Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats Site, Colorado

Calendar Year 2016

Operations and Maintenance

April 2017
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## Contents

Abbreviations .................................................................................................................................. ii  
1.0 2016 Highlights ......................................................................................................................1  
2.0 Annual Site Inspection ...........................................................................................................2  
3.0 Landfills ..................................................................................................................................3  
   3.1 Present Landfill ...........................................................................................................3  
      3.1.1 Inspection Results ........................................................................................4  
      3.1.2 Slumps ..........................................................................................................4  
      3.1.3 Settlement Monuments ................................................................................5  
   3.2 Original Landfill ..........................................................................................................5  
      3.2.1 Inspection Results ........................................................................................5  
      3.2.2 Settlement Monuments ................................................................................6  
      3.2.3 Inclinometers ..............................................................................................6  
      3.2.4 Seeps ............................................................................................................9  
      3.2.5 Precipitation Response Repairs ................................................................9  
      3.2.6 2016 Geotechnical Engineering Reviews and Geoprobe Investigation ......9  
      3.2.7 2016 EPC Maintenance ............................................................................10  
      3.2.8 2016 East Subsurface Drain Upgrade ........................................................10  
      3.2.9 2017 Path Forward .....................................................................................11  
4.0 Former Building Area Inspections .......................................................................................11  
5.0 North Walnut Creek Slump .................................................................................................12  
6.0 Site Road Maintenance .........................................................................................................12  
7.0 Sign Inspections ...................................................................................................................12  
8.0 Erosion Control and Revegetation .......................................................................................13  
9.0 References ............................................................................................................................13  

## Figure

Figure 1. Original Landfill, Rocky Flats Site .................................................................................7  

## Appendixes

Appendix A  Hydrologic Data  
Appendix B  Water Quality Data  
Appendix C  Landfill Inspection Forms, Fourth Quarter CY2016  
Appendix D  Data Evaluation Flowcharts Reproduced from RFLMA and RFSOG  
Appendix E  Uranium Isotopic Compositions and Concentrations of Rocky Flats Water Samples Submitted to LBNL  
Appendix F  2016 RFLMA Contact Records
Abbreviations

ATV       all-terrain vehicle
BMP       best management practice
CDPHE     Colorado Department of Public Health and Environment
COU       Central Operable Unit
CY        calendar year
DOE       U.S. Department of Energy
ECP       Erosion Control Plan for the Rocky Flats Property Central Operable Unit
EPA       U.S. Environmental Protection Agency
EPC       East Perimeter Channel
ESSD      East Subsurface Drain
GWIS      Groundwater Intercept System
ICs       institutional controls
ITS       Interceptor Trench System
ITSS      Interceptor Trench System Sump
LM        Office of Legacy Management
NREL      National Renewable Energy Laboratory
O&M       operations and maintenance
OLF       Original Landfill
OLF M&M   Rocky Flats Site Original Landfill Monitoring and Maintenance Plan
PLF       Present Landfill
PLF M&M   Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan,
           U.S. Department of Energy Rocky Flats, Colorado, Site
PLFTS     Present Landfill Treatment System
RCRA      Resource Conservation and Recovery Act
RFLMA     Rocky Flats Legacy Management Agreement
SPPTS     Solar Ponds Plume Treatment System
1.0 2016 Highlights

This report addresses operation and maintenance (O&M) activities conducted at the Rocky Flats Site, Colorado (Site) during calendar year (CY) 2016 (January 1 through December 31, 2016). O&M highlights for 2016 include:

- The annual site inspection was conducted on April 13, 2016. Most inspection observations were related to metal debris or trash that was picked up. No evidence of violations of institutional controls (ICs) or physical controls was observed. Likewise, no adverse biological conditions were noted during the inspection.

- The Present Landfill (PLF) was inspected quarterly during CY 2016. Additionally, two weather-related inspections were conducted as a result of the heavy precipitation the Site received. No significant problems were observed during these inspections.

- The Original Landfill (OLF) was inspected monthly during CY 2016. The OLF was also monitored weekly as a best management practice. In addition, as with the PLF, two weather-related inspections were conducted. In the spring of 2016, after several storms saturated the ground at the Site, the eastern edge of the landfill began to crack and slump, although to a much lesser extent than it did in 2015. The slump’s toe partially blocked the East Perimeter Channel (EPC) at the southeastern edge of the OLF. Repairs began in September 2016 and were completed in October 2016. All of this work was conducted outside the waste footprint.

