Chapter 3: Environmental Monitoring Programs – Liquid Effluents Monitoring

Some Idaho National Laboratory (INL) Site operations retain wastewater in lined, total containment evaporative ponds constructed to eliminate liquid effluent discharges to the environment. Other INL Site operations discharge liquid effluents to unlined infiltration basins or ponds that may potentially contain nonhazardous levels of radioactive, or nonradioactive, contaminants. Effluent discharges are subject to specified discharge limits, permit limits, or maximum contaminant levels. INL Site contractor personnel conduct liquid effluent monitoring through liquid effluent and surface water runoff sampling and surveillance programs to ensure compliance with applicable permits, limits, and maximum contaminant levels. These programs also sample groundwater to evaluate the potential for groundwater impacts from current effluent discharges and operations.

Table 3-1 presents requirements for liquid effluent monitoring and surveillance performed at the INL Site. Maps and a comprehensive discussion of environmental monitoring, including liquid effluent monitoring and surveillance programs performed by various organizations within and around the INL Site, can be found in the "INL Environmental Monitoring Plan" (DOE-ID 2023a) and the "Technical Basis for Environmental Monitoring and Surveillance at the Idaho National Laboratory Site" (DOE-ID 2023b).

Table 3-1. Liquid effluent monitoring and surveillance at the INL Site.

	MONITORING REQUIREMENTS			
AREA/FACILITY	**IDAHO REUSE PERMIT[a]**	**NE O 458.1A[b] LIQUID EFFLUENT MONITORING**	**DOE O 458.1[c] LIQUID EFFLUENT MONITORING**	**DOE O 435.1[d] SURFACE RUNOFF SURVEILLANCE**
IDAHO NATIONAL LABORATORY CONTRACTOR				
Advanced Test Reactor Complex Cold Waste Pond	•	•		
Materials and Fuels Complex Industrial Waste Pond	•	•		
IDAHO CLEANUP PROJECT CONTRACTOR				
Idaho Nuclear Technology and Engineering Center Percolation Ponds and Sewage Treatment Plant	•		•	
Radioactive Waste Management Complex Subsurface Disposal Area surface water runoff			•	•

a. Required by permits issued according to IDAPA 58.01.17, "Recycled Water Rules." This includes wastewater effluent and related groundwater monitoring.

b. Paragraphs 4(f) and Paragraph 4(g) of NE O 458.1A establishes specific requirements related to the control and management of radionuclides from U.S. Department of Energy (DOE) activities in liquid discharges, including protection of groundwater and drinking water. Radiological liquid effluent monitoring recommendations in DOE Handbook Environmental Radiological Effluent Monitoring and Environmental Surveillance (DOE 2015) are followed to ensure quality. "Derived Concentration Technical Standard" (DOE 2022) supports the implementation of NE O 458.1A and provides the Derived Concentration Standards (DCSs) as reference values to control effluent releases from DOE facilities.

c. Paragraph 4(g) of DOE O 458.1, establishes specific requirements related to the control and management of radionuclides from DOE activities in liquid discharges, including protection of groundwater and drinking water. Radiological liquid effluent monitoring recommendations in DOE-HDBK-1216-2015 (DOE 2015) are followed to ensure quality. DOE-STD-1196-2022 (DOE 2022) supports the implementation of DOE O 458.1 and provides the DCSs as reference values to control effluent releases from DOE facilities.

d. The objective of DOE O 435.1 is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health, as well as safety and the environment. This order requires that radioactive waste management facilities, operations, and activities meet the environmental monitoring requirements of DOE O 458.1. DOE-HDBK-1216-2015 (DOE 2015) suggests that potential impacts of stormwater runoff as a pathway to humans or biota should be evaluated.

3.1 Liquid Effluent and Related Groundwater Compliance Monitoring

The discharge of liquid effluent to the land surface for treatment or disposal is known as "reuse" in the state of Idaho and is regulated by the Idaho Department of Environmental Quality (DEQ) "Recycled Water Rules" (IDAPA 58.01.17), "Wastewater Rules" (IDAPA 58.01.16), and the "Ground Water Quality Rule" (IDAPA 58.01.11). The Idaho DEQ issues reuse permits for the operation of these reuse systems. Reuse permits require the monitoring of nonradioactive constituents in the effluent and groundwater in accordance with the monitoring requirements specified within each permit. The reuse permits may specify annual discharge volumes, application rates, and effluent quality limits. Annual reports (ICP 2026a and 2026b; INL 2026a, 2026b, 2026c, and 2026d) were prepared and submitted to the Idaho DEQ.

