

# ROCKY FLATS SITE REGULATORY CONTACT RECORD

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**Purpose:** GS10 Flume Replacement Project and Soil Disturbance Review Plan

**Contact Record Approval Date:** May 2, 2013

**Site Contact(s)/Affiliation(s):** Scott Surovchak, U.S. Department of Energy (DOE); Rick DiSalvo, S.M. Stoller Corporation (Stoller); Linda Kaiser, Stoller; George Squibb, Stoller

**Regulatory Contact(s)/Affiliation(s):** Carl Spreng, Colorado Department of Public Health and Environment (CDPHE); Vera Moritz, U.S. Environmental Protection Agency (EPA)

**Date of Consultation Meeting:** March 13, 2013

**Consultation Meeting Participants:** Carl Spreng, CDPHE; Vera Moritz, EPA; Scott Surovchak, DOE; John Boylan, Rick DiSalvo, Linda Kaiser, George Squibb, Stoller

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**Introduction:** The flume for Rocky Flats Legacy Management Agreement (RFLMA) Point of Evaluation (POE) monitoring location GS10 in South Walnut Creek was originally installed in 1993. DOE considered replacing the GS10 flume in 2000, when it replaced flumes for several other monitoring locations, but it was a low priority in relation to other cleanup and closure work at the time. The new surface water configuration resulting from breaching the dams for former retention ponds B-1, B-2, B-3, and B-4 in 2009 now allows DOE to propose replacing the GS10 flume and to move its location slightly downstream.

The GS10 flume is located just upstream of a massive, deeply anchored, approximately 50-foot-wide concrete diversion structure that blocks the stream channel. The diversion structure has three openings to allow creek water to flow through in corrugated metal pipes (CMPs). The CMP openings are fitted with gate valves, or “headgates.” Water monitored at GS10 flows through the diversion structure, as controlled by the position of the headgates. One headgate controls flow through a 24-inch-diameter CMP into the channel just upstream of the former retention pond B-1. The other two headgates control flow into a concrete distribution box connected to a single 48-inch-diameter CMP that serves as a bypass line around former retention ponds B-1, B-2, and B-3. The concrete distribution box and the CMPs, except the downstream open ends, are buried below the surface on the downstream side of the diversion structure.

The 48-inch-diameter discharge end of the CMP bypass line is downstream and south of former retention pond B-3, so that water flowing through the bypass line goes to former retention pond B-4. The 48-inch-diameter headgates of the CMP bypass line were closed in 2009, and the headgate for the 24-inch-diameter CMP to former retention pond B-1 was opened so that creek water monitored at GS10 now only flows into former retention pond B-1.

The GS10 flume is located at the bottom of fairly steep channel banks, and the bank on the south side has visible localized slumping and sliding toward the creek and GS10. The area just upstream and surrounding GS10 promotes the growth of thick stands of willow saplings, which must be cut periodically to allow access to maintain the flume.

Figure 1 is an aerial photograph of the GS10 flume area, showing the location of the various features described above.