- In addition, a crack reopened on the west side of the OLF in the vicinity of the West Perimeter Channel. Smaller cracks were filled in by hand where they were identified, using tools such as shovels and rakes.

- Throughout 2016, most of the OLF outside the waste footprint was stable, with the exception being the southeastern portion. The area of the OLF that includes the waste footprint was very stable with only minor cracking and no wastes were exposed at the surface.

- To provide options for minimizing future slumping at the OLF, two separate geotechnical engineering reviews were completed in 2016. The reports indicate that surface water infiltration and groundwater entering the OLF from the north both contribute to the OLF slope instability.

- Based in part on the geotechnical reviews, 16 wells/piezometers were installed, using a Geoprobe, on the Site pediment upgradient and north of the OLF to measure groundwater levels, locate historical buried utilities and excavations, and determine potential safety and health considerations for future subsurface work in this area.

- Additional actions to improve the diversion of groundwater away from the EPC included the repair and upgrade of the East Subsurface Drain (ESSD) in the northeast corner of the OLF so that it functions as intended and is less likely to clog. Work at the ESSD began in December 2016. This action was completed in January 2017, before groundwater levels were anticipated to rise again, when additional hillside movement was more likely.

- As 2016 ended, the Original Landfill Path Forward, Rocky Flats Site, Colorado (DOE 2017), report was being finalized. (The report was finalized and posted on the Site website on February 1, 2017.)
• Former building areas (Buildings 371, 771, 881, and 991) were routinely inspected for evidence of subsidence. After a significant precipitation event in April, subsidence was noted in the former Building 881 area at a location where subsidence had been previously filled. The depression was filled with soil and graded smooth. No other issues were noted.

• Slumping on the hillside east of the Solar Ponds Plume Treatment System (SPPTS) continued to develop in 2016. This movement was initially recognized before Site closure, and has been monitored more routinely for the past several years. The wet spring of 2015 caused larger-scale movement, and additional movement occurred in spring 2016.

• Site roads were routinely maintained during 2016. In June, a dust suppressant was applied on the primary routes to aid in dust control.

• The signs posted on the Central Operable Unit (COU) boundary fence were inspected quarterly during CY 2016. No significant issues were encountered.

• Maintenance, repair, replacement, and monitoring of the Site erosion control features continued as needed through 2016. Several monitored locations met the success criteria for vegetation establishment, so erosion control monitoring has been discontinued at these locations.

• Various O&M activities were conducted at the groundwater treatment systems, including construction projects that reconfigured two of these systems. Details on treatment system O&M are provided in the Groundwater Monitoring volume of this report.

A detailed summary of the O&M activities conducted during the 2016 field season is provided in this report, which is one of the five volumes that compose the *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats Site, Colorado, Calendar Year 2016*.

The other volumes of the 2016 Annual Report are:

- Overview
- Groundwater Monitoring
- Surface Water Monitoring
- Ecological Monitoring

2.0 Annual Site Inspection

The Site must be inspected annually for evidence of significant erosion and IC violations, in accordance with *Rocky Flats Legacy Management Agreement* (RFLMA) Attachment 2, Sections 5.3.4 and 5.3.6. The 2016 inspection was conducted on April 13, 2016, and reported in the *Rocky Flats Site Quarterly Report of Site Surveillance and Maintenance Activities, Second Quarter Calendar Year 2016* (DOE 2016a).

The annual inspection focuses on the following condition categories:

- Evidence of significant erosion in the COU and evaluation of the proximity of significant erosion to subsurface features, as per RFLMA, which was revised in 2012 (CDPHE et al. 2012). This monitoring includes visual observation for precursor evidence of significant erosion (e.g., cracks, rills, slumping, subsidence, and sediment deposition).
- The effectiveness of ICs, as determined by any evidence of violation.
- Evidence of adverse biological conditions, such as unexpected morbidity or mortality, observed during the inspection and monitoring activities.