During 2025, the INL Site contractors monitored the following reuse facilities as required by the permits, as shown in Table 3-2.

Table 3-2. 2025 status of INL Site contractors reuse permits.

FACILITY	PERMIT STATUS AT END OF 2025	PERMIT EXPIRATION DATE	EXPLANATION
Advanced Test Reactor Complex Cold Waste Ponds	Active	October 29, 2029	Idaho Department of Environmental Quality issued Reuse Permit I-161-03 on October 30, 2019 (DEQ 2019).
Idaho Nuclear Technology and Engineering Center Percolation Ponds	Active	June 25, 2034	Idaho Department of Environmental Quality issued Permit M-130-07 on June 25, 2024 (DEQ 2024).
Materials and Fuels Complex Industrial Waste Pond	Active	January 25, 2027	Idaho Department of Environmental Quality issued Reuse Permit I-160-02 on January 26, 2017 (DEQ 2017).

Effluent and groundwater radiological constituents are monitored at these facilities to comply with the environmental protection objectives of NE O 458.1A and DOE O 458.1 and are discussed in Subsection 3.2. Surface water monitoring at RWMC is presented in Subsection 3.3.

3.1.1 Advanced Test Reactor Complex Cold Waste Ponds

Description. The Cold Waste Ponds (CWP) are located near the southeast corner of the Advanced Test Reactor (ATR) Complex compound, approximately 1.2 km (0.75 mi) northwest of the Big Lost River channel. The CWP was excavated in 1982 and consists of two unlined cells that function as percolation basins for the infiltration of nonhazardous industrial liquid effluent. This effluent consists primarily of noncontact cooling tower blowdown, once-through cooling water for air conditioning units, coolant water from air compressors, and wastewater from secondary system drains and other nonradioactive drains throughout the ATR Complex. Chemicals used in the cooling tower and other effluent streams discharged to the CWP include commercial biocides and corrosion inhibitors. The cold waste effluent reports through collection piping to a monitoring location where flow rates to the CWP are measured and effluent samples are collected using an automated composite sampler.

Effluent Monitoring Results for the Reuse Permit. Reuse Permit I-161-03 requires monthly sampling of the effluent to the CWP (DEQ 2019). The CWP effluent is sampled for chromium, iron, Nitrate+nitrite as nitrogen, sulfate, and total dissolved solids (TDS), Filtered and un-filtered metals samples are analyzed to monitor system performance and provide better comparison to groundwater monitoring results. Field measurements for pH, conductivity and temperature are obtained at the time of sample collection using calibrated instruments. The 2025 permit reporting year monitoring results are presented in the 2025 annual reuse report (INL 2026c). When the ATR is operating, hydraulic discharge rates to the CWP are typically low while the evaporative cooling process in the cooler tower concentrates constituents in the effluent. During ATR outages, the cooling tower is not required and remains out of service. Consequently, once-through noncontact cooling water, which is normally directed to the ATR cooling tower basin as makeup water, is instead routed to the CWP collection system. In addition, because the cooling tower basin blowdown is not generated during outages, no blowdown water is discharged to the CWP system. This operational change reduces effluent concentrations of chromium, nitrate+nitrite as nitrogen, sulfate, and TDS during outage. Due to the composition and characteristics of the effluent, the reuse permit does not require pretreatment or specify maximum constituent loading limits or concentration limits for the cold waste effluent discharged to the CWP. During the 2025 permit reporting year total chromium ranged from 0.00152 to 0.0272 mg/L, Nitrate+nitrite as nitrogen ranged from 0.895 to 6.77 mg/L, sulfate from 20.8 to 1090 mg/L, and TDS from 187 to 1870 mg/L. During the summer and fall of 2025, a cold waste drain line carrying air compressor cooling water to the CWP was damaged, requiring temporary rerouting of this wastewater to the sewage lagoons. As a result, this stream no longer mixed with ATR cooling tower blowdown, causing the cold waste effluent to the reuse ponds to exhibit a lower flow rate and higher than normal constituent concentrations. Corrections were implemented in January 2026 to restore the line and return the flows to the CWP, resulting in a return to normal flows and concentration ranges. Except for the anomalously low flows and higher concentrations during the loss of the air compressor drainage, the constituent concentrations during the 2025 permit reporting year continued to remain stable and consistent with the historical results with no observable increasing or decreasing trends.

