidance for Radionuclides (40 CFR Part 141 Subpart F §141.66), applicable to community water systems.

[g] The U.S. Department of Commerce. 1963. Handbook of The National Bureau of Standards 69.

TABLE B-1D
Department of Energy (DOE)
Derived Concentration Standards (DCSs)[a] in Ingested Water

Radionuclide	*Units*	*Concentration in Ingested Water*
Gross Alpha (as U-232)[b]	µCi/mL	2.1E-07
Gross Beta (as Sr-90)[b]	µCi/mL	1.7E-06
Tritium (H-3)[c]	µCi/mL	2.6E-03
Carbon-14 (C-14)[d]	µCi/mL	3.3E-04
Potassium-40 (K-40)	µCi/mL	1.6E-05
Cobalt-60 (Co-60)	µCi/mL	1.4E-05
Strontium-90 (Sr-90)	µCi/mL	1.7E-06
Technetium-99 (Tc-99)	µCi/mL	3.9E-04
Iodine-129 (I-129)	µCi/mL	5.7E-07
Cesium-137 (Cs-137)	µCi/mL	4.1E-06
Europium-154 (Eu-154)	µCi/mL	6.8E-05
Uranium-232 (U-232)	µCi/mL	2.1E-07
Uranium-233 (U-233)	µCi/mL	1.2E-06
Uranium-234 (U-234)	µCi/mL	1.2E-06
Uranium-235 (U-235)	µCi/mL	1.3E-06
Uranium-236 (U-236)	µCi/mL	1.3E-06
Uranium-238 (U-238)	µCi/mL	1.4E-06
Plutonium-238 (Pu-238)	µCi/mL	4.3E-07
Plutonium-239 (Pu-239)	µCi/mL	4.0E-07
Plutonium-240 (Pu-240)	µCi/mL	4.0E-07
Americium-241 (Am-241)	µCi/mL	7.4E-07

[a] DCS: Derived Concentation Standard. DCSs are established in DOE-STD-1196-2022 and are defined as the concentration of a radionuclide that, under conditions of continuous exposure for one year by one exposure mode, would result in an effective dose equivalent of 100 mrem (1 mSv).

[b] Because there are no DCSs for gross alpha and gross beta concentrations, the DCSs for the most restrictive alpha and beta emitters in water at the WVDP, uranium-232 and strontium-90 are used as a conservative basis for comparison at location.There are no radionuclide-specific data, in which case a more appropriate DCS may be applied.

[c] Tritiated water

[d] Generic

APPENDIX B-2
Process Effluent Data

TABLE B-2A
Comparison of 2024 Outfall 001 (WNSP001) Liquid Effluent Radioactivity Concentrations With U.S. DOE-Derived Concentration Standards (DCSs)

Isotope [a]	*Discharge Activity*		*Flow-Weighted Mean Concentration*	*DCS* [c]	*Ratio of Mean Concentration to DCS*
	(Ci)	*(Becquerels)* [b]	*(µCi/mL)*	*(µCi/mL)*	
Gross Alpha	4.84±7.25E-05	1.79±2.68E+06	2.20±3.29E-09	2.1E-07[d]	NA
Gross Beta	1.96±0.02E-02	7.26±0.07E+08	8.89±0.09E-07	1.7E-06[d]	NA
H-3	5.49±1.19E-03	2.03±0.44E+08	2.49±0.54E-07	2.6E-03	0.0001
C-14	-1.40±3.24E-04	-0.52±1.20E+07	-0.64±1.47E-08	3.3E-04	< 0.0001
K-40	3.41±5.98E-04	1.26±2.21E+07	1.55±2.71E-08	NA[e]	NA
Co-60	-0.40±3.15E-05	-0.15±1.17E+06	-0.18±1.43E-09	1.4E-05	< 0.0001
Sr-90	8.69±0.11E-03	3.22±0.04E+08	3.94±0.05E-07	1.7E-06	0.2317
Tc-99	1.13±0.35E-04	4.19±1.29E+06	5.13±1.58E-09	3.9E-04	0.0001
I-129	5.02±1.64E-05	1.86±0.61E+06	2.27±0.75E-09	5.7E-07	0.0040
Cs-137	6.63±0.81E-04	2.45±0.30E+07	3.01±0.37E-08	4.1E-06	0.0073
U-232	2.31±0.25E-05	8.55±0.93E+05	1.05±0.11E-09	2.1E-07	0.0050
U-233/234[f]	1.82±0.27E-05	6.72±1.00E+05	8.23±1.23E-10	1.2E-06	0.0007
U-235/236	1.30±0.81E-06	4.82±2.99E+04	5.91±3.66E-11	1.3E-06	0.0001
U-238	1.58±0.25E-05	5.85±0.94E+05	7.17±1.15E-10	1.4E-06	0.0005
Pu-238	2.67±5.65E-07	0.99±2.09E+04	1.21±2.56E-11	4.3E-07	< 0.0001
Pu-239/240	1.23±0.62E-06	4.57±2.30E+04	5.59±2.82E-11	4.0E-07	0.0001
Am-241	3.10±1.07E-06	1.15±0.40E+05	1.40±0.49E-10	7.4E-07	0.0002
Sum of Ratios					**0.25**
Total Uranium	*6.00±0.27E+01*	*grams*			
	2.16±0.10E-03	*µg/mL (average)*			
Total Discharge Volume	*2.21E+10*	*mL*			
	5.83E+06	*gallons*			

NA – Not applicable; ratio calculated from isotopic data.

[a] Half-lives are listed in Table 8-4.

[b] 1 curie (Ci) = 3.7E+10 becquerels (Bq): 1Bq = 2.7E-11 Ci; 1 microcurie (µCi) = 1E-06 Ci.

[c] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.

[d] The representative DCS for gross alpha in water shown is for U-232 and for gross beta is for Sr-90 (selected as the most restrictive) since DCSs do not exist for indicator parameters.

[e] The DCS is not applied to potassium-40 (K-40) activity because of its natural origin.

[f] The DCS for U-233 is used for this comparison.

TABLE B-2B
2024 SPDES Results for Outfall 001 (WNSP001): Water Quality

Permit Limit	Ammonia (as NH_3) (mg/L)		BOD_5 day (mg/L)		Discharge Rate (MGD[a])		Chlorine, Total Residual (mg/L)	
	2.1 mg/L daily maximum		10.0 mg/L daily maximum		Monitor		0.1 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--	--	--
February	<0.016	0.022	<2.0	<2.0	0.232	0.328	<0.02	<0.02
March	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--
May	0.025	0.034	<2.1	2.2	0.224	0.299	0.02	0.02
June	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--	--
November	<0.01	0.01	1.2	1.2	0.193	0.233	<0.02	<0.02
December	--	--	--	--	--	--	--	--

Permit Limit	Dissolved Oxygen (mg/L)		Nitrogen, total Kjeldahl (as N) (mg/L)		Nitrate (as N) (mg/L)		Nitrite (as N) (mg/L)	
	3.0 mg/L minimum		Monitor		Monitor		0.1 mg/L daily maximum	
Month	**Min**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--	--	--
February	8.2	8.7	0.5	0.52	0.042	0.042	<0.02	<0.02
March	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--
May	8.3	8.5	0.45	0.46	<0.02	<0.02	<0.02	<0.02
June	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--	--
November	7.9	8.8	0.71	0.74	0.022	0.022	<0.02	<0.02
December	--	--	--	--	--	--	--	--

[a] MGD - Million gallons per day.
There was no discharge from outfall 001 during the month shown with "--".
Overall results in 2024: No results exceeded the permit limits.

TABLE B-2B *(continued)*
2024 SPDES Results for Outfall 001 (WNSP001); Water Quality

Permit Limit	Oil & Grease (mg/L)		pH (standard units)		Solids, Settleable (mL/L)		Solids, Total Dissolved (mg/L)	
	15.0 mg/L daily maximum		6.5 to 8.5		0.3 mL/L daily maximum		Monitor	
Month	**Avg**	**Max**	**Min**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--	--	--
February	<1.5	<1.5	7.7	7.7	<0.1	<0.1	864	870
March	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--
May	<1.6	<1.6	7.8	7.8	<0.1	<0.1	804	821
June	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--	--
November	<1.5	<1.5	7.9	7.9	<0.1	<0.1	824.0	826.0
December	--	--	--	--	--	--	--	--

Permit Limit	Solids, Total Suspended (mg/L)		Sulfate (as S) (mg/L)		Sulfide, (as S) Dissolved (mg/L)		Surfactant(as LAS [a]) (mg/L)	
	45 mg/L daily maximum		Monitor		0.4 mg/L daily maximum		0.04 mg/L	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--	--	--
February	<4.0	<4.0	63.0	63.0	<0.03	<0.03	0.01	0.01
March	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--
May	<4.0	<4.0	47.0	47.0	<0.03	<0.03	0.02	0.02
June	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--	--
November	<4.0	<4.0	59.0	59.0	<0.03	<0.03	0.009	0.009
December	--	--	--	--	--	--	--	--

[a] LAS - linear alkylbenzene sulfonate.
There was no discharge from outfall 001 during the month shown with "--".
Overall results in 2024: No results exceeded the permit limits.

Table B-2B *(concluded)*
2024 SPDES Results for Outfall 001 (WNSP001): Water Quality

Permit Limit	*Ultimate Oxygen Demand (UOD) (mg/L)*	
	22.0 mg/L daily maximum	
Month	***Avg***	***Max***
January	--	--
February	<5.29	<5.38
March	--	--
April	--	--
May	<5.21	5.31
June	--	--
July	--	--
August	--	--
September	--	--
October	--	--
November	4.98	5.0
December	--	--

There was no discharge from outfall 001 during the month shown with "--".

Overall results in 2024: No results exceeded the permit limits.

TABLE B-2C
2024 SPDES Results for Outfall 001 (WNSP001): Metals

Permit Limit	Aluminum, Total (mg/L)		Arsenic, Total Recoverable (mg/L)		Cobalt, Total Recoverable (mg/L)		Iron, Total (mg/L)	
	4.0 mg/L daily maximum		0.15 mg/L daily maximum		0.005 mg/L daily maximum		Monitor	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--	--	--
February	<0.06	<0.06	0.0012	0.0012	<0.0006	<0.0006	0.164	0.169
March	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--
May	<0.047	<0.047	0.00088	0.00088	<0.0002	<0.0002	<0.095	0.108
June	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--
October	--	--	--	--	--	--	--	--
November	<0.088	<0.088	0.0017	0.0017	<0.0006	<0.0006	0.054	0.063
December	--	--	--	--	--	--	--	--

Permit Limit	Mercury, Total (ng/L)		Selenium, Total Recoverable (mg/L)		Vanadium, Total Recoverable (mg/L)	
	50 ng/L monthly average		0.004 mg/L daily maximum		0.014 mg/L daily maximum	
Month	**Avg**	**Max**	**Avg**	**Max**	**Avg**	**Max**
January	--	--	--	--	--	--
February	1.7	1.7	<0.0004	<0.0004	<0.0015	<0.0015
March	--	--	--	--	--	--
April	--	--	--	--	--	--
May	2.2	2.2	<0.0009	<0.0009	<0.00082	<0.00082
June	--	--	--	--	--	--
July	--	--	--	--	--	--
August	--	--	--	--	--	--
September	--	--	--	--	--	--
October	--	--	--	--	--	--
November	0.8	0.8	<0.0004	<0.0004	<0.0015	<0.0015
December	--	--	--	--	--	--

There was no discharge from outfall 001 during the month shown with "--".
Overall results in 2024: No results exceeded the permit limits.

TABLE B-2D
2024 SPDES Results for Sum of Outfalls 001 and 007[a] : Water Quality

Permit Limit	Iron Total Net Effluent Limitation	
	1.0 mg/L daily maximum	
Month	**Avg**	**Max**
January	--	--
February	0.16	0.16
March	--	--
April	--	--
May	<0.095	0.108
June	--	--
July	--	--
August	--	--
September	--	--
October	--	--
November	<0.054	<0.054
December	--	--

[a] SPDES discharge from 007 was discontinued in November 2014.

There were no discharges from either outfall 001 or 007 during the month shown with "--" in 2023. Therefore, a calculated total iron is not required.
Overall results in 2024: No results exceeded the permit limits.

TABLE B-2E
2024 SPDES Results for Sum of Outfalls 001, 007[a] and 116: Water Quality

Permit Limit	Total Dissolved Solids (mg/L)	
	500 mg/L daily maximum	
Month	**Avg**	**Max**
January	--	--
February	326.0	352.0
March	--	--
April	--	--
May	329.0	336.0
June	--	--
July	--	--
August	--	--
September	--	--
October	--	--
November	356.0	371.0
December	--	--

[a] SPDES discharge from 007 was discontinued in November 2014.

There was no discharge from outfall 001 or 007 during the month shown with "--". Therefore, a calculated TDS at 116 is not required.

TABLE B-2F
2024 Annual and Semiannual SPDES Results for Outfall 001:
Metals, Water Quality and Organic Compounds

Permit Limit Parameters	*Permit Limit*	*Monitoring Frequency*	*Sample Date*	*Annual/ Semiannual Concentrations* [a, b]
2-Butanone	0.5 mg/L daily maximum	Annual	February 2024	<0.002
3,3-Dichlorobenzidine	0.01 mg/L daily maximum	Annual	February 2024	<0.0004
Alpha-BHC	0.01 ug/L daily maximum	Annual	February 2024	<0.007
Cadmium, Total Recoverable	0.002 mg/L daily maximum	Annual	February 2024	<0.00007
Chromium VI, Total Recoverable	0.011 mg/L daily maximum	Annual	February 2024	<0.005
Chromium, Total Recoverable	0.11 mg/L daily maximum	Semiannual	February 2024 November 2024	0.0006 <0.0012
Copper, Total Recoverable	0.014mg/L daily maximum	Semiannual	February 2024 November 2024	0.0016 <0.00073
Cyanide, Amenable to chlorination	0.005 mg/L daily maximum	Semiannual	February 2024 November 2024	< 0.005 < 0.005
Dichlorodifluoromethane	0.01 mg/L daily maximum	Annual	February 2024	<0.0003
Heptachlor	0.01 ug/L daily maximum	Semiannual	February 2024 November 2024	< 0.007 <0.006
Hexachlorobenzene	0.2 ug/L daily maximum	Annual	February 2024	<0.05
Lead, Total Recoverable	0.006 mg/L daily maximum	Semiannual	February 2024 November 2024	<0.0002 <0.0002
Manganese, Total	2.0 mg/L daily maximum	Semiannual	February 2024 November 2024	0.071 0.025
Nickel, Total	0.079 mg/L daily maximum	Semiannual	February 2024 November 2024	< 0.0036 <0.0034
Tri-n-butyl phosphate	0.1 mg/L daily maximum	Annual	February 2024	<0.0006
Trichlorofluoromethane	0.01 mg/L daily maximum	Annual	February 2024	<0.0005
Xylene	0.05 mg/L daily maximum	Annual	February 2024	<0.001
Zinc, Total Recoverable	0.13 mg/L daily maximum	Semiannual	February 2024 November 2024	0.0052 <0.0039

[a] There was no discharge in the second half of 2024.
[b] Measured results are reported in the same units as the permit limits shown in this table.
NS = Not sampled.
Overall results in 2024: No results exceeded the permit limits.

TABLE B-2G
2024 SPDES Action Level Requirement Monitoring Results for Outfalls 001 and 007
Metals and Water Quality

Outfall	*Action Level Parameters*	*Action Level*	*Monitoring Frequency*	*Sampling Date*	*Annual/ Semiannual Concentrations* [a,b]
001	**Antimony, Total**	1.0 mg/L daily maximum	Annual	February 2024 --	<0.0078
	Barium, Total	0.5 mg/L daily maximum	Annual	February 2024 --	0.04
	Boron, Total	2.0 mg/L daily maximum	Semiannual	February 2024 November 2024	0.071 0.057
	Bromide, Total	5.0 mg/L daily maximum	Semiannual	February 2024 November 2024	<0.37 <0.37
	Chloroform	0.3 mg/L daily maximum	Annual	February 2024 --	<0.0005
	Titanium, Total	0.65 mg/L daily maximum	Semiannual	February 2024 November 2024	<0.0011 <0.0011

[a] There was no discharge in the second half of 2024.
[b] Measured results are reported in the same units as the permit limits shown in this table.
Note: No results exceeded the permit limits.

TABLE B-2H
2024 SPDES Results for Outfall 01B (WNSP01B): Water Quality

Internal process monitoring point did not operate during 2024.

TABLE B-2I
2024 Radioactivity Results for Sewage Treatment Outfall (WNSP007)

There were no discharges from the Sewage Treatment Plant in 2024.
SPDES outfall 007 was discontinued in November 2014.

TABLE B-2J

2024 Paraquat Dichloride Data in Areas of Herbicide Application[a]

Stormwater Outfalls		*Units*	*Concentration*	
			Semiannual (January - June) Not Required in 2024	*Semimanual 2 (July - December)[b]*
Group 1	S04	mg/L	N.R.	< 0.00013 / < 0.00013
Group 2	S06	mg/L	N.R.	0.00022 / 0.0029
	S33	mg/L	N.R.	< 0.00021 / < 0.00013
Group 3	S09	mg/L	N.R.	< 0.00013 / < 0.00013
	S12	mg/L	N.R.	< 0.00013 / < 0.00013
Group 4	S34	mg/L	N.R.	< 0.00013 / < 0.00013
Group 5	S17	mg/L	N.R.	< 0.00021 / < 0.00013
	S28	mg/L	N.R.	< 0.00016 / < 0.00013
Group 6	S37	mg/L	N.R.	< 0.00013 / < 0.00013
Group 7	S20	mg/L	N.R.	< 0.00013 / < 0.00013
Group 8	S27	mg/L	N.R.	< 0.00021 / < 0.00013
	S35	mg/L	N.R.	< 0.00013 / < 0.00013

N.R. - Not required by permit.

[a] The site applied the herbicide Paraquat Dichloride in June and September 2024. In accordance with the SPDES permit, sampling is required from stormwater outfalls and process effluent outfalls within 60 days of herbicide application from the drainage basins potentially affected by the herbicide.

[b] Stormwater outfalls that could be affected were sampled for Paraquat Dichloride in July and September.

TABLE B-2K

2024 SPDES Whole Effluent Toxicity (WET) Testing[a]

SPDES Outfall	*Date*	*Species*	*Acute Toxicity Test (survival)*	*Chronic Toxicity Test (survival and reproduction)*	*Interpretation*
001	May 2024	Invertebrate Water Flea (Ceriodaphnia dubia)b	0.3 TUa	1.0 TUc	Compliant with action level
001	November 2024	Invertebrate Water Flea *(Ceriodaphnia dubia)*	0.3 TUa	1.0 TUc	

TUa = Toxicity Unit acute (Action Level = 0.3 TUa).

TUc = Toxicity Unit chronic (Action Level = 1.0 TUc).

[a] WET testing is performed in compliance with the site's SPDES permit that requires WET testing on a 5-year schedule. The next WET testing is scheduled for 2027. A confirmatory test was conducted in 2024.

[b] In January 2024, NYSDEC agreed that WET testing at the WVDP could include only invertebrate water flea test and testing for the fathead minnow would no longer be required, based on the test results in 2022 and 2023.

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APPENDIX B-3
SPDES-Permitted Stormwater Outfall Discharge Data

TABLE B-3A
2024 Stormwater Discharge Monitoring Data for Outfall Group 1

STORMWATER OUTFALL S04

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			04/02/24	*04/02/24*
Group A Parameters	BOD_5	mg/L	< 12	< 3.0
	Oil & Grease[a]	mg/L	1.6	N.R.
	pH	SU	7.9	N.R.
	Phosphorous, Total	mg/L	0.12	0.062
	Solids, Total Dissolved	mg/L	1600	1400
	Solids, Total Suspended	mg/L	18	14
Group B Parameters	Aluminum, Total	mg/L	4.2	2.6
	Copper, Total Recoverable	mg/L	0.0060	0.0044
	Iron, Total	mg/L	4.3	2.8
	Lead, Total Recoverable	mg/L	0.0036	0.0024
	Zinc, Total Recoverable	mg/L	0.028	0.019
Group C Parameters	Ammonia (as NH_3)	mg/L	0.032	0.042
	Cadmium, Total Recoverable	mg/L	0.000084	< 0.000071
	Chromium, Hexavalent, Total Recoverable	mg/L	0.015 “R“	0.020 “R”
	Chromium, Total Recoverable	mg/L	0.0062	0.0039
	Nitrogen, Nitrate (as N)	mg/L	0.31	0.26
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 0.79	< 0.53
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.46	0.25
	Selenium, Total Recoverable	mg/L	< 0.00044	< 0.00044
	Vanadium, Total Recoverable	mg/L	0.0071	0.0049
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.0	
	Rainfall During Sampling Event	inches	0.16	
Flow	Total Flow During Sampling Event	gallons	200,000	
	Maximum Flow Rate During Sampling Event	gpm	1,800	

gpm - gallons per minute.
N.R. - Not required by permit.
R - The result was flagged as unreliable.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3A *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 1

STORMWATER OUTFALL S04

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			08/06/24	*08/06/24*
Group A Parameters	BOD_5	mg/L	< 2.0	< 2.0
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.9	N.R.
	Phosphorous, Total	mg/L	0.044	0.031
	Solids, Total Dissolved	mg/L	730	430
	Solids, Total Suspended	mg/L	13	7.2
Group B Parameters	Aluminum, Total	mg/L	0.60	0.59
	Copper, Total Recoverable	mg/L	0.016	0.0028
	Iron, Total	mg/L	1.1	0.80
	Lead, Total Recoverable	mg/L	0.0030	0.0011
	Zinc, Total Recoverable	mg/L	0.0081	0.0095
Group C Parameters	Ammonia (as NH_3)	mg/L	0.020	0.022
	Cadmium, Total Recoverable	mg/L	< 0.000079	< 0.000079
	Chromium, Hexavalent, Total Recoverable	mg/L	< 0.0050	< 0.0050
	Chromium, Total Recoverable	mg/L	< 0.0012	0.0013
	Nitrogen, Nitrate (as N)	mg/L	< 0.020	0.41
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	0.020
	Nitrogen, Total (as N)	mg/L	< 0.65	0.70
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.61	0.27
	Selenium, Total Recoverable	mg/L	< 0.00044	< 0.00044
	Vanadium, Total Recoverable	mg/L	< 0.0019	< 0.0019
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	5.3	
	Rainfall During Sampling Event	inches	0.16	
Flow	Total Flow During Sampling Event	gallons	260,000	
	Maximum Flow Rate During Sampling Event	gpm	2,400	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3B
2024 Stormwater Discharge Monitoring Data for Outfall Group 2
STORMWATER OUTFALL S06

Parameter Group	*Analyte*	*Units*	*First Flush Duplicate*	*Flow-weighted Composite*
			05/22/24	*05/22/24*
Group A Parameters	BOD_5	mg/L	5.1 / 5.3	1.7
	Oil & Grease[a]	mg/L	< 1.6 / < 1.6	N.R.
	pH	SU	7.6 / 7.6	N.R.
	Phosphorous, Total	mg/L	0.077 / 0.023	< 0.020
	Solids, Total Dissolved	mg/L	770 / 760	820
	Solids, Total Suspended	mg/L	22 / 19	6.4
Group B Parameters	Aluminum, Total	mg/L	0.051 / 0.067	< 0.019
	Copper, Total Recoverable	mg/L	< 0.00064 / < 0.00072	0.00040
	Iron, Total	mg/L	2.9 / 2.5	0.8
	Lead, Total Recoverable	mg/L	< 0.00050 / < 0.00050	< 0.00050
	Zinc, Total Recoverable	mg/L	0.0081 /0.0082	< 0.0033
Group C Parameters	Surfactant (as LAS)	mg/L	0.035 / 0.021	0.015
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.1	
	Rainfall During Sampling Event	inches	0.16	
Flow	Total Flow During Sampling Event	gallons	2,500	
	Maximum Flow Rate During Sampling Event	gpm	17	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3B *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 2

STORMWATER OUTFALL S33

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			11/06/24	*11/06/24*
Group A Parameters	BOD_5	mg/L	3.7	5.2
	Oil & Grease[a]	mg/L	< 1.5	N.R.
	pH	SU	7.2	N.R.
	Phosphorous, Total	mg/L	0.21	0.26
	Solids, Total Dissolved	mg/L	440	400
	Solids, Total Suspended	mg/L	55	56
Group B Parameters	Aluminum, Total	mg/L	1.3	1.2
	Copper, Total Recoverable	mg/L	0.0018	0.0020
	Iron, Total	mg/L	6.0	6.6
	Lead, Total Recoverable	mg/L	0.0023	0.0022
	Zinc, Total Recoverable	mg/L	0.013	0.019
Group C Parameters	Surfactant (as LAS)	mg/L	< 0.013	< 0.013
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.2	
	Rainfall During Sampling Event	inches	0.22	
Flow	Total Flow During Sampling Event	gallons	3,400	
	Maximum Flow Rate During Sampling Event	gpm	40	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3C
2024 Stormwater Discharge Monitoring Data for Outfall Group 3
STORMWATER OUTFALL S09

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			04/11/24	*04/11/24*
Group A Parameters	BOD_5	mg/L	4.9	5.4
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.9	N.R.
	Phosphorous, Total	mg/L	0.28	0.20
	Solids, Total Dissolved	mg/L	320	360
	Solids, Total Suspended	mg/L	160	120
Group B Parameters	Aluminum, Total	mg/L	0.65	0.63
	Copper, Total Recoverable	mg/L	0.016	0.012
	Iron, Total	mg/L	1.1	1.0
	Lead, Total Recoverable	mg/L	0.011	0.0077
	Zinc, Total Recoverable	mg/L	0.076	0.055
Group C Parameters	Alpha BHC	mg/L	< 0.0000067	< 0.0000063
	Ammonia (as NH_3)	mg/L	0.045	0.034
	Mercury, Total[b] (1631E)	ng/L	12	N.R.
	Nitrogen, Nitrate (as N)	mg/L	0.18	0.18
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 1.3	< 1.0
	Nitrogen, Total Kjeldahl (as N)	mg/L	1.1	0.82
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.8	
	Rainfall During Sampling Event	inches	0.22	
Flow	Total Flow During Sampling Event	gallons	9,400	
	Maximum Flow Rate During Sampling Event	gpm	120	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.
[b] The SPDES permit requires that Group 3 outfall grab samples be analyzed for mercury as part of the Mercury Minimization Program.

TABLE B-3C *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 3
STORMWATER OUTFALL S12

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			11/26/24	*11/26/24*
Group A Parameters	BOD_5	mg/L	2.1	2.2
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.5	N.R.
	Phosphorous, Total	mg/L	0.044	0.071
	Solids, Total Dissolved	mg/L	850	670
	Solids, Total Suspended	mg/L	16	16
Group B Parameters	Aluminum, Total	mg/L	0.20	0.26
	Copper, Total Recoverable	mg/L	0.0013	0.0019
	Iron, Total	mg/L	1.8	1.7
	Lead, Total Recoverable	mg/L	0.0013	0.0017
	Zinc, Total Recoverable	mg/L	0.0066	0.011
Group C Parameters	Alpha BHC	mg/L	< 0.0000063	< 0.0000072
	Ammonia (as NH_3)	mg/L	0.017	0.017
	Mercury, Total[b] (1631E)	ng/L	3.7	N.R.
	Nitrogen, Nitrate (as N)	mg/L	0.25	0.19
	Nitrogen, Nitrite (as N)	mg/L	< 0.17	< 0.066
	Nitrogen, Total (as N)	mg/L	< 1.0	< 0.82
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.63	0.56
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.0	
	Rainfall During Sampling Event	inches	0.35	
Flow	Total Flow During Sampling Event	gallons	290,000	
	Maximum Flow Rate During Sampling Event	gpm	1,700	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.
[b] The SPDES permit requires that Group 3 outfall grab samples be analyzed for mercury as part of the Mercury Minimization Program.

