

Knolls Laboratory and Kesselring Site

Environmental Monitoring Report

Calendar Year 2025

Prepared for the U.S. Department of Energy
by Fluor Marine Propulsion, LLC

FLUOR[®]

KNOLLS LABORATORY AND KESSELRING SITE

ENVIRONMENTAL MONITORING REPORT

CALENDAR YEAR 2025

Prepared for the U.S. Department of Energy by
Fluor Marine Propulsion, LLC
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Niskayuna, New York
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LIST OF ACRONYMS

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
AOC	Area of Concern
ASFP	Air State Facility Permit
ASGTF	Advanced Steam Generator Test Facility
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BMPC	Bechtel Marine Propulsion Corporation
BOD-5	Biochemical Oxygen Demand, 5-day test
CAA	Clean Air Act
CBS	Chemical Bulk Storage
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CWA	Clean Water Act
D&D	Decontamination and Decommissioning
DCG	Derived Concentration Guide
DCS	Derived Concentration Standard
DLC(s)	Decision Level Concentration(s)
DO	Dissolved Oxygen
DOE	U.S. Department of Energy
DOE-EM	U.S. Department of Energy – Office of Environmental Management
DOT	U.S. Department of Transportation
ECL	[New York State] Environmental Conservation Law
EHS(s)	Extremely Hazardous Substance(s)
ELAP	Environmental Laboratory Approval Program
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERA	Environmental Resource Associates
ESH	Environmental, Safety, and Health
ESHMS	ESH Management System
FFCA	Federal Facility Compliance Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FMP	Fluor Marine Propulsion, LLC
HEPA	High Efficiency Particulate Air [filters]
HSWA	Hazardous and Solid Waste Amendments
KAPL	Knolls Atomic Power Laboratory

LIST OF ACRONYMS (continued)

KS	Kesselring Site
LEPC(s)	Local Emergency Planning Committee(s)
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level
MS4	Municipal Separate Storm Sewer System
MTRU	Mixed Transuranic
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NNL	Naval Nuclear Laboratory
NNPP	Naval Nuclear Propulsion Program
NO _x	Nitrogen Oxides
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NRLFO	Naval Reactors Laboratory Field Office
NSPS	New Source Performance Standards
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PBS(F)	Petroleum Bulk Storage (Facility)
PCB(s)	Polychlorinated Biphenyl(s)
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
POTW	Publicly Owned Treatment Works
PWR	Pressurized Water Reactor
QAP	Quality Assurance Program
RAE	Radionuclide Air Emission
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
RML	Radioactive Materials Laboratory
SCDOH	Saratoga County Department of Health
SBR	Sequencing Batch Reactor
SDS(s)	Safety Data Sheet(s)
SERC	State Emergency Response Commission
SO ₂	Sulfur Dioxide
SPDES	State Pollutant Discharge Elimination System

LIST OF ACRONYMS (continued)

SPRU	Separations Process Research Unit
SPRU DP	Separations Process Research Unit Disposition Project
SSW	Site Service Water
STP	Site Treatment Plan
SVOC(s)	Semi-Volatile Organic Compound(s)
SWDA	Solid Waste Disposal Act
SWMU	Solid Waste Management Unit
SWPPP(s)	Stormwater Pollution Prevention Plan(s)
SWTF	Sanitary Wastewater Treatment Facility
TDS	Total Dissolved Solids
THM	Trihalomethane
TKN	Total Kjeldahl Nitrogen
TLD(s)	Thermoluminescent Dosimeter(s)
TOC	Total Organic Carbon
TOGS	Technical and Operational Guidance Series
TRC	Total Residual Chlorine
TRI	Toxic Release Inventory
TRU	Transuranic [waste]
TSCA	Toxic Substances Control Act
TSDF(s)	Treatment, Storage, and Disposal Facility(ies)
TSS	Total Suspended Solids
UPA	Uniform Procedures Act
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VOC(s)	Volatile Organic Compound(s)
WET	Whole Effluent Toxicity

COMMON ABBREVIATIONS

Bq	Becquerel
BTU(s)	British Thermal Unit(s)
C	Celsius
cfs	cubic feet per second
Ci	curie
cm	centimeter
F	Fahrenheit
hr(s)	hour(s)
GPD	gallons per day
lbs/day	pounds per day
μCi	microcurie = 1×10^{-6} curie
$\mu\text{Ci/ml}$	microcuries per milliliter
μg	microgram = 1×10^{-6} gram
$\mu\text{g/l}$	micrograms per liter
μmho	micromho = 1×10^{-6} ohm
$\mu\text{mho/cm}$	micromhos per centimeter
mg	milligram = 1×10^{-3} gram
mg/l	milligrams per liter
MGD	million gallons per day
mm	millimeters
mrem	millirem = 1×10^{-3} rem
mrem/year	millirem per year
ml	milliliter = 1×10^{-3} liter
ml/l	milliliters per liter
mSv	millisievert = 100 millirem
nCi	nanocurie = 1×10^{-9} curie
ng/l	nanograms per liter
NTU	Nephelometric Turbidity Units
pCi	picocurie = 1×10^{-12} curie
pCi/g	picocuries per gram
pCi/l	picocuries per liter
pH	potential of Hydrogen
ppb	parts per billion
ppt	parts per trillion
rem	Roentgen Equivalent Man
SCF	Standard Cubic Feet
SU	Standard [pH] Unit

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EXECUTIVE SUMMARY

The results of the effluent and environmental monitoring programs at Knolls Atomic Power Laboratory (Knolls Laboratory) and Kenneth A. Kesselring Site (Kesselring Site) are summarized and assessed in this report. Tables 1 – 4 summarize the major elements of the environmental monitoring programs at each site. Information regarding the U.S. Department of Energy – Office of Environmental Management (DOE-EM) Decontamination and Decommissioning (D&D) work occurring at Knolls Laboratory and Kesselring Site is included in this report, as warranted. No DOE-EM work activities occurred at Kesselring Site in 2025. Operations at Knolls Laboratory and Kesselring Site, which include current DOE-EM activities, continue to have no adverse effect on human health or the environment.

The effluent and environmental monitoring programs conducted by Knolls Laboratory and Kesselring Site are designed to determine the effectiveness of treatment and control methods, provide measurement of the concentrations in effluents for comparison with applicable standards, and assess resultant concentrations in the environment. The monitoring programs include analyses of samples of liquid and gaseous effluents for chemical constituents and radioactivity as well as environmental monitoring of air, water, sediment, and fish. Radiation measurements are also made around the perimeter of Knolls Laboratory, the perimeter of Kesselring Site, and at off-site background locations.

Knolls Laboratory and Kesselring Site environmental controls are subject to applicable Federal, State, and local regulations governing use, emission, treatment, storage, and/or disposal of solid, liquid, and gaseous materials. Some nonradiological water and air emissions are generated and treated on site prior to discharge to the environment.

Nonradiological liquid effluents from Knolls Laboratory and Kesselring Site are controlled and monitored in accordance with permits issued by the New York State Department of Environmental Conservation (NYSDEC). Radiological liquid effluents are controlled and monitored in accordance with U.S. Department of Energy (DOE) requirements. Liquid effluent monitoring data show that both Knolls Laboratory and Kesselring Site have maintained a high degree of compliance with the New York State (NYS) and DOE requirements. At Knolls Laboratory, sewage discharges are controlled and monitored in accordance with limitations imposed locally by the Town of Niskayuna in accordance with an Outside Users Agreement (Reference (1)).

Nonradiological air emissions from Knolls Laboratory and Kesselring Site are controlled and monitored in accordance with NYSDEC and U.S. Environmental Protection Agency (EPA) air regulations. Radionuclide air emissions are regulated by the EPA under the requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAP), Title 40 Code of Federal Regulations (CFR) Part 61, Subpart H. For the purposes of the radionuclide NESHAP regulations, emissions from DOE-EM operations at Knolls Laboratory or Kesselring Site are included, when appropriate, in the overall site emissions. No DOE-EM work activities occurred at Kesselring Site in 2025.

Nonradiological air emission sources are not required to have exhaust stack monitoring. The use and maintenance of air emissions control equipment, fuel usage and tracking, or air source limitations such as fuel oil sulfur concentration limits, are used to demonstrate compliance. All of

Knolls Laboratory and Kesselring Site air emissions are within applicable Federal and State standards.

Knolls Laboratory and Kesselring Site operated their own landfills for facility-generated nonradiological wastes during their early histories. Knolls Laboratory and Kesselring Site landfill operations were terminated in 1993 and 1994, respectively. Nonhazardous solid wastes are currently disposed of off site through local permitted facilities.

Chemicals are not manufactured at either Knolls Laboratory or Kesselring Site but are used incidental to operations at both facilities. Those substances characterized as hazardous by Federal and State regulations are controlled through administrative procedures and personnel training. Small amounts of chemical waste are generated and disposed of off site by waste vendors operating under permits issued by the cognizant Federal and State regulatory agencies. Handling and storage incidental to shipment of wastes are controlled and monitored by trained personnel in compliance with applicable permits and regulations. Knolls Laboratory and Kesselring Site strive to minimize the quantity of hazardous and solid waste they produce. Waste avoidance, beneficial reuse, and recycling are practiced whenever practicable.

Accountability and radiation survey procedures are used at Knolls Laboratory and Kesselring Site for the handling, packaging, and transporting of all radioactive materials. Shipments of radioactive materials are performed in accordance with detailed written procedures to ensure compliance with all applicable regulations of the U.S. Department of Transportation (DOT), the DOE, and the U.S. Nuclear Regulatory Commission (NRC). All Knolls Laboratory and Kesselring Site generated wastes that contain radioactive constituents are regulated under the Atomic Energy Act (AEA) of 1954 and applicable DOE requirements. The volume of solid radioactive waste that requires disposal is minimized by using procedures that limit the amount of materials that become contaminated and by recycling. Radioactive wastes are shipped to government owned or licensed disposal sites. During 2025, approximately 389 cubic meters (509 cubic yards) of low-level radioactive waste were shipped from Knolls Laboratory and Kesselring Site for disposal.

Knolls Laboratory and Kesselring Site are within the DOE and EPA standards governing the release of radioactivity to the environment. The annual average concentration of Knolls Laboratory and Kesselring Site radioactivity in liquid and gaseous effluents at the boundary of each site corresponded to less than one percent of the permissible DOE radioactivity concentration standards. Radionuclide air emissions were also less than one percent of the EPA air emission standard. Radiation dose to the general public as a result of Knolls Laboratory's and Kesselring Site's operations was too small to be measured and, therefore, was estimated using conservative calculational techniques that provide an upper bound on the potential dose. The maximum potential annual dose to an individual off site was less than 0.1 millirem per year (mrem/year). This is less than one percent of the numerical guide established by the NRC for commercial reactor sites to demonstrate that radioactive materials in effluents released to unrestricted areas are as low as reasonably achievable (ALARA). The maximum potential annual dose was also less than 10% of the total radiation a person aboard a commercial airplane would receive from cosmic sources during one coast-to-coast flight. The estimated annual collective dose to the entire population within 80 kilometers (50 miles) of either Knolls Laboratory or Kesselring Site was less than 0.1 person-rem, which corresponds to less than one thousandth of one percent of the dose received by that population from normal background radiation.

In summary, the operations and activities at Knolls Laboratory and Kesselring Site continue to have no adverse effect on human health or the environment.

To improve clarity in this report, the following naming conventions are used:

- Knolls Laboratory refers to the Naval Nuclear Propulsion Program (NNPP) facility in Niskayuna, New York, including DOE-EM activities.
- Kesselring Site refers to the NNPP facility in West Milton, New York, including DOE-EM activities. No DOE-EM work activities occurred at Kesselring Site in 2025.

TABLE 1
KNOLLS LABORATORY RADIOLOGICAL
ENVIRONMENTAL MONITORING PROGRAM

Media Monitored	Analysis Frequency	Routine Analysis
Liquid Effluent		
• Outfall 002	Monthly – Continuous Composite Sample	Gross Alpha, Gross Beta, H-3, Sr-90, Cs-137
• Outfall 03A • Outfall 03D • Outfall 03E	Monthly – Grab Sample	Gross Alpha, Gross Beta, Sr-90
	Monthly Grab Samples taken and combined into a Quarterly Composite for analysis	Cs-137
• Outfall 004 (Lower Level Road Ditch)	Monthly – Grab Sample	Gross Alpha, Gross Beta, Sr-90, Cs-137
• Outfall 03B • West Landfill Stream	Monthly Grab Samples taken and combined into a Quarterly Composite for analysis	Gross Alpha, Gross Beta, Sr-90, Cs-137 if Gross Beta >10 pCi/l
• Upper West Boundary Stream (Background) • Mohawk River – Incoming river water to Lower Level Pumphouse (Outfall 001) (Background)	Monthly – Grab Sample	Gross Alpha, Gross Beta, H-3, Sr-90, Cs-137
• East Boundary Stream (Upper and Lower (Outfall 006)) • Midline Stream (Outfall 005)	Monthly Grab Samples taken and combined into a Quarterly Composite for analysis	Gross Alpha, Gross Beta, Sr-90, Cs-137
• Mohawk Riverbank Seepage	At least annually	If sufficient sample volume: Gross Alpha, Gross Beta, Sr-90, Cs-137
• Sanitary Effluent	Weekly – 24-hour composite sample	Gross Alpha, Gross Beta
	Quarterly Composite of weekly samples	H-3, Co-60, Sr-90, Cs-137, Uranium
Municipal Drinking Water Systems • Schenectady • Niskayuna • Latham/Colonie	Monthly Grab Samples taken and combined into a Quarterly Composite for analysis	Gross Alpha, Gross Beta; Sr-90, Cs-137 if Gross Beta >10 pCi/l
Knolls Laboratory Service Water	Monthly Grab Sample	Gross Alpha, Gross Beta, H-3, Sr-90, Cs-137

TABLE 1 (continued)
KNOLLS LABORATORY RADIOLOGICAL
ENVIRONMENTAL MONITORING PROGRAM

Media Monitored	Analysis Frequency	Routine Analysis
Mohawk River Water		
1000 feet upriver 3000 feet downriver	Second, Third, and Fourth Quarters	Gross Alpha, Gross Beta; Sr-90, Cs-137 if Gross Beta >10 pCi/l
2000 feet upriver 4500 feet downriver	Second, Third, and Fourth Quarters	Gross Alpha, Gross Beta, Sr-90, Cs-137
Mohawk River Sediment	Second, Third, and Fourth Quarters	Gross Beta, Cs-137, Uranium, Plutonium; Sr-90 on seven sediment samples in second quarter sample set only
Mohawk River Fish - Upriver above Lock 8 - Downriver below Outfall 002	Annually	Sr-90, Cs-137, Plutonium
Groundwater	Annually	Gross Alpha, Gross Beta, H-3, Sr-90, Cs-137
Stack Air Effluents		
- Particulate Radioactivity - Radioiodine	Weekly	Gross Alpha, Gross Beta on Filter Papers; Gamma Spectrometry on Charcoal Cartridges
Krypton-85	Continuous	Noble Gas Monitor System
Environmental Air		
Particulate Radioactivity	Weekly	Gross Alpha, Gross Beta on Filter Papers
Radioiodine	Bi-monthly	Gamma Spectrometry on Charcoal Cartridges
Environmental Radiation	Quarterly	Gamma Radiation

TABLE 2
KNOLLS LABORATORY NONRADIOLOGICAL
ENVIRONMENTAL MONITORING PROGRAM

Media Monitored	Analysis Frequency	Routine Analysis
Liquid Effluent		
Outfall 002	Continuous	Flow, Temperature
	Weekly	pH, Total & Net TSS, TDS, Oil & Grease, Total & Net Total Copper (when Copper Ion Generator is in use)
	Quarterly (during calendar years ending in "1" or "6")	WET Testing
Outfall 03B	Continuous	Flow, Temperature
	Weekly	pH, Total & Net Total Copper (when Copper Ion Generator is in use)
	Monthly	Net TSS, Oil & Grease
Outfall 03D	Continuous	Flow, Temperature
	Weekly	pH, Total & Net Total Copper (when Copper Ion Generator is in use)
	Monthly	TSS, Oil & Grease
Outfall 03A	Quarterly	Flow, pH, TSS, Thallium, Oil & Grease
Outfall 03E	Quarterly	Flow, pH, TSS, Oil & Grease
- Outfall 004 - Outfall 005 - Outfall 006	Quarterly	Flow, pH, TSS, Oil & Grease, COD, Chloride, Thallium [Outfall 004 only], VOCs
- East Boundary Stream, Upstream - East Boundary Stream, Downstream (Outfall 006)	Annually concurrent with landfill well sampling	Flow, Temperature, pH, DO, Specific Conductance, VOCs
Mohawk River Upstream (Outfall 001)	Continuous	Flow, Temperature
	Weekly	pH, TSS, TDS, Total Copper (when Copper Ion Generator is in use)
Mohawk River Upstream & Downstream	Quarterly	Chloride
- Supplemental Stormwater Sampling - Outfall 005 - T1 Wet Swale	Rain events >0.5" in 24 hours	COD, Oil & Grease, TSS, Turbidity, VOCs, SVOCs, Metals, Mercury, PCBs, Pesticides, DO, pH, Temperature, Flow
	Quarterly	PFAS and 1,4-Dioxane
Sanitary Effluent	Daily	Flow, pH
	Weekly 24-hour composite	BOD-5, COD, TSS, Ammonia, Nitrate, Nitrite, TKN, Total Organic Nitrogen, Total Nitrogen, Phosphate, Oil & Grease
	Monthly	Flow (Pump run-time based)
	Quarterly	Low Level Mercury
Groundwater		
Landfill Wells	Annually	Field Parameters, VOCs
Land Area Wells	Annually	Field Parameters, Filtered & Unfiltered Metals, Turbidity, VOCs
Hillside and Lower Level Wells	Annually	Field Parameters, VOCs
D3-D6 Area and G1-D4 Alleyway Wells and Catch Basins	Biannually	VOCs

TABLE 3
KESSELRING SITE RADIOLOGICAL
ENVIRONMENTAL MONITORING PROGRAM

Media Monitored	Analysis Frequency	Routine Analysis
Liquid Effluent		
- Retention Basins - Outfalls 001, 002	Monthly Composite Monthly Grab Sample	H-3, Co-60
Glowegee Creek Water	Quarterly	Co-60
Glowegee Creek Sediment	Quarterly	Co-60
Glowegee Creek Fish	Annually	Co-60
Groundwater	Annually	H-3, Co-60, Cs-137
Stack Air Effluents		
Particulate Radioactivity	Bi-monthly	Co-60
Radioiodine	Bi-weekly	I-131
H-3/C-14	Weekly	H-3, C-14
Environmental Air		
Particulate Radioactivity	Bi-monthly	Co-60
Radioiodine	Bi-weekly	I-131
Environmental Radiation	Quarterly	Gamma Radiation

TABLE 4
KESSELRING SITE NONRADIOLOGICAL
ENVIRONMENTAL MONITORING PROGRAM

Media Monitored	Analysis Frequency	Routine Analysis
Liquid Effluent		
- Outfall 001 - Outfall 002	Daily, when discharging from Outfalls 001 and 002	Flow, Temperature, TRC
	Monthly	pH, Oil & Grease, TSS, Nitrite, Total Iron, Total Phosphorus, Total Zinc, Total Boron, Total Sulfite, Ammonia
Outfall 003	Daily	Flow, Settleable Solids, pH, DO, Temperature
	Monthly	Nitrite, Available Cyanide, Ammonia, Total Surfactants (MBAS), Dissolved Copper, BOD-5, TSS, Total Phosphorus, Total Zinc, Total Copper, Total Iron, Total Boron, Total Aluminum, Butyl Benzyl Phthalate
Glowegee Creek Water	Daily, when discharging from Outfalls 001 and 002	Temperature
Glowegee Creek Water	Annually	Species Survey
Groundwater		
Hogback Road Landfill	Annually	Field Parameters, Hardness, Total & Dissolved Metals, Chloride, Nitrate, Sulfate, Alkalinity, Ammonia, COD, TDS, TOC, VOCs
Developed Area	Annually	Field Parameters, VOCs
Drinking Water System		
Head Tank 27B	Annually	Disinfection Byproducts (THM, Haloacetic Acids)
Entry Point to the Distribution System	Daily	Free Chlorine Residual
	Annually	Nitrates
	Every 3 years	Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cyanide, Mercury, Nickel, Selenium, Thallium, Fluoride, Sulfate, Group 1 and 2 Pesticides, Dioxin, PCBs, 1,4-Dioxane, and PFAS
	Every 9 years	Asbestos
Distribution System (various locations)	Minimum three times per month	Total Coliform, Free Chlorine Residual
	Every 3 years	Lead, Copper
Water Source	Every 3 years	Principal Organic Contaminants, Vinyl Chloride, and Methyl Tertiary Butyl Ether

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INTRODUCTION

Knolls Laboratory and Kesselring Site are operated by Fluor Marine Propulsion, LLC (FMP), under contract with the DOE and are both United States Government owned facilities. The principal function at Knolls Laboratory is research and development in the design and operation of naval nuclear propulsion plants. Kesselring Site is dedicated primarily to the training of personnel in the operation of these plants. Knolls Laboratory and Kesselring Site are two of four DOE sites that make up the Naval Nuclear Laboratory (NNL), which refers to the collective operations of these sites performing NNPP work and the personnel operating at these associated locations. All naval nuclear propulsion work has been, and remains, under the sole technical direction of the NNPP, operating initially as an element of the Atomic Energy Commission (AEC) and the Department of the Navy, and later as a DOE and Navy organization.

Since operations began, Knolls Laboratory and Kesselring Site environmental control programs have performed monitoring to demonstrate operations are in accordance with environmental standards. Monitoring results are published annually in reports provided to Federal, State, and local officials. The reports demonstrate that Knolls Laboratory and Kesselring Site monitoring practices meet, and are often stricter than, the requirements of applicable laws and regulations. The monitoring results also confirm compliance with environmental standards, in many cases by a significant margin.

Liquid effluents are monitored at Knolls Laboratory and Kesselring Site for the chemical parameters listed in the applicable State Pollutant Discharge Elimination System (SPDES) permits and for radioactivity. At Knolls Laboratory, the Outside Users Agreement (Reference (1)) with the Town of Niskayuna specifies the chemical parameters and radioactivity required to be monitored in the sanitary sewage effluent. Analyses are also performed on effluent and receiving stream water samples for select chemical parameters, some of which have NYS water quality standards. Additionally, fish, water, and bottom sediment samples from the receiving streams are collected periodically and analyzed for radioactivity.

Nonradiological industrial air emission sources do not require continuous monitoring under the terms of current NYS air regulations due to the combustion fuels used and the very low levels of emissions from overall operations at Knolls Laboratory and Kesselring Site. Airborne effluents from the main radiological emission points are continuously sampled for radioactivity. Other minor radiological emission points are evaluated for their potential for release, and a periodic measurement protocol is used to confirm the low radionuclide emissions. In addition, radiation levels around the perimeter of Knolls Laboratory, Kesselring Site, and at several offsite background locations are monitored with sensitive thermoluminescent dosimeters (TLDs).

The use of chemically hazardous substances at Knolls Laboratory and Kesselring Site is strictly limited to the types and quantities essential for operations. On-site handling of hazardous waste is performed by trained personnel in accordance with applicable regulations and permits. The transportation and disposal of hazardous waste is limited to vendors operating under permits issued by the cognizant Federal and State regulatory agencies. Additionally, all Knolls Laboratory and Kesselring Site personnel receive training on the hazards of chemical substances. Other types of solid waste produced on site, such as cafeteria waste, are disposed of at offsite permitted facilities.

Paper, cardboard, glass, wood, and plastic are also segregated for recycling whenever possible. Scrap metals are recycled through local vendors. Solid radioactive wastes are packaged and shipped from the sites in accordance with all applicable DOT, DOE, and NRC regulations.

Effluent and environmental surveillance programs are conducted at both Knolls Laboratory and Kesselring Site in accordance with applicable DOE Orders to monitor conformance with applicable Federal and State standards and to confirm that operations have no adverse impact on the environment or the public. Numerous programs to reduce the potential for environmental effects from operations at Knolls Laboratory and Kesselring Site have been implemented over the years. Additionally, both sites work to minimize the amount of hazardous waste generated annually. Knolls Laboratory and Kesselring Site policy is to minimize releases to levels that are ALARA. A summary of the year's routine monitoring data for each site is presented and assessed in this report.

Demonstration of compliance with environmental regulations is an integral part of the mission at both Knolls Laboratory and Kesselring Site and is necessary for each site's operations. Federal, State, and local regulatory personnel periodically perform site visits and inspections of Knolls Laboratory and Kesselring Site, which sometimes includes DOE-EM activities. During 2025, five of these visits and/or inspections were performed. A summary of these visits and/or inspections is provided in Table 5. Any questions or deficiencies identified during these visits and/or inspections were immediately addressed or promptly corrected.

SIGNIFICANT ACCOMPLISHMENTS

The technology developed at Knolls Laboratory and Kesselring Site is a critical element of the Nation's defense, making possible the extraordinary capabilities of U.S. nuclear-powered submarines and aircraft carriers that today comprise more than 35% of the Navy's major combatant fleet.

Key achievements at Knolls Laboratory include the development of the sodium-cooled reactor for the original Seawolf, the Nation's second nuclear-powered submarine; development of the dual pressurized water reactor (PWR) propulsion plant for the former submarine Triton; and development of the dual nuclear propulsion plant for the former guided missile cruiser Bainbridge and subsequent nuclear-powered cruisers. Knolls Laboratory has also developed advanced nuclear propulsion plants and long-lived reactor cores for modern nuclear powered ships, including Los Angeles Class attack submarines and Ohio Class ballistic missile submarines. Work continues today on further advances in naval nuclear propulsion technology, including the newest generation attack submarine, the Virginia Class, the next generation aircraft carrier, the Ford Class, and the next generation ballistic missile submarine, the Columbia Class.

Key achievements at Kesselring Site include testing of several subsequent generations of nuclear propulsion plants and training of more than 58,400 nuclear plant operators for the U.S. Navy. The training of naval nuclear operators continues to be one of Kesselring Site's most significant contributions to the National defense.

CONCLUSION

Effective environmental control programs have been in place since operations began at Knolls Laboratory in 1949, and at Kesselring Site in 1954. The objective has always been to meet or exceed the requirements of laws and regulations applicable at the time. The following conclusions are drawn from this report:

- Knolls Laboratory and Kesselring Site's performance in radioactivity control has established and maintained levels of control that are more stringent than applicable requirements.
 - Radiation exposure to any member of the public due to Knolls Laboratory and Kesselring Site operations, which includes DOE-EM operations, is too small to be measurable. The maximum possible annual radiation dose to any member of the public due to Knolls Laboratory, Kesselring Site, and DOE-EM operations can only be calculated using conservative assumptions of radioactivity release and human uptake. Annual calculations show the maximum dose is less than 0.1 mrem/year (one-thirtieth of the radiation received from cosmic radiation sources during a one-way cross-country flight from New York to Seattle). Calculations also show that the total radiation exposure from all operations for a person living continuously next to either Knolls Laboratory or Kesselring Site since operations began, would not exceed 90 millirem (mrem). This is less than an individual receives in four months from natural radiation sources.
 - There are no designated radioactive waste disposal sites at Knolls Laboratory or Kesselring Site. Areas located at both sites had radioactivity releases and incidental radioactive material burial in the early days of operations. Both Knolls Laboratory and Kesselring Site have taken action to remediate most areas where legacy releases or incidental burial occurred. The total amount of radioactivity in those affected areas at Knolls Laboratory is currently estimated to be approximately 0.5 curies (Ci), which is less than the amount of naturally occurring radioactivity in the top 0.5 inch of soil covering an area the size of a typical 18-hole golf course (170 acres) in the Schenectady region. The total amount of radioactivity in the affected areas at Kesselring Site is currently estimated to be less than 0.1 Ci. This is no more than the amount of naturally occurring radioactivity in the top two inches of soil covering an area of equal size to Congress Park in Saratoga Springs, NY (33 acres).
- Knolls Laboratory and Kesselring Site practices for handling chemical waste conform to established regulations. Knolls Laboratory and Kesselring Site have met or exceeded the stringent requirements for waste disposal established by law since the late 1970s. Prior to these regulations, however, chemical waste disposal was carried out in accordance with common industrial practices at the time. Past practices included burial of some chemicals at both Knolls Laboratory and Kesselring Site. The amount buried is estimated at 90 cubic feet per year for Knolls Laboratory and 170 cubic feet per year at Kesselring Site through 1977, when such practices ceased. Because of these practices, several chemical constituents are detectable in groundwater in the immediate vicinity of the historic chemical disposal areas but pose no threat to public health or the environment. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as "Superfund," the EPA conducted an evaluation of the areas containing radioactivity and chemical residues at Knolls Laboratory

and Kesselring Site. At the culmination of the evaluations, the EPA concluded that the environmental significance of these areas is small; therefore, the sites are not listed as Superfund sites on the National Priorities List (NPL). The affected groundwater at Knolls Laboratory is limited in extent and is not migrating off site. In addition, no detectable changes have been found in on-site stream samples or beyond Knolls Laboratory's boundary in the Mohawk River water. No significant concentration of toxic solvents or chemicals has been detected at Kesselring Site in wells that monitor areas where chemicals were buried.

- To promote environmental stewardship at both Knolls Laboratory and Kesselring Site, DOE-EM continues to remove legacy facilities and remediate environmental liabilities. This includes establishment of agreements with various government entities to move these efforts forward.
- Knolls Laboratory and Kesselring Site environmental programs are subject to periodic in-depth inspections by NNPP representatives of the DOE (formerly the AEC and then the Energy Research and Development Agency), and Federal and State agencies. Inspections consistently find Knolls Laboratory and Kesselring Site operations comply with all substantive requirements.

In over seven decades of operation, there have been no significant impacts from Knolls Laboratory or Kesselring Site operations on the environment or adverse effects on the community or the public. Both Knolls Laboratory and Kesselring Site have well-defined environmental programs in place to monitor current operations and address the results of past activities, which occurred when regulations and common industrial practices were less stringent.

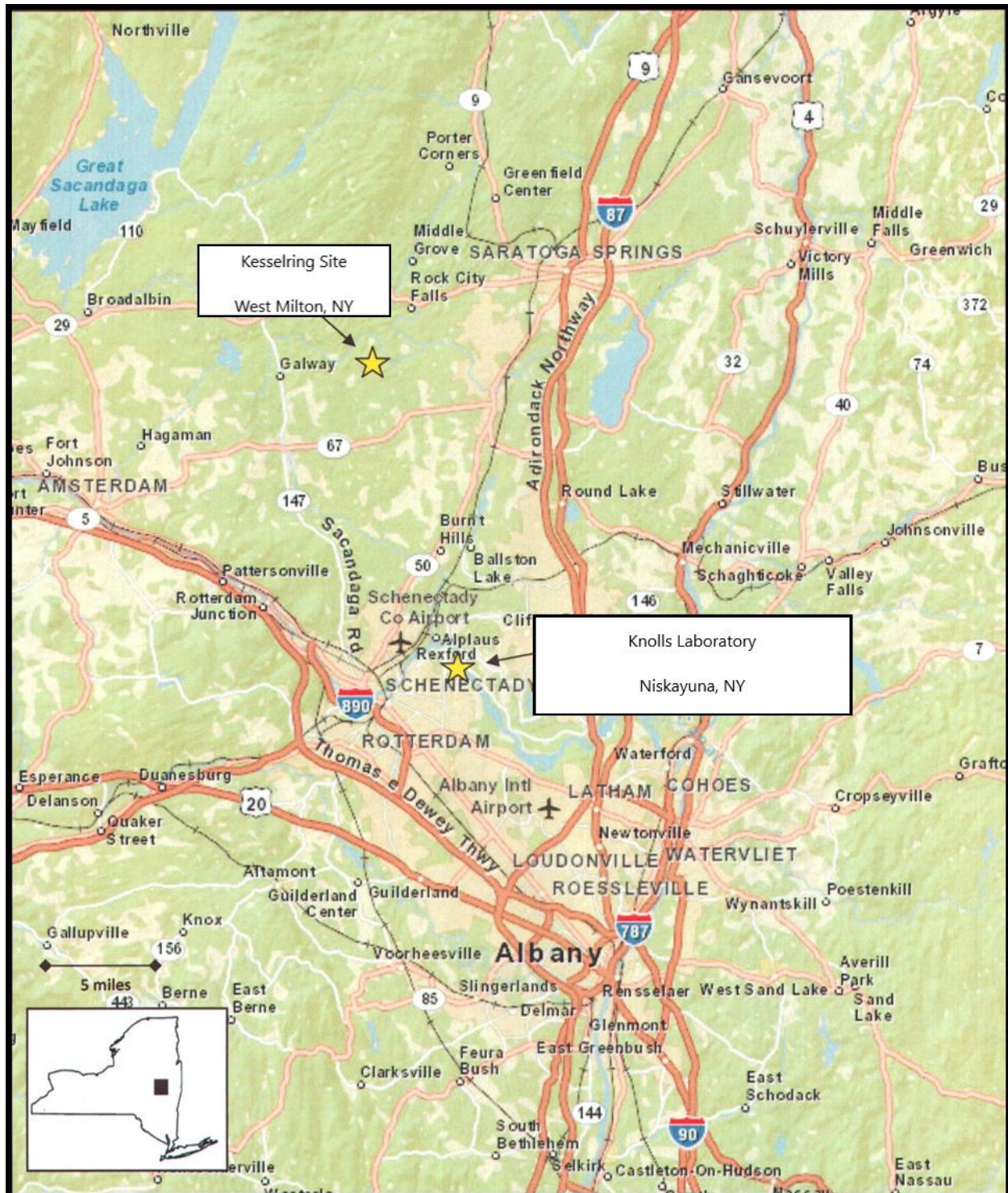


FIGURE 1
KNOLLS LABORATORY AND KESSELRING SITE LOCATIONS
IN RELATION TO THE SURROUNDING COMMUNITIES

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ENVIRONMENTAL PROGRAM & COMPLIANCE

ENVIRONMENTAL PROGRAM

Policy

Knolls Laboratory and Kesselring Site are committed to conducting operations and activities in a manner that provides and maintains safe and healthful working conditions, protects the environment and surrounding communities, and conserves natural resources. Knolls Laboratory and Kesselring Site are committed to environmental excellence through compliance with applicable Federal, State, and local regulations; proactive planning to integrate sound environmental, safety, and health (ESH) principles into every aspect of operations, including hazard identification and risk assessment; and a commitment to waste minimization and pollution prevention.

Objectives

The objectives of the environmental monitoring programs are to:

- Demonstrate compliance with regulatory requirements,
- Demonstrate that operations do not significantly impact the environment,
- Confirm the effectiveness of control methods in preventing increases in environmental radioactivity levels,
- Confirm that the potential radiation exposure received by a member of the public is insignificant compared to the dose received from natural background radioactivity,
- Provide accurate monitoring results to applicable Federal, State, and local officials and to the general public, and
- Maintain an accurate record of effluent releases to the environment from Knolls Laboratory and Kesselring Site.

Organization

Knolls Laboratory and Kesselring Site employ environmental staff professionals to ensure environmental responsibilities are met while also fulfilling the mission of each site. Despite having distinct ESH organizations, Knolls Laboratory and Kesselring Site collaborate to optimize expertise, standardize practices, and share best practices. These organizations are responsible for identifying, interpreting, and communicating ESH requirements to facility personnel for implementation; assisting other Knolls Laboratory and Kesselring Site organizations in meeting their ESH responsibilities; interfacing with DOE-EM ESH organizations; monitoring ESH activities for compliance; interfacing with regulatory agencies; and completing required regulatory reports.

ENVIRONMENTAL, SAFETY, AND HEALTH MANAGEMENT SYSTEM (ESHMS)

The NNL ESHMS documents the management processes and systems to perform work in a manner protective of employees, the public, and the environment, while ensuring regulatory compliance. Environmental performance objectives, performance targets, and deliverables are prepared and reviewed annually. The management processes and systems are used to identify, communicate, implement, assess, and update environmental programs.

ENVIRONMENTAL COMPLIANCE

Demonstration of compliance with environmental regulations is an integral part of Knolls Laboratory and Kesselring Site missions and is necessary for successful site operations. Federal and State regulatory personnel periodically perform site visits and inspections of Knolls Laboratory and Kesselring Site, which sometimes includes DOE-EM activities. Table 5 depicts a list of the visits and inspections that occurred from 2021 to 2025.

TABLE 5
SUMMARY OF VISITS & INSPECTIONS BY REGULATORY AGENCIES

KNOLLS LABORATORY		
Date	Purpose	Regulatory Agency
10/07/25	Annual Stormwater Inspection and Q-Complex Below Grade Activities	NYSDEC – Region 4
04/22/25	Annual SPDES Inspection	NYSDEC – Region 4
04/14/25	EPA RCRA Inspection	EPA – Region 2
12/19/24	Spill Engineer Visit	NYSDEC – Region 4
08/26/24	Stormwater Inspection and Q-Complex Below Grade Activities SWPPP Approval	NYSDEC – Region 4
04/25/24	EPA RCRA Inspection	EPA – Region 2
04/11/24	Annual SPDES Inspection	NYSDEC – Region 4
02/02/24	Observation of Q-Complex Well Decommissioning	NYSDEC – Central Office
10/19/23	Q-Complex RCRA Corrective Action and SPDES Inspection	NYSDEC – Central Office and Region 4
06/23/23	Q-Complex RCRA Corrective Action and SPDES Inspection	NYSDEC – Central Office and Region 4
05/11/23	NYSDEC RCRA Inspection	NYSDEC – Central Office
04/27/23	Annual SPDES Inspection	NYSDEC – Region 4
05/19/22	Annual SPDES Inspection	NYSDEC – Region 4
05/04/22	EPA RCRA Inspection	EPA – Region 2
06/23/21	NYSDEC RCRA Permit Renewal Meeting	NYSDEC – Central Office
05/20/21	Annual SPDES Inspection	NYSDEC – Region 4
04/01/21	NYSDEC RCRA Inspection	NYSDEC – Central Office

Notes for Table 5 are on page 17.

TABLE 5 (continued)
SUMMARY OF VISITS & INSPECTIONS BY REGULATORY AGENCIES

KESSELRING SITE⁽¹⁾		
Date	Purpose	Regulatory Agency
07/17/25	Air Program Review	NYSDEC – Region 5
01/23/25	NYSDEC RCRA Inspection	NYSDEC – Central Office
05/02/24	SWTF Tour	Saratoga County Sewer District
01/10/24	Annual SPDES Inspection	NYSDEC – Region 5
12/06/23	EPA RCRA Inspection	EPA
12/12/22	NYSDEC RCRA Inspection	NYSDEC – Central Office
09/27/22	NYSDEC RCRA Permit Renewal Meeting	NYSDEC – Region 5
04/26/22	Wetlands Review	USACE – NY District
03/30/22	Drinking Water Sanitary Inspection	NYSDOH
12/17/21	NYSDEC RCRA Inspection	NYSDEC – Central Office
07/29/21	NYSDEC CBS and PBS Inspection	NYSDEC – Region 5
03/17/21	Annual SPDES Inspection	NYSDEC – Region 5
SPRU AND OTHER DOE-EM ACTIVITIES⁽²⁾		
Date	Purpose	Regulatory Agency
10/07/25	Annual Stormwater Inspection and Q-Complex Below Grade Activities	NYSDEC – Region 4
04/14/25	EPA RCRA Inspection	EPA – Region 2
08/26/24	Stormwater Inspection and Q-Complex Below Grade Activities SWPPP Approval	NYSDEC – Region 4
04/11/24	Annual SPDES Inspection	NYSDEC – Region 4
02/02/24	Observation of Q-Complex Well Decommissioning	NYSDEC – Central Office
11/13/23	NYSDEC SPRU RCRA Permit Renewal Meeting	NYSDEC – Central Office
10/19/23	Q-Complex RCRA Corrective Action and SPDES Inspection	NYSDEC – Central Office and Region 4
06/23/23	Q-Complex RCRA Corrective Action and SPDES Inspection	NYSDEC – Central Office and Region 4

Notes:

1. NYSDEC did not perform annual SPDES inspections at Kesselring Site (KS) during calendar years 2022, 2023, or 2025.
2. No inspections or regulatory visits were performed for DOE-EM activities in 2021 and 2022.

Any questions or deficiencies identified during these visits and/or inspections were immediately addressed or promptly corrected. Over 90 periodic environmentally related reports were filed with Federal, State, and local agencies during 2025.

Table 6 shows Knolls Laboratory, Kesselring Site, and DOE-EM environmental permits, registrations, or agreements in effect during 2025 that were issued from regulatory agencies for specific facilities or operations. NYS General Permits for Stormwater Discharges implemented by Knolls Laboratory or Kesselring Site for construction projects one acre or greater or for work

in wetlands or streams are not included in Table 6 if their duration was less than one year. However, in Table 6, Knolls Laboratory includes the Municipal Separate Storm Sewer System (MS4) Permit that covers day-to-day operations with regard to stormwater management.

TABLE 6
KNOLLS LABORATORY, KESSELRING SITE,
AND DOE-EM ENVIRONMENTAL PERMITS

Permit Number	Permit Type	Issuing Agency	In Compliance	Expiration Date	Other Information
KNOLLS LABORATORY					
NY0005851	SPDES	NYSDEC	Yes	07/31/30 ⁽¹⁾	Site Outfalls
4-4224-00024/00052	Water Withdrawal	NYSDEC	Yes	09/23/35 ⁽²⁾	Initial Water Withdrawal Permit
94 3850	Sanitary	Town of Niskayuna	Yes	None	Outside Users Agreement (Reference (1)) for Sanitary Sewer Service
GP-0-24-001	SPDES	NYSDEC	Yes	01/02/29	MS4 General Permit Knolls Laboratory ID# NYR20A026
GP-0-25-001	SPDES	NYSDEC	Yes	01/28/30 ⁽³⁾	Construction General Permit - Clean Soil Management Areas ⁽⁴⁾ II (ID# NYR10H590), III (ID# NYR10N657), IV (ID# NYR10T230); NE Civil Utilities (ID# NYR11F131); Steam Piping and Hillside Roadway (ID# NYR11N727) ⁽⁵⁾
4-4224-00024/00001	RCRA	NYSDEC	Yes	09/04/34	RCRA Waste (EPA ID NY6890008992)
4-4224-00024/00039 Mod 4	ASFP	NYSDEC	Yes	None	Heating Boilers and ASGTF
4-443417	PBSF	NYSDEC	Yes	08/23/28	Oil Storage
KAPL-2012-003	RAE	EPA Region 2	Yes	None	Bldg. D3 Ventilation Duct Removal
C-OC-201800134	Use & Occupancy Permit	NYSCC	Yes	None	L4 Pump House Cooling Water Intake Screen
C-WK-202500079	Canal Work	NYSCC	Yes	12/31/25	Mohawk River Sampling
KESSELRING SITE					
NY0005843	SPDES	NYSDEC	Yes	08/31/28	Site Outfalls
GP-0-25-001	SPDES	NYSDEC	Yes	01/28/30 ⁽³⁾	Clean Soil Management Area (ID# NYR11H979)
5-4142-00005/00090	Water Withdrawal	NYSDEC	Yes	08/07/35	Water Withdrawal Permit
5-4142-00005/00049	RCRA	NYSDEC	Yes	12/12/23 ⁽⁶⁾	RCRA Waste (EPA ID NY5890008993)

Notes for Table 6 are on page 19.

TABLE 6 (continued)
KNOLLS LABORATORY, KESSELRING SITE,
AND DOE-EM ENVIRONMENTAL PERMITS

Permit Number	Permit Type	Issuing Agency	In Compliance	Expiration Date	Other Information
5-4142-00005/00073	Air Facility Registration	NYSDEC	Yes	07/08/35	Heating Boilers and Air Compressor
5-000070	Chemical Bulk Storage Facility	NYSDEC	Yes	07/19/27	Chemical Storage
5-414506	PBSF	NYSDEC	Yes	08/17/27	Oil Storage
KAPL-788-01	RAE	EPA Region 2	Yes	None	Radiological Work Facility
A-05	Wastewater Sludge	Saratoga County Sewer District #1	Yes	12/31/26	SWTF Sludge Disposal
GR-042-4	Grease Trap Disposal	Saratoga County Sewer District #1	Yes	12/31/25 ⁽⁷⁾	Cafeteria Grease Trap Disposal
09NY09104001	Underground Injection Control	EPA Region 2	Yes	None	Underground Injection Control Site Registration
DOE-EM Activities (Including SPRU)					
4-4224-00024/00055	RCRA	NYSDEC	Yes	09/04/34	RCRA Waste (EPA ID NYR000096859)

Notes:

1. The Knolls Atomic Power Laboratory SPDES Permit was renewed by NYSDEC effective August 1, 2025.
2. The Knolls Atomic Power Laboratory Water Withdrawal Permit was renewed by NYSDEC effective September 24, 2025.
3. NYSDEC issued GP-0-25-001 on January 29, 2025, which replaced GP-0-20-001. The updated permit required all active projects to file a Request to Continue Coverage within 30 days of the effective date of the permit. A Request to Continue Coverage was submitted to NYSDEC on February 28, 2025, for the Clean Soil Management IV, NE Civil Utilities, and Steam Piping and Hillside Roadway projects. A Request to Continue Coverage was submitted to NYSDEC on February 26, 2025, for the KS Clean Soil Management Area.
4. The Notice of Terminations for Clean Soil Management Areas II and III were submitted to NYSDEC on February 28, 2025.
5. The Notice of Intent for the Steam Piping and Hillside Roadway was submitted to NYSDEC on January 17, 2025.
6. The KS Part 373 Permit Renewal Application was submitted to NYSDEC on June 15, 2023. NYSDEC requested Naval Reactors Laboratory Field Office (NRLFO) agreement to an extension of statutory review timeframes on December 7, 2023. Subsequently, NYSDEC requested NRLFO agreement to an additional extension of statutory review timeframes on December 1, 2025. Current permit is under State Uniform Procedures Act (UPA) extension.
7. Grease is currently being transported from Kesselring Site to the Albany County Wastewater Treatment Plant, which does not require a permit. Saratoga County no longer issues paper Grease Trap Permits.

A description of Knolls Laboratory's and Kesselring Site's compliance with key environmental regulations is provided in the proceeding pages. Information on DOE-EM activities' compliance is also provided, where applicable.

Clean Water Act (CWA)

The Federal CWA and the NYS Environmental Conservation Law (ECL) regulate the chemical components and physical attributes of liquids discharged to the surface waters of the State of New York. Specifically, Knolls Laboratory and Kesselring Site effluent and environmental standards are established in site-specific SPDES Permits issued by NYSDEC. NYS water quality standards applicable to the Mohawk River and Glowegee Creek are given in Reference (2). NYSDEC renewed the Knolls Laboratory SPDES permit in 2025, which became effective on August 1, 2025. NYSDEC renewed the Kesselring Site SPDES permit in 2023, which became effective on

September 1, 2023. Renewed permits are generally in effect for five years. The Kesselring Site SPDES permit was modified in December 2024 to remove influent sampling requirements for Total Suspended Solids (TSS) from Outfall 002, which was inadvertently included in a previous modification.

Constituents of Knolls Laboratory sewage are regulated by an Outside Users Agreement (Reference (1)) with the Town of Niskayuna.

During 2025, Knolls Laboratory experienced zero SPDES noncompliance events as summarized in Table 7. Kesselring Site experienced one SPDES noncompliance event as summarized in Table 8.