The permit specifies the maximum annual and 5-year moving average hydraulic loading rate limits of 375 million gallons per year (MG/yr) and 300 MG/yr, respectively, based on the annual reporting year of the permit. The 2025 annual reporting year flow of 148.48 MG did not exceed either of these hydraulic loading limits.

Groundwater Monitoring Results for the Reuse Permit. The permit requires groundwater monitoring twice annually in April/May and September/October at seven groundwater wells to measure potential impacts from the CWP. Groundwater is sampled for the same constituents of concern in the CWP effluent including chromium, iron, nitrate+nitrie as nitrogen, sulfate, and TDS. Both filtered and un-filtered metals are analyzed to provide better comparison to CWP effluent monitoring results. The 2025 permit reporting year groundwater monitoring results are presented in the 2025 annual reuse report (INL 2026c). During the 2025 permit reporting year all constituents, except for chromium, remained below their respective primary or secondary constituent standards. Well USGS-065 is the closest downgradient well to the CWP and has historically had the highest concentrations for the constituents of interest, including chromium, nitrate+nitrite as nitrogen, sulfate, and TDS. Nitrate+nitrite as nitrogen continues to show a minor increasing trend in the upgradient wells USGS-098 and USGS-058 but remains well below the primary constituent standard (PCS). All downgradient wells continue to show stable nitrate+nitrite as nitrogen concentrations well below the PCS with no observable trends. Sulfate and TDS are below their applicable secondary constituent standards and remain stable or are gradually trending downward in all wells. Iron concentrations continue to remain at low levels and are consistent with the historical ranges with no observable trend. Chromium is a constituent of concern being addressed under the Comprehensive Environmental Response, Compensation, and Liability Act due to historical discharges that have been discontinued at the ATR Complex (see Chapter 4, Subsection 4.5.2 for more information).

Chromium results in Well USGS-65 decreased from approximately 0.500 mg/L in the early 1970s to less than the PCS of 0.100 mg/L, starting in 2009, then remained relatively stable in the range of approximately 0.070 to 0.090 mg/L from 2010 through April 2024.

In September 2024 total and filtered chromium results collected from Well USGS-065 increased to 0.0979 mg/L and 0.0974 mg/L, respectively. During the 2025 reporting year total and filtered chromium increase to 0.114 and 0.111 mg/L, respectively, then to 0.120 and 0.117 mg/L during the September 2025 sampling event. A comparison of the total and filtered chromium concentrations in the CWP effluent, which historically have remained less than 0.02 mg/L, and Well USGS-065 suggests the source of these elevated chromium levels is unlikely to be a result of current effluent discharges to CWP, but rather is due to other factors, such as historical contamination being addressed by the Comprehensive Environmental Response, Compensation, and Liability Act program. Additional details and discussion can be found in the 2025 annual reuse report (INL 2026c). Chromium concentrations will continue to be monitored closely in the effluent and all permit monitoring wells.

3.1.2 Idaho Nuclear Technology and Engineering Center Percolation Ponds and Sewage Treatment Plant

Description. The INTEC Percolation Ponds are composed of two rapid infiltration ponds excavated into the surficial alluvium and surrounded by bermed alluvial material. The rapid infiltration system uses the soil ecosystem to treat wastewater. Each pond is 93 m × 93 m (305 ft × 305 ft) at the top of the berm and is approximately 3 m (10 ft) deep. Each pond is designed to accommodate a continuous wastewater discharge rate of 11.36 mL (3 mg) per day.

The INTEC Percolation Ponds receive a discharge of only industrial and municipal wastewater. Industrial wastewater (i.e., service waste) from INTEC operations consists of steam condensates, noncontact cooling water, water treatment effluent, boiler blowdown wastewater, stormwater, and small volumes of other nonhazardous/nonradiological liquids. Municipal wastewater (i.e., sanitary waste) is treated at the INTEC Sewage Treatment Plant (STP).