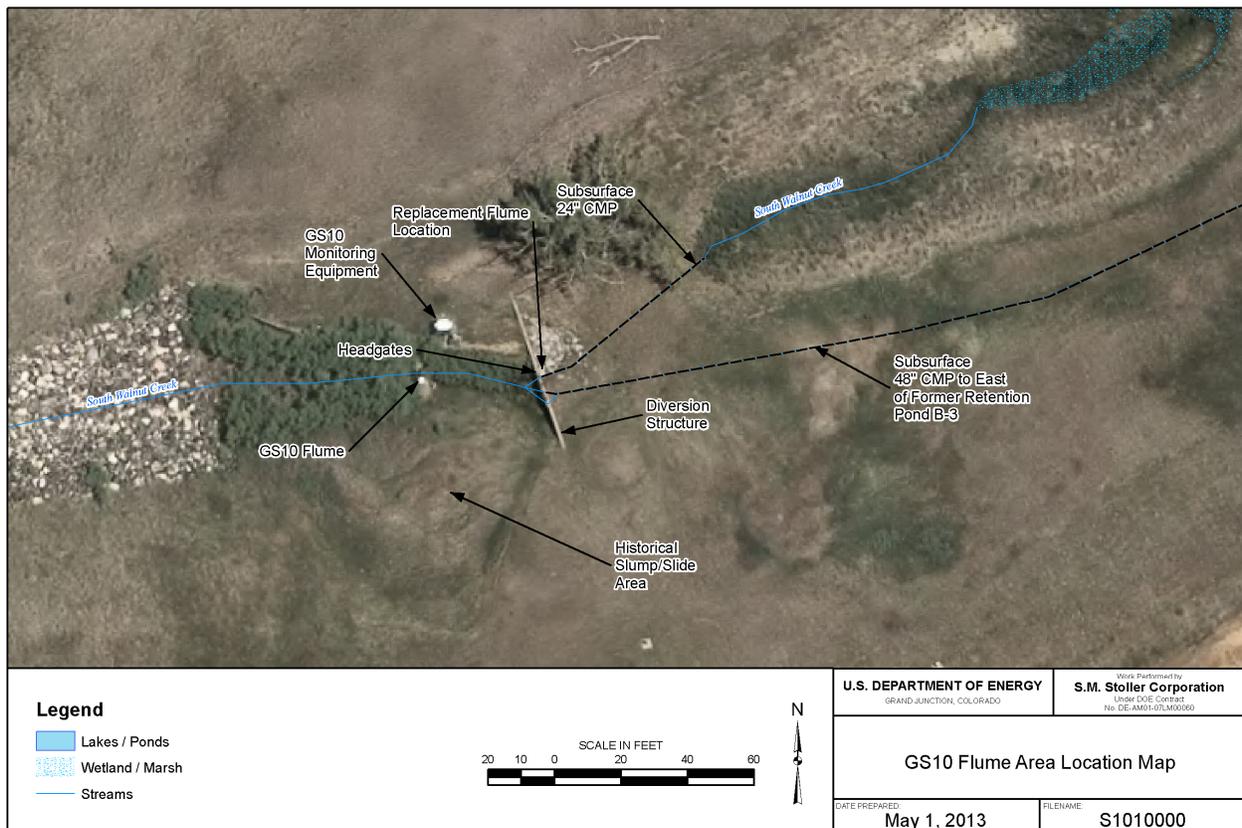


Figure 1. GS10 Flume Area

**Discussion:** DOE will replace the GS10 flume and move the flume location to the downstream side of the diversion structure, which will, among other things, make flume operation and maintenance easier. The creek channel upstream of the diversion structure will be filled and graded to raise the channel elevation, and the diversion structure will be notched at the top to an elevation slightly above the regraded channel elevation. Creek water will then flow through the diversion structure notch instead of through the diversion structure via the subsurface CMPs.

Although the GS10 metal flume currently is operational, additional structure aging and movement of the south hillside could compromise the quality of data collected in the future. Also, the new flume will be a fiberglass H-flume, better designed to measure the lower postclosure flow rate ranges in this portion of South Walnut Creek. The new fiberglass flume will be physically attached to the downstream side of the diversion structure.

The 48-inch-diameter CMP bypass line is no longer used or needed and the new flume location will eliminate the need for the 24-inch-diameter CMP. The headgates will be removed, and the CMP openings will be plugged and placed in a stable configuration as a good management practice.

As part of the construction work, the depression formed by the localized instability on the south side of the creek will be filled and graded to raise and contour the topography consistent with the regraded channel upstream of the diversion structure. This will serve to stabilize this area.

*GS10 Reportable Condition:* DOE is currently implementing the evaluation plans for the RFLMA reportable conditions for americium, plutonium, and uranium concentrations at GS10 in accordance with Contact Records 2011-04, 2011-05, and 2012-08. Information regarding the evaluation monitoring is reported in RFLMA quarterly and annual reports. The monitoring results show that water quality downstream of GS10 continuously meets RFLMA standards. This, along with the results of other evaluation monitoring upstream of GS10, does not suggest that actions besides continued evaluation monitoring to gather additional data are needed at this time. DOE will continue to conduct evaluation monitoring upstream and downstream of GS10 in accordance with the evaluation plans, in accordance with RFLMA Attachment 2, "Legacy Management Requirements," Section 6.0, "Action Determinations."

