

# **Rocky Flats Site, Colorado, Quarterly Report of Site Surveillance and Maintenance Activities, First Quarter, Calendar Year 2023**

**July 2023**



**U.S. DEPARTMENT OF  
ENERGY**

Legacy  
Management

# Contents

Abbreviations .....	iii
Executive Summary .....	iv
1.0 Introduction .....	1
2.0 Site Operations and Maintenance.....	2
2.1 Landfills .....	2
2.1.1 Present Landfill.....	2
2.1.2 Original Landfill .....	2
2.1.2.1 Inspection Results .....	2
2.1.2.2 Settlement Monuments .....	2
2.2 COU Inspections .....	3
2.3 North Walnut Creek Slump .....	3
2.4 Site Roads Maintenance.....	3
2.5 Groundwater Treatment Systems.....	4
2.5.1 Mound Site Plume Collection System .....	4
2.5.2 East Trenches Plume Treatment System.....	4
2.5.3 Solar Ponds Plume Treatment System.....	5
2.5.4 Present Landfill Treatment System.....	6
2.6 Sign Inspection.....	6
2.7 Erosion Control and Revegetation .....	6
3.0 Environmental Monitoring .....	7
3.1 Water Monitoring.....	7
3.1.1 Water Monitoring Highlights.....	7
3.1.2 POC Monitoring.....	10
3.1.2.1 Monitoring Location WALPOC .....	10
3.1.2.2 Monitoring Location WOMPOC .....	13
3.1.3 POE Monitoring.....	16
3.1.3.1 Monitoring Location GS10 .....	16
3.1.3.2 Monitoring Location SW027 .....	17
3.1.3.3 Monitoring Location SW093 .....	19
3.1.4 AOC Wells and Surface Water Support Location SW018 .....	20
3.1.5 Sentinel Wells .....	20
3.1.6 Evaluation Wells.....	20
3.1.7 PLF Monitoring .....	20
3.1.8 OLF Monitoring.....	21
3.1.9 Groundwater Treatment System Monitoring .....	21
3.1.9.1 Mound Site Plume Collection System .....	21
3.1.9.2 East Trenches Plume Treatment System.....	21
3.1.9.3 Solar Ponds Plume Treatment System.....	21
3.1.9.4 Present Landfill Treatment System.....	21
3.1.10 Predischarge Monitoring.....	22
4.0 Adverse Biological Conditions .....	22
5.0 Ecological Monitoring.....	22
6.0 References .....	22

## Figures

Figure 1. Rocky Flats Site Water Monitoring Locations and Precipitation Gages.....	9
Figure 2. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WALPOC: Year Ending First Quarter 2023 .....	10
Figure 3. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WALPOC: Year Ending First Quarter 2023.....	11
Figure 4. Volume-Weighted 30-Day Average Uranium Concentrations at WALPOC: Year Ending First Quarter 2023 .....	11
Figure 5. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at WALPOC: Year Ending First Quarter 2023 .....	12
Figure 6. Volume-Weighted 30-Day Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending First Quarter 2023 .....	12
Figure 7. Volume-Weighted 12-Month Rolling Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending First Quarter 2023 .....	13
Figure 8. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WOMPOC: Year Ending First Quarter 2023 .....	14
Figure 9. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WOMPOC: Year Ending First Quarter 2023 .....	14
Figure 10. Volume-Weighted 30-Day Average Uranium Concentrations at WOMPOC: Year Ending First Quarter 2023 .....	15
Figure 11. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at WOMPOC: Year Ending First Quarter 2023 .....	15
Figure 12. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at GS10: Year Ending First Quarter 2023 .....	16
Figure 13. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at GS10: Year Ending First Quarter 2023 .....	17
Figure 14. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW027: Year Ending First Quarter 2023 .....	18
Figure 15. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at SW027: Year Ending First Quarter 2023 .....	18
Figure 16. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW093: Year Ending First Quarter 2023 .....	19
Figure 17. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at SW093: Year Ending First Quarter 2023 .....	20

## Appendices

Appendix A Landfill Inspection Forms and Survey Data, First Quarter 2023

Appendix B Analytical Results for Water Samples, First Quarter 2023

## Abbreviations

Am	americium
AOC	Area of Concern
BMP	best management practice
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
COU	Central Operable Unit
CR	Contact Record
CY	calendar year
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ETPTS	East Trenches Plume Treatment System
IC	institutional control
ITSS	Interceptor Trench System Sump
LM	Office of Legacy Management
µg/L	micrograms per liter
MSPCS	Mound Site Plume Collection System
NWCS	North Walnut Creek Slump
OLF	Original Landfill
pCi/L	picocuries per liter
PLF	Present Landfill
PLFTS	Present Landfill Treatment System
POC	Point of Compliance
POE	Point of Evaluation
Pu	plutonium
RCRA	Resource Conservation and Recovery Act
RFLMA	<i>Rocky Flats Legacy Management Agreement</i>
RFSOG	Rocky Flats Site Operations Guide
SPPTS	Solar Ponds Plume Treatment System

## Executive Summary

This report for the first quarter (January 1–March 31) of calendar year (CY) 2023 includes information on the remedy-related surveillance, monitoring, and maintenance activities conducted at the Rocky Flats Site, Colorado, managed by the U.S. Department of Energy (DOE) Office of Legacy Management. This report summarizes the maintenance and inspection of the two closed Site landfills and four groundwater collection or treatment systems, the inspection of the perimeter signs of the Central Operable Unit, erosion control and revegetation activities, and water and ecological monitoring.

The Present Landfill quarterly inspection for the first quarter of CY 2023 was conducted on February 21, 2023. No issues were identified during this inspection. The Present Landfill Treatment System (PLFTS) North and South Manhole Outlet pipes were cleaned with a mechanical pipe cleaner as a best management practice.

The Original Landfill monthly inspections for the first quarter of CY 2023 were conducted on January 17, February 21, and March 23, 2023. No issues were observed during these inspections.

Routine maintenance was performed at the Mound Site Plume Collection System, the East Trenches Plume Treatment System, the Solar Ponds Plume Treatment System (SPPTS), and the PLFTS during the first quarter. Pilot-scale uranium treatment testing that began in November 2022 continued at the SPPTS. Freezing conditions interfered with flows at the SPPTS but did not cause any damage or lasting effects, and treatment continued without problem.

Water monitoring met the targeted monitoring objectives required by the *Rocky Flats Legacy Management Agreement* (RFLMA). During the quarter, 11 flow-paced, composite surface water samples; 18 surface water grab samples; 13 treatment system grab samples; and 11 groundwater samples were collected in accordance with RFLMA-required protocols and were submitted for laboratory analysis.

A reportable condition at Point of Evaluation (POE) GS10 for the uranium 12-month rolling average was determined upon receipt of recently validated analytical results. Validated results were received on May 9, 2023, with formal notification to regulators and stakeholders being made on May 17, 2023. The RFLMA Parties (DOE, Colorado Department of Public Health and Environment, and U.S. Environmental Protection Agency) held a consultation regarding this reportable condition on June 8, 2023. Once finalized, the plan and path forward will be described in a contact record that will be posted on the Rocky Flats website. See Section 3.1.3.1 for a detailed discussion.

All other analyte concentrations at POE locations GS10, SW027, and SW093 remained below reportable condition levels during the first quarter of CY 2023.

All analyte concentrations at Points of Compliance WALPOC and WOMPOC also remained below reportable condition levels during the first quarter of CY 2023.

RFLMA-required groundwater monitoring during the first quarter of CY 2023 was conducted at the 10 Resource Conservation and Recovery Act wells monitoring the two closed landfills.

Results were generally consistent with previous data. Groundwater monitoring data presented in this quarterly report will be evaluated as part of the annual report for CY 2023.

Ecological activities conducted during the first quarter included revegetation of disturbed areas, vegetation enhancement activities (interseeding with native grasses and shrubs), prairie dog surveys, and installation of wildlife crossings.

## 1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is responsible for implementing the final response action at the Rocky Flats Site, Colorado. The final response action was selected in the *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit* (DOE et al. 2006), hereafter referred to as the Corrective Action Decision/Record of Decision (CAD/ROD), issued September 29, 2006, and amended September 21, 2011 (DOE et al. 2011). The Peripheral Operable Unit was transferred from DOE to the U.S. Department of the Interior in July 2007 to establish the Rocky Flats National Wildlife Refuge. DOE implements the monitoring and maintenance requirements of the CAD/ROD for the Central Operable Unit (COU) as described in the *Rocky Flats Legacy Management Agreement* (RFLMA) (CDPHE et al. 2007). The RFLMA was executed on March 14, 2007. Attachment 2 to the RFLMA has been revised since, most recently in 2018. Results of that 2018 revision were implemented beginning January 1, 2019.

RFLMA Attachment 2 specifies remedy performance standards; monitoring, inspection, and maintenance requirements; evaluation criteria for the results of monitoring and inspection; and COU remedy reporting. These requirements include environmental monitoring; maintenance of erosion controls, access controls (signs), landfill covers, and groundwater collection and treatment systems; and operation of the groundwater collection and treatment systems. The RFLMA also requires that the institutional controls (ICs), in the form of use restrictions as established in the CAD/ROD, be maintained.

This report is required in accordance with Section 7.0, “Periodic Reporting Requirements,” of RFLMA Attachment 2. The purpose of this report is to inform the regulatory agencies and stakeholders of the remedy-related surveillance, monitoring, and maintenance activities conducted at the Site during the first quarter (January 1–March 31) of calendar year (CY) 2023. LM provides periodic communications through several means, including this report, web-based tools, and public meetings.

LM maintains the *Rocky Flats Site, Colorado, Site Operations Guide*, also called the Rocky Flats Site Operations Guide (RFSOG), (DOE 2021a) as the primary document to guide the work performed to satisfy the requirements of the RFLMA and to implement best management practices (BMPs) at the Site. Several other Site-specific documents provide additional details regarding the requirements described in RFLMA Attachment 2, including data evaluation protocols and all aspects of surveillance, monitoring, and maintenance activities.

Monitoring data and summaries of the monitoring and maintenance activities for past quarters are available in the quarterly reports. Extensive discussion and evaluation of the surveillance, monitoring, and maintenance activities are presented each calendar year in the annual reports of Site surveillance and maintenance activities. This report summarizes the following activities:

- Maintenance and inspection of the Present Landfill (PLF) and the Original Landfill (OLF)
- Maintenance and inspection of the groundwater collection and treatment systems
- Inspection of signs posted at the perimeter of the COU
- Erosion control and revegetation activities
- Routine water monitoring (in accordance with the RFLMA)
- Ecological monitoring

## **2.0 Site Operations and Maintenance**

### **2.1 Landfills**

#### **2.1.1 Present Landfill**

The PLF is inspected quarterly and after major precipitation events in accordance with the requirements of the *Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan, U.S. Department of Energy Rocky Flats, Colorado, Site* (DOE 2014) and Attachment 2 of the RFLMA (CDPHE et al. 2007).

The PLF quarterly inspection for the first quarter of CY 2023 was conducted on February 21, 2023. No issues were identified during this inspection. Copies of the landfill inspection forms and reports are presented in Appendix A.

#### **2.1.2 Original Landfill**

The OLF is inspected monthly and following major precipitation events in accordance with requirements in the *Rocky Flats Site Original Landfill Monitoring and Maintenance Plan* (DOE 2009) and Attachment 2 of the RFLMA (CDPHE et al. 2007). The design features installed as part of the OLF Slope Stabilization Project in 2019 and 2020 are expected to provide long-term stability to areas of the landfill that were prone to movement in the past. At a minimum, monthly inspections of the OLF will continue until a reduction in inspection frequency is established through the RFLMA consultative process. In addition to the RFLMA-required inspections, the OLF is walked down weekly as a best management practice (BMP).

##### **2.1.2.1 Inspection Results**

The OLF monthly inspections for the first quarter of CY 2023 were conducted on January 17, February 21, and March 23, 2023. No issues were observed during these inspections. Copies of the landfill inspection forms and reports are presented in Appendix A.

Seeps at the OLF are observed during monthly and weather-related inspections. Historical seep locations 2/3, 5, 6, 8A, 8C, 9, and 10 have been dry since the stabilization effort was completed. Seep locations 1 and 8 had flows or moisture generally consistent with that of previous first quarter inspections. Seep locations 4, 7, and 8B had less moisture than that of previous first quarter inspections. Estimates for individual seep flow rates are included in the monthly OLF inspection reports (Appendix A).

##### **2.1.2.2 Settlement Monuments**

The settlement monuments at the OLF are surveyed quarterly in accordance with the RFLMA. The CY 2023 first quarter survey was performed on March 6, 2023. Survey data indicate that vertical settling at each monument is within the calculated settlements specified in Figure 3-1 of the *Rocky Flats Site Original Landfill Monitoring and Maintenance Plan* (DOE 2009). The survey results are presented in Appendix A.

## **2.2 COU Inspections**

In accordance with the RFLMA, the COU is inspected for significant erosion annually and following major precipitation events. Particular attention is paid to areas near remaining subsurface features (e.g., former buildings, ash pits, and trenches). Additional inspections are conducted quarterly as a BMP, focusing on the areas of former Buildings 371, 771, 881, and 991, as well as the Ash Pits and East Trenches.

The COU quarterly inspection for the first quarter of CY 2023 was conducted on March 23, 2023. There were no new depressions, sink holes, or slumping identified in former building areas, and all roads and grounds were in good condition.

## **2.3 North Walnut Creek Slump**

The hillside east of the Solar Ponds Plume Treatment System (SPPTS) is the site of a slump that is monitored as a BMP. This feature is referred to as the North Walnut Creek Slump (NWCS). The slump block moved 0.1 foot during the first quarter of CY 2023 as indicated by the results of monthly survey monitoring of 22 locations. Observations of the North Walnut Creek hillside show that movement of approximately 4 to 6 feet along the scarp has occurred since the hillside was regraded in 2017. Soils are also heaving along the toe of the slope because of the continued movement.

In fall 2020, three inclinometers (location codes 74520, 74620, and 74720) were installed in the hillside. Since installation, inclinometer 74520, which is immediately adjacent to the eastern portion of the SPPTS groundwater collection trench, has shown near-surface movement (0-6 feet below grade), with a maximum amplitude of about 0.5 inch and movement of less than 0.125 inch down to 16 feet below grade. The inclinometer upgradient of the Interceptor Trench System Sump (ITSS), 74720, has shown near-surface movement (0 to 10 feet below grade) with a maximum amplitude of 0.66 inch and movement of 0.15 inch down to 32 feet below grade. The third inclinometer, 74620, near the ITSS, has shown variations of up to 0.3 inch in the upper 5 feet, likely caused by cycles of drying and wetting in the soils. These inclinometers continue to be monitored.

Two test pits were excavated in the first quarter of CY 2023 to investigate subsurface pipes shown as crossing the SPPTS groundwater collection trench on as-built drawings completed in early 2000. Neither pipe was located, suggesting they had been removed as a closure-related activity before the end of 2005. If the pipes had been present, the pipes and their associated utility corridor would have represented a preferential migration pathway for groundwater to flow to the slump, potentially contributing to hillside instability (see Contact Record [CR] 2022-01 for additional information).

## **2.4 Site Roads Maintenance**

Roads are assessed as part of routine Site operations and inspections. The roads were in good condition; road repair was not necessary in the first quarter of CY 2023. Routine road maintenance is planned for June 2023.

## **2.5 Groundwater Treatment Systems**

Four groundwater collection systems and the associated treatment facilities are monitored, operated, and maintained in accordance with requirements defined in the RFLMA and the additional implementation detail in the RFSOG. Three of these systems (Mound Site Plume Collection System [MSPCS],<sup>1</sup> East Trenches Plume Treatment System [ETPTS], and SPPTS) include a groundwater collection trench, which is similar to a French drain but with an impermeable membrane on the downgradient side. The fourth system, the PLF Treatment System (PLFTS), passively treats water collected from the northern and southern components of the PLF Groundwater Intercept System and the PLF seep.

### **2.5.1 Mound Site Plume Collection System**

Routine maintenance performed at the MSPCS during the first quarter of CY 2023 included the following activities:

- Inspecting the batteries and other solar-power components
- Clearing snow from the solar panels as necessary
- Checking water levels in the collection trench and lift station
- Cleaning and calibrating water-level transducers
- Exercising valves and cleaning piping
- Checking flow rates from the collection trench and lift station
- Checking the operation of the lift station transfer pump
- Periodically transferring excess sample and purge water from the backup storage tanks to the lift station

Refer to Section 3.1.9.1 for information on water quality monitoring.

### **2.5.2 East Trenches Plume Treatment System**

Routine maintenance at the ETPTS in the first quarter of CY 2023 included the following activities:

- Inspecting the batteries and other solar-power components
- Clearing snow from the solar panels as necessary
- Exercising valves
- Adjusting valves and controller settings to modify water-flow and airflow rates and maintaining air stripper operation
- Replacing the air stripper door and trays with clean units when required due to hard water scale deposits
- Cleaning the demister pad as necessary

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<sup>1</sup> The MSPCS, formerly the Mound Site Plume Treatment System, no longer treats groundwater; it was reconfigured in 2016 to collect groundwater and route it to the ETPTS for treatment.