NYS implements the EPA Phase II Stormwater regulations under the SPDES program through two stormwater general permits applicable to Knolls Laboratory and Kesselring Site. The versions in effect during this reporting period were GP-0-20-001 (General Permit for Stormwater Discharges from Construction Activities, expired on January 28, 2025), GP-0-25-001 (General Permit for Stormwater Discharges from Construction Activities, effective date January 29, 2025) and GP-0-24-001 (MS4 General Permit). Kesselring Site received an MS4 General Permit waiver from NYSDEC in May 2023 because the site's stormwater discharges are no longer subject to permitting. The Construction Stormwater permit requires Knolls Laboratory, Kesselring Site, and DOE-EM to process Notices of Intent to participate in the NYSDEC's Stormwater general permitting program for sites disturbing one acre or greater of soil. Participation in this general permit also requires preparation of project-specific Stormwater Pollution Prevention Plans (SWPPPs). The MS4 general permit is applicable to Knolls Laboratory and participating requires preparation and management of a Stormwater Management Program. In addition to certain administrative documentation requirements listed in each permit, the SPDES general permit for construction activities requires an inspection of the project site at least once every seven days. Post-rainfall inspections are required for specific erosion and sediment control practices.

TABLE 7
KNOLLS LABORATORY SPDES NONCOMPLIANCES

Permit Type	Outfall	Parameter	# of Noncompliances	# of Samples	# of Compliant Samples	Percent Compliance	Date(s)	Description/ Solution
NA	NA	NA	None	NA	NA	NA	NA	NA

TABLE 8
KESSELRING SITE SPDES NONCOMPLIANCES

Permit Type	Outfall	Parameter	# of Noncompliances	# of Samples	# of Compliant Samples	Percent Compliance	Date(s)	Description/ Solution
SPDES	001/002	Downstream Temperature	1	2	294	99	03/17/25	See Note 1

Notes:

- On March 17, 2025, due to significant rainfall the previous day, flooding occurred causing the Glowegee Creek to rise above the Outfall 001/002 Parshall flumes and made upstream temperature monitoring inaccessible. Downstream temperature locations were accessible but were not sampled during discharge as required in the permit. KS notified NYSDEC and included a Record of Non-Compliance Event with the March 2025 Discharge Monitoring Report submission. KS corrective actions initiated administrative protocols to better clarify the actions to take during instances of flooding that will emphasize the importance of collecting all valid permit required data measurements that can be collected safely.

Clean Air Act (CAA)

The Federal CAA and its amendments provide the regulatory basis for the following:

- Protection of ambient air quality;
- Control and reduction in the emissions of the pollutants carbon monoxide (CO), particulate matter, and those compounds that contribute to the formation of ground-level ozone (i.e., Volatile Organic Compounds (VOCs) and nitrogen oxides (NO_x)) and global warming (i.e., greenhouse gases);
- Control and reduction of pollutants likely to increase the risk of death or serious illness;
- Control and prevention of accidental releases of regulated hazardous air pollutants or any other extremely hazardous substances (EHSs);
- Control of the principal contributors to acid rain and other forms of acid deposition (i.e., sulfur dioxide (SO₂) and NO_x);
- Protection of stratospheric ozone; and
- A mandated Federal permitting program (Title V) for major air emission sources.

The regulatory authority for the majority of the CAA regulations that affect Knolls Laboratory and Kesselring Site has been delegated by the EPA to NYSDEC. The Federal regulations which currently affect Knolls Laboratory and Kesselring Site that have not yet been implemented by NYS, but require report submittals, recordkeeping, or operation and maintenance activity tracking are: “Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units” (40 CFR Part 60 – Subpart Dc); “National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources” (40 CFR Part 63 – Subpart JJJJJ); “National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities” (40 CFR Part 61 – Subpart H); “National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines” (40 CFR

Part 63 – Subpart ZZZZ); “Standards of Performance for Stationary Compression Ignition Internal Combustion Engines” (40 CFR Part 60 – Subpart IIII); “General Compliance Provisions for Highway, Stationary, and Nonroad Programs” (40 CFR Part 1068); “Protection of Stratospheric Ozone” (40 CFR Part 82); “Phasedown of Hydrofluorocarbons” (40 CFR Part 84); and “Mandatory Greenhouse Gas Reporting” (40 CFR Part 98). For these regulations, the EPA retains regulatory authority.

Knolls Laboratory and Kesselring Site are subject to numerous NYSDEC regulations under 6 New York Codes, Rules and Regulations (NYCRR) that govern air emissions and the operation of combustion sources at each site. The major applicable regulations include: Subpart 225-1 - Fuel Composition and Use - Sulfur Limitations; Subpart 228-2 - Commercial and Industrial Adhesives, and Sealants and Primers; Part 205 - Architectural and Industrial Maintenance Coatings; Part 253 - Mandatory Greenhouse Gas Reporting Program; Part 494 - Hydrofluorocarbon Standards and Reporting; and Part 495 - Sulfur Hexafluoride Standards and Reporting. These regulations were developed to either ban the usage or limit the impact of industrial pollutant and greenhouse gas emissions on the environment.

A number of air emission sources at both Knolls Laboratory and Kesselring Site, such as site heating boilers, are regulated under the NYSDEC Air Permitting/Registration Program (see Table 6). Both Knolls Laboratory heating boilers and the Advanced Steam Generator Test Facility (ASGTF) water heaters are permitted under a NYSDEC Air State Facility Permit (ASFP), renewed in January 2010, which is still in effect. One of the two ASGTF water heaters, procured after June 9, 1989, is also regulated by the EPA under 40 CFR Part 60 – Subpart Dc. Both ASGTF units are in long-term layup.

The ASFP for Knolls Laboratory heating boilers has federally enforceable capping provisions that allow the heating boilers to be classified as synthetic minor sources. As such, Knolls Laboratory does not require a Title V facility permit, which normally applies to major sources under the CAA.

For 2025, Knolls Laboratory refined the air emissions tracking program for Research and Development Activities as required under 6 NYCRR Part 201-1.16. Emissions data are collected and tracked on a rolling 12-month basis, and Safety Data Sheets (SDSs) for products emitted to the atmosphere are maintained. To date, the rolling 12-month emissions have not caused the Knolls Laboratory to exceed the Title V facility thresholds or the current established air emissions cap limits listed in the ASFP.

Kesselring Site maintains a NYSDEC Air Facility Registration for three heating boilers and one portable air compressor. The facility has the potential to emit NO_x and CO in excess of Title V thresholds and has elected to limit its emissions under NYSDEC’s cap-by-rule provisions.

During 2025, the air emission sources listed in Table 6 were operated in accordance with applicable permit or facility registration conditions.

Other nonradiological air emission sources that do not require NYS permits or registrations at Knolls Laboratory and Kesselring Site either come under an exemption for ventilating and

exhausts from laboratory operations, NESHAP minor source exemptions presently in effect, or are considered as exempt or trivial activities under NYS regulations.

The EPA, under 40 CFR Part 61 Subpart H, regulates radionuclide air emission sources at Knolls Laboratory and Kesselring Site. During 2025, the maximally exposed individual effective dose equivalent, calculated using the EPA computer code CAP88-PC, was less than 0.1 mrem for Knolls Laboratory and Kesselring Site. This is less than one percent of the 10 mrem/year EPA standard. Annual radionuclide air emission reports are provided to the EPA and NYSDEC, as required by the regulations.

Resource Conservation and Recovery Act (RCRA)

The Federal RCRA and the NYS ECL address the safe disposal of municipal and industrial solid and hazardous waste. RCRA, like most environmental legislation, encourages States to develop their own hazardous waste programs as an alternative to direct implementation of the Federal program. To this end, the EPA delegates its authority to NYSDEC for all aspects of RCRA, with the exception of a few specific portions associated with the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA.

During 2025, Knolls Laboratory and Kesselring Site continued to operate as both hazardous waste generators and permitted storage facilities. In this latter instance, Knolls Laboratory and Kesselring Site received their original NYSDEC, 6 NYCRR Part 373, hazardous waste management permits in July 1998 and June 1995, respectively. As such, both Knolls Laboratory and Kesselring Site must follow specific requirements for handling and accumulation of hazardous waste under applicable NYS regulations, as well as the conditions for storage of such waste under their respective State-issued hazardous waste management permits. Hazardous waste management permits are generally in effect for 10 years. The Knolls Laboratory permit was most recently renewed on September 5, 2024. The Kesselring Site permit was first renewed on December 13, 2013. A second permit application was submitted to NYSDEC on June 15, 2023. On December 8, 2023, and again on December 1, 2025, NRLFO agreed with NYSDEC's requests to extend the statutory review timeframe for two years for the application as provided under 6 NYCRR Part 621. The existing permit is currently in effect under a State UPA extension. Representatives from the EPA and/or NYSDEC inspect both Knolls Laboratory and Kesselring Site annually for compliance.

DOE-EM personnel and contractors manage universal/hazardous/mixed waste in accordance with 6 NYCRR Parts 370-373, Part 376, and Part 374-3 regulations, as applicable, and ship waste to permitted Treatment, Storage, and Disposal Facilities (TSDFs). DOE-EM is temporarily storing mixed transuranic (MTRU) waste at Knolls Laboratory under a DOE-EM 6 NYCRR Part 373 Hazardous Waste Management Permit issued on September 5, 2024.

RCRA Corrective Action Program

The 1984 HSWA to RCRA expanded EPA's authority to require TSDFs to conduct corrective action for releases from a facility. Under this section of RCRA, the EPA or an authorized State must require corrective action for all releases of hazardous waste or constituents from any solid

waste management unit at a TSDF seeking a permit under RCRA, regardless of the time at which the waste was placed in such units. The regulations implementing this section of RCRA define the term Solid Waste Management Unit (SWMU) to include: any discernible unit at which solid waste has 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 waste has been routinely and systematically released.

NYSDEC was granted authority by the EPA to manage their own RCRA Section 3004(u) Corrective Action Program via the NYS ECL. Knolls Laboratory and Kesselring Site 6 NYCRR Part 373 hazardous waste management permits require each site to pursue facility characterization and corrective action, if necessary. In addition to the SWMUs included in each of the permits, NYS also established Areas of Concern (AOCs). An AOC is an area that is not at this time known to be a SWMU, where hazardous waste and/or hazardous constituents are present, or are suspected to be present as a result of a release from the facility. The term includes areas of potential or suspected contamination, as well as actual contamination. Such areas may require study and a determination of what, if any, corrective action may be necessary. Areas where historical petroleum or chemical spills have been identified were reported to appropriate regulatory authorities. These areas have been remediated or will be in the future to meet NYS requirements.

Knolls Laboratory and Kesselring Site are performing RCRA corrective action efforts under the oversight of NYSDEC. Each site has several areas where historical releases of hazardous chemicals require sampling and potential remedial action. Reports of sample analytical results and actions taken are submitted for NYSDEC approval as they are accomplished, in accordance with established schedules.

DOE-EM performs RCRA corrective actions in accordance with DOE-EM 6 NYCRR Part 373 Permit No. 4-4224-00024/00055 under NYSDEC's authority.

Federal Facility Compliance Act (FFCA)

The FFCA was signed into law in October 1992 as an amendment to the Solid Waste Disposal Act (SWDA). The FFCA applies certain requirements and sanctions of RCRA to Federal facilities. In short, the FFCA waives sovereign immunity for Federal facilities from all civil and administrative penalties and fines; this includes waivers for both coercive and punitive sanctions for violations of the SWDA. Relative to mixed waste, the FFCA mandates the development and Federal/State approval of Site Treatment Plans (STPs) that contain schedules for developing treatment capabilities and for treating mixed wastes subject to the Land Disposal Restrictions of 40 CFR Part 268 and 6 NYCRR Part 376.

NRLFO and the NYSDEC signed Administrative Consent Orders in October 1995 to establish commitments regarding compliance with the approved STPs for mixed wastes stored and generated at Knolls Laboratory and Kesselring Site. NRLFO and NYSDEC terminated Kesselring Site's Administrative Consent Order in August 2009 because the requirements and milestones established in the Kesselring Site STP had all been completed. In compliance with Knolls Laboratory's Order, the STP is updated annually and issued to NYSDEC by June 30 each year, as

needed. Knolls Laboratory STP has met all its milestones with the exception of the MTRU remote handled waste stream, which has yet to be generated.

Waste Minimization, Pollution Prevention, and Recycling Programs

Knolls Laboratory and Kesselring Site waste minimization and pollution prevention programs promote the concepts below by encouraging employees to reduce the initial use of hazardous materials, energy, water, and other resources while protecting existing resources through conservation and more efficient use. The program focuses mainly on process efficiency improvements; source reduction; inventory control; preventive maintenance; improved housekeeping; recycling; and increasing employee awareness of, and participation in, pollution prevention.

The goal of the Pollution Prevention Program is to minimize the quantity and toxicity of waste generated at its source and, if waste is generated, to ensure that the treatment and disposal method used minimizes the present and future threat to people and the environment. The program consists of the following elements:

- Control of chemical acquisitions, including type and quantity;
- Maximize use of on-hand chemicals;
- Minimize production of process wastes (source reduction); and
- Process evaluation and modification.

Knolls Laboratory and Kesselring Site ensure that pollution prevention strategies are met by reviewing chemical purchases and major construction projects to incorporate source reduction strategies for environmentally hazardous substances.

Consistent with the NNL ESHMS, which serves as the foundation of both Knolls Laboratory and Kesselring Site environmental management programs, both facilities established and implemented a sustainable acquisition program.

Progress in sustainable acquisition is reported annually to the DOE via the DOE Sustainability Dashboard, formerly the Consolidated Energy Data Report. Sustainable acquisition maximizes the amounts of material procured that contain recycled material. Environmentally preferable items reported in Knolls Laboratory and Kesselring Site programs include, but are not limited to: paper and paper products, vehicular products (e.g., engine coolants, oils), construction (e.g., insulation, carpet, concrete, paint) and transportation products (e.g., traffic barricades, traffic cones), park and recreation products, landscaping products, non-paper office products (e.g., binders, toner cartridges, office furniture), and miscellaneous products (e.g., pallets, sorbents, and industrial drums).

Knolls Laboratory and Kesselring Site facilities both maintain an extensive recycling program, which includes unclassified office paper, glass, tin, aluminum, newspapers, magazines, plastic, cardboard, wood, asphalt, lead/lead acid batteries, concrete, precious metals, computers, metal and plastic drums, cafeteria grease, used oil, and universal waste (e.g., light bulbs, batteries, thermostats). The facilities recycled approximately 68% of their waste streams in 2025.

Knolls Laboratory and Kesselring Site strive to reduce or eliminate the acquisition, use, and release of toxic and hazardous chemicals and materials and to maximize the acquisition and use of environmentally preferable products in the conduct of operations.

Toxic Substances Control Act (TSCA)

The U.S. Congress enacted TSCA in 1976. TSCA authorizes EPA to secure information on all new and existing chemical substances and to control any of these substances determined to cause an unreasonable risk to public health or the environment. Unlike many other environmental laws, which generally govern discharge of substances, TSCA requires that the health and environmental effects be reviewed prior to a new chemical substance being manufactured for commercial use. TSCA, therefore, closes the gap in environmental regulations by allowing the EPA to prevent toxic chemical problems from being created rather than simply reacting to them after discharge. However, because Knolls Laboratory and Kesselring Site do not manufacture chemicals or materials for commercial use, a majority of the TSCA regulations do not apply.

Polychlorinated biphenyls (PCBs) are regulated as a toxic substance under TSCA by means of 40 CFR Part 761. PCBs were used prior to 1979 mainly as a dielectric fluid in electrical equipment, such as transformers and capacitors. PCBs were also added to certain surface coatings and other non-liquid materials due to their heat and chemical resistance. Knolls Laboratory and Kesselring Site have identified PCBs in materials, such as small electrical transformers, fluorescent light ballasts, applied dried paints, lubricants/machine oils, and electrical cable insulation. Knolls Laboratory and Kesselring Site have removed all large PCB transformers from their sites and continue to remove and replace suspected PCB fluorescent light ballasts, where practical. Additionally, both Knolls Laboratory and Kesselring Site employ strict controls for removal, storage, and disposal of remaining PCB containing items. Similarly, DOE-EM manages PCBs in accordance with the requirements of TSCA under 40 CFR Part 761.

CERCLA

The Federal CERCLA, or Superfund, was designed to respond to situations involving the past disposal of hazardous substances. As such, it complements RCRA, which regulates on-going hazardous waste handling and disposal.

The NPL is an important facet of CERCLA's response procedures and is updated annually to list sites warranting evaluation and/or cleanup under CERCLA. Neither Knolls Laboratory nor Kesselring Site are currently included on the NPL, as determined by EPA Region 2 in May 1994.

Emergency Planning and Community Right-to-Know Act (EPCRA)

The Federal EPCRA establishes authorities for emergency planning and preparedness, emergency release notification reporting, community right-to-know reporting, and toxic chemical release reporting. Under the provisions of this Act, covered facilities must provide the following information to State and local entities: the name of the individual who will function as a Facility Emergency Coordinator, notice that certain applicable substances (e.g., EHSs on site above certain threshold planning quantities) are present at that facility and, when required, report releases of

those substances and other listed hazardous substances in excess of certain reportable quantities. Additionally, EPCRA requires that facilities prepare and submit, or retain on file, the information listed in the following EPCRA Sections below, which are codified under 40 CFR Parts 370 and 372:

- § 302-303 Provide initial notification to State Emergency Response Commission (SERC), Local Emergency Planning Committees (LEPCs), and local fire departments that the facility is subject to the emergency planning requirements under EPCRA.
- § 304 Facilities must immediately notify the LEPC and the SERC if there is a release to the environment of a hazardous substance that is equal to or exceeds the minimum reportable quantity set in the regulations.
- § 311 The submission of Material Safety Data Sheets or SDSs for EHSs stored on site in quantities greater than the threshold planning quantity or any substance stored on site greater than 10,000 pounds for which a potential exposure to an employee exists. Updated SDSs are to be submitted within three months of discovery of significant new information about the hazardous chemicals/substances.
- § 312 Complete an annual Tier Two Emergency and Hazardous Chemical Inventory Report for EHSs and hazardous chemicals/substances present at each site in excess of specified quantities during the previous calendar year. The information is submitted to the SERC, LEPCs, and local fire departments for emergency planning purposes.
- § 313 Complete an annual evaluation of activities associated with the manufacturing, processing, or otherwise use of any of the listed toxic chemicals above the designated activity thresholds; and where necessary, prepare a Toxic Release Inventory (TRI) report for submittal to EPA.

The status summary of Knolls Laboratory, Kesselring Site, and DOE-EM EPCRA reporting is shown in Tables 9 and 10. No EPCRA reportable releases occurred from any of the sites in 2025 and none of the sites were required to submit TRI reports under Section 313 for the 2024 reporting year. Reports are filed in the year following the reporting year's activities (e.g., 2024 activities are reported in 2025).

TABLE 9
KNOLLS LABORATORY & KESSELRING SITE EPCRA REPORTING

EPCRA Section	Description of Reporting	Status
EPCRA § 302-303	Planning Notification	No notifications required during calendar year 2025.
EPCRA § 304	Emergency Release Notification	No EPCRA reportable releases during 2025.
EPCRA § 311-312	SDS Submittal / Tier Two Emergency and Hazardous Chemical Inventory Reporting	Knolls Laboratory made new SDS submittals during calendar year 2025.
		The Emergency and Hazardous Chemical Inventory (Tier Two) Reports for calendar year 2024 were filed in 2025 using E-Plan, an electronic reporting system approved for use by the New York SERC for Tier Two Reporting.
EPCRA § 313	TRI Reporting	Not required for the 2024 reporting year.

TABLE 10
DOE-EM EPCRA REPORTING

EPCRA Section	Description of Reporting	Status
EPCRA § 302-303	Planning Notification	No notifications required during calendar year 2025.
EPCRA § 304	Emergency Release Notification	No EPCRA reportable releases during 2025.
EPCRA § 311-312	SDS Submittal / Tier Two Emergency and Hazardous Chemical Inventory Reporting	For 2025, the Knolls Laboratory continued reporting in its Tier Two Report the amount (gallons) of No. 2 fuel oil deliveries made to the portable fuel oil storage tank in the Q3 yard area for DOE-EM use.
EPCRA § 313	TRI Reporting	Not required for the 2024 reporting year.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The FIFRA gives EPA authority to regulate the field use of pesticides, which EPA implements through a NYS-administered registration program. Authorized Knolls Laboratory and Kesselring Site personnel applying pesticides, such as cooling tower addition chemicals, keep a daily use log for every application of a general use pesticide. Annual reports are filed and provided to NYSDEC by the certified applicator/technician for all pesticides applied during the previous year. Any such chemical applied by a subcontractor licensed commercial application business or under their guidance is recorded and reported by the subcontractor directly.

National Environmental Policy Act (NEPA)

Significant construction, renovation, demolition, decommissioning, decontamination, and remediation activities are reviewed for their impact on the environment under the NEPA requirements as provided by the DOE. Other projects or capital equipment expenditures that have the potential for creating new emissions to the environment or affect any condition of a permitted or otherwise regulated operation also receive a NEPA evaluation. All NEPA documentation for the NNPP Sites including Knolls Laboratory and Kesselring Site in New York, are posted online at the DOE website located at www.energy.gov/nepa/office-nepa-policy-and-compliance.

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ENVIRONMENTAL MONITORING

KNOLLS LABORATORY

SITE DESCRIPTION

Knolls Laboratory is located in the Town of Niskayuna, New York, approximately two miles (3.2 kilometers) east of the City of Schenectady. Knolls Laboratory is situated on 170 acres of land on the south bank of the Mohawk River. Facilities at Knolls Laboratory include administrative offices; machine shops; a sewage pumping station; a boiler house; oil storage facilities; cooling towers; waste storage facilities; and chemistry, physics, and metallurgical laboratories. The surrounding area is a mixture of open land, other light industry, small farms, a closed municipal landfill, a small municipal park, and suburban residential areas.

The climate in the region of Knolls Laboratory is primarily continental in character but is subject to some modification from the maritime climate that prevails in the extreme southeastern portion of NYS. Winters are usually cold and occasionally severe. Maximum temperatures during the colder winter months often are below freezing, and nighttime low temperatures frequently drop to 14° F or lower. Sub-zero temperatures occur rather infrequently, about ten times a year. Snowfall in the area is quite variable, averaging approximately 60 inches/year. The mean annual precipitation for the region is approximately 40 inches/year. Westerly winds (west to northwest) predominate, and a secondary maximum occurs about the south-southeast direction.

Knolls Laboratory is located in the Mohawk River Valley at an elevation of approximately 330 feet above mean sea level. Monitoring wells and soil/bedrock borings in the vicinity of Knolls Laboratory show that unconsolidated materials, consisting mainly of glacial deposits, overlie bedrock. The depth of bedrock beneath the site generally ranges between 10 and 70 feet. Rock outcrops are visible on both banks of the Mohawk River between the Rexford Bridge, approximately two miles upstream, and a point about three quarters of a mile downstream from Knolls Laboratory. The outcrops are shales and sandstones of the Ordovician-age Schenectady Formation. These rocks are characteristically non-porous, impermeable, and form poor aquifers. The bedrock structure is relatively simple. Over 90% of Schenectady County is underlain by the Schenectady Formation, a series of alternating beds of shale, sandstone, and grit about 2,000 feet thick, which dip gently west and southwest. The Snake Hill formation is exposed along both sides of the Mohawk River near the dam at Lock 7, downstream from Knolls Laboratory. This formation consists of a considerable thickness of dark gray to black, bluish, and greenish-gray shale. It is the only formation in Schenectady County that is strongly folded, having been thrust westward against and over the Schenectady Formation.

The glacial deposits consist almost entirely of glacial till. The glacial till at Knolls Laboratory is clay rich, dense, compact, and is known locally as hardpan. The depth of the till beneath the site ranges from 0 to 70 feet. The till appears a grayish-blue color, but in the upper 12-foot portion, it has been weathered to a yellowish-brown color. Within the till, occasional lenses of graded material, usually fine sand, exist. The till is almost entirely impermeable except for a few lenses of sand, which are capable of transmitting water. These lenses are small in size and isolated from one another based on drilling records and on-site monitoring well performance. Overlying the till

in the eastern portion of the site are glacial lake sequences (silts and clays) and thin, discontinuous ice-contact deposits (sands and gravels). The ice-contact deposits are capable of transmitting water, but their limited extent diminishes the potential for yielding useable water volumes.

Knolls Laboratory is located adjacent to the Mohawk River, which serves as the main watercourse for the Mohawk River Drainage Basin, covering an area of 3,460 square miles. The river flows eastward to where it joins the Hudson River in Cohoes, New York. The average flow rate (1918–2025) of the Mohawk River is 5,976 cubic feet per second (cfs), and the lowest recorded seven-day minimum flow was 458 cfs during August 1995. Three small streams that receive drainage from Knolls Laboratory are tributaries to the Mohawk River. The East Boundary Stream is located between Knolls Laboratory closed landfill and the closed Town of Niskayuna landfill. The East Boundary Stream also receives runoff from a nearby housing development and roadway. The Midline Stream originates on site and drains the central portion of the site. The West Boundary Stream is located adjacent to Knolls Laboratory on General Electric Global Research Center property. This stream receives some surface water runoff from a tributary ditch from the site. A fourth surface water drainage-way, located on the west side of the closed Knolls Laboratory landfill, is referred to as the West Landfill Stream. This drainage-way discharges to the Mohawk River and rarely has an observable flow. The flow in all of these streams becomes extremely low to nonexistent during the late summer/early fall. These streams are not accessible to the public, except at the point where they each meet the Mohawk River, nor are they suitable for fishing or swimming.

The groundwater within the immediate vicinity of Knolls Laboratory is limited due to both low porosity and permeability of the till, which prohibits the development of the groundwater as a potable water supply. As such, no drinking water wells exist on site. The site also has no underlying principal or primary bedrock or overburden aquifers. Water for site operations involving potable and noncontact cooling use is obtained from the Schenectady and Niskayuna Municipal Water Systems. The majority of water for noncontact cooling at Knolls Laboratory is obtained from the Mohawk River.

The Mohawk River is classified by NYSDEC as a Class A stream. The best usages of Class A waters are considered to be a source of water for drinking, culinary or food processing purposes, primary and secondary contact recreation, and fishing. The waters shall be suitable for fish propagation and survival. Knolls Laboratory discharges water from its various operations within the concentration, mass loading, and flow limits set by the SPDES Permit (Reference (3)).

HISTORY AND OPERATIONS

History

General Electric operated Knolls Laboratory under Government contract, from its inception in 1946 until 1993. In 1993, responsibility for operation of Knolls Laboratory was transferred to Knolls Atomic Power Laboratory, Inc. (KAPL, Inc.), a subsidiary of the Martin Marietta Corporation. In 1995, KAPL, Inc. became a Lockheed Martin company after Martin Marietta and Lockheed corporations merged. The Bechtel Marine Propulsion Corporation (BMPC, a wholly owned subsidiary of Bechtel National, Inc.), operated Knolls Laboratory from February 2009 until October 2018, when FMP replaced BMPC. The NNPP implemented the use of>NNL, in 2016, to

refer to the collective operations of the four DOE sites performing NNPP work and the personnel operating at the associated locations.

Construction of Knolls Laboratory began in 1948; operations began in 1949. The original mission of Knolls Laboratory was to develop a chemical process for the separation of radionuclides from irradiated nuclear fuel, develop the basic science of reactor design, and develop an electric power station breeder reactor. In 1950, the electric power station project was converted to an NNPP project using liquid sodium coolant technology. The Separations Process Research Unit (SPRU) on the west side of Knolls Laboratory (1950-1953) developed an efficient method to extract useful radionuclides from irradiated nuclear fuel (for use at the AEC's Hanford Site and Savannah River Plant) and reduced the amount of radioactive waste associated with nuclear weapons production. Since ending SPRU related research in the mid-1950s, Knolls Laboratory has been dedicated to NNPP research and development. Knolls Laboratory directed its attention, in the late 1950s, to PWR technology, which was established as technically superior to sodium technology for naval reactor applications.

Following cessation of SPRU operations in 1953, partial cleaning of equipment and systems was performed, and the facility was placed in a stable long-term storage condition. Knolls Laboratory maintained an environmental monitoring program to confirm that the inactivated SPRU facility posed no threat to the health of site workers, the public, or the environment.

Present Operations

Since the mid-1950s, Knolls Laboratory has been exclusively engaged in development of nuclear propulsion plants for the U.S. Navy; much of the work occurs in office and computer spaces, employing scientists and engineers in propulsion plant design, operator training development, and procedure preparation activities. Physical work developing improved materials and components for naval nuclear propulsion plants occurs in several Knolls Laboratory facilities described below.

Chemical Laboratories: Chemical laboratories include several individual laboratories for chemical analysis, corrosion testing, mass spectrometry, radiochemistry, and related analytical and developmental functions. Most chemical laboratory work involves nonradioactive materials confined to appropriate containments, such as laboratory benches and hoods. Radioactive work containments provide filtered and monitored ventilation exhaust systems and controlled drainage systems that convey liquids to collection tanks for absorption and disposal as solid waste. Hazardous and nonhazardous chemical waste is collected for proper off-site disposal. Nonhazardous analytical waste and wash water drain to the sanitary wastewater system.

Fluids and Corrosion Testing Laboratories: These facilities test power plant components; both high and low pressure and temperature facilities operate to support materials and equipment development work. Hazardous chemical waste is collected for proper off-site disposal.

Machine Shops: Machine shop facilities perform machining operations, such as turning, milling, grinding, and drilling on a variety of nonradioactive metal products used in research.

Metallurgical Laboratories: These laboratories provide services related to the development, fabrication, testing, and inspection of materials for use in naval reactors. Most work is on

nonradioactive materials, as with the other laboratories. Radioactive work is confined to containments serviced by filtered and monitored ventilation systems and controlled drainage systems convey liquids to collection tanks for absorption for disposal as solid waste.

Radioactive Materials Laboratory: The Radioactive Materials Laboratory (RML) consists of shielded cells and support facilities for the physical, chemical, and metallurgical testing of highly radioactive material specimens. The quantities of such materials handled on site are small; however, the level of radioactivity in the RML requires the use of the shielded cells. Facility design assures complete containment of the radioactivity within closed shielded cells, equipped with filtered and monitored ventilation systems. The facility has comprehensive radiation monitors verifying the integrity of the shielded containments and the effectiveness of air handling systems. Due to the small volumes generated, RML radioactive liquids are collected and absorbed for shipment to off-site disposal facilities. A controlled drainage system that conveyed liquids to collections tanks for processing is no longer used.

Storage Vaults: Materials used in reactor development are stored in vaults with special safety and security provisions. Only a small amount of such material is kept at Knolls Laboratory. The vaults are serviced by filtered exhaust systems. Personnel involved in the handling of these materials are specially trained in nuclear and radiological safety and security.

Other Facilities: Necessary support facilities sustain Knolls Laboratory operations in addition to technical facilities already described. The facilities include office buildings that house the scientists, engineers, and support staff; a library; a computing center; and the following service facilities:

Boiler House

Knolls Laboratory has a boiler house at the Lower Level with three boilers that burn natural gas as a primary fuel and have a total steam capacity of 100,000 pounds per hour. Three exhaust stacks dissipate the combustion products from the boilers. Boiler house air emission controls are in accordance with a NYS air emissions permit. Auxiliary support facilities for the boilers include a dealkalizer and water softener feed water treatment and a boiler blow down water neutralization system. Wastewater discharged from the neutralization system complies with NYS discharge permit requirements.

Demineralized Water Production Facilities

Knolls Laboratory produces demineralized water by passing city water through columns of activated carbon and ion exchange resins to obtain the needed purity of water to support operations at the Knolls Laboratory. A commercial vendor regenerates these columns off site.

Cooling Towers

Four small evaporative cooling towers operate at Knolls Laboratory to dissipate the heat generated by computer air conditioning systems and other operations. During operation, continuous blow down of the cooling tower water at a rate of a few gallons per minute is used to control the concentration of soluble minerals that are naturally present in the supply water and cooling tower treatment chemicals.

A small quantity of blow down water directed into the Laboratory stormwater drainage system discharges to the Mohawk River through a monitored outfall to confirm compliance with NYS discharge permit requirements.

Hazardous and Mixed Waste Management Facilities

Knolls Laboratory hazardous waste management facility operates in accordance with provisions of its RCRA Permit issued by NYSDEC. This facility temporarily stores waste prior to shipment to permitted off-site treatment and disposal facilities; it is designed to contain any potential spill. Mixed waste management facilities (used to store waste containing both chemically hazardous and radioactive constituents) operate under the same permit and are also designed to contain any spill. Amounts of waste stored in these facilities are limited as specified in the permit. The facilities' construction and operation comply with applicable Federal and State regulations.

Radioactive Waste Treatment Facilities

Radioactive waste treatment facilities collect, process, package, and ship solid and liquid radioactive waste. Liquid waste from Knolls Laboratory operations is absorbed into a solid material prior to shipment as solid waste. As with all Knolls Laboratory facilities handling radioactive materials, the processing facilities for liquid and solid wastes are serviced by filtered and monitored exhaust systems.

Petroleum Storage Tanks

Two separate dual compartment aboveground tank systems at Knolls Laboratory have integral secondary containment systems with leak detection capabilities. One of the dual tank systems consists of a 10,000-gallon No. 2 fuel oil tank for the backup fuel oil supply for Knolls Laboratory's Boiler House, and a 2,000-gallon diesel tank to fuel a backup power generator. The second contains a 2,000-gallon gasoline storage tank and a 1,000-gallon diesel fuel tank, both used for fueling Knolls Laboratory vehicles and equipment.

Assorted additional diesel fuel storage tanks range from 50 to approximately 1,600-gallons; all have integral secondary containment systems. Knolls Laboratory storage tanks are registered with NYSDEC, comply with applicable Petroleum Bulk Storage (PBS) regulations, and are covered within the site's Spill Prevention Control and Countermeasure Plan.

LIQUID EFFLUENT MONITORING

Sources

Nonradiological: The principal sources of effluent water are:

1. *Sewage Pumping Station* - Knolls Laboratory sewage is pumped to the Town of Niskayuna Publicly Owned Treatment Works (POTW). The untreated sewage consists primarily of wastewater from restrooms, cafeteria services, and janitorial sinks. A small portion may also consist of dilute nonhazardous laboratory rinse water, dilute nonhazardous analytical waste, environmental samples, and ammoniated or phosphated process water.
2. *Cooling Towers* - Cooling water, used mainly for central air conditioning, is treated in most systems to maintain a potential of Hydrogen (pH) range of 7.0 to 7.5 Standard Unit (SU), to minimize scale buildup, to prevent corrosion of system materials, and to inhibit the growth of algae and slime. The P9 Cooling Tower pH is not controlled and is typically 8.8 SU. All the towers are periodically blown down to control chemistry, and some are drained to prevent freezing in the winter. The water drained from the towers is discharged to the Mohawk River. Water from the P9 tower is treated to reduce pH to 7.8 SU prior to discharge.
3. *Site Boiler Plant* - Site boiler water is chemically treated, softened, and de-alkalized. Operations that result in releases are (1) periodic blowdowns to control boiler chemistry and (2) ion exchange resin regeneration effluent from the softener and the de-alkalizer systems. Water generated by the blowdown and de-alkalizer regeneration operations is neutralized and allowed to cool before being discharged to the Mohawk River.
4. *Noncontact Cooling Water* - Mohawk River water and Site Service Water ((SSW) municipal water supply) are used as noncontact cooling media for several heat exchangers and are discharged to the Mohawk River.
5. *Process Water* - Treated/untreated wastewater, primarily from the river water system, is generated on site. Process water treatment typically consists of one or more of the following processes: sedimentation, filtration, ion exchange, activated carbon adsorption, or neutralization before being discharged to the Mohawk River.
6. *Site Drainage Water* - Stormwater and groundwater also make up a portion of the liquid effluent to the Mohawk River.

Approximate flows and chemical characteristics of the discharges to the Mohawk River (Items 2-6) were incorporated into the SPDES Permit application and Permit (Reference (3)).

Radiological: Historically, the concentrations of radioactivity in liquids released from Knolls Laboratory have always been below all applicable limits. The small volume of liquids generated from current laboratory operations that may contain radioactivity are collected for shipment off site in an absorbed form to an approved disposal facility. This minimizes the quantities of radioactivity released from Knolls Laboratory.

The small amounts of groundwater and stormwater that run off from areas that were associated with the former SPRU operations contain low level residual radioactivity from operations conducted during the 1950s and 1960s and are released in the site drainage water. The principal radioactive constituents released to the Mohawk River from all sources are the longer-lived fission products strontium-90 and cesium-137.

Effluent Monitoring

Nonradiological: Knolls Laboratory sanitary sewage is pumped to the Town of Niskayuna POTW in accordance with an Outside Users Agreement (Reference (1)). The Agreement specifies the parameters and sampling frequency for the untreated sewage. The minimum sampling frequency is monthly for chemical constituents, while flow and pH measurements are required daily. Typically, a 24-hour, flow-adjusted composite sample for chemical constituents is collected weekly. All monitoring data are averaged, with the exception of pH for which the maximum and minimum values for the month are reported, and then provided in a monthly report to the Town. The sewage pumping station is equipped with a pH alarm that shuts off the main pumps when the alarm set points are exceeded. Sewage flow is then allowed to passively overflow into a holding tank.

Knolls Laboratory water discharged to the Mohawk River is regulated by a SPDES Permit (Reference (3)). The SPDES Permit specifies the required sampling locations, parameters, and minimum sampling frequencies. The term of the permit is five years, and the NYSDEC renewed the permit in 2025, which became effective on August 1, 2025.

Liquid effluent from Knolls Laboratory enters the Mohawk River through a submerged outfall (Outfall 002), four small surface outfalls (Outfalls 03A, 03B, 03D, and 03E), and three natural stormwater streams (Outfalls 004, 005, and 006) as shown in Figure 2.

Outfall 002 discharges noncontact cooling water, process water, stormwater, and groundwater through a submerged drain line directly to the Mohawk River. The Outfall 002 monitoring station consists of a continuous temperature monitor and a Parshall flume, which provides for the continuous measurement and recording of effluent flow rate and total flow. In addition, weekly grab and composite samples are taken at Outfall 002 and analyzed for the constituents specified in the SPDES Permit, including copper when the Copper Ion Generator is operating. A Copper Ion Generator is used to inhibit zebra mussel attachment to noncontact cooling water system piping when the river water temperature is in excess of 50° F.

Outfalls 03B and 03D discharge Mohawk River water used for once-through noncontact cooling, municipal water used for once-through noncontact cooling, stormwater, and groundwater. The Outfalls 03B and 03D monitoring stations consist of continuous temperature and flow monitoring, which provides for the continuous measurement and recording of effluent flow rates and total flows. In addition, weekly grab samples are taken at Outfalls 03B and 03D and analyzed for the constituents specified in the SPDES Permit, including copper when the Copper Ion Generator is operating.

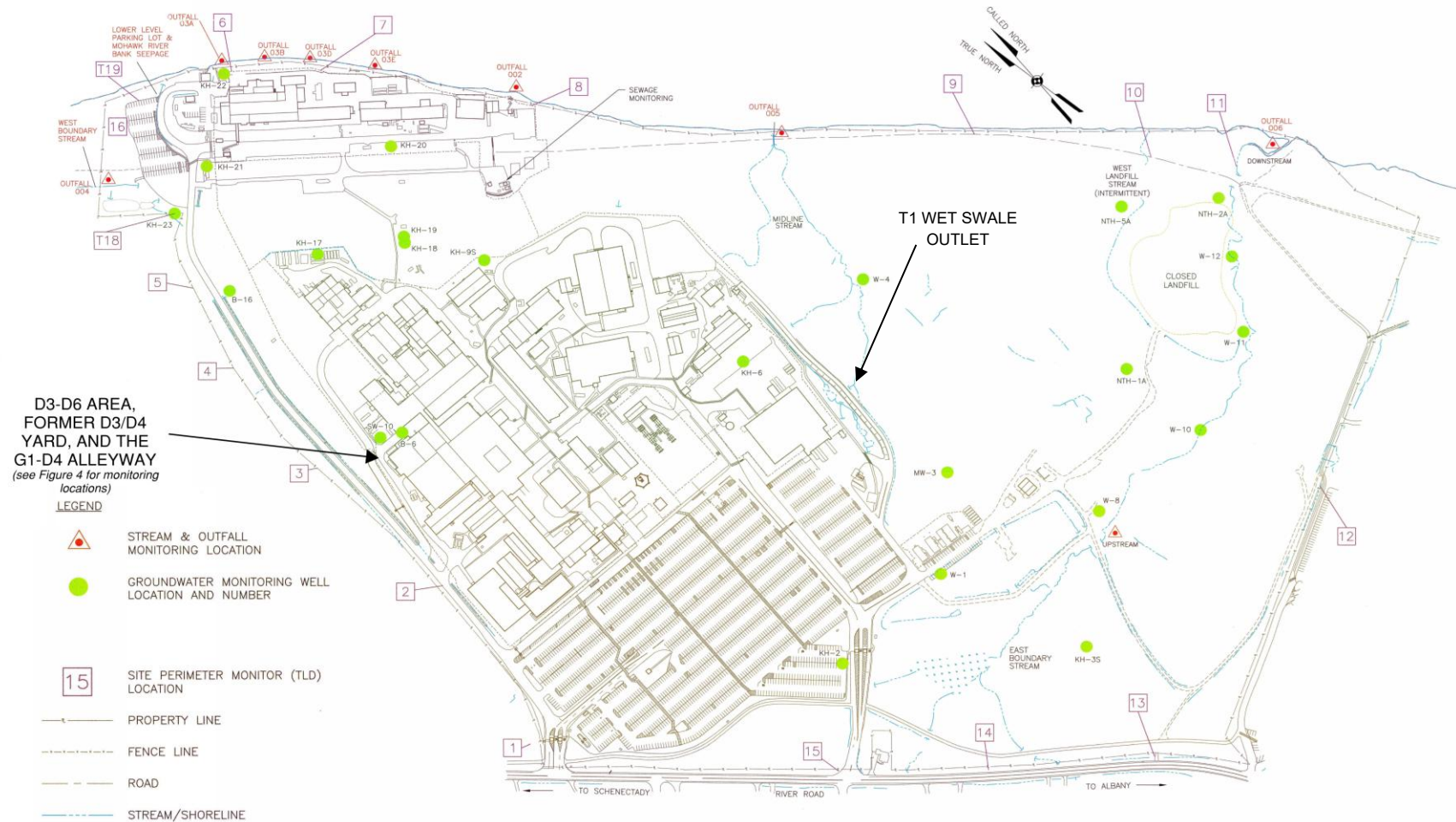


FIGURE 2
KNOLLS LABORATORY, NISKAYUNA, NEW YORK
STREAM AND OUTFALL, GROUNDWATER, AND PERIMETER TLD MONITORING LOCATIONS

The river water used for noncontact cooling must be strained to remove debris and biological life to prevent clogging of Knolls Laboratory heat exchangers and instrumentation lines. In 2017, Knolls Laboratory installed an inline screen (aka, Johnson screen) with a 0.79 millimeter (mm) screen in the Mohawk River. The Johnson screen's primary purpose is protection of biological life by filtration of biological organisms prior to entering the pump house galley. The settling tank, which removed sediment from the river water pump strainer backwash effluent, was in use up through October 2017. The discharge from the settling tank was directed to Outfall 03B. The settling tank is currently not in use; however, it could be used in the future if needed. After installation of the Johnson screen in the Mohawk River, verification monitoring to determine the efficiency of the Johnson screen was performed in 2018 per the SPDES permit. A biological entrainment reduction of 98.3% was calculated, well in excess of the 90% required by the facility's SPDES permit.

Outfalls 03A and 03E discharge only groundwater and stormwater as allowed by the SPDES Permit. These outfalls are monitored quarterly utilizing flow estimates and grab samples for pH and chemical constituent analyses. All monitoring is in accordance with the SPDES Permit.

Three Knolls Laboratory stormwater outfalls, designated as 004, 005, and 006, are commonly referred to as the West Boundary Stream, Midline Stream, and East Boundary Stream, respectively. The flows in these surface water streams are intermittent, and the streams are sampled quarterly for SPDES parameters, when possible. Additionally, the East Boundary Stream is sampled annually in accordance with Knolls Laboratory Landfill Post-Closure Monitoring Program. The sampling location for Outfall 004 is a ditch on Knolls Laboratory property that drains to the West Boundary Stream.

The West Landfill Stream is not part of the SPDES program and was removed from the Knolls Laboratory Landfill Post-Closure Monitoring Program in September 2018.

The current SPDES permit requires Whole Effluent Toxicity (WET) testing for Outfall 002 every five years, specifically in the years ending with a "1" or a "6." WET testing was last performed in 2021. All results were in compliance with the SPDES permit limits. The next required round of WET testing will occur in 2026.

Radiological: The Outfall 002 monitoring station includes a system for the collection of samples that are proportional to effluent flow. A monthly composite sample is prepared from the proportional samples and analyzed monthly for radioactivity. Monthly grab samples are collected at Outfalls 03A, 03B, 03D, 03E, 004, 005, 006, Upper East Boundary Stream, and West Landfill Stream. Background grab samples are also collected monthly at the Upper West Boundary Stream, SSW, and Mohawk River Cooling Water Intake. Seepage samples are also collected from the Mohawk Riverbank.

The sanitary sewage pumped to the Town of Niskayuna POTW is required to be sampled a minimum of quarterly for radioactivity in accordance with the Outside Users Agreement (Reference (1)). However, weekly 24-hour composite samples typically are obtained and then composited into quarterly samples and analyzed for radioactivity.

Effluent Analyses

Nonradiological: Periodic grab and composite samples collected from Outfalls 002, 03A, 03B, 03D, 03E, 004, 005, and 006 are analyzed for the chemical constituents listed in Reference (3). Samples from various outfalls may be analyzed for additional parameters for informational purposes only and are presented in the appropriate data tables. A 24-hour flow adjusted composite sample of the sewage pumped to the Town of Niskayuna POTW is collected and analyzed as required by Outside Users Agreement (Reference (1)).

Radiological: The monthly composite sample collected at Outfall 002 is analyzed for (1) strontium-90 by radiochemical separation and subsequent beta counting, (2) cesium-137 and other gamma-emitting radionuclides by gamma spectrometry, (3) tritium by liquid scintillation counting, and (4) gross alpha and gross beta radioactivity by direct sample evaporation and subsequent alpha and beta counting. Samples from the remaining outfalls are analyzed for gross alpha and gross beta radioactivity. Analyses for strontium-90 and cesium-137 are routinely performed for Outfalls 03A, 03D, 03E, 004, 005, 006, and Mohawk Riverbank seepage. For Outfall 03B and the West Landfill Stream, analysis for strontium-90, cesium-137, and other gamma-emitting radionuclides are performed if the gross beta radioactivity exceeds 10 picocuries per liter (pCi/l).

The quarterly composite sample of the sanitary sewage effluent to the Town of Niskayuna POTW is analyzed for strontium-90, cesium-137, cobalt-60, tritium, and uranium. Weekly samples are analyzed for gross alpha and beta radioactivity.

Assessment

Nonradiological: The analytical results for the chemical constituents, flow, and pH monitored in Knolls Laboratory sewage effluent during 2025 are summarized in Table 11. All monthly averages were within the parameters specified in the Outside Users Agreement (Reference (1)).

The analytical results for the chemical constituents, flow, and temperature monitored in Knolls Laboratory liquid effluent during 2025 are summarized in Table 12. The annual average values of all parameters were within the appropriate effluent permit limits or standards where standards exist for Outfalls 002, 03A, 03B, 03D, and 03E. All data were reported to NYSDEC as appropriate in the monthly SPDES Discharge Monitoring Reports.

The Knolls Laboratory SPDES Permit designates the Mohawk River intake as Outfall 001 and requires it to be monitored for flow, pH, TSS, and copper (when the Copper Ion Generator is operating). The normal designated Outfall 001 sampling location is in the L4 Pump House downstream of the Johnson Screen. The Knolls Laboratory SPDES permit requires composite sampling for TSS at Outfalls 001 and 002 and composite sampling for total dissolved solids (TDS) at Outfall 002. The SPDES permit requires composite sampling for total copper at Outfalls 001 and 002. The intake data are used to determine both the net discharges and appropriate pH limit ranges for the outfalls. Data are summarized in Table 12. The Mohawk River is voluntarily monitored for chloride at two locations and TDS at Outfall 001. The data for the upstream and downstream locations are presented in Table 13.

