2.0 Site Operations and Maintenance

2.1 Annual Site Inspection

Evidence of significant erosion and IC violations must be inspected for annually, in accordance with RFLMA Attachment 2, Sections 5.3.4 and 5.3.6. The 2011 inspection was conducted on March 15, 2011, and reported in the Rocky Flats Site Quarterly Report of Site Surveillance and Maintenance Activities, First Quarter Calendar Year 2011 (DOE 2011e).

The following categories were monitored during the inspection:

- Evidence of significant erosion in the COU and evaluation of the proximity of significant erosion to subsurface features in RFLMA Attachment 2, Figures 3 and 4. This monitoring included visual observation for precursor evidence of significant erosion (e.g., cracks, rills, slumping, subsidence, sediment deposition);
- The effectiveness of ICs, as determined by any evidence of their being violated; and
- 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. This verification is required annually. In addition, physical controls (signs placed along the COU fence) were also inspected.

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 were noted as having evidence of erosion, possible depressions, or holes. Except for a deep hole in the vicinity of the former Building 881 southwest corner, these appeared to be minor and very limited in area. Survey coordinates indicate that the location of this deeper hole was the south stairwell leading from the building entrance hallway to the basement level. A photograph of the hole is included in Appendix A of the Rocky Flats Site Quarterly Report of Site Surveillance and Maintenance Activities First Quarter Calendar Year 2011 (DOE 2011e), along with a copy of the building footprint showing the location. Based on the final characterization surveys of former Building 881, the building met free release criteria, and it was demolished by explosive demolition, resulting in the upper two floors collapsing onto the bottom floor. The area was then filled and contoured. The hole appears to be due to settling of fill material at the bottom area of the staircase, causing the fill soil to settle into the staircase structure that did not fully collapse during demolition.

The general area surrounding the hole was fenced off with temporary fencing, and S.M. Stoller Corporation (Stoller) Engineering provided guidance on the method to fill the hole. The hole was filled on March 30, 2011, using 28 tons of imported structural fines and 20 tons of imported Rocky Flats Alluvium. The fill material was imported from a pit located to the west of Rocky Flats Site. Fill material was hauled to the site with a tandem dump truck and staged approximately 60 feet away from the hole. An excavator was then used to move the material from the staging area directly into the hole. Fill material was mechanically compacted by using the bucket of the excavator. Final grade of the compacted fill was left approximately 1 foot above the surrounding grades so that any minor settlement of the fill material would not create a
depression. The area was re-seeded with Rocky Flats native seed varieties upon completion of the project.

Based on the depth of the Building 881 hole and the possibility that other holes could form in the future above buried subsurface structures, site operations personnel now inspect selected areas quarterly. The surface locations have been marked with fence posts for ease of conducting inspections, and access to these locations is managed using the Site work authorization and approval process.

Most inspection observations were related to metal debris on the surface or trash that was either picked up or marked for subsequent removal and pickup. Rocky Flats field operations subject matter experts will subsequently visit the areas to determine if any observations appear to be significant or require repairs and to collect debris to close out all items in the Site Observation Log.

Note that the 2011 inspection also included the SW027 drainage area, to look for signs of significant erosion or precursors of significant erosion, such as cracks, rills, slumping, subsidence, and sediment deposition. This area was included pursuant to the revegetation seeding and erosion controls installed as follow-up actions for elevated levels of plutonium at SW027 (DOE 2010g). See Contact Record 2010-06 and the 2010 Annual Report (DOE 2011d) for a discussion of the SW027 monitoring data and mitigation actions. There were no signs of significant erosion or precursors to erosion. The compost/wood-chip-filled wattles that were placed on the hillside in 2010 are holding up well and working effectively.

No evidence of violations of ICs or physical controls was observed.

On March 13, 2011, a team member verified that the Environmental Covenant for the COU remains in the administrative record (AR #PD-A-000054) and on file with the Jefferson County land records, which are used by the Planning and Zoning Department.

No adverse biological conditions were noted during the inspection.

2.2 Selected Buried Structure Inspections

As noted in Section 2.1, because of the subsidence hole found at former Building 881, periodic inspections of areas with remnants of former buildings are being conducted more frequently than the annual inspection. In the fourth quarter of 2011 it was noted that a minor depression and surface cracking had formed on the gravel road that is just south of former Building 771. Evaluation indicated that the subsidence and cracking were in the vicinity of a stairwell on the south east corner of the building.