- Cleaning the influent and effluent pumps
- Checking water levels in the collection trench and influent and effluent tanks
- Cleaning and calibrating the water-level transducers
- Cleaning the airflow sensor and diffuser
- Checking and cleaning piping as needed
- Adjusting the air stripper timer control to accommodate solar charging availability

Refer to Section 3.1.9.2 for information on water quality monitoring.

### **2.5.3 Solar Ponds Plume Treatment System**

Routine maintenance during the first quarter of CY 2023 at the SPPTS included the following activities:

- Inspecting the batteries and other solar-power components
- Clearing snow from the solar panels as necessary
- Cleaning flow meters, air release valves, pumps, and other piping components
- Cleaning and adjusting or replacing water-level transducers
- Exercising valves
- Flushing piping to clear clogs and maintain flows
- Periodically transferring water from the storage tank used for excess sample and purge water to the treatment component
- Adjusting the water depth in the nitrate treatment component to maintain a suitable residence time
- Adjusting the nutrient dose rate as appropriate to accommodate seasonal temperature changes
- Ensuring an adequate supply of the nutrient solution is on hand
- Pumping water out of the vaults as necessary

Subzero temperatures associated with several winter storms caused some components to freeze in February. The treated effluent line froze for a short time, which led to an increase in the residence time in the nitrate treatment component (i.e., water was treated for longer than necessary). Freezing does not cause problems as long as the plumbing is not damaged, and it was not in this case. Flow was restored without any related issues.

During the first quarter of CY 2023, there were extensive operations and maintenance activities related to the pilot-scale uranium treatment testing that began in November 2022. Freezing conditions were also present during this treatment testing but the tests were resumed without problem. This testing will continue into the second quarter of CY 2023. The annual report for 2023 will include more detailed discussion of this topic.

Also during this quarter, the electrical subcontractor performed additional tests and adjustments at the new solar/battery power facility installed in 2022.

Refer to Section 3.1.9.3 for information on water quality monitoring.

#### **2.5.4 Present Landfill Treatment System**

Routine maintenance during the first quarter of CY 2023 at the PLFTS included inspecting the system for potential problems, primarily by checking flow conditions. Influent piping was cleaned of biological growth using a mechanical pipe cleaner. No other issues were identified.

Refer to Section 3.1.9.4 for information on water quality monitoring.

### **2.6 Sign Inspection**

The RFLMA requires that signs (“U.S. Department of Energy – No Trespassing”) be posted at intervals around the perimeter of the COU sufficient to notify people that they are at the COU boundary. In addition, signs listing the ICs and providing contact information must be posted at COU access points. The signs are required by the remedy as physical controls, are inspected quarterly, and are maintained through repair or replacement as needed. Physical controls protect the engineered components of the remedy, including landfill covers, groundwater collection and treatment systems, and monitoring equipment, which are also inspected routinely during monitoring and maintenance activities.

In the first quarter of CY 2023, signs were inspected on February 27 and March 6, 2023. Two partially detached signs were resecured, and two signs that had fallen from the fence were reattached. Two sections of sagging fence (each approximately 10 feet long) were noted and repaired. Sign maintenance and replacement is also conducted throughout the year, as is fence repair, although the fences are not a requirement of the RFLMA.

### **2.7 Erosion Control and Revegetation**

Monitoring and maintenance of the Site erosion control features was performed throughout the first quarter of CY 2023, including extra inspections following high-wind or precipitation events. Stakes securing the erosion wattles, matting, and GeoRidges that were loosened or displaced by high winds, precipitation, or wildlife were routinely resecured. Sediment was removed from behind wattles and GeoRidges as needed and spread in vegetated areas upgradient from the erosion controls. As required by the RFLMA ICs, erosion controls were installed and maintained for the various projects that were ongoing during the first quarter of CY 2023.

## **3.0 Environmental Monitoring**

This section summarizes the environmental monitoring conducted in accordance with RFLMA Attachment 2 (CDPHE et al. 2007). RFLMA Attachment 2, Table 1, “Surface Water Standards,” is used in conjunction with the evaluation flowcharts also found in the attachment to evaluate analytical data and determine reportable conditions. Reportable conditions, as defined in RFLMA Attachment 2, Section 6.0, “Action Determinations,” require consultation between the RFLMA Parties (DOE, the Colorado Department of Public Health and Environment [CDPHE], and the U.S. Environmental Protection Agency [EPA]) to determine appropriate actions.

In this report, a condition described as “reportable” means that an analyte concentration at a surface water Point of Compliance (POC) or Point of Evaluation (POE) monitoring location has exceeded a RFLMA Table 1 water quality standard consistent with the evaluation flowcharts in Attachment 2 of the RFLMA. This term can also be applied to groundwater monitoring wells classified as Area of Concern (AOC) wells, also described in the flowcharts in Attachment 2 of the RFLMA. DOE is required to inform the RFLMA Parties and the public of a reportable condition within 15 days of receiving validated data. Within 30 days of receiving validated data, DOE is required to submit a plan and schedule to the regulatory agencies for an evaluation to address the occurrence.

In this report, plutonium (Pu) refers to plutonium-239, 240 or  $^{239}\text{Pu} + ^{240}\text{Pu}$ ; americium (Am) refers to americium-241 or  $^{241}\text{Am}$ ; and nitrate refers to nitrate + nitrite as nitrogen (N). In addition, the terms “activity” and “concentration” are used interchangeably for both Pu and Am to represent the amount of radioactivity or radioactive material per unit of water (e.g., picocuries per liter [pCi/L]).

### **3.1 Water Monitoring**

This section includes:

- A discussion of the routine analytical results for the POC, POE, PLF, and OLF surface water monitoring objectives and identification of any reportable conditions.
- Summaries of the routine groundwater monitoring at AOC wells, Sentinel wells, Evaluation wells, and Resource Conservation and Recovery Act (RCRA) wells; treatment system and associated performance monitoring; and Surface Water Support monitoring at the Site.

RFLMA Attachment 2 and the RFSOG offer details about the monitoring locations, sampling criteria, and evaluation protocols for the water monitoring objectives mentioned in the following sections. Appendix B of this report provides analytical water quality data for the first quarter of CY 2023. The annual report for 2023 will provide a more detailed interpretation and discussion of the water quality data.

#### **3.1.1 Water Monitoring Highlights**

During the first quarter of CY 2023, water monitoring met the targeted monitoring objectives required by the RFLMA. The routine RFLMA network consists of 8 automated gaging stations, 11 surface water grab sampling locations, 7 groundwater treatment system locations, and 88 groundwater monitoring locations. Additional locations are occasionally sampled in support

of investigations in response to reportable conditions. During the first quarter, 11 flow-paced, composite surface water samples; 18 surface water grab samples; 13 treatment system grab samples; and 11 groundwater samples were collected (in accordance with RFLMA protocols) and submitted for analysis.<sup>2</sup> Figure 1 shows the monitoring locations sampled during the first quarter of CY 2023.

A reportable condition at POE GS10 for the uranium 12-month rolling average was determined upon receipt of recently validated analytical results. Validated results were received on May 9, 2023, with formal notification to regulators and stakeholders made on May 17, 2023. The RFLMA Parties (DOE, CDPHE, and EPA) held a consultation regarding this reportable condition on June 8, 2023. Once finalized, the plan and path forward will be described in a contact record that will be posted on the Rocky Flats website. See Section 3.1.3.1 for a detailed discussion.

All other analyte concentrations at POE locations GS10, SW027, and SW093 remained below reportable condition levels during the first quarter of CY 2023.

All analyte concentrations at POC locations WALPOC and WOMPOC also remained below reportable condition levels during the first quarter.

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<sup>2</sup> Composite samples consist of multiple aliquots (“grabs”) of identical volume. Each grab is delivered by the automatic sampler to the composite container at each predetermined flow volume or time interval. During the first quarter of CY 2023, the 11 flow-paced composites comprised 655 individual grabs.

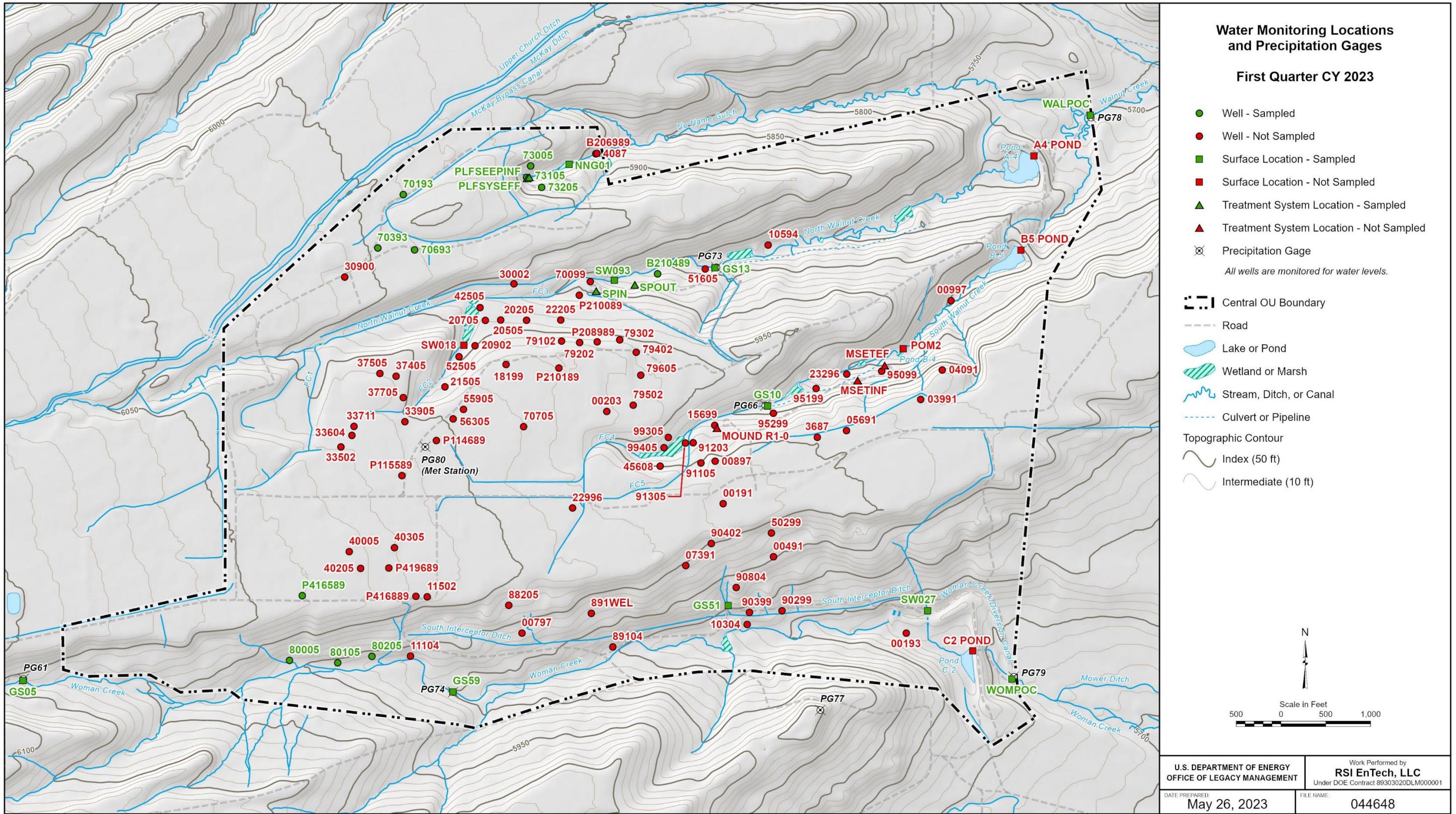


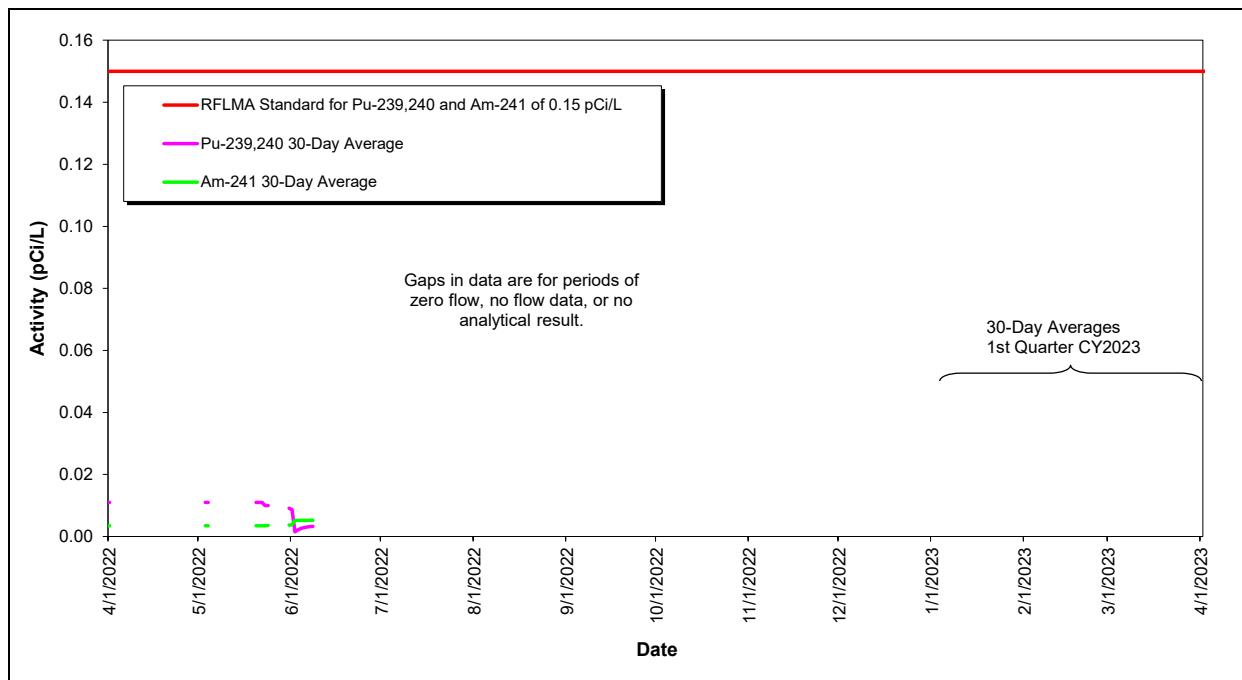
Figure 1. Rocky Flats Site Water Monitoring Locations and Precipitation Gages

### 3.1.2 POC Monitoring

The following sections include summary tables and plots showing the applicable 30-day and 12-month rolling averages for the POC analytes.

#### 3.1.2.1 Monitoring Location WALPOC

Monitoring location WALPOC is on Walnut Creek at the eastern COU boundary. There was no flow at WALPOC during the first quarter of CY 2023. Figure 2 through Figure 7 show 30-day and 12-month rolling averages for Am, Pu, uranium, and nitrate. The methods for calculating the 30-day and 12-month rolling averages are detailed in the annual report.