The STP is located east of INTEC, outside the INTEC security fence, and treats and disposes of sewage, septage, and other nonhazardous industrial wastewater at INTEC. The sanitary waste is treated by natural biological and physical processes (e.g., digestion, oxidation, photosynthesis, respiration, aeration, and evaporation) in four lagoons. After treatment in the lagoons, the effluent is combined with the service waste and discharged to the INTEC Percolation Ponds.

The INTEC Percolation Ponds were permitted by Idaho DEQ to operate as a reuse facility under Reuse Permit M-130-07 (DEQ 2024).

Wastewater Monitoring Results for the Reuse Permit. Monthly samples were collected from CPP-769 (influent to STP), CPP-773 (effluent from STP), and CPP-797 (effluent to the INTEC Percolation Ponds). As required by the permit, all samples are collected as 24-hour composites, except pH, fecal coliform, and total coliform, which are collected as grab samples. The permit specifies the constituents that must be monitored at each location. The permit does not specify any wastewater discharge limits at these three locations. During the 2025 reporting year, across all 3 sample locations biochemical oxygen demand results ranged from 8.96 to 189 mg/L, nitrate+nitrite as nitrogen results ranged from 0.069 to 6.48 mg/L, total kjeldahl nitrogen ranged from 3.04 to 123 mg/L, total phosphorus ranged from 1.57 to 10.3 mg/L, total suspended solids ranged from 4.5 to 195 mg/L, total coliform ranged from 10.2 to 2,419.2 most probable number, and TDS ranged from 178 to 389 mg/L. Monitoring results are provided in the 2025 Wastewater Reuse Report (ICP 2026a).

Percolation Ponds Flow Volumes. The INTEC wastewater permit specifies daily (3,000,000 gallons) and annual (1,095 million gallons) hydraulic loading limits for the recycled water discharged to the north and south percolation ponds. The maximum daily volume recorded during the 2025 reporting period was 955,000 gallons. The total annual volume discharged to the percolation ponds for the 2025 reporting year was 161,122,450 gallons, which was below the permitted annual hydraulic loading limit of 1,095,000,000 gallons.

Groundwater Monitoring Results for the Reuse Permit. To measure the potential impact on groundwater from wastewater discharges to the INTEC Percolation Ponds, the permit requires that groundwater samples are collected from six monitoring wells.

The permit requires that groundwater samples are collected semiannually during April/May and September/October and lists which constituents must be analyzed. Contaminant concentrations in the monitoring wells are limited by PCSs and secondary constituent standards as specified in IDAPA 58.01.11.

The 2025 water table elevations and depth-to-water table, determined prior to purging and sampling, and the analytical results for all constituents specified by the permit for the aquifer wells can be found in the 2025 Wastewater Reuse Report (ICP 2026a).

The chromium sample results were above groundwater PCS from Well ICPP-MON-V-212 (GW-0130-10) for the April/May sampling event. It was presumed that well corrosion contributed to the elevated chromium levels. A new pump was installed on the well September 29, 2025. The monitoring results for all samples collected from Well ICPP-MON-V-212 (GW-0130-10) after the pump replacement were within expected concentrations. All other wells under this project were below the constituent standards for both the spring and fall sampling events.

3.1.3 Materials and Fuels Complex Industrial Waste Pond

Description. The Materials and Fuels Complex (MFC) Industrial Waste Pond (IWP) is an unlined basin that was first excavated in 1959. The industrial wastewater discharged to the IWP consists of primarily noncontact cooling water, cooling tower drains, and air wash flows. Small volumes of MFC-768 power plant cooling water system blowdown, intermittent reverse osmosis blowdown, and floor drain and laboratory sink discharges are also sent to IWP. On occasion, with pre-approval, industrial wastewater from the MFC facility process holdup tanks discharges to the pipeline. IWP functions as a percolation basin for the infiltration of nonhazardous industrial effluent. The effluent reports through collection piping to a monitoring location where flow rates to IWP are measured and the effluent samples are collected using an automated composite sampler.