Based on this observation, the area was fenced with T-posts and rope, and this portion of the road closed. Traffic is now routed further south of this location. The depression and minor cracking area will be filled and graded as needed to be consistent with the surrounding grade and to prevent erosion of the area.

No other former building areas were noted as having depressions or subsidence.
2.3 Pond Operations

Five constructed ponds collect and manage surface-water runoff at the Site.1 The ponds are the A-Series Ponds in North Walnut Creek (A-3 and A-4), B-5 in South Walnut Creek, and C-2 near and alongside of Woman Creek, and the Present Landfill Pond in No Name Gulch. Ponds A-4, B-5, and C-2 are referred to as “terminal ponds” because they are the farthest downstream ponds in their respective drainages, and because they are the ponds from which water originating in the former Industrial Area (IA) is discharged offsite. Discharges of water from the Walnut Creek terminal ponds were performed using a batch-release method through September 11, 2011. On September 12, 2011, outlets at both Ponds A-4 and B-5 were opened to initiate flow-through operations. Similarly, flow-through operations for Pond C-2 began on November 7, 2011.

During CY 2011, the Site performed two terminal pond batch discharges (one each at A-4 and B-5). Pond A-3 discharged to Pond A-4 in flow-through mode during CY 2011 (Table 2). As of December 31, 2011, the Landfill Pond and Ponds A-3, A-4, B-5, and C-2 were holding a total of approximately 6.7 million gallons (6.7 percent of total capacity).

<table>
<thead>
<tr>
<th>Discharge/Transfer</th>
<th>Dates</th>
<th>Volume (million gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pond A-3 to A-4</td>
<td>1/1–12/31/11 (flow-through)</td>
<td>19.7</td>
</tr>
<tr>
<td>Pond A-4 to North Walnut Creek</td>
<td>3/24–3/30/11</td>
<td>3.3</td>
</tr>
<tr>
<td>Pond B-5 to South Walnut Creek</td>
<td>3/24–3/30/11</td>
<td>3.5</td>
</tr>
<tr>
<td>Pond A-4 to North Walnut Creek</td>
<td>9/12–12/31/11 (flow-through)</td>
<td>11.1</td>
</tr>
<tr>
<td>Pond B-5 to South Walnut Creek</td>
<td>9/12–12/31/11 (flow-through)</td>
<td>8.5</td>
</tr>
<tr>
<td>Pond C-2 to Woman Creek</td>
<td>11/7–12/31/11 (flow-through)</td>
<td>3.5</td>
</tr>
</tbody>
</table>

As described in Section 3.1.2.11, predischarge samples were collected during CY 2011 at Ponds A-4, B-5, and C-2 prior to each batch discharge and prior to opening the valves to initiate flow-through operation. All predischarge sample results suggested that discharged water would meet water quality standards at downstream POCs. Subsequent POC sampling during discharge also indicated acceptable water quality for the discharged water (see Section 3.1.2.1). The valves at Ponds A-4, B-5, and C-2 were all successfully exercised through their full travel periodically during the year. The Landfill Pond valve was also periodically exercised during CY 2011; the Present Landfill Pond is normally operated in a flow-through configuration.

Routine dam inspections, pond-level measurements, and piezometer measurements were performed as scheduled during the year. Annual dam mowing and vegetation removal was completed in October. Semiannual or quarterly (as applicable to specific dams) movement monument surveys and inclinometer readings were also performed approximately as scheduled.

In compliance with the State of Colorado Rules and Regulations for Dam Safety and Dam Construction, a registered professional engineer conducted a formal dam safety inspection for Dams A-4, B-5, and C-2 in October 2011.2 All inspected dams received a “satisfactory”

---

1 Former Dams A-1, A-2, B-1, B-2, B-3, and B-4 were breached during 2008–2009.
2 The PLF and A-3 Dams were not inspected in 2011; both dams are scheduled to be breached by June 2012.
condition rating and a recommended safe storage level of “full.” Recommendations to enhance dam safety included the following:

• Monument and inclinometer data for Dam B-5 continue to suggest that apparent small movement and settling of the dam is occurring. Monument and inclinometer monitoring should continue at the increased quarterly frequency.