TABLE B-3D
2024 Stormwater Discharge Monitoring Data for Outfall Group 4
STORMWATER OUTFALL S34

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			04/02/24	*04/02/24*
Group A Parameters	BOD_5	mg/L	< 2.0	< 2.0
	Oil & Grease[a]	mg/L	1.6	N.R.
	pH	SU	7.8	N.R.
	Phosphorous, Total	mg/L	0.17	0.12
	Solids, Total Dissolved	mg/L	820	610
	Solids, Total Suspended	mg/L	140	53
Group B Parameters	Aluminum, Total	mg/L	7.3	4.8
	Copper, Total Recoverable	mg/L	0.012	0.0066
	Iron, Total	mg/L	8.4	4.5
	Lead, Total Recoverable	mg/L	0.0077	0.0036
	Zinc, Total Recoverable	mg/L	0.073	0.047
Group C Parameters	Surfactant (as LAS)	mg/L	< 0.013	0.026
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.0	
	Rainfall During Sampling Event	inches	0.16	
Flow	Total Flow During Sampling Event	gallons	460,000	
	Maximum Flow Rate During Sampling Event	gpm	2,800	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3D *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 4

STORMWATER OUTFALL S34

Parameter Group	*Analyte*	*Units*	*First Flush Duplicate*	*Flow-weighted Composite*
			08/06/24	*08/06/24*
Group A Parameters	BOD_5	mg/L	2.3 / < 2.0	< 2.0
	Oil & Grease[a]	mg/L	< 1.6 / < 1.6	N.R.
	pH	SU	7.6 / 7.6	N.R.
	Phosphorous, Total	mg/L	0.064 / 0.058	0.082
	Solids, Total Dissolved	mg/L	590 / 600	570
	Solids, Total Suspended	mg/L	87 / 86	93
Group B Parameters	Aluminum, Total	mg/L	6.5 / 7.4	8.3
	Copper, Total Recoverable	mg/L	0.0077 / 0.0069	0.0096
	Iron, Total	mg/L	4.5 / 4.1	4.9
	Lead, Total Recoverable	mg/L	0.0097 / 0.010	0.012
	Zinc, Total Recoverable	mg/L	0.054 / 0.045	0.058
Group C Parameters	Surfactant (as LAS)	mg/L	0.015 / < 0.013	< 0.013
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	5.3	
	Rainfall During Sampling Event	inches	0.17	
Flow	Total Flow During Sampling Event	gallons	13,000	
	Maximum Flow Rate During Sampling Event	gpm	210	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3E
2024 Stormwater Discharge Monitoring Data for Outfall Group 5
STORMWATER OUTFALL S28

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			04/24/24	*04/24/24*
Group A Parameters	BOD_5	mg/L	6.8	5.1
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.6	N.R.
	Phosphorous, Total	mg/L	0.61	0.60
	Solids, Total Dissolved	mg/L	590	440
	Solids, Total Suspended	mg/L	2500	1500
Group B Parameters	Aluminum, Total	mg/L	34	16
	Copper, Total Recoverable	mg/L	0.081	0.039
	Iron, Total	mg/L	56	23
	Lead, Total Recoverable	mg/L	0.21	0.094
	Zinc, Total Recoverable	mg/L	0.49	0.22
Group C Parameters	Ammonia (as NH_3)	mg/L	0.063	0.061
	Nitrogen, Nitrate (as N)	mg/L	0.21	0.092
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 5.8	< 2.8
	Nitrogen, Total Kjeldahl (as N)	mg/L	5.6	2.7
	Settleable Solids	ml/L	< 0.1	< 0.1
	Sulfide	mg/L	< 0.033	< 0.033
	Surfactant (as LAS)	mg/L	< 0.013	0.026
	Vanadium, Total Recoverable	mg/L	0.059	0.028
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.3	
	Rainfall During Sampling Event	inches	0.26	
Flow	Total Flow During Sampling Event	gallons	54,000	
	Maximum Flow Rate During Sampling Event	gpm	320	

gpm - gallons per minute.

N.R. - Not required by permit.

[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3E *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 5

STORMWATER OUTFALL S14

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			10/14/24	*10/14/24*
Group A Parameters	BOD_5	mg/L	4.2	3.1
	Oil & Grease[a]	mg/L	< 1.7	N.R.
	pH	SU	7.2	N.R.
	Phosphorous, Total	mg/L	0.092	0.099
	Solids, Total Dissolved	mg/L	860	880
	Solids, Total Suspended	mg/L	11	11
Group B Parameters	Aluminum, Total	mg/L	0.94	1.4
	Copper, Total Recoverable	mg/L	0.0022	0.0022
	Iron, Total	mg/L	0.77	1.0
	Lead, Total Recoverable	mg/L	0.00063	0.00069
	Zinc, Total Recoverable	mg/L	0.0053	0.0058
Group C Parameters	Ammonia (as NH_3)	mg/L	0.039	0.047
	Nitrogen, Nitrate (as N)	mg/L	0.084	0.084
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 0.71	< 0.74
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.61	0.64
	Settleable Solids	ml/L	< 0.1	< 0.1
	Sulfide	mg/L	< 0.033	< 0.033
	Surfactant (as LAS)	mg/L	0.027	0.024
	Vanadium, Total Recoverable	mg/L	< 0.0019	< 0.0019
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	6.5	
	Rainfall During Sampling Event	inches	0.46	
Flow	Total Flow During Sampling Event	gallons	580	
	Maximum Flow Rate During Sampling Event	gpm	4.2	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3F
2024 Stormwater Discharge Monitoring Data for Outfall Group 6
STORMWATER OUTFALL S38

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			05/15/24	*05/15/24*
Group A Parameters	BOD_5	mg/L	4.8	4.2
	Oil & Grease[a]	mg/L	< 1.5	N.R.
	pH	SU	7.8	N.R.
	Phosphorous, Total	mg/L	0.33	0.21
	Solids, Total Dissolved	mg/L	310	340
	Solids, Total Suspended	mg/L	190	74
Group B Parameters	Aluminum, Total	mg/L	1.2	1.8
	Copper, Total Recoverable	mg/L	0.0065	0.0053
	Iron, Total	mg/L	2.1	2.5
	Lead, Total Recoverable	mg/L	0.0049	0.0026
	Zinc, Total Recoverable	mg/L	0.46	0.19
Group C Parameters	Ammonia (as NH_3)	mg/L	0.042	0.050
	Nitrogen, Nitrate (as N)	mg/L	0.031	0.021
	Nitrogen, Nitrite (as N)	mg/L	0.037	0.035
	Nitrogen, Total (as N)	mg/L	1.3	0.95
	Nitrogen, Total Kjeldahl (as N)	mg/L	1.2	0.89
	Solids, Settleable	ml/L	< 0.1	< 0.1
	Sulfide	mg/L	< 0.033	< 0.033
	Surfactant (as LAS)	mg/L	< 0.013	< 0.013
	Vanadium, Total Recoverable	mg/L	0.0025	0.0029
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	6.7	
	Rainfall During Sampling Event	inches	0.10	
Flow	Total Flow During Sampling Event	gallons	29,000	
	Maximum Flow Rate During Sampling Event	gpm	470	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3F *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 6

STORMWATER OUTFALL S36

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			11/26/24	*11/26/24*
Group A Parameters	BOD_5	mg/L	3.4	2.1
	Oil & Grease[a]	mg/L	2.2	N.R.
	pH	SU	8.0	N.R.
	Phosphorous, Total	mg/L	< 0.0050	< 0.0050
	Solids, Total Dissolved	mg/L	470	370
	Solids, Total Suspended	mg/L	44	37
Group B Parameters	Aluminum, Total	mg/L	2.9	2.3
	Copper, Total Recoverable	mg/L	0.0037	0.0056
	Iron, Total	mg/L	3.1	1.9
	Lead, Total Recoverable	mg/L	0.0030	0.0016
	Zinc, Total Recoverable	mg/L	0.10	0.053
Group C Parameters	Ammonia (as NH_3)	mg/L	0.054 “R”	0.045 “R”
	Nitrogen, Nitrate (as N)	mg/L	0.032	0.028
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 2.2	< 1.1
	Nitrogen, Total Kjeldahl (as N)	mg/L	2.1	1.0
	Settleable Solids	mg/L	< 0.1	< 0.1
	Sulfide	mg/L	< 0.033	< 0.033
	Surfactant (as LAS)	mg/L	< 0.013 “R”	< 0.013 “R”
	Vanadium, Total Recoverable	mg/L	0.0019	0.0031
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.0	
	Rainfall During Sampling Event	inches	0.35	
Flow	Total Flow During Sampling Event	gallons	8,600	
	Maximum Flow Rate During Sampling Event	gpm	87	

gpm - gallons per minute.
N.R. - Not required by permit.
R - The result was flagged as unreliable.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3G
2024 Stormwater Discharge Monitoring Data for Outfall Group 7

STORMWATER OUTFALL S20

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			05/15/24	*05/15/24*
Group A Parameters	BOD_5	mg/L	5.2	4.9
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.9	N.R.
	Phosphorous, Total	mg/L	0.067	0.067
	Solids, Total Dissolved	mg/L	11	< 2.4
	Solids, Total Suspended	mg/L	< 4.0	6.4
Group B Parameters	Aluminum, Total	mg/L	0.17	0.065
	Copper, Total Recoverable	mg/L	< 0.0017	< 0.0017
	Iron, Total	mg/L	0.27	< 0.083
	Lead, Total Recoverable	mg/L	0.00071	< 0.00045
	Zinc, Total Recoverable	mg/L	< 0.015	< 0.015
Group C Parameters	Ammonia (as NH_3)	mg/L	0.77	1.1
	Nitrogen, Nitrate (as N)	mg/L	0.28	0.26
	Nitrogen, Nitrite (as N)	mg/L	0.035	0.024
	Nitrogen, Total (as N)	mg/L	1.2	1.4
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.83	1.1
	Sulfide	mg/L	< 0.033	< 0.033
	Surfactant (as LAS)	mg/L	< 0.013	< 0.013
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	6.7	
	Rainfall During Sampling Event	inches	0.26	
Flow	Total Flow During Sampling Event	gallons	74,000	
	Maximum Flow Rate During Sampling Event	gpm	1,600	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3G *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 7

STORMWATER OUTFALL S20

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			10/29/24	*10/29/24*
Group A Parameters	BOD_5	mg/L	4.2	6.8
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.3	N.R.
	Phosphorous, Total	mg/L	0.033	0.022
	Solids, Total Dissolved	mg/L	< 2.4	11
	Solids, Total Suspended	mg/L	< 4.0	< 4.0
Group B Parameters	Aluminum, Total	mg/L	0.12	0.38
	Copper, Total Recoverable	mg/L	0.00081	0.0010
	Iron, Total	mg/L	0.11	0.32
	Lead, Total Recoverable	mg/L	0.00074	0.00066
	Zinc, Total Recoverable	mg/L	0.0052	0.0074
Group C Parameters	Ammonia (as NH_3)	mg/L	0.22	0.32
	Nitrogen, Nitrate (as N)	mg/L	0.077	< 0.020
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 0.29	< 0.34
	Nitrogen, Total Kjeldahl (as N)	mg/L	< 0.19	0.30
	Surfactant (as LAS)	mg/L	< 0.013	< 0.013
	Sulfide	mg/L	< 0.033	< 0.033
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	4.6	
	Rainfall During Sampling Event	inches	0.28	
Flow	Total Flow During Sampling Event	gallons	96,000	
	Maximum Flow Rate During Sampling Event	gpm	2,600	

gpm - gallons per minute.
N.R. - Not required by permit.
R - The result was flagged as unreliable.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3H
2024 Stormwater Discharge Monitoring Data for Outfall Group 8

STORMWATER OUTFALL S27

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			04/24/24	*04/24/24*
Group A Parameters	BOD_5	mg/L	2.5	< 2.0
	Oil & Grease[a]	mg/L	< 1.5	N.R.
	pH	SU	7.6	N.R.
	Phosphorous, Total	mg/L	0.054	0.12
	Solids, Total Dissolved	mg/L	200	280
	Solids, Total Suspended	mg/L	63	28
Group B Parameters	Aluminum, Total	mg/L	1.4	0.68
	Copper, Total Recoverable	mg/L	0.0030	0.0031
	Iron, Total	mg/L	1.5	0.69
	Lead, Total Recoverable	mg/L	0.0022	0.0023
	Zinc, Total Recoverable	mg/L	< 0.015	< 0.015
Group C Parameters	Ammonia (as NH_3)	mg/L	0.032	0.037
	Nitrogen, Nitrate (as N)	mg/L	0.028	0.14
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 1.0	< 0.80
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.95	0.64
	Surfactant (as LAS)	mg/L	0.021	0.027
	Sulfide	mg/L	N.R.	N.R.
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	7.3	
	Rainfall During Sampling Event	inches	0.26	
Flow	Total Flow During Sampling Event	gallons	58,000	
	Maximum Flow Rate During Sampling Event	gpm	360	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

TABLE B-3H *(concluded)*
2024 Stormwater Discharge Monitoring Data for Outfall Group 8

STORMWATER OUTFALL S35

Parameter Group	*Analyte*	*Units*	*First Flush Grab*	*Flow-weighted Composite*
			10/14/24	*10/14/24*
Group A Parameters	BOD_5	mg/L	2.0	< 2.0
	Oil & Grease[a]	mg/L	< 1.6	N.R.
	pH	SU	7.5	N.R.
	Phosphorous, Total	mg/L	0.040	0.043
	Solids, Total Dissolved	mg/L	250	250
	Solids, Total Suspended	mg/L	6.0	< 4.0
Group B Parameters	Aluminum, Total	mg/L	0.37	0.56
	Copper, Total Recoverable	mg/L	0.0025	0.0026
	Iron, Total	mg/L	0.27	0.31
	Lead, Total Recoverable	mg/L	0.00084	0.00090
	Zinc, Total Recoverable	mg/L	0.0096	0.010
Group C Parameters	Ammonia (as NH_3)	mg/L	0.044	0.049
	Nitrogen, Nitrate (as N)	mg/L	0.38	0.35
	Nitrogen, Nitrite (as N)	mg/L	< 0.020	< 0.020
	Nitrogen, Total (as N)	mg/L	< 1.2	< 1.2
	Nitrogen, Total Kjeldahl (as N)	mg/L	0.79	0.83
	Surfactant (as LAS)	mg/L	0.019	0.018
Rain Event Summary				
Rainfall	pH of Rainfall During Sampling Event	SU	6.5	
	Rainfall During Sampling Event	inches	0.46	
Flow	Total Flow During Sampling Event	gallons	81,000	
	Maximum Flow Rate During Sampling Event	gpm	470	

gpm - gallons per minute.
N.R. - Not required by permit.
[a] The SPDES permit specifies that oil and grease concentration shall not exceed 15 mg/L.

APPENDIX B-4
Surface Water Data

TABLE B-4A
Comparison of 2024 Radioactivity Concentrations in Surface Water at the Northeast Swamp (WNSWAMP) With U.S. DOE-Derived Concentration Standards (DCSs)

Isotope [a]	*N*	*Discharge Activity*		*Flow-Weighted Mean Concentration*	*DCS* [c]	*Ratio of Mean Concentration to DCS*
		(Ci)	*(Becquerels)* [b]	*(µCi/mL)*	*(µCi/mL)*	
Gross Alpha	26	1.21±3.67E-05	0.45±1.36E+06	2.57±7.83E-10	2.1E-07[d]	NA
Gross Beta	26	3.91±0.02E-02	1.45±0.01E+09	8.33±0.04E-07	1.7E-06[d]	NA
Tritium	12	1.49±1.27E-03	5.50±4.70E+07	3.17±2.71E-08	2.6E-03	0.0001
C-14	2	5.21±7.07E-04	1.93±2.61E+07	1.11±1.51E-08	3.3E-04	< 0.0001
Sr-90	12	1.96±0.03E-02	7.26±0.12E+08	4.18±0.07E-07	1.7E-06	0.2460
I-129	2	0.15±2.71E-05	0.05±1.00E+06	0.32±5.79E-10	5.7E-07	< 0.0010
Cs-137	12	1.12±4.19E-05	0.41±1.55E+06	2.39±8.94E-10	4.1E-06	< 0.0002
U-232	2	-0.34±1.47E-06	-1.25±5.45E+04	-0.72±3.14E-11	2.1E-07	< 0.0001
U-233/234[e]	2	7.45±2.61E-06	2.76±0.97E+05	1.59±0.56E-10	1.2E-06	0.0001
U-235/236	2	1.19±1.17E-06	4.41±4.32E+04	2.54±2.49E-11	1.3E-06	0.0001
U-238	2	5.93±2.28E-06	2.19±0.84E+05	1.26±0.49E-10	1.4E-06	0.0001
Pu-238	2	1.31±1.42E-06	4.86±5.27E+04	2.80±3.04E-11	4.3E-07	< 0.0001
Pu-239/240	2	-0.13±1.05E-06	-0.47±3.90E+04	-0.27±2.25E-11	4.0E-07	< 0.0001
Am-241	2	0.56±1.06E-06	2.07±3.92E+04	1.19±2.26E-11	7.4E-07	< 0.0001
Sum of Ratios						**0.25**
Average pH			7.6	*SU*		
Total Uranium			1.33±0.02E+01	*g*		
			2.83±0.04E-04	*µg/mL*		
Total Estimated Volume Released			4.69E+10	*mL*		
			1.24E+07	*galllons*		

Notes: Average concentrations represent sample composite concentrations weighted to monthly stream flow.
N - Number of samples. Duplicates are averaged.
NA - Not applicable; ratio calculated from isotopic data.

[a] Half-lives are listed in Table 8-4.

[b] 1 Ci = 3.7E+10 Bq: 1Bq = 2.7E-11 Ci.

[c] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.

[d] The representative DCS for gross alpha in water shown is for U-232 and for gross beta is for Sr-90 (selected as the most restrictive) since DCSs do not exist for indicator parameters.

[e] The DCS for Uranium-233 is used for this comparison.

TABLE B-4B
Comparison of 2024 Radioactivity Concentrations in Surface Water at the North Swamp (WNSW74A)
With U.S. DOE-Derived Concentration Standards (DCSs)

Isotope [a]	*N*	*Discharge Activity*		*Mean Concentration*	*DCS* [c]	*Ratio of Average Concentration to DCS*
		(Ci)	*(Becquerels)* [b]	*(µCi/mL)*	*(µCi/mL)*	
Gross Alpha	26	-1.66±3.25E-05	-0.61±1.20E+06	-3.55±6.97E-10	2.1E-07[d]	NA
Gross Beta	26	3.31±0.06E-03	1.22±0.02E+08	7.09±0.13E-08	1.7E-06[d]	NA
Tritium	12	1.14±1.15E-03	4.24±4.25E+07	2.45±2.46E-08	2.6E-03	< 0.0001
C-14	2	-2.12±8.53E-04	-0.78±3.16E+07	-0.45±1.83E-08	3.3E-04	< 0.0001
Sr-90	12	1.65±0.04E-03	6.11±0.14E+07	3.54±0.08E-08	1.7E-06	0.0208
I-129	2	1.26±2.33E-05	4.66±8.62E+05	2.70±4.99E-10	5.7E-07	< 0.0009
Cs-137	12	0.54±3.41E-05	0.20±1.26E+06	1.16±7.31E-10	4.1E-06	< 0.0002
U-232	2	0.40±2.69E-06	1.49±9.93E+04	0.86±5.75E-11	2.1E-07	< 0.0003
U-233/234[e]	2	6.86±2.54E-06	2.54±0.94E+05	1.47±0.54E-10	1.2E-06	0.0001
U-235/236	2	0.77±1.08E-06	2.85±4.01E+04	1.65±2.32E-11	1.3E-06	< 0.0001
U-238	2	4.78±2.22E-06	1.77±0.82E+05	1.02±0.48E-10	1.4E-06	0.0001
Pu-238	2	0.62±1.24E-06	2.29±4.58E+04	1.33±2.65E-11	4.3E-07	0.0001
Pu-239/240	2	0.28±1.19E-06	1.03±4.38E+04	0.59±2.54E-11	4.0E-07	< 0.0001
Am-241	2	0.81±1.36E-06	3.01±5.03E+04	1.74±2.91E-11	7.4E-07	< 0.0001
Sum of Ratios						**0.023**
Average pH			7.5	*SU*		
Total Uranium			1.21±0.01E+01	*g*		
			2.59±0.03E-04	*µg/mL*		
Total Estimated Volume Released			4.67E+10	*mL*		
			1.23E+07	*galllons*		

Notes: Discharge activity represents the sum of activity released per sampling period. Curies released are based on the estimated monthly flow.

N - Number of samples. Duplicates are averaged.

NA - Not applicable.

[a] Half-lives are listed in Table 6-4.

[b] 1 Ci = 3.7E+10 Bq: 1Bq = 2.7E-11 Ci.

[c] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.

[d] The representative DCS for gross alpha in water shown is for U-232 and for gross beta is for Sr-90 (selected as the most restrictive) since DCSs do not exist for indicator parameters.

[e] The DCS for Uranium-233 is used for this comparison.

TABLE B-4C

2024 Radioactivity and pH in Surface Water at Facility Yard Drainage (WNSP005)

Analyte	Units	N	WNSP005 Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [a] or Standard [b]
Gross Alpha	µCi/mL	12	1.38±0.57E-08	2.29E-08	12	< 3.51E-10 - 1.10E-09	2.1E-07 [c]
Gross Beta	µCi/mL	12	2.22±0.03E-06	2.87E-06	12	1.16E-09 - 1.91E-09	1.7E-06 [d]
Tritium	µCi/mL	12	4.13±9.02E-08	8.62E-08	12	< 6.13E-08 - < 1.10E-07	2.6E-03
Sr-90	µCi/mL	12	1.14±0.05E-06	1.48E-06	2	< 5.54E-10 - < 7.68E-10	1.7E-06
Cs-137	µCi/mL	12	0.56±3.43E-09	4.96E-09	2	< 1.83E-09 - < 4.20E-09	4.1E-06
pH	SU	12	7.25 - 7.60				6.0 - 9.5

N - Number of samples. Duplicates are averaged.

[a] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[b] New York State Water Quality Standards for Class "D" as a comparative reference for nonradiological results.

[c] Alpha as U-232.

[d] Beta as Sr-90.

TABLE B-4D

2024 Radioactivity of Surface Water Downstream of the WVDP at Franks Creek (WNSP006)

Analyte	Units	N	WNSP006 Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [b]
Gross Alpha	µCi/mL	26	3.12±8.25E-10	1.71E-09	12	< 3.51E-10 - 1.10E-09	2.1E-07 [c]
Gross Beta	µCi/mL	26	5.82±0.27E-08	2.04E-07	12	1.16E-09 - 1.91E-09	1.7E-06 [d]
Tritium	µCi/mL	12	1.73±8.68E-08	1.33E-07	12	< 6.13E-08 - < 1.10E-07	2.6E-03
C-14	µCi/mL	3	1.41±2.66E-08	< 2.69E-08	2	< 2.40E-08 - < 2.69E-08	3.3E-04
Sr-90	µCi/mL	12	2.87±0.25E-08	6.60E-08	2	< 5.54E-10 - < 7.68E-10	1.7E-06
Tc-99	µCi/mL	4	0.35±8.52E-10	< 1.59E-09	2	< 3.56E-11 - < 1.16E-09	3.9E-04
I-129	µCi/mL	4	2.22±4.89E-10	< 6.01E-10	2	< 5.61E-10 - < 7.74E-10	5.7E-07
Cs-137	µCi/mL	12	0.73±2.62E-09	2.87E-09	2	< 1.83E-09 - < 4.72E-09	4.1E-06
U-232	µCi/mL	4	0.31±1.31E-10	< 1.72E-10	2	< 7.69E-11 - < 1.21E-10	2.1E-07
U-233/234 [e]	µCi/mL	4	2.82±1.16E-10	4.25E-10	2	< 4.65E-11 - 7.79E-11	1.2E-06
U-235/236	µCi/mL	3	3.55±4.63E-11	8.89E-11	2	< 2.67E-11 - < 2.71E-11	1.3E-06
U-238	µCi/mL	4	2.16±1.03E-10	2.92E-10	2	< 5.12E-11 - 1.14E-10	1.4E-06
Total U	µg/mL	4	5.59±0.14E-04	7.27E-04	2	1.24E-04 - 1.63E-04	--
Pu-238	µCi/mL	4	1.37±2.75E-11	< 3.32E-11	2	< 1.98E-11 - < 2.40E-11	4.3E-07
Pu-239/240	µCi/mL	4	0.80±2.78E-11	< 3.56E-11	2	< 2.64E-11 - < 3.93E-11	4.0E-07
Am-241	µCi/mL	3	1.21±4.01E-11	< 4.24E-11	2	< 4.65E-11 - < 6.03E-11	7.4E-07

N - Number of samples. Duplicates are averaged.

-- No Guideline or standard available for these analytes.

[a] Background location.

[b] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[c] Alpha as U-232.

[d] Beta as Sr-90.

[e] DCS for U-233 is used for this comparison.

TABLE B-4E

2024 Radioactivity in Surface Water Drainage Between the NDA and SDA (WNNDADR)

Analyte	Units	N	WNNDADR Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [a]
Gross Alpha	µCi/mL	12	9.33±9.23E-10	3.42E-09	12	< 3.51E-10 - 1.10E-09	2.1E-07 [b]
Gross Beta	µCi/mL	12	1.09±0.13E-08	1.44E-08	12	1.16E-09 - 1.91E-09	1.7E-06 [c]
Tritium	µCi/mL	12	4.75±9.02E-08	1.61E-07	12	< 6.13E-08 - 1.10E-07	2.6E-03
Sr-90	µCi/mL	2	3.96±0.91E-09	4.74E-09	2	< 5.54E-10 - < 7.68E-10	1.7E-06
I-129	µCi/mL	2	-0.05±8.30E-10	9.06E-10	2	< 5.61E-10 - < 7.74E-10	5.7E-07
Cs-137	µCi/mL	12	0.73±2.83E-09	2.80E-09	2	< 1.83E-09 - < 4.72E-09	4.1E-06

N - Number of samples. Duplicates are averaged.

[a] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[b] Alpha as U-232.

[c] Beta as Sr-90.

TABLE B-4F

2024 Radioactivity and pH in Surface Water at Erdman Brook (WNERB53)

Analyte	Units	N	WNERB53 Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [b] or Standard [c]
Gross Alpha	µCi/mL	4	2.05±6.28E-10	8.86E-10	12	< 3.51E-10 - 1.10E-09	2.1E-07 [d]
Gross Beta	µCi/mL	4	2.72±0.68E-09	3.28E-09	12	1.16E-09 - 1.91E-09	1.7E-06 [e]
Tritium	µCi/mL	4	3.20±8.88E-08	1.16E-07	12	< 6.13E-08 - 1.10E-07	2.6E-03
Sr-90	µCi/mL	2	8.36±8.15E-10	1.27E-09	2	< 5.54E-10 - < 7.68E-10	1.7E-06
Cs-137	µCi/mL	2	-0.43±2.35E-09	< 2.49E-09	2	< 1.83E-09 - < 4.72E-09	4.1E-06
pH	SU	4	7.8 - 8.1		292	6.4 - 8.7	6.0–9.5

N - Number of samples. Duplicates are averaged.

[a] Background data are from Buttermilk Creek, upstream of the WVDP. Sampling for nonradiological data was discontinued at this location in 2008. The pH range was calculated from the most recent 10 years of sampling, 1998–2007.

[b] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[c] New York State Water Quality Standards for surface waters Class "D" as a standard for nonradiological results.

[d] Alpha as U-232.

[e] Beta as Sr-90.

TABLE B-4G
2024 Radioactivity and pH in Surface Water at Franks Creek (WNFRC67)

Analyte	Units	N	WNFRC67 Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [b] or Standard [c]
Gross Alpha	µCi/mL	4	-0.50±4.55E-10	5.05E-10	12	< 3.51E-10 - 1.10E-09	2.1E-07 [d]
Gross Beta	µCi/mL	4	2.17±0.56E-09	4.65E-09	12	1.16E-09 - 1.91E-09	1.7E-06 [e]
Tritium	µCi/mL	4	0.84±8.71E-08	< 1.01E-07	12	< 6.13E-08 - 1.10E-07	2.6E-03
Sr-90	µCi/mL	2	5.22±9.86E-10	< 1.07E-09	2	< 5.54E-10 - < 7.68E-10	1.7E-06
Cs-137	µCi/mL	2	0.28±2.05E-09	< 2.05E-09	2	< 1.83E-09 - < 4.72E-09	4.1E-06
pH	SU	4	7.1 - 7.9		292	6.4 - 8.7	6.0–9.5

N - Number of samples. Duplicates are averaged.
[a] Background data are from Buttermilk Creek, upstream of the WVDP. Sampling for nonradiological data was discontinued at this location in 2008. The pH range was calculated from the most recent 10 years of sampling, 1998–2007.
[b] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.
[c] New York State Water Quality Standards for Class "D" surface waters as a standard for nonradiological results.
[d] Alpha as U-232.
[e] Beta as Sr-90.