As part of the IC inspection, the Environmental Covenant’s presence in the Administrative Record and in Jefferson County records was verified on March 28. This verification is required annually. In addition, physical controls (signs placed along the COU boundary) were also inspected quarterly as required.

During the April inspection, marker flags were placed where conditions showed evidence of the three condition categories listed above, to track their location for follow-up by Site subject matter experts. Several areas had evidence of erosion and possible depressions, which were minor and very limited in area. The inspection forms and maps are included in the quarterly report for the second quarter of CY 2016 (DOE 2016a).

Most inspection observations were related to debris or trash on the surface that was either picked up or marked for subsequent removal and pickup. Site field operations subject matter experts visited the areas to determine if any observations were significant or required repairs and, additionally, to collect debris.

No evidence of violations of ICs or physical controls was observed, and no adverse biological conditions were noted.

### 3.0 Landfills

The 2016 results of inspections, monitoring data, and maintenance activities for the PLF and OLF are provided below.

#### 3.1 Present Landfill

The PLF consists of an approximately 22-acre engineered Resource Conservation and Recovery Act (RCRA) Subtitle C–compliant cover over a former sanitary and construction debris landfill. A diversion channel surrounds the landfill and diverts storm-water runoff away from the landfill to No Name Gulch. The landfill has a passive seep interception and treatment system (the Present Landfill Treatment System [PLFTS]) installed to treat landfill seep water and Groundwater Intercept System (GWIS) water that discharges into the former Landfill Pond area. A passive gas extraction system is also built into the landfill to let subsurface gas vent to the atmosphere.

Subsidence and consolidation at the PLF is monitored by visually inspecting the surface of the landfill cover for cracks, depressions, heaving, and sinkholes. The landfill final construction site conditions are used as a baseline for comparisons made during Site inspections. In addition to the visual inspection, settlement monuments are used to evaluate the actual settlement at specific locations compared to the expected settlement calculated in the final design. Nine settlement monuments were installed across the top of the landfill cap, and an additional six monuments are
located on the east face of the landfill. The monuments were monitored quarterly for the first year and annually thereafter, including in 2016.

Inspections and monitoring tasks follow the format and protocol established in the *Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan, U.S. Department of Energy Rocky Flats, Colorado, Site* (PLF M&M Plan) (DOE 2014) and include groundwater and surface water monitoring, as well as monitoring subsidence and consolidation, slope stability, soil cover, storm-water management structures, and erosion in surrounding features. This monitoring is conducted so that corrective actions can be taken in a timely manner.

### 3.1.1 Inspection Results

During CY 2016, quarterly inspections were performed at the PLF on February 29, June 21, August 17, and December 12. Additionally, weather-related inspections were conducted on March 29 and April 20. In accordance with the PLF M&M Plan, weather-related inspections will be conducted after a storm event of 1 inch or more of rain in a 24-hour period or after significant melt of a 10-inch or more snowstorm (assuming 10 inches of snow is equivalent to 1 inch of water).

The inspection process followed the format and protocol established in the PLF M&M Plan (DOE 2014). No significant problems were observed during these inspections. During the first quarter, cracking was observed in the grout surrounding the lids of the north and south manholes of the PLFTS. The grout was determined to be a cosmetic addition and was monitored for signs of deterioration. At the time of the third quarter inspection, it was determined that the grout needed to be repaired. On September 12, the cracks were filled with grout.

The fourth quarter inspection was performed on December 12, 2016. There was no evidence of cracking or slope failure on the landfill. What appeared to be a small burrow was found during this inspection on the cover sideslope in the southern region and it was subsequently filled with dirt. There was a follow-up inspection of the suspected burrow and it was determined to be inactive.

Landfill inspection forms for the fourth quarter of CY 2016 are provided in the Overview volume of this annual report as Appendix C; earlier 2016 inspection forms are included in the applicable quarterly reports.

### 3.1.2 Slumps

No slumps have been observed on the PLF. However, on February 13, 2007, a slump was discovered on the south-facing hillside east of the PLF (DOE 2008). The slump is not on the PLF, and an engineering review determined that it does not impact the PLF cover. The slump was likely caused by heavy snow conditions and influenced by the lower water levels in the Landfill Pond subsequent to closure. Therefore, regrading the slump is not necessary. The higher than normal precipitation in early CY 2015 caused additional movement of the hillside; areas showing movement now extend farther north.