• Shallow cracks were observed in the crests of A-4 and B-5 that are believed to be shrinkage cracks. These should be monitored for any increase in size and vertical displacement.

• Visual inspection of the downstream slopes at A-4, B-5, and C-2 should be made regularly to look for slumping or bulging.

• Rodent activity was noted at A-4, B-5, and C-2. This activity should be monitored closely and controlled if necessary.

• Spaces between the piezometer/inclinometer pads and the ground surface were noted at some locations. These spaces should be backfilled.

2.4 Landfills

The annual report of the results of inspections, monitoring data, and maintenance activities for the PLF and OLF is provided below.

2.4.1 Present Landfill

The PLF consists of an approximately 22-acre engineered 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 Landfill Pond. A 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 these 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.

Inspections and monitoring tasks follow the format and protocol established in the PLF M&M Plan and include groundwater and surface-water monitoring, as well as monitoring subsidence and consolidation, slope stability, soil cover, vegetation, stormwater management structures, and erosion in surrounding features. This monitoring is conducted so that corrective actions can be taken in a timely manner. Monthly inspections were initiated in October 2005. Quarterly inspections were initiated in the fourth quarter of CY 2007 as described in RFLMA Contact Record 2007-08.
2.4.1.1  Inspection Results

Four inspections were performed at the PLF in CY 2011. The inspection process followed the format and protocol established in the PLF M&M Plan. No significant problems were observed during these inspections. Appendix C contains the landfill inspection forms for the fourth quarter of CY 2011; earlier 2011 inspection forms are included in the applicable quarterly reports.

PLF area surface-water and groundwater monitoring, and operation of the PLFTS, is covered in those respective sections of this report.

2.4.1.2  Slumps

On February 13, 2007, a slump was discovered on the south-facing hillside just east of the PLF. The slump is not on the PLF, and engineering review determined that it does not impact the PLF cover. The slump was likely caused by heavy snow conditions and influenced by the post-closure lower water levels in the Landfill Pond. Therefore, regrading the slump is not necessary; however, deep-rooted plants were planted in the slump area to promote stabilization. There were no significant changes to the slumping area in CY 2011.

2.4.1.3  Settlement Monuments

The annual survey was completed in December 2011. Results of the settlement monument survey indicate that settling at each monument does not exceed expected settlement calculated in the final design and does not trigger any maintenance activity under the PLF M&M Plan.

2.4.2  Original Landfill

The OLF consists of an approximately 20-acre soil cover over a former solid sanitary and construction debris landfill. The final cover consists of a 2-foot-thick Rocky Flats Alluvium soil cover that was constructed over both a regraded surface and a buttress fill and then revegetated. The original surface was regraded to provide a consistent slope. A 20-foot-high, 1,000-foot-long soil mass buttress fill was placed at the toe of the landfill. 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 OLF M&M Plan (DOE 2009a).

2.4.2.1  Inspection Results

Twelve inspections were performed at the OLF in CY 2011. The inspection process followed the format and protocol established in the OLF M&M Plan. Appendix C contains the landfill inspection forms for the fourth quarter of CY 2011; earlier 2011 inspections forms are included in the applicable quarterly reports.

OLF area surface-water and groundwater monitoring is covered in those respective sections of this report.
2.4.2.2 Settlement Monuments

The settlement monuments were surveyed in March, June, September, and December 2011. Survey data indicate that settling at each monument does not exceed expected settling calculated in the final design and does not trigger any maintenance activity under the OLF M&M Plan.

2.4.2.3 Geotechnical Investigation and Repairs

Conditions that warranted further repair and that triggered further investigation were found at the OLF beginning in 2007. This resulted in a geotechnical investigation of the conditions and repairs and maintenance actions to address conditions. This work is summarized in the RFLMA annual report for 2009 and quarterly reports for 2010 (DOE 2010d, 2010c, 2010e, 2011b). In 2010 additional maintenance was completed at Berm 1 and recontoured the eastern end of Berm 7 where the berm was slumping into the eastern perimeter channel. This work is fully described in the quarterly reports for the second and third quarters of CY 2010. (DOE 2010e, 2011b) Locations are shown on Figure 1.

In 2011 no additional maintenance or repairs related to conditions addressed in the geotechnical investigation were needed.