Wastewater Monitoring Results for the Reuse Permit. Reuse Permit I-160-02 requires monthly sampling of effluent discharging into IWP (DEQ 2017). The 2025 permit reporting year monitoring results are presented in the 2025 annual reuse report (INL 2026d). Based on the composition of the industrial effluent, the reuse permit does not require pretreatment or specify maximum constituent loading limits or concentration limits. The effluent is analyzed for iron, manganese, sodium, chloride, nitrate+nitrite as nitrogen, and TDS. Total and filtered metals were analyzed to monitor system performance and provide better comparison to groundwater monitoring results. Chloride and sodium are monitored for operational purposes and are not required by the permit. Field parameters including pH, conductivity and temperature are measured at the time of sample collection using calibrated instruments. During the 2025 permit reporting year, concentrations of iron and manganese continued to be at or near the minimum detection levels. TDS ranged from 217 to 388 mg/L. The 2025 metals and TDS concentrations continue to be within historical ranges and remain stable with no observable trends. Effluent nitrate+nitrite as nitrogen concentrations continue to gradually trend upward at approximately the same rate and concentrations as the upgradient background groundwater concentration in Well ANL-MON-A-012. The aquifer is the source of water from which the industrial effluent is generated, and it is likely that the upgradient aquifer nitrogen concentrations are passing through the system to the effluent. As shown in the 2025 annual reuse report (INL 2026d), there are no discernible impacts or changes between upgradient and downgradient groundwater quality. The lack of a significant difference from upgradient to downgradient indicates the reuse system is not impacting the groundwater.

The permit specifies an annual reporting year hydraulic loading limit of 17 MG/yr. During the 2025 permit reporting year the effluent flow of 7.729 MG/yr was well below the permit limit.

Groundwater Monitoring Results for the Reuse Permit. The reuse permit requires groundwater monitoring twice per year, in April/May and September/October, at one upgradient well and two downgradient wells, to measure potential impacts from the pond. Groundwater samples were collected in April 2025 and September 2025. And analyzed for iron, manganese, sodium, potassium, calcium, magnesium, alkalinity, chloride, sulfate, conductivity, and TDS. Total and filtered metals were analyzed to meet permit requirements and to monitor system performance and provide better comparison to groundwater monitoring results. Chloride, sulfate, sodium, potassium, calcium, magnesium, and alkalinity are only required by the reuse permit during April/May of the first and last year of the permit; however, they were also sampled in 2025 including both total alkalinity and bicarbonate alkalinity The analytical results are presented in the 2025 annual reuse report (INL 2026d). In 2025, nitrate+nitrite as nitrogen continued to gradually trend up in the upgradient and downgradient wells to a high of 3.46 mg/L but remains well below the primary groundwater constituent standard of 10 mg/L. None of the constituents exceeded their respective primary or secondary constituent standards, and the analyte concentrations in the downgradient wells remained consistent with the background levels in the upgradient well. There appears to be no discernible groundwater impacts from MFC operations.

3.2 Liquid Effluent Radiological Surveillance Monitoring

The following subsections discuss the results of liquid effluent radiological surveillance monitoring performed at each wastewater reuse-permitted facility.

3.2.1 Advanced Test Reactor Complex

Effluent discharged to CWP is a combination of process water from various ATR Complex facilities. Radiological surveillance of CWP effluent is performed monthly for gross alpha, gross beta, gamma spectrometry, and tritium. In 2025, gross alpha and gross beta were the only surveillance constituents that were detected, with gross alpha concentrations ranging from 4.03 ± 1.32 to 8.49 ± 1.89 pCi/L and gross beta concentrations ranging from 3.95 ± 0.99 to 15.0 ± 1.36 pCi/L. These concentrations were within the historical ranges with no observable trends. When gross alpha levels exceed a threshold of 5 pCi/L, additional analysis for radium-226 and radium-228 are performed as well. Radium-226 and radium-228 analyses were conducted in November 2025 following a sample that exceeded the gross alpha threshold; neither radionuclide was positively detected.

Additionally, seven groundwater monitoring wells are sampled twice per year for radiological surveillance and analyzed for gross alpha, gross beta, gamma spectrometry, strontium-90, and tritium. The 2025 groundwater radionuclide surveillance monitoring results are presented in INL (2026a). All detected constituents—including tritium (326 ± 107 to 777 ± 136 pCi/L), gross alpha (0.54 ± 0.17 to 1.67 ± 0.29 pCi/L), and gross beta (1.72 ± 0.34 to 5.43 ± 0.43 pCi/L)—were well below the Idaho groundwater PCSs (IDAPA 58.01.11) and "Derived Concentration Standard" (DOE 2022). Gross alpha and gross beta measurements remain stable within the historical ranges and show no observable trends. Tritium continues to trend downward in the monitoring wells that have positive detections.