On March 16, 2016, Site staff and a subcontracted geotechnical engineer walked down the area east of the PLF to evaluate this slump. There was no evidence of recent movement. Likewise, there was no evidence of impending movement or saturated soils. The slump does not impact the PLF; however, this area will continue to be monitored.
3.1.3 Settlement Monuments

The annual settlement monument survey was completed on December 12, 2016. Results of the survey indicate that settling at each monument does not exceed expected settlement calculated in the final design and therefore does not trigger any maintenance activity under the PLF M&M Plan (DOE 2014).

3.2 Original Landfill

The OLF consists of an approximately 20-acre former solid sanitary and construction debris landfill. The original surface was regraded to provide a consistent slope. A 20-foot-high, 1000-foot-long soil buttress was placed at the toe of the landfill. The final cover consists of a 2-foot-thick Rocky Flats Alluvium soil cover that was constructed over both the regraded surface and the buttress fill. The area was then revegetated. Erosion is controlled by a series of diversion berms that carry storm-water runoff away from the cover to channels on the east and west perimeter of the cover.

The OLF is inspected monthly in accordance with the requirements in the Rocky Flats Site Original Landfill Monitoring and Maintenance Plan (OLF M&M Plan) (DOE 2009) and the RFLMA. It was expected that, after the first year, the inspection frequency might be reduced to quarterly for an additional 4 years. However, because of observed localized slumping and seep areas, and because of the investigation and repairs to the OLF cover completed in 2009, no change to the monthly inspection frequency was recommended in the Third Five-Year Review Report for the Rocky Flats Site, Jefferson and Boulder Counties, Colorado (DOE et al. 2012). In addition, as a best management practice (BMP), because of the larger-magnitude movement observed in 2015 (DOE 2016b) the OLF was monitored weekly throughout CY 2016.

3.2.1 Inspection Results

Monthly inspections were performed at the OLF in CY 2016. Additionally, two weather-related inspections were conducted due to precipitation received on the Site. In accordance with the OLF M&M Plan (DOE 2009), weather-related inspections are to be conducted within 2 days after a storm event of 1 inch or more of rain in a 24-hour period or after significant melt of a 10-inch or more snow storm, assuming 10 inches of snow equals 1 inch of water.

The inspection process followed the format and protocol established in the OLF M&M Plan (DOE 2009).

No significant issues (e.g., erosion) were observed during the first quarter inspection. The areas that experienced movement and were repaired in 2015 did not move in the first quarter of CY 2016.

In January, site staff finished removing snow fencing installed at the top of the OLF hillside to eliminate retention of the snow and thereby reduce the amount of water infiltrating the soil and recharging groundwater just upgradient of the OLF. Removal of the snow fence was recommended by the subcontracted engineers so that snow did not accumulate on top of the pediment north of the OLF.
The Site received 3.76 inches of precipitation for the second quarter of 2016, as measured at the Rocky Flats meteorological tower. A few small locations in the main crack on the west side from CY 2015 reopened. As shown in Figure 1, this crack on the west side, which resembles a horseshoe, runs from the West Perimeter Channel northeast to Berm 1 and then southeast toward Berm 2. Cracking was observed on the east side of the OLF in the same approximate locations as spring of 2015; however, the amount of cracking was much less. Nearly all the cracks were located outside of the waste footprint. Where feasible, the cracks were filled in as soon as possible after they were observed. Where ponded water was observed on the surface, trenches were hand-excavated to return flow to the berm channels and drain the water from the surface.

The continued cracking and slumping in the area of the EPC between Berms 5 and 6 caused the toe of the subsidence to progress farther into the end of the EPC. Hand-excavated channels were reexcavated to promote water flowing to the end of the EPC. Additionally, 45 hay bales and multiple georidges were put in place at the bottom of the EPC outlet to stop sediment runoff from entering Woman Creek.

During the third quarter of CY 2016, when the Site received 1.59 inches of precipitation as measured at the Site meteorological tower, one new crack was observed at the end of Berm 4, heading southwest for approximately 30 feet. In addition, four small cracks reopened below Berm 5. Other than the cracks, the cover appeared stable.