2.4.2.4 Inclinometers

Seven inclinometers were installed in boreholes at the OLF in 2008 as part of the geotechnical investigation (Figure 1).

Movement of the inclinometers has been monitored approximately monthly since installation. During the fourth quarter CY 2011, the inclinometers were monitored on October 20, November 22, and December 21. No noticeable deflection was indicated during the quarter.

Inclinometers deflect based on lateral movement of the ground in which the inclinometer is located and can deflect enough to cause the inclinometer tube to break. Once an inclinometer tube breaks, it will no longer be monitored. Inclinometer monitoring data provide information on localized soil movement and serve to focus periodic inspections of the soil surface on signs of potential instability, such as cracking, vertical displacement, and slumping. A deflection of more than 1 inch is used as a trigger for evaluation of the data by a qualified geotechnical engineer. The engineer determines the significance of the deflection in relation to recommendations for maintenance or repairs to address potential instability in accordance with the OLF M&M Plan (DOE 2009a).

During 2011, deflection was minor. Although it did not trigger a formal geotechnical evaluation, a qualified geotechnical engineer has reviewed the inclinometer data. The Technical Memorandum Regarding Instrumentation and Monitoring at the Rocky Flats OLF that discusses the evaluation is included as Appendix E.
Figure 1. Original Landfill Observed Surface Cracking Location and Inclinometer Locations
The conclusion of the data review is that recommendations made in the 2008 geotechnical investigation remain valid. The instrumentation indicates that instability is caused by one or more weak layers in the shallow subsurface, and movement is exacerbated by precipitation events and elevated water levels. Slope stability modeling indicates that on a large scale, the overall slope is stable. Localized failures have occurred on the OLF under elevated water level conditions, but continued monitoring and maintenance provide an effective course of action.

2.4.2.5 Topographic Survey

In accordance with Section 3.1, “Inspection Procedures,” of the OLF M&M Plan, a topographic survey will be conducted approximately every 2 years as an aid in periodically evaluating the subsidence and consolidation, slope stability, and storm-water management structure conditions at the OLF.

As discussed in the third quarterly report for CY 2011, the biennial topographic survey was completed in March 2011. The survey serves as a baseline for continued observation of berms and helps to identify areas for additional maintenance. Subsequent topographic surveys will be used to identify areas that require additional soil to maintain minimum heights, areas of ponding, or slopes indicating channel areas that may be conducive to ponding.

The survey results were mapped by engineering staff, and plans were developed (1) for adding minor amounts of soil to specific areas on the diversion berms to maintain minimum berm height and (2) for minor adjustments to the slope in some locations in berm channels. The results of the survey were forwarded to a qualified geotechnical engineer for review. The Technical Memorandum of the geotechnical engineer review of the survey results is included in Appendix A of the third quarterly report for CY 2011. Berm maintenance was completed in the third quarter. The survey confirmed that the required minimum average slope of the berm channels was 2 percent.

2.5 Groundwater Plume Treatment Systems Maintenance

The system-specific summaries below focus on the maintenance and operation of the MSPTS, the East Trenches Plume Treatment System (ETPTS), and the Solar Ponds Plume Treatment System (SPPTS) during CY 2011. Refer also to previous quarterly reports from 2011 (DOE 2011e, 2011f, 2012a).

Details of the monitoring of the treatment systems, including the PLFTS, are presented in Section 3.1.2.10, and interpretations related to system operation and the corresponding contaminant plumes are provided in Section 3.1.5.3.

2.5.1 Mound Site Plume Treatment System

Routine maintenance activities continued at the MSPTS through CY 2011 in addition to completion of system upgrades. During 2011, the system operated in parallel upflow, having been modified from series flow in CY 2010 in response to clogging of the zero-valent iron (ZVI) media.
A complete ZVI media replacement for both treatment cells started in February and was completed at the end of March. In addition to media replacement, plumbing upgrades and repairs were accomplished and a treatment finishing component was installed at the treatment system by the end of March. This is discussed in further detail in Section 2.5.1.1.