*Figure 2. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WALPOC: Year Ending First Quarter 2023*

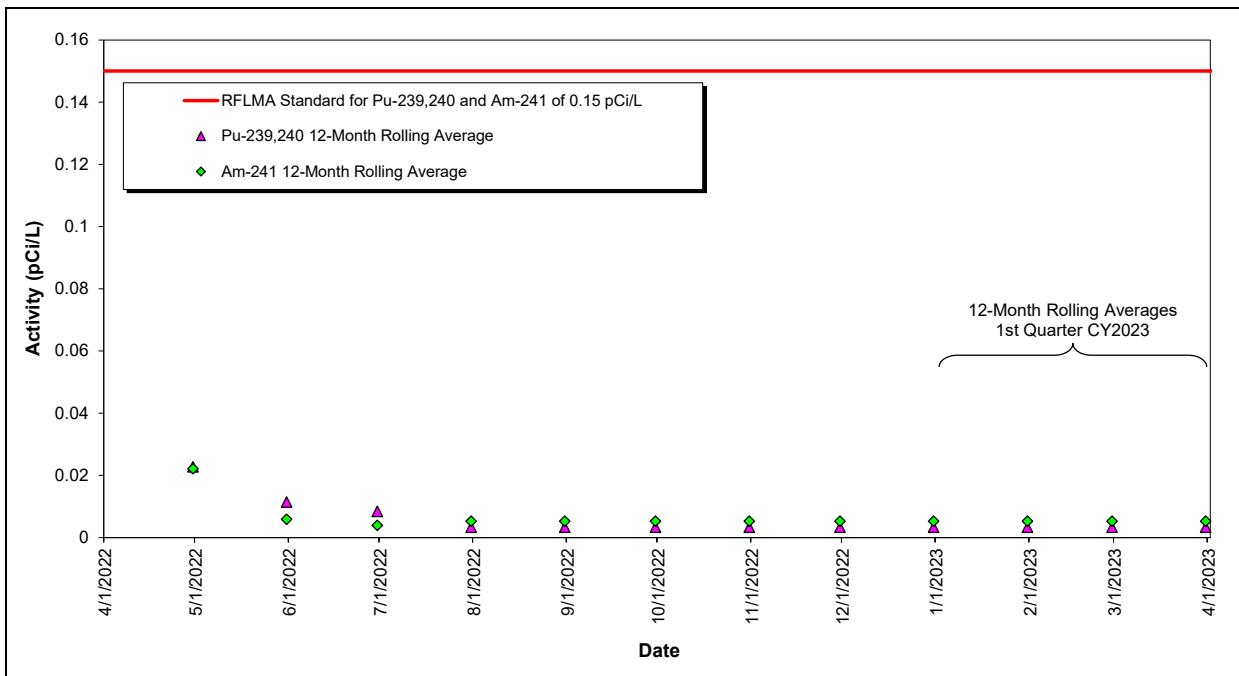
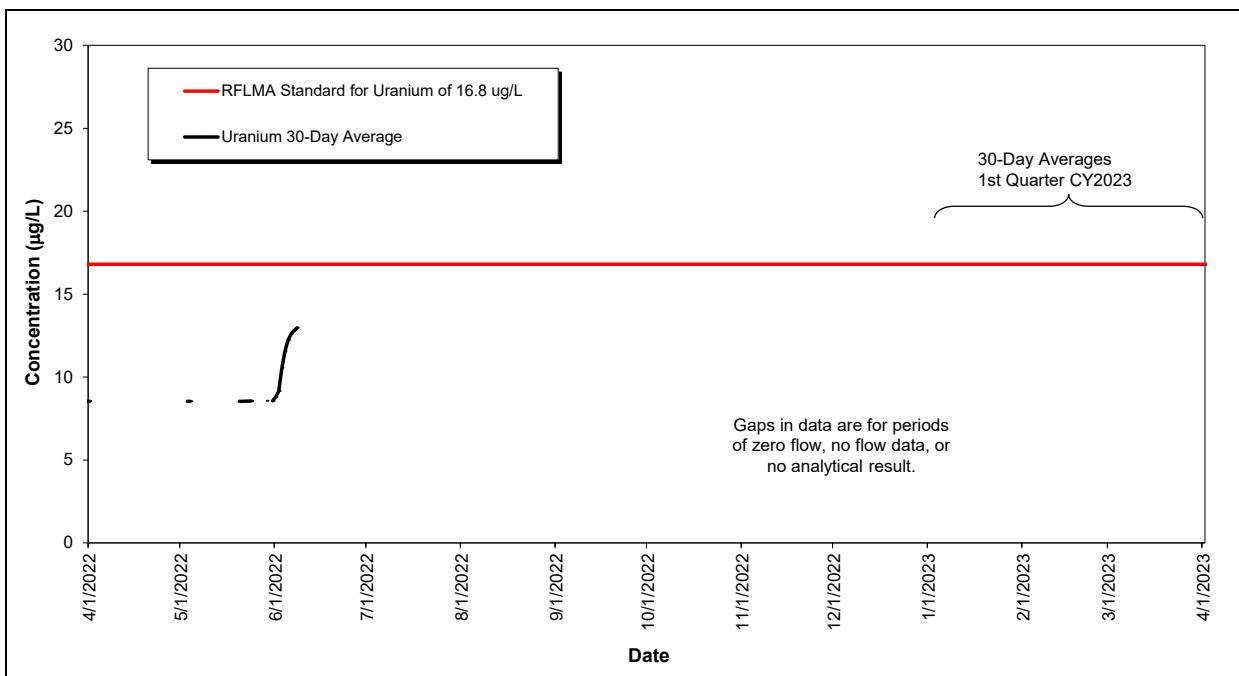
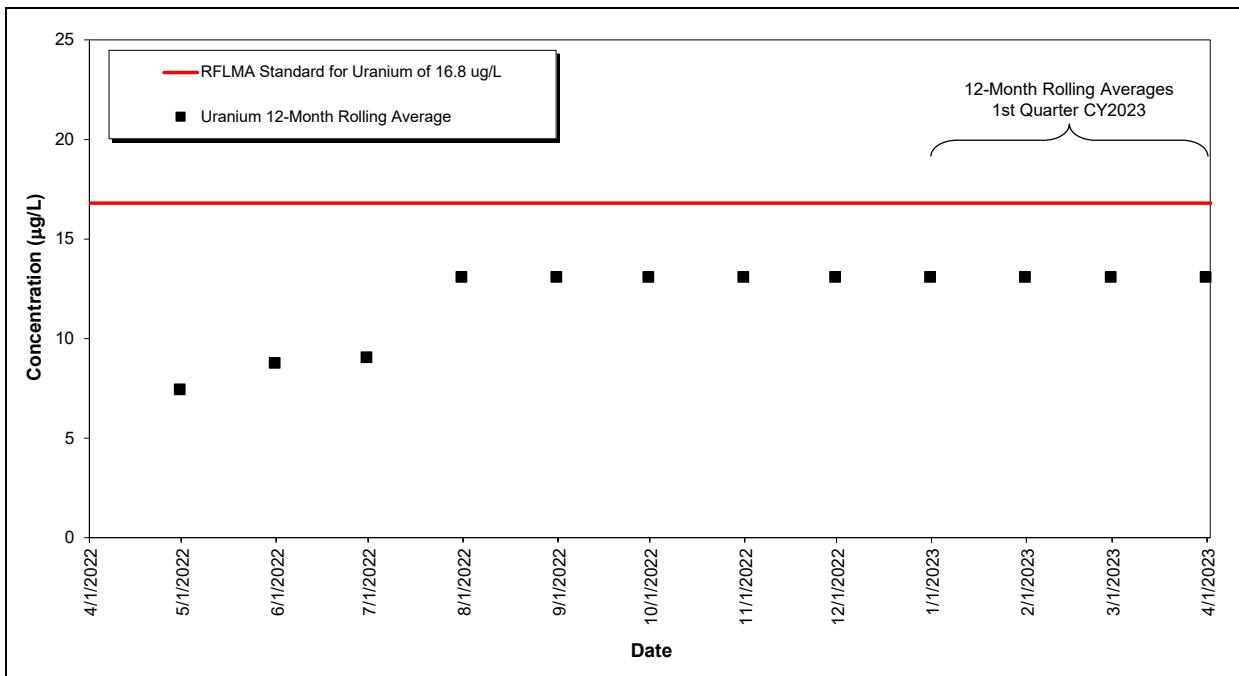


Figure 3. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WALPOC: Year Ending First Quarter 2023



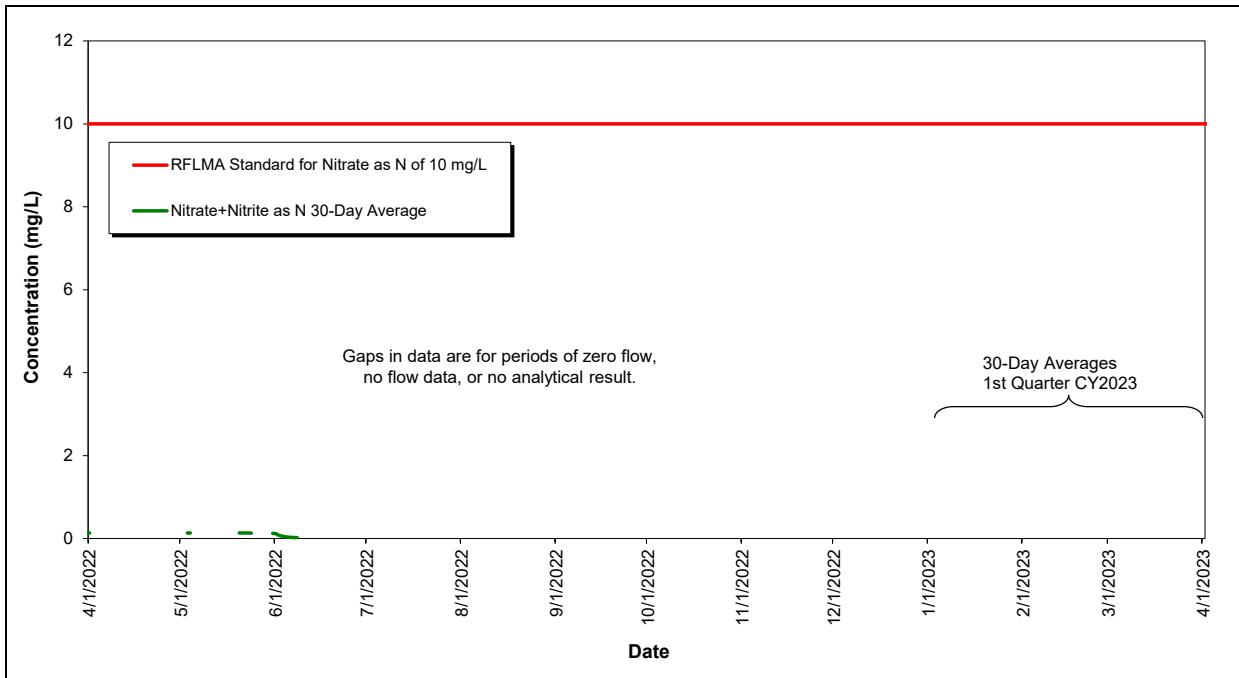
Abbreviation:  $\mu\text{g/L}$  = micrograms per liter

Figure 4. Volume-Weighted 30-Day Average Uranium Concentrations at WALPOC: Year Ending First Quarter 2023



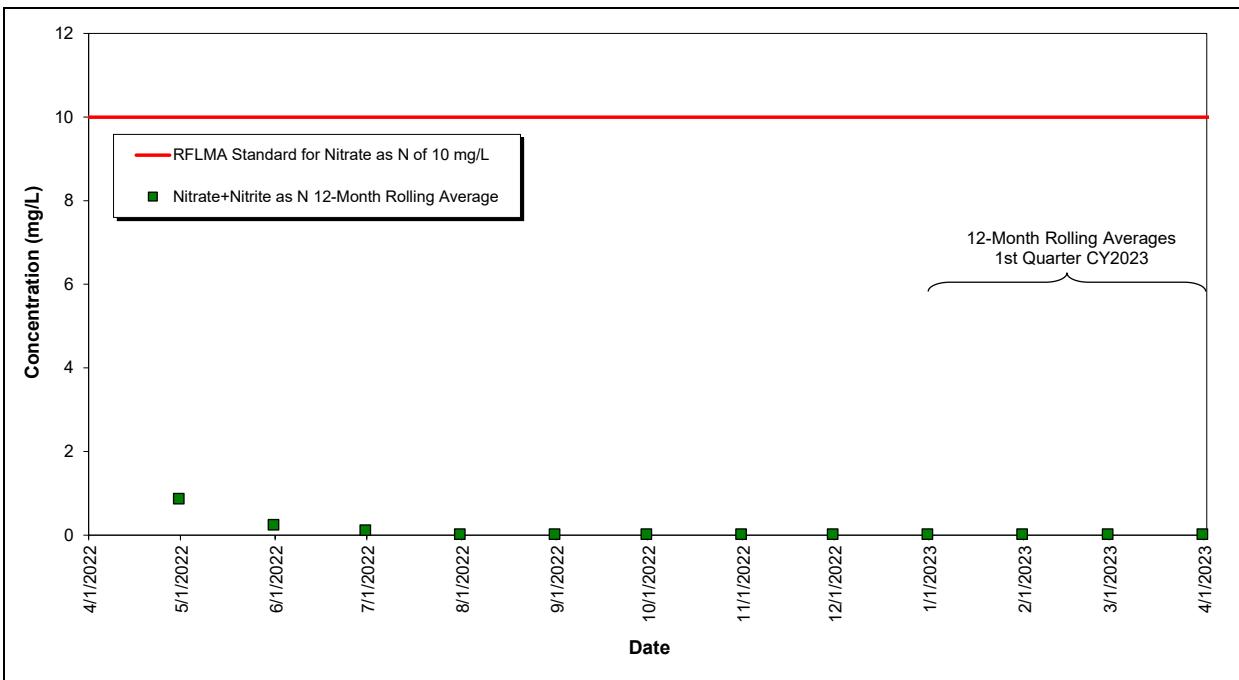
**Abbreviation:**  $\mu\text{g/L}$  = micrograms per liter

*Figure 5. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at WALPOC: Year Ending First Quarter 2023*



**Abbreviation:** mg/L = milligrams per liter

*Figure 6. Volume-Weighted 30-Day Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending First Quarter 2023*

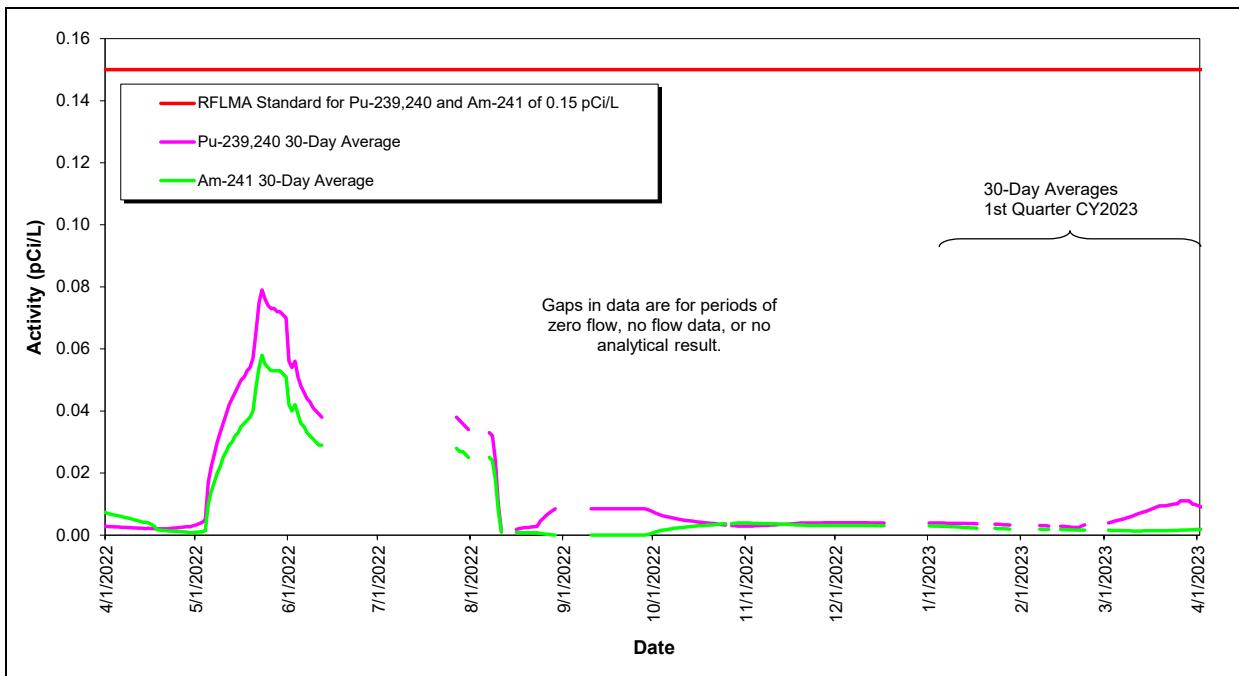


**Abbreviation:** mg/L = milligrams per liter

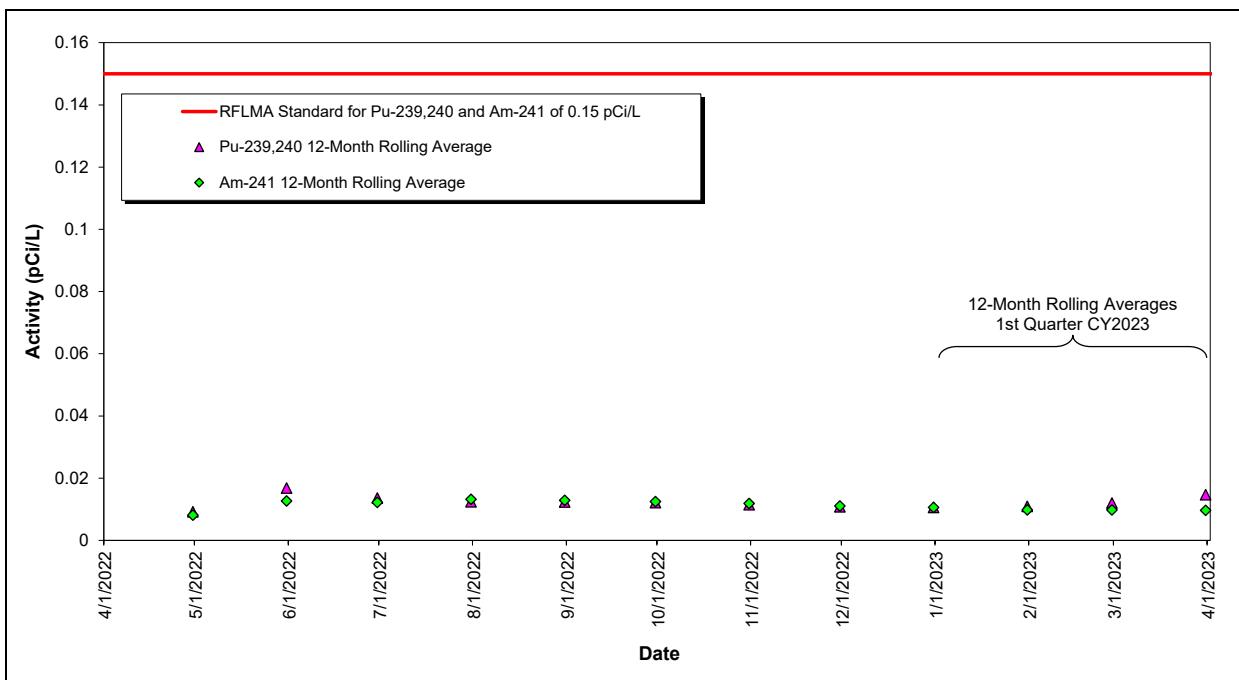
*Figure 7. Volume-Weighted 12-Month Rolling Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending First Quarter 2023*