No new signs of movement were observed in the fourth quarter. Although a new crack (approximately 1 inch wide and 30 feet long) was discovered east of the east end of Berm 5, near the east road, there was no evidence of movement associated with this crack. No other cracking was observed during this quarter.

Landfill inspection forms for the fourth quarter of CY2016 are included in the Overview volume as Appendix C. Inspection forms for the previous quarters are provided in the respective quarterly reports.

### 3.2.2 Settlement Monuments

The OLF settlement monuments were surveyed on March 14, June 6, September 12, and December 12, 2016. Figure 1 includes the locations of the settlement monuments. Survey data indicate that vertical settling at each monument is within the limits specified in the OLF M&M Plan (DOE 2009). The survey results for fourth quarter of CY 2016 are included in the Overview volume, Appendix C. Survey data for other quarters is included in the respective quarterly reports.

### 3.2.3 Inclinometers

Seven inclinometers were installed in boreholes at the OLF in 2008 as part of a geotechnical investigation. Movement of the inclinometers that are still operating had been monitored approximately monthly since installation. However, as of May 2015, the majority of the inclinometers had broken. The OLF M&M Plan states that once an inclinometer tube breaks, it will no longer be monitored (DOE 2009). On June 5, 2015, the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA) agreed with the U.S. Department of Energy (DOE) to discontinue monitoring the inclinometers on the OLF. Inclinometers will not be discussed in future annual reports.
3.2.4 Seeps

Seeps at the OLF were evaluated during the monthly inspections. Individual seep location flow rate estimates can be found in the monthly inspection reports for the OLF.

3.2.5 Precipitation Response Repairs

The OLF hillside has historically been prone to slumping and settling and seeps before the OLF began operation. These natural geologic features remained after improvements were made to the OLF in September of 2005 as part of site closure. In the spring of 2007, localized cover slumping and settling occurred in the northwest area of the OLF. This slumping and settling was repaired in 2008 and included reconfiguration of the West Perimeter Channel and installation of additional drainage features in this area. The reconfiguration and additional drainage features were generally successful with only minor cracking in this area during the following years. However, in the fall of 2013 after a significant week-long rain event, localized surface cracking and differential settlement in the northeastern portion of the OLF were noted.

Work to repair/regrade this area was scheduled for 2014; however, before the work could begin, there was additional cracking and slumping in the first and second quarters of 2014 on the east side of the EPC. The regrading work was reevaluated and redesigned and was ultimately completed in January 2015. From March through July of 2015, the Site received well above normal precipitation, which caused extensive movement on the eastern edge of the OLF hillside. This movement appeared as surficial cracks, settling (depressions), and rotational slumping. Most of this movement occurred outside the waste footprint. The repairs were completed in the fall of 2015. Although the amount of precipitation measured at the Site in 2016 was less than normal, sufficient precipitation occurred in the early part of the year (see the Surface Water Monitoring volume of this report) to cause movement (although less extensive) in the same general areas in the spring of 2016; this was repaired in the fall of 2016.

3.2.6 2016 Geotechnical Engineering Reviews and Geoprobe Investigation

To provide options for minimizing future slumping at the OLF, two separate geotechnical engineering reviews were completed in 2016. One was started in the fall of 2015 (Tetra Tech 2016) and the other in late spring 2016 (Terracon 2016). The geotechnical reports indicate that surface water infiltration and groundwater entering the OLF from the north both contribute to the OLF slope instability. The long-term goal is to increase the slope stability and maintain the integrity of the OLF cover.

Based in part on the geotechnical reviews, two activities were implemented in August and September 2016. The first activity involved using a Geoprobe (a direct-push drilling rig) to install 16 temporary wells/piezometers on the pediment immediately upgradient and north of the OLF to measure groundwater levels, locate historical buried utilities and excavations, and determine potential safety and health considerations for future subsurface work upgradient/north of the OLF on the Site pediment. Contact Record 2016-03 describes this effort (Overview, Appendix F), and Figure 1 illustrates the locations of these wells and buried drains. The groundwater levels in these wells/piezometers were measured weekly to provide data for future stabilization and modeling projects. (Other wells in the OLF area are also monitored weekly for water level; see the Groundwater Monitoring volume of this report for additional discussion.)
The second activity involved measuring bedrock elevations as part of the Geoprobe investigation. The bedrock elevations from these 16 wells/piezometers were combined with previously collected data and a more accurate bedrock elevation contour plot was generated.