The media replacement activity required significant manual effort, especially for treatment Cell 1. The uppermost pea gravel layer in Cell 1 was extremely easy to remove, but the layer of ZVI beneath had cemented and hardened, and it required additional methods to remove. Jackhammers and rotary hammer-drills were used to loosen this cemented media. As a result, media removal from Cell 1 took 6 days to complete. The media in Cell 2 had not hardened; it was much more granular and took less than 4 days to remove. This variation in media consistency reflects the series flow configuration of the system prior to being changed to parallel upflow at the end of CY 2010. Cell 1 had been configured to operate in upflow (water entered at the bottom and flowed upward through the media, exiting at the top) and Cell 2 still operated in downflow.

After the media had been removed, new influent distribution galleries were plumbed and installed in each treatment cell. Additional plumbing was installed to support potential future upgrades similar to those completed at the ETPTS in 2009 (which would reduce the need to excavate influent and effluent lines; see DOE 2010d).

The clogged, subsurface effluent discharge gallery for the system, which is located adjacent to Function Channel (FC)-4, was repaired during this time by replacing the existing PVC discharge pipe and gravel bedding. The new PVC pipe was placed in the same configuration as the former pipe, and aggregate was used to bed and fill the trench above the pipe in order to match existing topography.

Additional routine, weekly activities included water level measurements and inspection of the influent and effluent flow conditions.

2.5.1.1 **MSPTS Effluent Manhole Air Stripper**

The annual report for 2010 (DOE 2011d) describes MSPTS effluent water quality and difficulties in treatment. As a part of the media replacement activity, potential effluent polishing components were evaluated. Several options were considered to improve volatile organic compound (VOC) treatment. The option that was selected was a small, solar/battery-powered air stripper installed within the pre-existing effluent manhole. This component was also installed by the end of March 2011, and much of the subsequent MSPTS operation and maintenance effort was focused on this air stripper. Refer to Appendix F for more information on the air stripper, including other options that were considered, the initial testing conducted to evaluate the appropriateness of this component, its design, and its subsequent optimization.

Optimization of this air stripper continued throughout 2011 and into 2012. As described in Appendix F, this component operates for only 12 hours per day. Upon completion of optimization efforts and confirmation that the air stripper performs adequately (both in terms of water treatment and operational/maintenance needs), additional power infrastructure and any other necessary equipment will be installed to provide full-time operation. The design and
implementation of this system will be used to build a similar air stripper system at the ETPTS, which will be discussed in further detail in Section 2.5.2.

Routine maintenance of the air stripper typically entailed using a spray bottle with distilled water to clean the intake screen of the pump that forces water through the spray nozzles, exercising the spray nozzle valves, and cleaning the solar array of dirt and debris. Freeze protection (i.e., insulation) was installed on the inside of the manhole lid to protect equipment against harsh winter temperatures and to enhance treatment. The air temperature in the manhole was monitored in addition to changes in the line pressure of the pump (which typically indicated if cleaning was becoming necessary). Overall, the change in environmental temperatures had no impact on the operation of the pump equipment. At the end of December, the air stripper pump malfunctioned and air stripper optimization was put on hold. The pump was returned to the manufacturer in early 2012 for diagnosis and repair. It was later determined that the internal diaphragm of the pump had failed for reasons entirely unrelated to the specific use of the pump.

2.5.2 East Trenches Plume Treatment System

Routine maintenance activities continued at the ETPTS through CY 2011. The flow configuration at this system was parallel upflow (i.e., water is split between each cell, with a portion rising through the media in Cell 1 as the rest rises through the media in Cell 2, and these flows are commingled as they exit the system) for the majority of 2011. This configuration has been in effect since the media replacement in late 2009 was completed. Samples collected during fourth quarter 2011 indicated that groundwater treatment and effectiveness of the media had declined, eventually leading to reconfiguring system flow to series, upflow through Cell 1 and then downflow through Cell 2. Subsequent samples confirmed this addressed the treatment difficulties. Refer to 3.1.5.3 for additional information on this topic.

Routine weekly maintenance activities included inspection of influent and effluent flow conditions. In addition, accumulations of biological growth are skimmed from the surface of the standing water above the media in each cell, the plumbing drain that routes the standing water out of each treatment cell is brushed, and the lines from the tops of each cell are purged.