TABLE B-4H
2024 Water Quality of Surface Water Downstream of the WVDP in Buttermilk Creek at Thomas Corners Bridge (WFBCTCB)

Analyte	Units	N	WFBCTCB Concentrations		N	Reference Values	
			Average	Maximum		WFBCBKG [a] Background Range	Guideline [b]
Gross Alpha	µCi/mL	12	4.06±7.57E-10	1.41E-09	12	< 3.51E-10 - 1.10E-09	2.1E-07 [c]
Gross Beta	µCi/mL	12	5.17±1.01E-09	9.00E-09	12	1.16E-09 - 1.91E-09	1.7E-06 [d]
Tritium	µCi/mL	12	2.37±8.86E-08	< 1.11E-07	12	< 6.13E-08 - 1.10E-07	2.6E-03
Sr-90	µCi/mL	2	1.61±1.04E-09	1.68E-09	2	< 5.54E-10 - < 7.68E-10	1.7E-06
Cs-137	µCi/mL	2	0.89±3.72E-09	< 4.61E-09	2	< 1.83E-09 - < 4.72E-09	4.1E-06

N - Number of samples. Duplicates are averaged.
[a] Background location.
[b] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.
[c] Alpha as U-232.
[d] Beta as Sr-90.

TABLE B-4I
2024 Radioactivity and pH in Surface Water Downstream of the WVDP in Cattaraugus Creek at Felton Bridge (WFFELBR)

Analyte	Units	N	WFFELBR Concentrations [a]		N	Reference Values	
			Average	Maximum		WFBIGBR Background Range	Guideline [b] or Standard [c]
Gross Alpha	µCi/mL	12	2.62±7.28E-10	1.72E-09	98	<3.59E-10 - 4.62E-09	2.1E-07[d]
Gross Beta	µCi/mL	12	2.95±0.85E-09	7.12E-09	98	<9.03E-10 - 1.37E-08	1.7E-06[e]
Tritium	µCi/mL	12	1.84±9.14E-08	< 1.18E-07	98	<4.46E-08 - 2.65E-07	2.6E-03
Sr-90	µCi/mL	12	2.28±7.22E-10	8.64E-10	98	<3.57E-10 - 1.10E-08	1.7E-06
Cs-137	µCi/mL	12	0.63±3.36E-09	4.26E-09	98	<1.34E-09 - 5.29E-09	4.1E-06
pH	SU	26	7.6 - 8.4		98	5.8 - 8.3	6.5 - 8.5

Note: Historical background data are from Bigelow Bridge, on Cattaraugus Creek upstream of WFFELBR. Sampling at WFBIGBR was discontinued in 2008. Range was calculated from the most recent 10 years of sampling, 1998-2007.

N - Number of samples. Duplicates are averaged.

[a] Except for pH, values represent composite concentrations weighted to monthly stream flow.

[b] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[c] New York Water Quality Standards for Class "B" as a comparative reference for nonradiological results.

[d] Alpha as U-232.

[e] Beta as Sr-90.

TABLE B-4J
Historical Radioactivity and pH in Surface Water at Bigelow Bridge Cattaraugus Creek Background (WFBIGBR)

Analyte	Units	N	WFBIGBR Concentrations		Guideline [a] or Standard [b]
			Average	Maximum	
Gross Alpha	µCi/mL	98	0.45±1.05E-09	4.62E-09	2.1E-07[c]
Gross Beta	µCi/mL	98	2.64±1.35E-09	1.37E-08	1.7E-06[d]
Tritium	µCi/mL	98	0.71±7.79E-08	2.65E-07	2.6E-03
Sr-90	µCi/mL	98	1.27±1.46E-09	1.10E-08	1.7E-06
Cs-137	µCi/mL	98	0.59±3.27E-09	5.29E-09	4.1E-06
pH	SU	98	Range: 5.8 - 8.3		6.5 - 8.5

Note: Historical background data are from Bigelow Bridge, on Cattaraugus Creek upstream of WFFELBR. Sampling at WFBIGBR was discontinued in 2008. Range was calculated from the most recent 10 years of sampling, 1998-2007.

N - Number of samples.

[a] 2022 DOE ingestion-based DCSs for 100 mrem/yr dose limit are provided as a guideline for radiological results.

[b] The New York Water Quality Standard for Class "B" is provided as a comparative reference for pH.

[c] Alpha as U-232.

[d] Beta as Sr-90.

TABLE B-4K
2024 Radioactivity and pH in Surface Water at Fox Valley Road
Buttermilk Creek Background (WFBCBKG)

Analyte	*Units*	*N*	*WFBCBKG* [a] *Concentrations*		*Guideline* [b] *or Standard* [c]
			Average	*Maximum*	
Gross Alpha	µCi/mL	12	2.81±7.26E-10	1.10E-09	2.1E-07[d]
Gross Beta	µCi/mL	12	1.60±0.80E-09	1.91E-09	1.7E-06[e]
Tritium	µCi/mL	12	-1.67±8.49E-08	< 1.10E-07	2.6E-03
C-14	µCi/mL	2	-1.37±2.55E-08	< 2.69E-08	3.3E-04
Sr-90	µCi/mL	2	-4.27±6.70E-10	< 7.68E-10	1.7E-06
Tc-99	µCi/mL	2	-4.75±8.21E-10	< 1.16E-09	3.9E-04
I-129	µCi/mL	2	4.15±6.76E-10	< 7.74E-10	5.7E-07
Cs-137	µCi/mL	2	0.73±3.58E-09	< 4.72E-09	4.1E-06
U-232	µCi/mL	2	0.01±1.01E-10	< 1.21E-10	2.1E-07
U-233/234	µCi/mL	2	4.49±5.33E-11	< 7.79E-11	1.2E-06
U-235/236	µCi/mL	2	-0.95±2.69E-11	< 2.71E-11	1.3E-06
U-238	µCi/mL	2	7.00±6.13E-11	1.14E-10	1.4E-06
Total U	µg/mL	2	1.44±0.05E-04	< 1.63E-04	--
Pu-238	µCi/mL	2	-0.22±2.20E-11	2.40E-11	4.3E-07
Pu-239/240	µCi/mL	2	1.50±3.35E-11	3.93E-11	4.0E-07
Am-241	µCi/mL	2	3.02±5.38E-11	< 6.03E-11	7.4E-07
pH[a]	SU	292	Range: 6.4 - 8.7		6.0 - 9.5

N - Number of samples. Duplicates are averaged.

-- No Guideline or standard available for these analytes.

[a] Sampling for nonradiological constituents was discontinued in 2008. The pH values represent measurements from the most recent 10 years of sampling, 1998 through 2007.

[b] 2022 DOE ingestion-based DCS for 100 mrem/yr dose limit from water ingestion.

[c] The New York Water Quality Standard for Class "D" is provided as a comparative reference for pH.

[d] Alpha as U-232.

[e] Beta as Sr-90.

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APPENDIX B-5
Potable Water (Drinking Water) Data

TABLE B-5A
2024 Water Quality Results in Drinking Water
at Tap Water Location Inside the RHWF

Analyte	*Units*	*N*	*WNDNKRH (RHWF)*	*Standard* [a]
Disinfection Byproducts [b]				
Haloacetic Acids-Five (5)	mg/L	2	0.001	0.060
Total Trihalomethanes	mg/L	2	0.007	0.080

N - Number of samples.
NA - Not applicable, constituent not analyzed.
[a] New York State Department of Health (NYSDOH) MCLs and EPA or NYSDOH screening levels for drinking water used as comparative references.
[b] Sampling for disinfection byproducts is required every three years. The result shown in the average of duplicate samples collected in August 2021.

TABLE B-5B
2024 Biological and Chlorine Results in Drinking Water
at Sitewide Tap Water Locations

Analyte	*Units*	*N*	*Results from Various Site Tap Water Locations*	*Standard* [a]
E. coli[b]	NA	4	0 Positive: 4 Negative	one positive sample
Total Coliform[b]	NA	4	0 Positive: 4 Negative	one positive sample
Free Residual Chlorine[b]	mg/L	4	Range: 1.61 - 1.88	greater than 0.2 and less than 4.0

N- Number of samples.
NA - Not applicable.
[a] NYSDOH MCLs for drinking water or EPA MCLGs, whichever is more stringent.
[b] The four tap water locations sampled in 2024 were WNDK29 (new guardhouse sink), WNDK23 (10-plex men's lavatory sink), WNDNURSE (nurse's sink), and WNDFIN (Water Treatment Building supply tap). These samples were analyzed by Cattaraugus County Health Department (CCHD).

TABLE B-5C
2024 Copper and Lead Results from On-Site Tap Water Locations at the WVDP

Analyte	Date Collected	Units	N	Range	Average	90th Percentile [a]	Action Level [a]
Copper, Total	8/4/2024	mg/L	5	0.040 - 0.50	0.22	0.41	1.3
Lead, Total	8/4/2024	mg/L	5	<1.0 - 0.0047	0.0014	0.0038	0.015

N - Number of samples

[a] The 90th percentile calculation is used to evaluate exceedance of the action level.

[b] See Table B-1C.

TABLE B-5D
2024 Metals and Water Quality Results in Treated Potable Water

Analyte	Date Collected	Units	N	Concentration [a] (Average when multiple samples are collected)	Standard [b] or Guideline
Metals [c, d]					
Aluminum, Total	3/12/2024	mg/L	2	<0.0645	50-200
Antimony, Total	3/12/2024	mg/L	2	<0.001	0.006
Arsenic, Total	3/12/2024	mg/L	2	0.0004	0.01
Barium, Total	3/12/2024	mg/L	2	1.55	2.00
Beryllium, Total	3/12/2024	mg/L	2	<0.001	0.004
Cadmium, Total	3/12/2024	mg/L	2	<0.001	0.005
Chromium, Total	3/12/2024	mg/L	2	0.001	0.1
Mercury, Total	3/12/2024	mg/L	2	<0.001	0.002
Nickel, Total	3/12/2024	mg/L	2	0.0006	--
Selenium, Total	3/12/2024	mg/L	2	<0.001	0.05
Sodium, Total[d]	3/12/2024	mg/L	2	43.5	20/270[e]
Thallium, Total	3/12/2024	mg/L	2	<0.001	0.002
Water Quality [c,d]					
Cyanide, Total[c]	3/12/2024	mg/L	1	<0.0041	0.2
Fluoride[c]	3/12/2024	mg/L	1	0.31	2.2
Nitrate-N[d]	4/24/2024	mg/L	1	0.57	10

N - Number of samples.

Note: See Table B-5B for free residual chlorine daily measurement results.

[a] When an analysis results is 'less than' (<), the concentration is indicated with a symbol '<'. When a result smaller

[b] New York State Department of Health (NYSDOH) MCLs for drinking water.

[c] Inorganic chemicals (IOCs) including metals, cyanide and fluoride are analyzed for once every

[d] Sodium and Nitrate are analyzed for once every year. Nitrate sampled by CCHD.

[e] Although there is no designated limit for sodium, NYSDOH guidelines provide recommended limits for people

TABLE B-5E
2024 Water Quality Results for Organic Parameters in Treated Potable Water

Location Code	Date Collected	Analyte	Results (mg/L)
Principal Organic Contaminants (POCs)			
WNDFIN	October 2024	1,1,1,2-Tetrachloroethane	< 0.00050
		1,1,1-Trichloroethane	< 0.00050
		1,1,2,2-Tetrachloroethane	< 0.00050
		1,1,2-Trichloroethane	< 0.00050
		1,1-Dichloroethane	< 0.00050
		1,1-Dichloroethene	< 0.00050
		1,1-Dichloropropene	< 0.00050
		1,2,3-Trichlorobenzene	< 0.00050
		1,2,3-Trichloropropane	< 0.00050
		1,2,4-Trichlorobenzene	< 0.00050
		1,2,4-Trimethylbenzene	< 0.00050
		1,2-Dichloroethane	< 0.00050
		1,2-Dichloropropane	< 0.00025
		1,3,5-Trimethylbenzene	< 0.00050
		1,3-Dichloropropane	< 0.00050
		2,2-Dichloropropane	< 0.00050
		Benzene	< 0.00050
		Bromobenzene	< 0.00050
		Bromochloromethane	< 0.00050
		Bromomethane	0.00031
		Carbon Tetrachloride	< 0.00050
		Chlorobenzene	< 0.00050
		Chloroethane	< 0.00050
		Chloromethane	0.00175
		cis-1,2-Dichloroethene	< 0.00050
		cis-1,3-Dichloropropene	< 0.00050
		Dichlorodifluoromethane (DCDFM)	< 0.00050
		Ethylbenzene	< 0.00050
		Hexachlorobutadiene	< 0.00025
		Isopropylbenzene	< 0.00025
		m-Dichlorobenzene (1,3-Dichlorobenzene)	< 0.00050
		Methyl-tert butyl-ether (MTBE)	< 0.00050
		Methylene bromide (Dibromomethane)	< 0.00050
		Methylene Chloride	< 0.00050
		N-Butylbenzene	< 0.00050
		n-Propylbenzene	< 0.00050
		o-Chlorotoluene (2-Chlorotoluene)	< 0.00050
		o-Dichlorobenzene (1,2-Dichlorobenzene)	< 0.00050
		p-Chlorotoluene (4-Chlorotoluene)	< 0.00050
		p-Dichlorobenzene (1,4-Dichlorobenzene)	< 0.00050
		p-Isopropyltoluene	< 0.00050
		Sec-Butylbenzene	< 0.00050
		Styrene	< 0.00050
		Tert-Butylbenzene	< 0.00050
		Tetrachloroethene	< 0.00050
		Toluene	< 0.00050
		trans-1,2-Dichloroethene	< 0.00050
		trans-1,3-Dichloropropene	< 0.00050
		Trichloroethene	< 0.00050
		Trichlorofluoromethane	< 0.00050
		Vinyl chloride	< 0.00020
		Xylene (m-Xylene and p-Xylene)	< 0.00050
		Xylene (o-Xylene)	< 0.00050

Note: Sample is collected after treatment (at sampling location WNDFIN) prior to distribution into the water supply system.

TABLE B-5E *(concluded)*
2024 Water Quality Results for Organic Parameters in Treated Potable Water

Location Code	*Date Collected*	*Analyte*	*Results - All Quarters (mg/L)*	
Specific Organic Chemicals (SOCs)				
WNDFIN	September 2024	2,4-D	<	0.00010
		3-Hydroxycarbofuran	<	0.00050
		Alachlor	<	0.00010
		Aldicarb	<	0.00050
		Aldicarb sulfone	<	0.00070
		Aldicarb sulfoxide	<	0.00050
		Aldrin	<	0.00010
		Atrazine	<	0.00010
		Butachlor	<	0.00010
		Carbaryl	<	0.00050
		Carbofuran	<	0.00090
		Chlordane	<	0.00010
		Dalapon	<	0.00100
		Dicamba	<	0.00010
		Dieldrin	<	0.00010
		Dinoseb	<	0.00020
		Endrin	<	0.00001
		Glyphosate	<	0.00600
		Heptachlor	<	0.00001
		Heptachlor epoxide	<	0.00001
		Lindane (gamma BHC)	<	0.00002
		Methomyl	<	0.00050
		Methoxychlor	<	0.00010
		Metolachlor	<	0.00010
		Metribuzin	<	0.00010
		Oxymal	<	0.00100
		PCB-1016	<	0.00008
		PCB-1221	<	0.00010
		PCB-1232	<	0.00010
		PCB-1242	<	0.00010
		PCB-1248	<	0.00010
		PCB-1254	<	0.00010
		PCB-1260	<	0.00010
		Pichloram	<	0.00010
		Propachlor	<	0.00010
		Silvex (2,4,5-TP)	<	0.00010
		Simazine	<	0.00007
		Total pcbs	<	0.00010
		Toxaphene	<	0.00050
		2,3,7,8-TCDD Dioxin	<	0.00004855
		Benzo[a]pyrene	<	0.00002
		Bis(2-ehex)phthalate	<	0.00060
		Hexachlorcylopntaden	<	0.00010
		Hexachlorobenzene	<	0.00010
		Bis(2-ethhex)adipate	<	0.00060
		Pentachlorophenol	<	0.00004
		1,2 Dibromoethane	<	0.00001
		1,2-DBr-3Cl-Propane	<	0.00001

Note: Sample is collected after treatment (at sampling location WNDFIN) prior to distribution into the water supply system.

TABLE B-5F
2024 Radiological Indicator Water Quality Results in Raw (Untreated) Potable Water

Location Code	*Date Collected*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Background [a]		***7.61E-09***	***1.56E-08***	***1.78E-07***
Supply Well #1 Pumping				
WNDRAW1	1/4/2024	1.86±1.31E-09	4.78±1.09E-09	3.98±8.41E-08
WNDRAW1	2/5/2024	2.18±1.46E-09	5.21±0.74E-09	0.30±1.00E-07
WNDRAW1	3/4/2024	2.34±8.26E-10	3.97±1.04E-09	3.15±8.94E-08
WNDRAW1	4/1/2024	0.18±1.28E-09	3.77±1.14E-09	2.53±7.73E-08
WNDRAW1	5/1/2024	-2.38±7.38E-10	3.36±0.80E-09	0.14±9.51E-08
WNDRAW1	6/3/2024	0.06±9.29E-10	3.90±1.28E-09	1.76±9.43E-08
WNDRAW1	7/1/2024	1.19±0.93E-09	4.91±0.93E-09	-0.05±1.02E-07
WNDRAW1	8/5/2024	9.92±7.53E-10	3.40±0.89E-09	2.57±8.48E-08
WNDRAW1	9/3/2024	0.54±1.05E-09	3.04±1.15E-09	1.11±1.10E-07
WNDRAW1	10/1/2024	0.44±1.01E-09	3.46±1.01E-09	5.10±7.72E-08
WNDRAW1	11/4/2024	1.14±0.77E-09	3.95±0.81E-09	-0.44±1.01E-07
WNDRAW1	12/3/2024	1.38±1.04E-09	4.72±0.94E-09	2.85±8.69E-08
Supply Well #2 Pumping				
WNDRAW2	1/4/2024	1.22±1.08E-09	3.34±0.96E-09	4.17±8.43E-08
WNDRAW2	2/5/2024	0.82±1.05E-09	2.29±1.07E-09	-1.01±7.41E-08
WNDRAW2	3/4/2024	6.43±9.90E-10	2.74±0.94E-09	1.81±6.94E-08
WNDRAW2	4/1/2024	4.33±5.85E-10	2.88±0.80E-09	-2.72±6.90E-08
WNDRAW2	5/1/2024	2.29±6.36E-10	2.38±0.74E-09	5.22±9.82E-08
WNDRAW2	6/3/2024	0.07±1.35E-09	2.85±0.99E-09	0.15±9.35E-08
WNDRAW2	7/1/2024	6.46±8.85E-10	3.03±0.98E-09	-0.22±1.09E-07
WNDRAW2	8/5/2024	-2.03±8.51E-10	3.80±0.85E-09	5.16±8.85E-08
WNDRAW2	9/3/2024	1.03±7.75E-10	2.40±1.01E-09	0.68±1.05E-07
WNDRAW2	10/1/2024	7.10±9.72E-10	2.96±1.13E-09	-1.17±6.85E-08
WNDRAW2	11/4/2024	6.18±8.28E-10	2.03±0.90E-09	0.00±1.01E-07
WNDRAW2	12/3/2024	1.18±1.13E-09	3.70±1.02E-09	5.70±8.77E-08

[a] Guideline used for screening groundwater supply wells is the background groundwater concentration as shown in Table D-1A, Appendix D, Summary of Groundwater. Potable water has been supplied by two bedrock groundwater wells since the fall of 2014.

TABLE B-5G

2024 RadioisotopIc Results in Raw (Untreated) Potable Water [a]

Location Code	*Date Collected*	*Cesium-137 µCi/mL*	*Iodine-129 µCi/mL*
EPA Standard [b]		***2.00E-07***	***1.00E-09***
Supply Well #1 Pumping			
WNDRAW1	3/4/2024	1.73±2.23E-09	0.46±4.20E-10
Supply Well #2 Pumping			
WNDRAW2	3/4/2024	2.04±2.60E-09	0.33±4.58E-10

[a] Untreated potable water is analyzed for radioisotopes once per year.

[b] Standard used for screening radionulides are from the EPA Safe Drinking Water Act Implemention Guidance for Radionuclides (40 CFR Part 141 Subpart F §141.66).

TABLE B-5H

2024 Radiological Indicator Results from the Source Water Protection Plan Wells

Analyte	*Units*	*N*	*Concentrations*		*Reference Values Guideline [a] or Standard [b]*
			Average	*Maximum*	
WNCT272					
Gross Alpha	µCi/mL	28	8.22±9.54E-10	1.76E-09	7.61E-09
Gross Beta	µCi/mL	28	4.17±1.08E-09	5.68E-09	1.56E-08
Conductivity	µmhos/cm@ 25ºC	28	658	704	NA
pH	SU	28	Range: 7.5 - 8.0		6.5-8.5
WNEHMKE					
Gross Alpha	µCi/mL	28	1.13±2.24E-09	2.74E-09	7.61E-09
Gross Beta	µCi/mL	28	4.20±3.65E-09	7.37E-09	1.56E-08
Conductivity	µmhos/cm@ 25ºC	28	757	843	NA
pH	SU	28	Range: 7.6 - 8.0		6.5-8.5
WWCOURT					
Gross Alpha	µCi/mL	28	5.50±9.03E-09	1.44E-09	7.61E-09
Gross Beta	µCi/mL	28	3.35±0.89E-09	6.27E-09	1.56E-08
Conductivity	µmhos/cm@ 25ºC	28	585	772	NA
pH	SU	28	Range: 7.4 - 7.9		6.5-8.5

NA - Not applicable.

SU - Standard units.

[a] Guideline used for screening sentinel wells is the background groundwater concentrations as shown in Table D-1A, Appendix D, Summary of Groundwater.

[b] The New York Water Quality Standard for Class "B" is provided as a comparative reference for pH.

TABLE B-5I
2024 Perfluorooctanoic acid (PFOA), Perfluorooctane sulfonic acid (PFOS), and 1,4-Dioxane in Raw (Untreated) Water

Location Code [a]	Date Collected	EPA MCL [b] (ng/L)	NYS DOH MCLs [c] (ng/L)	Category	Result (ng/L)	
WNDRAW1	7/17/2024	4	10	Perfluorooctanoic acid (PFOA)	<	0.594
		4	10	Perfluorooctanesulfonate (PFOS)	<	0.594
		200[d]	1	1,4-Dioxane	<	0.040

[a] Sampling was not required at WNDFIN (Treatment Building) and WNDRAW2 locations in 2024.

[b] Final PFAS National Primary Drinking Water Regulation (NPDWR). (EPA, April 10 2024).

[c] NYS Public Water Systems and Drinking Water Standards for PFAS and Other Emerging Contaminants (August 20, 2020). New York State Senate Bill 2023-S9661 (Introduced in May 16, 2024. This act shall take effect one year after it shall have become a law).

[d] EPA Technical Fact Sheet - 1,4-Dioxane (January 2014). 1,4-Dioxane of 0.2 mg/L.

TABLE B-5J
2024 PFAS Compounds in Raw (Untreated) Water and EPA Hazard Index

EPA Individual Hazard Index Ratio [e] (Result/MCL) EPA's Hazard Index Maximum Contaminant Level (MCL) ratio is set at 1 and applies to any mixture containing two or more of PFNA, PFHxS, PFBS, and HFPO-DA						
Location Code	Date Collected	EPA MCL (ng/L)	Category	Result (ng/L)		EPA Hazard Index [f]
WNDRAW1	7/17/2024	10	Hexafluoropropylene oxide dimer acid (HFPO-DA)	< 0.619	<	0.062
		2000	Perfluorobutane sulfonic acid (PFBS)	< 0.594	<	0.000297
		10	Perfluorononanoic acid (PFNA)	< 0.594	<	0.059
		10	Perfluorohexanesulfonic acid (PFHxS)	< 0.594	<	0.059
		EPA Total Hazed Index Ratio			**<**	**0.2**

[e] Understanding the Final PFAS National Primary Drinking Water Regulation Hazard Index Maximum Contaminant Level (https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr_fact-sheet_hazard-index_4.8.24.pdf).

[f] If the average of the ratio greater than the MCL of 1, it is violation of the Hazard Index MCL.

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APPENDIX C
Summary of Air Monitoring Data

TABLE C-1
2024 Effluent Airborne Radioactivity at Supernatant Treatment System (ANSTSTK)

Isotope	*N*	*Total Activity Released (Ci)*	*Average Concentration (µCi/mL)*	*Maximum Concentration (µCi/mL)*	*DCS [a] (µCi/mL)*	*Absorbtion Types [b]*
Gross Alpha	26	0.41±1.11E-09	0.62±1.66E-17	1.07E-16	NA[c]	
Gross Beta	26	6.39±3.56E-09	9.62±5.37E-17	1.45E-15	NA[c]	
Co-60	2	2.02±3.20E-09	3.04±4.82E-17	< 8.12E-17	3.4E-10	M
Sr-90	2	3.33±3.48E-09	5.01±5.24E-17	< 8.45E-17	1.1E-10	M
I-129	2	1.21±0.01E-05	4.67±0.05E-21	2.29E-13	4.0E-11	F
Cs-137	2	5.93±4.34E-09	8.92±6.53E-17	1.45E-16	7.0E-10	F
Eu-154	2	0.32±9.87E-09	0.05±1.49E-16	< 2.53E-16	9.9E-11	M
U-232	2	-1.06±3.52E-10	-1.60±5.30E-18	< 8.47E-18	6.9E-13	M
U-233/234	2	7.10±4.71E-10	1.07±0.71E-17	1.78E-17	1.5E-12	M
U-235/236	2	1.90±3.05E-10	2.86±4.59E-18	< 7.76E-18	1.6E-12[d]	M
U-238	2	8.67±4.36E-10	1.30±0.66E-17	1.60E-17	1.8E-12	M
Pu-238	2	-0.39±4.11E-10	-0.58±6.19E-18	< 9.89E-18	1.6E-13	M
Pu-239/240	2	3.85±4.10E-10	5.79±6.17E-18	< 1.02E-17	1.5E-13	M
Am-241	2	2.07±3.25E-10	3.12±4.89E-18	< 7.11E-18	2.5E-13	M
Total Uranium[e]			2.55±0.08E-03	*g*		
			3.84±0.12E-11	*µg/mL*		

N - Number of samples.
NA - Not applicable.
[a] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.
[b] Absorption type is applicable to air only and is based on guidance from ICRP-72. Radionuclides associated with particulate material of Type F undergo fast dissolution in the respiratory tract and show a high rate and level of absorption to blood. Type M represents an intermediate rate of dissolution in the respiratory tract and an intermediate rate and level of absorption to blood. Type S represents slow dissolution in the respiratory tract and a low rate and level of absorption to blood (DOE-STD-1196-2022). Exceptions are shown in this table by the additional footnotes.
[c] DCSs do not exist for indicator parameters gross alpha and gross beta.
[d] 2022 DCS for U-236 used for comparison with U-235/236. (The 2022 DCS for U-233 is the same as the DCS for U-234, and the 2022 DCS for Pu-239 is the same as the DCS for Pu-240.)
[e] Total Uranium includes uranium contribution from glass fiber filter matrix.