### 3.1.2.2 Monitoring Location WOMPOC

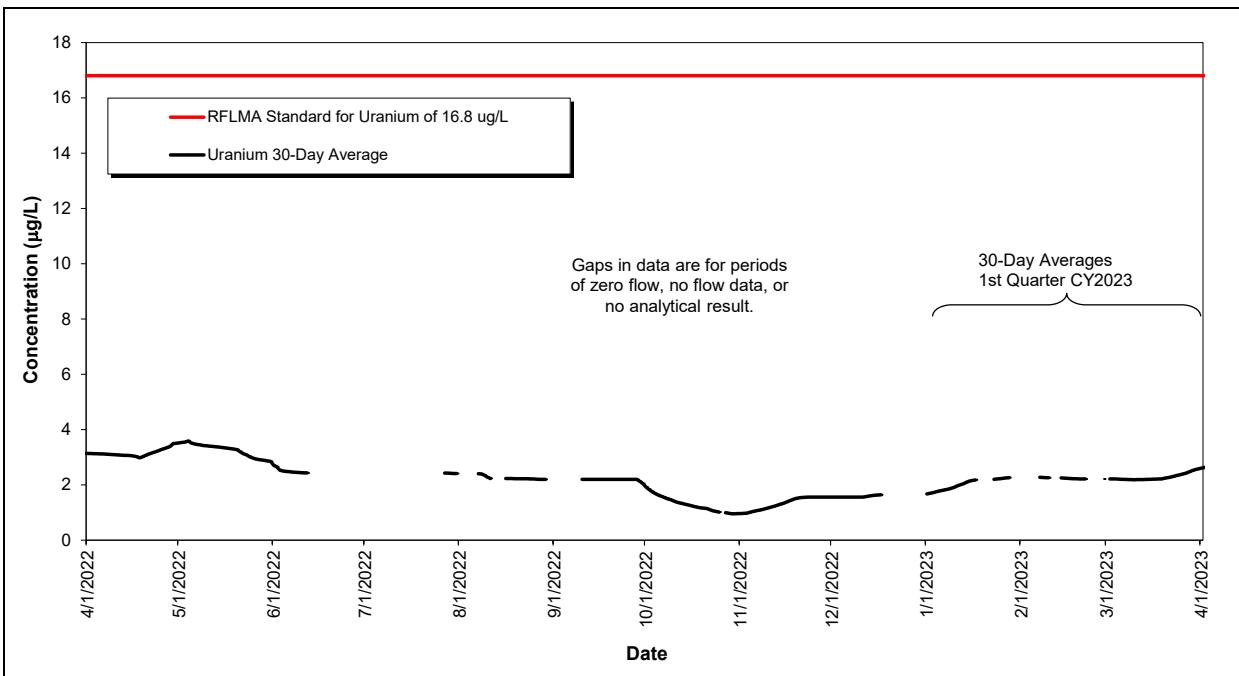
Monitoring location WOMPOC is on Woman Creek at the eastern COU boundary. Figure 8 through Figure 11 show no occurrences of a reportable condition for 30-day or 12-month rolling averages through March 31, 2023, for Am, Pu, or uranium. The methods for calculating the 30-day and 12-month rolling averages are detailed in the annual report.



*Figure 8. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WOMPOC: Year Ending First Quarter 2023*

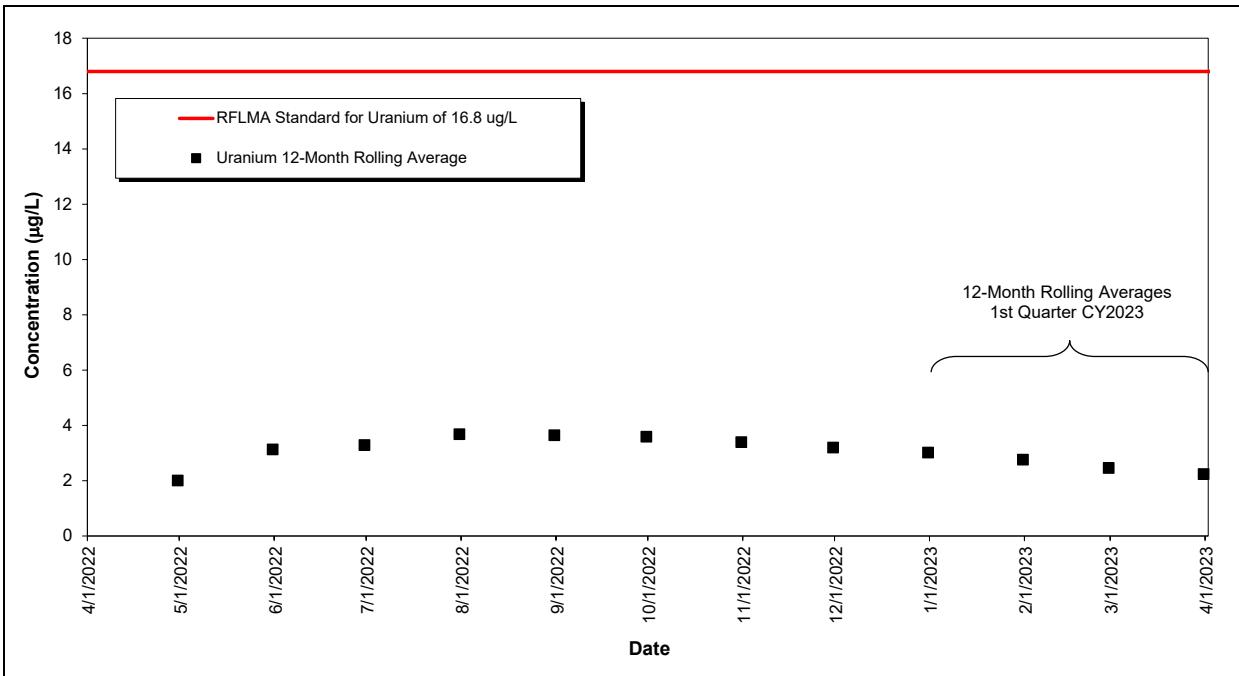


*Figure 9. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WOMPOC: Year Ending First Quarter 2023*



Abbreviation:  $\mu\text{g/L}$  = micrograms per liter

*Figure 10. Volume-Weighted 30-Day Average Uranium Concentrations at WOMPOC: Year Ending First Quarter 2023*



Abbreviation:  $\mu\text{g/L}$  = micrograms per liter

*Figure 11. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at WOMPOC: Year Ending First Quarter 2023*

### 3.1.3 POE Monitoring

The following sections include summary plots showing the applicable 12-month rolling averages for the POE analytes.

#### 3.1.3.1 Monitoring Location GS10

Monitoring location GS10 is on South Walnut Creek just upstream of the B-Series ponds. Figure 12 shows no occurrences of a reportable condition for Am or Pu. The method for calculating the 12-month rolling averages is detailed in the annual report.

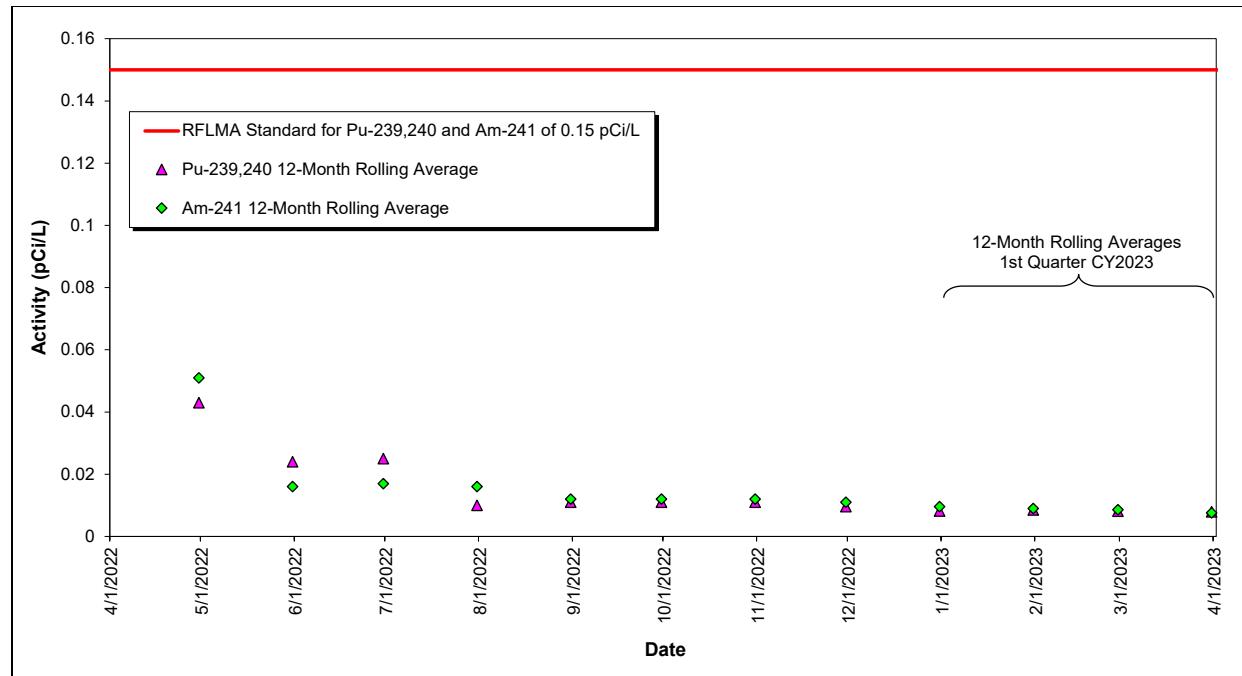


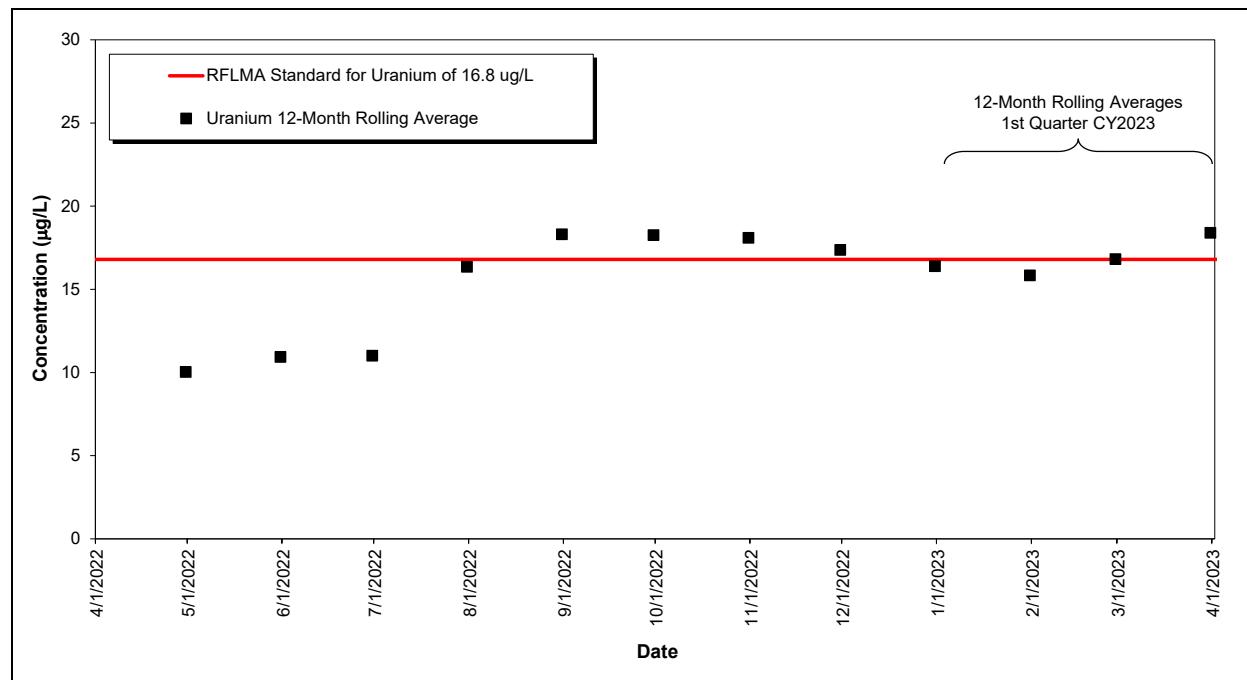
Figure 12. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at GS10: Year Ending First Quarter 2023

Figure 13 shows a reportable condition at GS10 for the uranium 12-month rolling average starting on March 31, 2023. This reportable condition was determined upon receipt of validated analytical results for uranium from the composite sample collected during the period January 23, 2023, to April 10, 2023; the uranium concentration was 24.9 micrograms per liter ( $\mu\text{g}/\text{L}$ ). Validated results were received on May 9, 2023. Formal notification to regulators and stakeholders was made on May 17, 2023.

The evaluation was performed in accordance with RFLMA Attachment 2, Figure 6, Points of Evaluation, which resulted in a calculated 12-month rolling average concentration for uranium on March 31, 2023, of 18.4  $\mu\text{g}/\text{L}$ . This concentration exceeds the applicable RFLMA Attachment 2, Table 1, standard of 16.8  $\mu\text{g}/\text{L}$ . This 12-month rolling average includes sample results for the period of April 1, 2022, through March 31, 2023.<sup>3</sup>

<sup>3</sup> The 12-month rolling average is calculated for the last day of each month. Twelve average values are calculated and evaluated each year.

The RFLMA Parties (DOE, CDPHE, and EPA) held a consultation regarding this reportable condition on June 8, 2023. Once finalized, the plan and path forward will be described in a contact record that will be posted on the Rocky Flats website.



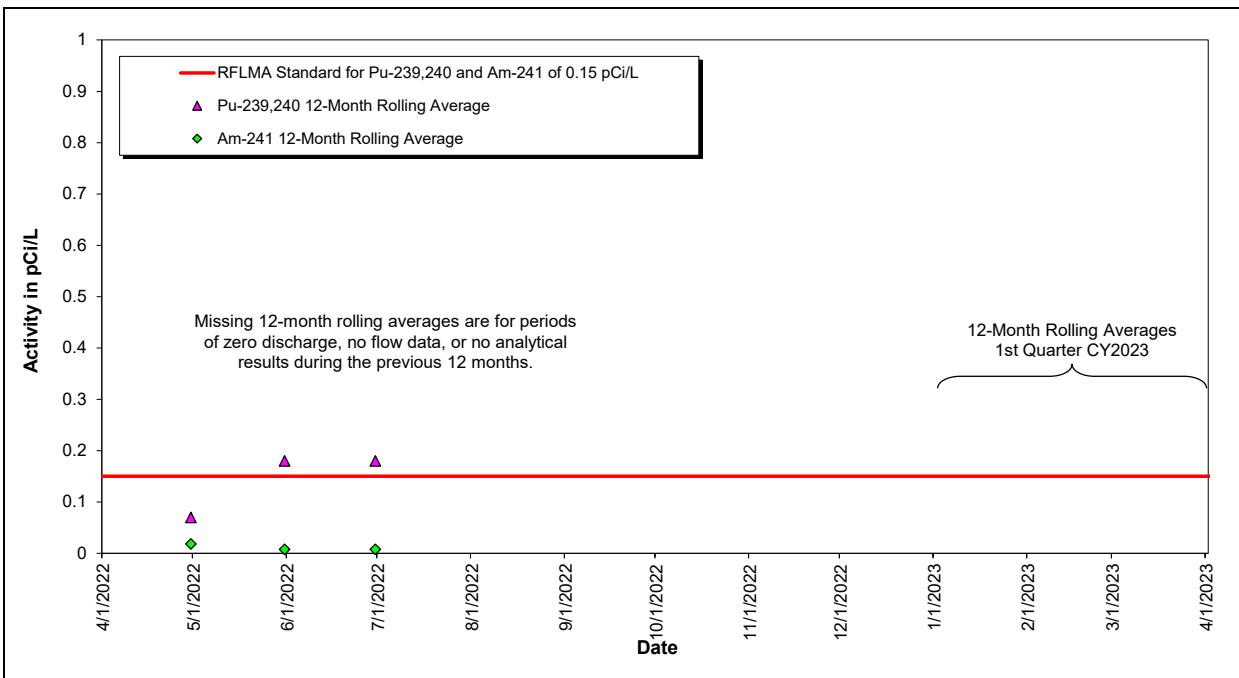
*Figure 13. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at GS10: Year Ending First Quarter 2023*

### **3.1.3.2 Monitoring Location SW027**

Monitoring location SW027 is at the downstream end of the South Interceptor Ditch at the inlet to Pond C-2. Since there was no flow during the first quarter of CY 2023, and the last flow occurred in July 2021, no water samples have been collected for more than 12 months. Therefore, there are no 12-month rolling averages for Am, Pu, and uranium after June 30, 2022. The method for calculating the 12-month rolling averages is detailed in the annual report.