The Knolls Laboratory SPDES Permit requires the surface water streams, West Boundary Stream, Midline Stream, and East Boundary Stream, to be monitored quarterly for five parameters when flow exists in these streams. The analytical results for required chemical constituents, flow, and pH were within the specified limits. Additional parameters are monitored voluntarily. These results are summarized in Tables 14 and 15.

Following review of Knolls Laboratory plans for construction activities during the 2023 annual SPDES inspection, NYSDEC pointed out that supplemental sampling should occur in conjunction with the controls of a SWPPP when the potential exists for soil contaminants to be discharged with stormwater runoff. Additionally, NYSDEC review and agreement of the stormwater controls and supplemental sampling should occur consistent with the site's SPDES permit. In January through September of 2025, the Q-Complex Demolition Project and Building T3 Construction Project required supplemental sampling plans, which had NYSDEC agreement. Supplemental sampling plans require monitoring at the T1 Wet Swale outlet and Outfall 005 (see Figure 2) within one business day following specified rain events. These locations are monitored for pH, temperature, flow, dissolved oxygen (DO), chemical oxygen demand (COD), organic pesticides, PCBs, metals, oil & grease, TSS, turbidity, mercury, semi-volatile organic compounds (SVOCs) and VOCs. Quarterly, the same locations are monitored for Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-Dioxane.

Nonradioactive liquid effluent monitoring data are reported monthly as required in Reference (3). The monthly SPDES Discharge Monitoring Reports are available for public viewing on the NNL Website, <https://navalnuclearlab.energy.gov/environmental-safety-reports/>.

TABLE 11
CHEMICAL CONSTITUENTS IN KNOLLS LABORATORY SANITARY SEWAGE
EFFLUENT DISCHARGED TO THE TOWN OF NISKAYUNA
PUBLICLY OWNED TREATMENT WORKS

Knolls Laboratory Sewage Lift Station					
Parameter (Units)	Number of Samples	Value ⁽¹⁾			
		Minimum	Maximum	Average	Limit ⁽²⁾
Outside Users Agreement #94 3850 Requirements (Reference (1))					
Flow (GPD)	364 ⁽³⁾	0	38,669	17,534 ⁽⁴⁾	45,000
pH (SU)	816	6.7	9.0	----	6.0-9.5 ⁽⁵⁾
BOD (mg/l)	53	98 J ⁽⁶⁾	490	294	700
COD (mg/l)	53	382	1,420	682	1,800
TSS (mg/l)	53	98	500	262	1,600
Ammonia (as N, mg/l)	53	54	167	117	200
Nitrate (as N, mg/l)	53	<0.04	0.60	<0.08	4
Nitrite (as N, mg/l)	53	<0.01	0.3	<0.03	4
TKN (as N, mg/l)	53	68	181	148	250
Total Organic Nitrogen (as N, mg/l)	53	<1	67	<31	175
Total Nitrogen ⁽⁷⁾ (as N, mg/l)	53	<68	<181	<148	250
Phosphate (as P, mg/l)	53	8	28	13	30
Additional Parameters Monitored					
Oil & Grease ⁽⁸⁾ (mg/l)	53	6	79	15	100
Low-Level Mercury ⁽⁹⁾ (ng/l)	4	0.5	14.8	8.8	None

Notes:

1. A value preceded by "<" is less than the reporting limit (RL).
2. Limit based on Outside Users Agreement (Reference (1)). Outside Users Agreement allows for monthly averaging of data unless otherwise noted.
3. On July 18, 2025, the pumping sanitary sewage system to the Town of Niskayuna was secured for Holding Tank pump calibration checks.
4. The average of the monthly flows reported to the Town of Niskayuna is used for this value.
5. pH values are not averaged and are required to be in this range.
6. The associated result is less than the RL but greater than or equal to the method detection limit and the concentration is an approximate value.
7. Concentration value is calculated as the sum of Nitrate + Nitrite + Total Kjeldahl Nitrogen (TKN) concentrations.
8. This parameter is not limited on the Outside Users Agreement (Reference (1)); however, the Town of Niskayuna sanitary code prohibits fats, waxes, grease, or oils in excess of 100 milligram per liter (mg/l).
9. The Low-Level Mercury sampling is performed quarterly per an agreement with the Town of Niskayuna.

TABLE 12
CHEMICAL CONSTITUENTS AND TEMPERATURE
IN KNOLLS LABORATORY LIQUID EFFLUENT

Parameter (Units)	Number of Samples	Value ⁽¹⁾			
		Minimum	Maximum	Average	Permit Limit ⁽²⁾
Discharge Permit Requirements (Reference (3))					
Intake Point 001					
Flow (MGD)	Continuous ⁽³⁾	0	3.7	3.2	Monitor
pH (SU)	50	6.9	7.7	----	Monitor
TSS (mg/l)	50	<1.0	274	<14	Monitor
Total Copper (mg/l)	27	<0.003	0.006	<0.003	Monitor
Discharge Point 002					
Flow (MGD)	Continuous ⁽³⁾	0.071	3.3	1.6	Monitor
pH (SU)	52	6.9	7.8	----	6.5-8.5 ⁽⁴⁾
Temperature (°F)	Continuous ⁽³⁾	32	83	54	90
TSS (mg/l)	52	1.3	202	11	Monitor
TSS, Net (mg/l)	52	0	9.5	0.64	40
TDS (mg/l)	52	165	1330	314	Monitor
Oil & Grease (mg/l)	53	<5.0	<5.6	<5.0	15
Total Copper (mg/l)	27	0.005	0.012	0.008	Monitor
Copper, Net (lbs/day)	27	0.03	0.17	0.08	Monitor
Discharge Point 03A					
Flow (MGD)	15	0.00033	0.0086	0.0026	Monitor
pH (SU)	4	7.2	7.8	----	6.5-8.5
Oil & Grease (mg/l)	4	<5.0	<5.0	<5.0	15
TSS (mg/l)	4	3.8	9.4	6.6	Monitor
Thallium (µg/l)	4	<0.5	<0.5	<0.5	25
Discharge Point 03B					
Flow (MGD)	Continuous ⁽³⁾	0	2.4	1.7	Monitor
pH (SU)	52	6.8	7.6	----	6.5-8.5 ⁽⁴⁾
Temperature (°F)	Continuous ⁽³⁾	35	85	56	90
Oil & Grease (mg/l)	12	<5.0	<5.0	<5.0	15
TSS, Net (mg/l)	12	0	15	1.7	40
Total Copper (mg/l)	27	0.003	0.011	0.006	Monitor
Copper, Net (lbs/day)	27	0	0.06	0.04	Monitor

Notes for Table 12 are on page 44.

TABLE 12 (continued)
CHEMICAL CONSTITUENTS AND TEMPERATURE
IN KNOLLS LABORATORY LIQUID EFFLUENT

Parameter (Units)	Number of Samples	Value ⁽¹⁾			
		Minimum	Maximum	Average	Permit Limit ⁽²⁾
Discharge Point 03D					
Flow (MGD)	Continuous ⁽³⁾	0.0078	0.79	0.49	Monitor
pH (SU)	52	6.8	8.0	----	6.5-8.5 ⁽⁴⁾
Temperature (°F)	Continuous ⁽³⁾	31	82	53	90
Oil & Grease (mg/l)	12	<5.0	<5.0	<5.0	15
TSS (mg/l)	12	1.1	57	12	Monitor
Total Copper (mg/l)	27	0.003	0.012	0.007	Monitor
Copper, Net (lbs/day)	27	0	0.040	0.009	Monitor
Discharge Point 03E					
Flow (MGD)	16	0.00014	0.0030	0.00045	Monitor
pH (SU)	4	7.2	8.1	----	6.5-8.5
Oil & Grease (mg/l)	4	<5.0	<5.0	<5.0	15
TSS (mg/l)	4	2.1	26	10	Monitor
Discharge Point 001, 002, 03B and 03D					
Copper, Net Loading (lbs/day)	27	0.03	0.28	0.12	1.1

Notes:

1. A value preceded by "<" is less than the RL. Average values preceded by "<" contain at least one "less than RL value" in the average calculation.
2. NYSDEC SPDES Permit (Reference (3)).
3. The number of continuous monitoring days may differ slightly due to shutdown of the River Water System during maintenance activities.
4. If intake pH (Outfall 001) is greater than or equal to 8.2, the upper pH limit is increased to 9.0, but in no case can the effluent pH exceed intake pH by more than 0.5 SU.

TABLE 13
CHEMICAL CONSTITUENTS IN MOHAWK RIVER WATER

Parameter (Units)	Number of Samples Upstream/ Downstream	Value						Standard ⁽¹⁾	
		Mohawk River Upstream (Outfall 001)				Mohawk River Downstream			
		Minimum	Maximum	Average		Minimum	Maximum		Average
TDS (mg/l) ⁽²⁾	50/0	95	330	200		----	----	----	500
Chloride (mg/l) ⁽²⁾	5/5	20.6	41.7	31.9		23.2	527	136	250

Notes:

1. NYS Quality Standards (Reference (2)) for Class A Waters: source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation, and fishing. The waters shall be suitable for fish propagation and survival.
2. Voluntary parameter.

TABLE 14
CHEMICAL CONSTITUENTS IN WEST BOUNDARY STREAM AND MIDLINE STREAM

Parameter (Units)	Number of Samples West Boundary Stream / Midline Stream	Value ⁽¹⁾						Standard ⁽²⁾⁽³⁾
		West Boundary Stream (Outfall 004)			Midline Stream (Outfall 005)			
		Minimum	Maximum	Average	Minimum	Maximum	Average	
Flow (Estimated (GPD)) ⁽⁴⁾	6/17	2,000	110,000	67,000	11,000	520,000	130,000	Monitor
pH (SU)	6/17	7.1	7.7	----	7.1	8.2	----	6.5-8.5
TSS (mg/l)	6/17	6.7	49	23	1.7	58	13	Monitor
Oil & Grease (mg/l)	6/20	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	15
COD (mg/l)	6/17	8	15	13	<5	25	<12	Monitor
Thallium (µg/l)	6/0	<1.0	<10	<2.0	----	----	----	25 ⁽⁵⁾
Chloride (mg/l)	5/5	353	2,250	880	569	1,720	1,036	Note (6)
VOC (µg/l) ⁽⁷⁾	6/17	****	****	****	****	****	****	Note (8)

Notes:

**** Nondetectable

1. A value preceded by "<" is less than the RL. Average values preceded by "<" contain at least one "less than RL value" in the average calculation.
2. NYS Quality Standards and Guidance Values (Reference (4)) for Class A Waters: source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival. The West Boundary and Midline Streams are tributaries to the Mohawk River, which is a Class A water.
3. Permit limits as required by NYSDEC SPDES Permit (Reference (3)).
4. Flow is estimated by measuring stream depth, width, and velocity. Flow is intermittent and is measured only when samples are collected.
5. NYSDEC SPDES Permit Action Level.
6. Voluntary parameter.
7. EPA method 601 was utilized to analyze for VOCs listed in Table 27 for West Boundary Stream samples. EPA method 601 and EPA method 8260C were utilized to analyze VOCs for the Midline Stream. All results were less than the RL.
8. Voluntary parameter. Water quality standards and guidance values differ depending upon the specific parameter. The standards/guidance values range from 0.07 to 50 micrograms per liter (µg/l).

TABLE 15
CHEMICAL CONSTITUENTS AND TEMPERATURE IN EAST BOUNDARY STREAM

Parameter (Units)	Number of Samples Upstream / Downstream	Value ⁽¹⁾						Standard ⁽²⁾⁽³⁾	
		East Boundary Stream Upstream				East Boundary Stream Downstream (Outfall 006)			
		Minimum	Maximum	Average		Minimum	Maximum	Average	
Flow (Estimated (GPD)) ⁽⁴⁾	1/5	20,000	20,000	20,000		15,000	360,000	150,000	Monitor
pH (SU)	1/5	7.9	7.9	----		7.1	8.2	----	6.5-8.5
Temperature (°F)	1/5	59	59	59		33	61	49	No Standard
DO (mg/l)	1/1	6.9	6.9	6.9		7.3	7.3	7.3	Note (5)
Specific Conductance (µmhos/cm)	1/1	2,922	2,922	2,922		1,867	1,867	1,867	No Standard
Oil & Grease (mg/l)	0/5	----	----	----		<5.0	<5.2	<5.0	15
TSS (mg/l)	0/5	----	----	----		1.1	10	4.2	Monitor
COD (mg/l)	0/5	----	----	----		5	33	14	Monitor
VOC (µg/l) ⁽⁶⁾	1/5	****	****	****		****	****	****	Note (7)
Chloride (mg/l)	0/5	----	----	----		58	1,120	536	Note (8)

Notes:

**** Nondetectable

1. A value preceded by "<" is less than the RL. Average values preceded by "<" contain at least one "less than RL value" in the average calculation.
2. NYS Quality Standards for Class A Waters: source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival. The East Boundary Stream is tributary to the Mohawk River, which is a Class A water.
3. Permit limit as required by NYSDEC SPDES permit (Reference (3)) for the downstream location.
4. Flow is intermittent and is estimated by measuring stream depth, width, and velocity or by volume collected over a time period. Flow is measured only when samples are collected.
5. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l, and at no time shall the DO concentration be less than 4.0 mg/l.
6. EPA method 601 was used to analyze for VOCs listed in Table 27. All results were less than the RL of 1 µg/l.
7. Voluntary parameter. Water quality standards and guidance values differ depending upon the specific parameter. The standards/guidance values range between 0.07 and 50 µg/l.
8. Voluntary parameter.

TABLE 16
KNOLLS SUPPLEMENTAL STORMWATER SAMPLING RESULTS

Parameter (Units) ⁽²⁾	Number of Samples T1 Wet Swale / Midline Stream	Value ⁽¹⁾						Standard ⁽³⁾⁽⁴⁾
		T1 Wet Swale			Midline Stream (Outfall 005)			
		Minimum	Maximum	Average	Minimum	Maximum	Average	
Flow (Estimated (GPD)) ⁽⁵⁾	12/12	6,000	150,000	41,000	11,000	520,000	160,000	Monitor
pH (SU)	12/12	7.1	7.4	----	7.1	7.8	----	6.5-8.5
TSS (mg/l)	12/12	3.2	20	9.0	1.7	58	16	Monitor
Oil & Grease (mg/l)	12/12	****	****	****	****	****	****	15
COD (mg/l)	12/12	<5.0	51	<21	<5.0	21	<11	Monitor
Temperature (°F)	12/12	41	74	59	35	72	55	No Standard
DO (mg/l)	12/12	3.8	14	7.9	6.1	15	10	Note (6)
VOC (µg/l) ⁽⁷⁾	12/12	****	****	****	****	****	****	Note (8)
Turbidity (NTU)	12/12	1.1	24	9.1	0.6	8.5	2.7	No Numerical Standard
Organochlorine Pesticides (µg/l) ⁽⁹⁾	12/12	****	****	****	****	****	****	Note (10)
PCBs (µg/l) ⁽¹¹⁾	12/12	****	****	****	****	****	****	0.09 (µg/l)
Aluminum (mg/l) ⁽¹²⁾	12/12	<0.100	0.325	<0.145	<0.100	0.132	<0.105	0.1 (mg/l)
Antimony (mg/l)	12/12	****	****	****	****	****	****	0.003 (mg/l)
Arsenic (mg/l)	12/12	****	****	****	****	****	****	0.05 (mg/l)
Barium (mg/l) ⁽¹²⁾	12/12	0.073	0.334	0.213	0.038	0.132	0.084	1 (mg/l)
Beryllium (mg/l)	12/12	****	****	****	****	****	****	No Standard
Cadmium (mg/l)	12/12	****	****	****	****	****	****	0.005 (mg/l)
Calcium (µmg/l) ⁽¹²⁾	12/12	30.4	359	168	20.4	177	105	No Standard
Chromium (mg/l)	12/12	<0.005	0.019	<0.006	****	****	****	0.05 (mg/l)
Cobalt (mg/l)	12/12	****	****	****	****	****	****	0.005 (mg/l)
Copper (mg/l) ⁽¹²⁾	12/12	<0.005	0.031	<0.015	<0.005	0.023	<0.011	0.2 (mg/l)
Iron (mg/l) ⁽¹²⁾	12/12	0.301	1.09	0.761	<0.050	0.281	<0.114	0.3 (mg/l)
Lead (mg/l) ⁽¹²⁾	12/12	****	****	****	****	****	****	0.05 (mg/l)
Magnesium (mg/l) ⁽¹²⁾	12/12	13.6	84.9	42.9	12.0	43.5	28.9	35 (mg/l)
Manganese (mg/l) ⁽¹²⁾	12/12	0.346	2.08	1.20	<0.020	0.190	<0.041	0.3 (mg/l)

Notes for Table 16 found on page 51.

TABLE 16 (continued)
KNOLLS SUPPLEMENTAL STORMWATER SAMPLING RESULTS

Parameter (Units) ⁽²⁾	Number of Samples T1 Wet Swale / Midline Stream	Value ⁽¹⁾						Standard ⁽³⁾⁽⁴⁾
		T1 Wet Swale			Midline Stream (Outfall 005)			
		Minimum	Maximum	Average	Minimum	Maximum	Average	
Nickel (mg/l)	12/12	****	****	****	****	****	****	0.1 (mg/l)
Potassium (mg/l) ⁽¹²⁾	12/12	2.92	12.2	5.53	1.59	4.37	2.39	No Standard
Selenium (mg/l)	12/12	****	****	****	<0.005	0.005	<0.005	0.01 (mg/l)
Silver (mg/l)	12/12	****	****	****	****	****	****	0.05 (mg/l)
Sodium (mg/l) ⁽¹²⁾	12/12	286	2170	1069	141	645	410	No Standard
Thallium (mg/l)	12/12	****	****	****	****	****	****	0.008 (mg/l)
Vanadium (mg/l)	12/12	****	****	****	****	****	****	0.014 (mg/l)
Zinc (mg/l) ⁽¹²⁾	12/12	0.010	0.081	0.025	<0.010	0.073	<0.015	No Standard
Mercury (mg/l)	12/12	****	****	****	****	****	****	0.0007 (mg/l)
Semi-Volatile Organics (µg/l) ⁽¹³⁾	12/12	5.6	<40	<32	****	****	****	Note (14)
PFOA (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	2.27	3.60	2.96	4.1	42	15	No Standard
PFOS (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	1.84	2.50	2.08	<0.75	2.6	<1.9	No Standard
Perfluorobutanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	1.14	<2.90	<1.98	0.637	<2.90	<2.03	No Standard
Perfluorohexanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	<1.80	3.02	<2.24	1.22	<9.10	<3.51	No Standard
Perfluoroheptanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	1.15	<1.90	<1.62	<0.651	6.40	<2.7	No Standard
Perfluorohexanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluorononanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluorodecanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluoroundecanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluorododecanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluorotridecanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
Perfluorotetradecanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard
N-methylperfluorooctane sulfonamidoacetic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****	****	****	****	No Standard

Notes for Table 16 found on page 51.

TABLE 16 (continued)
KNOLLS SUPPLEMENTAL STORMWATER SAMPLING RESULTS

Parameter (Units) ⁽²⁾	Number of Samples T1 Wet Swale / Midline Stream	Value ⁽¹⁾						Standard ⁽³⁾⁽⁴⁾	
		T1 Wet Swale				Midline Stream (Outfall 005)			
		Minimum	Maximum	Average		Minimum	Maximum		Average
N-ethylperfluorooctane sulfonamidoacetic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoropentanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	2.70	<3.80	3.28		1.89	12.2	<4.90	No Standard
Perfluoro-1-octanesulfonamide (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-1-heptanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-1-decanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
1H,1H,2H,2H-Perfluorooctanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
1H,1H,2H,2H-Perfluorodecanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-n-butanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		<0.302	19.9	<8.55	No Standard
Perfluoro(2-ethoxyethane)sulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-3,6-dioxaheptanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-4-oxapentanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-5-oxahexanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-1-pentanesulfonate (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
1H,1H,2H,2H-Perfluorohexanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Hexafluoropropylene oxide dimer acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard

Notes for Table 16 found on page 51.

TABLE 16 (continued)
KNOLLS SUPPLEMENTAL STORMWATER SAMPLING RESULTS

Parameter (Units) ⁽²⁾	Number of Samples T1 Wet Swale / Midline Stream	Value ⁽¹⁾						Standard ⁽³⁾⁽⁴⁾	
		T1 Wet Swale				Midline Stream (Outfall 005)			
		Minimum	Maximum	Average		Minimum	Maximum		Average
4,8-Dioxa-3H-perfluorononanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluorododecanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
Perfluoro-1-nonanesulfonic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
3-Perfluoropropyl propanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
3-Perfluoropentyl propanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
3-Perfluoroheptyl propanoic acid (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
N-methylperfluorooctane sulfonamidoethanol (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
N-methylperfluorooctane sulfonamide (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
N-ethylperfluorooctane sulfonamidoethanol (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
N-ethylperfluorooctane sulfonamide (ppt) ⁽¹⁵⁾⁽¹⁶⁾	3/4	****	****	****		****	****	****	No Standard
1,4-Dioxane (ppb) ⁽¹⁵⁾	3/3	****	****	****		****	****	****	No Standard

Notes for Table 16 found on page 51.

NOTES FOR TABLE 16

**** Nondetectable

1. A value preceded by "<" is less than the RL. Average values preceded by "<" contain at least one "less than RL value" in the average calculation.
2. Parameter required per T3 sampling plan during rain event ≥ 0.5 " and quarterly unless otherwise specified. Sampling for the T3 sampling plan was completed in September of 2025.
3. NYS Quality Standards for Class A Waters: source of water supply for drinking, culinary or food processing purposes, primary and secondary contact recreation, and fishing. The waters shall be suitable for fish propagation and survival. The Midline Stream is tributary to the Mohawk River, which is a Class A water.
4. Permit limit as required by NYSDEC SPDES Permit (Reference (3)) for the downstream location.
5. Flow is estimated by measuring stream depth, width, and velocity or by volume collected over a time period. Flow is measured only when samples are collected.
6. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l, and at no time shall the DO concentration be less than 4.0 mg/l.
7. EPA methods 601 and 8260C were used to analyze for VOCs. All results were less than the RL.
8. Water quality standards and guidance values differ depending upon the specific parameter. The standards/guidance values range between 0.07-50 µg/l.
9. EPA method 8081B was used to analyze for pesticides. All results were less than RL.
10. Water quality standards and guidance values differ depending upon the specific parameter. The standards/guidance values range between 0.0009-0.03 µg/l.
11. EPA method 8082A was used to analyze for PCBs. All results were less than RL.
12. The above detected metals can occur naturally and some metals (i.e., aluminum, calcium, iron, manganese, magnesium, and sodium) are naturally elevated in site groundwater.
13. EPA method 8270D was used to analyze for SVOCs.
14. Water quality standards and guidance values differ depending upon the specific parameter. The standards/guidance values range between 0.002-50 µg/l.
15. Parameter required per T3 sampling plan quarterly. One additional PFAS sample was taken in 2025 for information at Outfall 005.
16. EPA method 1633 was used to analyze for PFAS. PFAS analytes presented are those analytes for which EPA has published final Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act. EPA MCLs for these analytes are 4.0 parts per trillion (ppt) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) and 10 ppt for the next three analytes, no MCL for Perfluorobutanesulfonic acid, and a hazard index of 1 for a combination of the last four analytes.

Radiological: The average radioactivity concentrations in the sanitary sewage effluent to the Town of Niskayuna POTW are shown in Table 17. Only strontium-90 and naturally occurring uranium were detected in the quarterly effluent composite samples. The concentration of strontium-90 is at levels typically found in surface water from historical atmospheric weapons testing. The radioactivity concentrations in the sanitary sewage effluent quarterly composite samples were less than one percent of the DOE derived concentration guide (DCG) (Reference (5)), as required by the Outside Users Agreement (Reference (1)).

TABLE 17
KNOLLS LABORATORY SANITARY SEWAGE EFFLUENT DISCHARGED TO
THE TOWN OF NISKAYUNA PUBLICLY OWNED TREATMENT WORKS:
QUARTERLY COMPOSITE SAMPLE RADIOACTIVITY RESULTS

Radionuclide	Quarterly Composite Sample Average Radioactivity Concentration (pCi/l) ⁽¹⁾	DOE Order 5400.5 DCG (pCi/l)	Percent of DCG
Cs-137	<0.30 ± 0.18	3,000	<0.01
Sr-90	<0.11 ± 0.04	1,000	<0.01
Co-60	<0.34 ± 0.20	5,000	<0.01
H-3	<93.73 ± 4.90	2,000,000	<0.01
Total Uranium	0.60 ± 0.12	500 ⁽²⁾	<0.12
Total Percentage⁽³⁾⁽⁴⁾			<0.15

Notes:

1. Average values preceded by "<" contain at least one less than decision level concentration (DLC) value in the average. The (±) value provides the 95% confidence interval for the average value.
2. The DCG for total uranium is based on U-234.
3. The radioactivity standard for the Town of Niskayuna Sanitary Sewer System corresponds to one percent of the DCG in DOE Order 5400.5 for the mixture of radionuclides present, per Outside Users Agreement (Reference (1)).
4. Slight rounding differences occur when summing individual values.

The radioactivity concentrations in Knolls Laboratory liquid effluent are shown in Table 18. The average concentrations are all well below the DOE Derived Concentration Standard (DCS). The amount of each radionuclide released from Knolls Laboratory in liquid effluent is shown in Table 19.

The total radioactivity released from each outfall/source is as follows: Outfall 002, 442.0 microcurie (μCi); Outfall 03A, 35.7 μCi; Outfall 03D, 140.8 μCi; Outfall 03E, 0.2 μCi; Outfall 004, 16.8 μCi, and Riverbank seepage, 1.1 μCi for a total of 636.7 μCi (or 6.37×10^{-4} Ci). Slight rounding differences occur when summing individual values. The radioactivity was contained in approximately 5.29×10^9 liters of water released from Knolls Laboratory. The annual average radioactivity concentration in that effluent, prior to entering the Mohawk River water, corresponds to less than 0.1 percent of the DOE DCS (Reference (6)), for the mixture of radionuclides present.

TABLE 18
RADIOACTIVITY CONCENTRATIONS
IN KNOLLS LABORATORY LIQUID EFFLUENT

Sample Point / Parameter	Number of Samples	Radioactivity Concentration (pCi/l) ⁽¹⁾				Percent of DCS
		Minimum	Maximum	Average	DOE-STD-1196-2011 DCS ⁽²⁾	
Outfall 002						
Gross Alpha	12	<1.78	4.36 ± 4.87	<2.86 ± 0.55	140	<2.04
Gross Beta	12	1.93 ± 1.80	17.90 ± 5.29	<4.71 ± 2.84	1,100	<0.43
Sr-90	12	<0.08	0.26 ± 0.12	<0.15 ± 0.04	1,100	<0.01
Cs-137	12	<0.09	<0.31	<0.17 ± 0.04	3,000	<0.01
H-3	12	<72.86	<98.82	<92.27 ± 4.23	1,900,000	<0.01
Outfall 03A						
Gross Alpha	12	<7.92	45.10 ± 38.80	<18.90 ± 7.15	140	<13.50
Gross Beta	12	4.90 ± 5.47	35.58 ± 15.03	<12.87 ± 5.17	1,100	<1.17
Sr-90	12	0.82 ± 0.17	5.18 ± 0.54	2.31 ± 0.65	1,100	0.21
Cs-137 ⁽³⁾	4	<0.13	<0.22	<0.18 ± 0.06	3,000	<0.01
Outfall 03B						
Gross Alpha ⁽³⁾	4	<1.06	2.86 ± 3.72	<2.16 ± 1.23	140	<1.54
Gross Beta ⁽³⁾	4	1.80 ± 1.07	<2.76	<2.46 ± 0.71	1,100	<0.22
Outfall 03D						
Gross Alpha	12	<1.68	10.91 ± 6.40	<3.35 ± 1.61	140	<2.40
Gross Beta	12	<1.55	17.00 ± 5.22	<4.26 ± 2.59	1,100	<0.39
Sr-90	12	<0.08	0.24 ± 0.12	<0.12 ± 0.03	1,100	<0.01
Cs-137 ⁽³⁾	4	<0.08	<0.30	<0.19 ± 0.15	3,000	<0.01
Outfall 03E						
Gross Alpha	12	<6.58	<40.86	<21.74 ± 9.16	140	<15.53
Gross Beta	12	<5.63	56.46 ± 23.35	<17.64 ± 9.19	1,100	<1.60
Sr-90	12	<0.16	2.09 ± 0.30	<0.62 ± 0.37	1,100	<0.06
Cs-137 ⁽³⁾	4	<0.14	<0.23	<0.17 ± 0.06	3,000	<0.01
Outfall 004						
Gross Alpha ⁽⁴⁾	12	<4.81	38.18 ± 23.41	<13.97 ± 7.08	140	<9.98
Gross Beta ⁽⁴⁾	12	<2.96	35.25 ± 12.90	<12.05 ± 5.61	1,100	<1.10
Sr-90 ⁽⁴⁾	12	<0.08	0.49 ± 0.17	<0.26 ± 0.10	1,100	<0.02
Cs-137 ⁽⁴⁾	12	<0.16	1.11 ± 0.54	<0.37 ± 0.21	3,000	<0.01
Outfall 005						
Gross Alpha ⁽³⁾⁽⁴⁾	4	<6.08	12.57 ± 16.68	<8.67 ± 4.86	140	<6.19
Gross Beta ⁽³⁾⁽⁴⁾	4	<5.19	8.42 ± 5.27	<6.72 ± 2.11	1,100	<0.61
Sr-90 ⁽³⁾⁽⁴⁾	4	0.11 ± 0.11	0.31 ± 0.20	0.18 ± 0.14	1,100	0.02
Cs-137 ⁽³⁾⁽⁴⁾	4	<0.16	<0.32	<0.22 ± 0.12	3,000	<0.01
Outfall 006						
Gross Alpha ⁽³⁾⁽⁴⁾	4	<4.79	<9.12	<6.20 ± 3.15	140	<4.43
Gross Beta ⁽³⁾⁽⁴⁾	4	<3.61	8.42 ± 4.99	<5.07 ± 3.59	1,100	<0.46
Sr-90 ⁽³⁾⁽⁴⁾	4	<0.09	0.17 ± 0.18	<0.11 ± 0.06	1,100	<0.01
Cs-137 ⁽³⁾⁽⁴⁾	4	<0.01	<0.30	<0.13 ± 0.20	3,000	<0.01

Notes for Table 18 are on page 54.

TABLE 18 (continued)
RADIOACTIVITY CONCENTRATIONS
IN KNOLLS LABORATORY LIQUID EFFLUENT

Sample Point / Parameter	Number of Samples	Radioactivity Concentration (pCi/l) ⁽¹⁾				Percent of DCS
		Minimum	Maximum	Average	DOE-STD-1196-2011 DCS ⁽²⁾	
Riverbank Seepage						
Gross Alpha ⁽⁴⁾	1	<8.71	<8.71	<8.71	140	<6.22
Gross Beta ⁽⁴⁾	1	<3.81	<3.81	<3.81	1,100	<0.35
Sr-90 ⁽⁴⁾	1	0.19 ± 0.12	0.19 ± 0.12	0.19 ± 0.12	1,100	0.02
Cs-137 ⁽⁴⁾	1	<4.17	<4.17	<4.17	3,000	<0.14
West Landfill Stream						
Gross Alpha ⁽³⁾⁽⁴⁾	4	<0.78	<2.44	<1.88 ± 1.23	140	<1.34
Gross Beta ⁽³⁾⁽⁴⁾	4	1.36 ± 1.03	<2.91	<2.22 ± 1.04	1,100	<0.20
Upper East Boundary Stream						
Gross Alpha ⁽³⁾⁽⁴⁾	4	<5.00	<9.43	<7.83 ± 3.10	140	<5.59
Gross Beta ⁽³⁾⁽⁴⁾	4	<4.38	6.17 ± 4.22	<5.33 ± 1.55	1,100	<0.48
Sr-90 ⁽³⁾⁽⁴⁾	4	<0.08	<0.14	<0.10 ± 0.04	1,100	<0.01
Cs-137 ⁽³⁾⁽⁴⁾	4	<0.13	<0.59	<0.29 ± 0.34	3,000	<0.01
Upper West Boundary Stream (background for comparison)						
Gross Alpha ⁽⁴⁾	12	<2.17	11.44 ± 8.06	<3.82 ± 1.57	140	<2.73
Gross Beta ⁽⁴⁾	12	<2.63	17.04 ± 5.50	<5.02 ± 2.58	1,100	<0.46
Sr-90 ⁽⁴⁾	12	<0.09	0.22 ± 0.12	<0.15 ± 0.03	1,100	<0.01
Cs-137 ⁽⁴⁾	12	<0.13	<0.31	<0.21 ± 0.04	3,000	<0.01
H-3 ⁽⁴⁾	12	<73.01	<99.05	<92.40 ± 4.21	1,900,000	<0.01
Site Service Water (background for comparison)						
Gross Alpha	12	<1.76	8.64 ± 6.13	<3.49 ± 1.21	140	<2.49
Gross Beta	12	1.82 ± 2.05	12.53 ± 4.71	<4.84 ± 2.33	1,100	<0.44
Sr-90	12	<0.08	<0.17	<0.11 ± 0.02	1,100	<0.01
Cs-137	12	<0.10	<0.32	<0.20 ± 0.04	3,000	<0.01
H-3	12	<73.01	<98.87	<91.79 ± 4.04	1,900,000	<0.01
Mohawk River Cooling Water (background for comparison)						
Gross Alpha	12	<1.47	8.08 ± 5.69	<2.85 ± 1.10	140	<2.03
Gross Beta	12	2.22 ± 2.29	10.51 ± 4.59	<4.47 ± 1.62	1,100	<0.41
Sr-90	12	<0.08	0.20 ± 0.11	<0.12 ± 0.03	1,100	<0.01
Cs-137	12	<0.08	<0.31	<0.18 ± 0.05	3,000	<0.01
H-3	12	<73.09	<99.15	<92.53 ± 4.26	1,900,000	<0.01

Notes:

1. A value preceded by "<" is less than the DLC. Average values preceded by "<" contain at least one value that is less than the DLC. The (±) value provides the 95% confidence interval for the value.
2. The DCS for gross alpha and gross beta radioactivity is based on the most restrictive radionuclide possibly present in measurable quantities as a result of Knolls Laboratory operations.
3. Monthly samples are composited and analyzed quarterly.
4. Samples may not be obtained every month due to dry or frozen conditions.

TABLE 19
KNOLLS LABORATORY RADIOACTIVITY RELEASED IN LIQUID EFFLUENT

Radionuclide	Release (Ci)⁽¹⁾⁽²⁾	Half-life
Sr-90	1.63E-04	28.8 years
Y-90	1.63E-04	2.669 days
Cs-137	3.11E-04	30.07 years
Fission and Activation Products (Half-life > 3 hr)	6.37E-04	

Notes:

1. The totals include results that were less than or equal to the DLC.
2. Slight rounding differences occur when summing individual values.

AIRBORNE EFFLUENT MONITORING

Sources

Nonradiological: The principal source of industrial air emissions is Knolls Laboratory's steam-generating heating boiler system. Knolls Laboratory heating boilers are comprised of three stationary combustion units that primarily combust natural gas with ultra-low sulfur distillate fuel oil used as a backup fuel. The by-products from the combustion of fuel associated with the operation of this source are released through individual elevated stacks. Another stationary combustion source is the ASGTF that is comprised of two natural gas-fired water heaters (East and West) that exhaust through a common stack. Both gas-fired water heaters are in layup and have not been operated since 2010 and 2002, respectively.

Other operations at Knolls Laboratory that can result in air emissions include the carpenter shop, metalwork operations, belt grinders, welding, nonradiological laboratory hoods, mobile air compressors, non-road engines, research and development activities, and emergency power generating stationary internal combustion engines. Many of these sources of air emissions at Knolls Laboratory meet the criteria for exempt and trivial activity sources under the NYSDEC air regulations and are not required to have air permits or registrations to operate.

Radiological: Knolls Laboratory operations capable of generating airborne radioactivity are serviced by controlled exhaust systems that discharge through stacks. To minimize radioactivity content, the exhaust air is passed through appropriate air cleaning devices, such as high efficiency particulate air (HEPA) filters and activated carbon adsorbers, prior to release. Potential diffuse sources are also evaluated and may include emissions from resuspension of contaminated soil, D&D activities, and fugitive building emissions.

Effluent Monitoring

Nonradiological: Knolls Laboratory originally had two nonradiological air emission permits, one for the heating boilers and one for the ASGTF. The two permits were consolidated into a single permit ASFP (Mod 2) in December 2009. In January 2010, Knolls Laboratory was granted a modification ASFP (Mod 4), as listed in Table 6, to consolidate the reporting dates for certain regulatory submittals listed in the permit. The air permit currently limits CO and SO₂ emissions from the heating boilers based on fuel usage. Under the terms of the permit, direct emission monitoring from combustion installations listed in the permit is not required. The ASGTF has no emission limits. The quantities of pollutants released are estimated based on the quantity and type of fuel burned multiplied by the appropriate EPA approved emission factors. The NYS emission standards for stationary combustion installations are listed in Reference (7).

The NYSDEC regulations do not require air emission permits for exempt and trivial activities. In general, exempt and trivial activities do not require emissions monitoring; although some activities may require monitoring of run times, installation and maintenance of air quality control equipment, or limiting source material usage to maintain their exempt status.

Radiological: Airborne effluents from the main radiological emission points are continuously sampled for particulate radioactivity with particulate filter samplers and with activated charcoal cartridge samplers where iodine or antimony may be present. Exhaust systems servicing major facilities are also continuously monitored for particulate, iodine, and noble gas radioactivity. The monitors continuously record radioactivity levels in the effluents and are equipped with alarm functions to provide an alert should an abnormal level occur. Other minor radiological emission points are evaluated for the potential for release and monitored on a periodic basis, as necessary, to confirm their low emissions.

Effluent Analyses

Radiological: Particulate filters and activated charcoal cartridges are changed and analyzed on a routine basis. Particulate filters are analyzed by direct counting for gross alpha and beta radioactivity using a sensitive low-background gas proportional counting system. The system provides DLCs for alpha and beta radioactivity of approximately 2×10^{-15} microcuries per milliliter ($\mu\text{Ci/ml}$) and $5 \times 10^{-15} \mu\text{Ci/ml}$, respectively. The activated charcoal cartridges are analyzed for iodine-131 and antimony-125 by gamma spectrometry, which provides DLCs of approximately $1 \times 10^{-14} \mu\text{Ci/ml}$ and $3 \times 10^{-14} \mu\text{Ci/ml}$, respectively. Noble gas radioactivity released is calculated based on integration of recorded data from a continuous noble gas monitor.

Assessment

Nonradiological: The heating boiler operations at Knolls Laboratory are "capped," or limited, to the following conditions under the ASFP (Mod 4) issued by NYSDEC:

1. A maximum heat input of 162.4 billion British Thermal Units (BTUs) during any 12-month period;
2. The quantity of fuel used during any 12-month period shall not exceed 159.2 million standard cubic feet (SCF) of natural gas or 1.16 million gallons of distillate fuel oil or any combination of the two, not to exceed condition 1 above;
3. Annual emissions of the following contaminants are capped as follows:
CO – 13,370 pounds per year
SO₂ – 82,360 pounds per year;
4. The sulfur content of any fuel oil burned shall not exceed 0.5 percent by weight, and the fuel oil must conform to the specifications for distillate fuel oil per American Society for Testing and Materials (ASTM) D396-78, as amended; and
5. The annual capping period will run from the first working day in September to the first working day in September of the following year with the Annual Capping Certification due by September 30 each year.

The ASGTF water heater operations are not capped under the ASFP (Mod 4). Fuel oil supplier certification statements and/or applicable fuel oil analyses for distillate fuel oil are maintained to confirm that the fuel oil burned in Knolls Laboratory heating boilers contained less than 0.5 percent

sulfur by weight and conforms to the ASTM Standards for distillate fuel oil. Semi-annual reports demonstrating compliance with the fuel oil sulfur limitation are sent to both the EPA and NYSDEC. Under current NYSDEC regulations, the sulfur content of fuel oil is limited to 0.0015 percent sulfur by weight. Although the EPA and the ASFP require the combustion of fuel oil with a sulfur content of less than 0.5 percent sulfur, Knolls Laboratory complies with the more stringent NYSDEC regulatory requirement that fuel oils contain no more than 0.0015 percent sulfur by weight.

Compliance with the capping requirements is determined by calculations using fuel usage records each year and submittal of an annual capping certification statement to NYSDEC. Although the emissions from the operation of Air Emission Point EP-00030, ASTGF, are not capped, the emissions from this facility are included in the capping certification for information.

During 2025, Knolls Laboratory heating boilers continued to operate within the capped operating and emission limits established by NYSDEC in Knolls Laboratory's ASFP and as gas-fired boilers under 40 CFR 63 Subpart JJJJJ – NESHAP for Industrial, Commercial, and Institutional Boilers located at Area Sources of Hazardous Air Pollutants.

Radiological: The radioactivity released in airborne effluent during 2025 is shown in Table 20. The point source airborne radioactivity was contained in a total air exhaust volume of 1.51×10^{12} liters. The average radioactivity concentration in the exhaust air was well below the applicable standards listed in Reference (6). The diffuse source emissions were calculated using EPA approved methods. The radioactivity concentration for 2025 at the nearest Knolls Laboratory boundary, based on the annual diffusion parameters, averaged less than 0.01 percent of the DOE DCS (Reference (6)), for the mixture of radionuclides present. Airborne effluent monitoring data are reported as required by EPA regulations in Reference (8).

TABLE 20
KNOLLS LABORATORY RADIOACTIVITY RELEASED IN
AIRBORNE EFFLUENT

Radionuclide	Point Source Release Ci ⁽¹⁾	Diffuse Source Release Ci	Total Release Ci ⁽²⁾	Half-life
H-3	1.70E-07	0.00E+00	1.70E-07	12.32 years
Kr-85	2.06E-01	0.00E+00	2.06E-01	10.76 years
Sr-90	2.28E-06	1.66E-06	3.95E-06	28.8 years
Y-90	2.28E-06	1.66E-06	3.95E-06	2.669 days
Cs-137	2.28E-06	1.83E-06	4.11E-06	30.07 years
Sb-125	3.32E-07	0.00E+00	3.32E-07	2.758 years
Co-60	5.77E-08	3.41E-07	3.98E-07	5.271 years
Total Fission and Activation Products (Half-life>3 hr)	2.06E-01	5.50E-06	2.06E-01	
U-234	5.44E-07	1.20E-09	5.45E-07	2.46E05 years
U-235	9.12E-09	3.86E-11	9.16E-09	7.04E08 years
U-236	1.69E-09	4.96E-12	1.70E-09	2.342E07 years
U-238	1.13E-11	3.52E-13	1.16E-11	4.468E09 years
Total Uranium	5.54E-07	1.24E-09	5.56E-07	
Pu-238	8.90E-08	2.77E-08	1.17E-07	87.7 years
Pu-239	8.40E-11	8.12E-11	1.65E-10	2.41E04 years
Pu-240	0.00E+00	2.02E-11	2.02E-11	6.56E03 years
Pu-241	0.00E+00	4.09E-11	4.09E-11	14.29 years
Pu-242	0.00E+00	2.02E-15	2.02E-15	3.75E05 years
Total Plutonium (Alpha)	8.91E-08	2.78E-08	1.17E-07	
Am-241	1.38E-16	2.02E-11	2.02E-11	432.7 years

Note:

1. With the exception of Kr-85, the totals include results that were less than or equal to the DLC.
2. Slight rounding differences occur when summing individual values.

ENVIRONMENTAL MONITORING

Scope

Nonradiological: Knolls Laboratory nonradiological environmental monitoring program consists of routine surface water and groundwater sampling. Surface water is sampled for water quality at the following locations: Mohawk River upstream and downstream from Knolls Laboratory outfalls, the Midline Stream near the point of entry to the Mohawk River, the West Boundary Stream, and the East Boundary Stream upstream and downstream of the closed landfill. The West Boundary Stream sample point is on Knolls Laboratory property, prior to where the stream enters the General Electric property. The West Boundary Stream eventually meets the Mohawk River upstream from Knolls Laboratory. Required analytical surface water parameters were discussed earlier in this report and more details are provided in the following pages. Stream sample points are shown in Figure 2.

Knolls Laboratory contains a permanently capped landfill that covers an area of approximately 3.7 acres on the east side of the site. The landfill was officially closed in October 1993. The groundwater and surface water surrounding the closed landfill are routinely monitored and the results are reported to NYSDEC in compliance with Reference (9). An annual landfill inspection was conducted and no degradation in the cap was identified. Routine landfill maintenance was performed to ensure continued integrity of the landfill cap and associated cover. In accordance with a NYSDEC-approved RCRA corrective action groundwater monitoring plan, biannual groundwater monitoring is performed at the D3-D6 Area, former D3/D4 Yard, and G1-D4 Alleyway to assess the effectiveness of soil remediation projects. The results of the groundwater monitoring are reported to NYSDEC annually. Groundwater is also monitored by other groundwater monitoring wells located throughout Knolls Laboratory. Knolls Laboratory groundwater data are discussed separately later in this report. Groundwater monitoring locations are shown in Figure 4.

Radiological: Knolls Laboratory radiological environmental monitoring program includes: a) the routine collection and analysis of samples of Mohawk River water, sediment, and fish; surface water streams; groundwater; and local municipal waters; and b) the continuous sampling of air at stations located in the predominant upwind and downwind directions from Knolls Laboratory.

Mohawk River water and bottom sediment samples are collected for radioactivity analyses at locations upstream and downstream from the main Knolls Laboratory outfall as shown in Figure 3. Samples are collected during each of three calendar quarters; ice coverage and/or winter weather prevents sampling during the first calendar quarter. A Birge-Ekman dredge, which samples an area of approximately 15 centimeters (cm) x 15 cm to an average depth of 2.5 cm, is used for the collection of sediment samples. In addition, bottom feeding fish and recreational sport fish are collected from the Mohawk River upstream and downstream from the main Knolls Laboratory outfall for gamma spectrometry and radiochemical analyses.

Surface water is also sampled monthly for radioactivity at the Midline Stream near the point of entry to the Mohawk River, the West Boundary Stream, the East Boundary Stream upstream and downstream of the closed landfill, and the West Landfill Stream. Groundwater wells are sampled

annually for radioactivity and are discussed separately in the Groundwater Monitoring section of this report.

The municipal water systems servicing the area surrounding Knolls Laboratory are those of Schenectady, Niskayuna, and Latham/Colonie, New York. Supply wells for the Schenectady and Niskayuna systems are located upstream and downstream, respectively, from Knolls Laboratory. Although there is no direct mechanism for Knolls Laboratory effluent to enter the water supplies, samples are collected monthly from the Schenectady and Niskayuna municipal water systems. A monthly sample is also collected from the Latham/Colonie municipal water system that obtains its water from the Mohawk River. Monthly samples are composited quarterly and analyzed for radioactivity.

Environmental air samplers are operated in the predominant upwind and ten downwind locations around the entire perimeter of Knolls Laboratory to measure normal background airborne radioactivity, and to confirm that Knolls Laboratory effluents have no measurable effect on normal background airborne radioactivity levels.

Analyses

Nonradiological: The water samples collected from the Mohawk River and the three main surface water streams are analyzed for the constituents listed in Tables 13, 14, 15, and 16. The analyses were performed in accordance with 40 CFR Part 136 utilizing the procedures provided in Standard Methods (Reference (10)), or other EPA approved methods.