TABLE C-2
2024 Effluent Airborne Radioactivity at Remote-Handled Waste Facility (ANRHWFK)

Isotope	*N*	*Total Activity Released (Ci)*	*Average Concentration (µCi/mL)*	*Maximum Concentration (µCi/mL)*	*DCS [a] (µCi/mL)*	*Absorbtion Types [b]*
Gross Alpha	26	3.72±3.23E-09	3.05±2.65E-17	1.60E-16	NA[c]	
Gross Beta	26	-3.72±9.88E-09	-3.05±8.10E-17	5.58E-16	NA[c]	
Co-60	2	-0.60±1.07E-08	-4.91±8.77E-17	< 1.38E-16	3.4E-10	M
Sr-90	2	-0.31±1.00E-08	-2.50±8.23E-17	< 1.39E-16	1.1E-10	M
I-129	2	1.24±1.38E-08	1.01±1.13E-16	1.84E-16	4.0E-11	F
Cs-137	2	-0.14±1.19E-08	-1.15±9.72E-17	< 1.55E-16	7.0E-10	F
Eu-154	2	-2.48±2.60E-08	-2.03±2.13E-16	< 3.22E-16	9.9E-11	M
U-232	2	-1.03±9.64E-10	-0.84±7.90E-18	< 1.34E-17	6.9E-13	M
U-233/234	2	0.82±1.32E-09	0.67±1.08E-17	< 1.59E-17	1.5E-12	M
U-235/236	2	3.52±9.53E-10	2.88±7.81E-18	< 1.15E-17	1.6E-12[d]	M
U-238	2	2.35±1.62E-09	1.92±1.33E-17	2.52E-17	1.8E-12	M
Pu-238	2	0.01±7.53E-10	0.01±6.17E-18	< 8.99E-18	1.6E-13	M
Pu-239/240	2	5.73±7.67E-10	4.70±6.29E-18	< 1.03E-17	1.5E-13	M
Am-241	2	0.64±1.00E-09	5.22±8.22E-18	< 1.50E-17	2.5E-13	M
Total Uranium[e]			7.83±0.20E-03	*g*		
			6.42±0.17E-11	*µg/mL*		

N - Number of samples.
NA - Not applicable.

[a] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.

[b] Absorption type is applicable to air only and is based on guidance from ICRP-72. Radionuclides associated with particulate material of Type F undergo fast dissolution in the respiratory tract and show a high rate and level of absorption to blood. Type M represents an intermediate rate of dissolution in the respiratory tract and an intermediate rate and level of absorption to blood. Type S represents slow dissolution in the respiratory tract and a low rate and level of absorption to blood (DOE-STD-1196-2022). Exceptions are shown in this table by the additional footnotes.

[c] DCSs do not exist for indicator parameters gross alpha and gross beta.

[d] 2022 DCS for U-236 used for comparison with U-235/236. (The 2022 DCS for U-233 is the same as the DCS for U-234, and the 2022 DCS for Pu-239 is the same as the DCS for Pu-240.)

[e] Total Uranium includes uranium contribution from glass fiber filter matrix.

TABLE C-3
2024 Effluent Airborne Radioactivity at Container Sorting and Packaging Facility (ANCSPFK)

No container sorting and packaging was performed in the CSPF during 2024.

TABLE C-4
2024 Effluent Airborne Radioactivity at Portable Ventilation Units (PVUs)

Isotope	N	Total Activity Released (Ci)	Average Concentration (µCi/mL)	Maximum Concentration [a] (µCi/mL)	DCS [b] (µCi/mL)	Absorbtion Types [c]
Gross Alpha	17	3.38±0.65E-09	2.85±0.55E-17	8.13E-16	NA[d]	
Gross Beta	17	2.72±0.20E-08	2.29±0.17E-16	5.67E-15	NA[d]	
Co-60	2	1.01±1.67E-09	0.85±1.41E-17	< 2.62E-17	3.4E-10	M
Sr-90	2	1.45±2.50E-09	1.23±2.11E-17	< 3.28E-17	1.1E-10	M
Cs-137	2	1.86±1.31E-09	1.57±1.11E-17	2.78E-17	7.0E-10	F
Eu-154	2	-1.16±3.68E-09	-0.98±3.10E-17	< 5.21E-17	9.9E-11	M
U-232	2	-0.86±1.35E-10	-0.72±1.14E-18	< 1.83E-18	6.9E-13	M
U-233/234	2	2.74±1.69E-10	2.31±1.42E-18	2.70E-18	1.5E-12	M
U-235/236	2	0.40±1.06E-10	3.35±8.91E-19	< 1.47E-18	1.6E-12[e]	M
U-238	2	3.07±1.84E-10	2.59±1.55E-18	2.76E-18	1.8E-12	M
Pu-238	2	-0.17±1.57E-10	-0.14±1.33E-18	< 2.27E-18	1.6E-13	M
Pu-239/240	2	0.81±1.70E-10	0.68±1.44E-18	< 2.13E-18	1.5E-13	M
Am-241	2	1.49±1.72E-10	1.25±1.45E-18	< 2.11E-18	2.5E-13	M
Total Uranium[f]			1.01±0.03E-03	*g*		
			8.51±0.29E-12	*µg/mL*		

N - Number of samples.
NA - Not applicable.

[a] Maximum concentrations for gross alpha and gross beta were selected from PVUs that ran long enough to obtain detection limits comparable to continuously operated units.

[b] 2022 DCSs are used as reference values for the application of best available technology per DOE Order 458.1.

[c] Absorption type is applicable to air only and is based on guidance from ICRP-72. Radionuclides associated with particulate material of Type F undergo fast dissolution in the respiratory tract and show a high rate and level of absorption to blood. Type M represents an intermediate rate of dissolution in the respiratory tract and an intermediate rate and level of absorption to blood. Type S represents slow dissolution in the respiratory tract and a low rate and level of absorption to blood (DOE-STD-1196-2022). Exceptions are shown in this table by the additional footnotes.

[d] DCSs do not exist for indicator parameters gross alpha and gross beta.

[e] 2022 DCS for U-236 used for comparison with U-235/236. (The 2022 DCS for U-233 is the same as the DCS for U-234, and the 2022 DCS for Pu-239 is the same as the DCS for Pu-240.)

[f] Total Uranium includes uranium contribution from glass fiber filter matrix.

TABLE C-5
2024 Gross Alpha and Gross Beta Radioactivity at Near-Site Ambient Air Sampling Locations and at Background Great Valley Location (AFGRVAL)

Monitoring Location	*N*	*Gross Alpha µCi/mL*		*Gross Beta µCi/mL*	
		Average	*Maximum*	*Average*	*Maximum*
AF01_N	26	8.37±1.74E-16	1.43E-15	1.67±0.07E-14	2.55E-14
AF02_NNE	26	8.36±1.72E-16	1.24E-15	1.68±0.07E-14	2.51E-14
AF03_NE	26	8.13±1.54E-16	1.13E-15	1.63±0.06E-14	2.40E-14
AF04_ENE	26	7.99±1.57E-16	1.17E-15	1.57±0.06E-14	2.36E-14
AF05_E	26	7.88±1.59E-16	1.16E-15	1.63±0.06E-14	2.38E-14
AF06_ESE	26	8.59±1.76E-16	1.30E-15	1.65±0.07E-14	2.50E-14
AF07_SE	26	8.02±1.60E-16	1.09E-15	1.54±0.06E-14	2.30E-14
AF08_SSE	26	8.64±1.68E-16	1.36E-15	1.71±0.06E-14	2.61E-14
AF09_S	26	8.27±1.57E-16	1.21E-15	1.61±0.06E-14	2.44E-14
AF10_SSW	26	8.24±1.63E-16	1.38E-15	1.59±0.06E-14	2.36E-14
AF11_SW	26	8.25±1.60E-16	1.36E-15	1.65±0.06E-14	2.45E-14
AF12_WSW	26	8.93±1.78E-16	1.42E-15	1.60±0.06E-14	2.36E-14
AF13_W	26	8.75±1.61E-16	1.27E-15	1.67±0.06E-14	2.58E-14
AF14_WNW	26	9.59±1.73E-16	4.09E-15	1.79±0.06E-14	7.96E-14
AF15_NW	26	9.06±1.63E-16	1.55E-15	1.63±0.06E-14	2.42E-14
AF16_NNW	26	8.30±1.88E-16	1.36E-15	1.51±0.07E-14	2.48E-14
AF16HNNW	25	8.87±1.62E-16	1.31E-15	1.73±0.06E-14	2.50E-14
AFGRVAL	26	8.71±1.61E-16	1.40E-15	1.57±0.06E-14	2.43E-14

N - Number of samples for each gross anlaysis.

TABLE C-6
2024 Ambient Airborne Radioactivity
and Comparison to the NESHAP[a] Concentration Levels for Environmental Compliance

Location	N	Annual Average Concentration (µCi/mL)			
		Sr-90	I-129	Cs-137	U-232
NESHAP Compliance Level[b]		1.9E-14	9.1E-15	1.9E-14	1.3E-15
AF01_N	4	-0.64±1.29E-16	0.78±6.97E-17	0.04±1.47E-16	0.04±1.07E-17
AF02_NNE	4	-0.07±1.24E-16	0.51±6.74E-17	0.60±1.28E-16	0.48±1.30E-17
AF03_NE	4	-0.78±1.10E-16	-2.95±6.39E-17	0.22±9.88E-17	-7.30±8.53E-18
AF04_ENE	4	0.30±1.05E-16	-1.38±5.97E-17	-0.28±1.05E-16	-3.83±9.45E-18
AF05_E	4	-0.28±1.11E-16	0.24±6.09E-17	4.38±8.68E-17	-7.83±9.78E-18
AF06_ESE	4	-0.33±1.08E-16	-2.27±8.42E-17	0.59±1.13E-16	0.54±8.71E-18
AF07_SE	4	-0.60±1.05E-16	-1.81±5.17E-17	-0.05±1.06E-16	-0.08±1.10E-17
AF08_SSE	4	-0.07±9.65E-17	0.09±6.64E-17	0.14±1.01E-16	-3.83±8.67E-18
AF09_S	4	-0.24±1.01E-16	2.30±5.65E-17	3.50±9.26E-17	-4.09±8.51E-18
AF10_SSW	4	0.04±1.06E-16	-1.23±6.09E-17	-0.15±1.34E-16	-0.82±5.53E-18
AF11_SW	4	-0.23±1.22E-16	0.31±7.25E-17	0.20±1.07E-16	-6.52±9.53E-18
AF12_WSW	4	-0.03±1.21E-16	-0.39±5.32E-17	-0.59±1.15E-16	-5.38±8.11E-18
AF13_W	4	-1.25±8.59E-17	-2.77±6.40E-17	2.34±9.75E-17	-5.74±8.40E-18
AF14_WNW	4	5.68±1.84E-16	-0.76±6.79E-17	8.78±1.73E-16	0.91±8.72E-18
AF15_NW	4	-0.19±1.13E-16	0.38±4.55E-17	-0.07±1.06E-16	1.45±8.50E-18
AF16_NNW	4	-0.20±1.27E-16	-0.61±5.66E-17	0.29±1.06E-16	0.42±6.83E-18
AF16HNNW[c]	4	-0.50±2.98E-17	-0.61±5.66E-17[d]	2.49±2.56E-17	-0.74±2.15E-18
AFGRVAL[e]	4	-2.48±8.89E-17	2.63±6.14E-17	-0.05±1.40E-16	-0.84±8.17E-18

Location	N	Annual Average Concentration (µCi/mL)			Compliance Ratio (Sum of Ratios)[f]
		Pu-238	Pu-239/240	Am-241	
NESHAP Compliance Level[b]		2.1E-15	2.0E-15	1.9E-15	
AF01_N	4	1.04±1.33E-17	0.58±1.21E-17	0.26±1.10E-17	< 0.049
AF02_NNE	4	0.02±1.27E-17	0.30±1.26E-17	0.89±7.47E-18	< 0.047
AF03_NE	4	0.85±9.81E-18	0.92±9.20E-18	3.54±9.52E-18	< 0.039
AF04_ENE	4	0.13±8.24E-18	0.97±8.34E-18	-0.80±7.52E-18	< 0.037
AF05_E	4	1.59±1.12E-17	1.80±8.44E-18	5.21±8.60E-18	< 0.041
AF06_ESE	4	0.50±1.22E-17	-0.21±8.19E-18	-1.98±6.88E-18	< 0.041
AF07_SE	4	1.21±0.97E-17	1.08±0.98E-17	0.83±6.93E-18	< 0.040
AF08_SSE	4	-0.53±7.71E-18	0.15±7.33E-18	-1.70±8.43E-18	< 0.036
AF09_S	4	-2.14±7.36E-18	0.86±7.79E-18	0.33±5.90E-18	< 0.033
AF10_SSW	4	-0.96±8.65E-18	0.33±1.04E-17	5.91±8.27E-18	< 0.037
AF11_SW	4	-3.31±7.73E-18	1.49±8.22E-18	3.43±8.69E-18	< 0.040
AF12_WSW	4	0.38±1.04E-17	4.22±9.19E-18	1.10±0.92E-17	< 0.040
AF13_W	4	-0.73±7.68E-18	0.55±7.32E-18	0.56±1.12E-17	< 0.036
AF14_WNW	4	1.08±1.28E-17	2.38±1.32E-17	5.26±1.73E-17	**< 0.136**
AF15_NW	4	0.59±1.00E-17	0.85±1.21E-17	8.68±8.77E-18	< 0.038
AF16_NNW	4	0.08±1.02E-17	-0.04±1.09E-17	5.00±9.38E-18	< 0.039
AF16HNNW[c]	4	0.02±2.39E-18	0.69±3.00E-18	3.99±2.73E-18	< 0.016
AFGRVAL[e]	4	0.14±9.79E-18	-0.90±9.01E-18	1.16±8.46E-18	< 0.039

[a] NESHAP - National Emission Standards for Hazardous Air Pollutants, U.S. EPA 40 CFR Part 61.
[b] NESHAP Concentration Levels for Environmental Compliance, 40 CFR Part 61, Appendix E, Table 2.
[c] Location AF16HNNW is the high volume sampler at the same location as AF16_NNW.
[d] The low-volume result for I-129 is reported at the high-volume sampler in order to calculate an equivalent sum of ratios and estimated dose to compare with the other sampling results. I-129 is not measured at the high volume sampler.
[e] AFGRVAL is the background sampling location, approximately 29 km south of the WVDP.
[f] The largest ratio is presented in bold.

APPENDIX D-1
Summary of Groundwater Screening Levels and Practical Quantitation Limits

Groundwater Sampling Methodology

Groundwater samples are collected from monitoring wells using either dedicated well bailers or Teflon bladder pumps. Bailers are used in low-yield wells; bladder pumps are used in wells with good water-yielding characteristics. Each piece of sampling equipment is dedicated to an individual well to reduce the likelihood of sample contamination from external materials or cross contamination.

To ensure that only representative groundwater is sampled, three well volumes are removed (purged) from the well before the actual samples are collected. In low-yield wells, pumping or bailing to dryness provides sufficient purging. Conductivity and pH are measured before and after sampling to confirm the geochemical stability of the groundwater during sampling.

The bailer, a hollow tube with a check valve at the bottom, is lowered slowly into the well to minimize agitation of the water column. The water pressure raises the check valve which allows water to flow into the bailer. The bailer containing the groundwater is then withdrawn from the well and emptied into a sample container. Bladder pumps contain a Teflon bladder which fills with water, and then uses compressed air to gently squeeze the bladder to pump the water sample into a sample container. The bladder prevents air contact with the groundwater and the gentle compression minimizes agitation and mixing. A check valve ensures that the water flows in only one direction.

Groundwater samples are cooled and preserved, with chemicals if required, to minimize chemical and/or biological changes after sample collection. Groundwater samples collected for analysis of gross alpha and beta activity and radioisotopes under the GMP are filtered prior to analysis, since the presence of sediment or other solid particles can interfere with the measurement of these analytes that are dissolved in the groundwater. Groundwater samples collected for all other analyses under the GMP are not filtered. A strict chain-of-custody protocol is followed for all samples collected by the WVDP.

Groundwater Data Evaluation Methodology

Groundwater Trigger Level Evaluation

Groundwater monitoring data are compared against trigger levels. Groundwater trigger levels are statistically derived upper and lower prediction values calculated from historical results at each sampling location. These limits are used to promptly identify anomalies (exceptions) in monitoring results that may require further investigation. The trigger level evaluation also considers regulatory criteria, radiological DCSs, and analytical detection limits.

Trigger level exceptions, defined as monitoring results outside of the predicted range, may be the result of normal seasonal fluctuations, laboratory analytical problems, or changes in groundwater quality. Trigger level exceptions are evaluated and summarized in a quarterly trend analysis report with recommended response actions. Trigger level exceptions for RCRA-monitored wells and analytes are reported to NYSDEC.

Trigger levels are periodically updated as more data are collected over time, or following physical change (e.g., cap or slurry wall installation), that can influence the monitoring data. Groundwater trigger levels for selected chemical and radiological constituents were last recalculated in November 2022.

Groundwater Screening Levels (GSLs) for Radiological Constituents

Background values for radiological constituents in groundwater were derived for the RCRA Corrective Measures Studies in 2009 using data from background wells 301, 401, 706, and 1302 in the sand and gravel unit on the north plateau for samples

collected from 1991 through September 2009 (a year before the PTW was installed). The 95% upper confidence limit (UCL) was applied in a similar statistical calculation for each radiological constituent. The site-specific GSLs for radiological constituents were set to the greater of the background levels or the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Class GA groundwater quality standard for each radiological constituent. The NYSDEC TOGS standards are only established for gross alpha and gross beta concentrations, consequently most of the screening values for radiological constituents are set to equal the site background values. The groundwater screening levels (GSLs) for radiological constituents are listed in Table D-1A.

The radiological concentrations in groundwater from site monitoring wells are presented in the data tables in Appendix D-2 and were compared with these GSLs. Bolding indicates that the measured concentration exceeded the GSL.

Groundwater Screening Levels for Metals

The WVDP GSLs for metals were calculated in 2009 during a north plateau plume investigation to identify RCRA metals associated with the groundwater plume source area. The study concluded that RCRA metals had not been discharged from the plume source area (WVES 2009). The GSLs for metals were selected as the greater of the NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards or background concentrations in WVDP groundwater. The groundwater background concentrations were derived from a statistical calculation of the mean plus two standard deviations for metals data collected from four background wells (301, 401, 706, and well 1302). Elevated levels of chromium and nickel were previously identified in site wells constructed with stainless steel (which includes 301, 401, and 706), as presented to NYSDEC in a report entitled Final Report: Evaluation of the Pilot Program to Investigate Chromium & Nickel Concentration in Groundwater in the Sand and Gravel Unit (WVNSCO, 1998).

The findings of this 1998 report were subsequently accepted by NYSDEC in their memorandum dated September 15, 1998. Consequently, the majority of the chromium and nickel results from these stainless-steel wells were omitted from the dataset used to establish background, relying primarily on the results from polyvinyl chloride (PVC) well 1302 for these two constituents. The groundwater screening values for metals are listed in Table D-1B.

The metals concentrations in groundwater from site monitoring wells are presented in the data tables in Appendix D-2 and were compared with these GSLs. Bolding indicates that the measured concentration exceeded the GSL.

TABLE D-1A
Groundwater Screening Levels (GSLs) for Radiological Constituents

Radiological Constituent	*Range of Observed Concentrations From Background Monitoring Wells 301, 401, 706, and 1302* [a] *(µCi/mL)*	*WVDP 95% UCL Background Groundwater Concentration* [a] *(µCi/mL)*	*NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards* [b] *(µCi/mL)*	*WVDP GSLs* [c] *(µCi/mL)*
Gross alpha	< 7.78E-10 – 1.55E-08	7.61E-09	1.50E-08	1.50E-08
Gross beta	< 2.15E-09 – 2.35E-08	1.56E-08	1.00E-06	1.00E-06
Tritium	< 3.17E-08 – 2.63E-07	1.78E-07	NE	1.78E-07
Carbon-14	< 1.36E-11 – 5.02E-08	2.82E-08	NE	2.82E-08
Cesium-137	5.79E-10 – 1.90E-08	1.03E-08	NE	1.03E-08
Iodine-129	< 2.85E-10 – 1.58E-09	9.61E-10	NE	9.61E-10
Potassium-40	< 5.00E-08 – 3.56E-07	1.99E-07	NE	1.99E-07
Radium-226	< 1.10E-10 – 2.99E-09	1.33E-09	NE	1.33E-09
Radium-228	< 2.23E-10 – 3.20E-09	2.16E-09	NE	2.16E-09
Strontium-90	< 2.41E-10 – 6.40E-09	5.90E-09	NE	5.90E-09
Technetium-99	< 8.21E-10 – 8.61E-09	5.02E-09	NE	5.02E-09
Total Uranium (µg/mL)	< 1.27E-06 – 3.46E-03	1.34E-03	NE	1.34E-03
Uranium-232	< 1.71E-11 – 3.78E-10	1.38E-10	NE	1.38E-10
Uranium-233/234	< 3.85E-11 – 1.53E-09	6.24E-10	NE	6.24E-10
Uranium-235/236	< 1.80E-11 – 1.39E-10	8.07E-11	NE	8.07E-11
Uranium-238	< 1.32E-11 – 1.26E-09	4.97E-10	NE	4.97E-10

NE - No NYSDEC TOGS 1.1.1 Groundwater Quality Standard has been established for this analyte.

[a] The data used for the calculation of background values was taken from background wells 301, 401, 706, and 1302, in the sand and gravel unit on the north plateau for samples collected from 1991 through September 2009 (a year before the PTW was installed).

[b] NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards and Guidance Values.

[c] The GSLs for radiological constituents were set equal to the larger of the background concentrations or the NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards.

TABLE D-1B
Groundwater Screening Levels for Metals

Analyte [a]	*Range of Observed Concentrations From Background Monitoring Wells 301, 401, 706, and 1302* [b] *(µg/L)*	*Background Groundwater Concentration* [b] *(µg/L)*	*NYSDEC TOGS 1.1.1 Class GA Groundwater Quality Standards (µg/L)*	*WVDP Groundwater Screening Levels (GSLs)* [c] *(µg/L)*
Antimony, total	0.5 – 19.7	15.1	3	15.1
Arsenic, total	1.5 – 34.4	20.9	25	25
Barium, total	71.7 – 499	441	1,000	1,000
Beryllium, total	0.10 – 2.50	1.85	3	3
Cadmium, total	0.30 – 5.30	7.27	5	7.27
Chromium, total[d]	5 – 66	52.3	50	52.3
Cobalt, total	2.05 – 60.9	67.8	NE	67.8
Copper, total	1.4 – 90.5	59.9	200	200
Lead, total	0.5 – 120	42.7	25	42.7
Mercury, total	0.03 – 0.4	0.263	0.7	0.7
Nickel, total[d]	10 – 77.8	59.5	100	100
Selenium, total	1.0 – 25.0	10.1	10	10.1
Silver, total	0.1 – 10	15.5	50	50
Thallium, total	0.3 – 13.1	13.9	0.5	13.9
Tin, total	5.6 – 3,000	4,083	NE	4,083
Vanadium, total	0.6 – 73.1	69.6	NE	69.6
Zinc, total	5.71 – 256	127	2,000	2,000

NE - No TOGS 1.1.1 Class GA Groundwater Quality Standard has been established for this analyte.

[a] Analytes listed are those identified in the 6 NYCRR Part 373-2 Appendix 33 List.

[b] Data used for the calculation of background values was taken from wells 301, 401, 706, and 1302 in the S&G unit on the north plateau for samples collected from 1991 to December 2008, prior to the PTW installment. The background concentration was set equal to the mean plus two standard deviations (as reported in WVDP-494). Ninety-five percent of measurements are expected to fall below this value. Data were rounded to three significant digits or the closest integer.

[c] Metals GSLs were set equal to the larger of the background concentration or the TOGS 1.1.1 Class GA Groundwater Quality Standards.

[d] Elevated chromium and nickel concentrations attributed to well corrosion were noted in wells 301, 401, and 706 over the

TABLE D-1C
Practical Quantitation Limits (PQLs)

6 NYCRR[a] Appendix 33 Volatile Organic Compounds			
Compound	***PQL (µg/L)***	***Compound***	***PQL (µg/L)***
Acetone	10	cis-1,3-Dichloropropene	5
Acetonitrile	100	Ethyl Benzene	5
Acrolein	5	Ethyl methacrylate	5
Acrylonitrile	5	2-Hexanone	10
Allyl chloride	5	Isobutyl alcohol	100
Benzene	5	Methacrylonitrile	5
Bromodichloromethane	5	Methyl ethyl ketone	10
Bromoform (methyl bromide)	5	Methyl iodide	5
Bromomethane	10	Methyl methacrylate	5
Carbon disulfide	10	4-Methyl-2-pentanone (MIBK)	10
Carbon tetrachloride	5	Methylene bromide	10
Chlorobenzene	5	Methylene chloride	5
Chloroethane	10	Pentachloroethane	5
Chloroform	5	Propionitrile	50
Chloromethane (methyl chloride)	10	Styrene	5
Chloroprene	5	1,1,1,2-Tetrachloroethane	5
1,2-Dibromo-3-chloropropane	5	1,1,2,2-Tetrachloroethane	5
Dibromochloromethane	5	Tetrachloroethylene	5
1,2-Dibromoethane	5	Toluene	5
trans-1,4-Dichloro-2-butene	5	1,1,1-Trichloroethane (1,1,1-TCA)	5
1,1-Dichloroethane (1,1-DCA)	5	1,1,2-Trichloroethane (1,1,2-TCA)	5
1,2-Dichloroethane (1,2-DCA)	5	Trichloroethylene (TCE)	5
1,1-Dichloroethylene (1,1-DCE)	5	Trichlorofluoromethane	5
trans-1,2-Dichloroethylene (1,2-DCE[trans])	5	1,2,3-Trichloropropane	5
Dichlorodifluoromethane (DCDF Meth)	5	Vinyl acetate	10
1,2-Dichloropropane	5	Vinyl chloride	10
trans-1,3-Dichloropropene	5	Xylene (total)	5
6 NYCRR[a] Appendix 33 Metals			
Compound	***PQL (µg/L)***	***Compound***	***PQL (µg/L)***
Antimony	10	Mercury	0.2
Arsenic	10	Nickel	40
Barium	200	Selenium	5
Beryllium	1	Silver	10
Cadmium	5	Thallium	2
Chromium	10	Tin	3,000
Cobalt	50	Vanadium	50
Copper	25	Zinc	20
Lead	3		

Note: Specific quantitation limits are highly matrix dependent and may not always be achievable.
[a] Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.

TABLE D-1C (*continued*)
Practical Quantitation Limits (PQLs)

6 NYCRR [a] Appendix 33 Semi-Volatile Organic Compounds			
Compound	***PQL (µg/L)***	***Compound***	***PQL (µg/L)***
Acenaphthene	10	2,4-Dinitrotoluene	10
Acenaphthylene	10	2,6-Dinitrotoluene	10
Acetophenone	10	Diphenylamine	10
2-Acetylaminofluorene	10	Ethyl methanesulfonate	10
4-Aminobiphenyl	10	Famphur	10
Analine	10	Fluoranthene	10
Anthracene	10	Fluorene	10
Aramite	10	Hexachlorobenzene	10
Benzo[a]anthracene	10	Hexachlorobutadiene	10
Benzo[a]pyrene	10	Hexachlorocyclopentadiene	10
Benzo[b]fluoranthene	10	Hexachloroethane	10
Benzo[ghi]perylene	10	Hexachlorophene	10
Benzo[k]fluoranthene	10	Hexachloropropene	10
Benzyl alcohol	10	Indeno(1,2,3,-cd)pyrene	10
Bis(2-chloroethyl)ether	10	Isodrin	10
Bis(2-chloroethoxy)methane	10	Isophorone	10
Bis(2-chloroisopropyl)ether	10	Isosafrole	10
Bis(2-ethylhexyl)phthalate	10	Kepone	10
4-Bromophenyl phenyl ether	10	Methapyrilene	10
Butyl benzyl phthalate	10	Methyl methanesulfonate	10
Chlorobenzilate	10	3-Methylcholanthrene	10
2-Chloronaphthalene	10	2-Methylnapthalene	10
2-Chlorophenol	10	1,4-Naphthoquinone	10
4-Chlorophenyl phenyl ether	10	1-Naphthylamine	10
Chrysene	10	2-Naphthylamine	10
Di-n-butyl phthalate	10	Nitrobenzene	10
Di-n-octyl phthalate	10	5-Nitro-o-toluidine	10
Diallate	10	4-Nitroquinoline 1-oxide	40
Dibenz[a,h]anthracine	10	N-Nitrosodi-n-butylamine	10
Dibenzofuran	10	N-Nitrosodiethylamine	10
3,3-Dichlorobenzidine	10	N-Nitrosodimethylamine	10
2,4-Dichlorophenol	10	N-Nitroso-di-n-propylamine	10
2,6-Dichlorophenol	10	N-Nitrosodiphenylamine	10
Diethyl phthalate	10	N-Nitrosomethylethylamine	10
Dimethoate	10	N-Nitrosomorpholine	10
7,12-Dimethylbenz[a]anthracene	10	N-Nitrosopiperidine	10
3,3-Dimethylbenzidine	20	N-Nitrosopyrrolidine	10
2,4-Dimethylphenol	10	Naphthalene	10
Dimethyl phthalate	10	0,0,0-Triethyl phosphorothioate	10
4,6-Dinitro-o-cresol	25	O,O-Diethyl O-2-pyrazinylphosphorothioate	10
2,4-Dinitrophenol	25		

Note: Specific quantitation limits are highly matrix dependent and may not always be achievable.
[a] Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.