The bedrock elevation plot was used to update the OLF groundwater modeling effort and could aid in the placement of sumps and groundwater removal systems. The buried utilities and their associated excavations will be targeted, if appropriate, for groundwater intercept work in the near future to minimize groundwater intrusion within the slope of the OLF.

3.2.7 2016 EPC Maintenance

In the spring of 2016, after several storms saturated the ground at the Site, the eastern edge of the landfill began to crack and slump between Berms 5 and 6, although to a lesser extent than it did in 2015. The slump’s toe partially blocked the EPC at the southeastern edge of the OLF (Figure 1). Repairs began in September 2016 and were completed in October 2016. This effort involved removing slumped materials blocking the EPC, regrading the eastern ends of Berms 4 and 5 to create flow channels with steeper grades, and filling in localized low spots along the flow line of Berm 5 to reduce the potential for ponding and surface water infiltration. This work, covered under Contact Record 2015-03 (Overview, Appendix F), was conducted outside the waste footprint.

Erosion-control matting was placed over the disturbed areas, and the areas were reseeded. Excess soil generated by the regrading efforts was used to fill a low spot on the pediment north of the OLF.

3.2.8 2016 East Subsurface Drain Upgrade

Additional actions to improve the diversion of groundwater away from the OLF included the repair and upgrade of the ESSD in the northeast corner of the OLF so that it functions as intended and is less likely to clog. The ESSD (Figure 1) is upgradient of the area that exhibited the most significant slumping in 2016, and it no longer operated as installed. The ESSD was initially constructed in 2005 as an open, graded rock drain with no geotextile filter fabric to reduce the potential for clogging. The drain could not be cleaned without being excavated. While the ESSD had not fully stopped working—minor seepage continued to issue from it in 2016—it no longer functioned as originally intended, when several gallons per minute issued from the drain. The excavation of portions of the ESSD in the summer of 2015 failed to provide an outlet for water that might have been collecting in the buried rock drain.

Based on the information above, work at the ESSD began in December 2016 to repair and upgrade it so that it properly functions and is less likely to clog. The intent was to divert groundwater, via the ESSD, before it enters the area of the most significant slumping.

Contact Record 2016-04 describes this effort. This action was completed in January 2017, before groundwater levels were anticipated to rise again and additional hillside movement was more likely.
3.2.9 2017 Path Forward

In response to the slumping, cracking, and displacements that have occurred at the edges of the landfill, DOE initiated a multifaceted effort to further evaluate and reduce the instability of the slopes surrounding the OLF. The Original Landfill Path Forward, Rocky Flats Site, Colorado, report (the OLF Path Forward report), finalized in January 2017, documents this effort (DOE 2017).

The OLF Path Forward report considers the various causes of the landfill instability and potential ways to address these causes. The most practical conditions to focus on to reduce the instability are reducing the volume of water that enters the OLF and physically stabilizing the toe of the unstable areas using a buttress. Note that the recent instabilities and movement have occurred on the west and east edges of the landfill where there is no toe buttress, and generally outside the waste footprint.

The OLF Path Forward report identified 11 options that were evaluated for their potential to mitigate the slumping and movement on the OLF (DOE 2017). These options were qualitatively evaluated using specific criteria.

Planning for one of the 11 options (temporary groundwater intercept system) was in progress as 2016 ended, and this work is scheduled for construction in spring of 2017. The goal of this option is to divert what may be the most significant sources of groundwater before they enter the OLF. The main focus will be the abandoned storm-water lines from former Buildings 460 and 444 and associated bedding materials, because those bedding materials and the trenches themselves may represent preferential flowpaths even if the pipes themselves are plugged.

This effort will remove groundwater using two wells or sumps and a drain system located north of the OLF, outside of the waste footprint. As stated, construction of the groundwater intercept system is scheduled to begin in spring of 2017.