Radiological: The individual quarterly samples of Mohawk River water and quarterly composite samples of Schenectady, Niskayuna, and Latham/Colonie municipal waters are analyzed for gross alpha and gross beta radioactivity. The stream samples are analyzed for gross alpha and gross beta radioactivity, and for other radionuclides as appropriate. The methods used are described in the Effluent Analyses portion of the Liquid Effluent Monitoring section of this report.

The Mohawk River sediment samples are analyzed for uranium and plutonium alpha radioactivity by chemical extraction with subsequent direct counting on an alpha spectrometry system, for gross beta radioactivity by direct counting of a dried sample, and for cesium-137 and other gamma emitting radionuclides by gamma spectrometry. Seven samples from the second quarter sample set collected at locations upstream, opposite, and downstream from the main Knolls Laboratory outfall (i.e., Outfall 002) are also analyzed for strontium-90 by chemical extraction and gross beta counting. The downstream samples for strontium-90 analyses are selected from locations that previous monitoring had indicated would be locations of highest concentrations.

Edible portions of the fish collected from the Mohawk River are analyzed for gamma emitting radionuclides with a high purity germanium spectrometer system, for strontium-90 by chemical extraction and beta counting, and for plutonium by chemical separation followed by alpha spectrometry.

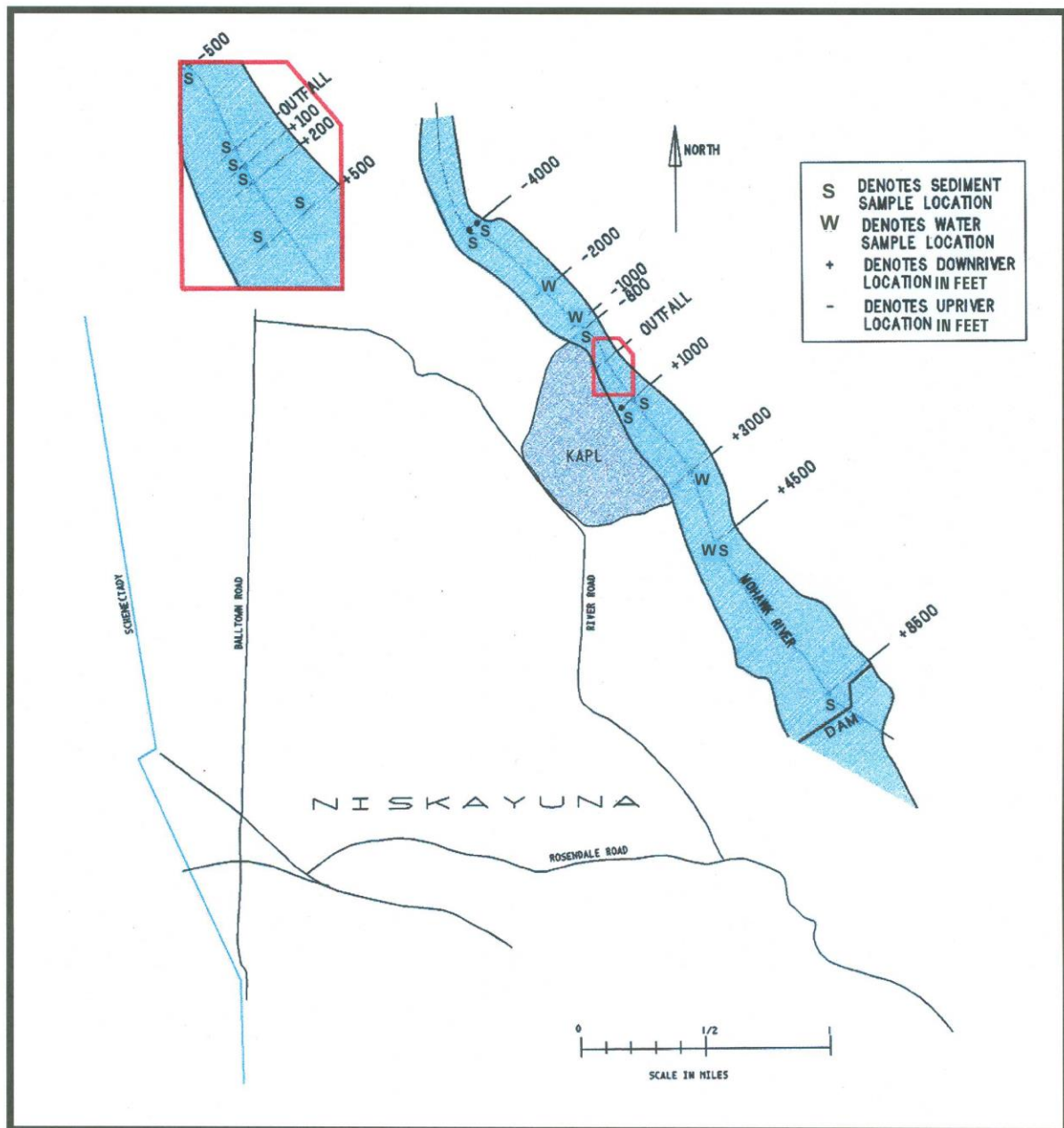


FIGURE 3
KNOLLS LABORATORY, NISKAYUNA, NEW YORK
MOHAWK RIVER SAMPLING LOCATIONS

The environmental air sample filters are changed on a routine basis and analyzed by direct counting for gross alpha and gross beta radioactivity using the method described in the Effluent Analyses of the Airborne Effluent Monitoring section of this report.

Assessment

Nonradiological: The results of the analyses of Mohawk River water for chemical quality are summarized in Table 13. Results of routine analyses in the West Boundary Stream and Midline Stream are summarized in Table 14, and results for the East Boundary Stream are summarized in Table 15. Results of supplemental analyses in the Midline Stream are summarized in Table 16. Analyzed parameters were generally below the NYS standards and guidance values for Class A waters for the section of the Mohawk River that borders Knolls Laboratory. The surface water database shows that there is no water quality degradation attributable to Knolls Laboratory.

Current Knolls Laboratory Operations

The Midline Stream has the potential to be influenced by runoff from the east side of Knolls Laboratory. The West Boundary Stream captures runoff from an on-site road and parking lot. Therefore, the Knolls Laboratory SPDES Permit requires the stormwater for these areas to be monitored. Additional voluntary monitoring is performed and is presented in Tables 13, 14, and 15. Results of supplemental analyses in the Midline Stream are summarized in Table 16. The NYS water quality standard for chloride was exceeded in West Boundary Stream, Midline Stream, and East Boundary Stream. The high chloride results for all streams were attributed to winter road salting and snow/ice removal operations.

Voluntary surface water monitoring is also performed for other parameters at these locations to supplement the regulatory required SPDES and landfill post-closure monitoring activities. The data from samples analyzed during 2025 continued to indicate there is no adverse impact from current Knolls Laboratory operations on the Mohawk River or the closed landfill on the surrounding surface water streams. Instances where surface water standards or guidance values have been exceeded are discussed below.

Surface Water Near the Closed Landfill

The former Knolls Laboratory landfill (permanently closed and capped in 1993) is bordered by the East Boundary Stream, the West Landfill Stream (which is frequently dry), and the Mohawk River to the north. Sample data for the East Boundary Stream is presented in Table 15. The East Boundary Stream upstream and downstream locations are sampled as part of the landfill post-closure monitoring activities.

The Mohawk River and East Boundary Stream data, as previously discussed, do not indicate any measurable impact from the former landfill.

Radiological: Results of the radioactivity analyses performed on samples of Mohawk River and municipal waters are summarized in Table 21. The results for the gross alpha and gross beta radioactivity concentrations showed no significant difference between river water samples

upstream and downstream from Knolls Laboratory or in Schenectady, Niskayuna, and Latham/Colonie municipal waters.

The results of radioactivity measurements for gross beta, strontium-90, cesium-137, plutonium, and uranium in Mohawk River bottom sediment samples are summarized in Table 22. The 2025 data showed no significant differences between upstream and downstream radioactivity concentrations for gross beta, strontium-90, cesium-137, plutonium, and uranium. Historically, slightly higher concentrations of radioactivity have occasionally been measured in samples collected from locations within one thousand feet downstream from the main Knolls Laboratory outfall. This localized concentration of radioactivity has been attributed to operations conducted prior to 1964, when the facility was subject to applicable Federal regulations and State and local agreements through the Mohawk River Advisory Committee that permitted limited amounts of radioactivity to be released to the Mohawk River. These low levels of radioactivity in the river sediment do not present a health risk since the radioactivity is deposited as bottom sediment, which is not subject to becoming airborne and is unlikely to interact with the aquatic environment. Additional detail regarding the low level of radioactivity in the Mohawk River is discussed in the Special Mohawk River Surveys section later in this report.

The results of the detailed gamma spectrum analyses performed on Mohawk River bottom sediment samples also indicated the expected low levels of potassium-40 and daughters of uranium and thorium. The potassium-40 and daughters of uranium and thorium are naturally occurring radionuclides. No detectable cobalt-60 was found in any of the samples. However, localized low levels of cobalt-60, attributable to operations prior to 1964, have been observed occasionally in past river sediment samples.

The analytical results for the fish collected from the Mohawk River are summarized in Tables 23 and 24. The results indicated the presence of naturally occurring potassium-40. The results of sensitive analyses for strontium-90 and plutonium indicated essentially no detectable strontium-90 or plutonium in either upstream or downstream fish. The measured concentrations of radioactivity indicated no effect from Knolls Laboratory operations. In addition, the results of a detailed biological survey (Reference (11)) confirm that the low levels of radioactivity in the Mohawk River bottom sediment near the main Knolls Laboratory outfall (Outfall 002) are not propagated through the food chain.

The analytical results for the environmental air samples for 2025 indicated that there were no significant differences between the average upwind and downwind radioactivity concentrations. The average upwind gross alpha and gross beta radioactivity concentrations were 1.1×10^{-15} $\mu\text{Ci/ml}$ and 1.4×10^{-14} $\mu\text{Ci/ml}$, respectively. The average downwind gross alpha and gross beta radioactivity concentrations were 1.0×10^{-15} $\mu\text{Ci/ml}$ and 1.5×10^{-14} $\mu\text{Ci/ml}$, respectively.

TABLE 21
RESULTS OF MONITORING MOHAWK RIVER WATER
AND MUNICIPAL WATER

Location and Source of Water Sample	Number of Samples	Radioactivity Concentration (pCi/l) ^(1,2,3)						
		Gross Alpha Values				Gross Beta Values		
		Minimum	Maximum	Average		Minimum	Maximum	Average
Mohawk River								
Upstream	6	<2.19	6.79 ± 4.01	<3.85 ± 1.87	<2.89	11.46 ± 4.20	<5.78 ± 3.40	
Downstream	6	<2.25	7.39 ± 4.76	<4.84 ± 1.94	<2.18	5.70 ± 4.08	<4.48 ± 1.60	
Municipal Water								
Schenectady Municipal Water ⁽⁴⁾	4	<1.29	<2.29	<1.88 ± 0.67	0.84 ± 1.02	3.72 ± 2.26	<1.95 ± 1.97	
Niskayuna Municipal Water ⁽⁴⁾	4	<1.46	<2.37	<2.06 ± 0.66	1.65 ± 1.16	2.57 ± 2.20	<1.93 ± 0.68	
Latham/Colonie Municipal Water ⁽⁴⁾	4	1.41 ± 1.87	<2.34	<1.89 ± 0.65	1.16 ± 1.02	<1.88	<1.54 ± 0.47	

Notes:

1. The (±) value for average values provides the 95% confidence interval for the average value. The lowest possible value for any parameter is zero.
2. A value preceded by "<" is less than the DLC for that sample and parameter.
3. Average values preceded by "<" contain at least one value that is less than the DLC.
4. Monthly samples are composited and analyzed quarterly.

TABLE 22
RESULTS OF ANALYSES OF MOHAWK RIVER SEDIMENT
FOR RADIOACTIVITY

Number of Samples and Type of Results	Radioactivity Concentration (pCi/g, dry weight) ^{(1) (2)}		
	Area Sampled Relative to Effluent Point		
	Upstream	Opposite	Downstream
Gross Beta Concentration			
Number of samples	12	3	24
Average Concentration ⁽³⁾	39.60 ± 4.40	37.00 ± 1.79	42.53 ± 2.22
Minimum Concentration	30.10 ± 6.76	36.20 ± 7.60	33.00 ± 7.06
Maximum Concentration	49.90 ± 8.59	37.60 ± 7.52	53.00 ± 9.10
Sr-90 Concentration			
Number of samples	4	1	2
Average Concentration ⁽³⁾	<0.02 ± 0.01	0.04 ± 0.02	<0.01 ± 0.01
Minimum Concentration	<0.01	0.04 ± 0.02	<0.01
Maximum Concentration	0.03 ± 0.02	0.04 ± 0.02	<0.01
Cs-137 Concentration			
Number of samples	12	3	24
Average Concentration ⁽³⁾	<0.03 ± 0.01	<0.02 ± 0.01	<0.04 ± 0.01
Minimum Concentration	<0.02	0.02 ± 0.02	0.02 ± 0.01
Maximum Concentration	0.08 ± 0.03	<0.02	0.09 ± 0.04
Plutonium Concentration⁽⁴⁾			
Number of samples	12	3	24
Average Concentration ⁽³⁾	<0.01 ± 0.01	<0.02 ± 0.04	<0.02 ± 0.01
Minimum Concentration	<0.01	<0.01	<0.01
Maximum Concentration	<0.05	<0.04	<0.04
Uranium Concentration⁽⁵⁾			
Number of samples	12	3	24
Average Concentration ⁽³⁾	0.85 ± 0.09	0.80 ± 0.55	0.85 ± 0.10
Minimum Concentration	0.61 ± 0.04	0.61 ± 0.04	0.30 ± 0.02
Maximum Concentration	1.13 ± 0.06	1.04 ± 0.06	1.20 ± 0.06

Notes:

1. The sediment is sampled to a depth of approximately 2.5 cm.
2. The (±) values for minimum and maximum concentrations represent the statistical uncertainty at two standard deviations. A value preceded by "<" is less than the DLC.
3. The (±) values for average concentrations provide the 95% confidence interval for the average value. Average values preceded by "<" contain at least one value that is less than the DLC.
4. Plutonium concentration values are the sum of results for Pu-238, Pu-239, and Pu-240. Minimum and maximum concentrations preceded by "<" include at least one radionuclide concentration that is less than the DLC in the sum of the radionuclides.
5. Uranium concentration values are the sum of results for U-234, U-235, and U-238. Minimum and maximum concentrations preceded by "<" include at least one radionuclide concentration that is less than the DLC in the sum of the radionuclides.

TABLE 23
GAMMA SPECTROMETRY RESULTS FOR MOHAWK RIVER FISH

Sample Location ⁽²⁾	Fish Type	Number of Samples	Radioactivity Concentrations (pCi/g, wet weight) ⁽¹⁾			
			K-40		Cs-137	
			Maximum	Average ⁽³⁾	Maximum	Average ⁽³⁾
Upstream	Shorthead Redhorse Sucker Carp	3	3.53 ± 0.30	2.87 ± 1.58	<0.01	<0.01 ± 0.01
Upstream	Smallmouth Bass Walleye	2	4.09 ± 0.32	3.75 ± 4.34	<0.01	<0.01 ± 0.01
Downstream	Carp Shorthead Redhorse Sucker	3	3.51 ± 0.29	3.03 ± 1.02	<0.01	<0.01 ± 0.01
Downstream	Walleye Smallmouth Bass	2	3.86 ± 0.31	3.69 ± 2.14	<0.01	<0.01 ± 0.01

Notes:

1. A value preceded by "<" is less than the DLC for that sample and parameter. The (±) value provides the statistical uncertainty at the 95% confidence interval.
2. Upstream samples were obtained above Lock 8 and below Lock 9. (Lock 8 and Lock 9 are located approximately 9 miles and 14 miles, upstream respectively, from Knolls Laboratory Outfall 002). Downstream samples were obtained between Knolls Laboratory Outfall 002 and Lock 7.
3. Average values preceded by "<" contain at least one value that is less than the DLC.

TABLE 24
RADIOCHEMICAL ANALYSIS RESULTS FOR MOHAWK RIVER FISH

Sample Location ⁽¹⁾	Fish Type	Radioactivity Concentration (pCi/g wet weight) ⁽²⁾	
		Sr-90	Plutonium ⁽³⁾
Upstream	Smallmouth Bass	<0.004	<0.002
Upstream	Walleye	<0.003	<0.001
Upstream	Carp	0.007 ± 0.007	<0.001
Downstream	Smallmouth Bass	0.005 ± 0.005	<0.001
Downstream	Walleye	<0.004	<0.001
Downstream	Carp	<0.004	<0.001

Notes:

1. Upstream samples were obtained above Lock 8 and below Lock 9. (Lock 8 and Lock 9 are located approximately 9 miles and 14 miles, upstream respectively, from Knolls Laboratory Outfall 002). Downstream samples were obtained between Knolls Laboratory Outfall 002 and Lock 7.
2. A value preceded by "<" is less than the DLC for that sample and parameter. The (±) value provides the statistical uncertainty at the 95% confidence interval.
3. Plutonium concentration values are the sum of results for Pu-238, Pu-239, and Pu-240.

Special Mohawk River Surveys

Knolls Laboratory conducted an extensive sediment and biological sampling program of the Mohawk River during the summer of 1992 and again during the summer of 2002. These sampling programs were performed to update information on the quantity and distribution of radioactivity in the river sediment attributable to Knolls Laboratory operations prior to 1964 and to demonstrate that the residual radioactivity has no adverse effect on human health or the environment. Samples included numerous sediment core samples and various samples of fish, macrophyton, periphyton, plankton, benthic macroinvertebrates, and water. NYSDEC participated in the 2002 survey by observing Knolls Laboratory sampling on the Mohawk River and splitting select core samples for independent analysis. Knolls Laboratory also conducted a special sampling program consisting of only sediment core samples in 1980 (Reference (11)).

In 2019, DOE-EM collected sediment core samples in locations adjacent to and downstream of Knolls Laboratory. Results from this survey were published in Reference (12). Based on the results, DOE-EM concluded that current data is consistent with previously collected survey data, and existing residual radioactivity in the Mohawk River sediment has not migrated further downstream.

The results of the 1992 and 2002 sampling programs, as discussed in References (13) and (14), respectively, show that the distribution of residual radioactivity in the Mohawk River sediment in the vicinity of Knolls Laboratory is well understood. The majority of radioactivity present is confined to an area along the south side of the Mohawk River, which extends from Knolls Laboratory Outfall 002 to 1,000 feet downstream. The radioactivity generally is located at least 8 inches below the top of the sediment surface. Radioactivity concentrations above background levels were also detectable further downstream; however, the concentrations are lower, and the radioactivity is located even deeper in the sediment.

Comparison of the 2002 sediment sampling results with those from 1992 and to those obtained from the similar survey done in 1980 showed that the 2002 results were similar to the 1992 results, though generally were lower than the 1980 results. The residual radioactivity remained deeper in the sediment than when surveyed in 1980, due to deposition of new sediment in the outfall area. Additionally, the NYSDEC split sample results for the 2002 survey were in very good agreement with Knolls Laboratory sample results.

A comparison was made between the total amount of residual radioactivity of Knolls Laboratory origin estimated to be present in the sediment above the Lock 7 dam for the 1980, 1992, and 2002 surveys. Though below the results from 1980 (with correction for radioactive decay), the 2002 survey results were not significantly different than the results obtained in 1992. The total radioactivity of Knolls Laboratory origin present in the sediment above the Lock 7 dam was considered to be the same as estimated from the 1992 study: less than 0.65 Ci, of which 90% was attributable to cesium-137 and strontium-90 (and its short-lived daughter product yttrium-90). For perspective, the total radioactivity of Knolls Laboratory origin present in the sediment is less than 10% of the naturally occurring radioactivity found in the sediment in the same region.

The results of the fish and other biological sampling conducted showed no detectable radioactivity of Knolls Laboratory origin above weapons testing fallout levels in any biological sample. These

results continue to demonstrate that the residual radioactivity in the sediment is not being taken up in the food chain.

A radiological assessment of the residual radioactivity in the sediment concluded that, even using very conservative assumptions and hypothetical scenarios, no measurable dose to a member of the public would result, even if all of the radioactivity in the sediment were released back into the river water. The major conclusion of the radiological assessment is that the radioactivity of Knolls Laboratory origin continues to have no adverse effect on human health or the environment.

RADIATION MONITORING

The purpose of the environmental radiation monitoring program is to measure the ambient radiation levels around Knolls Laboratory to confirm that operations have not altered the natural radiation background levels at Knolls Laboratory perimeter. The sources of radiation at Knolls Laboratory are from small specimens of irradiated and non-irradiated materials, radioactive waste management facilities, and residual radioactivity remaining in facilities from historical operations.

Scope

Environmental radiation levels were monitored at the perimeter of Knolls Laboratory with a network of standard DT-702/PD lithium fluoride TLDs. The sixteen locations of Knolls Laboratory perimeter TLD monitors are shown in Figure 2. Two temporary perimeter TLD locations (T18 and T19) were added to monitor the relocation of the SPRU project transuranic (TRU) waste temporary storage on November 27, 2018, at the start of the first quarter 2019 monitoring period.

Control TLD monitors were also posted at remote off-site locations to measure the natural background levels typical of the surrounding area. All TLD monitors were posted for quarterly exposure periods.

Analyses

The environmental TLDs were calibrated to a cesium-137 standard source. The TLD radiation exposures were measured quarterly utilizing an automated TLD readout system, which was calibrated prior to the processing of the TLDs.

Assessment

The results for Knolls Laboratory perimeter and off-site radiation monitoring locations are summarized in Table 25. Except for monitoring location 5, 16, and T18, the total annual exposures for each perimeter location are within the expected distribution of the off-site measurements at the 95% confidence interval. Perimeter monitoring locations 4, 5, 16, and T18 are located close to the SPRU Disposition Project (SPRU DP) temporary storage area established for managing TRU waste from the SPRU DP, which resulted in slightly elevated radiation levels at these locations. Other locations such as T19 were slightly elevated for the same reason but fell within the 95% confidence interval of the off-site locations. Conservative calculations show that the radiation exposure to the nearest off-site neighbor in the same direction would not be discernable from natural background radiation. As a result, Knolls Laboratory operations in 2025 have had no significant effect on off-site radiation levels beyond the Knolls Laboratory perimeter.

TABLE 25
PERIMETER AND OFF-SITE RADIATION MONITORING RESULTS,
KNOLLS LABORATORY

Monitoring Location ⁽¹⁾	Total Annual Exposure ⁽²⁾ (mrem)
1	72 ± 2
2	66 ± 2
3	69 ± 1
4	80 ± 1
5	84 ± 2
6	72 ± 2
7	77 ± 2
8	75 ± 3
9	69 ± 2
10	66 ± 2
11	72 ± 2
12	71 ± 2
13	66 ± 1
14	70 ± 2
15	76 ± 3
16	84 ± 2
T18	112 ± 3
T19	79 ± 2
Off-Site Locations	64 ± 16 ⁽³⁾

Notes:

1. See Figure 2 for perimeter monitoring locations.
2. The (±) values for individual locations provide the 95% confidence interval for the exposure due to random uncertainty.
3. Approximately 95% of off-site natural background measurements are expected to be within this range.

GROUNDWATER MONITORING

Scope

Knolls Laboratory groundwater monitoring program includes routine monitoring of the closed Knolls Laboratory landfill, monitoring of localized areas as part of the RCRA Corrective Action program, and voluntary monitoring across the site.

Groundwater from 34 monitoring wells was sampled and analyzed for chemical quality and/or radioactivity in 2025. Sampling and analysis of 16 groundwater monitoring wells and water from two catch basins is required by NYS regulations. Five wells (NTH-1A, NTH-2A, NTH-5A, W-11, and W-12) are associated with post-closure landfill groundwater monitoring. Eleven wells (MW-40, MW-44R, MW-45, MW-46, MW-47R, MW-48, MW-49, MW-50, MW-51, MW-52, and SW-10) and two catch basins (CBR 002-248 and CBR 002-260) are monitored to assess the effectiveness of soil remediation projects performed in the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway. The remaining groundwater monitoring wells were voluntarily monitored by Knolls Laboratory. The locations of Knolls Laboratory monitoring wells and the location of the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway are shown on Figure 2. The locations of the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway monitoring wells and catch basins are shown on Figure 4.

Sources

Nonradiological: Generally, groundwater underlying Knolls Laboratory is contained in highly impermeable and nonporous soil and bedrock. Consequently, there is only slight movement of the water, generally believed to be toward the northeast, toward the Mohawk River. Due to the impermeable and nonporous nature of the soil and bedrock, there is no commercial or public development of the groundwater in the vicinity of Knolls Laboratory. Groundwater contaminants can be introduced through two possible routes. The first route, surface recharging, carries atmospheric contaminants such as acid rain and airborne radioactivity from natural and manmade sources (such as past nuclear weapons testing), and surface contaminants from operational and historical land use (such as de-icing compounds, fertilizers, and pesticides). The second route is leaching of shallow nonradioactive buried wastes in the closed Knolls Laboratory landfill and other burial areas in the vicinity of the landfill where small amounts of waste chemicals from laboratory operations were buried many years ago, consistent with common industrial practices at the time.

Radiological: In some areas of Knolls Laboratory, the soil contains low levels of radioactivity from operations that commenced in the 1950s that is detectable above background levels. This has resulted in low levels of radioactivity in some of the on-site groundwater wells.

Analyses

Nonradiological: As part of the NYSDEC-approved Knolls Laboratory Landfill Post-Closure Monitoring Program (Reference (9)), Knolls Laboratory monitors five overburden wells; one upgradient (NTH-1A) and four downgradient wells (NTH-2A, NTH-5A, W-11, and W-12). The parameters monitored under the revised monitoring plan (approved by NYSDEC in 2018) allow

for adequate groundwater quality assessment based on the large historical database. During 2025, the landfill wells were sampled once, in accordance with Reference (9).

The D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway post-remediation groundwater monitoring program consists of eleven wells (MW-40, MW-44R, MW-45, MW-46, MW-47R, MW-48, MW-49, MW-50, MW-51, MW-52, and SW-10) and four inlet sample locations from two catch basins (CBR 002-248; inlet samples A, B, and C and CBR 002-260; inlet sample A) that are monitored biannually to assess the effectiveness of soil remediation projects in these areas. The monitoring program is performed on a biannual frequency (i.e., monitoring in the first and third quarters in odd-numbered years and the second and fourth quarters in even-numbered years) starting in 2023. The soil remediation projects were performed in accordance with NYS regulatory agency approved plans and entailed the removal of soil and debris containing VOCs.

Table 26 summarizes the scope of groundwater monitoring, including both regulatory and voluntary monitoring programs. Table 27 lists the specific analyses for each chemical parameter group (field parameters, metals, and VOCs). For the voluntary program, the selection of wells and parameter groups is based on the historical groundwater monitoring program results, site operational history, well locations, and subsurface hydrogeological information. For data discussion purposes, the wells are grouped into the following categories as listed in Table 26: Landfill, Land Area, Hillside, and Lower Level.

All field parameters except for turbidity are measured in the field using procedures provided in Standard Methods (Reference (10)), or other EPA approved methods for analyzing chemical parameters. The vendor analytical laboratory is NYS Environmental Laboratory Approval Program (ELAP) certified in potable water analyses and wastewater chemical analyses.

Radiological: The groundwater well samples are analyzed by Knolls Laboratory for radiological parameters using the methods described in the Effluent Analyses section of this report.

TABLE 26
KNOLLS LABORATORY GROUNDWATER SAMPLING PROGRAM

WELL CATEGORY	WELL ID	RADIOACTIVITY	MONITORING PARAMETER GROUP		
			FIELD	METALS	VOCs
LANDFILL	NTH-1A	A	A		A
	NTH-2A	A	A		A
	NTH-5A	A	A		A
	W-11	A	A		A
	W-12	A	A		A
LAND AREA	KH-2	A	A	A	A
	KH-3S ⁽¹⁾	A			
	MW-3	A	A	A	A
	W-1	A	A	A	A
	W-4	A	A	A	A
	W-8	A	A	A	A
	W-10	A	A	A	A
HILLSIDE	B-6	A	A		A
	B-16	A	A		A
	KH-6	A	A		A
	KH-9S	A	A		A
	KH-17	A	A		A
	KH-18	A	A		A
	MW-40 ⁽²⁾		B		B
	MW-44R ⁽²⁾		B		B
	MW-45 ⁽²⁾		B		B
	MW-46 ⁽²⁾		B		B
	MW-47R ⁽²⁾		B		B
	MW-48 ⁽²⁾		B		B
	MW-49 ⁽²⁾		B		B
	MW-50 ⁽²⁾		B		B
	MW-51 ⁽²⁾		B		B
	MW-52 ⁽²⁾		B		B
	SW-10 ⁽³⁾	A	A, B		A, B
LOWER LEVEL	KH-19	A	A		A
	KH-20 ⁽¹⁾	A			
	KH-21	A	A		A
	KH-22	A	A		A
	KH-23	A	A		A

Notes:

A = Annually

B = Biannually

1. Wells KH-3S and KH-20 are only sampled for radioactivity under the Voluntary Monitoring Program.
2. Wells are associated with the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway post-remediation groundwater monitoring program.
3. Well SW-10 is associated with the Voluntary Monitoring Program and the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway post-remediation groundwater monitoring program.

TABLE 27
GROUNDWATER MONITORING PARAMETERS

MONITORING PARAMETER GROUPS		
FIELD	METALS ⁽¹⁾	VOLATILE ORGANIC COMPOUNDS
Static Water Level Specific Conductance Temperature pH Turbidity ⁽²⁾	Aluminum Antimony Arsenic Barium Beryllium Boron Cadmium Calcium Chromium (total and hexavalent) Copper Iron Lead Magnesium Manganese Mercury Nickel Potassium Selenium Silver Sodium Thallium Zinc	EPA Method 601: Chloromethane Bromomethane Dichlorodifluoromethane Vinyl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1,1-Dichloroethane 1,1-Dichloroethene trans-1,2-Dichloroethene cis-1,2-Dichloroethene Chloroform 1,2-Dichloroethane 1,1,1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1,2-Dichloropropane trans-1,3-Dichloropropene Trichloroethene Dibromochloromethane 1,1,2-Trichloroethane cis-1,3-Dichloropropene Bromoform 1,1,2,2-Tetrachloroethane Tetrachloroethene Chlorobenzene p-Dichlorobenzene m-Dichlorobenzene o-Dichlorobenzene EPA Method 602: ⁽³⁾ Benzene Toluene Ethylbenzene Xylenes EPA Method 8260: ⁽⁴⁾ Acetone Bromochloromethane 2-Butanone Carbon disulfide Cyclohexane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane

Notes for Table 27 are on page 76.

TABLE 27 (continued)
GROUNDWATER MONITORING PARAMETERS

MONITORING PARAMETER GROUPS		
FIELD	METALS ⁽¹⁾	VOLATILE ORGANIC COMPOUNDS
		1,4-Dioxane 2-Hexanone Isopropylbenzene Methyl acetate Methyl tert-butyl ether Methylcyclohexane 4-Methyl-2-pentanone Styrene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,1,2-Trichloro-1,2,2-trifluoroethane

Notes:

1. Analysis of metals (unfiltered and filtered) is performed voluntarily and only in the Land Area Wells.
2. Measured only for the Land Area Wells.
3. EPA method 602 parameters not required at the Landfill Wells.
4. EPA method 8260 parameters also include the parameters listed in EPA method 601 and EPA method 602. They are required only for the Hillside wells associated with the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway post-remediation groundwater monitoring program.

Assessment

Nonradiological: Tables 28, 29, and 30 summarize the 2025 nonradiological groundwater monitoring results for the landfill and voluntary monitoring wells. Generally, the majority of analytical results are indicative of natural groundwater quality. Most variations in the data are attributable to natural water quality, variability in laboratory results at or near the RL, or interference associated with groundwater turbidity. The turbidity is the result of natural particulate materials entering the well from the surrounding clay and silt-rich geologic materials. Turbid water samples commonly show elevated metal results that are caused by particle mineralogy and are not indicative of dissolved, mobile metals. Tables 31 and 32 summarize the 2025 biannual monitoring of the D3-D6 Area, the former D3/D4 Yard, and the G1-D4 Alleyway.

All monitoring results are compared to the NYS groundwater standards provided in 6 NYCRR Part 703 for Class GA groundwater (Reference (2)). If no standard is provided, then the results are compared to the Guidance Values provided in the NYS Technical and Operational Guidance Series (TOGS) (1.1.1) Water Quality Standards and Guidance Values (Reference (4)).

Landfill

Knolls Laboratory Landfill well results are presented in Table 28. Specific conductance and pH were consistent with past monitoring results. Overall results of field parameters for the landfill wells were within representative ranges typical of the landfill area per Reference (15). VOCs were not detected at or above the RL in any of the monitored Landfill wells.

Land Area

The Land Area data (Table 29) show natural water quality variations, the turbidity/elevated metal relationship, and road salting effects. Specific conductance and pH were consistent with past monitoring results. Toxic metal results from all wells were less than the corresponding groundwater standard and are attributable to natural water quality. VOCs were not detected at or above the RL or the applicable groundwater standard in any of the monitored Land Area wells, with the exception of well W-4. Three VOCs were detected in the samples collected from well W-4, but only two VOCs were detected above the applicable groundwater standards. The presence of VOCs in W-4 is consistent with historical detections.

Hillside

The Hillside groundwater monitoring consists of field parameters and VOC analysis. The field parameter data are consistent with the effects of natural groundwater compositional variations (Table 30). VOCs were not detected at or above the RL at any Hillside well locations. An investigation of the Hillside revealed that the VOCs are mostly restricted to porous backfill associated with building foundations and utility lines and are not migrating through indigenous soils.

Lower Level

The Lower Level wells are installed in bedrock and are sampled for field parameters and VOCs. Field parameter data are shown in Table 30. The field data show the effects of natural groundwater compositional variations and are generally consistent with historical results. VOCs were not detected at or above the RL at any Lower Level well locations.

D3-D6 Area, Former D3/D4 Yard, and G1-D4 Alleyway

The D3-D6 Area, former D3/D4 Yard, and G1-D4 Alleyway monitoring wells and catch basin inlet monitoring locations are situated adjacent to and within areas subject to past soil remediation (Figure 4). The monitoring consists of VOC analysis. VOCs were detected in samples collected from six of the eleven monitoring wells. One well contained VOCs at concentrations below applicable groundwater standards, and five wells contained VOCs at concentrations above applicable groundwater standards. These VOCs are localized to the area adjacent to Buildings D3 and D6 and were not detected in downgradient or side-gradient monitoring wells. A summary of the detected VOCs is provided in Table 31.

VOCs were detected in samples collected from the four catch basin inlets at concentrations below the applicable groundwater standards. The VOCs detected in the catch basin inlets are consistent with those detected in monitoring wells adjacent to Buildings D3 and D6 with some influence from VOC remnants in the G1-D4 Alleyway. The presence of VOCs in the storm drain inlets shows some in-leakage of adjacent groundwater into the storm drain system. A summary of the detected VOCs is provided in Table 32.

Radiological: Results of the groundwater monitoring for radioactivity are summarized in Table 33. Some wells had slightly higher gross beta and/or gross alpha radioactivity than the background wells. This is attributed to slightly higher levels of dissolved naturally occurring uranium, thorium, and their respective daughter products. Naturally occurring potassium-40 would also contribute to the gross beta radioactivity. Strontium-90 was detected above background levels in several wells. Strontium-90 and its daughter product, yttrium-90, also contribute to the gross beta radioactivity. All gross alpha, gross beta, and strontium-90 results were generally within the range of previously reported values. The maximum concentration of strontium-90, which has the most restrictive DCS of any radionuclide measured in any well, was detected in well KH-21. The KH-21 strontium-90 concentration was less than one percent of the DOE DCS (Reference (6)).

Conclusion

The overall conclusion of the groundwater monitoring program is that previous operations and waste disposal practices have resulted in some small, measurable effects on the groundwater quality in localized areas of Knolls Laboratory. Based on upstream and downstream monitoring of the Mohawk River, there is no detectable effect on river water quality as a result of past or current Knolls Laboratory operations. The groundwater is limited in quantity and is not used as a drinking water supply. In addition, Knolls Laboratory is not located over any principal or primary bedrock or overburden aquifers. Therefore, the groundwater associated with Knolls Laboratory does not pose any threat to public health or the environment.

TABLE 28
RESULTS OF KNOLLS LABORATORY
GROUNDWATER MONITORING OF LANDFILL WELLS

Well	Sample Date	Parameter				
		Water Level Elevation (ft) ⁽¹⁾	Temperature (°C)	pH (SU)	Specific Conductance (µmhos/cm)	VOCs ⁽²⁾ (µg/l)
NTH-1A ⁽³⁾	05/19/25	320.00	9.9	6.3	376	<1.0
NTH-2A	05/19/25	233.34	8.6	7.1	533	<1.0
NTH-5A	05/19/25	269.75	11.1	6.5	207	<1.0
NTH-5A QA Duplicate	05/19/25	----	----	----	----	<1.0
W-11	05/19/25	257.74	10.5	6.9	866	<1.0
W-12	05/19/25	240.57	9.5	7.0	391	<1.0
STANDARD/GUIDANCE VALUE ⁽⁴⁾		Note (5)	Note (5)	6.0 – 9.0 ⁽⁶⁾	Note (5)	Note (7)

Notes:

1. The latest site-wide topological mapping project results were used for the groundwater elevation calculations.
2. See Table 27 for a listing of the VOCs. Landfill wells are analyzed for VOCs only using EPA method 601. A value preceded by "<" is less than the RL.
3. Up-gradient well.
4. NYS Quality Standards and Guidance Values (References (2) and (4)).
5. No standard or guidance value available.
6. Per the NYSDEC-approved Post-Closure Landfill Monitoring Plan, the acceptable pH range is 6.0 – 9.0.
7. Standards/Guidance Values vary between 0.4 µg/l and 50 µg/l.

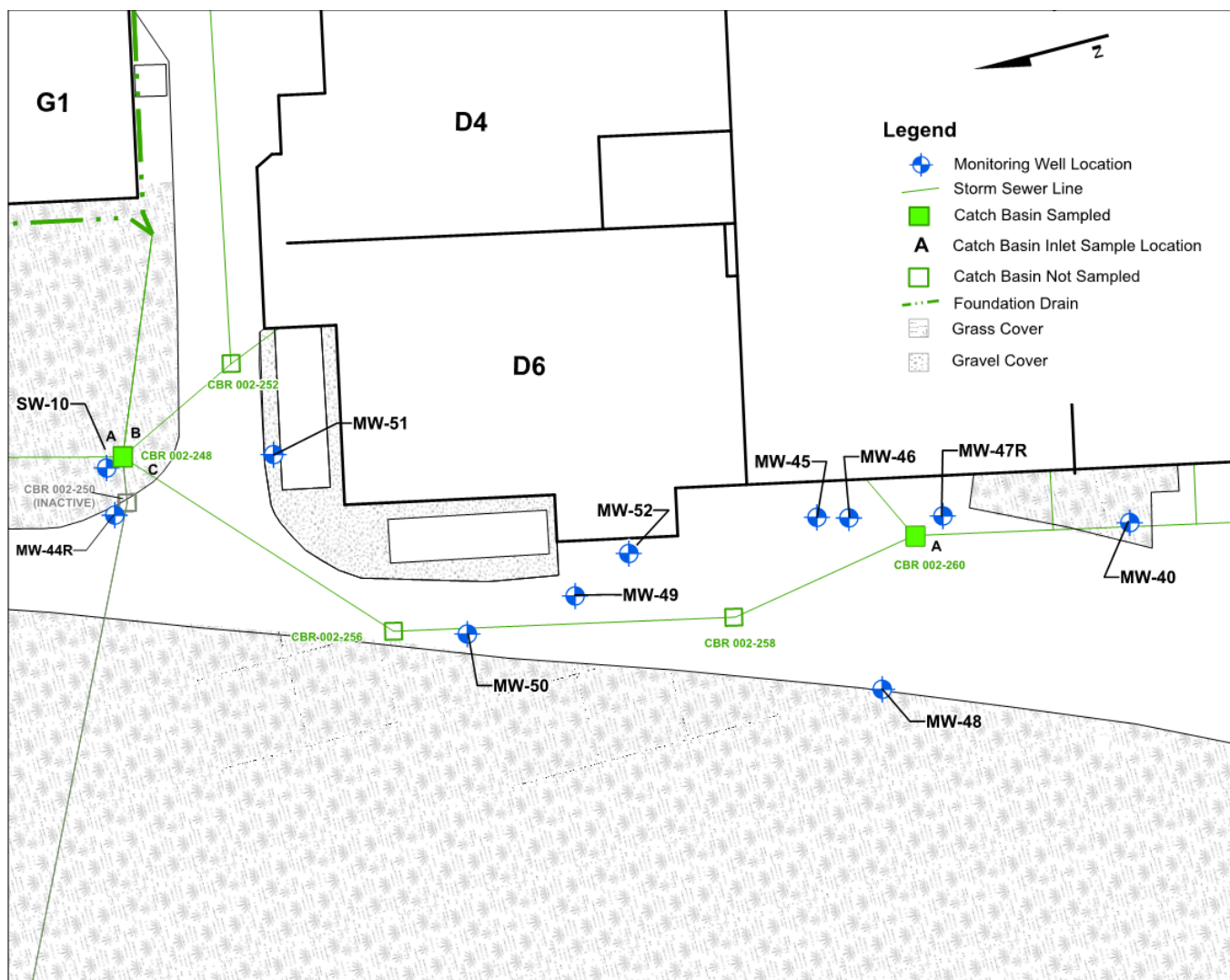


FIGURE 4
KNOLLS LABORATORY, NISKAYUNA, NEW YORK
D3-D6 AREA, FORMER D3/D4 YARD, AND G1-D4 ALLEYWAY
MONITORING LOCATIONS

TABLE 29
RESULTS OF KNOLLS LABORATORY GROUNDWATER MONITORING OF LAND AREA WELLS

Well	Sample Date	Parameter ⁽¹⁾									
		Field Parameters					Metals ⁽²⁾				
		Water Level Elevation (ft)	Temperature (°C)	pH (SU)	Specific Conductance (µmhos/cm)	Turbidity (NTU)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)
KH-2	05/19/25	323.51	12.2	6.8	7,730	7.0	0.253 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.448 / 0.437	<0.005 / <0.005
MW-3	05/19/25	319.20	11.1	6.5	1,817	0.8	<0.100 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.065 / 0.069	<0.005 / <0.005
W-1	05/19/25	320.94	13.3	7.3	6,331	5.6	<0.100 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.338 / 0.331	<0.005 / <0.005
W-4	05/19/25	283.42	11.7	7.1	1,298	34.0	0.318 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.065 / 0.057	<0.005 / <0.005
W-4, Duplicate	05/19/25	----	----	----	----	32.0	0.271 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.064 / 0.059	<0.005 / <0.005
W-8	05/19/25	300.43	12.1	7.8	474	16.0	0.163 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.115 / 0.138	<0.005 / <0.005
W-10	05/19/25	285.33	10.5	7.3	892	3.9	<0.100 / <0.100	<0.060 / <0.060	<0.005 / <0.005	0.022 / 0.022	<0.005 / <0.005
STANDARD/GUIDANCE VALUE ⁽³⁾		Note (4)	Note (4)	6.5 - 8.5	Note (4)	5	Note (4)	0.003	0.025	1	0.003 ⁽⁵⁾

Notes for Table 29 are on page 83.

TABLE 29 (continued)
RESULTS OF KNOLLS LABORATORY GROUNDWATER MONITORING OF LAND AREA WELLS

Well	Sample Date	Metals ^(1,2)									
		Boron (mg/l)	Cadmium (mg/l)	Calcium (mg/l)	Chromium (mg/l)	Chromium, VI (mg/l) ⁽⁶⁾	Copper (mg/l)	Iron (mg/l)	Lead (mg/l)	Magnesium (mg/l)	Manganese (mg/l)
KH-2	05/19/25	<0.050 / 0.050	<0.005 / <0.005	547 / 541	<0.005 / <0.005	<0.02	0.018 / 0.023	1.01 / 0.233	<0.005 / <0.005	165 / 160	2.81 / 2.45
MW-3	05/19/25	<0.050 / <0.050	<0.005 / <0.005	160 / 178	<0.005 / <0.005	<0.02	0.010 / 0.012	0.098 / <0.050	<0.005 / <0.005	31.8 / 34.0	<0.020 / <0.020
W-1	05/19/25	0.075 / 0.069	<0.005 / <0.005	347 / 351	<0.005 / <0.005	<0.02	0.017 / 0.019	0.436 / 0.116	<0.005 / <0.005	88.8 / 86.7	0.165 / 0.144
W-4	05/19/25	0.077 / 0.075	<0.005 / <0.005	146 / 143	<0.005 / <0.005	<0.02	0.008 / 0.007	0.764 / <0.050	<0.005 / <0.005	41.3 / 42.7	0.251 / 0.129
W-4, Duplicate	05/19/25	0.077 / 0.077	<0.005 / <0.005	135 / 154	<0.005 / <0.005	<0.02	0.006 / 0.009	0.934 / <0.050	<0.005 / <0.005	38.2 / 43.2	0.312 / 0.146
W-8	05/19/25	0.251 / 0.266	<0.005 / <0.005	44.1 / 50.0	<0.005 / <0.005	<0.02	<0.005 / <0.005	0.200 / <0.050	<0.005 / <0.005	13.5 / 15.7	0.067 / 0.070
W-10	05/19/25	<0.050 / <0.050	<0.005 / <0.005	131 / 135	<0.005 / <0.005	<0.02	<0.005 / <0.005	0.187 / <0.050	<0.005 / <0.005	39.2 / 38.4	0.202 / 0.158
STANDARDS/GUIDANCE VALUES ⁽³⁾		1	0.005	Note (4)	0.05	0.05	0.2	0.3 ⁽⁷⁾	0.025	35 ⁽⁵⁾	0.3 ⁽⁷⁾

Notes for Table 29 are on page 83.

TABLE 29 (continued)
RESULTS OF KNOLLS LABORATORY GROUNDWATER MONITORING OF LAND AREA WELLS

Well	Sample Date	Metals ^(1,2)								Organics
		Mercury (mg/l)	Nickel (mg/l)	Potassium (mg/l)	Selenium (mg/l)	Silver (mg/l)	Sodium (mg/l)	Thallium (mg/l)	Zinc (mg/l)	VOCs (µg/l)
KH-2	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	53.1 / 52.6	<0.005 / 0.006	<0.010 / <0.010	1,030 / 1,050	<0.010 / <0.010	0.067 / 0.058	<1.0
MW-3	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	0.318 / 0.320	<0.005 / <0.005	<0.010 / <0.010	247 / 226	<0.010 / <0.010	0.013 / <0.010	<1.0
W-1	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	6.35 / 6.04	<0.005 / <0.005	<0.010 / <0.010	1,100 / 1,050	<0.010 / <0.010	0.012 / <0.010	<1.0
W-4	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	1.98 / 1.76	<0.005 / <0.005	<0.010 / <0.010	132 / 123	<0.010 / <0.010	0.010 / <0.010	8.7; cis-1,2-Dichloroethene 2.4; Trichloroethene 9.3; Tetrachloroethene
W-4, Duplicate	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	1.79 / 1.84	<0.005 / <0.005	<0.010 / <0.010	133 / 131	<0.010 / <0.010	<0.010 / <0.010	9.8; cis-1,2-Dichloroethene 2.7; Trichloroethene 9.0; Tetrachloroethene
W-8	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	2.79 / 3.42	<0.005 / <0.005	<0.010 / <0.010	53.2 / 53.0	<0.010 / <0.010	<0.010 / <0.010	<1.0
W-10	05/19/25	<0.0002 / <0.0002	<0.020 / <0.020	2.83 / 2.82	<0.005 / <0.005	<0.010 / <0.010	42.5 / 45.9	<0.010 / <0.010	<0.010 / <0.010	<1.0
STANDARD/GUIDANCE VALUE ⁽³⁾		0.0007	0.10	Note (4)	0.010	0.05	20	0.0005 ⁽⁵⁾	2.0 ⁽⁵⁾	Note (8)

Notes:

1. A value preceded by "<" is less than the RL.
2. Unfiltered / Filtered results.
3. Water Quality Standards, 6 NYCRR 703.5 (Reference (2)).
4. No groundwater standard or guidance value available.
5. NYSDEC, Division of Water TOGS (1.1.1), (Reference (4)).
6. Hexavalent chromium results are unfiltered, per Standard Method 3500Cr-D.
7. Combined concentration of iron and manganese shall not exceed 0.5 mg/l per 6 NYCRR 703.
8. See Table 27 for the complete list of VOCs that were analyzed. Standards/Guidance values vary between 0.4 µg/l and 50 µg/l.