TABLE D-1C (*concluded)*
Practical Quantitation Limits (PQLs)

6 NYCRR [a] ***Appendix 33 Semi-Volatile Organic Compounds***			
Compound	***PQL (µg/L)***	***Compound***	***PQL (µg/L)***
p-(Dimethylamino)azobenzene	10	2,3,4,6-Tetrachlorophenol	10
p-Chloroaniline	10	Tetraethyl dithiopyrophosphate	10
p-Chloro-m-cresol	10	1,2,4-Trichlorobenzene	10
p-Cresol	10	2,4,5-Trichlorophenol	25
p-Dichlorobenzene	10	2,4,6-Trichlorophenol	10
p-Nitroaniline	25	alpha,alpha-Dimethylphenethylamine	50
p-Nitrophenol	25	m-Cresol	10
p-Phenylenediamine	10	m-Dichlorobenzene	10
Parathion	10	m-Dinitrobenzene	10
Pentachlorobenzene	10	m-Nitroanaline	25
Pentachloronitrobenzene	10	o-Cresol	10
Pentachlorophenol	25	o-Dichlorobenzene	10
Phenacetin	10	o-Nitroaniline	25
Phenanthrene	10	o-Nitrophenol	10
Phenol	10	o-Toluidine	10
Pronamide	10	sym-Trinitrobenzene	10
Pyrene	10	2-Picoline	10
Safrole	10	Pyridine	10
1,2,4,5-Tetrachlorobenzene	10	1,4-Dioxane	10
Other Organic Compounds			
Compound	***PQL (µg/L)***		
1,2-Dichloroethylene (Total)	5		
N-Dodecane	60		
Tributyl phosphate	10		

Note: Specific quantitation limits are highly matrix dependent and may not always be achievable.
[a] Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.

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APPENDIX D-2
Groundwater Monitoring Data

TABLE D-2A
2024 Indicator Results From the Sand and Gravel Unit

Location Code	*Hydraulic Position* [a]	*Date Collected*	*pH SU*	*Conductivity µmhos/cm @ 25°C*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
301	UP	Mar-24	6.62	2550	-1.63±2.86E-09	1.39±0.34E-08	-5.24±7.51E-08
301	UP	Jun-24	6.52	3700	5.51±4.63E-09	1.91±0.38E-08	1.08±7.98E-08
301	UP	Sep-24	6.43	3238	0.98±3.32E-09	9.45±3.95E-09	-1.75±7.92E-08
301	UP	Dec-24	6.61	3040	1.83±4.65E-09	1.65±0.35E-08	0.18±1.02E-07
302	UP	Jun-24	6.85	9756	0.00±8.97E-09	1.05±1.03E-08	1.11±7.87E-08
302	UP	Dec-24	6.85	9475	8.69±9.83E-09	-1.34±9.52E-09	0.34±1.02E-07
401	UP	Mar-24	6.94	10936	3.42±9.00E-09	0.60±1.34E-08	-4.85±7.19E-08
401	UP	Jun-24	6.96	10898	0.00±1.56E-08	0.35±2.27E-08	1.08±7.97E-08
401	UP	Sep-24	6.42	5762	0.00±1.15E-08	1.09±0.10E-07	3.09±8.55E-08
401	UP	Dec-24	6.88	9480	0.66±1.16E-08	1.44±1.19E-08	0.16±1.01E-07
402	UP	Jun-24	6.97	9606	**2.10±1.51E-08**	1.65±1.30E-08	-1.82±7.25E-08
402	UP	Dec-24	6.95	9886	-2.82±8.18E-09	-3.76±8.96E-09	-5.73±9.59E-08
403	UP	Jun-24	7.12	1267	0.94±1.54E-09	9.34±1.94E-09	-3.57±7.26E-08
403	UP	Dec-24	7.15	1350	3.09±7.90E-10	6.93±1.29E-09	-5.49±9.22E-08
706	UP	Mar-24	6.99	955	0.66±1.36E-09	7.41±1.27E-09	-6.45±7.20E-08
706	UP	Jun-24	6.74	1530	0.93±1.75E-09	7.80±1.92E-09	4.40±8.52E-08
706	UP	Sep-24	6.59	1444	-1.39±1.58E-09	8.26±2.06E-09	1.06±0.95E-07
706	UP	Dec-24	6.47	872	5.65±7.00E-10	5.00±1.20E-09	-6.16±9.25E-08
1302	UP	Dec-24	7.15	948	0.00±9.46E-10	5.92±9.18E-10	0.10±1.10E-07
103	DOWN	Mar-24	8.80	2439	-0.50±1.44E-09	5.95±2.28E-09	-2.12±7.59E-08
103	DOWN	Jun-24	8.48	3203	0.67±1.98E-09	1.45±0.22E-08	0.74±1.10E-07
103	DOWN	Sep-24	8.21	2313	2.28±2.65E-09	1.22±0.24E-08	6.14±8.93E-08
103	DOWN	Dec-24	8.90	2126	1.30±2.28E-09	1.19±0.23E-08	3.16±9.89E-08
104	DOWN	Mar-24	7.12	3148	4.31±4.89E-09	**3.92±0.01E-05**	1.28±8.51E-08
104	DOWN	Jun-24	7.05	3184	0.00±1.42E-08	**3.79±0.02E-05**	1.04±1.01E-07
104	DOWN	Sep-24	7.03	3131	2.93±1.97E-08	**4.09±0.02E-05**	3.05±9.34E-08
104	DOWN	Dec-24	7.05	3211	-0.28±6.31E-09	**4.06±0.01E-05**	3.04±7.75E-08

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NA - Not applicable.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2A (*continued*)
2024 Indicator Results From the Sand and Gravel Unit

Location Code	Hydraulic Position [a]	Date Collected	pH SU	Conductivity µmhos/cm @ 25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
105	DOWN	Mar-24	7.15	3444	5.08±4.45E-09	**5.42±0.01E-05**	-0.89±8.34E-08
105	DOWN	Jun-24	7.07	3518	1.02±1.33E-08	**4.45±0.03E-05**	7.92±9.91E-08
105	DOWN	Sep-24	6.95	3383	0.42±1.61E-08	**4.69±0.03E-05**	1.50±7.94E-08
105	DOWN	Dec-24	7.09	3517	3.51±4.50E-09	**4.53±0.01E-05**	7.92±8.85E-08
106	DOWN	Mar-24	6.93	2891	-3.67±4.58E-09	**1.46±0.01E-05**	1.19±0.98E-07
106	DOWN	Jun-24	6.87	2989	1.46±1.15E-08	**1.38±0.01E-05**	1.31±1.02E-07
106	DOWN	Sep-24	6.74	2880	-0.40±1.69E-08	**1.27±0.01E-05**	**2.46±1.10E-07**
106	DOWN	Dec-24	6.74	2645	0.66±3.88E-09	**1.01±0.01E-05**	**3.02±1.13E-07**
111	DOWN	Mar-24	6.53	743	9.77±1.84E-09	**3.12±0.01E-06**	-3.58±8.06E-08
111	DOWN	Jun-24	6.45	1157	0.00±8.43E-09	**4.15±0.08E-06**	3.32±9.62E-08
111	DOWN	Sep-24	6.18	1955	2.31±1.51E-08	**5.64±0.09E-06**	-0.82±7.90E-08
111	DOWN	Dec-24	6.57	2330	**2.84±0.71E-08**	**7.23±0.06E-06**	0.83±7.78E-08
116	DOWN	Jun-24	7.10	3652	1.50±1.59E-08	**4.67±0.03E-05**	1.91±9.67E-08
116	DOWN	Dec-24	7.36	3610	-0.75±4.02E-09	**4.14±0.01E-05**	2.78±7.71E-08
205	DOWN	Jun-24	6.82	5195	0.00±5.23E-09	1.97±0.64E-08	2.67±7.95E-08
205	DOWN	Dec-24	7.03	2754	0.83±2.42E-09	1.12±0.37E-08	0.18±9.95E-08
406	DOWN	Mar-24	7.33	634	9.48±8.31E-10	3.89±1.22E-09	3.49±8.67E-08
406	DOWN	Jun-24	7.78	638	0.00±7.67E-10	4.54±0.99E-09	3.95±8.22E-08
406	DOWN	Sep-24	7.22	636	8.79±6.09E-10	5.07±1.05E-09	-2.51±7.86E-08
406	DOWN	Dec-24	7.23	590	-0.37±1.16E-09	7.46±1.23E-09	-2.23±9.36E-08
408	DOWN	Mar-24	7.32	4837	3.52±7.79E-09	**1.74±0.01E-04**	4.02±8.86E-08
408	DOWN	Jun-24	7.30	4640	0.24±1.35E-08	**1.56±0.01E-04**	1.22±0.98E-07
408	DOWN	Sep-24	7.19	5078	**1.95±1.81E-08**	**1.68±0.01E-04**	**2.45±0.86E-07**
408	DOWN	Dec-24	7.29	3987	-1.94±8.62E-09	**1.49±0.01E-04**	1.51±1.01E-07
501	DOWN	Mar-24	7.36	2728	-2.81±3.60E-09	**2.60±0.01E-05**	-4.72±7.72E-08
501	DOWN	Jun-24	7.32	2788	1.59±1.18E-08	**2.34±0.02E-05**	4.40±9.53E-08
501	DOWN	Sep-24	7.23	2782	2.13±1.94E-08	**2.62±0.02E-05**	-2.06±7.78E-08
501	DOWN	Dec-24	7.46	2637	0.45±3.76E-09	**2.29±0.01E-05**	5.89±8.61E-08
502	DOWN	Mar-24	7.38	3066	4.59±5.84E-09	**3.83±0.01E-05**	-2.12±8.23E-08
502	DOWN	Jun-24	7.31	3016	2.14±9.40E-09	**3.44±0.02E-05**	1.74±8.39E-08
502	DOWN	Sep-24	7.32	2792	0.00±1.52E-08	**3.26±0.02E-05**	1.03±9.32E-08
502	DOWN	Dec-24	7.40	2736	1.03±4.57E-09	**3.01±0.01E-05**	1.85±7.92E-08
602A	DOWN	Jun-24	6.99	1170	0.37±1.11E-09	8.11±1.37E-09	7.05±8.85E-08
602A	DOWN	Dec-24	6.67	1128	0.36±1.26E-09	8.42±1.47E-09	0.77±1.02E-07

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NA - Not applicable.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2A (*continued)*
2024 Indicator Results From the Sand and Gravel Unit

Location Code	*Hydraulic Position* [a]	*Date Collected*	*pH SU*	*Conductivity µmhos/cm @ 25°C*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
604	DOWN	Jun-24	6.33	1908	0.00±2.05E-09	7.22±2.17E-09	1.48±1.15E-07
604	DOWN	Dec-24	6.52	1862	0.00±2.13E-09	7.55±2.24E-09	0.44±1.08E-07
605	DOWN	Jun-24	7.18	1431	0.85±1.15E-09	1.73±0.22E-08	4.82±8.47E-08
605	DOWN	Dec-24	6.45	854	-2.73±7.95E-10	1.56±0.15E-08	0.34±1.04E-07
801	DOWN	Mar-24	6.84	2221	3.50±4.62E-09	**1.30±0.01E-05**	-4.00±8.02E-08
801	DOWN	Jun-24	6.72	2205	0.71±1.38E-08	**1.15±0.01E-05**	1.09±8.15E-08
801	DOWN	Sep-24	6.81	1622	1.23±1.94E-08	**6.53±0.10E-06**	-1.05±0.70E-07
801	DOWN	Dec-24	6.66	1332	0.16±1.97E-09	**5.30±0.03E-06**	2.18±7.91E-08
802	DOWN	Mar-24	6.55	130	2.48±9.95E-10	**2.52±0.02E-06**	-6.72±7.50E-08
802	DOWN	Jun-24	6.80	384	0.00±8.28E-09	2.45±0.24E-07	4.87±8.98E-08
802	DOWN	Sep-24	6.97	1401	0.48±1.73E-09	**1.10±0.01E-06**	-0.60±8.77E-08
802	DOWN	Dec-24	6.89	1954	-1.13±2.30E-09	**1.64±0.02E-06**	7.24±8.82E-08
803	DOWN	Mar-24	7.19	3275	5.03±5.95E-09	**5.63±0.04E-06**	2.89±8.83E-08
803	DOWN	Jun-24	7.11	3318	0.00±1.54E-08	**5.46±0.09E-06**	-0.04±7.95E-08
803	DOWN	Sep-24	7.10	3660	0.77±1.66E-08	**6.53±0.17E-06**	1.34±8.99E-08
803	DOWN	Dec-24	7.37	3576	1.62±5.39E-09	**5.90±0.04E-06**	3.93±7.80E-08
804	DOWN	Mar-24	7.06	2114	4.40±4.01E-09	1.07±0.06E-07	-4.59±7.40E-08
804	DOWN	Jun-24	6.79	2312	1.60±2.16E-09	1.18±0.06E-07	4.83±8.52E-08
804	DOWN	Sep-24	6.81	2974	-0.86±2.97E-09	1.34±0.06E-07	1.38±0.96E-07
804	DOWN	Dec-24	6.91	2836	0.40±2.92E-09	1.25±0.06E-07	0.94±1.04E-07
1304	DOWN	Mar-24	7.12	3332	0.00±3.80E-09	5.80±4.18E-09	2.08±8.17E-08
1304	DOWN	Jun-24	6.92	4448	1.22±3.11E-09	7.60±3.88E-09	0.26±7.70E-08
1304	DOWN	Sep-24	7.00	2830	-0.48±3.45E-09	0.86±4.02E-09	9.87±9.82E-08
1304	DOWN	Dec-24	7.16	2208	0.00±2.12E-09	3.98±0.35E-08	0.63±1.11E-07
8603	DOWN	Jun-24	7.14	3680	1.55±1.69E-08	**5.28±0.03E-05**	2.55±8.58E-08
8603	DOWN	Dec-24	7.16	3443	2.10±3.85E-09	**5.03±0.01E-05**	1.65±7.66E-08
8604	DOWN	Jun-24	7.04	3478	-0.78±1.24E-08	**4.22±0.03E-05**	6.94±9.11E-08
8604	DOWN	Dec-24	7.10	3406	2.42±9.30E-09	**4.84±0.01E-05**	3.98±8.47E-08
8605	DOWN	Mar-24	6.80	706	**1.70±0.29E-08**	**3.99±0.02E-06**	1.28±8.73E-08
8605	DOWN	Jun-24	6.71	1094	-1.72±1.31E-08	**5.38±0.09E-06**	0.08±8.29E-08
8605	DOWN	Sep-24	7.02	2654	1.81±2.17E-08	**2.17±0.06E-06**	9.32±9.66E-08
8605	DOWN	Dec-24	7.05	1834	**4.75±0.62E-08**	**5.09±0.03E-06**	6.57±8.79E-08

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NA - Not applicable.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2A (*concluded*)
2024 Indicator Results From the Sand and Gravel Unit

Location Code	Hydraulic Position [a]	Date Collected	pH SU	Conductivity µmhos/cm @ 25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
Groundwater Screening Levels [b]			*NA*	*NA*	*1.50E-08*	*1.00E-06*	*1.78E-07*
8607	DOWN	Mar-24	7.09	1049	0.47±1.37E-09	2.45±0.19E-08	-1.36±8.33E-08
8607	DOWN	Jun-24	6.86	983	1.07±1.26E-09	3.07±0.20E-08	**1.65±1.20E-07**
8607	DOWN	Sep-24	6.73	1131	3.24±8.99E-10	2.90±0.19E-08	**1.50±1.01E-07**
8607	DOWN	Dec-24	6.81	978	-9.21±9.71E-10	1.16±1.24E-09	-0.19±1.07E-07
8609	DOWN	Mar-24	7.14	1777	1.73±2.20E-09	7.84±0.11E-07	2.05±8.63E-08
8609	DOWN	Jun-24	7.09	1862	1.64±2.13E-09	8.25±0.12E-07	-0.25±8.00E-08
8609	DOWN	Sep-24	7.12	1924	2.26±2.07E-09	8.53±0.11E-07	**1.61±1.03E-07**
8609	DOWN	Dec-24	7.13	1624	1.06±2.20E-09	7.99±0.11E-07	-0.28±1.04E-07
8612	DOWN	Mar-24	7.15	3286	1.12±4.29E-09	**3.37±0.03E-06**	-1.47±8.41E-08
8612	DOWN	Jun-24	6.88	3532	3.89±9.02E-09	**4.01±0.08E-06**	0.23±8.07E-08
8612	DOWN	Sep-24	7.09	3314	-1.46±1.95E-08	**4.36±0.08E-06**	-5.14±8.26E-08
8612	DOWN	Dec-24	7.03	3444	2.13±3.92E-09	**4.79±0.03E-06**	8.00±9.18E-08
GSEEP	DOWN	Mar-24	8.11	2929	-1.02±4.48E-09	2.06±0.07E-07	3.00±8.51E-08
GSEEP	DOWN	Jun-24	7.81	3285	2.19±1.92E-09	2.58±0.08E-07	1.04±0.92E-07
GSEEP	DOWN	Sep-24	7.45	3276	1.86±3.77E-09	2.62±0.08E-07	1.43±1.04E-07
GSEEP	DOWN	Dec-24	7.65	2133	5.83±4.04E-09	2.16±0.08E-07	1.23±9.66E-08
SP04	DOWN	Mar-24	NS	NS	-1.00±5.17E-09	3.21±0.11E-07	NS
SP04	DOWN	Jun-24	NS	NS	2.14±2.03E-09	3.42±0.08E-07	2.18±8.34E-08
SP04	DOWN	Dec-24	NS	NS	2.45±2.96E-09	3.77±0.09E-07	-0.05±1.06E-07
SP06	DOWN	Mar-24	NS	NS	-0.87±5.52E-09	1.64±0.08E-07	NS
SP06	DOWN	Jun-24	NS	NS	2.64±2.32E-09	1.73±0.06E-07	1.53±8.21E-08
SP06	DOWN	Dec-24	NS	NS	3.01±2.64E-09	1.24±0.05E-07	0.74±1.00E-07
SP11	DOWN	Mar-24	NS	NS	1.06±3.70E-09	5.53±0.13E-07	NS
SP11	DOWN	Jun-24	NS	NS	3.35±3.07E-09	5.15±0.11E-07	4.62±8.73E-08
SP11	DOWN	Dec-24	NS	NS	0.54±2.53E-09	2.11±0.06E-07	-0.63±9.95E-08
SP12	DOWN	Mar-24	NS	NS	-2.94±5.82E-09	2.01±0.03E-06	NS
SP12	DOWN	Jun-24	7.30	3441	0.84±1.14E-08	3.63±0.07E-06	0.12±9.27E-08
SP12	DOWN	Sep-24	7.16	3536	0.00±1.68E-08	**4.73±0.08E-06**	9.12±9.81E-08
SP12	DOWN	Dec-24	7.24	3100	-0.76±4.99E-09	**4.39±0.03E-06**	6.73±8.75E-08
MP-03	DOWN	Mar-24	7.34	1894	3.42±3.40E-09	**1.13±0.01E-04**	-0.16±8.34E-08
MP-03	DOWN	Jun-24	7.27	1704	0.28±2.43E-08	**1.33±0.01E-04**	4.69±8.78E-08
MP-03	DOWN	Sep-24	7.29	1512	1.63±1.82E-08	**1.01±0.01E-04**	**2.43±0.83E-07**
MP-03	DOWN	Dec-24	7.56	1558	1.84±1.68E-09	**7.85±0.01E-05**	**3.72±1.26E-07**
MP-04	DOWN	Mar-24	7.40	2006	3.66±3.24E-09	**1.94±0.01E-04**	4.83±9.10E-08
MP-04	DOWN	Jun-24	7.32	2202	-0.49±1.03E-08	**2.46±0.01E-04**	**3.02±1.19E-07**
MP-04	DOWN	Sep-24	7.28	1834	-2.84±3.07E-08	**1.98±0.01E-04**	4.16±9.53E-08
MP-04	DOWN	Dec-24	7.48	1673	1.73±2.09E-09	**1.40±0.01E-04**	9.36±8.99E-08

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NA - Not applicable. SU - Standard units. NS - Not sampled in 2024.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2B
2024 Indicator Results From the Lavery Till-Sand Unit

Location Code	*Hydraulic Position* [a]	*Date Collected*	*pH SU*	*Conductivity µmhos/cm @ 25°C*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
204	DOWN	Mar-24	7.59	1982	0.39±2.60E-09	4.26±2.61E-09	-2.08±7.95E-08
204	DOWN	Jun-24	7.56	2168	1.67±2.59E-09	4.71±2.64E-09	1.29±1.15E-07
204	DOWN	Sep-24	7.56	2323	0.00±1.85E-09	2.79±2.78E-09	0.29±8.21E-08
204	DOWN	Dec-24	7.53	2220	2.02±2.58E-09	7.35±3.05E-09	0.40±1.07E-07
206	DOWN	Jun-24	7.13	3108	1.47±2.27E-09	-2.34±2.68E-09	3.29±8.22E-08
206	DOWN	Dec-24	7.39	3134	-0.97±4.09E-09	1.89±3.87E-09	0.59±1.08E-07

NA - Not applicable.
SU - Standard units.
[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.
[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2C
2024 indicator Results From the Weathered Lavery Till Unit

Location Code	Hydraulic Position [a]	Date Collected	pH SU	Conductivity µmhos/cm @ 25°C	Gross Alpha µCi/mL	Gross Beta µCi/mL	Tritium µCi/mL
Groundwater Screening Levels [b]			*NA*	*NA*	*1.50E-08*	*1.00E-06*	*1.78E-07*
908R	WLT	Dec-24	7.13	1222	1.81±3.13E-09	6.63±2.50E-09	0.46±8.07E-08
1005	WLT	Jun-24	7.06	801	0.44±1.01E-09	2.44±1.05E-09	8.38±9.94E-08
1005	WLT	Dec-24	7.23	750	0.55±1.07E-09	3.85±1.15E-09	0.73±1.12E-07
1008C	WLT	Jun-24	7.28	613	7.06±5.89E-10	1.91±0.66E-09	1.20±1.16E-07
1008C	WLT	Dec-24	7.51	617	-1.87±7.14E-10	4.95±8.54E-10	-0.27±1.04E-07
906	WLT	Jun-24	7.28	651	3.32±9.86E-10	3.95±1.03E-09	-4.81±7.18E-08
906	WLT	Dec-24	6.81	500	5.83±6.98E-10	7.09±1.05E-09	0.01±8.12E-08
909	WLT	Jun-24	6.63	1320	1.43±1.35E-09	1.59±0.05E-07	**3.21±1.17E-07**
909	WLT	Dec-24	6.73	1393	-3.15±2.23E-09	2.00±0.06E-07	**4.18±1.31E-07**
1006	WLT	Jun-24	7.10	1453	6.41±2.29E-09	8.32±2.36E-09	**1.20±1.18E-07**
1006	WLT	Dec-24	7.10	1409	1.62±2.36E-09	4.16±2.18E-09	0.05±1.06E-07
NDATR	WLT	Mar-24	7.82	1528	2.37±3.05E-09	1.62±0.05E-07	4.01±7.81E-08
NDATR	WLT	Jun-24	7.51	1579	1.57±1.69E-09	1.94±0.06E-07	4.60±8.50E-08
NDATR	WLT	Sep-24	7.09	1632	2.05±2.63E-09	2.01±0.06E-07	5.38±8.84E-08
NDATR	WLT	Dec-24	8.05	1393	2.07±2.39E-09	1.76±0.05E-07	7.82±9.08E-08

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit.

NA - Not applicable.

NM - Not Measured. Well 908R was dry in June 2023.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2D
2024 Indicator Results From the Unweathered Lavery Till

Location Code	*Hydraulic Position* [a]	*Date Collected*	*pH SU*	*Conductivity µmhos/cm @ 25°C*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
405	UP	Mar-24	7.17	3347	1.00±3.63E-09	1.03±0.39E-08	-6.54±7.00E-08
405	UP	Jun-24	7.23	3130	0.06±2.74E-09	8.25±3.64E-09	-0.93±7.61E-08
405	UP	Sep-24	6.87	3595	-0.93±3.54E-09	9.74±3.78E-09	-1.78±7.83E-08
405	UP	Dec-24	6.93	3388	0.90±2.63E-09	6.48±3.75E-09	-2.67±9.72E-08
1303	DOWN	Mar-24	7.86	300	6.17±5.73E-10	1.13±0.72E-09	1.75±8.39E-08
1303	DOWN	Jun-24	7.94	508	5.43±4.03E-10	2.39±0.52E-09	1.06±1.18E-07
1303	DOWN	Sep-24	7.92	430	3.43±9.57E-10	1.87±1.11E-09	1.36±0.97E-07
1303	DOWN	Dec-24	7.71	406	-1.27±4.77E-10	4.82±0.62E-09	-1.69±9.60E-08
107	DOWN	Mar-24	7.54	629	0.44±1.02E-09	1.58±0.13E-08	-5.45±7.48E-08
107	DOWN	Jun-24	7.24	816	2.63±7.29E-10	1.76±0.14E-08	-2.24±7.48E-08
107	DOWN	Sep-24	7.38	798	1.08±1.26E-09	1.92±0.16E-08	3.65±8.67E-08
107	DOWN	Dec-24	7.79	685	0.25±1.36E-09	1.84±0.16E-08	-0.18±1.02E-07
108	DOWN	Jun-24	7.36	726	1.67±1.29E-09	3.28±0.88E-09	1.30±8.02E-08
108	DOWN	Dec-24	7.74	702	3.34±1.29E-09	2.71±0.85E-09	0.52±1.05E-07
110	DOWN	Mar-24	7.44	564	3.87±7.19E-10	1.18±0.78E-09	**2.44±1.07E-07**
110	DOWN	Jun-24	7.28	606	1.51±0.97E-09	2.38±0.65E-09	7.24±8.82E-08
110	DOWN	Sep-24	7.42	681	5.66±5.49E-10	1.64±0.80E-09	4.89±8.79E-08
110	DOWN	Dec-24	7.47	587	2.25±6.23E-10	1.80±0.67E-09	0.53±1.10E-07
409	DOWN	Mar-24	8.16	304	1.19±6.15E-10	1.65±0.53E-09	-6.66±7.18E-08
409	DOWN	Jun-24	8.48	302	3.75±4.84E-10	6.66±0.68E-09	-1.13±7.65E-08
409	DOWN	Sep-24	7.97	266	-7.34±6.21E-10	7.08±1.43E-09	1.55±8.34E-08
409	DOWN	Dec-24	8.32	166	2.69±0.71E-09	5.73±0.69E-09	0.27±1.07E-07
704	DOWN	Mar-24	6.76	824	0.40±1.16E-09	7.59±1.50E-09	-4.39±7.42E-08
704	DOWN	Jun-24	6.53	822	-0.42±1.64E-09	8.55±1.59E-09	0.58±1.15E-07
704	DOWN	Sep-24	6.55	894	-1.30±1.41E-09	7.22±1.47E-09	-1.67±8.83E-08
704	DOWN	Dec-24	6.73	924	-1.04±1.09E-09	7.08±1.58E-09	0.57±1.06E-07
707	DOWN	Jun-24	6.59	590	0.00±8.17E-10	3.89±0.90E-09	0.73±1.12E-07
707	DOWN	Dec-24	6.82	468	1.49±5.69E-10	2.89±0.76E-09	-0.18±1.11E-07
910R	DOWN	Jun-24	7.10	1330	8.11±3.19E-09	7.50±2.54E-09	-0.04±8.06E-08
910R	DOWN	Dec-24	6.86	1210	2.94±4.65E-09	3.59±2.56E-09	-2.28±7.47E-08

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit.