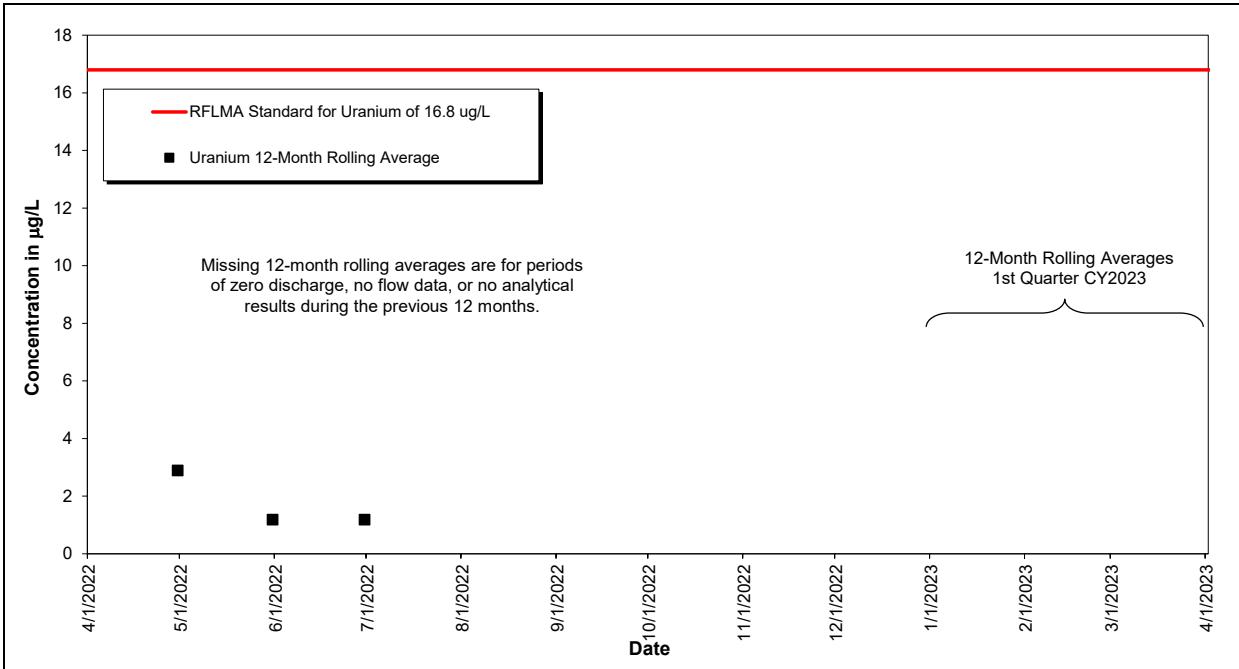
Figure 14 and Figure 15 show the averages for the 12 months ending March 31, 2023; no reportable conditions are triggered by Am and uranium concentrations. The 2022 reportable condition for Pu (Figure 14) is essentially a continuation of the 2021 reportable condition since both were caused by data collected in 2021. CR 2022-04 addresses the 2022 reportable condition for Pu; the 2021 reportable condition is addressed in CR 2021-03.

As of July 31, 2022, no flow had occurred at SW027 for more than 12 months, and no flow or analytical data were available. Therefore, with the absence of average values after July 31, 2022, Pu is no longer reportable at SW027. Regardless, response actions associated with CR 2021-03 have been implemented or are ongoing.



**Note:** There has been no flow at SW027 since early July 2021. Therefore, there are no 12-month rolling averages after June 30, 2022.

*Figure 14. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW027: Year Ending First Quarter 2023*



**Note:** There has been no flow at SW027 since early July 2021. Therefore, there are no 12-month rolling averages after June 30, 2022.

*Figure 15. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at SW027: Year Ending First Quarter 2023*

### 3.1.3.3 Monitoring Location SW093

Monitoring location SW093 is on North Walnut Creek, 1300 feet upstream of former Pond A-1. Figure 16 and Figure 17 show that there were no reportable conditions for Pu, Am, or uranium at SW093 during the first quarter of CY 2023. The method for calculating the 12-month rolling averages is detailed in the annual report.

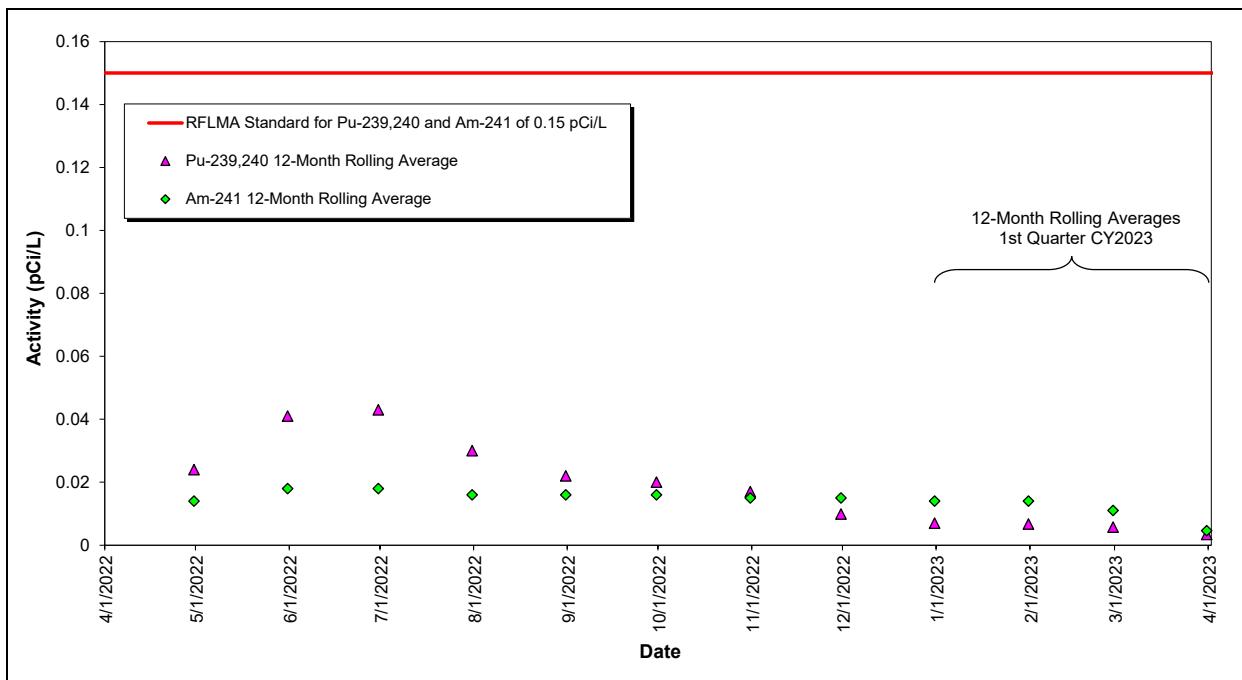
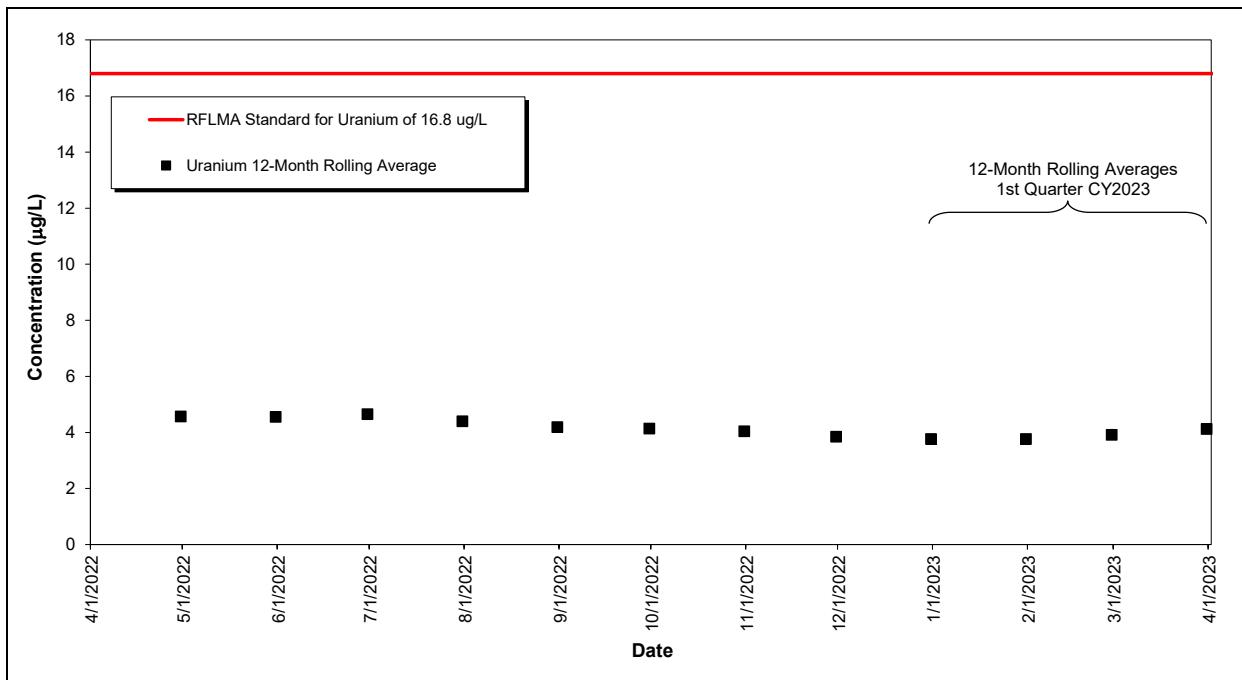


Figure 16. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW093: Year Ending First Quarter 2023



*Figure 17. Volume-Weighted 12-Month Rolling Average Uranium Concentrations at SW093: Year Ending First Quarter 2023*

### **3.1.4 AOC Wells and Surface Water Support Location SW018**

Neither the AOC wells nor Surface Water Support location SW018 were scheduled for RFLMA monitoring in the first quarter of CY 2023.

### **3.1.5 Sentinel Wells**

No Sentinel wells were scheduled for RFLMA monitoring in the first quarter of CY 2023.

### **3.1.6 Evaluation Wells**

No Evaluation wells were scheduled for RFLMA monitoring in the first quarter of CY 2023. However, Evaluation well B210489 was sampled to support consideration of its replacement, in case that is deemed necessary due to encroachment of the NWCS. The annual report for 2023 will provide additional discussion of this topic.

### **3.1.7 PLF Monitoring**

The six RCRA wells at the PLF were scheduled for RFLMA monitoring during the first quarter of CY 2023. Analytical results (Appendix B) were generally consistent with previous data. Additional discussion and statistical evaluation will be provided in the annual report for 2023. Section 3.1.9.4 discusses monitoring at the PLFTS.

### **3.1.8 OLF Monitoring**

The four RCRA wells at the OLF were scheduled for RFLMA monitoring during the first quarter of CY 2023. Analytical results (Appendix B) were generally consistent with previous data. Additional discussion and statistical evaluation will be provided in the annual report for 2023.

During the first quarter of CY 2023, when routine surface water sampling was performed in Woman Creek downstream of the OLF (location GS59), the mean concentrations for all analytes were below the applicable surface water standards.

### **3.1.9 Groundwater Treatment System Monitoring**

As described in Section 2.5, contaminated groundwater is intercepted and treated by the onsite groundwater treatment systems. The MSPCS,<sup>4</sup> ETPTS, and SPPTS each include a groundwater intercept trench. The PLFTS treats groundwater from the northern and southern components of the Groundwater Intercept System and groundwater that discharges from the PLF seep.

#### ***3.1.9.1 Mound Site Plume Collection System***

No MSPCS monitoring locations were scheduled for RFLMA monitoring in the first quarter of CY 2023.

#### ***3.1.9.2 East Trenches Plume Treatment System***

No ETPTS monitoring locations were scheduled for RFLMA monitoring in the first quarter of CY 2023.

#### ***3.1.9.3 Solar Ponds Plume Treatment System***

No SPPTS monitoring locations were scheduled for RFLMA monitoring in the first quarter of CY 2023.

Additional nonroutine samples were collected at the SPPTS during the first quarter of CY 2023 to support the *Surface Water Configuration Adaptive Management Plan for the Rocky Flats, Colorado, Site*, also called the Adaptive Management Plan (DOE 2021c). Further discussion will be provided in the Adaptive Management Plan annual report for 2023. Data were also collected to support development of a full-scale uranium treatment component for the SPPTS, which will be discussed in the 2023 annual report.

#### ***3.1.9.4 Present Landfill Treatment System***

During collection of the first quarter CY 2023 samples from the PLFTS, the seep influent flow rate was measured at 1.3 gallons per minute. The routine RFLMA quarterly effluent sample was collected on January 12, 2023. All analyte concentrations in the effluent sample were below the RFLMA standards.

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<sup>4</sup> The MSPCS is discussed in this section for consistency and convenience, even though treatment is no longer performed here.

### **3.1.10 Predischarge Monitoring**

No predischarge samples were collected from Ponds A-4, B-5, or C-2 during the first quarter of CY 2023. All three ponds were continuously operated in a flow-through configuration.

## **4.0 Adverse Biological Conditions**

No evidence of adverse biological conditions (e.g., unexpected mortality or morbidity) was observed during monitoring and maintenance activities in the first quarter of CY 2023.

## **5.0 Ecological Monitoring**

During the first quarter of CY 2023, few ecological field activities were conducted because it was winter. Revegetation occurred at exploratory test pits dug in the NWCS area. Vegetation enhancement actives included interseeding native grasses in areas that had low vegetation growth and adding native shrub seed to enhance vegetation diversity. Wildlife-related activities consisted of observing the elk population, adding wildlife crossings to facilitate wildlife movement, and checking for the presence of black-tailed prairie dogs.

No active prairie dog towns were observed within the Site boundaries; however, prairie dog activity was noted both northeast and southeast of the Site boundaries. Two individual black-tailed prairie dogs (*Cynomys ludovicianus*) were noted outside the COU, south of the C-2 Pond. Numerous black-tailed prairie dogs and burrows were noted to the northeast of the COU, south of Highway 128 near the Rocky Flats National Wildlife Refuge parking lot where prairie dog relocations have been taking place.

More details on ecological monitoring and land management activities will be provided in the annual report for CY 2023.

## **6.0 References**

CDPHE (Colorado Department of Public Health and Environment), DOE (U.S. Department of Energy), and EPA (U.S. Environmental Protection Agency), 2007. *Rocky Flats Legacy Management Agreement*, executed on March 14, Attachment 2 updated December 2018.

DOE (U.S. Department of Energy), 2009. *Rocky Flats Site Original Landfill Monitoring and Maintenance Plan*, LMS/RFS/S05516, Office of Legacy Management, September.

DOE (U.S. Department of Energy), 2014. *Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan*, U.S. Department of Energy Rocky Flats, Colorado, Site, LMS/RFS/S03965, Office of Legacy Management, December.

DOE (U.S. Department of Energy), 2021a. *Rocky Flats Site, Colorado, Site Operations Guide*, LMS/RFS/S03037, Office of Legacy Management, December.

DOE (U.S. Department of Energy), 2021b. *Surface Water Configuration Adaptive Management Plan for the Rocky Flats, Colorado, Site*, LMS/RFS/S07698, Office of Legacy Management, December.

DOE (U.S. Department of Energy), EPA (U.S. Environmental Protection Agency), and CDPHE (Colorado Department of Public Health and Environment), 2006. *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit*, EPA/541/R-06/197, September 29, amended September 21, 2011.

DOE (U.S. Department of Energy), EPA (U.S. Environmental Protection Agency), and CDPHE (Colorado Department of Public Health and Environment), 2011. *Corrective Action Decision/Record of Decision Amendment for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit*, September 21.