TABLE 30
RESULTS OF KNOLLS LABORATORY GROUNDWATER MONITORING
OF HILLSIDE AREA AND LOWER LEVEL WELLS

Locations	Sample Date	Water Level Elevation (ft)	Temperature (°C)	pH (SU)	Specific Conductance (µmhos/cm)	Volatile Organic Compounds (µg/l) ⁽¹⁾
Hillside Area						
B-6	05/20/25	322.43	15.7	6.9	4,907	<1.0
SW-10	05/20/25	326.94	12.8	6.8	2,848	<1.0
SW-10 (Duplicate)	05/20/25	----	----	----	----	<1.0
B-16	05/20/25	269.2	10.9	7.2	1,728	<1.0
KH-6	05/20/25	315.03	12.0	6.8	711	<1.0
KH-17	05/20/25	322.27	10.8	6.9	1,189	<1.0
KH-9S	05/20/25	325.73	11.7	6.8	5,474	<1.0
KH-18	05/20/25	281.69	11.5	6.8	944	<1.0
Lower Level						
KH-19	05/20/25	237.61	12.6	9.1	934	<1.0
KH-21	05/20/25	242.49	11.7	6.8	7,272	<1.0
KH-22	05/20/25	221.99	11.7	7.2	5,902	<1.0
KH-23	05/20/25	245.45	11.8	7.4	3,703	<1.0
KH-23 (Duplicate)	05/20/25	----	----	----	----	<1.0

Notes:

- See Table 27 for the complete list of VOCs that were analyzed. A value preceded by "<" is less than the RL. The results for those parameters not listed in this table were all less than the RL.

TABLE 31
RESULTS OF KNOLLS LABORATORY GROUNDWATER MONITORING
OF D3-D6 AREA, FORMER D3/D4 YARD, AND G1-D4 ALLEYWAY,
DETECTED VOLATILE ORGANIC COMPOUNDS

Well	Sample Date	Volatile Organic Compounds ^(1,2)		
		cis-1,2-Dichloroethene (µg/l)	Tetrachloroethene (µg/l)	Trichloroethene (µg/l)
MW-45	03/11/25	1.7	5.7	1.7
	09/09/25	7.2	15	5.7
MW-45 Duplicate	03/11/25	1.7	5.4	1.6
	09/09/25	7.2	15 J-	5.6 J-
MW-46	03/11/25	<1.0	8.8	0.96
	09/09/25	6.9	84	10
MW-47R	03/12/25	3.1	38	1.6
	09/09/25	5.9	27	1.9
MW-49	03/11/25	1.3	4.5	0.68
	09/09/25	0.73 J	1.1	<0.28
MW-51	03/11/25	4.7	11	2.0
	09/10/25	9.8	17	3.4
MW-52	03/11/25	9.7	38	8.4
	09/09/25	16	40	10
Standards ⁽³⁾		5	5	5

Notes for Table 31 on page 86.

NOTES FOR TABLE 31

- J The associated result is less than the RL but greater than or equal to the method detection limit and the concentration is an approximate value.
- J- The associated result is less than the RL but greater than or equal to the method detection limit and the concentration is an approximate value biased low.
1. A value preceded by "<" is less than the RL.
2. Samples were analyzed for 52 VOCs. Acetone was detected in the March 11, 2025, sample from MW-40 at a concentration of 11 µg/l. The acetone result is less than the Reference (4) guidance value of 50 µg/l. The presence of acetone may be attributed to laboratory interference or natural occurrence. Carbon disulfide was detected in the September 10, 2025, sample from MW-44R at a concentration of 1.6 µg/l. The carbon disulfide result is less than the Reference (2) standard of 60 µg/l. The presence of carbon disulfide may be attributed to natural occurrence. Trans-1,2-dichloroethene was detected in the September 9, 2025, sample from MW-46 at a concentration of 0.28 J µg/l. The trans-1,2-dichloroethene result is less than the Reference (2) standard of 5 µg/l. Trans-1,2-dichloroethene is a breakdown product of tetrachloroethene and trichloroethene.
3. Water Quality Standards, 6 NYCRR 703.5 (Reference (2)).

TABLE 32
RESULTS OF KNOLLS LABORATORY CATCH BASIN MONITORING OF
D3-D6 AREA, FORMER D3/D4 YARD, AND G1-D4 ALLEYWAY,
DETECTED VOLATILE ORGANIC COMPOUNDS

Catch Basin	Sample Date	Volatile Organic Compounds ⁽¹⁾		
		cis-1,2-Dichloroethene (µg/l)	Tetrachloroethene (µg/l)	Trichloroethene (µg/l)
CBR 002-248-A	03/12/25	<1.0	0.29 J	0.48
	09/10/25	0.85 J	<0.40	3.1
CBR 002-248-A Duplicate	03/12/25	<1.0	0.30 J	0.47
	09/10/25	0.88 J	<0.40	3.1
CBR 002-248-B	03/12/25	<1.0	0.29 J	0.45
	09/10/25	0.74 J	0.52	1.4
CBR 002-248-C	03/12/25	<1.0	<0.40	0.45
	09/10/25	0.73 J	0.56	1.3
CBR 002-260-A	03/12/25	<1.0	0.46	0.36
	09/10/25	0.65 J	0.45	0.52
Standards ⁽²⁾		5	5	5

Notes:

- J The associated result is less than the RL but greater than or equal to the method detection limit and the concentration is an approximate value.
- 1. A value preceded by "<" is less than the RL.
- 2. Water Quality Standards, 6 NYCRR 703.5 (Reference (2)).

TABLE 33
RESULTS OF KNOLLS LABORATORY
GROUNDWATER MONITORING FOR RADIOACTIVITY

Location Month Sampled		Radioactivity Concentrations ^(1,2)					
		Gross Alpha	Gross Beta	Sr-90	Cs-137		H-3
							x10 ² pCi/l
pCi/l							
Landfill Area							
May	NTH-1A	<1.96	<1.58	<0.18	<0.60		<0.98
	NTH-2A	<2.25	<1.62	<0.17	<0.57		<0.97
	NTH-5A	<1.37	<1.40	<0.18	<0.56		<0.98
	W-11	<4.81	7.72 ± 3.41	<0.17	<0.59		<0.97
	W-12	<2.38	<1.68	<0.17	<0.65		<0.97
Land Area							
May	W-4	<4.38	4.20 ± 2.87	<0.17	<0.68		<0.98
	W-8	3.10 ± 4.03	5.17 ± 2.45	<0.17	<0.61		<0.98
	W-10	<3.22	6.26 ± 2.77	<0.17	<0.72		<0.98
	MW-3	<4.62	<2.15	<0.20	<0.54		<0.97
Hillside Area							
May	B-6	<11.83	8.26 ± 7.72	0.17 ± 0.22	<0.58		<0.97
	B-16	<2.92	10.11 ± 3.65	<0.17	<0.60		<0.97
	KH-6	<1.78	4.12 ± 2.90	<0.17	<0.50		<0.97
	KH-9S	<3.36	6.00 ± 3.53	<0.17	<0.49		<0.97
	KH-17	<1.98	8.40 ± 3.39	<0.18	<0.49		<0.97
	KH-18	<1.87	6.00 ± 3.06	<0.17	<0.54		<0.97
	SW-10	<8.41	<5.55	0.33 ± 0.23	<0.44		<0.97
Lower Level							
May	KH-19	<2.94	5.96 ± 2.72	<0.17	<0.52		<0.97
	KH-20	<4.02	<3.60	<0.17	<0.50		<0.97
	KH-21	<8.66	8.49 ± 7.24	2.08 ± 0.37	<0.53		<0.97
	KH-22	<12.45	6.41 ± 7.95	0.78 ± 0.28	<0.44		<0.98
	KH-23	<7.11	7.48 ± 6.38	<0.22	<0.31		<0.97
Background Wells – for comparison							
May	W-1	<15.80	<7.27	<0.17	<0.36		<0.98
	KH-2	<7.86	10.87 ± 9.25	0.17 ± 0.22	<0.53		<0.97
	KH-3S	<1.37	4.48 ± 2.79	<0.17	<0.36		<0.97

Notes:

1. A value preceded by "<" is less than the DLC for that sample and parameter. The (±) value represents the statistical uncertainty at the 95% confidence interval.
2. The lowest possible value for any parameter is zero.

CONTROL OF CHEMICALLY HAZARDOUS SUBSTANCES AND SOLID WASTE

Sources

Chemicals are not manufactured at Knolls Laboratory. Minimal quantities of hazardous wastes do result from the necessary use of chemicals in Knolls Laboratory operations. To ensure the safe use of chemicals and disposal of the resulting wastes, Knolls Laboratory maintains a hazardous waste control program. Hazardous wastes are disposed of through permitted off-site TSDFs.

Chemical Control Program

The control program minimizes the quantity of waste material generated, ensures safe usage and storage of the materials at Knolls Laboratory, and provides for proper disposal of the wastes by vendors that operate under permits issued by cognizant Federal and State agencies.

A principal part of the waste minimization program is the control of the acquisition of hazardous substances for use at Knolls Laboratory. Purchase requests for chemicals are reviewed to ensure that the materials are actually necessary for Knolls Laboratory operations, the amount ordered is not excessive, and that methods for proper disposal are in place before the material is ordered. Hazardous substance storage controls include as a minimum: labeling, providing revetments as appropriate, segregation based on compatibility, limiting storage volumes, and providing weather protection as appropriate. When required, large volumes of chemicals and petroleum products are stored in accordance with the NYS Chemical Bulk Storage (CBS) regulations (Reference (16)) and the PBS regulations (Reference (17)). Knolls Laboratory did not store any chemicals in quantities that are subject to the CBS regulations during 2025.

Additionally, many hazardous substances have been replaced by nonhazardous substitutes. Knolls Laboratory stresses the "Know-Before-Do" principle. To this end, facility personnel must identify ways to minimize waste prior to purchasing new chemicals or performing a waste generating process. Knolls Laboratory also evaluates the hazardous waste that is generated and determines if additional waste minimization can be achieved.

All personnel working at Knolls Laboratory are provided with general information on Knolls Laboratory policies for the procurement, use, and disposal of hazardous substances. For individuals who use hazardous substances in operations, specific training is provided to ensure that they are knowledgeable of safe handling techniques and emergency response procedures. After chemicals are used and no longer needed, they are accumulated in designated staging and storage areas where they are segregated and packaged for shipment. Waste is temporarily stored only as necessary to accumulate sufficient volumes for shipment to an offsite TSDF. Hazardous and mixed (radioactive and hazardous) waste storage facilities are operated at Knolls Laboratory under a permit obtained from NYSDEC. Knolls Laboratory has an inspection program to verify routinely that hazardous substances are properly stored and controlled in accordance with approved procedures.

In addition, the Knolls Laboratory hazardous waste control program is subject to periodic on-site inspections by NYSDEC and EPA.

Chemical Disposal

Hazardous waste is managed in compliance with RCRA. Generated waste is transported by vendors to TSDFs for final disposition. The transportation vendors and the TSDFs operate under permits issued by the cognizant Federal and State regulatory agencies. During 2025, Knolls Laboratory shipped approximately 10.3 tons of RCRA and NYS hazardous waste off-site for disposal. This included approximately 2.05 tons of mixed waste and 8.25 tons of hazardous waste. Knolls Laboratory reduces the potential environmental impact of waste by selecting the ultimate disposal methods that minimize or eliminate future environmental effects.

Nonhazardous chemical waste is also sent off-site for disposal. The transportation vendors and the TSDFs are typically the same as those used for hazardous waste disposal. These facilities also operate under permits issued by the cognizant Federal and State regulatory agencies. Knolls Laboratory requires the TSDFs to provide itemized written verification that the waste was received. During 2025, approximately 103.8 tons of nonhazardous chemical and medical waste were sent for off-site disposal via incineration, wastewater treatment, chemical treatment, or land disposal from Knolls Laboratory.

Solid Waste Disposal/Recycling

During 2025, approximately 1,986 tons of nonhazardous solid waste were generated from waste streams such as office and cafeteria trash, construction and demolition debris, and classified scrap paper. From these waste streams, Knolls Laboratory recycles materials such as unclassified office paper, glass, plastic, tin, aluminum, newspapers, magazines, corrugated cardboard, asphalt, computers, wood, precious metals, used oil, lead/lead acid batteries, scrap metal, concrete, universal waste (e.g., light bulbs, batteries, thermostats), printer cartridges, and cafeteria grease. In 2025, approximately 1,123 tons of these materials were recycled from Knolls Laboratory.

CONTROL OF RADIOACTIVE MATERIALS AND RADIOACTIVE WASTE

Sources

Operation of Knolls Laboratory results in the generation of various types of radioactive materials and wastes. Low level radioactive solid waste materials that require disposal include filters, metal scrap, rags, resin, paper, and plastic materials.

Control Program

Detailed procedures are used for handling, packaging, transportation, and disposal of radioactive waste at a government operated or licensed TSDF. Internal reviews are made prior to the shipment of any radioactive material from Knolls Laboratory to ensure that the material is properly identified, surveyed, and packaged in accordance with Federal requirements.

The volume of radioactive waste is minimized through the use of special work procedures that limit the amount of materials that become contaminated during work on radioactive systems and components. Radioactive liquid waste is collected in an absorbed form prior to shipment to an

approved TSDF. All radioactive wastes are prepared and shipped in accordance with written procedures to meet the applicable DOT regulations given in Reference (18). The waste packages also comply with all applicable requirements of the NRC, the DOE, and the TSDFs.

Disposal/Recycling

The shipments of low level radioactive solid wastes were made by authorized common carriers to TSDFs located outside NYS. During 2025, approximately 218.53 cubic meters (285.82 cubic yards) of low level radioactive waste containing approximately 8.48E-02 Ci of radioactivity was shipped from Knolls Laboratory for disposal. There were no shipments of radioactive metal for recycling from the Knolls Laboratory in 2025.

CONTROL OF MIXED WASTES

Sources

Waste that is both radioactive and chemically hazardous is regulated under both the AEA and RCRA as “mixed waste.” Also, per NYSDEC, certain TSCA regulated PCB waste is also considered a hazardous waste. Operations at Knolls Laboratory, in support of research and development for the design and operation of naval nuclear propulsion plants, result in the generation of a small quantity of mixed wastes. These wastes include laboratory chemicals, oils, equipment, and debris.

Control Program

Mixed wastes are managed in accordance with the Knolls Laboratory RCRA permit, the FFCA of 1992, and the Knolls Laboratory Mixed Waste STP. The Mixed Waste STP is updated annually, if required, and provided to NYSDEC. Knolls Laboratory takes aggressive action to minimize the creation of mixed waste by reducing the commingling of radioactive and hazardous materials and avoiding the use of hazardous substances where technically acceptable. The amount of generated mixed waste is also minimized through the use of detailed work procedures and worker training.

Storage and Disposal

Mixed wastes are accumulated in designated regulated and permitted storage areas. The wastes are packaged for storage and shipment to off-site TSDFs in accordance with DOT requirements for transport to and receipt at RCRA-permitted TSDFs. In 2025, there were two shipments totaling approximately 2.05 tons of various mixed wastes to TSDFs.

RADIATION DOSE ASSESSMENT

The effluent and environmental monitoring results show that radioactivity present in liquid and gaseous effluents from 2025 operations at Knolls Laboratory, including DOE-EM activities for the NNPP had no measurable effect on normal background radioactivity levels. Therefore, any radiation doses from Knolls Laboratory operations, including DOE-EM activities, to off-site individuals were too small to be measured and must be calculated using conservative methods. Estimates of the radiation dose to the maximally exposed individual in the vicinity of Knolls Laboratory, including DOE-EM activities, and the collective dose to the population residing in the 80 kilometer (50 mile) radius assessment area are summarized later in this report in the Radiation Dose Assessment and Methodology section.

The results show that the estimated doses were less than 0.1 percent of that permitted by the radiation protection standards of the DOE listed in Reference (19), and that the estimated dose to the population residing within 80 kilometers (50 miles) of Knolls Laboratory was less than 0.001 percent of the natural background radiation dose to the population. In addition, the estimated doses were less than one percent of that permitted by the NRC numerical guide listed in Reference (20) for whole-body dose, demonstrating that doses are ALARA. The dose attributed to radioactive air emissions from Knolls Laboratory was less than one percent of the EPA standard in Reference (8).

The collective radiation dose to the public along the travel route from outgoing Knolls Laboratory shipments of radioactive materials during 2025 was calculated using data given by the NRC in Reference (21). Based on the type and number of shipments made, the collective annual radiation dose to the public along the transportation routes, including transportation workers, was less than one person-rem. This is less than 0.001 percent of the dose received by the same population from natural background radiation.

HISTORICAL OPERATIONS

Past Operations

During the early years of operation of Knolls Laboratory, research was conducted on several new technologies but was focused on two primary areas: naval nuclear propulsion plant development beginning in 1950 and SPRU.

Past Radioactive Waste Management

Knolls Laboratory has always been involved in handling radioactive materials and always had a radioactive waste management program consistent with, or more stringent than, the applicable requirements at the time.

Disposal practices appropriate to radioactive waste streams were developed and implemented. Requirements for treatment and disposal of these wastes were provided for in the operating facility design. For example, retention tanks and evaporators for liquid waste, surface and subsurface facilities for temporary storage of solid waste, and air cleaning systems (high efficiency filters, activated carbon filters, etc.) were incorporated in the initial facility design. The following is a description of the practices employed in management of these materials.

Radioactive Liquid Waste:

Low level radioactive liquid wastes were managed by a variety of methods. In 1948, during initial construction of Knolls Laboratory, a study of the hydraulics and hydrology of the Mohawk River was begun to determine the suitability for releases of low concentrations of radioactivity to the river. The U.S. Geological Survey (USGS) performed this study in cooperation with the AEC. Representatives of the New York State Department of Public Works and Department of Public Health also participated in the study. Knolls Laboratory initiated a preoperational monitoring program during the construction of Knolls Laboratory to determine background concentrations in the river due to naturally occurring radioactivity and fallout from nuclear weapons tests. Effluent water containing concentrations of radioactivity below then-existing concentration limits for discharge was first released from Knolls Laboratory in 1950, shortly after operations began.

In response to contacts made by the AEC with State and local agencies in 1951, the Mohawk River Advisory Committee was established in 1952. The committee was to provide advice and counsel regarding the release of radioactivity to surface streams (including the Mohawk River) and to provide liaison to ensure that State and local officials interested in these matters were kept informed. Membership of the committee consisted of representatives of the New York State Department of Health (NYSDOH) and the City of Schenectady. The Committee periodically reviewed the Knolls Laboratory waste management program, concurred with program changes, and participated in the establishment of limits for radioactivity in Knolls Laboratory effluent water.

Further information is provided in the Special Mohawk River Surveys portion of this report regarding detailed surveys performed of the Mohawk River.

Since Knolls Laboratory operations began in 1949, about 153 Ci of Knolls Laboratory-produced radioactivity have been released to the Mohawk River, with about 150 Ci released prior to 1964. The most radioactivity released in any one year was about 37 Ci in 1963, which was under the Mohawk River Advisory Committee limit of 40 Ci per year. The reported 3 Ci discharged since 1964 is a conservative estimate (i.e., in some cases, a radionuclide is assumed to be present at the detection limit and included in the total curie content when in fact the actual measurement indicated less than the detection limit.)

At present, there is less than 1 Ci of radioactivity in the river sediments in the vicinity of Knolls Laboratory. Radioactivity produced by Knolls Laboratory consists primarily of cesium-137 but includes traces of other radionuclides such as strontium-90, americium-241, uranium, and plutonium. The average concentration of cesium-137 in sediment between Knolls Laboratory and the downstream Lock 7 dam is less than 3 picocuries per gram (pCi/g). The concentrations decrease with distance down the river. The concentration of naturally occurring radionuclides present in the same sediment, such as potassium-40, is about 30 pCi/g. During the 2002 sampling program, the highest cesium-137 concentration (670 pCi/g) found was in the immediate vicinity of the discharge location. As noted above, the cesium-137 in the sediment poses no risk to the population. Consistent with the 30-year half-life of the isotope, the concentration will gradually decline.

Periodic environmental monitoring continues to this day, with the results reported in this annual Environmental Monitoring Report. The conclusions remain unchanged. Fish and water samples taken in the Mohawk River, both upstream and downstream of Knolls Laboratory, show only naturally occurring radionuclides (e.g., potassium-40) and radionuclides from atmospheric weapons testing, but no radionuclides attributable to Knolls Laboratory operations. The residual radioactivity from Knolls Laboratory operations remaining in the sediment has resulted in no significant impact on the environment and poses no health risk to the public.

Radioactive Airborne Effluents:

Overall, an estimated 2,530 Ci of Knolls Laboratory-produced radioactivity have been released to the atmosphere during the years of operation since 1949. Over 95% of the total radioactivity emissions to date were associated with SPRU operations in the period from 1951 through 1954. The completion of SPRU operations resulted in reducing radioactivity emissions to less than one percent of previous levels. Over 95% of the radioactivity consisted of the inert gas krypton-85. This inert gas does not deposit on surfaces and readily disperses in the atmosphere. Smaller amounts, approximately 90 Ci, of other beta-gamma emitting fission products and trace quantities of alpha emitting particulates comprised the remaining amount of the airborne radioactivity released. In recent years, releases have averaged less than one curie per year, again consisting mainly of krypton-85.

For perspective, the total amount of radioactivity released to the atmosphere since the start of operations at Knolls Laboratory corresponds to a small fraction of that permitted by Federal regulations. During the period of largest discharges (1951–1954), the radioactivity released corresponded to less than 10% of the amount permitted by Government standards. Subsequent monitoring has indicated no detectable residual radioactivity as a result of the release of radioactivity into the atmosphere.

Residual Radioactivity in Soil

Knolls Laboratory has no designated radioactive waste disposal sites, and Knolls Laboratory rules have always prohibited burial of radioactive wastes on site. Historical waste management operations and SPRU operations resulted in some radioactive residue contaminating adjacent soils. Some incidental low-level radioactive materials were also found in land area disposal sites. The involved radionuclides consist primarily of cesium-137, a very small amount of strontium-90, and still smaller amounts of plutonium and uranium in isolated spots. Investigation work initially performed in 2000 under the Knolls Laboratory RCRA Permit Corrective Action provisions, and later under the SPRU Permit, found chemical contamination commingled with radioactivity. All chemical investigation and remediation work was conducted in accordance with work plans approved by NYSDEC.

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KESSELRING SITE

SITE DESCRIPTION

Kesselring Site is located near West Milton, New York, approximately 17 miles (27.4 kilometers) north of the City of Schenectady, 9 miles (14.5 kilometers) southwest of Saratoga Springs, and 13 miles (21 kilometers) northeast of Amsterdam (see Figure 1). The surrounding area is a rural, sparsely populated region of wooded lands through which flow the Glowegee Creek and several small streams that empty into the Kayaderosseras Creek. Kesselring Site consists of 3,900 acres on which the S8G Prototype pressurized-water naval nuclear propulsion plant and support facilities are located, including administrative offices, machine shops, waste storage facilities, oil storage facilities, training facilities, equipment service buildings, chemistry laboratories, a boiler house, a cooling tower, and wastewater treatment facilities.

The S3G, D1G, and MARF Prototype reactor plants were shut down in May 1991, March 1996, and May 2019, respectively. All spent nuclear fuel was removed from the S3G, D1G, and MARF prototypes and shipped off site in July 1994, February 1997, and July 2025, respectively. Dismantlement of the S3G and D1G plants was completed in September 2006 and September 2023, respectively. MARF dismantlement is in progress.

The climate in the region of Kesselring Site is primarily continental in character but is subjected to some modification from the maritime climate, which prevails in the extreme southeastern portion of NYS. Winters are usually cold and occasionally fairly severe. Maximum temperatures during the colder winter months often are below freezing, and nighttime low temperatures frequently drop to 10° F or lower. Sub-zero temperatures occur rather infrequently, about a dozen times a year. Snowfall in the area is quite variable, averaging 68 inches per year. The mean annual precipitation for the area averages 43 inches per year. The prevailing winds are from the west.

The area surrounding Kesselring Site has a complex geological history due to the processes of erosion, glaciation, folding, and faulting. The geological formations of the West Milton area are comprised of two major types: bedrock, which ranges in age from Precambrian to Ordovician, and unconsolidated deposits of Pleistocene and Recent age. Bedrock underlying the area crops out only on some steep hillsides and in some stream valleys. It is covered by the unconsolidated deposits in the remainder of the area. These unconsolidated deposits range in thickness from zero to 200 feet with an average thickness of 50 feet. Bedrock underlying the West Milton area may be divided into two groups: (1) metamorphosed rocks of Precambrian age and (2) sedimentary rocks of Paleozoic age. The older metamorphosed rocks consist of gneiss, schist, quartzite, and limestone (marble) of sedimentary origin and syenite and granite of igneous origin. These rocks are referred to as crystalline rocks. The Paleozoic rocks likewise consist of several types of rocks including sandstone, dolomite, limestone, and shale. The unconsolidated deposits can be subdivided into four groups: (1) till – an unstratified, dense heterogeneous mixture of glacially deposited rock particles ranging in size from clay to gravel; (2) ice-contact deposits – kames and eskers composed of stratified sand and gravel; (3) glaciolacustrine deposits – a homogeneous stratified layer of sand, silt, and clay; and (4) recent fluvial deposits consisting of sand and gravel. Generally, the coarser-grained and stratified unconsolidated deposits form better aquifers than the fine-grained and unstratified unconsolidated deposits or bedrock foundations. Only small areas

are underlain by these coarse-grained deposits. Percolating water from rainfall and snowmelt recharge the shallow, unconfined aquifers beneath Kesselring Site, and in turn, streams are recharged by shallow groundwater. The Kayaderosseras Creek is underlain by coarse-grained glacial and fluvial valley-fill deposits from which all Site Service (drinking) Water is produced. The Kesselring Site drinking water well field is located near the eastern boundary of Kesselring Site within the creek's floodplain. Kesselring Site obtains all water for its operation from on-site production wells that are hydrogeologically separate from current and historical operational areas.

Kesselring Site is located in the transition zone between the Adirondack Mountains and the Hudson-Mohawk Valley lowland. The Kayaderosseras Creek forms the main drainage system in the vicinity of Kesselring Site. The average flow (1927–1994) in the Kayaderosseras Creek is 137.8 cfs and the lowest recorded seven-day minimum flow is 12.4 cfs during August 1964. The Kayaderosseras gauging station was taken out of service in 1995.

The Glowegee Creek, Crook Brook, Hogback Brook, and their tributaries drain Kesselring Site. Crook Brook directly joins the Kayaderosseras. Hogback Brook is a tributary to the Glowegee, which is the receiving water for Kesselring Site drainage. The average flow (1948–2025) in the Glowegee is 39.1 cfs and the lowest recorded seven-day minimum flow is 0.51 cfs during August 1949. The Glowegee Creek joins with the Kayaderosseras Creek approximately one mile east of West Milton.

The Glowegee and Kayaderosseras Creeks have a classification of Class C under NYCRR. Under this classification, the waters are suitable for fishing and fish propagation. Additionally, the water quality shall be suitable for primary and secondary contact recreation, even though other factors may limit the use for that purpose. Portions of each creek have also been assigned the Trout Stream standard. The NYSDEC has permitted Kesselring Site to discharge effluent from various Kesselring Site operations to the Glowegee Creek as specified in Kesselring Site's SPDES Permit (Reference (22)). Environmental monitoring has shown no measurable water quality degradation in the Glowegee Creek due to Kesselring Site operations.

HISTORY AND OPERATIONS

History

Development of Kesselring Site began in 1948 with Government acquisition of the 3,900 acres of land. The site was known as the West Milton Site until 1968 when it was renamed the Kenneth A. Kesselring Site in honor of a former KAPL General Manager. Groundbreaking occurred in 1950, and construction of facilities began in 1951. The site was originally developed as a location for testing of liquid metal cooled power breeder reactors, although none were ever built there.

Kesselring Site was later developed for testing propulsion plants for the NNPP and training Navy operators for these propulsion plants. Later, extensive reforestation was implemented on the open fields that existed prior to the Government's acquisition of the property.

Operations at Kesselring Site first began in 1954, and the first power plant at the site went into operation in 1955. This was the liquid sodium-cooled naval prototype for the second nuclear powered submarine, the original Seawolf (SSN 575). In 1958, a second plant, the S3G Prototype

for the former submarine Triton (SSRN 586), was placed into operation. This plant and the subsequent plants at Kesselring Site contained pressurized-water propulsion plants. In 1957, the prototype liquid sodium-cooled plant was shut down and dismantlement commenced in 1958. This prototype was replaced with the D1G Prototype for the former guided missile cruiser Bainbridge (CGN 25). The D1G Prototype began its operations in 1962. An advanced test platform, the MARF Prototype, was placed in service in 1976, and the S8G Prototype, for USS Ohio (SSGN 726), became operational in 1979.

As a result of the end of the Cold War and the downsizing of the Navy, and the availability of other more modern training platforms, the S3G Prototype ceased operation in 1991. In 1996, the D1G Prototype similarly ceased operation. Dismantlement and removal of the S3G Prototype from the site was completed in 2006. Dismantlement and removal of the D1G Prototype was completed in 2023. The MARF Prototype ceased operation in 2019, and defueling operations were completed in 2025. Dismantlement of the MARF prototype is in progress.

Present Operations

Kesselring Site continues to be engaged in nuclear propulsion plant testing and propulsion plant operator training for the U.S. Navy. Kesselring Site employs engineers, scientists, and support personnel in prototype plant operations, operator training, training development, prototype plant maintenance, and procedure preparation activities. These activities are supported by Kesselring Site facilities described below.

Prototype Plant: The operating prototype plant consists of a pressurized-water nuclear reactor, auxiliary equipment, and propulsion systems necessary for the training of naval personnel and for the testing and evaluation of design concepts.

Chemical and radioactive liquid wastes resulting from operations are directed to controlled collection systems for monitoring and processing for reuse, discharge, or disposal as appropriate. Exhaust air from the prototypes is filtered and monitored prior to release.

Cooling Tower: One evaporative cooling tower is in operation at Kesselring Site; it is used to dissipate the heat generated by prototype operations. Four other cooling towers were removed after the three decommissioned prototypes they supported ceased operation.

During operation, periodic discharge of cooling tower water is used to control the concentration of soluble minerals, naturally present in the supply water, and cooling tower treatment chemicals. This water is directed to the Lagoon Wastewater Treatment System, which discharges to the Glowegee Creek through two outfalls that are routinely sampled to ensure compliance with Kesselring Site SPDES permit requirements.

Fuel Service Facility: This facility was previously used to prepare reactor fuel, upon its infrequent removal from the prototypes, for off-site shipment. The facility is no longer used for fuel handling operations. The facility was also occasionally used as a maintenance area for work involving radioactive materials but is no longer used for that purpose. Currently, this area is being used for MARF support activities. The facility is serviced by filtered and monitored exhaust systems.

Radioactive Waste Management Facilities: Radioactive waste management facilities collect and process water containing small amounts of radioactivity and collect, process, package, and ship solid radioactive waste. As with other facilities handling radioactive materials, the processing facilities for liquid and solid wastes are serviced by filtered and monitored exhaust systems. Processed water is very pure and therefore is reused in appropriate site operations to the maximum extent practicable.

Hazardous and Mixed Waste Management Facilities: The hazardous waste management facility is operated in accordance with the provisions of a hazardous waste management permit issued by NYS. This facility is used for temporary storage of waste prior to shipment to permitted off-site treatment and disposal facilities. The facility is designed to contain any potential spill. A separate mixed waste management facility is operated under the same hazardous waste management permit; mixed waste contains both chemically hazardous and radioactive constituents. This facility is also designed to contain any potential spill. The amount of waste stored in the above facilities is limited as specified in the waste management permit. The facilities' construction and operation are compliant with applicable Federal and State regulations.

Chemical Laboratories: The chemical laboratories consist of several individual laboratories for chemical analysis, radiochemistry, and other related analytical functions. Most chemical laboratory work involves nonradioactive materials, controlled within appropriate containment areas, such as hoods. Radioactive work containment areas are provided with filtered and monitored ventilation exhaust systems and controlled drainage systems or portable bottles used to convey liquids to collection tanks for processing. Hazardous chemical waste and most nonhazardous analytical waste are collected for proper off-site disposal. Small amounts of nonhazardous analytical waste and wash water drain to the site's sanitary wastewater system, which discharges to the Glowegee Creek through an outfall that is routinely sampled to ensure compliance with Kesselring Site SPDES permit requirements.

Boiler House: The boiler house has three operational boilers, with a total design capacity of about 46,000 pounds per hour of steam, that burn ultra-low sulfur No. 2 fuel oil. In 2025, Kesselring Site began using bioheating fuel comprised of distillate fuel oil blended with 10 percent biofuel as required by the NYS bioheating fuel requirements. The oil, delivered to the site in tank trucks, is stored in an above ground storage tank within a secondary containment near the boiler house. Three exhaust stacks dissipate the combustion products from the boilers. Auxiliary support facilities in the building include feed water treatment components and systems for treatment of boiler blow down water. The boiler house emissions are controlled in accordance with NYS and Federal requirements.

Machine Shops: Machine shop facilities perform machining operations, such as turning, milling, grinding, and drilling on a variety of metal products. These operations support maintenance on the operating prototype and the site facilities.

Demineralized Water Production Facilities: Demineralized water is produced at Kesselring Site using two parallel reverse-osmosis systems. The reverse-osmosis systems went into operation in 2004, which eliminated the need for the acid-base regeneration solutions used in the previous ion exchange resin-column demineralizing system. Nonhazardous chemicals now in use with the

reverse-osmosis system are discharged to the site drainage system, which discharges to the Glowegee Creek through two outfalls that are routinely sampled to ensure compliance with Kesselring Site SPDES permit requirements.

Wastewater Treatment Facility: The wastewater treatment system design minimizes TSS levels resulting from algae blooms in the site's holding lagoon during warm weather and from sediment in stormwater runoff. Spray recirculation used previously to control the algae in the lagoon was discontinued in 2012. Water discharged from the site passes through the holding lagoon prior to being released to the Glowegee Creek, which allows for settling of solid particles. This treatment is necessary to maintain site operations compliant with the Kesselring Site SPDES permit. The treatment system minimizes the growth of algae by indirect chlorination and an ultra-sonic system that destroys algae cells. In addition, the treatment system removes residual chlorine from the discharged water and provides for temperature and pH control of the lagoon effluent. As a voluntary pollution prevention initiative, systems to reduce the amount of phosphates contained in water discharged from the site were installed upstream of the wastewater treatment facility.

Sanitary Wastewater Treatment Facilities (SWTF): In December of 2013, the site began using a new NYSDEC-approved SWTF, which replaced an older treatment system on site. The system consists of influent wastewater grinding, a biological treatment process consisting of pre-equalization, chemical coagulation for phosphorous removal, sequencing batch reactors (SBR), post-equalization and aeration, followed by filtration. Treated effluent is discharged from the SWTF to the Glowegee Creek in accordance with the site's Kesselring Site SPDES permit.

Petroleum Bulk Storage Tanks: Several stationary and portable aboveground bulk storage fuel tanks are located at the site. These various tanks store No. 2 fuel oil and 10 percent biofuel for the Boiler House steam boilers, diesel fuel for emergency electrical generators and site equipment, and gasoline for use in site vehicles. All tanks are situated within secondary containments. The stationary fuel storage tanks at Kesselring Site are registered with NYS and comply with applicable regulations.

Chemical Bulk Storage Tanks: Currently, two tanks are used for CBS at Kesselring Site. One tank is used for storage of sulfuric acid to support S8G Prototype operations. The other tank stores sodium hypochlorite used in the disinfection of SSW. Both of these tanks are situated within secondary containments. The CBS tanks at Kesselring Site are registered with NYS and are compliant with the applicable regulations.

LIQUID EFFLUENT MONITORING

Sources

Nonradiological: The primary sources of the effluent water at Kesselring Site are:

1. *Site Boiler House Discharges* - Site boiler water is treated demineralized water. Operations that result in discharges are (1) annual boiler draining and periodic blowdowns to control the concentration of solids and (2) wastewater from a reverse osmosis water treatment system.
2. *Sanitary Wastewater Treatment Facility* - The SWTF consists of influent wastewater grinding, a biological treatment process consisting of pre-equalization, SBR, post-equalization, aeration, and filtration. Waste sludge is stored in a holding tank and removed periodically by a licensed subcontractor for disposal at a State-approved facility.
3. *Cooling Tower Water* - Cooling tower water is treated to minimize scale formation, to prevent corrosion of system materials, and to inhibit the growth of algae and slime. The pH is normally maintained in the range of 7.1 to 7.6 SU.
4. *Retention Basin Liquids* - The retention basins receive wastewater from prototype plant facilities including blowdown water from steam generators and drainage water from the engine rooms.
5. *Site Drainage Water* - Stormwater and groundwater also make up a portion of the liquid effluent.
6. *Site Service Water* - SSW is used for drinking water and non-contact cooling purposes. Sodium hypochlorite is added to the SSW system as a drinking water disinfectant.

With the exception of the SWTF effluent and some stormwater, all of the above sources of effluent water are discharged into the Kesselring Site Lagoon and through a wastewater treatment system before ultimate off-site discharge into the Glowegee Creek. The Kesselring Site Lagoon is a five-million gallon holding basin that was designed to accumulate effluent water for the purposes of pH control, thermal equalization, chlorine dissipation, and settling of solid particles.

Radiological: Some of the liquid effluent discharged from the retention basins contains low levels of radioactivity. The source of this radioactivity is small quantities of activation products. The activation products may include tritium and radionuclides of corrosion and wear products.

Tritium is present in the reactor coolant as the result of neutron interaction with naturally occurring deuterium present in the water. Tritium produced in the reactor exists in the oxide form and is chemically indistinguishable from water. Corrosion and wear products, in the form of small insoluble metal oxide particles, become radioactive as they pass through the reactor, with cobalt-60 being the predominant radionuclide. Operation of the prototype plant requires processing reactor coolant using radioactive liquid waste collection systems.

To minimize releases of radioactivity in liquid effluent to the environment, a water reuse system and evaporators are employed. The reactor coolant water that is discharged from the prototype plant to the radioactive liquid waste collection system is processed through a series of filters and demineralizers. The processing system removes nearly all of the radioactivity with the exception of tritium. After purification, the water is either reused as reactor coolant makeup and in other radioactive systems, or evaporated to reduce the amount of radioactivity that could be released as liquid effluent.

The low concentrations of radioactivity in the liquids released from Kesselring Site have always been below all applicable Federal and State limits and have not resulted in any detectable radioactivity in the Glowegee Creek from Kesselring Site operations.

Effluent Monitoring

Nonradiological: Liquid effluents from Kesselring Site enter the Glowegee Creek through two surface channels (Outfalls 001 and 002) and a submerged drain line from the SWTF (Outfall 003) shown in Figure 5. A series of gates are located in the site's industrial wastewater conveyance system to provide a means to contain spills or upsets.

Since 1998, Kesselring Site has operated a wastewater treatment system at the outlet of the lagoon. This treatment system is designed to treat for TSS, residual chlorine, pH, and temperature. The treatment system is necessary to maintain Kesselring Site operations and to ensure continued compliance with SPDES Permit limits. The system removes residual chlorine from the lagoon effluent using an automated sodium bisulfite system. Treatment is provided for pH using carbon dioxide, and temperature using SSW.

Effluent samples from the lagoon wastewater treatment system (Outfalls 001 and 002) and the SWTF (Outfall 003) are collected and analyzed as required by the SPDES Permit.

Stormwater from Kesselring Site enters the Glowegee Creek from stormwater Outfalls 01A, 02A, 004, 005, and 006 (Figure 5). Outfalls 01A and 02A were used for Kesselring Site discharge prior to the construction of the lagoon. These outfalls currently collect only stormwater.

Stormwater drainage from the parking lots and the southern part of the developed area of Kesselring Site, is conveyed to Tributary 3 (formerly designated as the Parking Lot Ditch). The tributary's headwaters originate from a large undeveloped woodland area west of the site. Water from the tributary flows to the Glowegee Creek at a point just downstream of Sluice Gate 10, south of the main access road bridge. This location is identified as Outfall 004 in the Kesselring Site SPDES Permit. Discharges through this outfall are controlled locally or remotely by a sluice gate. The sluice gate provides control for contaminants (i.e., oils and chemicals), which could reach this drainage way in the event of a spill, fire, or other emergency. Given the designation as a tributary, Kesselring Site, with NYSDEC approval, removed the oil baffle and internal weir gate to restore natural flow to the tributary adjacent the sluice gate. Stormwater also collects in Outfall 005 from Hogback Road and enters the Glowegee Creek. Outfall 006 collects stormwater runoff from the landfill that was operated from the early 1950s until October 1993. The landfill was capped in

1994 in accordance with a closure plan approved by NYSDEC. Currently, no routine sampling or monitoring is required for stormwater Outfalls 01A, 02A, 004, 005, and 006.

Radiological: Liquid discharges that might contain tritium are either sampled and analyzed individually or sampled and combined into a monthly composite that is then analyzed for tritium. Monthly grab samples are also taken at Outfalls 001 and 002.

Effluent Analyses

Nonradiological: The analyses performed for chemical constituents on effluent samples from each discharge point and the SWTF are listed in Tables 34, 35, and 36. Analyses for chemical constituents are performed using procedures described in Standard Methods (Reference (10)), or other EPA approved procedures. Flow, temperature, and total residual chlorine (TRC) are measured at Outfalls 001 and 002 during every day on which there is a discharge from the lagoon, except when the flumes are flooded with Glowegee Creek water. Outfall 001 is flooded more often than Outfall 002 because its elevation is lower.

Radiological: Each liquid discharge that might contain tritium is sampled. The samples are combined into a monthly composite for each frequently used release point. Samples from other tritium release points are analyzed individually. Tritium analyses are performed by liquid scintillation counting. Additionally, the monthly grab samples are analyzed by gamma spectrometry.

Assessment

Nonradiological: The analytical results for the measurements of chemical constituents summarized in Tables 34, 35, and 36 show that average values are within the applicable effluent standards. Table 8 identifies the Kesselring Site SPDES noncompliances for 2025. Liquid effluent monitoring data is reported as required in Reference (22).

Radiological: The radioactivity released in Kesselring Site liquid effluent during 2025 totaled 6.05×10^{-4} Ci of tritium as shown in Table 37. The activity was contained in approximately 2.15×10^6 liters of water. Tritium and gamma emitting radionuclides attributable to Kesselring Site operations were not detected in the monthly grab samples of the outfalls. The resulting annual average radioactivity concentration in the effluent corresponds to less than 0.1 percent of the DOE DCS (Reference (6)), for the mixture of radionuclides present.

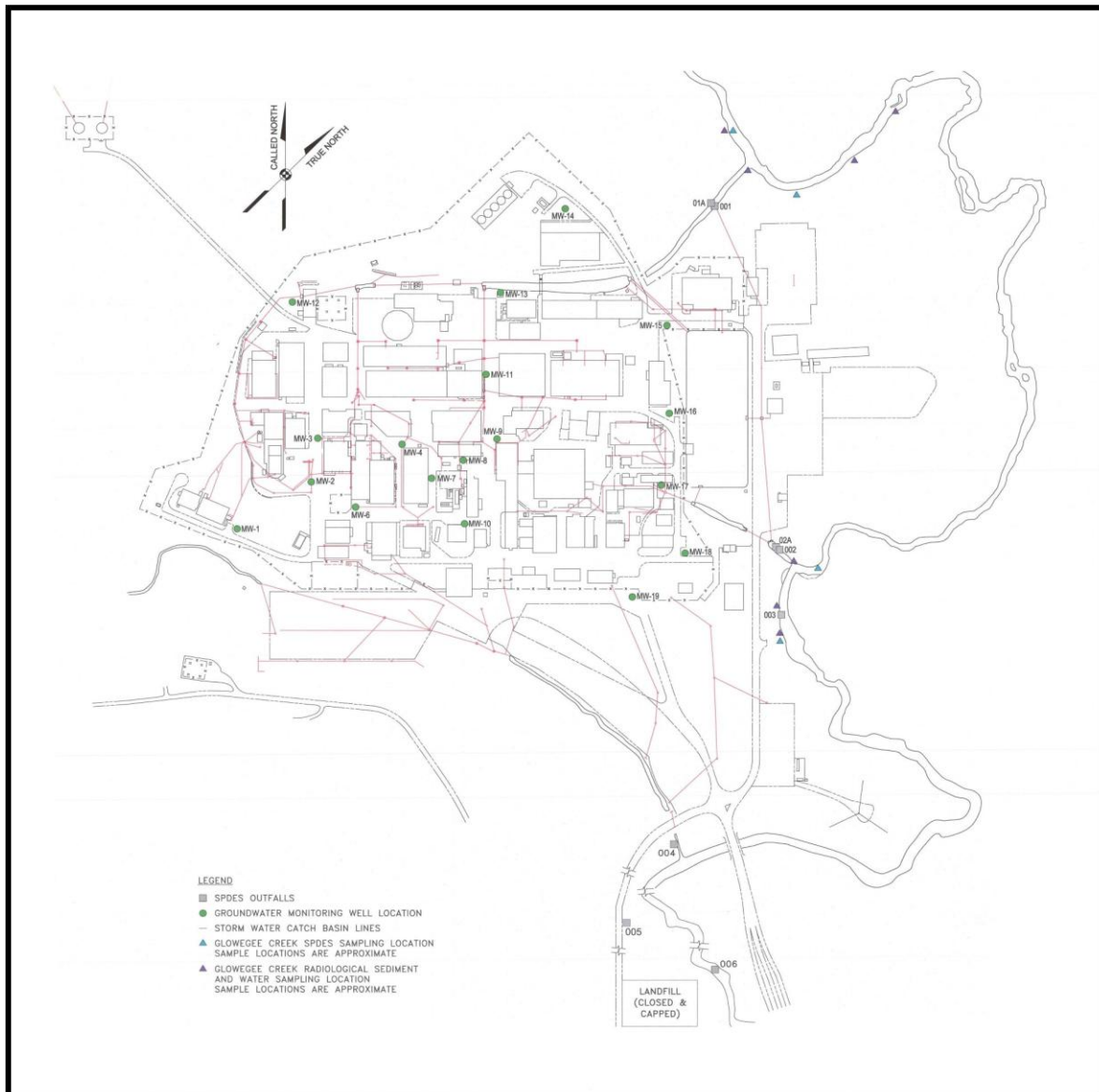


FIGURE 5
KESSELRING SITE, NEAR WEST MILTON, NEW YORK
GLOWEGEE CREEK SAMPLING LOCATIONS AND OUTFALL LOCATIONS

TABLE 34
CHEMICAL CONSTITUENTS AND TEMPERATURE IN KESSELRING
SITE LIQUID EFFLUENT, OUTFALL 001

Parameter (units)	Number of Samples	Value			SPDES Permit Limit
		Minimum ⁽¹⁾	Maximum ⁽¹⁾	Average ⁽²⁾	
Discharge Requirements (Reference (22))					
Flow (MGD)	145 ⁽³⁾	0.05	0.84	0.29	Monitor ⁽⁴⁾
Temperature (°F)	145 ⁽³⁾	34	73	56	Note (5)
Residual Chlorine (mg/l)	145 ⁽³⁾	<0.02	<0.02	<0.02	0.04
pH (SU)	12	7.0	7.7	7.3	6.0 – 9.0
Oil and Grease (mg/l)	12	<5.0	<5.4	<5.1	15
TSS (mg/l)	12	4.4	21	9.8	45
Nitrite as N (mg/l)	12	<0.01	0.01	<0.01	0.04
Iron					
(mg/l)	12	0.14	0.39	0.24	Monitor ⁽⁴⁾
(lbs/day)	12	0.15	0.83	0.43	Note (6)
Total Phosphorus					
(mg/l)	12	0.02	0.26	0.098	Monitor ⁽⁴⁾
(kg/month)	12	0.26	4.3	1.28	Note (7)
Zinc					
(mg/l)	12	<0.005	0.02	<0.013	Monitor ⁽⁴⁾
(lbs/day)	12	<0.005	0.069	<0.028	Note (8)
Boron (mg/l)	12	<0.05	0.10	<0.058	0.5
Sulfite (mg/l)	12	<2.0	<2.0	<2.0	2.0
Nitrogen, Ammonia (as NH ₃ , mg/l)	12	<0.1	<0.1	<0.1	Monitor ⁽⁴⁾

Notes for Table 34 are on page 108.