NA - Not applicable.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2E
2024 Indicator Results From the Kent Recessional Sequence

Location Code	*Hydraulic Position* [a]	*Date Collected*	*pH SU*	*Conductivity µmhos/cm @ 25°C*	*Gross Alpha µCi/mL*	*Gross Beta µCi/mL*	*Tritium µCi/mL*
Groundwater Screening Levels [b]			***NA***	***NA***	***1.50E-08***	***1.00E-06***	***1.78E-07***
901	UP	Jun-24	7.38	411	4.01±9.30E-10	1.81±0.23E-08	-0.27±8.05E-08
901	UP	Dec-24	7.00	405	1.00±0.87E-09	3.31±0.53E-09	4.20±8.67E-08
902	UP	Jun-24	8.00	449	4.63±4.06E-10	1.91±0.51E-09	3.07±8.42E-08
902	UP	Dec-24	7.94	401	-0.68±6.28E-10	2.99±0.79E-09	1.39±8.19E-08
1008B	UP	Dec-24	7.89	344	7.34±6.66E-10	2.93±0.58E-09	0.29±1.04E-07
903	DOWN	Jun-24	7.55	911	-0.61±1.12E-09	2.09±0.92E-09	-0.80±7.69E-08
903	DOWN	Dec-24	7.46	889	0.44±1.42E-09	2.68±1.41E-09	-2.57±7.61E-08
8610	DOWN	Jun-24	7.65	1786	0.65±2.17E-09	4.47±2.12E-09	4.86±8.81E-08
8610	DOWN	Dec-24	7.39	1662	-1.35±2.57E-09	2.54±2.86E-09	2.30±8.29E-08
8611	DOWN	Jun-24	7.06	1726	3.60±2.61E-09	4.45±2.60E-09	8.13±9.14E-08
8611	DOWN	Dec-24	7.07	1665	-0.49±3.00E-09	3.35±2.79E-09	-2.11±7.72E-08

NA - Not applicable.

SU - Standard units.

[a] Hydraulic position is relative to other wells within the same hydrogeologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2F
2024 Results for Metals in Groundwater
Compared With WVDP Groundwater Screening Levels

Location Code	*Hydraulic Position*	*Date Collected*	*Antimony µg/L*	*Arsenic µg/L*	*Barium µg/L*	*Beryllium µg/L*	*Cadmium µg/L*	*Chromium µg/L*	*Cobalt µg/L*	*Copper µg/L*
Groundwater Screening Levels [a]			***15.1***	***25***	***1,000***	***3***	***7.27***	***52.3***	***67.8***	***200***
Sand and Gravel Unit										
706	UP	Jun-24	<3.0	<10.0	<200	<1.0	<5.0	**109**	<50.0	<25.0
706	UP	Dec-24	<3.0	<10.0	<200	<1.0	<5.0	**76.1**	<50.0	<25.0
1302	UP	Dec-24	<3.0	<10.0	<200	<1.0	<5.0	<10.0	<50.0	<25.0
111	DOWN	Dec-24	<3.00	<10.0	238	<1.00	<5.00	15.5	<50.0	<25.0
1304	DOWN	Jun-24	<3.0	<10.0	247	<1.0	<5.0	<10.0	<50.0	<25.0
1304	DOWN	Dec-24	<3.0	<10.0	<200	<1.0	<5.0	<10.0	<50.0	<25.0
8605	DOWN	Dec-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
MP-03	DOWN	Mar-24	<3.00	<10.0	261	<1.00	<5.00	24.5	<50.0	<25.0
MP-03	DOWN	Jun-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
MP-03	DOWN	Sep-24	<3.00	<10.0	210	<1.00	<5.00	<10.0	<50.0	<25.0
MP-03	DOWN	Dec-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
MP-04	DOWN	Mar-24	<3.00	<10.0	225	<1.00	<5.00	<10.0	<50.0	<25.0
MP-04	DOWN	Jun-24	<3.00	<10.0	215	<1.00	<5.00	<10.0	<50.0	<25.0
MP-04	DOWN	Sep-24	<3.00	<10.0	206	<1.00	<5.00	<10.0	<50.0	<25.0
MP-04	DOWN	Dec-24	<3.00	<10.0	<200	<1.00	<5.00	11.3	<50.0	<25.0

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

R - The result was rejected due to deficiencies in the ability to analyze the sample. The presence or absence of the analyte could not be verified and there was no replacement sample.

[a] GSLs have been established by selection of the larger of the WVDP background concentration or the 6 NYCRR TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1B).

TABLE D-2F *(continued)*
2024 Results for Metals in Groundwater
Compared with WVDP Groundwater Screening Levels

Location Code	*Hydraulic Position*	*Date Collected*	*Lead µg/L*	*Mercury µg/L*	*Nickel µg/L*	*Selenium µg/L*	*Silver µg/L*	*Thallium µg/L*	*Tin µg/L*	*Vanadium µg/L*	*Zinc µg/L*
Groundwater Screening Levels [a]			***42.7***	***0.7***	***100***	***10.1***	***50***	***13.9***	***4,083***	***69.6***	***2,000***
Sand and Gravel Unit											
706	UP	Jun-24	<3.0	<0.20	**1760**	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
706	UP	Dec-24	<3.0	<0.20	**842**	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
1302	UP	Dec-24	<3.0	<0.20	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
111	DOWN	Dec-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
1304	DOWN	Jun-24	<3.0	<0.20	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
1304	DOWN	Dec-24	<3.0	<0.20	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
8605	DOWN	Dec-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-03	DOWN	Mar-24	3.65	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	38.7
MP-03	DOWN	Jun-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-03	DOWN	Sep-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-03	DOWN	Dec-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-04	DOWN	Mar-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	20.5
MP-04	DOWN	Jun-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-04	DOWN	Sep-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
MP-04	DOWN	Dec-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

[a] GSLs have been established by selection of the larger of the WVDP background concentration or the 6 NYCRR TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1B.)

TABLE D-2F *(continued)*
2024 Results for Metals in Groundwater
Compared with WVDP Groundwater Screening Levels

Location Code	*Hydraulic Position*	*Date Collected*	*Antimony µg/L*	*Arsenic µg/L*	*Barium µg/L*	*Beryllium µg/L*	*Cadmium µg/L*	*Chromium µg/L*	*Cobalt µg/L*	*Copper µg/L*
Groundwater Screening Levels [a]			***15.1***	***25***	***1,000***	***3***	***7.27***	***52.3***	***67.8***	***200***
Weathered Lavery Till Unit										
909	DOWN	Dec-24	<3.0	14.3	336	<1.0	<5.0	<10.0	<50.0	<25.0
NDATR	DOWN	Mar-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
NDATR	DOWN	Jun-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
NDATR	DOWN	Sep-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
NDATR	DOWN	Dec-24	<3.00	<10.0	<200	<1.00	<5.00	<10.0	<50.0	<25.0
Unweathered Lavery Till Unit										
405	UP	Jun-24	<3.0	<10.0	<200	<1.0	<5.0	**69.1**	<50.0	<25.0
405	UP	Dec-24	<3.0	<10.0	<200	<1.0	<5.0	**1540**	<50.0	27.1
1303	DOWN	Jun-24	<3.0	19.6	318	1	<5.0	26.8	<50.0	25
1303	DOWN	Dec-24	<3.0	<10.0	<200	<1.0	<5.0	<10.0	<50.0	<25.0

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

[a] GSLs have been established by selection of the larger of the WVDP background concentration or the 6 NYCRR TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1B.)

TABLE D-2F (*concluded)*
2024 Results for Metals in Groundwater
Compared with WVDP Groundwater Screening Levels

Location Code	*Hydraulic Position*	*Date Collected*	*Lead µg/L*	*Mercury µg/L*	*Nickel µg/L*	*Selenium µg/L*	*Silver µg/L*	*Thallium µg/L*	*Tin µg/L*	*Vanadium µg/L*	*Zinc µg/L*
Groundwater Screening Levels [a]			***42.7***	***0.7***	***100***	***10.1***	***50***	***13.9***	***4,083***	***69.6***	***2,000***
Weathered Lavery Till Unit											
909	DOWN	Dec-24	<3.0	<0.20	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
NDATR	DOWN	Mar-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	24.2
NDATR	DOWN	Jun-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
NDATR	DOWN	Sep-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
NDATR	DOWN	Dec-24	<3.00	<0.200	<40.0	<5.00	<10.0	<2.00	<3000	<50.0	<20.0
Unweathered Lavery Till Unit											
405	UP	Jun-24	<3.0	<0.20	**2025**	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
405	UP	Dec-24	<3.0	<0.20	**2640**	<5.0	<10.0	<0.50	<3000	<50.0	<20.0
1303	DOWN	Jun-24	13.7	<0.60	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	75.1
1303	DOWN	Dec-24	<3.0	<0.20	<40.0	<5.0	<10.0	<0.50	<3000	<50.0	<20.0

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

[a] GSLs have been established by selection of the larger of the WVDP background concentration or the 6 NYCRR TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1B.)

TABLE D-2G
2024 Radioactivity in Groundwater

Location	Hydraulic Position [a]	Date Collected	C-14 µCi/mL	Sr-90 µCi/mL	Tc-99 µCi/mL	I-129 µCi/mL	Cs-137 µCi/mL	Ra-226 µCi/mL
Groundwater Screening Levels [b]			2.82E-08	5.90E-09	5.02E-09	9.61E-10	1.03E-08	1.33E-09
Sand and Gravel Unit								
401	UP	Dec-24	-0.19±2.92E-08	**7.68±1.29E-09**	0.52±1.08E-09	4.06±9.55E-10	1.97±2.26E-09	**1.58±0.39E-09**
104	DOWN	Mar-24	-3.61±2.72E-08	**1.89±0.03E-05**	2.25±1.19E-09	**7.33±2.54E-09**	0.70±2.75E-09	5.28±2.61E-10
105	DOWN	Jun-24	NS	NS	NS	**5.41±2.22E-09**	NS	NS
106	DOWN	Dec-24	NS	NS	NS	**7.17±3.21E-09**	NS	NS
116	DOWN	Jun-24	NS	NS	NS	2.31±2.69E-09	NS	NS
406	DOWN	Dec-24	-1.85±2.87E-08	1.03±1.04E-09	1.54±1.43E-09	-0.08±7.42E-10	1.93±2.02E-09	1.12±0.38E-09
408	DOWN	Mar-24	-1.18±2.85E-08	**8.19±0.13E-05**	3.21±1.40E-09	**1.66±0.35E-08**	-0.98±2.85E-09	4.50±2.49E-10
408	DOWN	Jun-24	NS	**8.89±0.04E-05**	NS	**1.54±0.27E-08**	NS	NS
408	DOWN	Sep-24	NS	**9.54±0.09E-05**	NS	NS	NS	NS
408	DOWN	Dec-24	0.22±2.35E-08	**7.31±0.05E-05**	3.44±2.61E-09	**9.84±2.02E-09**	-1.36±4.83E-09	**1.56±0.62E-09**
501	DOWN	Mar-24	0.30±2.93E-08	**1.22±0.01E-05**	4.23±0.23E-09	**5.06±1.56E-09**	-3.83±3.13E-09	3.10±2.97E-10
501	DOWN	Jun-24	NS	NS	NS	**4.29±2.99E-09**	NS	NS
501	DOWN	Dec-24	NS	**1.05±0.02E-05**	NS	NS	NS	NS
502	DOWN	Jun-24	NS	NS	NS	**5.16±1.88E-09**	NS	NS
502	DOWN	Dec-24	NS	**1.57±0.03E-05**	NS	NS	NS	NS
801	DOWN	Dec-24	NS	**3.22±0.03E-06**	NS	NS	NS	NS
1304	DOWN	Dec-24	-3.44±2.76E-08	NS	1.68±0.32E-09	5.65±9.14E-10	0.66±2.62E-09	0.75±1.09E-10
8603	DOWN	Jun-24	NS	NS	NS	**5.72±2.78E-09**	NS	NS
8604	DOWN	Jun-24	NS	NS	NS	**6.28±2.26E-09**	NS	NS
8609	DOWN	Dec-24	NS	**3.39±0.09E-07**	NS	NS	NS	NS
MP-03	DOWN	Mar-24	-2.41±2.78E-08	**5.00±0.10E-05**	4.47±3.13E-09	**1.49±0.36E-08**	0.98±3.23E-09	4.40±2.71E-10
MP-03	DOWN	Jun-24	NS	**6.61±0.05E-05**	NS	**1.06±0.46E-08**	NS	NS
MP-03	DOWN	Sep-24	NS	**5.47±0.06E-05**	NS	NS	NS	NS
MP-03	DOWN	Dec-24	1.53±2.44E-08	**5.27±0.05E-05**	3.21±0.75E-09	**4.79±2.56E-09**	1.85±2.82E-09	3.01±3.01E-10
MP-04	DOWN	Mar-24	2.04±3.02E-08	**8.97±0.13E-05**	3.81±2.74E-09	**2.42±0.39E-08**	-0.44±2.74E-09	7.26±3.65E-10
MP-04	DOWN	Jun-24	NS	**1.09±0.01E-04**	NS	**2.16±0.61E-08**	NS	NS
MP-04	DOWN	Sep-24	NS	**1.00±0.01E-04**	NS	NS	NS	NS
MP-04	DOWN	Dec-24	-0.26±2.33E-08	**6.67±0.05E-05**	2.32±1.29E-09	0.00±1.55E-08	0.31±2.72E-09	3.23±2.62E-10
Weathered Lavery Till Unit								
909	DOWN	Dec-24	-0.40±2.96E-08	**7.47±0.37E-08**	8.23±4.30E-10	**8.94±1.57E-09**	-0.69±4.10E-09	2.71±1.96E-10
NDATR	DOWN	Jun-24	-2.84±3.06E-08	**1.09±0.05E-07**	0.10±1.58E-10	**2.29±1.63E-09**	-0.29±1.97E-09	3.41±2.09E-10
NDATR	DOWN	Dec-24	-2.95±2.78E-08	**6.23±0.40E-08**	0.21±1.27E-09	**4.23±1.76E-09**	-0.25±6.47E-09	4.26±2.20E-10

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NS - Not sampled. MP-01 and MP-02 were not sampled after September 2022 because the deconstruction water management system was constructed over these wells and they are no longer accessible.

[a] Hydraulic position is relative to other wells within the same hydrologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2G (*continued*)
2024 Radioactivity in Groundwater

Location	Hydraulic Position [a]	Date Collected	Ra-228 µCi/mL	U-232 µCi/mL	U-233/234 µCi/mL	U-235/236 µCi/mL	U-238 µCi/mL	Total U µg/mL
Groundwater Screening Levels [b]			2.16E-09	1.38E-10	6.24E-10	8.07E-11	4.97E-10	1.34E-03
Sand and Gravel Unit								
401	UP	Dec-24	1.04±0.49E-09	-1.29±6.46E-11	2.78±0.78E-10	3.06±3.16E-11	1.98±0.65E-10	5.04±0.23E-04
104	DOWN	Mar-24	2.23±1.49E-08	1.47±1.93E-10	**8.27±2.50E-10**	2.35±6.47E-11	**5.00±1.98E-10**	**1.36±0.04E-03**
105	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
106	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
116	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
406	DOWN	Dec-24	1.32±5.03E-10	-2.62±6.41E-11	2.06±0.62E-10	1.54±2.61E-11	1.65±0.54E-10	4.54±0.37E-04
408	DOWN	Mar-24	-0.43±1.01E-08	-0.14±1.24E-10	**9.69±2.52E-10**	4.55±6.55E-11	**5.14±1.86E-10**	**1.75±0.07E-03**
408	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
408	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
408	DOWN	Dec-24	1.24±2.76E-08	-9.19±6.29E-11	**6.71±1.33E-10**	6.15±4.56E-11	4.88±1.16E-10	**1.44±0.02E-03**
501	DOWN	Mar-24	0.59±1.50E-08	0.67±2.09E-10	5.28±2.01E-10	0.51±5.37E-11	2.75±1.49E-10	9.02±0.25E-04
501	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
501	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
502	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
502	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
801	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
1304	DOWN	Dec-24	2.39±5.36E-10	0.67±5.11E-11	2.06±0.61E-10	6.39±3.50E-11	1.23±0.51E-10	3.40±0.20E-04
8603	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
8604	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
8609	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
MP-03	DOWN	Mar-24	-0.97±1.25E-08	0.81±1.86E-10	**1.19±0.29E-09**	**1.20±1.03E-10**	**1.00±0.27E-09**	**2.63±0.06E-03**
MP-03	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
MP-03	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
MP-03	DOWN	Dec-24	0.33±1.68E-08	0.77±5.70E-11	**9.39±1.97E-10**	**1.05±0.64E-10**	**5.91±1.50E-10**	**1.56±0.09E-03**
MP-04	DOWN	Mar-24	1.17±9.88E-09	-0.55±1.28E-10	**2.04±0.39E-09**	**3.03±1.56E-10**	**1.46±0.33E-09**	**4.40±0.13E-03**
MP-04	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
MP-04	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
MP-04	DOWN	Dec-24	8.00±8.88E-09	3.92±8.31E-11	**1.38±0.26E-09**	**1.21±0.86E-10**	**9.68±2.17E-10**	**3.03±0.17E-03**
Weathered Lavery Till Unit								
909	DOWN	Dec-24	9.85±5.00E-10	-1.32±4.86E-11	3.22±1.24E-10	4.93±5.09E-11	3.11±1.02E-10	6.25±0.42E-04
NDATR	DOWN	Jun-24	5.06±3.24E-10	-1.48±4.25E-11	**1.95±0.29E-09**	**1.42±0.89E-10**	**1.30±0.24E-09**	**4.47±0.25E-03**
NDATR	DOWN	Dec-24	0.05±3.47E-10	-5.11±4.59E-11	**1.21±0.16E-09**	**8.75±5.04E-11**	**1.10±0.15E-09**	**3.02±0.19E-03**

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NS - Not sampled. MP-01 and MP-02 were not sampled after September 2022 because the deconstruction water management system was constructed over these wells and they are no longer accessible.

[a] Hydraulic position is relative to other wells within the same hydrologic unit.

[b] The GSLs for radiological constituents are set equal to the larger of the background concentrations or the TOGS 1.1.1 Class GA Groundwater Quality Standards. (See Table D-1A.)

TABLE D-2G *(concluded)*
2024 Radioactivity in Groundwater

Location	Hydraulic Position [a]	Date Collected	Np-237 [b] µCi/mL	Pu-238 [b] µCi/mL	Pu-239/240 [b] µCi/mL	Pu-241 [b] µCi/mL	Am-241 [b] µCi/mL	Cm-243/244 [b] µCi/mL
Sand and Gravel Unit								
401	UP	Dec-24	NS	NS	NS	NS	NS	NS
104	DOWN	Mar-24	2.82±7.92E-11	2.46±3.01E-11	2.05±3.12E-11	5.77±6.70E-09	1.30±0.49E-10	4.01±3.34E-11
105	DOWN	Jun-24	NS	NS	NS	NS	5.45±4.79E-11	NS
106	DOWN	Dec-24	NS	NS	NS	NS	0.91±2.69E-11	NS
116	DOWN	Jun-24	NS	NS	NS	NS	2.59±5.62E-11	NS
406	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
408	DOWN	Mar-24	0.31±1.05E-10	1.44±3.26E-11	4.83±5.30E-11	4.04±7.48E-09	2.42±0.64E-10	1.50±2.32E-11
408	DOWN	Jun-24	NS	NS	NS	NS	2.89±1.18E-10	NS
408	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
408	DOWN	Dec-24	NS	3.72±3.75E-11	0.53±2.75E-11	NS	9.35±6.56E-11	NS
501	DOWN	Mar-24	0.38±1.45E-10	4.63±4.83E-11	0.52±2.69E-11	1.59±6.50E-09	1.26±0.45E-10	3.58±3.14E-11
501	DOWN	Jun-24	NS	NS	NS	NS	7.46±7.75E-11	NS
501	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
502	DOWN	Jun-24	NS	NS	NS	NS	8.38±7.45E-11	NS
502	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
801	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
1304	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
8603	DOWN	Jun-24	NS	NS	NS	NS	6.83±3.33E-11	NS
8604	DOWN	Jun-24	NS	NS	NS	NS	4.25±5.89E-11	NS
8609	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
MP-03	DOWN	Mar-24	0.02±1.12E-10	1.02±2.91E-11	2.89±2.93E-11	1.23±8.14E-09	3.55±0.67E-10	2.26±2.28E-11
MP-03	DOWN	Jun-24	NS	NS	NS	NS	2.71±0.82E-10	NS
MP-03	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
MP-03	DOWN	Dec-24	-4.26±5.99E-11	4.18±4.72E-11	0.46±3.52E-11	7.51±9.70E-09	2.82±3.68E-11	0.00±2.58E-11
MP-04	DOWN	Mar-24	0.25±1.12E-10	3.33±4.22E-11	4.02±5.12E-11	-3.25±7.48E-09	5.32±0.90E-10	6.49±3.89E-11
MP-04	DOWN	Jun-24	NS	NS	NS	NS	5.13±1.14E-10	NS
MP-04	DOWN	Sep-24	NS	NS	NS	NS	NS	NS
MP-04	DOWN	Dec-24	-2.37±4.50E-11	-2.42±5.80E-11	1.21±5.29E-11	1.04±2.70E-08	1.22±0.54E-10	1.30±2.54E-11
Weathered Lavery Till Unit								
909	DOWN	Dec-24	NS	NS	NS	NS	NS	NS
NDATR	DOWN	Jun-24	NS	NS	NS	NS	NS	NS
NDATR	DOWN	Dec-24	NS	NS	NS	NS	NS	NS

Note: Bolding indicates radiological concentration that exceeds the GSL, excluding the cases when uncertainty exceeds detection or decision limit (critical level).

NS - Not sampled. MP-01 and MP-02 were not sampled after September 2022 because the deconstruction water management system was constructed over these wells and they are no longer accessible.

[a] Hydraulic position is relative to other wells within the same hydrologic unit.

[b] Groundwater screening levels have not been established for Np-237, Pu-238, Pu-239/240, Pu-241, Am-241, or Cm-234/244.

APPENDIX E
Summary of Biological Data

TABLE E-1
2024 Radioactivity Concentrations in Milk

Location	*Sample Date*	*K-40 (µCi/mL)*	*Sr-90 (µCi/mL)*	*I-129 (µCi/mL)*	*Cs-137 (µCi/mL)*
BFMSCHT Annual	12/30/2024	**1.27±0.22E-06**	-1.28±7.69E-10	1.02±2.97E-10	-0.17±5.68E-09

Note: This milk sample (BFMSCHT) was collected from a dairy farm 4.9 km south of the site. The near-site milk sample (BFMFLDMN), where milk was previously sampled annually, sold its business. The annual sampling location was changed to the BFMSCHT.

Location	*Sample Date*	*K-40 (µCi/mL)*	*Sr-90 (µCi/mL)*	*I-129 (µCi/mL)*	*Cs-137 (µCi/mL)*
BFMCTLS (Background) Once every five years	11/29/2022	**1.43±0.23E-06**	-4.51±8.96E-10	-4.21±4.06E-10	1.37±5.58E-09

Note 1: The control milk sample (BFMCTLS) is located 22 km south of the site. It was last sampled in 2022.
Note 2: Bolding indicates that the radiological concentration was positively detected, which means that the result was larger than the associated uncertainty.

TABLE E-2
2024 Radioactivity Concentrations in Venison

Location	*Sample Date*	*% Moisture*	*H-3 (µCi/mL)*	*K-40 (µCi/g - dry)*	*Sr-90 (µCi/g - dry)*	*Cs-137 (µCi/g - dry)*
BFDCTRL (Background)	11/4/2024	73.1	-4.61±6.93E-08	**1.24±0.09E-05**	-1.35±2.21E-09	2.46±4.18E-08
BFDCTRL1 (Background)	11/4/2024	74.9	0.71±6.64E-08	**1.29±0.09E-05**	2.15±2.76E-09	**7.11±3.96E-08**
BFDCTRL2 (Background)	12/30/2024	74.7	-0.61±3.09E-07	**1.11±0.10E-05**	2.07±2.78E-09	3.82±7.59E-08
BFDNEAR (Near Site)	10/3/2024	73.7	1.71±6.96E-08	**1.17±0.09E-05**	1.71±2.69E-09	2.88±3.23E-08
BFDNEAR1 (Near Site)	11/5/2024	74.5	-3.55±6.05E-08	**1.31±0.08E-05**	0.15±2.41E-09	2.63±2.79E-08
BFDNEAR2 (Near Site)	5/16/2024	76.0	-4.13±6.12E-08	**1.43±0.10E-05**	**3.38±2.24E-09**	0.55±2.22E-08

Note 1: Both near-site and background venison samples are collected annually.
Note 2: Bolding indicates that the radiological concentration was positively detected, which means that the result was larger than the associated uncertainty. K-40 (potassium-40) is a naturally occurring radioisotope and is commonly detected in crops, fruites, wild animals, and milk.

TABLE E-3
2024 Radioactivity Concentrations in Food Crops

Food crops were sampled in 2022 and will next be sampled in CY 2027.[a]

[a] Food crops are sampled every five years, consistent with guidance on periodic confirmatory sampling in DOE-HDBK-1216-2015.

TABLE E-4
2024 Radioactivity Concentrations in Edible Portions of Fish

Fish were sampled in 2022 and will next be sampled in CY 2027.[a]

[a] Fish are sampled every five years, consistent with guidance on periodic confirmatory sampling in DOE-HDBK-1216-2015.

APPENDIX F
Summary of Direct Radiation Monitoring Data

TABLE F-1
Summary of 2024 Semiannual Averages of Off-Site TLD Measurements
(mR±2 SD/quarter)

Location Number [a]	*1st Half*	*2nd Half*	*Location Average*	*Background DFTLD23*
DFTLD01	16±2	17±2	16±2	
DFTLD02	15±1	17±1	16±1	
DFTLD03	13±1	15±1	14±1	
DFTLD04	14±1	16±1	15±1	
DFTLD05	15±1	17±1	16±1	
DFTLD06	14±1	16±1	15±1	
DFTLD07	13±1	14±1	13±1	
DFTLD08	15±1	15±1	15±1	
DFTLD09	15±1	16±1	15±1	16±1
DFTLD10	13±1	14±1	14±1	
DFTLD11	13±1	13±1	13±1	
DFTLD12	15±1	16±1	15±1	
DFTLD13	16±1	17±1	17±1	
DFTLD14	15±1	16±1	16±1	
DFTLD15	14±1	16±1	15±1	
DFTLD16	16±2	16±1	16±1	
DFTLD20	12±1	14±1	13±1	

[a] Off-site locations are shown on Figures A-13 and A-14.

TABLE F-2

Summary of 2024 Semiannual Averages of On-Site TLD Measurements
(mR±2SD/quarter)

Location Number [a]	*1st Half*	*2nd Half*	*Location Average*
DNTLD24	37±4	37±4	37±4
DNTLD28	17±1	19±3	18±2
DNTLD32	16±1	17±1	16±1
DNTLD33	17±1	18±2	17±1
DNTLD35	36±3	60±5	48±4
DNTLD36	15±1	15±1	15±1
DNTLD38	143±17	322±32	232±26
DNTLD40	505±37	525±40	515±39
DNTLD43	14±1	15±1	14±1
DNTLD44	18±2	19±1	18±2

[a] On-site locations are shown on Figure A-12.