## **Appendix A**

### **Landfill Inspection Forms and Survey Data, First Quarter 2023**

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Inspector: Nathan Krohn Date: 1/17/23 Time: 1020  
 Precipitation: MET\* 1.32 inches NREL\* NA Weather: Overcast, 36°F Report Type:  Monthly  Weather-related  
 Reviewed by: APRIL TISCHER (Affiliate) Review date: 2023-01-26 12:53:13  
 \*Since last report Jan 17 -0700'

## Subsidence/Consolidation

Region	Visible Cracks	Visible Depressions	Visible Ponding	Within Waste Footprint	Other (Describe Below)
Berm 1 Basin - West	NO	NO	NO	NA	
Berm 1 Basin - East	NO	NO	NO		
Berm 2 Basin	NO	NO	NO		
Berm 3 Basin	NO	NO	NO		
Berm 4 Basin	NO	NO	NO		
Berm 5 Basin	NO	NO	NO		
Berm 6 Basin	NO	NO	NO		
Berm 7 Basin	NO	NO	NO		
Buttress fill	NO	NO	NO		

Settlement monuments—inspect integrity. Intact: YES

Maintenance required, comments, and photo log:

Up to 4 inches of snow remain in beam channels and shaded areas (from 12/28/22 precip[8in.] and scattered precip in early January.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

### Slope Stability

Region	Visible Cracks	Visible Seeps	Visible Block or Circular Failure	Other (Describe Below)
Cover– West	NO	NO*	NO	*Entire cover wet from snowmelt.
Cover– East	NO	NO*	NO	* " " "
Buttress fill side slope	NO	NO	NO	
West perimeter channel side slopes	NO	NO	NO	
East perimeter channel side slopes	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

### Soil Cover and Buttress

Region	Visible Erosion	Visible Gullies	Visible Animal Burrows	Other (Describe Below)
Cover– West	NO	NO	NO	
Cover– East	NO	NO	NO	
Buttress fill	NO	NO	NO	
Buttress fill side slope	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

Seep Evaluation				
Seep	Visible Saturation	Visible Flow	Approximate Flow	Description
Seep 1*	YES	NO		
Seep 2/3*	YES	NO		
Seep 4*	YES	NO		
Seep 5*	YES	NO		
Seep 6*	YES	NO		
Seep 7*	YES	NO		
Seep 8a	YES	NO		
Seep 8b	YES	NO		
Seep 8c	YES	NO		
Seep 9	YES	NO		
Seep 10	YES	NO		
Seep 10a	NA	NA	NA	
Seep 8	YES	YES	~ 1 GPM	Not an official seep. See NOTE below

Maintenance required, comments, and photo log:

All seep locations have damp soils.

\* Indicates seep was observed during or shortly after OLF closure in 2005.

**NOTE:** A seep is defined as an area where water percolates to the land surface or an area persistently moist whose source, as observed in multiple inspections, is confirmed to be groundwater and not surface water.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Water Management Structures						
Channels						
Structure	Visible Excessive Erosion, Gullying, or Undermining	Visible Settlement, Subsidence, or Depressions	Visible Breaching or Bank Failure	Visible Animal Burrows	Visible Sediment Build-Up or Other Blockage	Comments
Diversion Berm 1	No	No	No	No	No	
Diversion Berm 2	No	No	No	No	No	
Diversion Berm 3	No	No	No	No	No	
Diversion Berm 4	No	No	No	No	No	
Diversion Berm 5	No	No	No	No	No	
Diversion Berm 6	No	No	No	No	No	
Diversion Berm 7	No	No	No	No	No	
West perimeter channel	No	No	No	No	No	
East perimeter channel	No	No	No	No	No	
Drains/Outfalls						
Structure	Visible Excessive Erosion, or Gullying	Visible Sediment Build-Up or Other Blockage	Is Water Draining or Flowing from Structure?		Comments	
East Subsurface Drain – Solid pipe	No	No	No			
East Subsurface Drain – Perforated pipe	No	No	YES *		* Flow concealed by snow.	
French Drain (SID)	No	No	YES *		* Flow concealed by snow.	
Maintenance required and photo log:						
No issues.						

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

"Run-On" Control		
Area	Adversely Affecting OLF	Comments
Run-on to the OLF (any direction)	No	
Maintenance required and photo log:		
<p>No issues.</p>		
Violations of Institutional Controls		
Item	Comments	
Evidence of unauthorized <sup>1</sup> excavations of cover and immediate vicinity of cover?	No	
Evidence of unauthorized <sup>1</sup> construction of roads, trails, or buildings on cover?	No	
Evidence of unauthorized <sup>1</sup> drilling of wells or use of groundwater?	No	
Damage to groundwater monitoring wells at OLF (upgradient or downgradient)?	No	
Other observations, maintenance required, comments, and photo log:		
<p>No issues.</p>		
<p>If "Yes" is marked on any item in the Institutional Controls section, immediately notify your supervisor.</p>		

<sup>1</sup> Unauthorized means not approved by RFLMA parties (DOE, EPA, CDPHE) through the consultative process. Actions covered under an approved soil disturbance review plan are authorized actions.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Action Items			
Deficiency	Action	Date Completed	Comments
None	NA	NA	

## Signatures

Inspector signature: 

Date: 1/17/2023

Reviewer signature:  APRIL TISCHER (Affiliate)

Date: \_\_\_\_\_

2023.01.26 12:54:08 -07'00'

Attachment 1: January 2023 Monthly Report of the Original Landfill Inspection at the Rocky Flats Site, Colorado

The monthly inspection of the Original Landfill (OLF) at the Rocky Flats Site, Colorado, was completed on January 17, 2023. The weather was overcast with an ambient temperature of 36 °F during the inspection. The Rocky Flats Site meteorological tower recorded 1.33 inches of precipitation between this inspection and the previous monthly inspection performed on December 19, 2022.

Monthly inspection forms are completed to document current conditions at the OLF. Items previously indicated as deficient on inspection forms that have since been repaired are not marked again on the form unless further action is required.

**Figure 1** provides an aerial view of the OLF hillside with the approximate locations of the report photographs (the photographs in **Figure 2** through **Figure 8** were taken on January 17, 2023).

No issues were noted during the inspection. Snow remained in channels and shaded areas as a result of a December 28 snowstorm of approximately 9 inches. Berms 1–3 (**Figure 2**) and Berms 4–7 (**Figure 3**) were in good condition. The East Perimeter Channel (EPC) was in good condition (**Figure 4**). The West Perimeter Channel (WPC) was in good condition (**Figure 5**).

The Seep 8 location (**Figure 6**) had a flow of approximately 1 gallon per minute (gpm). All other historical seep locations had damp soils due to ongoing snowmelt.

No issues were noted with the East Subsurface Drain (ESSD) (**Figure 7**). No issues were noted with the South Interceptor Ditch (SID) (**Figure 8**), which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside. Flow rates could not be estimated due to snow cover.

The revegetation of recently disturbed areas on the OLF is managed and monitored under the *Erosion Control Plan for Rocky Flats Property Central Operable Unit* (DOE-LM/1497-2007, LMS/RFS/S03416)<sup>1</sup> and under sitewide vegetation and revegetation plans, as appropriate. Established vegetation is visible across the hillside areas that were reseeded after the stabilization effort in 2019–2020.

#### Summary of January 2023 Inspection Findings

No new issues were noted. Snow remained in channels and shaded areas as a result of December precipitation. The EPC was in good condition. The WPC was in good condition. The Seep 8 location had a flow of approximately 1 gpm. All other historical seep locations had damp soils due to ongoing snowmelt. No issues were noted with the ESSD. No issues were noted with the SID, which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside. Flow rates could not be estimated due to snow cover.

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<sup>1</sup> *Erosion Control Plan for Rocky Flats Property Central Operable Unit*, DOE-LM/1497-2007, LMS/RFS/S03416, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.



Figure 1. Locations of OLF Inspection Report Figure Photographs, Rocky Flats Site, Colorado (Photo Taken June 15, 2022)



*Figure 2. Looking Southeast at Berms 1–3, Which Were in Good Condition*



*Figure 3. Looking Southeast at Berms 4–7, Which Were in Good Condition*



*Figure 4. Looking Southwest at the EPC, Which Was in Good Condition*



*Figure 5. Looking South-Southeast at the WPC, Which Was in Good Condition*



Figure 6. Looking South-Southwest at Seep 8 and the Surrounding Area, Which Had a Flow of Approximately 1 gpm



Figure 7. Looking West-Northwest at the ESSD and the Surrounding Area, Which Was in Good Condition



*Figure 8. Looking East-Northeast at the SID, Which Receives Groundwater from the ESSD Outfall and an Interceptor Drain on the Eastern Hillside*

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Inspector: Nathan Krohn Date: 2/21/23 Time: 1000  
 Precipitation: MET\* 0.52 inch NREL\* NA Weather: Partly Cloudy, 59°F Report Type:  Monthly  Weather-related  
 Reviewed by: APRIL TISCHER (Affiliate) Review date: 2023.02.27 08:13:18 -07'00'  
 \*Since last report ayn hwt

## Subsidence/Consolidation

Region	Visible Cracks	Visible Depressions	Visible Ponding	Within Waste Footprint	Other (Describe Below)
Berm 1 Basin - West	No	No	No	NA	
Berm 1 Basin - East	No	No	No		
Berm 2 Basin	No	No	No		
Berm 3 Basin	No	No	No		
Berm 4 Basin	No	No	No		
Berm 5 Basin	No	No	No		
Berm 6 Basin	No	No	No		
Berm 7 Basin	No	No	No		
Buttress fill	No	No	No	↓	

Settlement monuments—inspect integrity. Intact: YES

Maintenance required, comments, and photo log:

No issues.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

### Slope Stability

Region	Visible Cracks	Visible Seeps	Visible Block or Circular Failure	Other (Describe Below)
Cover- West	NO	YES	NO	Seeps 4 and 7
Cover- East	NO	NO	NO	East seeps off cover
Buttress fill side slope	NO	NO	NO	
West perimeter channel side slopes	NO	NO	NO	
East perimeter channel side slopes	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

### Soil Cover and Buttress

Region	Visible Erosion	Visible Gullies	Visible Animal Burrows	Other (Describe Below)
Cover- West	NO	NO	NO	
Cover- East	NO	NO	NO	
Buttress fill	NO	NO	NO	
Buttress fill side slope	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

Seep Evaluation				
Seep	Visible Saturation	Visible Flow	Approximate Flow	Description
Seep 1*	No			
Seep 2/3*	No			
Seep 4*	YES	No		
Seep 5*	No			
Seep 6*	No			
Seep 7*	YES	No		
Seep 8a	No			
Seep 8b	No			
Seep 8c	No			
Seep 9	No			
Seep 10	No			
Seep 10a	NA	NA	NA	See NOTE below, single-year occurrence
Seep 8	YES	YES	~ 1 GPM	
Maintenance required, comments, and photo log:  No issues.				

\* Indicates seep was observed during or shortly after OLF closure in 2005.

**NOTE:** A seep is defined as an area where water percolates to the land surface or an area persistently moist whose source, as observed in multiple inspections, is confirmed to be groundwater and not surface water.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Water Management Structures						
Channels						
Structure	Visible Excessive Erosion, Gullying, or Undermining	Visible Settlement, Subsidence, or Depressions	Visible Breaching or Bank Failure	Visible Animal Burrows	Visible Sediment Build-Up or Other Blockage	Comments
Diversion Berm 1	No	No	No	No	No	
Diversion Berm 2	No	No	No	No	No	
Diversion Berm 3	No	No	No	No	No	
Diversion Berm 4	No	No	No	No	No	
Diversion Berm 5	No	No	No	No	No	
Diversion Berm 6	No	No	No	No	No	
Diversion Berm 7	No	No	No	No	No	
West perimeter channel	No	No	No	No	No	
East perimeter channel	No	No	No	No	No	
Drains/Outfalls						
Structure	Visible Excessive Erosion, or Gullying	Visible Sediment Build-Up or Other Blockage	Is Water Draining or Flowing from Structure?		Comments	
East Subsurface Drain – Solid pipe	No	No	No			
East Subsurface Drain – Perforated pipe	No	No	No			
French Drain (SID)	No	No	YES		< 1 GPM	
Maintenance required and photo log:						
No issues.						

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

"Run-On" Control		
Area	Adversely Affecting OLF	Comments
Run-on to the OLF (any direction)	No	
Maintenance required and photo log:		
No issues.		
Violations of Institutional Controls		
Item	Comments	
Evidence of unauthorized <sup>1</sup> excavations of cover and immediate vicinity of cover?	No	
Evidence of unauthorized <sup>1</sup> construction of roads, trails, or buildings on cover?	No	
Evidence of unauthorized <sup>1</sup> drilling of wells or use of groundwater?	No	
Damage to groundwater monitoring wells at OLF (upgradient or downgradient)?	No	
Other observations, maintenance required, comments, and photo log:		
No issues.		
If "Yes" is marked on any item in the Institutional Controls section, immediately notify your supervisor.		

<sup>1</sup> Unauthorized means not approved by RFLMA parties (DOE, EPA, CDPHE) through the consultative process. Actions covered under an approved soil disturbance review plan are authorized actions.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

Action Items			
Deficiency	Action	Date Completed	Comments
None	NA	NA	

### Signatures

Inspector signature: Nathan Kuhl

Date: 2/21/23

Reviewer signature: April Tischer APRIL TISCHER (Affiliate)  
2023.02.27 08:12:29 -07'00'

Date: \_\_\_\_\_

Attachment 1: February 2023 Monthly Report of the Original Landfill Inspection at the Rocky Flats Site, Colorado

The monthly inspection of the Original Landfill (OLF) at the Rocky Flats Site, Colorado, was completed on February 21, 2023. The weather was partly cloudy with an ambient temperature of 59 °F during the inspection. The Rocky Flats Site meteorological tower recorded 0.52 inches of precipitation between this inspection and the previous monthly inspection performed on January 17, 2023.

Monthly inspection forms are completed to document current conditions at the OLF. Items previously indicated as deficient on inspection forms that have since been repaired are not marked again on the form unless further action is required.

**Figure 1** provides an aerial view of the OLF hillside with the approximate locations of the report photographs (the photographs in **Figure 2** through **Figure 8** were taken on February 21, 2023).

No issues were noted during the inspection. Spots of less than an inch of snow remained in channels and shaded areas from past precipitation. Berms 1–3 (**Figure 2**) and Berms 4–7 (**Figure 3**) were in good condition. The East Perimeter Channel (EPC) was in good condition (**Figure 4**). The West Perimeter Channel (WPC) was in good condition (**Figure 5**).

The Seep 8 location (**Figure 6**) had a flow of approximately 1 gallon per minute (gpm). The Seep 4 and Seep 7 locations had damp soils. All other historical seep locations were dry.

No issues were noted with the East Subsurface Drain (ESSD) (**Figure 7**), which had no flow during the inspection. No issues were noted with the South Interceptor Ditch (SID) (**Figure 8**), which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside which had a flow of less than 1 gpm during the inspection.

The revegetation of recently disturbed areas on the OLF is managed and monitored under the *Erosion Control Plan for Rocky Flats Property Central Operable Unit* (DOE-LM/1497-2007, LMS/RFS/S03416)<sup>1</sup> and under sitewide vegetation and revegetation plans, as appropriate. Established vegetation is visible across the hillside areas that were reseeded after the stabilization effort in 2019–2020.

#### Summary of February 2023 Inspection Findings

No new issues were noted. Spots of less than an inch of snow remained in channels and shaded areas from past precipitation. The EPC was in good condition. The WPC was in good condition. The Seep 8 location had a flow of approximately 1 gpm. The Seep 4 and Seep 7 locations had damp soils. No issues were noted with the ESSD, which had no flow during the inspection. No issues were noted with the SID, which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside which had a flow of less than 1 gpm during the inspection.

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<sup>1</sup> *Erosion Control Plan for Rocky Flats Property Central Operable Unit*, DOE-LM/1497-2007, LMS/RFS/S03416, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.