TABLE 35
CHEMICAL CONSTITUENTS AND TEMPERATURE IN KESSELRING
SITE LIQUID EFFLUENT, OUTFALL 002

Parameter (units)	Number of Samples	Value			SPDES Permit Limit
		Minimum ⁽¹⁾	Maximum ⁽¹⁾	Average ⁽²⁾	
Discharge Requirements (Reference (22))					
Flow (MGD)	146 ⁽⁹⁾	0.07	1.1	0.39	Monitor ⁽⁴⁾
Temperature (°F)	146 ⁽⁹⁾	33	73	56	Note (5)
Residual Chlorine (mg/l)	146 ⁽⁹⁾	<0.02	<0.02	<0.02	0.04
pH (SU)	12	7.0	7.7	7.3	6.0 – 9.0
Oil and Grease (mg/l)	12	<5.0	<5.3	<5.1	15
TSS (mg/l)	12	4.2	21	9.4	45
Nitrite (as N, mg/l)	12	<0.01	<0.01	<0.01	0.04
Iron					
(mg/l)	12	0.15	0.39	0.24	Monitor ⁽⁴⁾
(lbs/day)	12	0.21	1.0	0.52	Note (6)
Total Phosphorus					
(mg/l)	12	0.02	0.25	0.1	Monitor ⁽⁴⁾
(kg/month)	12	0.35	5.7	1.8	Note (7)
Zinc					
(mg/l)	12	<0.005	0.02	<0.01	Monitor ⁽⁴⁾
(lbs/day)	12	<0.006	0.08	<0.03	Note (8)
Boron (mg/l)	12	<0.05	0.1	<0.06	0.5
Sulfite (mg/l)	12	<2.0	<2.0	<2.0	2.0
Nitrogen, Ammonia (as NH ₃ , mg/l)	12	<0.1	<0.1	<0.1	Monitor ⁽⁴⁾

Notes for Table 35 are on page 108.

NOTES FOR TABLES 34 AND 35

1. A value preceded by "<" is less than the RL for that sample and parameter.
2. Average values preceded by "<" contain at least one value less than the RL value in the average.
3. KS discharged 148 times from Outfall 001 during 2025. Outfall 001 was flooded three times; therefore, representative flow, outfall temperature, and TRC measurements/samples could not be collected during these events. As outlined in Table 8 of this report, on March 17, 2025, one downstream temperature sample was missed at Outfall 001.
4. The Reference (22) permit requires the data to be reported but does not specify a limit for this discharge parameter.
5. During the period from May through October, the temperature of heated water discharges from KS operations shall not exceed 75°F, except that if the ambient stream temperature exceeds 75°F, the temperature of the discharge can be equal to the stream temperature, up to a maximum of 78°F. During the period from November through April, the temperature of the heated water discharges from KS operations shall not exceed 75°F. In addition, no discharges will occur which will raise the temperature of the stream by more than 5°F, or to a maximum of 55°F, whichever temperature is less, except that if the upstream temperature is > 55°F, the discharge to the stream shall be such that the downstream temperature is less than or equal to the upstream temperature. If the upstream creek temperature is > 55°F, the heated water discharges shall not exceed the upstream temperature of the creek.
6. Total KS mass discharge limit of 4.0 pounds per day (lbs/day) for Outfalls 001, 002, and 003 combined.
7. An action level of 50 kg/month has been assigned for the total mass discharged from Outfalls 001, 002, and 003 combined. An action level is not a limit, but a specified effluent level that requires additional short term monitoring upon exceedance.
8. Total KS mass discharge limit of 0.5 lbs/day for Outfalls 001, 002, and 003 combined.
9. KS discharged 148 times from Outfall 002 during 2025. Outfall 002 was flooded two times; therefore, representative flow, outfall temperature, and TRC measurements/samples could not be collected during these events. As outlined in Table 8 of this report, on March 17, 2025, one downstream temperature sample was missed at Outfall 002.

TABLE 36
CHEMICAL CONSTITUENTS AND TEMPERATURE IN KESSELRING SITE
SANITARY WASTEWATER TREATMENT FACILITY EFFLUENT, OUTFALL 003

Parameter (units)	Number of Samples	Value			SPDES Permit Limit
		Minimum ⁽¹⁾	Maximum ⁽¹⁾	Average ⁽²⁾	
Discharge Requirements (Reference (22))					
Flow (MGD)	365 ⁽³⁾	0.001	0.02	0.008	0.09 ⁽⁴⁾
pH (SU)	410 ⁽³⁾	7.4	8.1	7.8	6.0 - 9.0 ⁽⁵⁾
Settleable Solids (ml/l)	410 ⁽³⁾	<0.1	<0.1	<0.1	0.1
DO (mg/l)	410 ⁽³⁾	7.6	15	11	≥ 5.0 ⁽⁶⁾
Nitrite (as N, mg/l)	12	<0.01	0.03	<0.013	0.6
Cyanide, Available (mg/l)	12	<0.006	0.007	<0.006	0.09
Ammonia (as NH ₃ , mg/l)	12	<0.1	0.1	<0.1	25
Surfactants (MBAS) (mg/l)	12	<0.1	<0.1	<0.1	0.7
Boron (mg/l)	12	<0.05	0.09	<0.06	1.2 ⁽⁷⁾
Dissolved Copper (mg/l)	12	<0.005	0.036	<0.012	Monitor ⁽⁸⁾
BOD-5 (mg/l)	12	3 ⁽⁹⁾	<4	<4	30 ⁽¹⁰⁾
TSS (mg/l)	12	1.1	2.9	1.7	30 ⁽¹⁰⁾
Total Phosphorus					
(mg/l)	12	0.05	0.36	0.20	Monitor ⁽⁸⁾
(kg/month)	12	0.04	0.46	0.20	Note (11)
Zinc					
(mg/l)	12	<0.005	0.021	<0.009	Monitor ⁽⁸⁾
(lbs/day)	12	<0.0002	0.002	<0.0007	Note (12)
Total Copper (lbs/day)	12	<0.0002	0.002	<0.001	0.06
Iron					
(mg/l)	12	<0.05	0.13	<0.057	Monitor ⁽⁸⁾
(lbs/day)	12	<0.001	0.008	<0.004	Note (13)
Aluminum (mg/l)	12	<0.1	<0.1	<0.1	2.0 ⁽⁷⁾
Butyl Benzyl Phthalate (mg/l)	12	<0.005	<0.0051	<0.005	0.1 ⁽⁷⁾

Notes for Table 36 are on page 110.

NOTES FOR TABLE 36

1. A value preceded by "<" is less than the RL for that sample and parameter.
2. Average values preceded by "<" contain at least one value less than the RL value in the average.
3. The Reference (22) permit requires KS to collect and analyze monthly samples for pH, DO and settleable solids. The SWTF operators collect and analyze pH, DO, and settleable solids on a daily basis to support proper operation of the treatment system. In March 2024, it was determined that data from the collection of additional pH, settleable solids, and DO samples by SWTF operators on days when there was second discharge should be included on the daily log. The SWTF operators collected and analyzed an additional 45 samples for these parameters on days when a second batch discharge occurred. The flow values represent the total discharge for the day.
4. 30-day average.
5. The minimum and maximum pH values are required to be in this range.
6. The minimum value is well above the limit, which is a minimum allowable value.
7. Values are action levels, which are not a limit but a specified effluent level that requires additional short-term monitoring upon exceedance.
8. The Reference (22) permit requires the data to be reported but does not specify a limit for this discharge parameter.
9. Value detected below method detection limit and reported as estimated value.
10. The maximum limit for the 30-day arithmetic mean is 30 mg/l; the maximum limit for the 7-day arithmetic mean is 45 mg/l.
11. An action level of 50 kg/month has been assigned for the total mass discharged from Outfalls 001, 002 and 003 combined. An action level is not a limit but a specified effluent level that requires additional short-term monitoring upon exceedance.
12. Total Site mass discharge limit of 0.5 lbs/day for Outfalls 001, 002, and 003 combined.
13. Total Site mass discharge limit of 4.0 lbs/day for Outfalls 001, 002, and 003 combined.

TABLE 37
KESSELRING SITE RADIOACTIVITY RELEASED IN LIQUID EFFLUENT

Radionuclide	Release Ci ⁽¹⁾	Half-life
H-3	6.05E-04	12.32 years

Note:

1. The total includes results that were less than or equal to the DLC.

AIRBORNE EFFLUENT MONITORING

Sources

Nonradiological: The principal sources of industrial gaseous effluents are three steam generating boilers (two 21 million BTU per hour (BTU/hr) boilers and one 14.3 million BTU/hr boiler). The bioheating fuel oil used to fire these boilers is comprised of Number 2 fuel oil blended with biodiesel, as required by New York's bioheating fuel requirements. The bioheating fuel contains a maximum of 0.0015 percent by weight sulfur. Each boiler is connected to a dedicated exhaust stack. Other operations such as carpenter shops, welding hoods, abrasive cleaning, spray painting, and other miscellaneous internal combustion sources (e.g., air compressors and emergency generators) constitute point sources of airborne effluents.

Radiological: Small quantities of particulate radioactivity, principally cobalt-60, are processed through controlled exhaust systems during reactor coolant sampling, draining, and venting operations. Gaseous radioactivity contained in the exhaust air consists principally of carbon-14, short-lived isotopes of xenon and krypton, argon-41, and tritium. Carbon-14 and argon-41 are the result of neutron interaction with isotopes of dissolved oxygen, nitrogen, and argon in the coolant. Other radioactive gases such as xenon and krypton are produced by neutron interaction with trace quantities of uranium impurities in structural members within the reactor. Prior to release from the exhaust stacks, the exhaust air is passed through HEPA filter systems to minimize particulate radioactivity content. Additionally, some processed water is evaporated to minimize releases of radioactivity in liquid effluent. The evaporator air effluent contains gaseous tritium. Potential diffuse sources are also evaluated and include emissions from D&D activities such as building demolition.

Effluent Monitoring

Nonradiological: For Kesselring Site boilers, monthly fuel usage records are tracked and tabulated to ensure compliance with regulatory requirements. Fuel oil supplier certification certificates for purchased bioheating fuel oil are maintained by Kesselring Site to confirm the fuel burned in Kesselring Site boilers contains a maximum of 0.0015 percent by weight sulfur and conforms to the ASTM Standards for fuel oil/biodiesel blends. Semiannual reports demonstrating compliance with the fuel oil sulfur limitation are sent to the EPA, as required by EPA's New Source Performance Standards (NSPS). Operating logs are maintained for other miscellaneous internal combustions sources to ensure site-wide emissions remain below 50% of Title V thresholds. There are no direct exhaust gas monitoring requirements for nonradiological emissions.

Radiological: The air exhausted from the reactor plant is continuously monitored for particulate radioactivity with monitors that are equipped with alarm functions to provide an alert should an out-of-specification release occur. The air exhausted from all radiological work facilities is continuously sampled for particulate radioactivity. Reactor plant air emissions are also continuously sampled for radioiodine with activated charcoal cartridges. Sampling is performed for tritium and carbon-14 using appropriate absorbers.

Effluent Analyses

Radiological: The air particulate sample filters from the radiological emission points are changed routinely and analyzed by gamma spectrometry. A DLC of approximately 5×10^{-15} $\mu\text{Ci/ml}$ is achieved for cobalt-60. The activated charcoal cartridges are analyzed for radioiodine by gamma spectrometry to a DLC of approximately 5×10^{-15} $\mu\text{Ci/ml}$ for iodine-131. The tritium and carbon-14 absorbers are analyzed by liquid scintillation spectrometry. The DLCs of tritium and carbon-14 in air are approximately 5×10^{-11} $\mu\text{Ci/ml}$ for typical sampling parameters. The quantity of gaseous radioactivity released is calculated based on reactor plant operating parameters.

Assessment

Nonradiological: Kesselring Site emissions of NO_x and CO continue to be within the limits established by the NYSDEC air facility registration. Emissions of SO_2 from Kesselring Site boiler units are within the EPA's NSPS for stationary combustion installations.

Combined, Kesselring Site emergency generators and the fire pump operated less than 293 hours during 2025. An emergency engine would have to operate 500 hours or greater to trigger a NYSDEC permitting requirement. All other point source emissions also conform to the applicable Federal and State clean air standards.

Radiological: The radioactivity released in airborne effluent during 2025 is shown in Table 38. The radioactivity was contained in a total volume of 9.92×10^{11} liters of air. The average radioactivity concentration in the effluent air was well below the applicable standards listed in Reference (6). The average annual radioactivity concentration at the nearest Kesselring Site boundary, based on average annual diffusion parameters, was less than 0.01 percent of the DOE DCS (Reference (6)), for the mixture of radionuclides present. Kesselring Site had three diffuse sources of emission in 2025. Airborne effluent monitoring data is reported as required in Reference (8).

TABLE 38
KESSELRING SITE RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENT

Radionuclide	Point Source Release Ci ⁽¹⁾	Diffuse Source Release Ci	Total Release Ci	Half-life
Fission & Activation Products⁽²⁾				
Ag-110m	7.60E-12	5.42E-13	8.14E-12	249.8 days
Ba-137m	7.60E-11	5.42E-12	8.14E-11	2.552 minutes
C-14	1.05E-02	9.03E-13	1.05E-02	5,715 years
Co-58	9.29E-11	6.62E-12	9.95E-11	70.88 days
Co-60	1.70E-05	6.02E-11	1.70E-05	5.271 years
Cs-134	8.44E-12	6.02E-13	9.05E-12	2.065 years
Cs-137	7.60E-11	5.42E-12	8.14E-11	30.07 years
Fe-55	8.44E-10	6.02E-11	9.05E-10	2.75 years
H-3	6.38E-03	0.00E+00	6.38E-03	12.32 years
I-129	3.38E-15	2.40E-16	3.62E-15	1.57E07 years
I-131	5.82E-07	0.00E+00	5.82E-07	8.023 days
Kr-85	1.08E-07	0.00E+00	1.08E-07	10.76 years
Mn-54	7.26E-10	5.18E-11	7.78E-10	312.1 days
Nb-94	1.69E-13	1.20E-14	1.81E-13	2.00E04 years
Ni-59	6.75E-13	4.82E-14	7.24E-13	7.60E04 years
Ni-63	6.75E-11	4.82E-12	7.24E-11	101 years
Sb-125	3.38E-11	2.40E-12	3.62E-11	2.758 years
Sr-90	4.22E-12	3.01E-13	4.52E-12	28.8 years
Tc-99	7.60E-12	5.42E-13	8.14E-12	2.13E05 years
Y-90	4.22E-12	3.01E-13	4.52E-12	2.669 days
Zn-65	3.38E-11	2.40E-12	3.62E-11	244.0 days
Total Fission & Activation Products (Half-life >3hr)	1.68E-02	2.02E-10	1.68E-02	
Noble Gases				
Ar-41	3.32E-02	0.00E+00	3.32E-02	1.83 hours
Kr-83m	1.55E-06	0.00E+00	1.55E-06	1.86 hours
Kr-85m	3.16E-05	0.00E+00	3.16E-05	4.48 hours
Kr-87	1.04E-06	0.00E+00	1.04E-06	1.27 hours
Kr-88	3.02E-05	0.00E+00	3.02E-05	2.84 hours
Xe-131m	4.46E-06	0.00E+00	4.46E-06	11.9 days
Xe-133m	2.72E-05	0.00E+00	2.72E-05	2.19 days

Notes for Table 38 on page 114.

TABLE 38 (continued)
KESSELRING SITE RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENT

Radionuclide	Point Source Release Ci ⁽¹⁾	Diffuse Source Release Ci	Total Release Ci	Half-life
Noble Gases				
Xe-133	8.44E-04	0.00E+00	8.44E-04	5.243 days
Xe-135	4.80E-04	0.00E+00	4.80E-04	9.10 hours
Noble Gases (Half-life <40 days)	3.46E-02	0.00E+00	3.46E-02	

Notes:

1. The H-3, C-14, Co-60, and I-131 totals include results that were less than or equal to the DLC.
2. The number of radionuclides listed varies year-to-year based on KS's potential to emit evaluations for area or point releases from D&D type work. Those that are listed were detected in radiochemistry analysis of samples.

ENVIRONMENTAL MONITORING

Scope

Nonradiological: The nonradiological environmental monitoring program at Kesselring Site during 2025 included monitoring and recording of the Glowegee Creek temperature conducted upstream of Kesselring Site, between the discharge channels, and downstream of Kesselring Site discharge locations each day Kesselring Site discharged water through Outfalls 001 and 002 (See Figure 5). Flow measuring equipment is installed in Kesselring Site's three non-stormwater discharge channels. In addition, Glowegee Creek flow is monitored by the USGS one-half mile downstream of Kesselring Site at the West Milton Road gauging station (USGS No. 01330000).

A voluntary aquatic life sampling and evaluation program is conducted in the Glowegee Creek upstream, near the discharge channels, and downstream in the Glowegee Creek. Backpack electro-fishing techniques are used to collect the fish, which are identified, measured, and returned to the creek unharmed.

Kesselring Site operated its own sanitary landfill for the disposal of nonradioactive and nonhazardous solid wastes until October 1993, when landfill operations permanently ceased. NYSDEC approved the final Landfill Closure Plan, and landfill closure construction was completed in October 1994. The closed landfill is maintained in accordance with a Post-Closure Monitoring and Maintenance Operations Manual, which has been approved by NYSDEC. Groundwater monitoring of the landfill is performed in accordance with this manual. All Kesselring Site groundwater monitoring data are discussed separately later in this report.

Radiological: The radiological environmental monitoring program at Kesselring Site during 2025 included: (1) the collection of fish upstream and downstream of discharge locations to the Glowegee Creek, (2) the collection of quarterly samples of Glowegee Creek water and sediment at seven locations, and (3) the operation of continuous air samplers at stations located in the primary upwind and downwind directions from Kesselring Site.

Three samples of sediment and one composite water sample are collected quarterly for radioanalysis across the creek at the seven locations shown in Figure 5.

Environmental air samplers are operated in the primary upwind and downwind directions from Kesselring Site to measure normal background airborne radioactivity and to confirm that Kesselring Site effluents have no measurable effect on normal background levels.

Analyses

Radiological: The routine quarterly samples of Glowegee Creek water and bottom sediment samples are analyzed with a high purity germanium gamma spectrometer system. In addition, a more sensitive gamma spectrometry analyses is performed annually on the fish and some of the water and sediment samples collected from the Glowegee Creek. The more sensitive analysis is intended to fully characterize the low levels of naturally and non-naturally occurring gamma-

emitting radionuclides. The environmental air particulate sample filters are changed and analyzed routinely by high purity germanium gamma spectrum analysis.

Assessment

Nonradiological: The Gloweggee Creek fish survey results from 2025 are summarized in Table 39. The concentrations of chemical constituents in liquid effluent from Kesselring Site resulted in no adverse effect on the quality of the Gloweggee Creek. This conclusion is substantiated by results of the fish surveys that confirmed the existence of a diverse and healthy aquatic community in the creek water. The 2025 survey data is consistent with historical fish survey data. The different relative abundance of fish species at each sampling location reflects their different preferred habitats.

Radiological: The gamma spectrum analysis results for fish collected from the Gloweggee Creek are shown in Table 40. The results show no radioactivity attributable to Kesselring Site operations. The only radionuclide observed in both fish samples was potassium-40. This naturally occurring radionuclide is frequently observed in fish.

Results of the gamma analysis of sediment and water samples are shown in Table 41. The data shows that there is no significant difference between radioactivity concentrations measured upstream and downstream. Only naturally occurring radionuclides were detected in the Gloweggee Creek water samples. Results of the detailed gamma spectrum analyses performed on sediment samples also indicate low concentrations of potassium-40, cesium-137, and daughters of uranium and thorium. Potassium-40 and the daughters of uranium and thorium are naturally occurring radionuclides and are not associated with Kesselring Site operations. The EPA has attributed similar low levels of cesium-137 to fallout from low yield atmospheric nuclear weapon tests. Since the beginning of prototype operations in 1954, the release of radioactivity into the Gloweggee Creek has been small and has had no adverse effect on the natural background radioactivity levels in the sediment.

The results for the environmental air samples show that there was no significant difference between the average upwind and downwind radioactivity concentrations. The average upwind radioactivity concentration was $1.56 \times 10^{-15} \mu\text{Ci/ml}$ and the average downwind radioactivity concentration was $4.73 \times 10^{-15} \mu\text{Ci/ml}$. Gamma spectrum analyses indicated the presence of only background quantities of naturally occurring radionuclides.

RADIATION MONITORING

The purpose of the environmental radiation monitoring program is to measure the ambient radiation levels around Kesselring Site to confirm operations have not altered the natural radiation background levels at Kesselring Site perimeter. The sources of radiation at Kesselring Site are associated with the operation and maintenance of the prototype reactor plant.

Scope

Environmental radiation levels were monitored at the perimeter of Kesselring Site with a network of DT-702/PD lithium fluoride TLDs. The eight locations of Kesselring Site perimeter TLDs are shown in Figure 6. Control TLDs were posted at four remote off-site locations to measure the natural background levels typical of the surrounding area. All TLDs were posted for quarterly exposure periods.

Analyses

The DT-702/PD lithium fluoride environmental TLDs are calibrated to a cesium-137 standard source. The TLD radiation exposures were measured quarterly utilizing an automated TLD readout system that was calibrated prior to the processing of the TLDs.

Assessment

The total annual radiation exposures measured with TLDs at the boundary of Kesselring Site and at remote, off-site monitoring locations are summarized in Table 42. There is no statistically significant difference between the perimeter and the off-site measurements. Kesselring Site operations in 2025 had no measurable effect on natural background radiation levels at Kesselring Site perimeter.

TABLE 39
GLOWEGEE CREEK FISH SURVEY

Location	Species	Number Collected	Length (mm)
400 Feet Upstream of 001	Blacknose Dace	26	17 - 69
	Bluegill	-	-
U-2	Bluntnose Minnow	2	53 - 57
	Brook Stickleback	-	-
	Brook Trout	-	-
	Brown Bullhead	-	-
	Brown Trout	-	-
	Common Shiner	12	20 - 29
	Creek Chub	69	20 - 130
	Cutlips Minnow	13	81 - 99
	Fallfish	-	-
	Fathead Minnow	7	41 - 47
	Golden Shiner	-	-
	Largemouth Bass	-	-
	Longnose Dace	1	48
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	-	-
	Rainbow Trout	-	-
	Tessellated Darter	9	55 - 65
	White Sucker	91	46 - 84
	Yellow Bullhead	3	135 - 149
	Yellow Perch	-	-
50 Feet Upstream of 001	Blacknose Dace	30	35 - 66
	Bluegill	-	-
U-1	Bluntnose Minnow	2	43 - 46
	Brook Stickleback	-	-
	Brook Trout	1	67
	Brown Bullhead	1	129
	Brown Trout	-	-
	Common Shiner	-	-
	Creek Chub	46	27 - 157
	Cutlips Minnow	4	62 - 91
	Fallfish	-	-
	Fathead Minnow	-	-
	Golden Shiner	-	-
	Largemouth Bass	-	-
	Longnose Dace	4	44 - 85
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	-	-
	Rainbow Trout	-	-
	Tessellated Darter	4	34 - 74
	White Sucker	4	65 - 78
	Yellow Bullhead	3	54 - 160
	Yellow Perch	-	-
360 Feet Downstream of 001	Blacknose Dace	28	31 - 63
	Bluegill	2	44 - 91
M-1	Bluntnose Minnow	3	51 - 66
	Brook Stickleback	-	-
	Brook Trout	-	-
	Brown Bullhead	1	137
	Brown Trout	-	-
	Common Shiner	9	24 - 95
	Creek Chub	47	24 - 139
	Cutlips Minnow	6	64 - 111
	Fallfish	-	-
	Fathead Minnow	-	-
	Golden Shiner	-	-
	Largemouth Bass	4	82 - 85
	Longnose Dace	-	-
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	6	69 - 76
	Rainbow Trout	-	-
	Tessellated Darter	9	38 - 72
	White Sucker	19	48 - 88
	Yellow Bullhead	-	-
	Yellow Perch	-	-

TABLE 39 (continued)
GLOWEGEE CREEK FISH SURVEY

Location	Species	Number Collected	Length (mm)
2350 Feet Downstream of 001 D-2	Blacknose Dace	66	28 - 61
	Bluegill	-	-
	Bluntnose Minnow	17	65 - 75
	Brook Stickleback	-	-
	Brook Trout	-	-
	Brown Bullhead	-	-
	Brown Trout	1	355
	Common Shiner	71	34 - 91
	Creek Chub	41	37 - 132
	Cutlips Minnow	4	46 - 102
	Fallfish	-	-
	Fathead Minnow	1	55
	Golden Shiner	-	-
	Largemouth Bass	-	-
	Longnose Dace	-	-
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	3	86 - 90
	Rainbow Trout	-	-
	Tessellated Darter	12	45 - 79
	White Sucker	20	65 - 75
	Yellow Bullhead	-	-
	Yellow Perch	-	-
2700 Feet Downstream of 001 D-1	Blacknose Dace	15	24 - 61
	Bluegill	-	-
	Bluntnose Minnow	2	34 - 72
	Brook Stickleback	1	42
	Brook Trout	-	-
	Brown Bullhead	-	-
	Brown Trout	-	-
	Common Shiner	3	47 - 83
	Creek Chub	82	31 - 133
	Cutlips Minnow	2	59 - 73
	Fallfish	1	84
	Fathead Minnow	-	-
	Golden Shiner	-	-
	Largemouth Bass	-	-
	Longnose Dace	1	48
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	-	-
	Rainbow Trout	-	-
	Tessellated Darter	20	40 - 69
	White Sucker	2	73 - 76
	Yellow Bullhead	-	-
	Yellow Perch	-	-
5000 Feet Downstream of 001 D-3	Blacknose Dace	118	35 - 71
	Bluegill	-	-
	Bluntnose Minnow	-	-
	Brook Stickleback	-	-
	Brook Trout	-	-
	Brown Bullhead	-	-
	Brown Trout	-	-
	Common Shiner	4	36 - 97
	Creek Chub	13	41 - 109
	Cutlips Minnow	12	37 - 106
	Fallfish	2	60 - 93
	Fathead Minnow	-	-
	Golden Shiner	-	-
	Largemouth Bass	-	-
	Longnose Dace	19	49 - 97
	Northern Redbelly Dace	-	-
	Pearl Dace	-	-
	Pumpkinseed	-	-
	Rainbow Trout	-	-
	Tessellated Darter	3	60 - 64
	White Sucker	-	-
	Yellow Bullhead	-	-
	Yellow Perch	-	-

TABLE 40
RESULTS OF ANALYSES OF GLOWEGEE CREEK
FISH FOR RADIOACTIVITY

Sample Location	Radioactivity Concentration ⁽¹⁾ (pCi/g wet weight)		
	K-40	Cs-137	Co-60
Upstream of Discharge			
Channel 001	2.188 ± 0.276	<0.007	<0.005
Downstream of Discharge			
Channel 002	2.500 ± 0.294	<0.007	<0.008

Note:

1. A value preceded by "<" is less than the DLC for that sample and parameter. The (±) value represents the statistical uncertainty at two standard deviations.

TABLE 41
RESULTS OF ANALYSES OF GLOWEGEE CREEK
SEDIMENT AND WATER FOR RADIOACTIVITY

Sample Location	No. of Samples	Co-60 Radioactivity Concentration						
		Sediment (pCi/g, dry weight) ^(1,2)				Water (pCi/l) ⁽²⁾		
	Sediment / Water	Minimum	Maximum	Average		Minimum	Maximum	Average
Upstream of Discharge								
Channel 001	12 / 4	<0.02	<0.02	<0.02		<9.45	<10.78	<10.13
Opposite Discharge								
Channel 001	12 / 4	<0.02	<0.02	<0.02		<5.95	<9.45	<7.40
Between Discharge								
Channels 001 & 002	24 / 8	<0.02	<0.02	<0.02		<6.55	<9.74	<8.41
Opposite Discharge								
Channel 002	12 / 4	<0.02	<0.02	<0.02		<8.96	<9.91	<9.62
Downstream of Discharge								
Channel 003	24 / 8	<0.02	<0.02	<0.02		<4.69	<10.36	<7.86

Notes:

1. Dry weight is based on sample weight with free water removed.
2. A value preceded by "<" is less than the DLC for that sample and parameter.

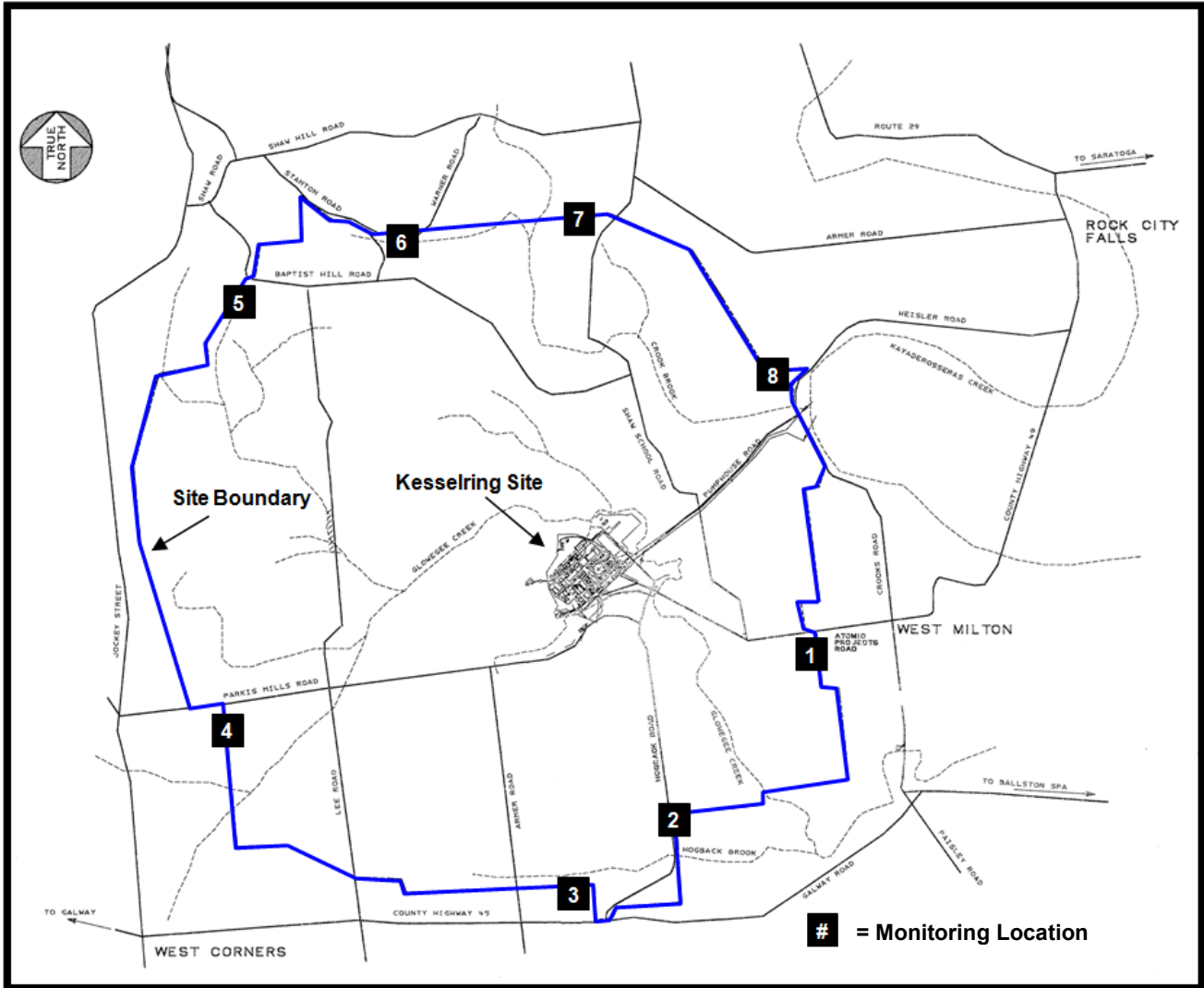


FIGURE 6
KESSELRING SITE, NEAR WEST MILTON, NEW YORK
PERIMETER MONITORING LOCATIONS

TABLE 42
PERIMETER AND OFF-SITE RADIATION MONITORING
RESULTS, KESSELRING SITE

Monitoring Location ⁽¹⁾	Total Annual Exposure (mrem) ⁽²⁾
1	55 ± 2
2	45 ± 2
3	46 ± 1
4	52 ± 2
5	53 ± 3
6	50 ± 1
7	50 ± 2
8	53 ± 2
Off-site locations	55 ± 16 ⁽³⁾

Notes:

1. See Figure 6 for monitoring locations.
2. The (±) values for individual locations are expressed at the 2 sigma confidence level based on the calculated measurement uncertainty.
3. Approximately 95% of natural background radiation measurements are expected to be within this range.

GROUNDWATER MONITORING

Scope

The Kesselring Site groundwater program includes environmental (nonradiological) monitoring of the closed Hogback Road Landfill in accordance with NYSDEC regulations and the voluntary monitoring of wells within the developed area of Kesselring Site. Voluntary radiological monitoring of groundwater is also performed concurrently at the above locations and at several outlying areas of Kesselring Site. The groundwater monitoring program is summarized in Table 43.

In 1993, the Hogback Road Landfill was closed, and in 1994 it was capped in accordance with a closure plan approved by NYSDEC. Landfill capping minimizes the amount of precipitation moving through the fill material and serves to stabilize and lessen the generation of landfill leachate that would migrate into groundwater. The Hogback Road Landfill Post-Closure Monitoring and Maintenance Operations Manual documents all of the required measures Kesselring Site takes to ensure the integrity of the landfill cap, and any associated impacts to the environment are tracked and understood.

The landfill regulatory-required monitoring program consists of annually sampling six groundwater monitoring wells during the late summer to fall timeframe when groundwater tables are typically lowest. Five shallow overburden wells (HB-1A, LMW-4, HB-5A2, LMW-6, and HB-11A) and one deep bedrock well (HB-5B) are sampled for a focused list of analytical parameters approved by NYSDEC. The locations of all existing landfill groundwater monitoring wells are shown in Figure 7. In addition to annual groundwater monitoring, Kesselring Site performs quarterly inspections of landfill integrity and an annual survey for explosive gases at the landfill gas vents.

The groundwater monitoring program for the developed area (Figure 8) typically consists of annual sampling of 18 monitoring wells. This sampling is performed as a best management practice to track known constituents and to provide early detection of unexpected releases.

The groundwater monitoring program for the former disposal areas consists of annual sampling of 13 monitoring wells (Figure 9) for radiological analyses. In 1999, Kesselring Site evaluated each of the former disposal sites with regard to the nature of the disposal source material, hydrogeology, and historic analytical database, and concluded that no groundwater threat exists. These wells are monitored to maintain a record of negative radiological data.

Sources

Nonradiological: Elevated parameters in the landfill wells are associated with past disposal practices. The landfill, operated since 1951 and closed in 1993, was used predominantly for the disposal of sanitary wastes. Prior to enactment of Federal and State regulations for solid waste disposal activities that banned disposal of certain wastes in such facilities, asbestos scraps, scrap metal including lead, some oil and oily water, solvents, paint, and chemicals were disposed of in the landfill.

Elevated parameters in and adjacent to the developed area of Kesselring Site are predominantly the result of operational activities, such as: historical material handling practices and construction activities, on-going use of roadway de-icing materials (e.g., sodium chloride, calcium chloride, etc.), cooling tower operations, and routine operations of SSW systems containing chlorine.

The five former disposal sites at Kesselring Site were used for construction and demolition waste, limited amounts of acid waste, and some waste burning. These disposal practices were conducted prior to enactment of Federal and State regulations governing the disposal of these materials.

Analyses

Nonradiological: All groundwater samples are analyzed by a NYSDOH certified laboratory for chemical parameters in accordance with Reference (10) or other EPA approved methods. Field parameters, which include static water level, temperature, and pH, are measured on site at the time of environmental sampling. Specific conductance and turbidity are sampled on site at the time of sampling for some monitoring events and are analyzed at a certified laboratory for others.

TABLE 43
KESSELRING SITE GROUNDWATER MONITORING PROGRAM

Program Area	Monitoring Wells	Field Parameters & Modified Routine List & Halogenated VOCs ^(1,2)	Field Parameters & VOCs	Radioactivity
Landfill	HB-1A, HB-5A2, HB-5B, HB-11A, LMW-4, LMW-6	A, R		A, V
Developed Area	MW-1 to MW-4, MW-6 to MW-19 ⁽³⁾		A, V	A, V
Land Disposal Area	KBH-1 to KBH-4, KBH-6 to KBH-13, and T-3 ⁽³⁾			A, V

Notes:

A = Annual

R = Regulatory Required Monitoring

V = Voluntary Monitoring

1. Parameters are discussed in the tables of this section.

2. Filtered metals analysis is performed as necessary for verification of elevated metals which are attributable to sample turbidity (suspended clay/silt particles).

3. MW-5, MW-20, and KBH-5 were decommissioned in accordance with NYSDEC regulations.

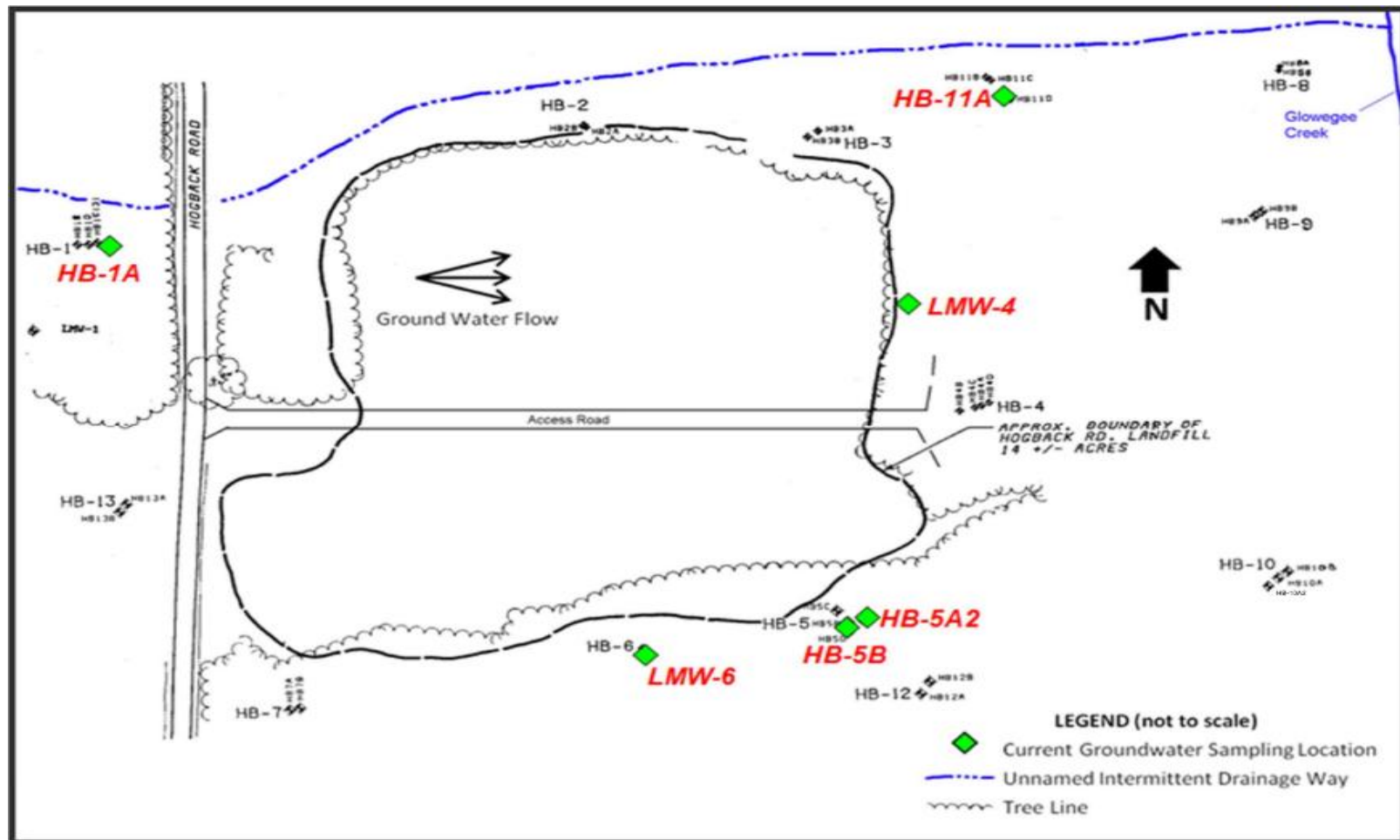


FIGURE 7
KESSELRING SITE, NEAR WEST MILTON, NEW YORK
LANDFILL GROUNDWATER MONITORING WELLS

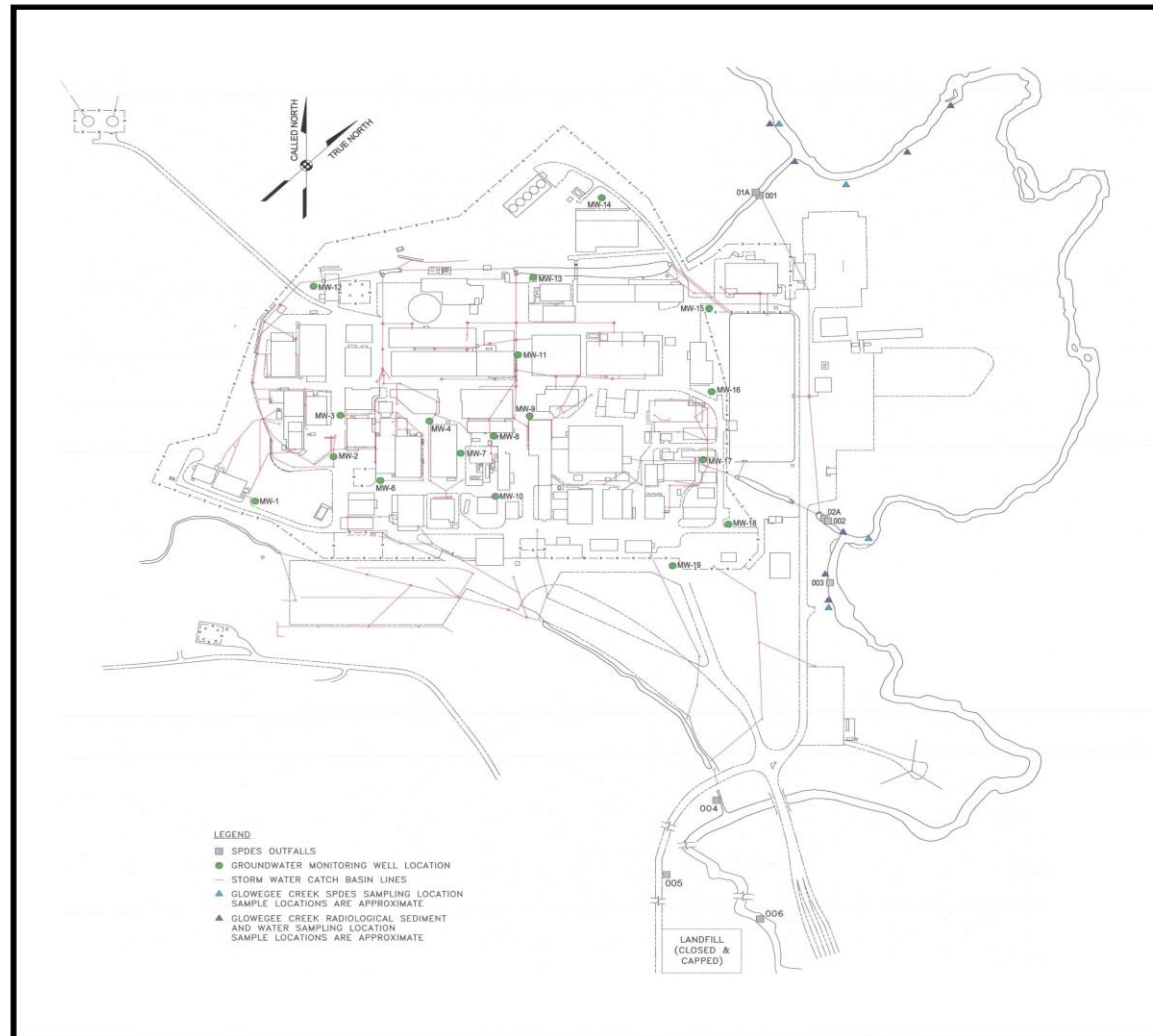


FIGURE 8
KESSELRING SITE, NEAR WEST MILTON, NEW YORK
DEVELOPED AREA GROUNDWATER MONITORING WELLS

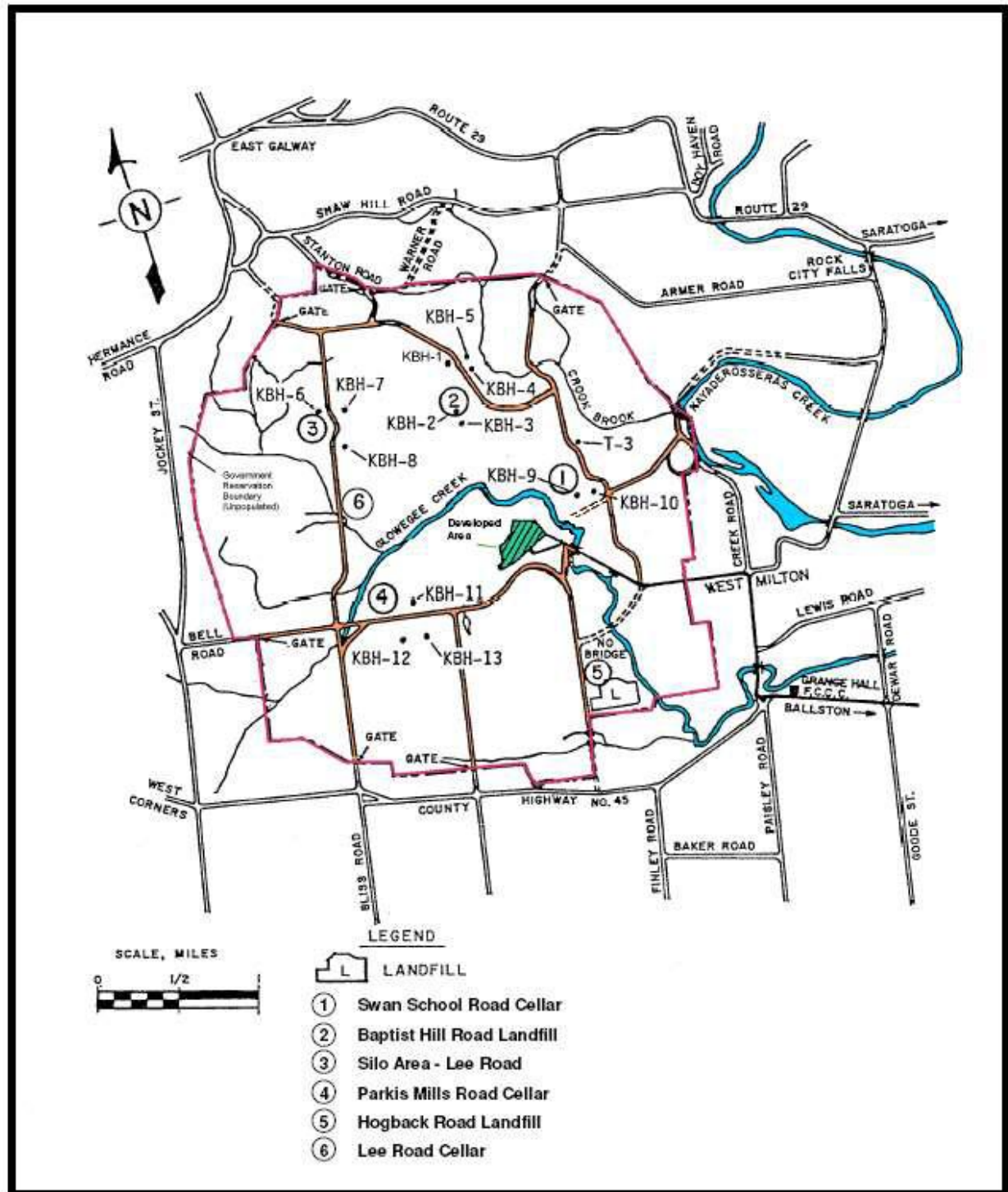


FIGURE 9
KESSELRING SITE, NEAR WEST MILTON, NEW YORK
DISPOSAL AREAS – GROUNDWATER MONITORING WELLS

Landfill samples are analyzed for a modified list of routine chemical and leachate-indicator parameters approved by NYSDEC in 2002. The modified routine parameter list includes alkalinity, ammonia, COD, chloride, hardness, nitrate, sulfate, TDS, total organic carbon (TOC), calcium, iron, manganese, magnesium, potassium, and sodium. The samples are also analyzed for halogenated and aromatic VOCs. All samples were collected in accordance with the procedures and requirements of the Post-Closure Monitoring and Maintenance Operations Manual. All routine parameter results are shown in Table 44. Gas monitoring was performed at the landfill in accordance with the post-closure monitoring requirements using an oxygen/explosive gas detector calibrated to the manufacturer's specifications.