APPENDIX G

Summary of Quality Assurance Crosscheck Analyses

TABLE G-1
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 50; March 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?* [b]	*Analyzed by:*
MAPEP – 24 – RdF50, Air Filter – Radiological							
Am-241	Air Filter	Bq/sample	0.0911	0.0897	0.0628 - 0.1166	Yes	GEL
Cs-137	Air Filter	Bq/sample	1.34	1.48	1.04 - 1.92	Yes	ES
Co-60	Air Filter	Bq/sample	1.49	1.64	1.15 - 2.13	Yes	ES
Cs-137	Air Filter	Bq/sample	1.51	1.48	1.04 - 1.92	Yes	GEL
Co-60	Air Filter	Bq/sample	1.62	1.64	1.15 - 2.13	Yes	GEL
Pu-238	Air Filter	Bq/sample	0.123	0.114	0.080 - 0.148	Yes	GEL
Pu-239/240	Air Filter	Bq/sample	0.0976	0.0936	0.0655 - 0.1217	Yes	GEL
Sr-90	Air Filter	Bq/sample	1.69	1.56	1.09 - 2.03	Yes	GEL
U-234	Air Filter	Bq/sample	0.134	0.125	0.088 - 0.163	Yes	GEL
U-238	Air Filter	Bq/sample	0.136	0.130	0.091 - 0.169	Yes	GEL
U - Total[f]	Air Filter	µg/sample	10.1739	10.5	7.4 - 13.7	Yes	GEL
MAPEP – 24 – MaW50, Water – Radiological							
Cs-137	Water	Bq/L	9.99	9.7	6.8 - 12.6	Yes	ES
Co-60	Water	Bq/L	10.0	10.27	7.19 - 13.35	Yes	ES
Sr-90	Water	Bq/L	3.48	3.68	2.58 - 4.78	Yes	ES
Am-241	Water	Bq/L	-0.012	[c]	*False Positive Test* [d]	Yes	GEL
Cs-137	Water	Bq/L	10.6	9.7	6.8 - 12.6	Yes	GEL
Co-60	Water	Bq/L	10.5	10.27	7.19 - 13.35	Yes	GEL
H-3	Water	Bq/L	574	637	446 - 828	Yes	GEL
Pu-238	Water	Bq/L	0.731	0.745	0.522 - 0.969	Yes	GEL
Pu-239/240	Water	Bq/L	0.714	0.769	0.538 - 1.000	Yes	GEL
Ra-226	Water	Bq/L	0.321	0.310	0.217 - 0.403	Yes	GEL
Sr-90	Water	Bq/L	3.41	3.68	2.58 - 4.78	Yes	GEL
Tc-99	Water	Bq/L	5.96	7.47	5.23 - 9.71	W	GEL
U-234	Water	Bq/L	0.943	0.990	0.693 - 1.287	Yes	GEL
U-238	Water	Bq/L	1.02	1.028	0.720 - 1.336	Yes	GEL

Note: This report includes only those matrix/analyte combinations performed in support of the analysis of environmental samples collected as part of the WVDP monitoring program or special investigations.
ES - WVDP Environmental Services. GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "No" - Result not acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%.

[c] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[d] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte is far below the detection limit.

[e] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

[f] Inorganic.

TABLE G-1 *(continued)*
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 50; March 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?* [b]	*Analyzed by:*
MAPEP – 24 – GrW50, Water – Radiological							
Gross alpha	Water	Bq/L	0.897	1.01	0.30 - 1.72	Yes	GEL
Gross beta	Water	Bq/L	5.01	5.57	2.79 - 8.36	Yes	GEL
MAPEP – 24 – MaW50, Water – Inorganic							
Antimony	Water	mg/L	5.47	5.71	4.00 - 7.42	Yes	GEL
Arsenic	Water	mg/L	2.62	2.73	1.91 - 3.55	Yes	GEL
Barium	Water	mg/L	0.0534	0.0561	0.0393 - 0.0729	Yes	GEL
Beryllium	Water	mg/L	2.77	2.87	2.01 - 3.73	Yes	GEL
Cadmium	Water	mg/L	0.788	0.854	0.598 - 1.110	Yes	GEL
Chromium	Water	mg/L	1.06	1.09	0.76 - 1.42	Yes	GEL
Cobalt	Water	mg/L	9.40	8.99	6.29 - 11.69	Yes	GEL
Copper	Water	mg/L	7.12	7.47	5.23 - 9.71	Yes	GEL
Lead	Water	mg/L	1.19	1.25	0.88 - 1.63	Yes	GEL
Mercury	Water	mg/L	-0.000021	[d]	*False Positive Test* [e]	Yes	GEL
Nickel	Water	mg/L	0.00618	[f]	*False Positive Test* [e]	No	GEL
Selenium	Water	mg/L	0.197	0.247	0.173 - 0.321	W	GEL
Thallium	Water	mg/L	3.4	3.38	2.37 - 4.39	Yes	GEL
Uranium - Total	Water	mg/L	0.0706	0.0833	0.0583 - 0.1083	Yes	GEL
Vanadium	Water	mg/L	5.79	5.76	4.03 - 7.49	Yes	GEL
Zinc	Water	mg/L	6.79	7.40	5.18 - 9.62	Yes	GEL
MAPEP – 24 – MaS50, Soil – Inorganic							
Antimony	Soil	mg/kg	4.74	8.4	5.9 - 10.9	No	GEL
Arsenic	Soil	mg/kg	23.5	24.5	17.2 - 31.9	Yes	GEL
Barium	Soil	mg/kg	185	197	138 - 256	Yes	GEL
Beryllium	Soil	mg/kg	23.1	23.0	16.1 - 29.9	Yes	GEL
Cadmium	Soil	mg/kg	4.35	4.74	3.32 - 6.16	Yes	GEL
Chromium	Soil	mg/kg	11.0	11.7	8.2 - 15.2	Yes	GEL
Cobalt	Soil	mg/kg	26.5	29.1	20.4 - 37.8	Yes	GEL
Copper	Soil	mg/kg	47.0	46.3	32.4 - 60.2	Yes	GEL
Lead	Soil	mg/kg	23.7	23.6	16.5 - 30.7	Yes	GEL
Mercury	Soil	mg/kg	0.254	0.257	0.180 - 0.334	Yes	GEL
Nickel	Soil	mg/kg	29.8	33.3	23.3 - 43.3	Yes	GEL
Selenium	Soil	mg/kg	7.42	8.26	5.78 - 10.74	Yes	GEL
Silver	Soil	mg/kg	4.76	5.42	3.79 - 7.05	Yes	GEL
Thallium	Soil	mg/kg	1.79	2.85	2.00 - 3.71	No	GEL
Uranium - Total	Soil	mg/kg	7.0752	8.9	6.2 - 11.6	W	GEL
Vanadium	Soil	mg/kg	52.8	55.0	38.5 - 71.5	Yes	GEL
Zinc	Soil	mg/kg	65.6	70	49 - 91	Yes	GEL

GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "No" - Result not acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%.

[c] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

[d] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[e] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte is far below the detection limit.

[f] False positive and the result was not acceptable (|bias| > 30%).

TABLE G-1 *(concluded)*
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 50; March 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?* [b]	*Analyzed by:*
MAPEP – 24 – MaS50, Soil – Radiological							
Am-241	Soil	Bq/kg	1.35	[c]	*False Positive Test* [d]	Yes	GEL
Cs-137	Soil	Bq/kg	1690	1550	1085 - 2015	Yes	GEL
Co-60	Soil	Bq/kg	665	660	462 - 858	Yes	GEL
Pu-238	Soil	Bq/kg	35.7	34.7	24.3 - 45.1	Yes	GEL
Pu-239/240	Soil	Bq/kg	1.29	0.37	*Sensitivity Evaluation* [e]	Yes	GEL
K-40	Soil	Bq/kg	538	485	340 - 631	Yes	GEL
Sr-90	Soil	Bq/kg	352	440	308 - 572	Yes	GEL
Tc-99	Soil	Bq/kg	283	336	235 - 437	Yes	GEL
U-234	Soil	Bq/kg	36.8	40.7	28.5 - 52.9	Yes	GEL
U-238	Soil	Bq/kg	107	110	77 - 143	Yes	GEL
MAPEP – 24 – RdV50, Vegetation – Radiological							
Cs-137	Veg	Bq/sample	2.82	2.57	1.80 - 3.34	Yes	GEL
Co-60	Veg	Bq/sample	3.14	2.96	2.07 - 3.85	Yes	GEL
Sr-90	Veg	Bq/sample	0.391	0.529	0.370 - 0.688	W	GEL

GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "No" - Result not acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%.

[c] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[d] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte is far below the detection limit.

[e] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

TABLE G-2
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 51; August 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?*[b]	*Analyzed by:*
MAPEP – 24 – RdF51, Air Filter – Radiological							
Am-241	Air Filter	Bq/sample	0.0258	0.0211	0.0148 - 0.0274	W	GEL
Cs-137	Air Filter	Bq/sample	0.261	0.269	0.188 - 0.350	Yes	ES
Co-60	Air Filter	Bq/sample	0.328	0.361	0.253 - 0.469	Yes	ES
Cs-137	Air Filter	Bq/sample	0.335	0.269	0.188 - 0.350	W	GEL
Co-60	Air Filter	Bq/sample	0.394	0.361	0.253 - 0.469	Yes	GEL
Pu-238	Air Filter	Bq/sample	0.0152	0.0157	0.0110 - 0.0204	Yes	GEL
Pu-239/240	Air Filter	Bq/sample	0.0206	0.0215	0.0151 - 0.0280	Yes	GEL
Sr-90	Air Filter	Bq/sample	0.865	0.91	0.64 -1.18	Yes	GEL
U-234	Air Filter	Bq/sample	0.093	0.093	0.065 - 0.121	Yes	GEL
U-238	Air Filter	Bq/sample	0.0967	0.096	0.067 - 0.125	Yes	GEL
U – Total[f]	Air Filter	µg/sample	8.31	7.8	5.5 - 10.1	Yes	GEL
MAPEP – 24 – MaW51, Water – Radiological							
Cs-137	Water	Bq/L	0.127	[c]	*False Positive Test*[d]	Yes	ES
Co-60	Water	Bq/L	14.5	15.0	10.5 - 19.5	Yes	ES
Sr-90	Water	Bq/L	10.3	11.2	7.8 - 14.6	Yes	ES
Am-241	Water	Bq/L	0.352	0.363	0.254 - 0.472	Yes	GEL
Cs-137	Water	Bq/L	-0.0164	[c]	*False Positive Test*[d]	Yes	GEL
Co-60	Water	Bq/L	15.1	15.0	10.5 - 19.5	Yes	GEL
H-3	Water	Bq/L	350	374	262 - 486	Yes	GEL
Pu-238	Water	Bq/L	0.377	0.439	0.307 - 0.571	Yes	GEL
Pu-239/240	Water	Bq/L	0.405	0.437	0.306 - 0.568	Yes	GEL
Ra-226	Water	Bq/L	0.475	0.360	0.252 - 0.468	No	GEL
Sr-90	Water	Bq/L	11.1	11.2	7.8 - 14.6	Yes	GEL
Tc-99	Water	Bq/L	10.6	11.2	7.8 - 14.6	Yes	GEL
U-234	Water	Bq/L	0.333	0.380	0.266 - 0.494	Yes	GEL
U-238	Water	Bq/L	0.339	0.385	0.270 - 0.501	Yes	GEL

Note: This report includes only those matrix/analyte combinations performed in support of the analysis of environmental samples collected as part of the WVDP monitoring program or special investigations.
ES - WVDP Environmental Services. GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "No" - Result not acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%.

[c] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[d] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte is far below the detection limit.

[e] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

[f] Inorganic.

TABLE G-2 *(continued)*
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 51; August 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?* [b]	*Analyzed by:*
MAPEP – 24– GrW51, Water – Radiological							
Gross alpha	Water	Bq/L	1.07	1.29	0.39 - 2.19	Yes	GEL
Gross beta	Water	Bq/L	4.78	5.09	2.55 - 7.64	Yes	GEL
MAPEP – 24 – MaW51, Water – Inorganic							
Antimony	Water	mg/L	0.000217	[c]	*False Positive Test* [d]	Yes	GEL
Arsenic	Water	mg/L	2.22	2.13	1.49 - 2.77	Yes	GEL
Barium	Water	mg/L	3.10	2.82	1.97 - 3.67	Yes	GEL
Beryllium	Water	mg/L	5.13	4.91	3.44 - 6.38	Yes	GEL
Cadmium	Water	mg/L	-0.00396	[f]	*False Positive Test* [d]	No	GEL
Chromium	Water	mg/L	0.00192	[c]	*False Positive Test* [d]	Yes	GEL
Cobalt	Water	mg/L	11.4	10.2	7.1 - 13.3	Yes	GEL
Copper	Water	mg/L	2.79	2.5	1.75 - 3.25	Yes	GEL
Lead	Water	mg/L	0.000199	0.000154	*Sensitivity Evaluation* [e]	Yes	GEL
Mercury	Water	mg/L	0.0766	0.087	0.061 - 0.113	Yes	GEL
Nickel	Water	mg/L	6.58	6.19	4.33 - 8.05	Yes	GEL
Selenium	Water	mg/L	0.595	0.624	0.437 - 0.811	Yes	GEL
Thallium	Water	mg/L	2.3	2.290	1.603 - 2.977	Yes	GEL
Uranium – Total	Water	mg/L	0.0285	0.0312	0.0218 - 0.0406	Yes	GEL
Vanadium	Water	mg/L	-0.000688	[c]	*False Positive Test* [d]	Yes	GEL
Zinc	Water	mg/L	2.31	2.28	1.60 - 2.96	Yes	GEL
MAPEP – 24 – MaS51, Soil – Inorganic							
Antimony	Soil	mg/kg	5.21	6.47	4.53 - 8.41	Yes	GEL
Arsenic	Soil	mg/kg	30.1	26.5	18.6 - 34.5	Yes	GEL
Barium	Soil	mg/kg	223	218	153 - 283	Yes	GEL
Beryllium	Soil	mg/kg	14.2	12.9	9.0 - 16.8	Yes	GEL
Cadmium	Soil	mg/kg	3.20	3.14	2.20 - 4.08	Yes	GEL
Chromium	Soil	mg/kg	48.7	45.6	31.9 - 59.3	Yes	GEL
Cobalt	Soil	mg/kg	27.6	27.3	19.1 - 35.5	Yes	GEL
Copper	Soil	mg/kg	56.0	50.7	35.5 - 65.9	Yes	GEL
Lead	Soil	mg/kg	22.5	22.0	15.4 - 28.6	Yes	GEL
Mercury	Soil	mg/kg	0.160	0.182	0.127 - 0.237	Yes	GEL
Nickel	Soil	mg/kg	43.9	42.8	30.0 - 55.6	Yes	GEL
Selenium	Soil	mg/kg	5.90	5.65	3.96 - 7.35	Yes	GEL
Silver	Soil	mg/kg	4.06	3.37	2.36 - 4.38	W	GEL
Thallium	Soil	mg/kg	2.11	2.02	1.41 - 2.63	Yes	GEL
Uranium – Total	Soil	mg/kg	11.73	13.3	9.3 - 17.3	Yes	GEL
Vanadium	Soil	mg/kg	46.7	44.7	31.3 - 58.1	Yes	GEL
Zinc	Soil	mg/kg	117	110	77 - 143	Yes	GEL

GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%. "No" - Result not acceptable.

[c] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[d] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte is far below the detection limit.

[e] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

[f] False positive and the result was not acceptable (|bias| > 30%).

TABLE G-2 *(concluded)*
Crosscheck Sample Comparisons From the DOE Mixed Analyte Performance Evaluation Program (MAPEP)[a] ; Study 51; August 2024

Analyte	*Matrix*	*Units*	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?* [b]	*Analyzed by:*
MAPEP – 24 – MaS51, Soil – Radiological							
Am-241	Soil	Bq/kg	2.42	0.26	*Sensitivity Evaluation* [e]	Yes	GEL
Cs-137	Soil	Bq/kg	1790	1650	1155 - 2145	Yes	GEL
Co-60	Soil	Bq/kg	699	700	490 - 910	Yes	GEL
Pu-238	Soil	Bq/kg	17.0	17.8	12.5 - 23.1	Yes	GEL
Pu-239/240	Soil	Bq/kg	49.6	50.0	35.0 - 65.0	Yes	GEL
K-40	Soil	Bq/kg	562	525	368 - 683	Yes	GEL
Sr-90	Soil	Bq/kg	388	487	341 - 633	W	GEL
Tc-99	Soil	Bq/kg	204	171	120 - 222	Yes	GEL
U-234	Soil	Bq/kg	46.1	50.0	35.0 - 65.0	Yes	GEL
U-238	Soil	Bq/kg	150	165	116 - 215	Yes	GEL
MAPEP – 24 – RdV51, Vegetation – Radiological							
Cs-137	Veg	Bq/sample	1.93	1.91	1.34 - 2.48	Yes	GEL
Co-60	Veg	Bq/sample	2.06	2.01	1.41 - 2.61	Yes	GEL
Sr-90	Veg	Bq/sample	2.46	2.39	1.67 - 3.11	Yes	GEL

GEL - GEL Laboratories, LLC.

[a] MAPEP monitors performance and requests corrective action as required.

[b] "Yes" - Result acceptable. "W" - Result acceptable with warning 20% < |bias| < 30%.

[c] Although no actual reference value or acceptance range was provided, the results were assessed by MAPEP as acceptable.

[d] The false positive test is used to identify laboratory results indicating the presence of an analyte, when, in fact, the analyte. is far below the detection limit.

[e] A sensitivity evaluation tests the laboratory's ability to measure the analyte near the detection limit.

TABLE G-3
Comparisons of Results From Crosscheck Samples Analyzed for Water Quality Parameters as Part of the EPA's Discharge Monitoring Report - Quality Assurance (DMR-QA) Study 44; 2024; for the National Pollutant Discharge Elimination System (NPDES)

Analyte	*Units*	*Reference Value*	*Reported Value*	*Acceptance Range*	*Accept?* [a]	*Analyzed by:*
Aluminum	µg/L	1,750	1,650	1450 - 1650	Yes	Eurofins
Aluminum (EPA 200.8)[b]	µg/L	1,130	1,180	926 - 1310	Yes	GEL
Ammonia (as N)	mg/L	11.3	11.3	9.05 - 13.6	Yes	Eurofins
Antimony	µg/L	490	482	395 - 570	Yes	Eurofins
Arsenic (EPA 200.8)	µg/L	316	314	259 - 370	Yes	Eurofins
Barium	µg/L	1,800	1,760	1530 - 2070	Yes	Eurofins
Biochemical oxygen demand	mg/L	59.0	53.5	29.6 - 98.3	Yes	Eurofins
Biochemical oxygen demand	mg/L	32.1	24.2	16.1 - 48.2	Yes	GEL
Cadmium (EPA 200.8)	µg/L	819	842	696 - 942	Yes	Eurofins
Chlorine (total residual)	µg/L	170	170	110 - 230	Yes	ES
Chromium (EPA 200.8)	µg/L	803	822	683 - 924	Yes	Eurofins
Chromium (hexavalent)	µg/L	648	604	544 - 742	Yes	Eurofins
Cobalt	µg/L	318	303	270 - 365	Yes	Eurofins
Copper (EPA 200.8)	µg/L	555	583	472 - 639	Yes	Eurofins
Copper (EPA 200.8)	µg/L	361	383	307 - 415	Yes	GEL
Cyanide, total	mg/L	0.793	0.738	0.516 - 1.07	Yes	Eurofins
Iron	µg/L	2570	2400	2180 - 2950	Yes	Eurofins
Iron (EPA 200.8)	µg/L	3,580	3,660	3040 - 4120	Yes	GEL
Lead (EPA 200.8)	µg/L	261	264	222 - 301	Yes	Eurofins
Lead (EPA 200.8)	µg/L	214	228	182 - 246	Yes	GEL
Manganese	µg/L	528	553	449 - 607	Yes	Eurofins
Mercury (EPA 1631E)	µg/L	22.5	23.6	15.8 - 29.2	Yes	GEL
Nickel	µg/L	1,410	1,350	1250 - 1580	Yes	Eurofins
Nitrate (as N)	mg/L	17.4	18.9	14.5 - 20.2	Yes	Eurofins
Nitrite (as N)	mg/L	3.50	3.34	3.03 - 3.97	Yes	Eurofins
Oil & Grease (Gravimetric)	mg/L	139	108.0	101 - 159	Yes	Eurofins
Oil & Grease (Gravimetric)	mg/L	149	128	109 - 170	Yes	GEL
pH	SU	6.49	6.47	6.29 - 6.69	Yes	ES
Phosphorus (total, as P)	mg/L	1.61	1.47	1.28 - 1.92	Yes	Eurofins
Phosphorus (total, as P)	mg/L	8.67	8.32	7.23 - 10.0	Yes	GEL
Selenium (EPA 200.8)	µg/L	696	727	591 - 800	Yes	Eurofins
Sulfate	mg/L	101	103	83.9 - 114	Yes	Eurofins
Settleable solids	mL/L	26.1	30.0	21.2 - 33.3	Yes	Eurofins
Suspended solids (total)	mg/L	72.7	66.4	58.8 - 81.4	Yes	Eurofins
Suspended solids (total)	mg/L	48.2	56	37.2 - 55.3	No	GEL
Total dissolved solids	mg/L	242	238	197 - 287	Yes	Eurofins
Total dissolved solids	mg/L	239	232	194 - 284	Yes	GEL
Total Kjeldahl Nitrogen (as N)	mg/L	24.3	21.9	18.3 - 29.4	Yes	Eurofins
Vanadium	µg/L	143	146	121 - 164	Yes	Eurofins
Zinc (EPA 200.8)	µg/L	1,220	1,150	1030 - 1400	Yes	Eurofins
Zinc (EPA 200.8)	µg/L	957	994	813 - 1100	Yes	GEL

Samples provided by Environmental Resource Associates (ERA) and Phenova.
ES - WVDP Environmental Services Eurofins - Eurofins Buffalo
GEL - GEL Laboratories, LLC.
[a] "Yes" - Result acceptable. "No" -
[b] EPA Method 200.8: Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry

TABLE G-3 (*concluded*)
Comparisons of Results From Crosscheck Samples Analyzed for Water Quality Parameters as Part of the EPA's Discharge Monitoring Report - Quality Assurance (DMR-QA) Study 44; 2024; for the National Pollutant Discharge Elimination System (NPDES)

Analyte	Units[b]	*Reported Value*	*Reference Value*	*Acceptance Range*	*Accept?*[a]	*Analyzed by:*
Toxicity						
Ceriodaphnia Acute MHSF 25° - LC50	S.U.	47.9	37.0	23.6 - 50.4	Yes	New England Bioassay
Ceriodaphnia Chronic MHSF - Survival NOEC	S.U.	25.0	25	12.5 - 50	Yes	New England Bioassay
Ceriodaphnia Chronic MHSF - Reproduction IC25	S.U.	21.3	27.6	16.8 - 38.4	Yes	New England Bioassay
Ceriodaphnia Chronic MHSF - Reproduction NOEC	S.U.	12.5	25	12.5 - 50	Yes	New England Bioassay
Fathead Minnow Acute MHSF 25° - LC50	S.U.	32.0	34.9	25.7 - 44.2	Yes	New England Bioassay
Fathead Minnow Chronic MHSF - Survival NOEC	S.U.	50.0	50	25 - 100	Yes	New England Bioassay
Fathead Minnow Chronic MHSF - Growth IC25	S.U.	61.8	49.4	31.0 - 67.8	Yes	New England Bioassay
Fathead Minnow Chronic MHSF - Growth NOEC	S.U.	50.0	25	12.5 - 50	Yes	New England Bioassay

[a] "Yes" - Result acceptable. "No" - Result not acceptable.
[b] S.U. - Standard Units

APPENDIX H

West Valley Demonstration Project Act and the Timeline of the WVNSC and WVDP

(As presented in Exhibit G of the Cooperative Agreement between USDOE and NYSERDA for the WNYNSC at West Valley, New York; effective October 1, 1980 as amended September 18, 1981.)

EXHIBIT G

WEST VALLEY PROJECT DEMONSTRATION ACT

PUBLIC LAW 96–368 [S. 2443]; October 1, 1980

WEST VALLEY DEMONSTRATION PROJECT ACT

For Legislative History of this and other Laws, see Table 1, Public Laws and Legislative History, at end of final volume

An Act to authorize the Department of Energy to carry out a high-level liquid nuclear waste management demonstration project at the Western New York Service Center in West Valley, New York.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

West Valley Demonstration Project Act. 42 USC 2021a note.

SECTION 1. This Act may be cited as the "West Valley Demonstration Project Act".

42 USC 2021a note.

SEC. 2. (a) The Secretary shall carry out, in accordance with this Act, a high level radioactive waste management demonstration project at the Western New York Service Center in West Valley, New York, for the purpose of demonstrating solidification techniques which can be used for preparing high level radioactive waste for disposal. Under the project the Secretary shall carry out the following activities:

Activities.

(1) The Secretary shall solidify, in a form suitable for transportation and disposal, the high level radioactive waste at the Center by vitrification or by such other technology which the Secretary determines to be the most effective for solidification.

(2) The Secretary shall develop containers suitable for the permanent disposal of the high level radioactive waste solidified at the Center.

(3) The Secretary shall, as soon as feasible, transport, in accordance with applicable provisions of law, the waste solidified at the Center to an appropriate Federal repository for permanent disposal.

(4) The Secretary shall, in accordance with applicable licensing requirements, dispose of low level radioactive waste and transuranic waste produced by the solidification of the high level radioactive waste under the project.

(5) The Secretary shall decontaminate and decommission—

(A) the tanks and other facilities of the Center in which the high level radioactive waste solidified under the project was stored,

(B) the facilities used in the solidification of the waste, and

(C) any material and hardware used in connection with the project,

in accordance with such requirements as the Commission may prescribe.

(b) Before undertaking the project and during the fiscal year ending September 30, 1981, the Secretary shall carry out the following:

Hearings.

(1) The Secretary shall hold in the vicinity of the Center public hearings to inform the residents of the area in which the Center is located of the activities proposed to be undertaken under the project and to receive their comments on the project.

(2) The Secretary shall consider the various technologies available for the solidification and handling of high level radioactive waste taking into account the unique characteristics of such waste at the Center.

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(3) The Secretary shall—

(A) undertake detailed engineering and cost estimates for the project,

(B) prepare a plan for the safe removal of the high level radioactive waste at the Center for the purposes of solidification and include in the plan provisions respecting the safe breaching of the tanks in which the waste is stored, operating equipment to accomplish the removal, and sluicing techniques,

(C) conduct appropriate safety analyses of the project, and

(D) prepare required environmental impact analyses of the project.

(4) The Secretary shall enter into a cooperative agreement with the State in accordance with the Federal Grant and Cooperative Agreement Act of 1977 under which the State will carry out the following:

41 USC 501 note.

(A) The State will make available to the Secretary the facilities of the Center and the high level radioactive waste at the Center which are necessary for the completion of the project. The facilities and the waste shall be made available without the transfer of title and for such period as may be required for completion of the project.

(B) The Secretary shall provide technical assistance in securing required license amendments.

State costs, percentage.

(C) The State shall pay 10 per centum of the costs of the project, as determined by the Secretary. In determining the costs of the project, the Secretary shall consider the value of the use of the Center for the project. The State may not use Federal funds to pay its share of the cost of the project, but may use the perpetual care fund to pay such share.

Licensing amendment application.

(D) Submission jointly by the Department of Energy and the State of New York of an application for a licensing amendment as soon as possible with the Nuclear Regulatory Commission providing for the demonstration.

(c) Within one year from the date of the enactment of this Act, the Secretary shall enter into an agreement with the Commission to establish arrangements for review and consultation by the Commission with respect to the project: *Provided*, That review and consultation by the Commission pursuant to this subsection shall be conducted informally by the Commission and shall not include nor require formal procedures or actions by the Commission pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, or any other law. The agreement shall provide for the following:

42 USC 2011 note.
42 USC 5801 note.

(1) The Secretary shall submit to the Commission, for its review and comment, a plan for the solidification of the high level radioactive waste at the Center, the removal of the waste for purposes of its solidification, the preparation of the waste for disposal, and the decontamination of the facilities to be used in solidifying the waste. In preparing its comments on the plan, the Commission shall specify with precision its objections to any provision of the plan. Upon submission of a plan to the Commission, the Secretary shall publish a notice in the Federal Register of the submission of the plan and of its availability for public inspection, and, upon receipt of the comments of the Commission respecting a plan, the Secretary shall publish a notice in the Federal Register of the receipt of the comments and of the availability of the comments for public inspection. If the Secre-

Publications in Federal Register.

tary does not revise the plan to meet objections specified in the comments of the Commission, the Secretary shall publish in the Federal Register a detailed statement for not so revising the plan.

(2) The Secretary shall consult with the Commission with respect to the form in which the high level radioactive waste at the Center shall be solidified and the containers to be used in the permanent disposal of such waste.

(3) The Secretary shall submit to the Commission safety analysis reports and such other information as the Commission may require to identify any danger to the public health and safety which may be presented by the project. Reports and other information to Commission.

(4) The Secretary shall afford the Commission access to the Center to enable the Commission to monitor the activities under the project for the purpose of assuring the public health and safety.

(d) In carrying out the project, the Secretary shall consult with the Administrator of the Environmental Protection Agency, the Secretary of Transportation, the Director of the Geological Survey, and the commercial operator of the Center. Consultation with EPA and others.