3.2.2 Idaho Nuclear Technology and Engineering Center

In addition to the permit-required monitoring summarized in Subsection 3.1.3, surveillance monitoring was conducted at CPP-797 (effluent to the Idaho Nuclear Technology and Engineering Center [INTEC] Percolation Ponds), and groundwater monitoring was conducted at the INTEC Percolation Ponds. Radiological monitoring was also conducted at CPP-797, and in Wells ICPP-MON-A-165, ICPP-MON-A-166, ICPP-MON-V-200, and ICPP-MON-V-212.

Twenty-four-hour flow proportional samples were collected from the CPP-797 wastewater effluent and composited daily into a monthly sample. Each monthly composite sample was analyzed for specific gamma-emitting radionuclides, gross alpha, gross beta, and total strontium activity. Gross alpha was detected in one sample, and gross beta was detected in all 12 samples collected in 2025. Gross alpha detection was 4.80 ± 1.22 pCi/L, gross beta ranged from 3.88 ± 0.715 to 14.8 ± 1.49 pCi/L. All detected constituents were below the Idaho groundwater PCSs in IDAPA 58.01.11. Historical trends are steady with only minor fluctuations in activity results.

Groundwater samples were collected from the aquifer from Wells ICPP-MON-A-165 and ICPP-MON-A-166 and from perched water from Wells ICPP-MON-V-200 and ICPP-MON-V-212 in April 2025 and September 2025 and were analyzed for gross alpha and gross beta. Throughout all the wells, gross alpha results ranged from 2.89 ± 0.951 pCi/L to 3.43 ± 1.13 pCi/L, and gross beta results throughout all the wells ranged from 2.69 ± 1.16 pCi/L to 24.0 ± 1.58 pCi/L. All detected constituents, gross alpha, and gross beta, were below the Idaho groundwater PCSs in IDAPA 58.01.11. Historical trends are steady with only minor fluctuations in activity results. The aquifer radiological results can be found in the "2025 Radiological Monitoring Results Associated with the INTEC Percolation Ponds" (ICP 2026b).

3.2.3 Materials and Fuels Complex

Radiological surveillance of the effluent in the IWP is performed three times per year and analyzed for gross alpha, gross beta, gamma spectrometry, and tritium. Annual samples also are collected and analyzed for select isotopes of americium, strontium, plutonium, and uranium. In 2025, gross alpha, gross beta, uranium-233/234, and uranium-238 were the only surveillance constituents detected in the IWP. Detected gross alpha concentrations ranged from 3.22 ± 0.97 pCi/L to 3.74 ± 1.12 pCi/L, gross beta concentrations from 5.74 ± 0.68 pCi/L to 7.37 ± 1.17 pCi/L, a detected concentration of 1.14 ± 0.15 pCi/L for uranium-233/234, and 0.62 ± 0.10 pCi/L for uranium-238. These concentrations are all well below the applicable DCS (DOE 2022) and remain within historical ranges.

Additionally, three ground water monitoring wells are sampled twice per year for radiological surveillance and analyzed for gross alpha, gross beta, alpha spectrometry, gamma spectrometry, and tritium. The 2025 groundwater radionuclide surveillance monitoring results are presented in INL (2026b). In 2025, gross alpha, gross beta, uranium-233/234, and uranium-238 were the only surveillance constituents detected in the wells. Gross alpha concentrations ranged from 0.64 ± 0.19 to 1.41 ± 0.32 pCi/L, and gross beta ranged from 2.90 ± 0.22 to 5.26 ± 0.32 pCi/L. Uranium-233/234 concentrations ranged from 1.00 ± 0.28 to 1.46 ± 0.17 pCi/L, and uranium-238 ranged from 0.48 ± 0.09 to 0.69 ± 0.12 pCi/L. Overall, the detected results were below the Idaho groundwater PCSs (IDAPA 58.01.11), applicable DCS (DOE 2022), and remain within the historical ranges and show no discernible impact from MFC operations.