4.0 Former Building Area Inspections

Former building areas are routinely inspected (i.e., quarterly and weather-related inspections) for evidence of subsidence. These areas include former Buildings 371, 771, 881, and 991. After a significant precipitation event in April, additional subsidence was noted in the former Building 881 area at a location where subsidence had been previously filled. The new subsidence was approximately 4 feet in diameter and 3 to 4 feet deep. The subsidence area was filled with soil and graded smooth.
5.0 North Walnut Creek Slump

Slumping on the hillside east of the SPPTS continued to develop after the heavy precipitation events of 2015. The toe of the slump encroached on the road leading to the SPPTS Discharge Gallery and the Interceptor Trench System Sump (ITSS) but the slumping did not appear to be causing other issues. During the spring precipitation of 2016, the slumping became more pronounced. Site staff determined that if significant additional movement occurred in the future, a groundwater monitoring well, the ITSS, and the SPPTS trench could potentially be impacted. In addition, it is possible that portions of the subsurface Intercept Trench System (ITS) drain lines that are located downgradient of the SPPTS groundwater intercept trench may have been affected by the slump movement. A statement of work was prepared and a geotechnical engineering firm was hired to evaluate the slumping area and the potential effect on SPPTS components.

The geotechnical evaluation indicated that continued movement is likely and that further movement would likely impact SPPTS components. The evaluation also included several preliminary recommendations.

Grading of the North Walnut Creek slump and repairing tension cracks by excavating to the bottom of the crack and backfilling the excavation is being planned for the spring of 2017. The purpose of repairing the tension cracks is to minimize surface water (e.g., precipitation) infiltrating into the slump area soils and contributing to the instability of the area. This grading effort is a temporary fix; a more extensive evaluation will be conducted.

6.0 Site Road Maintenance

Access to different areas of the Site is provided by established gravel roadways and all-terrain vehicle (ATV) paths; these are typically maintained on an annual basis. Maintenance includes grading and filling ruts on the primary routes. In June 2016, a dust suppressant was applied on the primary routes to aid in dust control. Site roads are continually monitored throughout the year and after significant weather events to ensure safe passage of Site personnel for routine operations.

Watering for dust control was performed as needed, especially during construction projects when there was additional truck traffic.

7.0 Sign Inspections

It is required that “U.S. Department of Energy - No Trespassing” signs be posted at intervals around the perimeter of the COU to notify persons that they are at its boundary. It is also required that signs listing the use restrictions (ICs) and providing contact information are posted at access points to the COU. The signs are required as physical controls of the remedy, 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 treatment systems, and monitoring equipment, which are also inspected routinely during monitoring and maintenance activities.

The signs were inspected quarterly during CY 2016 as required (February 11, May 2, August 23, and November 15). A couple of signs had letters missing, which were replaced. Other signs knocked off by deer or elk were reinstalled.

8.0 Erosion Control and Revegetation

The existing erosion controls are maintained and repaired to protect bare soil areas until the vegetation can stabilize the soil. Areas lacking sufficient vegetation cover are assessed and typically reseeded. In some cases, soil amendments are added to help establish the native vegetation. Additional information on the revegetation activities conducted at the Site during 2016 is provided in the Ecological Monitoring volume to this 2016 annual report.

Maintenance, repair, replacement, and monitoring of the Site erosion control features continued as needed through 2016. Guidance in the Erosion Control Plan for the Rocky Flats Property Central Operable Unit (ECP) (DOE 2007) was followed for various projects conducted in 2016. The plan addresses the regulatory approach, monitoring inspections, and applicability and scope of erosion control activities at the Site. It outlines the responsibilities, BMPs, and implementation aspects for erosion control activities before, during, and after projects. Erosion controls were inspected on a regular basis (typically weekly or monthly depending on location) or following high-wind events that are common at the Site and after significant precipitation events. Repairs in 2016 included restaking (or weighting with rocks) wattles or erosion blankets that had loosened. Woodstraw was added to some locations and GeoRidges were also installed at locations to provide added protection. Several monitored locations met the success criteria in the ECP for vegetation establishment, so erosion control monitoring has been discontinued at these locations.

9.0 References

CDPHE (Colorado Department of Public Health and Environment), DOE (U.S. Department of Energy), and EPA (U.S. Environmental Protection Agency), 2012. Rocky Flats Legacy Management Agreement, as revised, including Attachment 2 modifications, December. Available at https://www.lm.doe.gov/Rocky_Flats/RFLMA.pdf.