Figure 1. Locations of OLF Inspection Report Figure Photographs, Rocky Flats Site, Colorado (Photo Taken June 15, 2022)



*Figure 2. Looking Southeast at Berms 1–3, Which Were in Good Condition*



*Figure 3. Looking Southeast at Berms 4–7, Which Were in Good Condition*



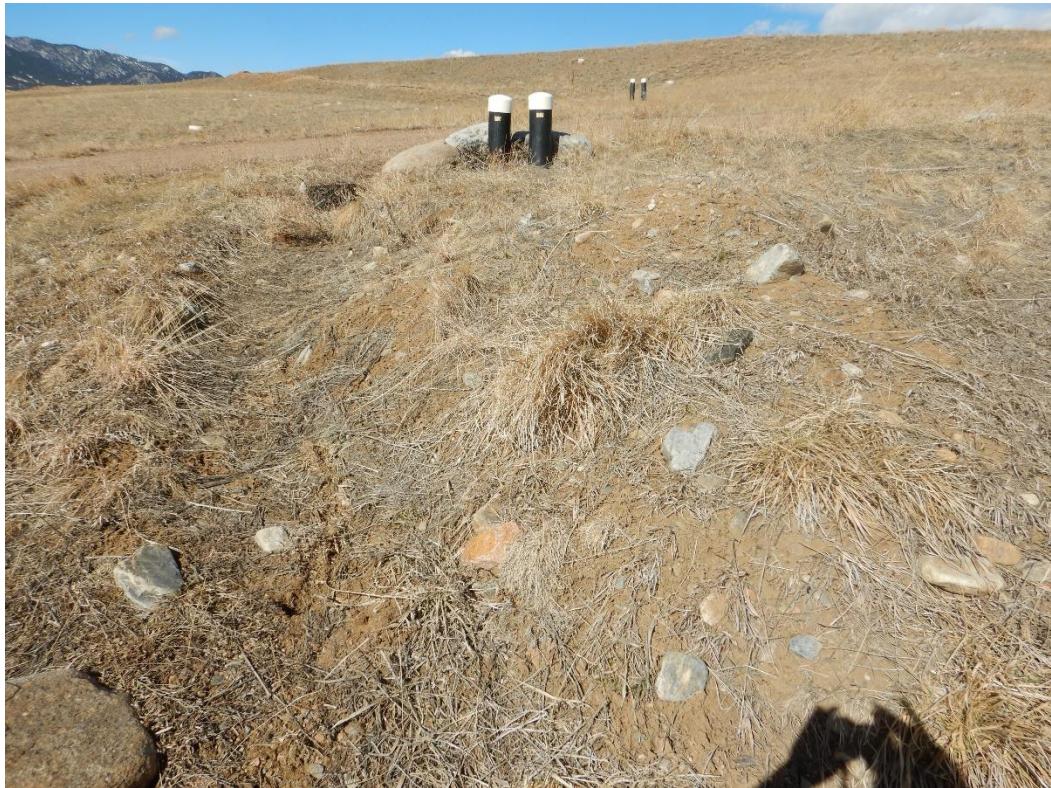
*Figure 4. Looking Southwest at the EPC, Which Was in Good Condition*



*Figure 5. Looking South-Southeast at the WPC, Which Was in Good Condition*



*Figure 6. Looking South-Southwest at Seep 8 and the Surrounding Area, Which Had a Flow of Approximately 1 gpm*



*Figure 7. Looking West-Northwest at the ESSD (Cleanouts) and the Surrounding Area, Which Was in Good Condition*



*Figure 8. Looking East-Northeast at the SID, Which Receives Groundwater from the ESSD Outfall and an Interceptor Drain on the Eastern Hillside*

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Inspector: Nathan Krohn Date: 3/23/23 Time: 1145  
 Precipitation: MET\* 0.47 inch NREL\* Weather: Cloudy, 48°F Report Type:  Monthly  Weather-related  
 Reviewed by: April Tischer Review date: \_\_\_\_\_  
Digitally signed by APRIL TISCHER  
Affiliate  
Date: 2023.03.27 12:12:15 -06'00'

\*Since last report

## Subsidence/Consolidation

Region	Visible Cracks	Visible Depressions	Visible Ponding	Within Waste Footprint	Other (Describe Below)
Berm 1 Basin - West	NO	NO	NO	NA	
Berm 1 Basin - East	NO	NO	NO		
Berm 2 Basin	NO	NO	NO		
Berm 3 Basin	NO	NO	NO		
Berm 4 Basin	NO	NO	NO		
Berm 5 Basin	NO	NO	NO		
Berm 6 Basin	NO	NO	NO		
Berm 7 Basin	NO	NO	NO		
Buttress fill	NO	NO	NO	↓	

Settlement monuments—inspect integrity. Intact: YES

Maintenance required, comments, and photo log:

No issues.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

### Slope Stability

Region	Visible Cracks	Visible Seeps	Visible Block or Circular Failure	Other (Describe Below)
Cover– West	NO	YES	NO	Seep 7 has damp soil
Cover– East	NO	NO	NO	
Buttress fill side slope	NO	NO	NO	
West perimeter channel side slopes	NO	NO	NO	
East perimeter channel side slopes	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

### Soil Cover and Buttress

Region	Visible Erosion	Visible Gullies	Visible Animal Burrows	Other (Describe Below)
Cover– West	NO	NO	NO	
Cover– East	NO	NO	NO	
Buttress fill	NO	NO	NO	
Buttress fill side slope	NO	NO	NO	

Maintenance required, comments, and photo log:

No issues.

## Original Landfill – Monitoring and Maintenance Plan Inspection Form

Seep Evaluation				
Seep	Visible Saturation	Visible Flow	Approximate Flow	Description
Seep 1*	NO			
Seep 2/3*	NO			
Seep 4*	NO			
Seep 5*	NO			
Seep 6*	NO			
Seep 7*	YES	NO		
Seep 8a	NO			
Seep 8b	NO			
Seep 8c	NO			
Seep 9	NO			
Seep 10	NO			
Seep 10a	NA	NA	NA	No reappearence after 2017.
Seep 8	YES	YES	~ 1 GPM	

Maintenance required, comments, and photo log:

No issues.

\* Indicates seep was observed during or shortly after OLF closure in 2005.

**NOTE:** A seep is defined as an area where water percolates to the land surface or an area persistently moist whose source, as observed in multiple inspections, is confirmed to be groundwater and not surface water.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Water Management Structures						
Channels						
Structure	Visible Excessive Erosion, Gullying, or Undermining	Visible Settlement, Subsidence, or Depressions	Visible Breaching or Bank Failure	Visible Animal Burrows	Visible Sediment Build-Up or Other Blockage	Comments
Diversion Berm 1	NO	NO	NO	NO	NO	
Diversion Berm 2	NO	NO	NO	NO	NO	
Diversion Berm 3	NO	NO	NO	NO	NO	
Diversion Berm 4	NO	NO	NO	NO	NO	
Diversion Berm 5	NO	NO	NO	NO	NO	
Diversion Berm 6	NO	NO	NO	NO	NO	
Diversion Berm 7	NO	NO	NO	NO	NO	
West perimeter channel	NO	NO	NO	NO	NO	
East perimeter channel	NO	NO	NO	NO	NO	
Drains/Outfalls						
Structure	Visible Excessive Erosion, or Gullying	Visible Sediment Build-Up or Other Blockage	Is Water Draining or Flowing from Structure?		Comments	
East Subsurface Drain – Solid pipe	NO	NO	NO			
East Subsurface Drain – Perforated pipe	NO	NO	NO			
French Drain (SID)	NO	NO	YES		< 1 GPM flow	

Maintenance required and photo log:

No issues.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

"Run-On" Control		
Area	Adversely Affecting OLF	Comments
Run-on to the OLF (any direction)	<b>No</b>	
Maintenance required and photo log:		
<p><i>No issues.</i></p>		
Violations of Institutional Controls		
Item	Comments	
Evidence of unauthorized <sup>1</sup> excavations of cover and immediate vicinity of cover?	<b>No</b>	
Evidence of unauthorized <sup>1</sup> construction of roads, trails, or buildings on cover?	<b>No</b>	
Evidence of unauthorized <sup>1</sup> drilling of wells or use of groundwater?	<b>No</b>	
Damage to groundwater monitoring wells at OLF (upgradient or downgradient)?	<b>No</b>	
Other observations, maintenance required, comments, and photo log:		
<p><i>No issues.</i></p>		
<p>If "Yes" is marked on any item in the Institutional Controls section, immediately notify your supervisor.</p>		

<sup>1</sup> Unauthorized means not approved by RFLMA parties (DOE, EPA, CDPHE) through the consultative process. Actions covered under an approved soil disturbance review plan are authorized actions.

# Original Landfill – Monitoring and Maintenance Plan Inspection Form

Action Items			
Deficiency	Action	Date Completed	Comments
None	NA	NA	

## Signatures

Inspector signature: 

Date: 3/23/23

Reviewer signature: 

Date: \_\_\_\_\_

Digitally signed by APRIL TISCHER  
(Affiliate)  
Date: 2023.03.27 12:14:08 -06'00'

Attachment 1: March 2023 Monthly Report of the Original Landfill Inspection at the Rocky Flats Site, Colorado

The monthly inspection of the Original Landfill (OLF) at the Rocky Flats Site, Colorado, was completed on March 23, 2023. The weather was cloudy with an ambient temperature of 48 °F during the inspection. The Rocky Flats Site meteorological tower recorded 0.47 inch of precipitation between this inspection and the previous monthly inspection performed on February 21, 2023.

Monthly inspection forms are completed to document current conditions at the OLF. Items previously indicated as deficient on inspection forms that have since been repaired are not marked again on the form unless further action is required.

**Figure 1** provides an aerial view of the OLF hillside with the approximate locations of the report photographs (the photographs in **Figure 2** through **Figure 11** were taken on March 23, 2023).

No issues were noted during the inspection. Berms 1–3 (**Figure 2**) and Berms 4–7 (**Figure 3**) were in good condition. Erosion control blankets along eastern Berm 2 (**Figure 4**) were displaced by elk passing through the area in early March. The blankets were restaked in late March and early April. Erosion control blankets along Berm 4 (**Figure 5**) have remained in good condition. Erosion controls installed in 2021 on the western end of Berm 3 have remained in good condition (**Figure 6**). The East Perimeter Channel (EPC) was in good condition (**Figure 7**). The West Perimeter Channel (WPC) was in good condition (**Figure 8**).

The Seep 8 location (**Figure 9**) had a flow of approximately 1 gallon per minute (gpm). The Seep 4 and Seep 7 locations had damp soils. All other historical seep locations were dry.

No issues were noted with the East Subsurface Drain (ESSD) (**Figure 10**), which had no flow during the inspection. No issues were noted with the South Interceptor Ditch (SID) (**Figure 11**), which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside, which had a flow of less than 1 gpm during the inspection.

The revegetation of recently disturbed areas on the OLF is managed and monitored under the *Erosion Control Plan for Rocky Flats Property Central Operable Unit* (DOE-LM/1497-2007, LMS/RFS/S03416)<sup>1</sup> and under sitewide vegetation and revegetation plans, as appropriate. Established vegetation is visible across the hillside areas that were reseeded after the stabilization effort in 2019–2020.

#### Summary of March 2023 Inspection Findings

No new issues were noted. Erosion control blankets along eastern Berm 2 were displaced by elk passing through the area in early March. The blankets were restaked in March and April. Erosion control blankets along Berm 4 have remained in good condition. Erosion controls installed in 2021 on the western end of Berm 3 have remained in good condition. The EPC was in good condition. The WPC was in good

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<sup>1</sup> *Erosion Control Plan for Rocky Flats Property Central Operable Unit*, DOE-LM/1497-2007, LMS/RFS/S03416, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.

condition. The Seep 8 location had a flow of approximately 1 gpm. The Seep 4 and Seep 7 locations had damp soils. No issues were noted with the ESSD, which had no flow during the inspection. No issues were noted with the SID, which receives groundwater from the ESSD outfall and an interceptor drain on the eastern hillside, which had a flow of less than 1 gpm during the inspection.



Figure 1. Locations of OLF Inspection Report Figure Photographs, Rocky Flats Site, Colorado (Photo Taken June 15, 2022)



*Figure 2. Looking East-Southeast at Berms 1–3, Which Were in Good Condition*



*Figure 3. Looking Southeast at Berms 4–7, Which Were in Good Condition*



*Figure 4. Looking Southwest at Erosion Control Blankets Along Eastern Berm 2, Which Were Displaced by Elk Passing Through the Area in Early March; the Blankets Were Restaked in March and April*



*Figure 5. Looking East-Northeast at Erosion Control Blankets Along the Center of Berm 4, Which Were in Good Condition*



*Figure 6. Looking North-Northeast at Erosion Controls Installed in 2021 on the Western End of Berm 3, Which Have Remained in Good Condition*



*Figure 7. Looking Southwest at the EPC, Which Was in Good Condition*



*Figure 8. Looking Northwest at the WPC, Which Was in Good Condition*



*Figure 9. Looking South-Southwest at Seep 8 and the Surrounding Area, Which Had a Flow of Approximately 1 gpm*



Figure 10. Looking West-Northwest at the ESSD (Cleanouts) and the Surrounding Area, Which Was in Good Condition



Figure 11. Looking East-Northeast at the SID, Which Receives Groundwater from the ESSD Outfall and an Interceptor Drain on the Eastern Hillslope

**PRESENT LANDFILL – MONITORING AND MAINTENANCE PROGRAM**

**(Q1) INSPECTION FORM**

INSPECTOR: Nathan Krohn DATE: 2/21/23 TIME: 1140 REVIEWED BY: Ami K

TEMPERATURE: 59°F WEATHER CONDITIONS: Partly Cloudy 59°F REVIEW DATE: -07'00'

METEOROLOGICAL STATION LOCATION: RF MET = 2.31 inches (1/16/22 - 2/21/23)

APRIL TISCHER

(Affiliate)

2023.03.06 14:53:06

**SUBSIDENCE/CONSOLIDATION**

REGION	EVIDENCE OF CRACKS?	EVIDENCE OF DEPRESSIONS?	EVIDENCE OF SINK HOLES?	EVIDENCE OF PONDING?	OTHER (DESCRIBE BELOW)
TOP OF COVER – WEST	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
TOP OF COVER – EAST	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
COVER SIDESLOPE – NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
COVER SIDESLOPE – SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
EAST FACE SLOPE – NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
EAST FACE SLOPE – SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
EAST FACE SLOPE – CENTRAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
EAST FACE SLOPE – NORTH SEEP*	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				

Settlement Plates and side-slope monitoring points to be inspected for integrity.  
During Year 1, they will be surveyed quarterly, and annually thereafter

Integrity intact?  
 Yes  No

MAINTENANCE REQUIRED/COMMENTS/PHOTO LOG

No issues.

\* AREA OF SEEP IS OUTSIDE OF LANDFILL COVER AND EAST OF THE COVER ANCHOR TRENCH

## SLOPE STABILITY

REGION	EVIDENCE OF CRACKS?	EVIDENCE OF BLOCK OR CIRCULAR FAILURE?	EVIDENCE OF SEEPS?	OTHER (DESCRIBE BELOW)
COVER SIDESLOPE - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
COVER SIDESLOPE - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
PERIMETER CHANNEL OUTER SLOPE - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
PERIMETER CHANNEL OUTER SLOPE - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - CENTRAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - NORTH SEEP*	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

MAINTENANCE REQUIRED/COMMENTS/PHOTO LOG

No issues.

\* AREA OF SEEP IS OUTSIDE OF LANDFILL COVER AND EAST OF THE COVER ANCHOR TRENCH

## SOIL COVER

REGION	EVIDENCE OF SOIL DEPOSITION OR EROSION?	EVIDENCE OF EROSION RILLS/GULLIES?	EVIDENCE OF BURROWING ANIMALS?	OTHER (DESCRIBE BELOW)
TOP OF COVER - WEST	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
TOP OF COVER - EAST	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
COVER SIDESLOPE - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
COVER SIDESLOPE - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
EAST FACE SLOPE -- CENTRAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
AREA WHERE EAST SLOPE CENTRAL MEETS EAST SLOPE NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
AREA WHERE EAST SLOPE CENTRAL MEETS EAST SLOPE SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
	<b>VENT CAPS IN PLACE &amp; SECURE?</b>	<b>STANDPIPES IN GOOD CONDITION?</b>	<b>BIRDS OR INSECTS IN VENT CAPS?</b>	
COVER - BAROMETRIC VENTS	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

MAINTENANCE REQUIRED/COMMENTS/PHOTO LOG

No issues.

## SEEP TREATMENT SYSTEM

REGION	EVIDENCE OF PLUGGING, OBSTRUCTIONS, OR EXCESS DEBRIS?		EVIDENCE OF CRACKS OR DETERIORATION?	OTHER (DESCRIBE BELOW)
	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		
GWIS INLET PIPES	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
STRIP DRAIN INLET PIPE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
NORTH MANHOLE OUTLET PIPE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
SOUTH MANHOLE OUTLET PIPE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
TREATMENT UNIT	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
TREATMENT UNIT OUTLET PIPE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
NORTH MANHOLE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
SOUTH MANHOLE	<input type="checkbox"/>	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
TREATMENT UNIT GRATING	NA		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

### MAINTENANCE REQUIRED/COMMENTS/PHOTO LOG

North and South Manhole Outlet pipes cleaned with mechanical pipe cleaner as a BMP.

3/6/23 NK - Excess bio-growth has built up in the North manhole, but the outlet pipe is unobstructed. The situation is being monitored.

## STORMWATER MANAGEMENT STRUCTURES

### CHANNELS/LINING

STRUCTURE	EVIDENCE OF EXCESSIVE EROSION, GULLYING, SCOUR, OR UNDERMINING?	EVIDENCE OF SETTLEMENT/ SUBSIDENCE OR DEPRESSIONS?	EVIDENCE OF BREACHING OR BANK FAILURE?	EVIDENCE OF BURROWING ANIMALS?	EVIDENCE OF SEDIMENT BUILD-UP OR OTHER BLOCKAGE?	EVIDENCE OF LINING DETERIORATION, HOLES, RIPS, OR SEPARATION?	EVIDENCE OF LINING DISPLACEMENT?
DIVERSION BERM	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
VEGETATION-LINED PERIMETER CHANNEL - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
VEGETATION-LINED PERIMETER CHANNEL - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
RIPRAP-LINED PERIMETER CHANNEL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
C350-LINED EAST FACE	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
EAST FACE RIPRAP CHANNEL - NORTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
EAST FACE RIPRAP CHANNEL - SOUTH	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						

OTHER DEFICIENCIES?

N/A

MAINTENANCE REQUIRED/COMMENTS/PHOTO LOG

No issues.

## STORMWATER MANAGEMENT STRUCTURES (CONTINUED)

### OUTFALLS

CHECK EACH STRUCTURE FOR EXCESSIVE EROSION AND SEDIMENT DEPTH. IF SEDIMENT DEPTH IS COMPROMISING THE DESIGN CHARACTERISTICS, REMOVE SEDIMENT.

STRUCTURE	CONDITION/SEDIMENT DEPTH
DIVERSION BERM OUTFALL – NORTH	No issues.
DIVERSION BERM OUTFALL – SOUTH	
CULVERT 1 OUTFALL	
CULVERT 2 OUTFALL	
SOUTHWEST CULVERT OUTFALL	

### CULVERTS

CHECK EACH STRUCTURE FOR BLOCKAGE, SURROUNDING CONDITIONS, BREACHING, SEDIMENT BUILD-UP, AND INLET/OUTLET CONDITIONS.