Within the developed area, 18 monitoring wells are sampled for both halogenated and aromatic VOCs. The VOC analysis suite consists of 29 halogenated and 5 aromatic compounds of which only a few have been detected above the practical quantitation limit/reporting limit in the past. VOC results are shown in Table 45. In addition, laboratory analyses are performed for chloride, nitrate, ammonia, and nitrite for the developed area monitoring wells.

Groundwater from four production wells located along Kesselring Site's eastern property boundary is used to supply the drinking water system at Kesselring Site. The drinking water is sampled in accordance with NYS drinking water regulations defined in Reference (23). The sample results are shown in Table 46.

Radiological: Kesselring Site conducts voluntary radiological monitoring on the groundwater wells at the landfill area, the developed area, and four former disposal sites. The well locations are shown in Figures 7, 8, and 9. The well samples are analyzed by gamma spectrometry for cesium-137 and cobalt-60 and by liquid scintillation spectrometry for tritium. The results of the analyses are shown in Table 47.

Assessment

Nonradiological:

Landfill

Groundwater wells were sampled both upgradient and downgradient of the Hogback Road Landfill to monitor groundwater quality impacts from the landfill and for any indications of a breach in the integrity of the landfill cap. Analytical results obtained during 2025 remain consistent overall with historical data trends.

The 2025 analytical results continue to show that while certain routine parameters remain elevated in most of the downgradient wells when compared to the upgradient well (HB-1A) (Table 44), these parameters are either stable or decreasing over time, and there remains no indication of a breach in landfill cap integrity. The individual parameters that are typically elevated include: specific conductance, alkalinity, hardness, TDS, chloride, sulfate, magnesium, manganese, potassium, sodium, and calcium. Several other parameters exhibit variability and are generally elevated in only a few downgradient wells. These parameters routinely include turbidity, COD, TOC, ammonia, nitrate, and iron.

TABLE 44
RESULTS OF KESSELRING SITE GROUNDWATER MONITORING,
HOGBACK ROAD LANDFILL⁽¹⁾

Sample Location	HB-1A	LMW-4 ⁽²⁾	HB-11A	HB-5A2	HB-5A2 Duplicate	HB-5B	LMW-6	Standard/ Criteria ⁽³⁾
Sample Date	09/08/25	09/08/25	09/08/25	09/08/25	09/08/25	09/08/25	09/08/25	
Field Parameters								
Groundwater Elevation (ft)	482.72	463.95	453.88	451.00	----	450.7	460.70	NC
Temperature (°C)	15.1	----	13.4	10.5	----	10.8	11.7	NC
pH (SU)	6.9	----	6.9	6.5	----	6.6	6.5	6.5 - 8.5
Specific Conductance (µmhos/cm)	1726	----	724	846	----	920	909	NC
Turbidity (NTU)	18.2	----	50.3	45.5	----	7.97	28.1	5
Indicator (mg/l, or as indicated)								
Alkalinity, as CaCO ₃	88	----	370	480	480	540	430	NC
Ammonia (as N, mg/l)	<0.1	----	<0.1	0.1	<0.1	0.2	<0.1	2
COD	12	----	12	33	20	7	10	NC
Chloride	<2.00	----	31.9	<2.00	<2.00	15.0	54.8	250
Hardness, as CaCO ₃	98	----	336	407	342	477	347	NC
Nitrate (as N, mg/l)	<0.04	----	<0.04	0.13	0.10	<0.04	0.11	10
Sulfate	6.08	----	5.14	3.85	3.73	7.47	17.8	250
TDS	115	----	430	520	540	585	585	500
TOC	1.4	----	1.5	6.5	5.2	1.8	2.0	NC
Metals (mg/l)⁽⁴⁾								
Calcium	30.0/25.0	----	106/104	147/146	121/120	153/150	113/113	NC
Iron	0.335/0.061	----	0.839/0.379	17.8/16.8	19.2/16.4	4.21/4.15	6.16/<0.050	0.3
Magnesium	5.51/4.79	----	17.4/16.9	9.66/9.41	9.78/9.30	23.1/23.2	15.7/15.3	35.0
Manganese	<0.020/<0.020	----	0.628/0.175	0.964/0.954	0.977/0.935	0.562/0.561	1.96 /0.034	0.3
Potassium	0.306/0.300	----	1.45/1.41	2.18/0.995	1.23/1.00	1.71/1.63	1.63/1.71	NC
Sodium	2.72/1.97	----	22.7/22.0	5.72/2.91	3.92/2.79	19.8/18.4	60.6/59.8	20
Volatiles (µg/l)⁽⁵⁾⁽⁶⁾								
Acetone	5.5	----	<5.0	<5.0	<5.0	<5.0	<5.0	50

Notes:

- NC No Criteria Available (no standards or guidance values per Reference (2) and Reference (4)).
- Compounds that are not detected at or above the RL are reported in the table as less than (<) the RL.
 - During well development, LMW-4 was pumped dry and did not recover; therefore, no field parameters or samples were collected.
 - Groundwater standards taken from Reference (2). Additional water standards and guidance values taken from Reference (4).
 - Total metal sample analysis data are shown preceding the dissolved metal result, i.e., total/dissolved. In some cases, the dissolved data are shown to be slightly higher than the total data. The analytical laboratory has validated the data identifying the total and dissolved results are within the margin of error for the analytical procedures.
 - All VOCs analyzed but not detected at or above the RL in any of the presented sampling rounds are not listed in the table.
 - VOCs analyzed using EPA SW-846 method 8260C.

While a number of parameters continue to exceed groundwater quality standards per Reference (2) or guidance values per Reference (4), inorganic parameters detected in downgradient well samples are within, or below, representative ranges for inorganic parameters typical of leachate from sanitary landfills per Reference (15).

Ambient air gas monitoring was performed at the landfill gas vents. No detectable concentrations of explosive gases were observed. Quarterly landfill inspections were conducted, and no degradation or breaches in the cap were identified. Routine landfill maintenance was performed to ensure continued integrity of the landfill cap.

TABLE 45
RESULTS OF KESSELRING SITE GROUNDWATER MONITORING,
DEVELOPED AREA WELLS^(1,2)

Well	Sample Date	Chloroform (µg/l)	Bromodichloromethane (µg/l)	Chloromethane (µg/l) ⁽⁵⁾
MW-1 ⁽³⁾	09/08/25	2.0	----	----
Standard ⁽⁴⁾⁽⁵⁾		7 ⁽⁴⁾⁽⁵⁾	50 ⁽⁴⁾⁽⁵⁾	5
RL		1.0	1.0	1.0

Notes:

1. All samples analyzed by EPA methods 601 and 602. Additionally, MW-18 and MW-19 are analyzed for EPA method 8260 parameters.
2. During well development, MW-10 was pumped dry and did not recover; therefore, no field parameters or samples were collected. The listed VOCs in the table had detectable values above the RL. The other 16 monitoring wells analyzed for VOCs were below the RL of less than 1 µg/l.
3. Upgradient well.
4. Groundwater standards taken from Reference (2) and Reference (4).
5. Per Reference (23), total Trihalomethane (THM) MCL is 80 µg/l. The sum of chloroform, bromodichloromethane, dibromochloromethane and bromoform equals THM. The THMs associated with MW-1 are attributed to past routine fire hydrant flushing with chlorinated SSW and/or associated system leaks of SSW contacting natural humic material and are not related to waste management or product spills.

Developed Area

The routine annual groundwater program for the developed area includes field parameters and VOC analyses. Field parameters include groundwater elevation, temperature, pH, specific conductance, and turbidity. Analyses for chloride, nitrate, ammonia, nitrite, and VOCs were performed at an off-site laboratory.

Elevated chloride and turbidity levels are attributed to the on-going use of roadway de-icing materials and snow/ice removal operations. In 2025, groundwater chloride results ranged between 81.6 mg/l to 10,300 mg/l, and turbidity ranged from 12.8 Nephelometric Turbidity Units (NTU) to 684 NTU, consistent with elevated chloride levels. The 2025 pH results were all within the acceptable range for groundwater standards. The detection of chloroform in MW-1 is generally consistent with historical results.

Site Service (Drinking) Water

The drinking water supply is part of the SSW system and is supplied from a deep (confined) groundwater aquifer. The drinking water system is sampled and monitored to ensure its quality meets NYSDOH drinking water regulations (Reference (23)). On April 1, 2025, jurisdictional oversight of drinking water regulations transitioned from NYSDOH to the Saratoga County Department of Health (SCDOH). All 2025 sample results were compliant with the NYSDOH MCLs. The sample results are shown in Table 46. The SSW well field is hydrogeologically separate from Kesselring Site landfill and former disposal sites and is consequently not affected by materials at those locations.

Radiological: The groundwater sample results for radioactivity are summarized in Table 47. The levels of cesium-137, cobalt-60, and tritium were below DLCs in all wells. The concentrations for these radionuclides were less than 0.1 percent of the respective Reference (6) DCS values.

TABLE 46
CHEMICAL CONSTITUENTS IN KESSELRING SITE DRINKING WATER

Parameter / Units ⁽¹⁾ (Units are mg/l unless otherwise noted)	Number of Samples	Value			Standard ⁽⁴⁾
		Minimum ⁽²⁾	Maximum ⁽²⁾	Average ⁽³⁾	
Drinking Water Standards (Reference (23))					
Nitrate (mg/l as N)	1	0.587	0.587	0.587	10
Total Coliform ^(5,6)	40	Negative	Positive	NA	None Detectable
Free Chlorine Residual	365	0.47	3.98	1.24	Note (7)
Free Chlorine Residual ⁽⁸⁾	39	0.67	2.36	1.24	Note (7)
1,1,1,2- Tetrachloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1,1-Trichloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1,2,2-Tetrachloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1,2-Trichloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1-Dichloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1-Dichloroethene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,1-Dichloropropene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2,3-Trichlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2,3-Trichloropropane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2,4-Trichlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2,4-Trimethylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2-Dichlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2-Dichloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,2-Dichloropropane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,3,5-Trimethylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,3-Dichlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,3-Dichloropropane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
1,4-Dichlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
2,2-Dichloropropane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
2-Chlorotoluene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
4-Chlorotoluene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
4-Isopropyltoluene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005

Notes for Table 46 are on page 133.

TABLE 46 (continued)
CHEMICAL CONSTITUENTS IN KESSELRING SITE DRINKING WATER

Parameter / Units ⁽¹⁾ (Units are mg/l unless otherwise noted)	Number of Samples	Value			Standard ⁽⁴⁾
		Minimum ⁽²⁾	Maximum ⁽²⁾	Average ⁽³⁾	
Drinking Water Standards (Reference (23))					
Benzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Bromodichloromethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	NA ⁽¹⁰⁾
Bromoform ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	NA ⁽¹⁰⁾
Bromomethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Carbon Tetrachloride ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Chlorobenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Chloroethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Chloroform ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	NA ⁽¹⁰⁾
Chloromethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
cis-1,2-Dichloroethene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
cis-1,3-Dichloropropene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Dibromochloromethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	NA ⁽¹⁰⁾
Dibromomethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Dichlorodifluoromethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Ethylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Hexachlorobutadiene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Isopropylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
m,p-Xylene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Methyl tert-butyl ether ⁽⁹⁾	2	<0.002	<0.002	<0.002	0.010
Methylene chloride ⁽⁹⁾⁽¹⁰⁾	2	<0.0005	<0.0005	<0.0005	0.005
n-Butylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
n-Propylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
o-Xylene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
sec-Butylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Styrene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
tert-Butylbenzene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Tetrachloroethene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Toluene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
trans-1,2-Dichloroethene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
trans-1,3-Dichloropropene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Trichloroethene ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Trichlorofluoromethane ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.005
Vinyl chloride ⁽⁹⁾	2	<0.0005	<0.0005	<0.0005	0.002
Haloacetic Acids ⁽¹¹⁾	1	0.0141	0.0141	0.0141	0.060
Total Trihalomethanes ⁽¹¹⁾	1	0.0115	0.0115	0.0115	0.080

Notes for Table 46 are on page 133.

NOTES FOR TABLE 46

1. All samples were collected at the entry point to the distribution system unless otherwise noted.
2. A value preceded by "<" is less than the RL for that sample and parameter.
3. Average values preceded by "<" contain at least one value less than the RL value in the average.
4. MCL per Reference (23).
5. Total coliform sample results are now reported as positive or negative. No numerical value is provided thus no average value is presented.
6. In August 2025, one total coliform sample had a positive result. The associated E. coli sample was also positive. All required repeat samples were completed and were negative for both total coliform and E. coli. No additional actions were required by SCDOH.
7. The minimum specification is that the free chlorine residual is 0.2 mg/l at the entry point and detectable in the distribution system. The maximum average level is 4 mg/l as calculated by taking the annual average, computed quarterly, of the samples collected in the distribution system.
8. These samples are taken at various locations in the distribution system when total coliform samples are taken.
9. Samples were taken from Wells 1 and 7.
10. No MCL exists.
11. These samples are collected from Head Tank 27B (Storage Tank B).

TABLE 47
RESULTS OF KESSELRING SITE GROUNDWATER MONITORING
FOR RADIOACTIVITY⁽¹⁾

LOCATION	Cs-137	Co-60	Tritium pCi/l x 10 ²
	pCi/l		
LANDFILL AREA			
HB-1A ⁽²⁾	<0.81	<0.67	<1.70
HB-1B ⁽²⁾ Well Dry, Not Sampled	-----	-----	-----
HB-5A2	<0.81	<0.67	<1.70
HB-5B	<0.79	<0.66	<1.70
HB-11A	<0.67	<0.58	<1.70
HB-11B Well Dry, Not Sampled	-----	-----	-----
LMW-4 Well Dry, Not Sampled	-----	-----	-----
LMW-6	<0.82	<0.65	<1.70
DEVELOPED AREA ⁽³⁾			
MW-1 ⁽²⁾ Well Dry, Not Sampled	-----	-----	-----
MW-2	<0.81	<0.65	<1.76
MW-3	<0.82	<0.65	<1.76
MW-4	<0.79	<0.64	<1.76
MW-6	<0.69	<0.59	<1.76
MW-7	<0.81	<0.63	<1.76
MW-8	<0.67	<0.59	<1.76
MW-9	<0.79	<0.63	<1.76
MW-10 Well Dry, Not Sampled	-----	-----	-----
MW-11	<0.82	<0.65	<1.76
MW-12	<0.68	<0.61	<1.76
MW-13	<0.81	<0.66	<1.76
MW-14	<0.79	<0.64	<1.76
MW-15	<0.83	<0.65	<1.76
MW-16	<0.64	<0.58	<1.76
MW-17	<0.80	<0.64	<1.76
MW-18	<0.70	<0.61	<1.76
MW-19	<0.80	<0.66	<1.76
BAPTIST HILL ROAD LANDFILL ⁽³⁾			
KBH-1 ⁽²⁾	<0.82	<0.66	<1.90
KBH-2	<0.80	<0.65	<1.90
KBH-3	<0.79	<0.65	<1.90
KBH-4	<0.83	<0.66	<1.90
SILO AREA			
KBH-6 ⁽²⁾⁽⁴⁾	<0.89	<0.69	<1.90
KBH-7 ⁽⁴⁾	<0.88	<0.69	<1.90
KBH-8 Well Dry, Not Sampled	-----	-----	-----
SWANN SCHOOL ROAD CELLAR			
KBH-9 ⁽⁴⁾	<0.72	<0.59	<1.90
KBH-10 ⁽⁴⁾	<0.75	<0.61	<1.90
T-3	<0.82	<0.66	<1.90
PARKIS MILLS ROAD CELLAR			
KBH-11	<0.68	<0.58	<1.90
KBH-12 ⁽⁴⁾	<0.86	<0.68	<1.90
KBH-13	<0.80	<0.64	<1.90

Notes:

1. A value preceded by "<" is less than the DLC for that sample and parameter.
2. Background well for comparison purposes.
3. MW-5, MW-20, and KBH-5 were decommissioned in accordance with NYSDEC regulations.
4. KBH-6, KBH-7, KBH-9, KBH-10, and KBH-12 were resampled on 03/30/26 due to a laboratory error.

Conclusion

The 2025 groundwater data demonstrate no adverse changes from historical monitoring results. Past waste disposal practices at the landfill have resulted in observable effects on groundwater quality downgradient of the landfill. However, data trends show that groundwater quality has improved since the landfill was closed, and a breach in landfill cap integrity is not indicated.

Within the industrial facility, groundwater results are predominantly attributed to normal facility operations including the continued use of chlorinated SSW for drinking, fire protection, and system cooling needs; the operation of Kesselring Site cooling tower; the on-going use of roadway de-icing materials during winter months; and limited effects from past operational practices. Results from 2025 are consistent with historical monitoring trends. Previously sampled downstream surface water analysis has consistently shown no adverse effects from developed area Kesselring Site operations.

CONTROL OF CHEMICALLY HAZARDOUS SUBSTANCES AND SOLID WASTE

Sources

Chemicals are not manufactured or disposed at Kesselring Site. Nonhazardous chemical wastes and minimal quantities of hazardous wastes are generated by the necessary use of chemicals in Kesselring Site operations. To ensure the safe use of chemicals and disposal of the resulting wastes, Kesselring Site maintains programs in waste minimization and hazardous waste control. Unless recycled, all chemical wastes are either treated or disposed of through permitted off-site facilities.

Chemical Control Program

A principal part of the waste minimization program is the controlling of the acquisition of hazardous substances for use at Kesselring Site. Purchase requests for chemicals are reviewed to ensure that the materials are necessary for Kesselring Site's operations, the amount ordered is not excessive, and that methods for proper disposal are in place before the material is ordered.

Hazardous substance storage controls include at a minimum: labeling, segregation based on compatibility, limited storage volumes, appropriate use of secondary containment, and weather protection. When required, large volumes of chemicals and petroleum products are stored in accordance with the NYS CBS regulations as specified in Reference (16) and the PBS regulations in Reference (17).

Chemical Disposal

After implementing chemical controls on purchases and pursuing green alternatives, minimal quantities of hazardous wastes remain, resulting from the necessary use of chemicals in Site operations. Larger quantities of hazardous wastes periodically result from one-time facility decommissioning and dismantlement activities as well as from routine construction and demolition efforts. Hazardous waste and mixed (radioactive and hazardous) waste storage facilities are operated at Kesselring Site under provisions of the NYS regulation implementing RCRA and the FFCA. Kesselring Site operates these facilities under a Part 373 permit issued by NYSDEC. During 2025, Kesselring Site shipped approximately 18.5 tons of RCRA and NYS hazardous waste off site for treatment and disposal. This includes approximately 3.4 tons of mixed waste, predominantly from facility decommissioning and dismantlement activities. Waste that is both radioactive and chemically hazardous is regulated under both the AEA and RCRA as "mixed waste." Additionally, per the NYSDEC, certain TSCA regulated PCB waste is also considered a hazardous waste.

Elementary neutralization of small volume laboratory waste also occurs on site. This process is exempt from regulation as a RCRA treatment process. The neutralized discharge is controlled under the Kesselring Site SPDES permit.

Nonhazardous chemical waste is also sent off site for disposal. The transportation vendors and the TSDFs are typically the same as those used for hazardous waste disposal. These facilities operate

under permits issued by the cognizant Federal and State regulatory agencies. Kesselring Site also requires the disposal facility to provide itemized written verification that the waste was received. In 2025, approximately 41 tons of nonhazardous chemical waste was sent off site for incineration, wastewater treatment, chemical treatment, and/or land disposal.

In addition, Kesselring Site hazardous waste control program is subject to periodic on-site inspections by NYSDEC and the EPA.

Solid Waste Disposal/Recycling

During 2025, approximately 3,096 tons of nonhazardous, solid wastes were generated from waste streams such as office and cafeteria trash, construction and demolition debris, and classified scrap paper. From these waste streams, Kesselring Site recycles materials such as unclassified office paper, glass, plastic, aluminum, newspapers, magazines, corrugated cardboard, asphalt, computers, wood, precious metals, used oil, lead/lead acid batteries, scrap metal, concrete, universal waste (e.g., light bulbs, batteries, thermostats), printer cartridges, and cafeteria grease. Approximately 2,083 tons of materials were recycled.

CONTROL OF RADIOACTIVE MATERIALS AND RADIOACTIVE WASTE

Sources

Operations at Kesselring Site result in the generation of various types of radioactive materials and wastes. Low level radioactive solid waste material that requires disposal includes filters, metal scrap, resin, rags, paper, and plastic materials.

Control Program

Detailed procedures are used for handling, packaging, and transportation of radioactive materials and disposal of radioactive waste at a government operated or licensed disposal site. Internal reviews are made prior to the shipment of any radioactive material from Kesselring Site to ensure that the material is properly identified, surveyed, and packaged in accordance with Federal, State, and local requirements.

The volume of radioactive waste is minimized through recycling and the use of special work procedures that limit the amount of material that becomes contaminated during work on radioactive systems and reactor components. Radioactive liquid waste is processed into an absorbed form prior to shipment to an approved disposal facility. All radioactive wastes are prepared and shipped to meet applicable regulations of the DOT given in Reference (18). The waste packages also comply with all applicable requirements of the NRC, the DOE, and the disposal sites.

Disposal/Recycling

The shipments of low level radioactive solid wastes were made by authorized common carriers to disposal sites located outside NYS.

During 2025, approximately 170.7 cubic meters (223.3 cubic yards) of low level radioactive waste containing approximately 0.654 Ci of radioactivity were shipped from Kesselring Site for disposal. Kesselring Site shipped approximately 16.1 tons of radioactive metal material for recycling.

CONTROL OF MIXED WASTES

Sources

Waste that is both radioactive and chemically hazardous is regulated under both the AEA and RCRA as “mixed waste.” Ongoing operations at Kesselring Site resulted in the generation of a very small proportion of the mixed waste generated at Kesselring. The majority of the mixed waste is generated as a result of dismantlement or refurbishment activities.

Control Program

Since mixed wastes are both RCRA hazardous and radioactive, the controls for hazardous wastes are applied to the hazardous constituents, while the controls for radioactive wastes are applied to the radioactive constituents.

Mixed wastes are managed on site in accordance with the Kesselring Site RCRA permit. The amount of mixed waste generated is minimized via detailed work procedures and worker training.

Storage and Disposal

Mixed wastes are accumulated in designated regulated and permitted storage areas. The wastes are packaged for storage and shipment to off-site treatment facilities in accordance with DOT requirements for transport to and receipt at RCRA-permitted treatment and disposal facilities.

In 2025, two shipments totaling approximately 3.4 tons of various mixed wastes were shipped to treatment and disposal facilities.

RADIATION DOSE ASSESSMENT

The effluent and environmental monitoring results show that the radioactivity in liquid and gaseous effluents from 2025 operations at Kesselring Site had no measurable effect on background radioactivity levels. Therefore, any radiation doses from Kesselring Site operations to off-site individuals were too small to be measured and must be calculated using conservative methods. Estimates of the radiation dose to the maximally exposed off-site individual in the vicinity of Kesselring Site and the collective dose to the population residing in the 80 kilometer (50 mile) radius assessment area are summarized later in this report in the Radiation Dose Assessment and Methodology section.

The results show that the estimated doses were less than 0.1 percent of that permitted by the DOE radiation protection standards listed in Reference (19) and that the estimated dose to the population residing within 80 kilometers (50 miles) of Kesselring Site was less than 0.001 percent of the natural background radiation dose to the population. In addition, the estimated doses were less than one percent of that permitted by the NRC numerical guide listed in Reference (20) for whole body dose demonstrating that doses are ALARA. The dose attributed to radioactive air emissions was less than one percent of the EPA standard in Reference (8).

The collective radiation dose to the public along travel routes from outgoing Kesselring Site shipments of radioactive materials during 2025 were calculated using data given by the NRC in Reference (21).

Based on the type and number of shipments made, the collective annual radiation dose to the public along the transportation routes, including transportation workers, was less than one person-rem. This is less than 0.001 percent of the dose received by the same population from natural background radiation.

HISTORICAL OPERATIONS

Past Operations

Operations at Kesselring Site have focused on naval nuclear propulsion plant testing since its beginning. In addition, operations at the site have been devoted to training of nuclear propulsion plant operators for the U.S. Navy.

Past Radioactive Waste Management

Kesselring Site has always been involved in handling radioactive materials and has always maintained a radioactive waste management program. Disposal practices appropriate to the waste forms were developed and implemented. Requirements for treatment and disposal of solid and liquid wastes were provided for in the design of the operating facilities. For example, retention tanks for liquid waste, facilities for temporary storage of solid waste, and air cleaning systems using HEPA filters were incorporated in the initial design of the facilities. The following is a description of the practices employed in management of these materials.

Radioactive Liquid Waste: The primary methods for removal of radioactivity from water at Kesselring Site have always been mechanical filtration and ion exchange.

In 1948, a study of the geology and hydrology of the West Milton area was conducted to determine the suitability of releases of low concentrations of radioactivity to the Glowegee Creek. The USGS performed this study in cooperation with the AEC. Representatives of the NYS Department of Public Works also participated in the study. A preoperational monitoring program was also initiated by KAPL during the construction of the site to determine background concentrations in the Glowegee Creek due to naturally occurring radioactivity and fallout from nuclear weapons tests. Effluent water, which contained concentrations of radioactivity below the existing discharge concentration limits, was first released from Kesselring Site in 1954, shortly before prototype operations began.

In response to contacts made by the AEC with State and local agencies in 1951, the Mohawk River Advisory Committee was established in 1952. The functions of the committee were to provide advice and counsel regarding the release of radioactivity to surface streams (including the Glowegee Creek) and to provide liaison to State and local officials interested in these matters. Membership of the committee consisted of representatives of the NYSDOH and of the City of Schenectady. The Committee periodically reviewed the Kesselring Site waste management program, concurred with program changes, and participated in the establishment of limits for radioactivity in Kesselring Site effluent water.

Liquid effluents from the site, including those containing low levels of radionuclides, flowed through on-site discharge channels, or ditches, prior to entering the Glowegee Creek. In the late 1950s and early 1960s, monitoring in these channels showed a slow buildup of low levels of radioactivity in the sediment from the discharge of water containing low-level radioactivity. These areas were dredged to prevent the radioactivity from entering the Glowegee Creek. The contaminated soil was shipped off-site to an approved disposal facility, and a filter and

demineralizer were installed to reduce radioactivity in the water being discharged. Subsequently, low levels of radioactivity buildup were again found during channel monitoring and the radioactivity concentration discharge limits were further reduced to prevent radioactivity buildup from recurring. The areas were again dredged, and the contaminated soil was shipped off-site to an approved disposal facility.

Since Kesselring Site operations began in 1954, about 15 Ci of Kesselring Site produced radioactivity have been released to the Glowegee Creek. Over 98% of the radioactivity discharged to the Glowegee Creek was tritium, but traces of other radionuclides, such as cobalt-60, iron-55, nickel-63, and antimony-125 were included. The most radioactivity released in any one year was 1.6 Ci in 1974, of which over 98% was tritium. The amount of tritium released was significantly decreased when water reuse was put in effect. In addition, the average concentration of tritium discharged to the Glowegee Creek was over 1,000 times less than that permitted by Federal regulations. Tritium is also naturally present in the environment because it is generated by cosmic radiation in the upper atmosphere. The tritium released from Kesselring Site operations is in the oxide form and is chemically indistinguishable from water; therefore, it does not concentrate significantly in aquatic life or collect on sediment, as do some other radionuclides.

Kesselring Site has performed comprehensive environmental monitoring of the Glowegee Creek since 1948, before operations at the site began. Water, fish, and sediment samples have been evaluated for effects from site operations. Periodic monitoring continues to this day, with the results reported annually in this report. The conclusions remain unchanged. There is no detectable radioactivity due to site operations present in the creek sediment. Fish and water samples taken in the Glowegee Creek, both upstream and downstream of the site outfalls, show only naturally occurring radionuclides (such as potassium-40) and no radionuclides attributable to site operation. The radioactivity discharged from Kesselring Site operations has resulted in no significant impact on the environment.

Radioactive Solid Waste: Most of the radioactive solid waste volume generated by Kesselring Site has been low-level waste. This type of waste consisted of items such as paper and cloth wipes, protective clothing, air filters, resin/filter media, and used components. The waste was collected in waste cans, packaged in boxes or drums, and sent off-site for disposal. The site landfill was never used for disposal of radioactive waste, and no radioactive waste has ever been sent to a municipal landfill. Exhaust air from the low-level waste handling area passed through a monitored ventilation system with HEPA filters. The processed wastes were stored in monitored areas at the site prior to shipment.

Occasionally, the site was required to dispose of items that contained higher levels of radioactivity than the typical low-level wastes routinely handled. This included waste such as irradiated reactor plant components, resin/filter media, and some decontamination materials. This waste was placed in approved shipping containers and stored until shipment off-site to an approved disposal facility.

Irradiated Fuel: Infrequently, the prototype reactors at Kesselring Site require refueling. The reactor fuel assemblies are loaded into sealed and shielded shipping containers certified to NRC and DOE requirements and are shipped in accordance with DOT regulations. The spent fuel is shipped to DOE facilities in Idaho for disposition. U.S. Government representatives escort each

fuel shipment. Each shipping container is specifically designed to withstand extreme accident impacts, fire, or water immersion to prevent release of the material to the environment in the event of an accident. The cargo in the fuel shipments is non-explosive and non-flammable.

Radioactive Airborne Effluents: Ventilation air from radiological facilities was discharged to the atmosphere through elevated exhaust stacks. Prior to release, the air was passed through HEPA filters and monitored to ensure compliance with existing radiation protection guides.

Monitoring of exhaust air was accomplished through the collection and analysis of samples of the effluent. The sampling technique used included sampling with filter papers and gas chambers. Environmental air also was monitored at various distances and directions from the exhaust stacks.

Since 1954, an estimated 399 Ci of site-produced radioactivity have been released to the atmosphere. This is less than 10% of the amount of naturally occurring radon released during this time from an area the size of the developed portion of Kesselring Site. The majority of the radioactivity, over 90%, consisted of inert gases, such as krypton-85 and the shorter-lived xenon-133, xenon-135, and argon-41. These inert gases do not deposit on surfaces and are readily dispersed in the atmosphere. Smaller amounts, approximately 34 Ci, of other beta-gamma emitting activated corrosion and wear products, carbon-14, tritium, and trace quantities of fission products comprised the remaining amount of the airborne radioactivity released. In recent years, releases to the atmosphere have averaged approximately 0.6 Ci per year, again consisting mainly of inert gases.

For perspective, the total amount of radioactivity released to the atmosphere since the start of operations at Kesselring Site corresponds to a small fraction of that permitted by Government standards. The average radioactivity concentration in the exhaust air was well below all applicable standards. Subsequent monitoring has indicated no detectable residual radioactivity as a result of the release of radioactivity into the atmosphere. The annual airborne radioactivity concentration at the nearest site boundary currently averages less than 0.01 percent of that permitted for off-site areas based on applicable DOE guidelines and results in a dose less than one percent of the EPA standard.

Because the radiation exposure to people off-site is too small to be measured, Kesselring Site has employed calculation techniques that estimate potential exposures using EPA-approved computer models. These techniques consider breathing the air and eating regional animal and vegetable food. It is conservatively estimated that the total accumulated radiation exposure to a member of the public living continuously next to Kesselring Site during the entire time the facility has been operating would not exceed 3 mrem due to airborne radioactive effluents. This is no more than the exposure an average person receives in one week due to naturally occurring radiation sources.

Residual Radioactivity in Soil

Kesselring Site has no radioactive waste disposal sites. However, operations in the past have resulted in inadvertent releases of small amounts of radioactive material. As a consequence, the site had two small areas where radioactive contamination had been identified in the soil or groundwater: the Silo Area where low-level radioactive materials were once handled, and an area

in the vicinity of the former Building 29 area within the developed area of the site where low-level tritium had been detected just above natural background levels in the groundwater. Each of the affected areas is discussed below.

Silo Area: The Silo Area was used intermittently between 1958 and 1966 to burn oil and sodium contaminated with low-level radioactivity and for disposal of components potentially contaminated with mercury. The area is remote from any occupied area, is approximately one-half acre in size, and is named for the concrete silo foundation ring from a farm site abandoned when the Government reservation was established. In 1978, numerous soil samples were collected, and surveys of the area found localized areas of low-level contamination. One sample contained a cesium-137 concentration of 1,600 pCi/g. A very small piece of more highly contaminated material was also found during this survey and disposed of off-site as radioactive waste. In addition, in 1978, approximately 82 cubic yards of radioactively contaminated soil were removed from this location and sent off-site to an approved disposal facility.

In 1987, a very detailed radiological survey of this area was performed. The highest concentrations of radioactivity found in this soil during the 1987 survey were 179 pCi/g of cesium-137 and 6 pCi/g of cobalt-60. These were less than the respective NYS limits at the time of 200 pCi/g and 500 pCi/g for uncontrolled areas. At the time, Kesselring Site estimated that the soil containing radioactivity from site operations remaining in this area had an estimated total radioactivity content of about 0.05 Ci. During 2002 and 2003, additional radiological data was collected at the Silo Area that was consistent with the results from previous surveys.

The Silo Area was monitored to confirm that there was no threat to Kesselring Site employees or the public and to confirm the radioactivity was remaining in place. Radiation monitoring of the area indicated natural background radiation levels except for one small localized area, which was twice the natural background level. As a measure of the significance of the radioactive residue in this soil, the total amount present was less than the amount of naturally occurring radioactivity found in the top four feet of soil covering a local area equivalent in size to the Silo Area.

As the predominant radionuclides were cesium-137 and cobalt-60, which decay with half-lives of about thirty years and five years, respectively, the concentrations would naturally decline. Nevertheless, the Silo Area was cleaned up and the residual radioactivity removed. From 2006 to 2008, about 2,445 tons of soil, approximately 1,900 cubic yards, with an estimated total radioactivity content of 0.1 Ci, were removed. The soil containing radioactive residue was packaged and sent off-site to an approved radioactive waste disposal site. Radiological surveys and soil sample analyses to confirm the removal of residual radioactivity were completed. During the soil removal, several small metal items were found, some with trace radioactivity on them and some containing residual sodium-potassium mixtures; these items were removed, properly managed, and packaged for disposal. An unrestricted release from radiological controls was completed for the Silo Area in 2010.

Building 29 Area: From 1988 to 1990, tritium above normal background levels was occasionally detected in the groundwater in the vicinity of the former Building 29 area (within the developed area of Kesselring Site). The highest concentration of tritium found in the groundwater was only 25% of the EPA limit for drinking water. The source of the tritium in the groundwater was never

conclusively identified; however, it could have entered the ground from an in-ground water-holding tank constructed of concrete. The holding tank was subsequently removed from service. All subsequent groundwater tritium results were at their normal background levels, at or below minimum detectable, indicating the tritium had dissipated.

Tritium, which decays with a half-life of about 12 years, is a naturally occurring substance (due to cosmic radiation interaction with the atmosphere) and a by-product of Kesselring Site reactor operations. The total amount of localized tritium (above background levels) previously identified in the groundwater was very small (less than 0.05 Ci). For perspective, that amount of tritium is less than the amount of tritium in some radioluminescent wristwatches and more than 100 times less than the amount of tritium in some radioluminescent emergency exit markers.

DOE-EM ACTIVITIES

BACKGROUND

From 2007 through 2018, DOE-EM performed remediation, demolition, and disposal of the Cold War era facilities and impacted soil from legacy operations associated with the SPRU at Knolls Laboratory. Following DOE-EM's efforts at Knolls Laboratory to remove the SPRU facilities, the NNPP established a partnership with DOE-EM to remove the NNPP's legacy facilities at Knolls Laboratory and Kesselring Site. The NNPP maintains a cradle-to-grave responsibility for its actions, and consistent with this philosophy, the NNPP is dedicating funding to support remediation and demolition of these facilities.

In 2025, DOE-EM completed remediation activities at Knolls Laboratory Q-Complex, located in the Upper Level area. Debris and subsurface media generated during remediation activities were shipped off site for disposal. Two shipments of low-level radioactive waste from the former Q4 Drum Pit (SWMU-051), that were containerized in 2024 were shipped in 2025. No DOE-EM characterization activities occurred in 2025 at the Hillside Area AOC - H2-G2 Area, located in the Upper Level area. In addition, DOE-EM maintained and inspected the MTRU waste storage area, located in Knolls Laboratory Lower Level area. This storage area includes wastes from the SPRU project that are pending off-site disposition. The DOE-EM areas are shown in Figure 10.

LIQUID EFFLUENT MONITORING

Sources

Nonradiological: The principal source of nonradiological effluent water from DOE-EM controlled land areas is stormwater run-off. Collection tanks are used when needed to collect groundwater and stormwater during work activities to ensure no contravention occurs to site discharges.

Radiological: DOE-EM performed no work activities in 2025 that created sources of radioactive water and had no sources of radiological liquid effluents.

Effluent Monitoring

Effluent monitoring is performed by Knolls Laboratory and is described in the corresponding section of this report.

Effluent Analyses

Effluent analyses are performed by Knolls Laboratory and are described in the corresponding section of this report.

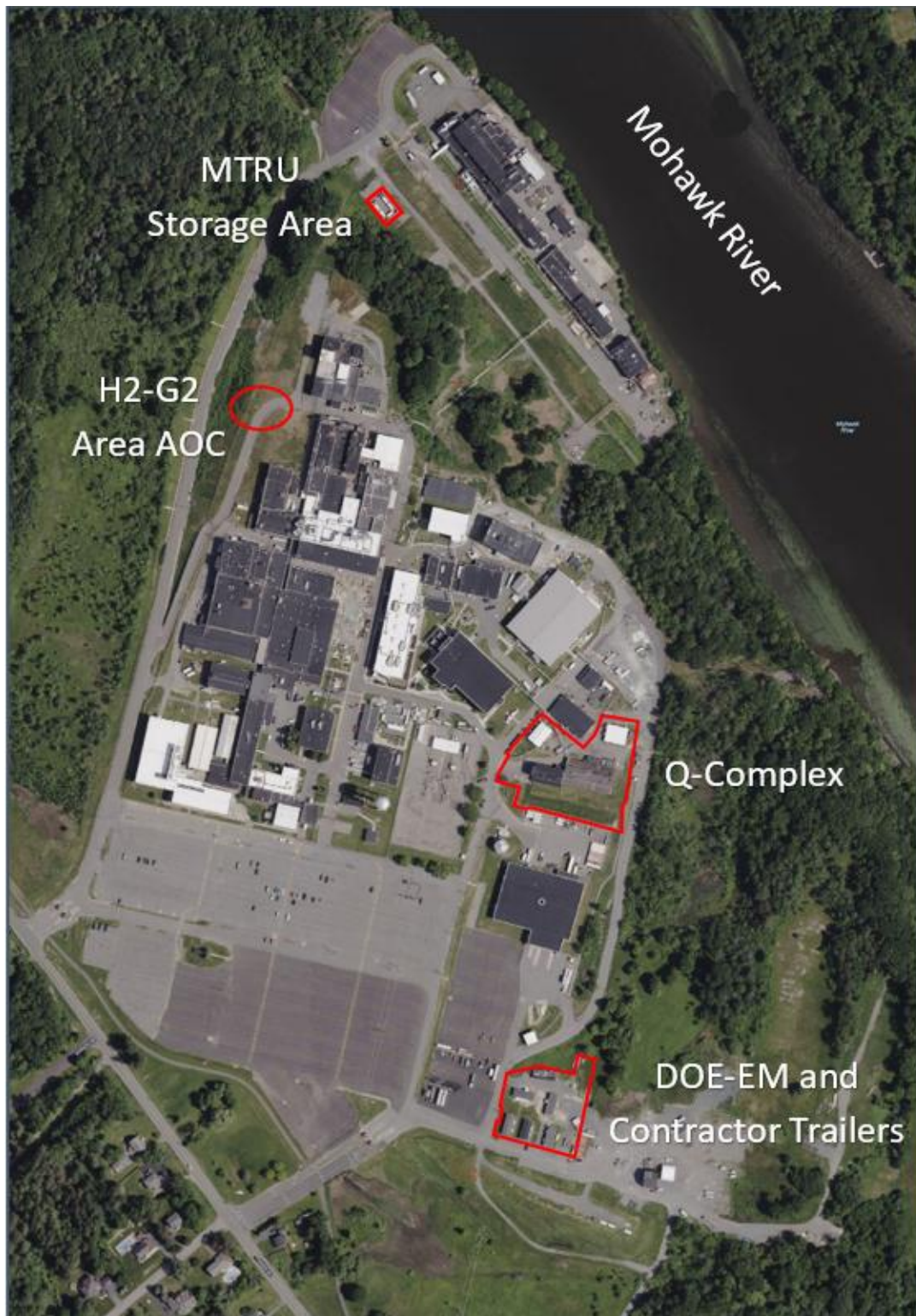


FIGURE 10
DOE-EM LAND AREAS AT THE KNOLLS LABORATORY

Assessment

See the Knolls Laboratory section on this subject.

AIRBORNE EFFLUENT MONITORING

Sources

Nonradiological: In 2025, DOE-EM performed work at Knolls Laboratory that created nonradiological air emissions during remediation of the Q-Complex. The principal sources of nonradiological air emissions are non-emergency diesel generators and equipment. These sources of air emissions meet the criteria for exempt and trivial sources under NYSDEC regulations and are not required to have air permits or registrations.

Radiological: DOE-EM performed no work activities in 2025 at Knolls Laboratory with the potential to generate airborne radioactivity.

Effluent Monitoring

Nonradiological: No emissions monitoring was required in 2025.

Radiological: No emissions monitoring was required in 2025.

Effluent Analyses

Radiological: No DOE-EM activities at Knolls Laboratory required airborne effluent monitoring.

Assessment

Radiological: No DOE-EM activities at Knolls Laboratory required airborne effluent assessment.

ENVIRONMENTAL MONITORING

Scope

In 2025, DOE-EM activities did not require any additional environmental monitoring to those performed by Knolls Laboratory. Environmental monitoring performed by Knolls Laboratory is described in the corresponding section of this report.

RADIATION MONITORING

The environmental radiation monitoring programs are performed by Knolls Laboratory and are described in the corresponding section of this report.

GROUNDWATER MONITORING

The groundwater monitoring programs are performed by Knolls Laboratory and are described in the corresponding section of this report.

CONTROL OF CHEMICALLY HAZARDOUS SUBSTANCES AND SOLID WASTE

Sources

Chemicals are not manufactured at DOE-EM work sites for NNPP-related work activities. To ensure the safe use of chemicals and disposal of the resulting wastes, DOE-EM requires that contractors performing work maintain a hazardous waste control program. Hazardous wastes are disposed through permitted off-site treatment and disposal facilities.

Chemical Control Program

The control program minimizes the quantity of waste material generated, ensures safe usage and storage of the materials at DOE-EM work activities on NNPP sites, and provides for proper disposal of the wastes through vendors that operate under permits issued by Federal and State agencies.

The control of hazardous substances for use at DOE-EM work sites includes a review of waste minimization impact. Purchase orders for chemicals are reviewed to ensure that the materials are necessary for operations, the amount ordered is not excessive, and that methods for proper disposal are in place before the material is ordered. Hazardous substance storage controls include as a minimum: labeling, providing revetments as appropriate, segregation based on compatibility, limited storage volumes, and weather protection as appropriate. When required, large volumes of chemicals and petroleum products are stored in accordance with the NYS CBS regulations (Reference (16)) and the PBS regulations (Reference (17)). DOE-EM contractors currently do not store any chemicals or petroleum products in quantities that are subject to the CBS regulations or the PBS regulations.

All personnel are provided with general information on the policies for the procurement, use, and disposal of hazardous substances. For individuals who use hazardous substances in operations, specific training is provided to ensure that they are knowledgeable of safe handling techniques and emergency response procedures. After chemicals are used and no longer needed, they are accumulated in designated staging and storage areas where they are segregated and packaged for shipment. Waste is temporarily stored only as necessary to accumulate sufficient volumes for shipment to a waste disposal vendor with the exception of MTRU waste, which is stored under DOE-EM 6 NYCRR Part 373 Hazardous Waste Management Permit requirements. DOE-EM has an inspection program to routinely verify that hazardous substances are properly stored and controlled in accordance with approved procedures.

Chemical Disposal

During 2025, DOE-EM shipped 40 kilograms of NYS hazardous PCB waste off site for disposal during Knolls Laboratory Q-Complex remediation activities.

During 2025, DOE-EM shipped approximately 13,400 tons of nonhazardous waste (construction and demolition debris and subsurface media) and approximately 24.4 tons of PCB remediation waste from Knolls Laboratory Q-Complex remediation activities for off-site disposal.