2.5.3 Solar Ponds Plume Treatment System

This section addresses the operation and optimization of the SPPTS. Routine inspections included monitoring water levels, line pressures, power consumption, and flow rates, and cleaning flow meters and lines. For a discussion of treatment system monitoring and performance, refer to Sections 3.1.2.10 and 3.1.5.3. A summary of the SPPTS upgrades is also included.

Due to the wet spring in April and May, water levels in the SPPTS groundwater intercept trench rose, and the influent flow rate, maintained at a relatively even rate for months to support objectives associated with optimization of Phases II and III and the SPPTS as a whole, was increased.

During CY 2011, few maintenance issues arose within the original concrete structure (which contains the original treatment cells, Cell 1 and Cell 2, as well as the overburden covering the media in these treatment cells). These issues were almost exclusively related to hydraulics within
the original cells. Several maintenance issues were addressed during CY 2010 (DOE 2011d), but little active maintenance was needed during CY 2011.

A puddle that had formed on the surface of the overburden within the original structure persisted throughout CY 2010, but it dried up by March CY 2011. The auxiliary distribution gallery installed in 2010 was not inspected in any detail, nor were continued attempts made to improve flow through this or the original Cell 1 influent distribution gallery following the efforts of 2010 (DOE 2011d).

The additional infrastructure installed as part of the Phase I upgrades continued to operate throughout CY 2011. (These components primarily include the additional groundwater collection sump referred to as the Intercept Trench System Sump [ITSS], a new effluent line and effluent monitoring location, and a new vault housing at this effluent monitoring location, plus additional plumbing and power equipment to serve these additions.) Routine inspections of these components include monitoring water levels, power usage, effluent flow totals, and details of pump operation.

The influent pump (SPIN) began experiencing power problems in October 2011. The pump rate would decline rapidly such that the pump control voltage needed to be reset daily. This issue would periodically self-correct, but continuing, occasional difficulties led to a thorough evaluation and correction of the underlying electrical cause in early 2012. The inconsistency in SPIN flow during the fourth quarter did not impact the overall treatment of the system.

Routine operation and optimization activities focusing on the Phase II and Phase III components included monitoring water levels, power usage, flow totals, and pumping operations. Flow rates were a main focal point throughout the year. Flow rates were adjusted by varying both the control voltage delivered to the pumps installed within the system influent line (denoted as SPIN) and the Metering Vault (which delivers water to Cells A and B), essentially “turning them up” or “turning them down,” and adjusting the valves downstream of those pumps to open or constrict flows.

The Phase II cell operated throughout CY 2011 (its reduced treatment effectiveness is discussed in Section 3.1.5.3) and required minimal maintenance that was generally limited to routine monitoring of water levels, flow rates, and pressures.

Phase III Cell A operation continued throughout 2011, though the Phase III pilot-scale studies had been concluded (see Section 3.1.5.3). Operational parameters that were adjusted included liquid carbon dose rates, influent flow rates, and use of the recirculation pump.

Biofouling in Cell A became a significant maintenance and overall system performance issue during CY 2011. Initial biofouling was prevalent at the end of CY 2010. The accumulation of biological debris led to slime-coated media, a quantity of the media floating well above the water level (thereby being short-circuited by water flowing through the cell), and the release of gas while the media was poked with a mixing instrument (typically, a 6 foot wooden oar). Poking and mixing the inert plastic media became a part of weekly treatment system inspections. Observations of the smell of Cell A, condition of the media, and the sound while the media was being mixed all contributed to the decision that the media needed to be removed and cleaned. (Note that, as a short-term pilot study, Cell A was not originally equipped with a means to
control or remove accumulations of biomass. Extending its operation led to the need to manually address this.)

At the beginning of the third quarter, the carbon dosing was shut off for several weeks to attempt to reduce the biofouling and associated clogging of the system. Dosing was then resumed at a reduced rate (60 percent of its prior value). At the beginning of May, some of the equipment associated with Cell A performance began to malfunction, including the recirculation pump and the pump directing water from the Phase II cell to Phase III cells. In addition, the biofouling had worsened such that quantities of the inert media needed to be removed from the cell in order to close the lid. Cell A was taken offline in June 2011 to address the biofouling and equipment issues.

Two attempts were made to address the biofouling of Cell A, a lower-energy effort and then a much more intensive effort (because the lower-energy effort was not successful). Initially, a hot water pressure washer was used to try to break apart and thoroughly mix and wash the Cell A media while it was contained within the cell. This was unsuccessful because the pressure was not adequate and the wand was not long enough (although, with a longer wand and higher pressures, this approach might still be inadequate).