STRUCTURE	CONDITION
CULVERT 1	No issues
CULVERT 2	
SOUTHWEST CULVERT	

### MAINTENANCE REQUIRED/PHOTO LOG

No issues.

**“RUN-ON” EROSION CONTROL**

AREA	ADVERSELY AFFECTING PLF?		
RUN-ON INTO PERIMETER CHANNEL – NORTH	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	COMMENT:
RUN-ON INTO PERIMETER CHANNEL – SOUTH	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	COMMENT:
NATURAL DRAINAGE FED BY CULVERT 1	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	COMMENT:
NATURAL DRAINAGE FED BY NORTHEAST PERIMETER CHANNEL	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	COMMENT:
NATURAL DRAINAGE FED BY RIPRAP	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	COMMENT:

MAINTENANCE REQUIRED/PHOTO LOG

No issues.

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## INSTITUTIONAL CONTROLS

ITEM			COMMENT:
EVIDENCE OF EXCAVATION(S) OF COVER AND IMMEDIATE VICINITY OF COVER?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
EVIDENCE OF CONSTRUCTION OF ROADS OR TRAILS ON COVER OR BUILDINGS?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
EVIDENCE OF UNAUTHORIZED ENTRY?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
EVIDENCE OF DRILLING OF WELLS OR USE OF GROUNDWATER?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
DISRUPTION OR DAMAGE OF SEEP TREATMENT SYSTEM?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
DAMAGE OR REMOVAL OF ANY SIGNAGE OR GROUNDWATER MONITORING WELLS?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

### OTHER DEFICIENCIES/PHOTO LOG

No issues.

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ACTION ITEMS

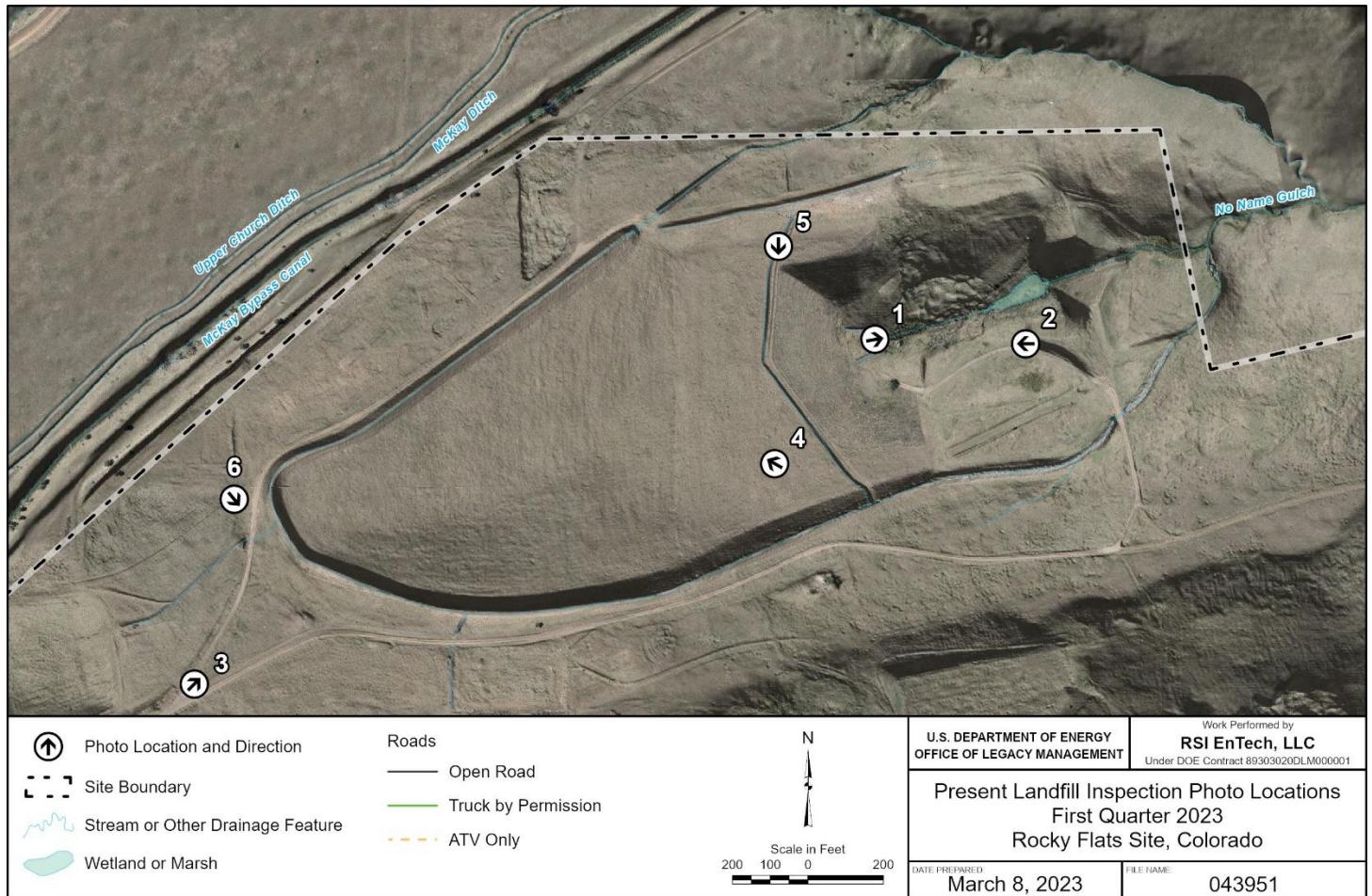
DEFICIENCY	DATE NOTED	ACTION	DATE COMPLETED	COMMENTS
None	NA	NA	NA	

INSPECTOR SIGNATURE: April Tischer DATE: 2/21/23

REVIEWER SIGNATURE: Ami JW APRIL TISCHER  
 (Affiliate) DATE: \_\_\_\_\_  
 2023.03.06 14:54:02  
 -07'00'

## First Quarter 2023 PLF Inspection photos

(Photos taken 2/21/2023)



Locations of PLF Inspection Report Figure Photographs, Rocky Flats Site, Colorado



*Figure 1. Looking East at the Present Landfill Treatment System. Small amounts of Bio-growth were removed from the North and South Manhole Outlet Pipes, treatment unit outlet pipe, and system outfall using a mechanical pipe cleaner as part of routine preventative maintenance. Bio-growth in the manholes is not currently being inspected, but lighter covers are scheduled to be installed in 2023 to make inspection of the manholes easier and safer.*



*Figure 2. Looking West at the East Face Slope, Which Was in Good Condition.*



*Figure 3. Looking Northeast at the landfill's top cover, Which Was in Good Condition.*



*Figure 4. Looking West-Northwest at a Barometric Gas Vent. No issues were found with survey markers or barometric gas vents.*



*Figure 5. Looking South at the Diversion Berm Located Between the East Face Slope and the Top of the Landfill Cover, Which Was in Good Condition.*



*Figure 6. Looking Southeast at the Southern Vegetation-Lined Perimeter Channel. Snow remains in a few areas from the previous week. All channels and culverts appear to be functioning properly.*

**Rocky Flats Site**

**Original Landfill - Settlement Plates Monitoring**

**Quarterly Survey March 6, 2023 Comparison to Previous December 7, 2022**

03-06-2023 OBSERVATIONS					DELTA NORTHING	DELTA EASTING	DELTA ELEVATION	12-07-2022 OBSERVATIONS				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION				POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
68727	747913.27	2082234.22	6004.86	N RIM PIPE AA	-0.01	0.01	-0.01	68558	747913.26	2082234.23	6004.86	N RIM PIPE AA
68728	747644.86	2081851.28	5975.21	N RIM PIPE BB	0.00	0.01	0.01	68559	747644.86	2081851.29	5975.22	N RIM PIPE BB
68731	747883.14	2081665.96	6019.51	N RIM PIPE CC	0.01	0.00	0.00	68562	747883.14	2081665.95	6019.51	N RIM PIPE CC
68732	747803.27	2081642.34	6006.06	N RIM PIPE DD	0.01	0.00	-0.01	68563	747803.28	2081642.34	6006.06	N RIM PIPE DD
68733	747700.66	2081620.55	5988.52	N RIM PIPE EE	0.01	0.01	0.01	68564	747700.66	2081620.56	5988.53	N RIM PIPE EE
68735	747703.23	2081407.71	5997.14	N RIM PIPE FF	-0.01	0.01	0.00	68566	747703.22	2081407.72	5997.14	N RIM PIPE FF
68734	747563.08	2081656.31	5974.10	N RIM PIPE GG	0.00	0.01	0.01	68565	747563.08	2081656.32	5974.11	N RIM PIPE GG
68736	747776.77	2081215.25	6021.91	N RIM PIPE HH	-0.01	0.01	0.00	68567	747776.77	2081215.26	6021.91	N RIM PIPE HH

**PIPE AA THE SOIL SURROUNDING PIPE AA WAS TEMPORARILY EXCAVATED OUT AND THEN BACKFILLED AND COVERED, THE SURROUNDING GROUND SURFACE IS HIGHER, PIPE AA WAS NEVER MOVED.**

**BASELINE RE-SET AS BEST PRACTICE.**

**PIPE HH WAS REPLACED AND HAS A NEW LOCATION FIRST OBSERVED ON 08-31-2020**

**PIPE HH HAS BEEN REMOVED FOR 06-02-2020 COMPARISON AND NO LONGER EXISTS**

**DELTAS ARE CALCULATED AS THE DIFFERENCE BETWEEN THE 03-06-2023 OBSERVATION AND THE 12-07-2022 OBSERVATION**

**POINTS ARE GRID BASED COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 27, NGVD 29**

**POINTS ARE GRID BASED COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 83, NAVD 88**

03-06-2023 OBSERVATIONS					DELTA NORTHING	DELTA EASTING	DELTA ELEVATION	12-07-2022 OBSERVATIONS				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION				POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
68727	1747922.72	3082079.57	6008.40	N RIM PIPE AA	-0.01	0.01	-0.01	68558	1747922.71	3082079.58	6008.40	N RIM PIPE AA
68728	1747654.31	3081696.63	5978.75	N RIM PIPE BB	0.00	0.01	0.01	68559	1747654.31	3081696.64	5978.76	N RIM PIPE BB
68731	1747892.59	3081511.31	6023.05	N RIM PIPE CC	0.00	0.00	0.00	68562	1747892.59	3081511.30	6023.05	N RIM PIPE CC
68732	1747812.72	3081487.69	6009.60	N RIM PIPE DD	0.01	0.00	-0.01	68563	1747812.73	3081487.69	6009.60	N RIM PIPE DD
68733	1747710.11	3081465.91	5992.06	N RIM PIPE EE	0.00	0.01	0.01	68564	1747710.11	3081465.91	5992.07	N RIM PIPE EE
68735	1747712.68	3081253.07	6000.68	N RIM PIPE FF	-0.01	0.01	0.00	68566	1747712.68	3081253.07	6000.68	N RIM PIPE FF
68734	1747572.53	3081501.67	5977.64	N RIM PIPE GG	0.00	0.01	0.01	68565	1747572.53	3081501.67	5977.65	N RIM PIPE GG
68736	1747786.22	3081060.60	6025.45	N RIM PIPE HH	-0.01	0.01	0.00	68567	1747786.22	3081060.61	6025.45	N RIM PIPE HH

**PIPE HH WAS REPLACED AND HAS A NEW LOCATION FIRST OBSERVED ON 08-31-2020**

**PIPE HH HAS BEEN REMOVED FOR 06-02-2020 COMPARISON AND NO LONGER EXISTS**

**DELTAS ARE CALCULATED AS THE DIFFERENCE BETWEEN THE 03-06-2023 OBSERVATION AND THE 12-07-2022 OBSERVATION**

**POINTS ARE GRID BASED COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 83, NAVD 88**

**Appendix B**

**Analytical Results for Water Samples,  
First Quarter 2023**































Appendix B  
Analytical Results for Water Samples—First Quarter CY 2023  
**RFLMA Data**

LOCATION CODE	LOCATION TYPE	DATE SAMPLED	SAMPLE CODE	CAS	ANALYTE	FILTRATION STATUS	RESULT	UNITS	LAB QUALIFIERS	SAMPLE TYPE	DETECTION LIMIT	UNCER-TAINTY	DATA VALIDATION QUALIFIERS	COLLECTION METHOD	LAB CODE
WALPOC	SL	1/17/2023	RFS01-13.2306094-001	14596-10-2	Americium-241	N	0.0299	pCi/L		F		0.0168	J	C	GEN
WALPOC	SL	1/17/2023	RFS01-13.2306094-003	14596-10-2	Americium-241	N	0.0382	pCi/L		D		0.0162	J	C	GEN
WALPOC	SL	1/17/2023	RFS01-13.2306094-001	PU-239,240	Plutonium-239, 240	N	0.0395	pCi/L		F		0.0251	J	C	GEN
WALPOC	SL	1/17/2023	RFS01-13.2306094-003	PU-239,240	Plutonium-239, 240	N	0.0657	pCi/L		D		0.0234	J	C	GEN
WALPOC	SL	1/17/2023	RFS01-13.2306094-001	7440-61-1	Uranium	N	5.25	ug/L		F	0.067			C	GEN
WALPOC	SL	1/17/2023	RFS01-13.2306094-003	7440-61-1	Uranium	N	5.41	ug/L		D	0.067			C	GEN
WOMPOC	SL	1/17/2023	RFS01-13.2302088-015	14596-10-2	Americium-241	N	0.00129	pCi/L	U	F		0.00983		C	GEN
WOMPOC	SL	1/17/2023	RFS01-13.2302088-015	PU-239,240	Plutonium-239, 240	N	0.00143	pCi/L	U	F		0.0128		C	GEN
WOMPOC	SL	1/17/2023	RFS01-13.2302088-015	7440-61-1	Uranium	N	2.14	ug/L		F	0.067			C	GEN
WOMPOC	SL	2/21/2023	RFS01-13.2303089-015	14596-10-2	Americium-241	N	0.00142	pCi/L	U	F		0.00833		C	GEN
WOMPOC	SL	2/21/2023	RFS01-13.2303089-015	PU-239,240	Plutonium-239, 240	N	0.0142	pCi/L	U	F		0.0128		C	GEN
WOMPOC	SL	2/21/2023	RFS01-13.2303089-015	7440-61-1	Uranium	N	2.27	ug/L		F	0.067			C	GEN
WOMPOC	SL	3/20/2023	RFS01-13.2304090-015	14596-10-2	Americium-241	N	0.0025	pCi/L	U	F		0.00599		C	GEN
WOMPOC	SL	3/20/2023	RFS01-13.2304090-015	PU-239,240	Plutonium-239, 240	N	-0.00533	pCi/L	U	F		0.00906		C	GEN
WOMPOC	SL	3/20/2023	RFS01-13.2304090-015	7440-61-1	Uranium	N	3.29	ug/L		F	0.067			C	GEN

## **EXPLANATION**

### **FILTRATION STATUS**

N = Sample was not filtered.

Y = Sample was filtered.

### **UNITS**

mg/L; ppm = milligrams per liter

pCi/L = picocuries per liter

ug/L = micrograms per liter

C = degrees celsius

mS/cm = millisiemens per centimeter

NTU = normal turbidity units

s.u. = standard pH units

uS/cm = microSiemens per centimeter

umhos/cm = microSiemens per centimeter

### **SAMPLE TYPE**

F = Field Sample

D = Duplicate

### **DATA VALIDATION QUALIFIERS**

<NULL> No qualifiers.

F Low flow sampling method used.

G Possible grout contamination, pH > 9.

J Estimated value.

L Less than 3 bore volumes purged prior to sampling.

Q Qualitative result due to sampling technique.

R Unusable result.

U Parameter analyzed for but was not detected.

X Location is undefined.

999 Validation not complete.

### **LAB QUALIFIERS**

- \* Replicate analysis not within control limits.
- + Correlation coefficient for MSA < 0.995.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic & Radiochemistry: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- M GFAA duplicate injection precision not met.
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Arochlor concentrations between 2 columns.
- S Result determined by method of standard addition (MSA).
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Y Laboratory defined (USEPA CLP organic) qualifier, see case narrative.
- Z Laboratory defined (USEPA CLP organic) qualifier, see case narrative.

### **LOCATION TYPE**

- |    |                  |
|----|------------------|
| SL | SURFACE LOCATION |
| TS | TREATMENT SYSTEM |
| WL | WELL             |

### **COLLECTION METHOD**

- |   |           |     |                       |
|---|-----------|-----|-----------------------|
| G | Grab      | GEN | Gel Laboratories LLC  |
| C | Composite | STD | Eurofins Test America |

### **LAB CODE**

Appendix B  
Analytical Results for Water Samples—First Quarter CY 2023  
**Information for RFLMA Composite Samples with Unavailable Data**

Location	Sample Dates*	Status
Data were available for all samples		

**Notes:**

- \* Analytical results are reported with the start date of the composite sampling period.
- > Composite sample end date to be determined.
- NSQ: non-sufficient quantity for analysis.