SEC. 3. (a) There are authorized to be appropriated to the Secretary for the project not more than $5,000,000 for the fiscal year ending September 30, 1981. Appropriation authorization. 42 USC 2021a note.

(b) The total amount obligated for the project by the Secretary shall be 90 per centum of the costs of the project.

(c) The authority of the Secretary to enter into contracts under this Act shall be effective for any fiscal year only to such extent or in such amounts as are provided in advance by appropriation Acts.

SEC. 4. Not later than February 1, 1981, and on February 1 of each calendar year thereafter during the term of the project, the Secretary shall transmit to the Speaker of the House of Representatives and the President pro tempore of the Senate an up-to-date report containing a detailed description of the activities of the Secretary in carrying out the project, including agreements entered into and the costs incurred during the period reported on and the activities to be undertaken in the next fiscal year and the estimated costs thereof. Report to Speaker of the House and President pro tempore of the Senate. 42 USC 2021a note.

SEC. 5. (a) Other than the costs and responsibilities established by this Act for the project, nothing in this Act shall be construed as affecting any rights, obligations, or liabilities of the commercial operator of the Center, the State, or any person, as is appropriate, arising under the Atomic Energy Act of 1954 or under any other law, contract, or agreement for the operation, maintenance, or decontamination of any facility or property at the Center or for any wastes at the Center. Nothing in this Act shall be construed as affecting any applicable licensing requirement of the Atomic Energy Act of 1954 or the Energy Reorganization Act of 1974. This Act shall not apply or be extended to any facility or property at the Center which is not used in conducting the project. This Act may not be construed to expand or diminish the rights of the Federal Government. 42 USC 2021a note. 42 USC 2011 note. 42 USC 5801 note.

(b) This Act does not authorize the Federal Government to acquire title to any high level radioactive waste at the Center or to the Center or any portion thereof.

SEC. 6. For purposes of this Act: Definitions. 42 USC 2021a note.

(1) The term "Secretary" means the Secretary of Energy.

(2) The term "Commission" means the Nuclear Regulatory Commission.

(3) The term "State" means the State of New York.

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(4) The term "high level radioactive waste" means the high level radioactive waste which was produced by the reprocessing at the Center of spent nuclear fuel. Such term includes both liquid wastes which are produced directly in reprocessing, dry solid material derived from such liquid waste, and such other material as the Commission designates as high level radioactive waste for purposes of protecting the public health and safety.

(5) The term "transuranic waste" means material contaminated with elements which have an atomic number greater than 92, including neptunium, plutonium, americium, and curium, and which are in concentrations greater than 10 nanocuries per gram, or in such other concentrations as the Commission may prescribe to protect the public health and safety.

(6) The term "low level radioactive waste" means radioactive waste not classified as high level radioactive waste, transuranic waste, or byproduct material as defined in section 11 e. (2) of the Atomic Energy Act of 1954. 42 USC 2014.

(7) The term "project" means the project prescribed by section 2(a).

(8) The term "Center" means the Western New York Service Center in West Valley, New York.

Approved October 1, 1980.

Table H-1
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
1954	The Federal Atomic Energy Act (AEA) promoted commercialization of reprocessing spent nuclear fuel.
1959	NYS established the Office of Atomic Development (OAD) to coordinate the atomic industry.
1961	The NYS OAD acquired 3,345 acres (1,354 ha) of land in Cattaraugus County, Town of Ashford (near West Valley), in western New York and established the WNYNSC.
1962	Davison Chemical Company established Nuclear Fuel Services, Inc. (NFS) as a nuclear fuel reprocessing company, and reached an agreement with NYS to lease the WNYNSC (also referred to as "the Center").
1966	NFS constructed and operated the commercial nuclear fuel reprocessing facility at the WNYNSC from 1966 to 1972. NFS processed 640 metric tons (mt) of spent reactor fuel at the facility, generating 660,000 gallons (gal) (2.5 million liters [L]) of highly radioactive liquid waste. A 5-acre landfill, the U.S. Nuclear Regulatory Commission (NRC)-licensed disposal area (NDA) was operated for disposal of waste generated from the reprocessing operations from 1966 until 1986. Also, a 15-acre commercial disposal area, the SDA regulated by NYS agencies, under delegation of authority from the NRC, accepted low-level radioactive waste (LLW) from operations at the WNYNSC and from off-site facilities from 1963 until 1975.
1972	In 1972, while the plant was closed for modifications, more rigorous regulatory requirements were imposed upon fuel reprocessing facilities. NFS determined the costs to meet regulatory requirements of spent nuclear fuel reprocessing were not economically feasible. NFS then notified the NYSERDA, the successor to NYS OAD, in 1976 that they would discontinue reprocessing and would not renew the lease that would expire at the end of 1980.
1975	Water infiltrated into the New York State-Licensed Disposal Area (SDA) trenches and waste burial operations ceased. Between 1975 and 1981, NFS pumped, treated, and released liquids to the adjacent stream. Redesigning the covers reduced, but did not eliminate, water accumulation in the trenches.
1980	The United States (U.S.) Congress passed Public Law 96-368, the West Valley Demonstration Project Act (WVDP Act), requiring the U.S. Department of Energy (DOE) to be responsible for solidifying the liquid high-level radioactive waste (HLW) stored in underground tanks, disposing of the waste that would be generated by solidification, and decontaminating and decommissioning the facilities used during the process. Per the WVDP Act, the DOE entered into a Cooperative Agreement with NYSERDA that established the framework for cooperative implementation of the WVDP Act. Under the agreement, DOE has exclusive use and possession of a portion of the Center (i.e., WNYNSC) known as the Project Premises (approximately 167 acres at that time). A supplement to the Cooperative Agreement (1981 amendment) between the two agencies set forth special provisions for the preparation of a joint Environmental Impact Statement (EIS).
1981	DOE and NRC entered into a Memorandum of Understanding (MOU) that established specific agency responsibilities and arrangements for informal review and consultation by NRC. Because NYSERDA holds the license and title to the WNYNSC, NRC put the technical specifications of the license (CSF-1) in abeyance to allow DOE to carry out the responsibilities of the WVDP Act.
1982	West Valley Nuclear Services (WVNS), a Westinghouse subsidiary, was chosen by DOE to be the management and operating contractor. WVNS commenced operations at the WVDP on February 28, 1982.
1983	Before discontinuing fuel reprocessing operations, NFS had accepted 750 spent fuel assemblies which remained in storage in the on-site fuel receiving and storage (FRS) area. Between 1983 and 1986, 625 of those assemblies were returned to the utilities that owned them. In 1983, NYSERDA assumed management responsibility for the SDA and focused efforts on minimizing infiltration of water into the trenches. In the 1990s, installation of a geomembrane cover over the entire SDA and an underground barrier wall were successful in eliminating increases in trench water levels. The DOE selected the vitrification process as the preferred method for solidifying the HLW into glass.
1984	Nonradioactive testing of a full-scale VIT system was conducted from 1984–1989. NFS entered into an agreement with DOE in which DOE assumed ownership of the remaining 125 fuel assemblies in the FRS pool and the responsibility for their removal.

TABLE H-1 *(continued, page 2 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
1986	A large volume of radioactive, non-HLW would result from WVDP activities. On-site disposal of most of this waste was evaluated in an Environmental Assessment (EA [DOE/EA-0295, April 1986]), and a finding of no significant impact (FONSI) was issued. The Coalition on West Valley Nuclear Waste (The Coalition) and the Radioactive Waste Campaign filed suit contending an EIS should have been prepared. The NYS Department of Environmental Conservation (NYSDEC) was authorized by the U.S. Environmental Protection Agency (EPA) to administer the Resource Conservation and Recovery Act (RCRA) hazardous waste program.
1987	A decision to potentially dispose of LLW at the Project led to a legal disagreement between DOE, The Coalition, and the Radioactive Waste Campaign. The lawsuit was resolved by a Stipulation of Compromise which states that LLW disposal at the site and the potential effects of erosion at the site must be included in a comprehensive EIS.
1988	In December 1988, the DOE and NYSERDA issued a Notice of Intent (NOI) in the Federal Register (FR) to prepare an EIS in accordance with Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 8-0109 of the New York State Environmental Quality Review (SEQR) Act. To prepare for VIT, the integrated radiological waste treatment system was constructed to process liquid supernatant from the underground waste tanks by removing most of the radioactivity in the supernatant, concentrating the liquid, and blending it with cement. The HLW sludge layer was then washed to remove soluble salts. The water containing the salts was also stabilized into cement. Approximately 20,000 drums of cement-stabilized LLW were stored in the aboveground drum cell. The process was completed in 1995.
1990	Organic solvent was observed in a groundwater monitoring well immediately downgradient of the NDA in 1983. Following characterization of the area, an interceptor trench bordering the northeast and northwest boundaries of the NDA and a liquid pretreatment system (LPS) were built in 1990–1991. The trench was designed to collect liquid that might migrate from the NDA and the LPS was designed to recover free organic product (if present) from the recovered liquid. To date, no organic product has been detected in the interceptor trench water; therefore, the water has been pumped and treated through the LLW treatment system. In 1990, NYS was granted the authority to regulate the hazardous waste constituents of radioactive mixed waste. Subsequently, a Title 6 New York State Official Compilation of Codes, Rules, and Regulations (NYCRR) RCRA Part 373-3 (Part A) Permit Application for the WVDP was filed with NYSDEC for storage and treatment of hazardous and mixed wastes.
1992	In 1992, DOE and NYSERDA entered into a RCRA §3008(h) Administrative Order on Consent (Consent Order) with NYSDEC and the EPA. The Consent Order pertained to management of hazardous waste and/or hazardous constituents from solid waste management units (SWMUs) at the WVDP. It also required DOE and NYSERDA to perform a RCRA Facility Investigation (RFI) at the WNYNSC to determine if there had been or if there was potential for a release of RCRA hazardous constituents. Final RFI reports were submitted in 1997, completing the Consent Order investigative activities.
1993	In 1993, gross beta activity in excess of 1.0E-06 microcuries per milliliter (µCi/mL) (the DOE Derived Concentration Guide [DCG] for strontium-90, the applicable guidance at that time) was detected in surface water on the north plateau, in the vicinity of sampling location WNSWAMP. The gross beta radioactivity was determined to be strontium-90.
1994	Extensive subsurface investigations delineated the extent of the strontium-90 plume and determined that the plume originated beneath the southwest corner of the main plant process building (MPPB) during NFS operations and migrated toward the northeast quadrant of the north plateau. A second lobe of contamination was attributed to the area of former lagoon 1, which was backfilled in 1984.
1995	In 1995, a groundwater recovery system consisting of three wells was installed on the north plateau to extract and treat the strontium-90-contaminated groundwater. In 1999, a pilot-scale permeable treatment wall (PTW) was constructed to test this passive in-situ remediation technology. The VIT building shielding was installed in 1991, the slurry-fed ceramic melter was assembled in 1993, and the remaining major components were installed and tested by the end of 1994. In 1995, the Vitrification Facility (VF) was completed, fully tested, and "cold operations" began.

TABLE H-1 *(continued, page 3 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
1996	The DOE and NYSERDA issued a draft EIS (DEIS) for completion of the WVDP and closure or long-term management of the WNYNSC. Following evaluation of the public comments on the DEIS, the Citizen Task Force was convened to enhance stakeholder understanding and input regarding the WVDP/WNYNSC closure process. VIT operations began in 1996 and continued into 2002, producing 275 ten-foot-tall stainless-steel canisters of hardened radioactive glass containing 16.1 million curies of radioactive material, primarily cesium and strontium, with the radioactivity from daughter products included (decay corrected to January 1, 2014, WVNS-CAL-396). The VIT melter was shut down in September 2002. NYSDEC and DOE entered into an Order on Consent negotiated under the Federal Facilities Compliance Act (FFCA) for handling, storage, and treatment of mixed wastes at the WVDP. The Seneca Nation of Indians Cooperative Agreement was signed in 1996 to foster government-to-government relationships between the Seneca Nation and the U.S. government, as represented by DOE.
1999	VIT expended materials processing was initiated to begin processing unserviceable equipment from the VF. This success helped in developing a remote-handled waste facility (RHWF) to process large-scale, highly contaminated equipment excessed during decontamination and decommissioning (D&D) activities.
2000	Restructuring of the work force and construction of the RHWF began.
2001	The 125 spent fuel assemblies that remained in storage at the WVDP since 1975 were prepared for transport to the Idaho National Engineering and Environmental Laboratory (INEEL). Initial decontamination efforts began in two significantly contaminated areas in the MPPB, the process mechanical cell (PMC) and the general purpose cell (GPC), to place the cells in a safer configuration for future facility decommissioning. DOE published formal notice in 66 FR 16447 to split the EIS process into (1) the WVDP Waste Management EIS, and (2) the Decommissioning and/or Long-Term Stewardship EIS at the WVDP and the WNYNSC.
2002	NRC issued "Decommissioning Criteria for the West Valley Demonstration Project (M-32) at the West Valley Site; Final Policy Statement" (67 FR 5003). Vitrification of the HLW in the underground tanks was completed in September 2002.
2003	The remaining 125 spent fuel assemblies were shipped to INEEL, allowing for decontamination of the FRS to begin.
2004	The RHWF became operational. Major decontamination efforts continued and site footprint reduction began as 20 office trailers were removed. In December, the 6 NYCRR Part 373-2 Permit Application (i.e., Part B) was submitted to NYSDEC.
2005	In June, the DOE published its final decision on the "WVDP Waste Management Environmental Impact Statement (68 FR 26587)." The DOE implemented the preferred alternative for the management of LLW and mixed LLW. The decision on transuranic (TRU) waste was deferred, and the canisters of vitrified HLW will remain in on-site storage until they can be shipped to a repository. In November, the WVDP was downgraded to a Category 3 nuclear facility, marking the first time in the site's history that it has been designated the least of the three DOE nuclear facility designations. The categorization is based on amounts, types, and configuration of the nuclear materials stored and their potential risks.
2006	An EA (DOE/EA-1552) evaluating the proposed decontamination, deconstruction, and removal of 36 facilities was issued. By the end of 2006, 11 of the 36 structures were removed. The DOE-WVDP office initiated a collaborative, consensus-based team process, referred to as the "Core Team," that involved DOE, NYSERDA, EPA, the New York State Department of Health (NYSDOH), NRC, NYSDEC, and later West Valley Environmental Services, LLC (WVES). This team brought individuals with decisionmaking authority together to resolve challenging issues surrounding the WVDP EIS process and to make recommendations to move the Project toward an "Interim End-State" prior to issuance of the "Final EIS for the Decommissioning and/or Long-Term Stewardship at the WVDP and the WNYNSC." Shipment of the cement-filled LLW drums was initiated.
2007	Deconstruction and removal of four more structures identified under DOE/EA-1552 was completed. On June 29, 2007, DOE awarded WVES a four-year contract (Contract DE-AC30-07CC30000) to conduct the next phase of cleanup operations at the WVDP. The remaining drums of cemented LLW in the drum cell were packaged and shipped to the Nevada Test Site for disposal. In the fall of 2007, an Interim Measure (IM) to minimize water infiltration into the NDA was initiated with site surveys and soil borings.

TABLE H-1 *(continued, page 4 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
2008	During 2008, a trench was excavated along two sides of the NDA, on the south plateau. The trench was backfilled with bentonite and soil to form a slurry wall, a low-permeability subsurface barrier to infiltration. A geomembrane cover was placed over the entire landfill. On the north plateau, additional subsurface soil and groundwater samples were collected in the summer and fall of 2008 to further characterize chemical and radiological constituents within the contaminated groundwater plume beneath and downgradient of the MPPB. The revised DEIS for Decommissioning and/or Long-Term Stewardship at the WVDP and WNYNSC was issued in December for public review, which continued through September 8, 2009. Concurrently, the Proposed Phase 1 Decommissioning Plan (DP) for the WVDP was prepared and submitted to NRC.
2009	Extensive characterization was completed on the north plateau in 2009 to delineate the leading edge of the subsurface strontium-90 groundwater plume and to find a suitable material to capture and retain the contamination.
2010	In January, DOE and NYSERDA issued the final EIS (FEIS) for the WVDP and the WNYNSC (DOE/EIS-0226). The phased decisionmaking alternative was selected as the preferred alternative. The phase 2 decision was deferred for no more than 10 years. In February, NRC issued a Technical Evaluation Report (TER) for the DP, concluding that the DP was consistent with the preferred alternative in the EIS. A SEQR notice of completion for the EIS and its acceptance by NYSERDA was issued on January 27, 2010. On April 14, 2010, DOE issued the Record of Decision (ROD) for the EIS, and on May 12, NYSERDA issued a SEQR Findings Statement, selecting the phased decisionmaking alternative. On August 17, 2010, DOE and NYSERDA reached an agreement and signed a Consent Decree that formally defined the cost sharing for cleanup of the WVDP and the WNYNSC. In September 2010, a revised RCRA Part 373-2 Permit Application was submitted to NYSDEC. An 860-foot-long full-scale PTW near the leading edge of the strontium-90 plume was installed and completed. The Tank and Vault Drying System (T&VDS) was installed to reduce the harmful effects of corrosion on the underground waste tanks. MPPB cell decontamination and deactivation activities continued.
2011	DOE awarded the Phase 1 Decommissioning and Facility Disposition contract to CH2M HILL • B&W West Valley, LLC (CHBWV) on June 29, 2011. The "continuity of contract" period extended to August 29, 2011 during which time work activities were transitioned, environmental monitoring continued, and licenses and permits were transferred to CHBWV. A separate contract was awarded to Safety and Ecology Corporation to implement work associated with the Phase 1 characterization support services, which are requirements of the Phase 1 DP. In September 2011, DOE and NYSERDA jointly awarded a Phase 1 Studies contract to Enviro Compliance Solutions to identify and implement the Phase 1 Studies. The objective of the studies is to use technical experts to conduct scientific studies that will facilitate interagency consensus for decisionmaking in the Phase 2 decommissioning process.
2012	Work continued on the Phase 1 Decommissioning Facilities Disposition Contract, including design of the HLW Canister Interim Storage System, continued legacy waste shipment, preparation for deconstruction of the MPPB and VF, and deconstruction of nonradiological Balance of Site Facilities (BOSF). Deconstruction of the nonradiologically contaminated portions of the 01-14 building began in 2012. DOE issued a final Waste Incidental to Reprocessing (WIR) evaluation for the VIT melter in February 2012, determining that this vessel is LLW incidental to reprocessing and therefore may be managed under DOE's authority in accordance with the requirements of LLW. Phase 1 Studies teams of Subject Matter Experts (SMEs) continued development of recommendations for the identified areas of study. Environmental characterization of surface soils and soil excavations performed in 2012 included characterization of two reference areas, the HLW Canister Interim Storage System area, and two building footprints following deconstruction.

TABLE H-1 *(continued, page 5 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
2013	Deconstruction of seven buildings was completed in 2013, including deconstruction of the radiologically contaminated portions of the 01-14 building. The HLW Cask Storage Pad was constructed and eight Vertical Storage Casks (VSCs) were fabricated. The site's existing inventory of legacy LLW and mixed low-level waste (MLLW) was reduced by 50% from the start of the CHBWV contract as a result of off-site shipments. Preparations continued for canister relocation and deconstruction of the MPPB and VF. A request for EPA approval was prepared for a new MPPB ventilation system. The off-site ambient air monitoring network was in service for a full year in 2013. DOE issued a WIR for the Concentrator Feed Makeup Tank (CFMT) and Melter Feed Hold Tank (MFHT) in February 2013 and began planning for off-site shipment of these vessels and the VIT melter. Phase 1 Studies to support the Phase 2 decision continued in 2013. Environmental characterization activities continued in 2013 and included collection of soil samples and radiological ground surface
2014	The WVDP was identified as one of DOE's safest sites in 2014 and CHBWV earned the DOE-Voluntary Protection Program (VPP) STAR of Excellence for safe work practices. Preparation for HLW canister relocation continued in 2014, with fabrication of eight additional VSCs, development of a canister decontamination process, procurement of custom designed heavy equipment to move the canister-loaded casks from the MPPB to the HLW Cask Storage Pad, and modifications to the rooms in the MPPB that will be used during the transfer. The Con-Ed and T-FS-04 buildings were deconstructed. Deactivation and hazard reduction continued inside the MPPB. Debris removal and gross decontamination of the VF was completed in preparation for deconstruction. The potable water supply system was changed over from a surface water source to a groundwater source. EPA conditionally approved construction of a new MPPB ventilation system in April 2014 (with final approval in March 2015). EPA approved use of the ambient air data to demonstrate compliance with air emissions standards for 2014. A transportation safety analysis report for off-site shipment of the VIT melter was submitted to NRC. Extensive repairs to the lakes and dams were made followed by site
2015	The first 20 canisters of HLW were safely removed from the MPPB and placed in VSCs. The first four VSCs were relocated to the HLW Cask Storage Pad on the south plateau. Prior to the HLW cask relocation, the final custom designed relocation equipment was received and operation readiness testing was completed. A dose rate cave was procured to obtain dose rates on the non-HLW drums stored in the Chemical Process Cell in order to remove and store the drums safely in preparation for MPPB deconstruction. A Replacement Ventilation System (RVS) for a portion of the MPPB was constructed, tested and put into operation in August 2015. An erosion control engineering project was completed to reroute the S09 stormwater outfall discharge from the lagoon 3 embankment to the bottom of the hill at Franks Creek. The radiologically contaminated High Efficiency Particulate Air (HEPA) filters from the MPPB were shipped off site in 2015, achieving 100% reduction in the legacy MLLW. Deactivation and hazard reduction continued inside the MPPB and VF. The NRC issued a "Special Package Authorization (SPA)" for the VIT melter transportation package in 2015. Personnel were relocated from the Administration Building in order to prepare the building for deconstruction. Work began on a probabilistic performance assessment to support Phase 2 of the Phased Decisionmaking alternative for the WVDP and WNYNSC.
2016	Removal and relocation of the remaining canisters of HLW from the MPPB was safely completed. The canisters were loaded into a total of 56 VSCs, relocated on site, and safely stored on the WVDP interim HLW Cask Storage Pad by the end of November 2016, approximately one year ahead of schedule. The CFMT, MFHT, and VIT melter were safely shipped to Waste Control Specialists LLC (WCS), a long-term disposal facility in Andrews, Texas. They were buried in an underground waste cell at WCS before the end of CY 2016. Deactivation and hazard reduction continued inside the MPPB. Deactivation of the VF was nearly complete by the end of the year with planning in progress to begin deconstruction of the VF in CY 2017. Progress was made in the initial development of a conceptual site model for the probabilistic performance assessment, and additional Phase 1 study work was performed in 2016 to support Phase 2 decisionmaking.

TABLE H-1 *(continued, page 6 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
2017	CHBWV received the DOE VPP Legacy of Stars safety award for 4 consecutive years as a Star site. Deactivation of the VF was completed in 2017. Deconstruction of the VF began on September 11, 2017. Deactivation and hazard reduction in the MPPB continued in 2017. Shipment of legacy waste was 86% complete by the end of the year of 2017, with completion anticipated ahead of schedule. The remaining non-HLW drums were removed from the MPPB Chemical Process Cell (CPC) in preparation for MPPB deconstruction. Construction of the new potable water treatment system and communications hub were completed in 2017, and progress was made towards upgrading the electrical supply infrastructure.
2018	Completed deconstruction of the VF in September 2018. The Master Slave Manipulator (MSM) Shop, Contact-Size Reduction Facility (CSRF) and a portion of the Head End Ventilation (HEV) building were also deconstruction. Significant progress was made in deactivation and hazard reduction associated with the MPPB including removal of the MPPB stack. Completed shipment of legacy waste in September 2018. Deconstruction of 28 of 47 BOSF, including the Administration Building, complete by the end of December 2018. Completed natural gas supply upgrade and installed electrical power lines and a new on-site electrical substation to allow replacement of the electrical supply infrastructure in the near future. In February 2018, DOE submitted a NOI to prepare a Supplemental Environmental Impact Statement (SEIS) and held public scoping meetings in March 2018. The Phase 1 studies were completed in 2018 and progress continued on Probabilistic Performance Assessment (PPA) in support of the SEIS. Request for Information (RFI)/Sources Sought for Phase 1B Decontamination and Decommissioning, and Soil Remediation procurement released by DOE in October 2018.
2019	The laundry, URE, MPPB office and Chemical Viewing Aisle (CVA) were all deconstructed in 2019 leaving only the UR and Load-In/Load-Out (LILO) ancillary facilities attached to the MPPB to remove. In addition, all except two of the 47 BOSF were removed by the end of 2019. Waste management shipped a record volume of materials off site. The remaining VF deconstruction debris was shipped off site in January 2019. Continued progress was made in deactivation and hazard reduction associated with the MPPB including the beginning of Nitrocision® in PPC-S. Planning for deconstruction of the MPPB included development of detailed WIPs, a deconstruction water management plan, and determination of a contamination area (CA) and radiological buffer area (RBA) for MPPB deconstruction. NYSDEC issued a new water withdrawal permit for the WVDP in December 2019. Progress continued on the PPA in support of the SEIS.
2020	Facility disposition activities continued in 2020 with deconstruction of the UR and continued deactivation of the MPPB. On March 20, 2020, the DOE-WVDP implemented a partial stop work order due to the COVID-19 pandemic. Mission critical work continued including compliance inspections, environmental monitoring, mitigation of emergent conditions, and critical preventative maintenance throughout the year. Some work activities, including Nitrocision®, were temporarily suspended. The majority of the waste shipped off site in 2020 was deconstruction debris from the MPPB office (deconstructed in 2019) and from the UR. Reduction of the hazards associated with radiologically contaminated areas inside the MPPB continued in 2020 with grouting of the below ground General Purpose Cell (GPC), minicell, and General Operation Area (GOA), and approximately three months of wall scabbling by Nitrocision® in PPC-S. A new MPPB water management system was designed and construction initiated to support collection and treatment of dust suppression water and precipitation during MPPB deconstruction. Progress continued on the PPA in support of the SEIS.
2021	Facility disposition activities continued in 2021 with continued deactivation of the MPPB and partial deconstruction of the LILO facility. The COVID-19 pandemic affected some work activities, including Nitrocision® and duct work in the VWR. Waste shipping by rail was resumed in 2021. The majority of the waste shipped off site in 2021 was waste soil and deconstruction debris from disposal of the PTW soil containment structure and radiologically contaminated water pumped from below ground cells. Preparations for MPPB deconstruction included internal self-evaluations of MPPB deconstruction water management, waste processing, and work control processes, as well as continued wall scabbling by Nitrocision® in PPC-S. Installation of the MPPB water management system was completed. Renovations to the drum cell were made for its future use during MPPB deconstruction.

TABLE H-1 *(concluded, page 7 of 7)*
Historic Timeline of the WNYNSC and the WVDP

Year	*Activity*
2022	MPPB deconstruction formally began on September 22, 2022 with associated waste shipments off site by rail. In preparation for MPPB deconstruction, VWR deactivation, PPC-S decontamination, LILO waste shipments, and readiness assessments for deconstruction were completed. Site infrastructure enhancements were performed including construction of a new site security gatehouse, removal of the no longer used diesel fuel tank and electric substation, and on-site road improvements for heavy equipment use. Evaluation of potential PTW performance enhancements began in November 2022. Special projects continued such as characterization of HLW tank 8D-4 to prepare for phase 2 decommissioning. Progress continued on the PPA in support of the SEIS.
2023	MPPB deconstruction activities continued in 2023. At the end of December 2023, about 50% of the planned deconstruction projects was completed. The evaluation of potential PTW performance enhancements continued, including additional on-site sampling and bench testing. The excavation of soil within the LSA #2 was completed, and RCRA closure verification sampling and analysis was performed. Archived sludge sample analysis was completed for the HLW tank 8D-4. Several containers and boxes of legacy waste and equipment were shipped off site for disposal.
2024	MPPB deconstruction activities continued in 2024. At the end of December 2024, about 90% of the planned deconstruction projects was completed and approximately 90% of expected waste from the project was boxed and shipped off site. The PTW longevity enhancement options were presented to the DOE and are under review. The demolition of the Analytical & Process Chemistry (A&PC) Hot Cells was completed and the final RCRA Hazardous Waste Closure Certification Report for A&PC was submitted. The Hazardous Waste Closure Certification report was submitted for Lag Storage Area (LSA) #2 Hardstand. Sludge samples were collected in the HLW tank 8D-4 and sent for laboratory analysis. Planning and preparations for Phase 1B work are ongoing.

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