The second attempt was much more labor-intensive and entailed physically removing the media from the cell. Like the first method, water was first removed from Cell A and stored to act as inoculum following completion of the cleaning process. The water was then drained from the cell. A simple drum-head vacuum was used to remove the media from the cell. The media was removed in small volumes (approximately 30–40 gallons) and placed in a wooden-framed box with screen sides. The biofouled media was spread out on the screen surface and sprayed clean using the heated pressure washer. Once the media was cleaned, it was placed into plastic bags and set aside until all of the media had been removed and cleaned. At that point, the accessible interior surfaces of Cell A were also sprayed down. The remaining fluids were drained from the cell. All of the cleaned media was then returned to Cell A. The cell was filled with dosed influent and the inoculum and left to recirculate for several days before being placed back online.

Cell A was offline for five weeks while the biomass issue was addressed. Poking and mixing the media continued to be a part of routine treatment system inspections to limit biomass accumulation and postpone repetition of the media cleaning activity. Treatment and biomass conditions were monitored for the remainder of CY 2011. Precipitates removed from Cell A were analyzed and found to be primarily biological with significant carbonate and iron content (Cell A is downstream from the Phase II Cell).

Phase III Cell B operated under continuous flow conditions throughout CY 2011, apart from work to effect repairs as noted above and the Cell A maintenance event. Routine maintenance was performed on Cell B, such as monitoring water levels and cleaning the flow meter, but otherwise the cell was not disturbed. Cell B was taken offline in November 2011 to support the “microcell” tests discussed in Section 3.1.5.3, as components of the Cell B influent line (such as the flow meter, line pressure gage and influent piping) will be used for these tests. Results and discussion of the microcell tests will be included in the CY 2012 Annual Report.

2.6 Erosion Control and Revegetation

The existing erosion controls are maintained and repaired to protect the bare soil areas until the vegetation can stabilize the soil. Areas lacking sufficient vegetation cover are assessed, and
typically reseeded; however, in some cases, soil amendments are added to help establish the native vegetation. Additional information on the revegetation activities conducted at the Site during 2011 is provided in Section 3.2.2.3.

2.6.1 Erosion Control

Maintenance, repair, replacement, and monitoring of the Site erosion control features continued as needed through 2011. Assessing the erosion control is especially important following the high-wind events that are common at the Site and after significant precipitation events. Typical repairs included re-staking (or weighting with rocks) wattles or erosion blankets that had loosened. The Erosion Control Plan for the Rocky Flats Property Central Operable Unit (DOE 2007b) was followed for various projects conducted in 2011. The plan addresses the regulatory approach, monitoring inspections, and the 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.

2.7 General Site Maintenance and Operations

The Site is managed and maintained, and activities are conducted, pursuant to DOE’s jurisdiction and control responsibilities. These activities help maintain the general condition of the Site through BMPs. The Site is assessed both according to a schedule and continuously. Highlights of the routine and nonroutine maintenance and operations are described below.

2.7.1 Site Road Upgrades

2.7.1.1 Site Road Upgrades 2011

The Site Road Upgrades 2011 Project was completed in June 2011. The scope of the project included the regrading of existing road sections at the Rocky Flats Site. Heavy equipment was used to regrade and compact the road surfaces. Additional 3/4-inch rock was added to help strengthen the road surface.

2.7.1.2 PLF Road Upgrades

The PLF Road Upgrades Project was completed in November 2011. The road upgrades were needed to support heavy equipment and trucks used to complete the PLF and A-3 Ponds Dam Breach Project. Heavy equipment was used to regrade road surfaces, apply roadbase as required, and compact the roads surface. Angular rock was spread over the top of the compacted roads to strengthen the road surface.

2.7.2 Site Security

A USFWS officer was assigned to the Rocky Flats National Wildlife Refuge to perform nonroutine security evaluations as well as respond to any security events on the refuge. LM may utilize the services of the USFWS enforcement officer, when available, as well as the existing Memorandum of Understanding with the Jefferson County Sheriff to pursue law enforcement on the COU.

No security infractions were noted on the COU during CY 2011.