3.3 Surface Water Runoff Surveillance Water Sampling

Radionuclides could be transported outside the Radioactive Waste Management Complex (RWMC) boundaries via surface water runoff. Surface water runs off the Subsurface Disposal Area (SDA) during periods of rapid snowmelt or heavy precipitation. The canal also carries runoff from outside RWMC that has been diverted around the SDA. In addition, water sheet flows across asphalt surfaces and infiltrates around/under door seals at Waste Management Facility (WMF)-636 at the Advanced Mixed Waste Treatment Project. The resulting surface water inflow accumulates in the WMF-636 Firewater Catch Tanks A, B, C, and D. If the level of surface water in the Firewater Catch Tanks reaches a predetermined level, the water is pumped into aboveground holding tanks, where it can be sampled, prior to discharge into the drainage canal surrounding the SDA.

In compliance with DOE O 435.1, the Idaho Cleanup Project (ICP) contractor collects surface water runoff samples at RWMC SDA from the WMF-636 Firewater Catch Tanks. Surface water is collected to determine whether radionuclide concentrations exceed the administrative control levels or if concentrations have increased significantly, as compared with the historical data. A field blank is also collected for comparison.

On August 11, 2025, Firewater Catch Tank B (WMF-636) at Advanced Mixed Waste Treatment Project was sampled. The sample underwent radionuclide analysis for gross alpha, gross beta, radium-226, and strontium-90. All maximum concentrations measured were below their respective DCSs. The analytical results were consistent with historical data and remained well within all applicable DCS limits.

A water sample was collected from the SDA lift station in 2025. This sample was analyzed for a suite of radionuclides that included americium-241, strontium-90, and plutonium and uranium isotopes. There were 13 positive three sigma (3σ) detections between americium-241, plutonium-238, plutonium-239/240, and strontium-90 in the samples taken in 2025 The maximum concentrations detected for americium-241, plutonium-238, plutonium-239/240, and strontium-90 were each well below their respective DCS. In addition to sampling for these nuclides, uranium isotopes were detected at levels consistent with historical results, which were below any applicable DCS.

Table 3-3 summarizes the specific alpha and beta results of human-made radionuclides. No human-made gamma-emitting radionuclides were detected in the surface water runoff sample. Review of the available data indicates that results remain consistent with historical trends, with no deviations observed. ICP temporarily ceased sample collection since teardown of the Accelerated Retrieval Project V facility removed electrical facilities to the SDA lift station. The ICP contractor has revised their sampling procedure to allow for continued sampling at the SDA lift station considering the changes resulting from these closure activities.

Table 3-3. Radionuclides detected in surface water runoff at the RWMC SDA (2025).

LOCATION	PARAMETER	MAXIMUM CONCENTRATION[a] (pCi/L)	% DCS[b]
Subsurface Disposal Area Lift Station	Americium-241	0.07 ± 0.01	0.01
	Plutonium-239/240	0.04 ± 0.01	0.01
	Uranium-234	0.40 ± 0.04	0.03
	Uranium-238	0.36 ± 0.03	0.03

a. Result ±1s. Results shown are greater than 3σ.
b. See DOE-STD-1196-2022, Table A-6 (DOE 2022).

3.4 Quality Assurance

3.4.1 INL Contractor Quality Assurance

In 2025, the INL contractor implemented its quality control program to ensure environmental monitoring results were accurate and trustworthy. Quality assurance activities included the use of duplicates, and performance evaluation samples to verify the performance of the contracted analytical laboratory. When discrepancies were identified, the contractor collaborated with the laboratory to refine processes, procedures, and methods. Field sampling, laboratory measurements and performance evaluation samples were thoroughly reviewed. These measures ensure that monitoring data used to protect public health and the environment are valid, reliable, and defensible. All laboratory data presented in this chapter by the INL contractor meet these standards.

3.4.2 ICP Contractor Quality Assurance

The ICP contractor followed a similar approach in 2025 to maintain data integrity and reliability. Its quality assurance activities also included blanks, duplicates, and performance evaluation samples to assess laboratory performance and identify discrepancies. Corrective actions were implemented as needed to strengthen processes and ensure accuracy. By adhering to these rigorous quality control measures, the ICP contractor ensures that all reported data are accurate, defensible, and compliant with regulatory requirements for protecting public health and the environment. All laboratory data presented in this chapter by the ICP contractor meet these standards.

3.5 References

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