Solid Waste Disposal/Recycling

During 2025, DOE-EM and its contractors generated small volumes of office and food trash from administrative office areas at Knolls Laboratory. This waste was provided to Knolls Laboratory for disposal and recycling. Recycled materials include universal waste (e.g., light bulbs, batteries), scrap lead, unclassified office paper, glass, plastic, aluminum, newspapers, magazines, and corrugated cardboard. The volumes are included in Knolls Laboratory section of this report.

CONTROL OF RADIOACTIVE MATERIALS AND RADIOACTIVE WASTE

Sources

Operations during 2025 from DOE-EM work did not result in the potential generation of radioactive materials. DOE-EM work activities in 2025 included shipping the SWMU-051 Former Q4 Drum Pit remnants, which had been containerized in 2024 during Q-Complex remediation activities.

Prior to 2018, during the SPRU project, DOE-EM activities generated waste that contained greater than 100 nanocuries (nCi) of alpha-emitting transuranic isotopes per gram of waste with half-lives greater than 20 years (referred to as TRU waste). TRU waste is being temporarily stored and managed by DOE-EM until the waste is shipped to the DOE Waste Isolation Pilot Plant or processed at an off-site facility for disposal at another authorized disposal facility.

Control Program

Detailed procedures are used for handling, packaging, transportation, and disposal of radioactive waste at a government operated or licensed disposal site. As new projects generate waste, internal reviews will be made prior to the shipment of any radioactive material from DOE-EM projects to ensure that the material is properly identified, surveyed, and packaged in accordance with Federal requirements.

The volume of radioactive waste generated on new projects at Knolls Laboratory and Kesselring Site will vary based on the project. However, waste from radiological control activities will be minimized through the use of work procedures that limit the amount of materials that become contaminated during work on radioactive systems and components. All radioactive wastes are prepared and shipped in accordance with written procedures to meet the applicable DOT

regulations given in Reference (18). The waste packages also comply with all applicable requirements of the DOE and the disposal sites.

Disposal/Recycling

38.8 tons of low-level radiological waste was disposed of in 2025.

CONTROL OF MIXED WASTE

Sources

No mixed waste was generated during the remediation activities at the Q-Complex in 2025.

Control Program

No mixed waste was generated during the remediation activities at the Q-Complex in 2025.

Storage and Disposal

MTRU waste from the SPRU project is stored in containers and is managed by DOE-EM under a 6 NYCRR Part 373 Hazardous Waste Management Permit issued on September 5, 2024. The MTRU wastes are being temporarily stored in a designated storage area.

RADIATION DOSE ASSESSMENT

The effluent and environmental monitoring results show that radioactivity present in liquid and gaseous effluents from 2025 operations at Knolls Laboratory and Kesselring Site (including DOE-EM activities) had no measurable effect on normal background radioactivity levels. Therefore, any radiation doses from Knolls Laboratory and Kesselring Site (including DOE-EM activities) operations to off-site individuals were too small to be measured and must be calculated using conservative methods. Estimates of the radiation dose to the maximally exposed individual in the vicinity of Knolls Laboratory and Kesselring Site (including DOE-EM activities) and the collective dose to the population residing in the 80 kilometer (50 mile) radius assessment area are summarized in the Radiation Dose Assessment and Methodology section later in this report.

The results show that the estimated doses were less than 0.1 percent of that permitted by the radiation protection standards of the DOE listed in Reference (19) and that the estimated dose to the population residing within 80 kilometers (50 miles) of Knolls Laboratory and Kesselring Site (including DOE-EM activities), was less than 0.001 percent of the natural background radiation dose to the population. In addition, the estimated doses were less than one percent of that permitted by the NRC numerical guide listed in Reference (20) for whole-body dose, demonstrating that doses are as low as is reasonably achievable. The dose attributed to radioactive air emissions from Knolls Laboratory was less than one percent of the EPA standard in Reference (8).

RADIATION DOSE ASSESSMENT AND METHODOLOGY

Measurements for radioactivity in environmental media representing an exposure pathway to humanity indicated no radioactivity attributable to operations at Knolls Laboratory (including DOE-EM) and Kesselring Site. Therefore, potential doses to the general public from liquid and airborne effluents were too small to be measured and were estimated using conservative calculational techniques based on assumed pathways to humanity.

The exposure pathways via air and water considered for estimating radiation exposures were:

1. *Air Pathways*

- a. External exposure from airborne radioactivity and radioactivity deposited on the ground;
- b. Ingestion of food products; and
- c. Inhalation of airborne radioactivity.

2. *Water Pathways*

- a. Ingestion of water and fish;
- b. Ingestion of food products grown on irrigated land;
- c. External exposure from irrigated land; and
- d. Boating, swimming, and shoreline recreation.

For Knolls Laboratory (including DOE-EM) and Kesselring Site, calculations were made to estimate: (1) the radiation dose to the maximally exposed individual in the vicinity of the two Sites, and (2) the collective dose to the population residing in the 80 kilometer (50 mile) radius assessment area. See Figure 11 for a map of the 80 kilometer (50 mile) assessment areas surrounding the two Sites.

The fundamental equation for calculation of the annual dose from a single radionuclide is:

$$D = XUK$$

where:

- D = annual dose
- X = the concentration of the radionuclide in the media of the exposure pathway of interest
- U = the annual exposure time (hours) or intake (ml or kg) associated with the exposure pathway of interest
- K = the annual dose factor for external exposure to a radionuclide or the dose commitment for a 50-year period from the current year's intake of a radionuclide

In estimating potential doses via the water pathway, the contribution from each radionuclide present in the liquid effluents to the effective dose equivalent was calculated using DOE dose conversion factors from Reference (24), Reference (19), and the Reference (25) liquid pathway model for both Knolls Laboratory (including DOE-EM) and Kesselring Site.

Estimates of potential doses via air pathways were calculated using CAP88-PC, Version 4.0, the EPA computer code package approved for use in Reference (26). The code package was prepared to implement the dose assessment required to demonstrate compliance with Reference (8). It includes the computer code AIRDOS2 and a file of the 50-year committed effective dose equivalent conversion factors calculated by the computer code DARTAB, which uses the dose factor database RADRISK using weighting factors from ICRP-72. CAP88-PC Version 4.0 is an updated version of CAP88-PC. It incorporates Federal Guidance Report 13 dose and risk factors.

In CAP88-PC Version 4.0, the area surrounding the site was divided into a circular grid defined by 16 pie-shaped segments, which were subdivided into sectors by annular rings out to 80 kilometers (50 miles). The computer code calculates the air concentration and surface deposition in each sector for each radionuclide released from each Site using site specific average atmospheric dispersion parameters. Dispersion parameters for each Site were based on on-site meteorological data summarized in accordance with Reference (27). Next, the radionuclide concentrations in meat, milk, and fresh vegetables produced in each sector were estimated using terrestrial food chain models. In CAP88-PC Version 4.0 the environmental radionuclide transfer factors were updated to the values from the National Council on Radiation Protection and Management Report 123. The code then calculated the effective dose equivalent to persons (adults) residing in each sector through the following exposure modes: (1) immersion in air containing radionuclides, (2) exposure to radionuclides deposited on ground surfaces, (3) inhalation of radionuclides in air, and (4) ingestion of food produced in the sector. The collective (population) effective dose equivalent was obtained by summing the product of the dose and population for each sector. The population residing within 80 kilometers (50 miles) of each site was based on the 2020 census data as reported in Reference (28).

The air pathway calculated doses are summarized in Tables 48 and 49. Ingestion was the calculated principal exposure pathways for each hypothetical maximally exposed individual at Knolls Laboratory and Kesselring Site.

A comparison of the estimated (calculated) radiation dose to the maximally exposed individual from Knolls Laboratory, Kesselring Site, and DOE-EM operations with the average radiation dose received from other sources is shown in Figure 12. Data in Figure 12 show that the maximum radiation dose that may have been received as a result of Knolls Laboratory, Kesselring Site, and DOE-EM operations is much lower than the DOE radiation protection standard and the drinking water and air emission standards established by the EPA and considerably lower than the average dose received from other sources (natural and human-made) of radiation.

TABLE 48
ESTIMATED ANNUAL DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
AND ASSESSMENT AREA POPULATION FROM KNOLLS LABORATORY
(INCLUDING DOE-EM ACTIVITIES)

Pathway	Dose to Maximally Exposed Individual ⁽¹⁾ (mrem) (mSv)		% of DOE 100 mrem/yr Limit	Estimated Population Dose (person-rem) (person-Sv)		Population within 80 km	Estimated Background Radiation Population Dose (person-rem)
Air	2.4E-04 ⁽²⁾	2.4E-06	2.4E-04	9.1E-04	9.1E-06	1.37E06 ⁽³⁾	8.8E04 ⁽⁴⁾
Water	3.1E-04	3.1E-06	3.1E-04	7.1E-03	7.1E-05		
Other Pathways	None		None	None			
All Pathways ⁽⁵⁾	4.6E-04	4.6E-06	4.6E-04	8.0E-03	8.0E-05		

TABLE 49
ESTIMATED ANNUAL DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
AND ASSESSMENT AREA POPULATION FROM KESSELING SITE
(INCLUDING DOE-EM ACTIVITIES)

Pathway	Dose to Maximally Exposed Individual ⁽¹⁾ (mrem) (mSv)		% of DOE 100 mrem/yr Limit	Estimated Population Dose (person-rem) (person-Sv)		Population within 80 km	Estimated Background Radiation Population Dose (person-rem)
Air	3.6E-04 ⁽²⁾	3.6E-06	3.6E-04	2.0E-03	2.0E-05	1.24E06 ⁽³⁾	6.8E04 ⁽⁴⁾
Water	2.6E-06	2.6E-08	2.6E-06	6.4E-07	6.4E-09		
Other Pathways	None		None	None			
All Pathways ⁽⁵⁾	3.6E-04	3.6E-06	3.6E-04	2.0E-03	2.0E-05		

Notes for Tables 48 and 49:

1. The Maximally Exposed Individual for the Water Pathway case may be a different location than the Maximally Exposed Individual for the Air Pathway and All Pathways cases.
2. The EPA Radionuclide NESHAP standard is 10 mrem/year.
3. Total population residing within 80 kilometers (50 miles) is based on 2020 census data as reported in Reference (28).
4. Dose based on average off-site background radiation level determined for Knolls Laboratory and Kesseling Site with TLDs as reported in Tables 25 and 42, respectively. It does not include the estimated average annual effective dose equivalent of 29 mrem that a member of the population receives from naturally occurring radionuclides in the human body or the 228 mrem received from exposure to radon and its decay products as reported in Reference (29).
5. Slight rounding differences occur when summing individual values.

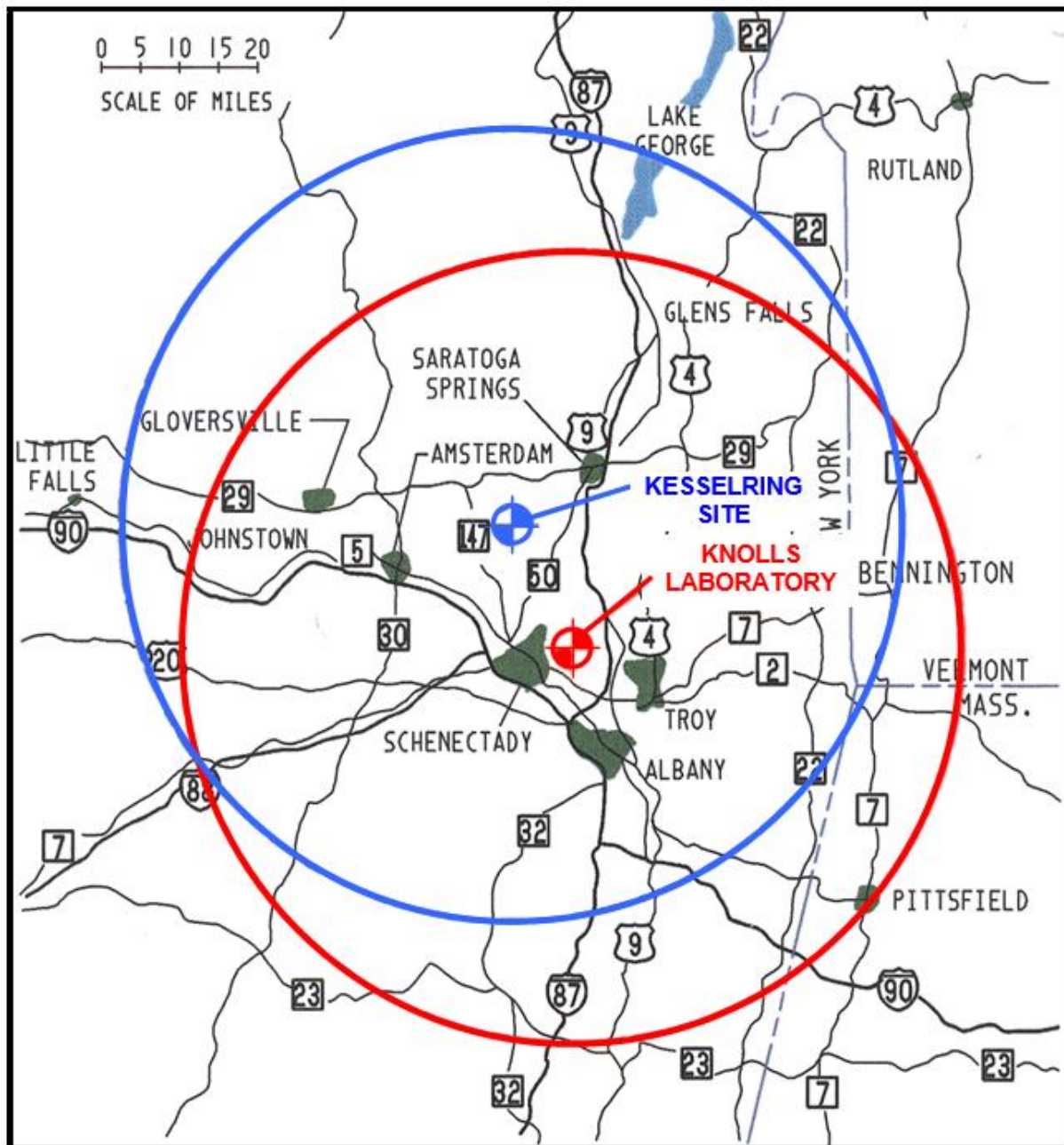


FIGURE 11
EIGHTY KILOMETER (50 MILE) ASSESSMENT AREA MAP
FOR KNOLLS LABORATORY, KESSELRING SITE,
AND DOE-EM ACTIVITIES

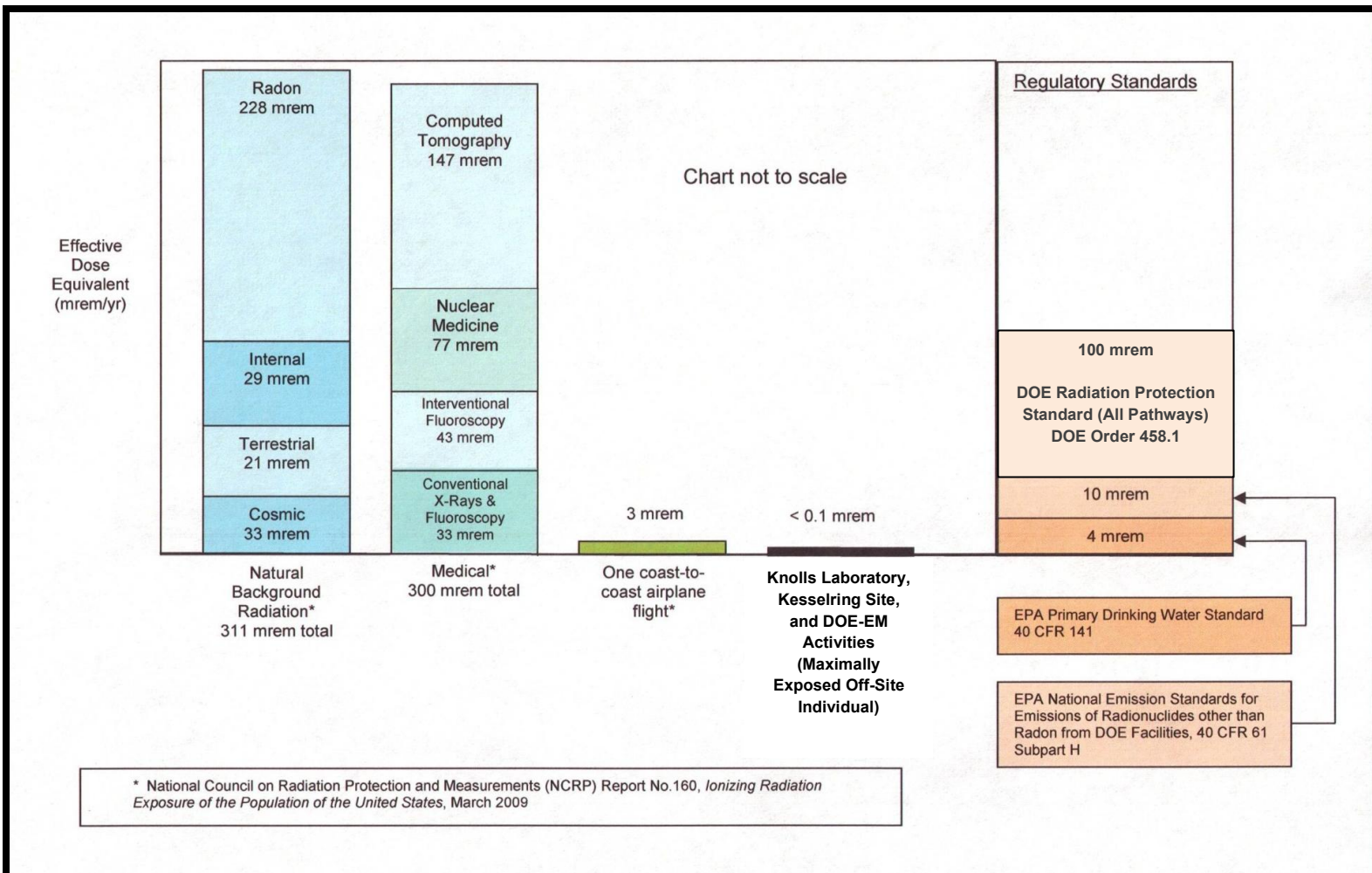


FIGURE 12
COMPARISON OF THE ESTIMATED RADIATION DOSE FROM KNOLLS
LABORATORY, KESSELRING SITE, AND DOE-EM ACTIVITIES
WITH DOSES FROM OTHER SOURCES

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QUALITY ASSURANCE PROGRAM

The Knolls Laboratory and Kesselring Site Quality Assurance Program (QAP) is conducted to ensure the accuracy and precision of effluent and environmental sampling, analysis, and reporting. The program is based on the guidance contained in several DOE, EPA, and NRC documents on the subject (References (30), (31), and (32), respectively).

The program for 2025 consisted of the following elements:

1. Internal quality assurance procedures
 - a. Personnel training and qualification;
 - b. Written procedures for sampling, sample analysis, and computational methods;
 - c. Calibration of sampling and sample analysis equipment;
 - d. Internal quality assurance sample analyses; and
 - e. Data review and computation check.
2. Participation in a QAP administered by a commercial laboratory, Environmental Resource Associates (ERA) for Knolls Laboratory only.
3. Subcontractor quality assurance procedures.
4. Program audits.

The internal quality assurance procedures start with the training of all personnel involved in the collection and analysis of samples, in accordance with established Knolls Laboratory and Kesselring Site policies. Personnel are not permitted to perform sampling and sample analysis until they are trained and have demonstrated the ability to properly perform their duties. Written procedures, based on the methods recommended in References (30) and (32), cover collection and analysis of samples, the computation of results, and the calibration of sampling and analytical equipment, as required. Radioactivity counting equipment is, whenever possible, calibrated using standards that are traceable to the National Institute of Standards and Technology. Internal quality assurance procedures also provide for a system of duplicate (or replicate) analyses of the same sample and the analyses of spiked samples to demonstrate precision and accuracy. All measurement data are assessed to detect anomalies, unusual results, and trends.

Knolls Laboratory participates in a QAP administered by a commercial laboratory, ERA. Kesselring Site participates in a QAP administered by Knolls Laboratory in accordance with NNPP requirements. The QAP provides an independent verification of the accuracy and precision of Knolls Laboratory and Kesselring Site analyses of effluent and environmental monitoring samples. The results of Knolls Laboratory participation in the ERA QAP are summarized in Table 50. The data demonstrated satisfactory Knolls Laboratory performance. Knolls Laboratory has verified satisfactory performance of Kesselring Site.

Vendor subcontractor laboratories perform nonradioactive environmental sample analyses. Knolls Laboratory and Kesselring Site maintain a QAP to ensure the accuracy and precision of the

subcontractor analytical results. This includes submitting blanks and replicate samples along with routine samples for analysis. If unsatisfactory results are obtained, follow-up investigations are performed to correct the problems. Knolls Laboratory and Kesselring Site also require vendor laboratories that perform analyses for the sites be certified by the NYSDOH under the ELAP.

Periodic audits are conducted that examine the effluent and environmental monitoring programs to ensure compliance with all Knolls Laboratory and Kesselring Site procedures and applicable Federal and State regulations.

TABLE 50
KNOLLS LABORATORY PERFORMANCE IN THE ERA QUALITY ASSURANCE PROGRAM

Study & Study Dates ⁽¹⁾	Sample Type	Analysis	Knolls Laboratory Result ⁽²⁾	ERA Assigned Value ⁽²⁾	Acceptance Limits ⁽³⁾
MRAD-42 03/17/25 - 05/16/25	Soil	Potassium-40	37,100	34,100	23,500 – 40,700
		Cobalt-60	3,130	3,260	2,570 – 4,020
		Cesium-137	4,380	4,420	3,340 – 5,590
		Plutonium-238	1,240	1,070	534 – 1,630
		Plutonium-239	1,370	1,150	627 – 1,650
		Strontium-90	5,110	5,710	1,780 – 8,890
MRAD-42 03/17/25 - 05/16/25	Water	Tritium	9,240	9,420	7,100 – 11,500
		Cobalt-60	278	255	220 – 293
		Strontium-90	675	626	451 – 774
		Cesium-137	1,140	1,080	925 – 1,230
		Plutonium-238	72.4	77.2	46.4 – 100
		Plutonium-239	59.2	58.4	36.1 – 72.0
		Uranium-234	102	98.2	74.8 – 112
		Uranium-238	101	97.4	75.5 – 115
		Gross Alpha	60.2	77.3	28.2 – 107
		Gross Beta	98.6	99.4	49.7 – 137
MRAD-42 03/17/25 - 05/16/25	Air Filter	Gross Alpha	31.7	39.5	20.6 – 65.1
		Gross Beta	66.7	55.2	33.5 – 83.4
		Cobalt-60	267	250	212 – 318
		Cesium-137	471	451	370 – 592
MRAD-43 09/22/25 - 11/21/25	Soil	Potassium-40	37,900	34,100	23,500 – 40,700
		Cobalt-60	1,320	1,190	937 – 1,470
		Cesium-137	7,340	7,190	5,440 – 9,090
MRAD-43 09/22/25 - 11/21/25	Water	Tritium	27,800	28,300	21,300 – 34,400
		Cobalt-60	2,250	2,080	1,790 – 2,390
		Cesium-137	1,770	1,670	1,430 – 1,900
		Gross Alpha	108	136	49.6 – 188
		Gross Beta	172	188	94.0 – 259
MRAD-43 09/22/25 - 11/21/25	Air Filter	Gross Alpha	20	22.0	11.5 – 36.2
		Gross Beta	52	40.5	24.6 – 61.2
		Cobalt-60	319	322	274 – 409
		Cesium-137	378	379	311 – 497

Notes:

1. The study dates are assigned by ERA.
2. The results are expressed in pCi/l for water, pCi/kg for soil, and pCi/Filter for air filters.
3. The Acceptance Limits range is provided by ERA.

DOE-EM Quality Assurance Program

The DOE-EM QAP described in Revision 2 EM-QA-001 establishes DOE-EM expectations for QAPs and the implementation of quality assurance requirements DOE-EM complex-wide in the context of DOE Order 414.1D and 10 CFR 830 Subpart A. The DOE-EM QAP further adopts the use of the American Society of Mechanical Engineers (ASME) Quality Assurance Requirements for Nuclear Facility Applications (NQA-1) standard version 2008 with 2009 addendum (ASME NQA-1a-2009 or later editions) Part I and the applicable subparts of Part II as a national consensus standard for quality assurance requirements that apply to work accomplished by DOE-EM and work accomplished by private organizations under contract with the DOE-EM. Together, EM-QA-001, DOE Order 414.1D, 10 CFR 830 Subpart A and ASME NQA-1a-2009 (or later editions) Part I and the applicable subparts of Part II form the basis for the DOE-EM QAPs.

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RADIATION AND RADIOACTIVITY

This section provides general information on radiation and radioactivity for those who may not be familiar with the terms and concepts.

Humanity has always lived in an environment where natural background radiation is present. This background radiation is as much a part of the Earth's environment as is light and heat from the sun's rays. Three principal sources of natural background radiation are: cosmic radiation from the sun and outer space, radiation from the natural radioactivity in soil and rocks (called "terrestrial radiation"), and internal radiation from natural radioactive chemical elements that are part of our bodies. A basic knowledge of the concepts of radiation and radioactivity is important in understanding how effective control programs are in reducing radiation exposures and minimizing radioactivity releases to levels that are "as low as is reasonably achievable," or ALARA.

RADIATION

In simple terms, radiation is a form of energy. Microwaves, radio waves, X-rays, light, and heat are all common forms of radiation. The radiation from radioactive materials (radionuclides) is in the form of particles or rays. During the decay of radionuclides, alpha, beta, and gamma radiation can be emitted.

Alpha radiation consists of small, positively charged particles of low penetrating power that can be stopped by a sheet of paper. Radionuclides that emit alpha particles include radium, uranium, and thorium.

Beta radiation consists of positively or negatively charged particles that are smaller than alpha particles but generally have more penetrating power and may require up to an inch of wood or other light material to be stopped. Examples of beta emitters include strontium-90, cesium-137, and cobalt-60.

Gamma radiation is an energy emission similar to an X-ray. Gamma rays have great penetrating power but can potentially be stopped by several feet of concrete or several inches of lead. The actual thickness required of a particular shielding material depends on the quantity and energy of the gamma rays to be stopped. Most radionuclides emit gamma rays along with beta or alpha particles.

Each radionuclide emits a unique combination of radiations that is like a "finger print" of that radionuclide. Alpha or beta particles and/or gamma rays are emitted in various combinations and energies. Radionuclides may be identified by measuring the type, relative amounts, and energy of the radiations emitted. Measurement of half-life and chemical properties may also be used to help identify radionuclides.

Radiation and Dose

Body tissue can be damaged if enough energy from radiation is absorbed. The amount of energy absorbed by body tissue during radiation exposure is called an "absorbed dose." The potential

biological effect resulting from a particular dose is based on a technically defined quantity called a "dose equivalent." The unit of dose equivalent is called the Roentgen equivalent man or "rem." Another quantity called "effective dose equivalent" is a dose summation that is used to estimate the risk of health-effects when the radiation dose is received from sources that are both external to the body and from radioactive materials that are within the various body tissues. The traditional unit of effective dose equivalent, which is used in the United States, is the rem while the standard international unit is the Sievert (One Sievert is equal to 100 rem). The rem is a large unit when compared with radiation doses received from natural background radiation or projected as a result of releases of radioactivity to the environment. The millirem (mrem, or one thousandth of a rem), is frequently used instead of the rem. The rem and mrem are better understood by relating to concepts that are more familiar.

Radiation comes from both natural and human-made sources. Natural background radiation includes cosmic radiation from the sun and outer space, terrestrial radiation from radioactivity in soil, radioactivity in the body, and inhaled radioactivity.

The National Council on Radiation Protection and Measurements estimates that the average member of the population of the United States receives an annual effective dose equivalent of approximately 311 mrem from natural background radiation. This is composed of approximately 33 mrem from cosmic radiation, 21 mrem from terrestrial radiation, 29 mrem from radioactivity within the body and 228 mrem from inhaled radon and its decay products. The cosmic radiation component in the United States varies from 22 mrem in Honolulu, Hawaii to 65 mrem in Colorado Springs, Colorado. The terrestrial component varies from about 10 mrem in the Atlantic and Gulf Coastal Plain to about 40 mrem in the mountainous regions of the west. The dose from inhaled radon and its decay products is the most variable component of dose from natural background radiation because radon concentrations can fluctuate within houses due to changes in weather patterns and other factors such as changes in living habits.

The average natural background radiation level measured in the vicinity of Knolls Laboratory and Kesselring Site is approximately 70 mrem per year. Individual locations vary depending on soil composition, soil moisture content and snow cover.

In addition to natural background radiation, people are also exposed to human-made sources of radiation, such as medical and dental X-rays and conventional fluoroscopy, computed tomography, nuclear medicine, and interventional fluoroscopy. The average radiation dose from these sources is about 300 mrem per year. Other sources include consumer products such as building products (brick and concrete), lawn and garden fertilizer, loose-leaf spinach, and bananas. Additionally, an airplane trip typically results in a radiation exposure. A round-trip flight between the east and the west coast results in a dose of about six mrem.

RADIOACTIVITY

All materials are made up of atoms. In the case of radioactive material, these atoms are unstable and give off energy in the form of rays or tiny particles as they attempt to reach a stable state. Each type of radioactive atom is called a radionuclide. Each radionuclide emits a characteristic form of radiation as it gives off energy. Radionuclides change as they emit radiation, and this transition is

called radioactive decay. The rate at which a particular radionuclide decays is measured by its half-life. A half-life is the time required for one-half the radioactive atoms in a given amount of material to decay. For example, the half-life of the human-made radionuclide cobalt-60 is 5.3 years. This means that after a 5.3 year period, half of the original cobalt-60 atoms present will have decayed. The following 5.3 year period will result in half of the remaining cobalt-60 atoms to decay, and so on.

The half-lives of radionuclides vary greatly. For instance, the half-life of naturally occurring radon-220 is only 55 seconds, but the half-life of uranium-238, another naturally occurring radionuclide, is 4.5 billion years.

Through the decay process, each radionuclide changes into a different nuclide or atom - often becoming a different chemical element. For example, naturally occurring radioactive thorium-232, after emitting its radiation, transforms to a second radionuclide, which transforms to a third, and so on. Thus, a chain of 11 radionuclides is formed including radon-220, before nonradioactive lead-208 is formed. Each of the radionuclides in the series has its own characteristic half-life and type of radiation. The chain finally ends when the newest nuclide is stable. The uranium chain starts with uranium-238 and proceeds through 13 radionuclides, ending with stable lead-206. All of these naturally occurring radionuclides are present in trace amounts in the soil in your backyard as well as in many other environmental media.

Measuring Radioactivity

The Ci is the traditional unit used for expressing the magnitude of radioactive decay in a sample containing radioactive material. The analogous unit from the International System of Units for the Ci is the becquerel (Bq). Specifically, the Ci is the amount of radioactivity equal to 3.7×10^{10} (37 billion) disintegrations per second and a Bq is equal to one disintegration per second. For environmental monitoring purposes, the Ci is usually too large a unit to work with conveniently and is broken down into smaller values such as μCi (one millionth of a Ci or 10^{-6} Ci) and pCi (one trillionth of a Ci or 10^{-12} Ci). Older wristwatches that were painted with radium to allow the numbers or segments to “glow in the dark” contained about one (1) μCi of radium. The average person has about one tenth (0.1) of a μCi of naturally occurring potassium-40 in their body. Typical soil and sediment samples contain about one (1) pCi of natural uranium per gram.

Sources of Radioactivity

Some of the radioactive atoms that exist in nature have always existed and natural processes are continually forming others. For example, uranium has always existed, it is radioactive, and it occurs in small but variable concentrations throughout the earth. Radioactive carbon and tritium, on the other hand, are formed by cosmic radiation striking atoms in the atmosphere. Radionuclides can also be created by humanity. For example, fission products and activation products are created in nuclear reactors. Fission products are residues of the uranium fission process that produces the energy within the reactor. The fission process also produces neutrons that interact with structural and other materials in the reactor to form activation products. Because of the nature of the fission process, many fission products are radioactive. Most fission products have short half-lives and are

retained within the nuclear fuel itself; however, trace natural uranium impurities in reactor structural materials release small quantities of fission products to the reactor coolant.

It should be noted that a certain level of background fission-product radioactivity also exists in the environment, primarily due to past atmospheric nuclear weapons testing. Although the level is very low, these fission products are routinely detected in air, food, and water when analyzed with extremely sensitive instruments and techniques.

CONTROL OF RADIATION AND RADIOACTIVITY

To reduce the exposure of persons to ionizing radiation to ALARA, controlling the use and disposal of radioactive materials and comprehensive monitoring programs to measure the effectiveness of these controls is required. Effluent streams that may contain radioactive materials must be treated by appropriate methods to remove the radioactive materials and the effluent monitored to ensure that these materials have been reduced to concentrations that are ALARA and are well within all applicable guidelines and requirements prior to discharge.

GLOSSARY

Activation Products - As cooling water circulates through the reactor, certain impurities present in the water and even components of the water itself can be converted to radioactive nuclides (they become "activated"). Important activation products present in reactor coolant water include radionuclides of corrosion and wear products (cobalt-60, iron-59, cobalt-58, chromium-51), of impurities dissolved in the water (argon-41, sodium-24, carbon-14) and of atoms present in the water molecules (tritium). The predominant radionuclide, and the one with the most restrictive limits, is cobalt-60.

Algae - Simple rootless plants that grow in bodies of water in relative proportion to the amount of nutrients available. Algae blooms, or sudden growth spurts can affect water quality adversely.

Alkalinity - The measurable ability of solutions or aqueous suspensions to neutralize an acid.

Alpha Radioactivity - A form of radioactivity exhibited by certain radionuclides characterized by emission of an alpha particle. Many naturally occurring radionuclides including radium, uranium, and thorium decay in this manner.

Benthic Macroinvertebrates - Small organisms inhabiting the bottom of lakes and streams or attached to stones or other submersed objects. The study of macroinvertebrate communities gives an indication of the overall quality of the body of water from which they are taken.

Beta-Gamma Radioactivity - A form of radioactivity characterized by emission of a beta particle and/or gamma rays. Many naturally occurring radionuclides such as lead-212, bismuth-212, and bismuth-214 decay in this manner.

Biochemical Oxygen Demand (BOD) - The BOD test is used to measure the content of organic material in both wastewater and natural waters. BOD is an important parameter for stream and industrial waste studies and control of waste treatment plants because it measures the amount of oxygen consumed in the biological process of breaking down organic materials in the water.

Birge-Ekman Dredge - A device used for sampling the bottom sediment in rivers, streams, lakes, etc. The Birge-Ekman dredge is lowered to the bottom on a line and its spring-loaded "jaws" are remotely tripped from the surface. It samples an area of approximately 230 cm² to an average depth of 2.5 cm.

British Thermal Unit (BTU) - A unit commonly used to quantify the heat output of boilers, furnaces, etc. Specifically, the amount of heat necessary to raise 1 lb. of water one degree Fahrenheit.

Backpack Electro-Fishing Techniques - A technique of collecting samples of fish from a body of water whereby the fish are stunned with an electric current, categorized, and returned to the water unharmed. Also called Chain electro-fishing.

Chemical Oxygen Demand (COD) - A measure of the oxygen required to oxidize all compounds in water, organic and inorganic.

Collective Dose Equivalent and Collective Effective Dose Equivalent - The sums of the dose equivalents or effective dose equivalents of all individuals in an exposed population within an 80-km radius and they are expressed in units of person-rem.

Committed Dose Equivalent (CDE) - The predicted total dose equivalent to a tissue or organ over a 50-year period after a known intake of a radionuclide into the body. It does not include contributions from external dose. Committed dose equivalent is expressed in units of rem.

Committed Effective Dose Equivalent (CEDE) - 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 expressed in units of rem.

Composite Sample - A sample that is comprised of a number of grab samples over the compositing period. In some cases, the composite sample obtained may be proportional to effluent flow and is called a proportional sample or flow-composited sample.

Conductance - A measure of water's capacity to convey an electrical current. This property is related to total concentration of the ionized substances in water and the temperature at which the measurement is made.

Confidence Interval - Statistical terminology for the error interval ($\pm$) assigned to numerical data. A two sigma (2σ) confidence interval means there is 95% confidence that the true value (as opposed to the measured one) lies within the ($\pm$) interval. The 95% is the confidence level (See ($\pm$) value, Standard Deviation of the Average).

Corrosion and Wear Products - Piping and components used in construction of a nuclear reactor are fabricated from extremely durable, corrosion and wear resistant materials. Even under the best circumstances, however, small amounts of these materials enter the reactor coolant due to wear of moving parts and corrosion of the water contact surfaces of reactor plant components. While this does not affect operational characteristics or reactor plant integrity, some of these corrosion and wear products may become activated as they pass through the reactor core. This necessitates that the reactor coolant be processed by filtration or other methods of purification before it is discharged or reused (See Activation Products).

Curie (Ci) - The common unit used for expressing the magnitude of radioactive decay in a sample containing radioactive material. Specifically, the curie is that amount of radioactivity equal to 3.7×10^{10} (37 billion) disintegrations per second. For environmental monitoring purposes, the curie is usually too large a unit to conveniently work with and is broken down to smaller values (See microcurie and picocurie).

Decision Level Concentration (DLC) - The quantity of radioactivity above which a decision is made that a net amount of radioactivity is present with a five percent probability of erroneously reporting net radioactivity when none is present (i.e., false positive).

Derived Concentration Guide (DCG) or Derived Concentration Standard (DCS) - The concentration of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem (0.1 rem).

Dose Equivalent - The quantity that expresses the biological effects of radiation doses from all types (alpha, beta-gamma) of radiation on a common scale. The unit of dose equivalent is the rem.

Downgradient - Referring to the flow of groundwater, downgradient is analogous to downstream and is a point that is “after” an area of study that is used as a baseline for comparison with upgradient or upstream data.

Duplicate Sample - A sample that is created by splitting existing samples before analysis and treating each split sample as a separate sample. The samples are then analyzed as a quality assurance method to assess the precision in the analytical process.

Effective Dose Equivalent - The sum of the dose equivalent to the whole body from external sources plus the dose equivalents to specific organs times a weighting factor appropriate for each organ. The weighting factor relates the effect of individual organ exposure relative to the effect of exposure to the whole body. The unit of effective dose equivalent is the rem.

Fission Products - During operation of a nuclear reactor, heat is produced by the fission (splitting) of "heavy" atoms, such as uranium, plutonium or thorium. The residue left after the splitting of these "heavy" atoms is a series of intermediate weight atoms generally termed "fission products." Because of the nature of the fission process, many fission products are unstable and, hence, radioactive. Most fission products have short lives and are retained within the nuclear fuel itself; however, trace natural uranium impurities in reactor structural materials release small quantities of fission products to the reactor coolant.

It should be noted that fission product radioactivity exists in the environment, primarily due to atmospheric nuclear weapons testing. The level is very low, but may be detectable when environmental samples are analyzed with extremely sensitive instruments and techniques such as those used in the NNPP.

Grab Sample - A single sample that is collected and is representative of the stream or effluent.

Half-life - A value assigned to a radionuclide that specifies how long it takes for one half of a given quantity of radioactivity to decay away. Half-lives may range from fractions of a second to billions of years.

High Purity Germanium Gamma Spectrometry (HPGe) - A gamma ray measuring system designed for qualitative and quantitative determination of radionuclides present in a sample. Gamma spectrometry systems make use of the fact that during the decay of most radionuclides, one or more gamma rays are emitted at energy levels characteristic of the individual radionuclide. For example, during the decay of cobalt-60, two gamma rays of 1.17 and 1.33 million electron volts (MeV) are emitted while the decay of argon-41 produces one gamma ray of 1.29 MeV. The high purity germanium detectors used in these systems are capable of detecting and very precisely resolving differences in gamma ray energy levels.

Long-Lived Gamma Radioactivity - Two very important characteristics of radionuclides are the length of time it takes for a given amount to decay away and the type of radiation emitted during decay. From an environmental standpoint, some of the most significant radionuclides are those whose half-lives are relatively long and that also emit penetrating gamma radiation during decay. Two radionuclides of concern in these respects are cobalt-60 (a corrosion and wear activation product) and cesium-137 (a fission product). (See Half-life, Beta-Gamma Radioactivity)

Macrophyton - Macroscopic plants in an aquatic environment.

Method Detection Limit - The lowest value at which a nonradiological sample result shows a statistically positive difference from a sample in which no constituent is present.

microcurie (μCi) - One millionth of a curie (10^{-6} curie). A typical smoke detector contains 1 μCi of americium-241 radioactive material (See curie and picocurie).

millirem (mrem) - One thousandth of a rem (10^{-3} rem).

Mixed Waste - Waste that contains both hazardous (regulated by EPA/NYSDEC) and radioactive material (regulated by DOE).

Outfall - A point of discharge (e.g., drain or pipe) of liquid effluent into a stream, river, ditch, or other water body.

Parshall Flume - A specially constructed channel designed such that discharge water flow rate can be accurately measured. The Parshall Flume may also be instrumented to record the total volume of flow over long periods of time.

Per- and Polyfluoroalkyl Substances (PFAS) - A large group of highly soluble, stable, synthetic chemicals that have been used since the 1940s in a wide variety of industrial and consumer products such as: carpet and clothing treatments, industrial surfactants, emulsifiers, and fire-fighting aqueous film-forming foam (AFFF). PFAS are composed primarily of a chain of carbon atoms to which fluorine atoms are attached. They have been found to be persistent in the environment as well as in the human body and resistant to natural means of degradation because of the strong chemical bond between the carbon and fluorine atoms.

Periphyton - Communities of microorganisms growing on stones, sticks, and other submerged surfaces. The quantities and types of periphyton present are very useful in assessing the effects of pollutants on lakes and streams.

Person-Rem - The sum of the individual dose equivalents or effective dose equivalents received by each member of a certain group or population. It is calculated by multiplying the average dose per person by the number of persons within a specific geographic area. For example, a thousand people each exposed to 0.001 rem would have a collective dose of one person-rem.

pH - A measure of the acidity or alkalinity of a solution on a scale of 0 to 14 (low is acidic, high is alkaline or caustic, 7 is neutral).

picocurie (pCi) - One trillionth of a curie (10^{-12} curie). Typical soil and sediment samples contain about 1 pCi of natural uranium per gram. (See curie and microcurie.)

Plankton - Tiny plants and animals that live in water.

± Value (plus or minus value) - An expression of the uncertainty in sample results. The magnitude of the ($\pm$) value depends on the number of samples, the size of the sample, intrinsic analytical uncertainties and the degree of confidence required. The ($\pm$) value assigned to data in this report is for the 95% confidence level (See Confidence Interval).

Polychlorinated Biphenyls (PCBs) - Halogenated aromatic hydrocarbons formed by the chlorination of biphenyl molecules. PCBs were commonly used in transformers as a dielectric fluid because of their stability.

Radionuclides - Atoms that exhibit radioactive properties. Standard practice for naming radionuclides is to use the name or atomic symbol of an element followed by its atomic weight (e.g., cobalt-60 or Co-60, a radionuclide of cobalt). There are several hundred known radionuclides, some of which are man-made and some of which are naturally occurring. Radionuclides can be differentiated by the types of radiation they emit, the energy of the radiation and the rate at which a known amount of the radionuclide decays away (See Half-life).

Roentgen Equivalent Man (Rem) - The unit of dose equivalent and effective dose equivalent.

Reporting Limit (RL) - The lowest concentration of an analyte that can be reliably reported in nonradiological samples within specified limits of precision and accuracy during routine laboratory operating conditions.

Reverse Osmosis - Also known as hyper-filtration, it is a process that allows the separation of solutes (i.e., dissolved substances) from a solution by forcing the solvent through a semi-permeable membrane by applying a pressure greater than the osmotic pressure associated with the solutes. A semi-permeable membrane is a membrane that allows diffusion of solvent molecules through it, while retarding the diffusion of solute molecules.

Semi-Volatile Organic Compound (SVOC) – An organic carbon-containing compound of intermediate volatility which are less volatile than VOCs and more volatile than non-volatile compounds.

Settleable Solids - A measurement of the amount of solids that will settle out of a sample of water in a certain interval of time. This parameter commonly applies to water being processed in sewage treatment plants and is used to control the operation and evaluate the performance of these plants.

Short-Lived Gamma Radioactivity - Radioactive material of relatively short life that decays with the emission of gamma rays. It is generally not important with respect to environmental discharges because of the short life span. Some examples of short-lived gamma emitting radionuclides are argon-41 (an activation product gas), krypton-88 (a fission product gas), and xenon-138 (a fission product gas).

Side-gradient - Referring to the flow of groundwater, side-gradient is analogous to cross gradient and is a point that is “alongside” an area of study.

Spiked Sample - A sample to which a known quantity of the material that is being analyzed for has been added for quality assurance testing.

Standard Deviation of the Average - A term used to characterize the uncertainty assigned to the mean of a set of analyzed data (See Confidence Interval, ($\pm$) Value).

Suspended Solids - Particulate matter, both organic and inorganic suspended in water. High levels of suspended solids not only affect the aesthetic quality of water by reducing clarity, but also may indirectly indicate other undesirable conditions present. The analysis for suspended solids is performed by passing a sample of water through a filter and weighing the residue.

Thermoluminescent Dosimeters (TLDs) - Sensitive monitoring devices that absorb and store energy from radiation. The TLDs used by Knolls Laboratory and Kesselring Site for environmental monitoring consist of small chips of lithium fluoride (LiF) encased in appropriate materials and strategically located at site perimeter and off-site locations. Thermoluminescent Dosimeters derive their name from a property that certain crystals exhibit when exposed to radiation and subsequently heated- that of emitting light proportional to the amount of radiation exposure received (thermoluminescence). The emitted light can then be read out on special instrumentation and correlated to the amount of radiation dose accumulated.

Turbidity - A cloudy condition in water due to suspended silt or organic matter. Turbidity is measured in nephelometric turbidity units (NTU).

Upgradient - Referring to the flow of groundwater, upgradient is analogous to upstream and is a point that is “before” an area of study that is used as a baseline for comparison with downgradient or downstream data.

Volatile Organic Compound (VOC) - An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature.

Weight Percent - A term commonly used to describe the amount of a substance in a material. For example, oil containing 0.5 lb. sulfur per 100 lb. oil would contain 0.5 percent by weight sulfur.

Weighting Factor - Tissue-specific representation of the fraction of the total health risk resulting from uniform, whole-body irradiation that could be contributed to that particular tissue.

Whole Effluent Toxicity (WET) - The aggregate toxic effect to aquatic organisms from all pollutants contained in a facility's wastewater. WET tests measure wastewater's effects on specific test organisms' (plants, vertebrates and invertebrates) ability to survive, grow, and reproduce.

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Regional Water Engineer, Region 4
New York State Department of Environmental Conservation

Regional Director, Region 5
New York State Department of Environmental Conservation

Regional Environmental Remediation Engineer, Region 5
New York State Department of Environmental Conservation

Regional Materials Management Engineer, Region 5
New York State Department of Environmental Conservation

Regional Water Engineer, Region 5
New York State Department of Environmental Conservation

Regional Air Pollution Control Engineer, Region 5
New York State Department of Environmental Conservation

Regional Citizen Participation Specialist, Region 5
New York State Department of Environmental Conservation

Public Information Officer
New York State Division of Homeland Security and Emergency Services

Senior Advisor
Radioactive Waste Policy and Nuclear Coordination
New York State Energy Research and Development Authority

Director
New York State Canal Corporation

Federal Project Director
Environmental Management Consolidated Business Center- NY
United States Department of Energy

Manager, Environmental Toxicology
Aquatec Environmental Inc.

Schenectady County Public Library, Niskayuna Branch
Niskayuna, New York

Saratoga Springs Public Library
Saratoga Springs, New York