The RFLMA parties agree that conducting the GS10 flume replacement project as described in this Contact Record is not likely to impede the reportable condition evaluation. They also agree that replacement of the GS10 flume complies with RFLMA water monitoring requirements. The new flume will be approximately 40 feet east of its present location.

Because of the proximity of the new flume to the current flume location, this monitoring location will continue to be identified as GS10, and no changes to the tables or figures in RFLMA Attachment 2 that relate to GS10 are needed.

*Flume Replacement Scope and Sequence:* Figures 2 and 3 show the project area and the main features related to the work sequence.

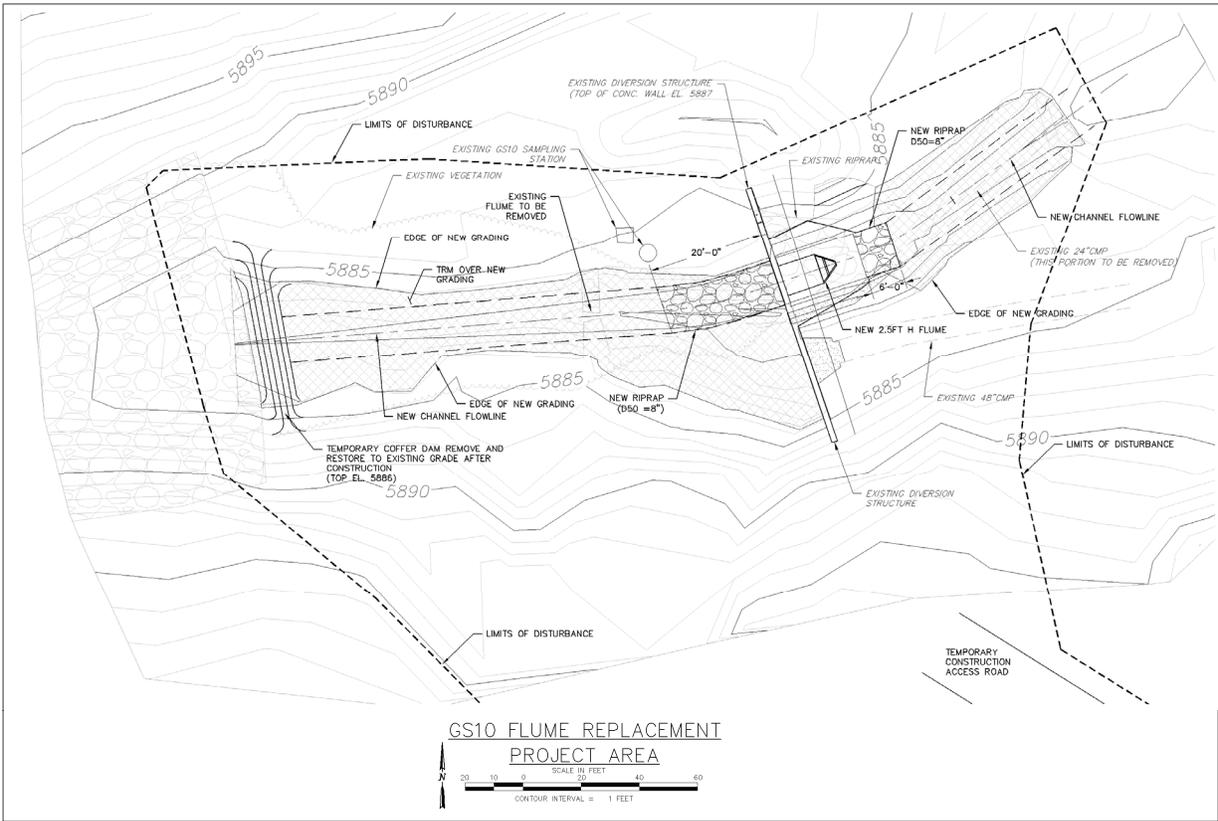


Figure 2. GS10 Flume Replacement Project Area

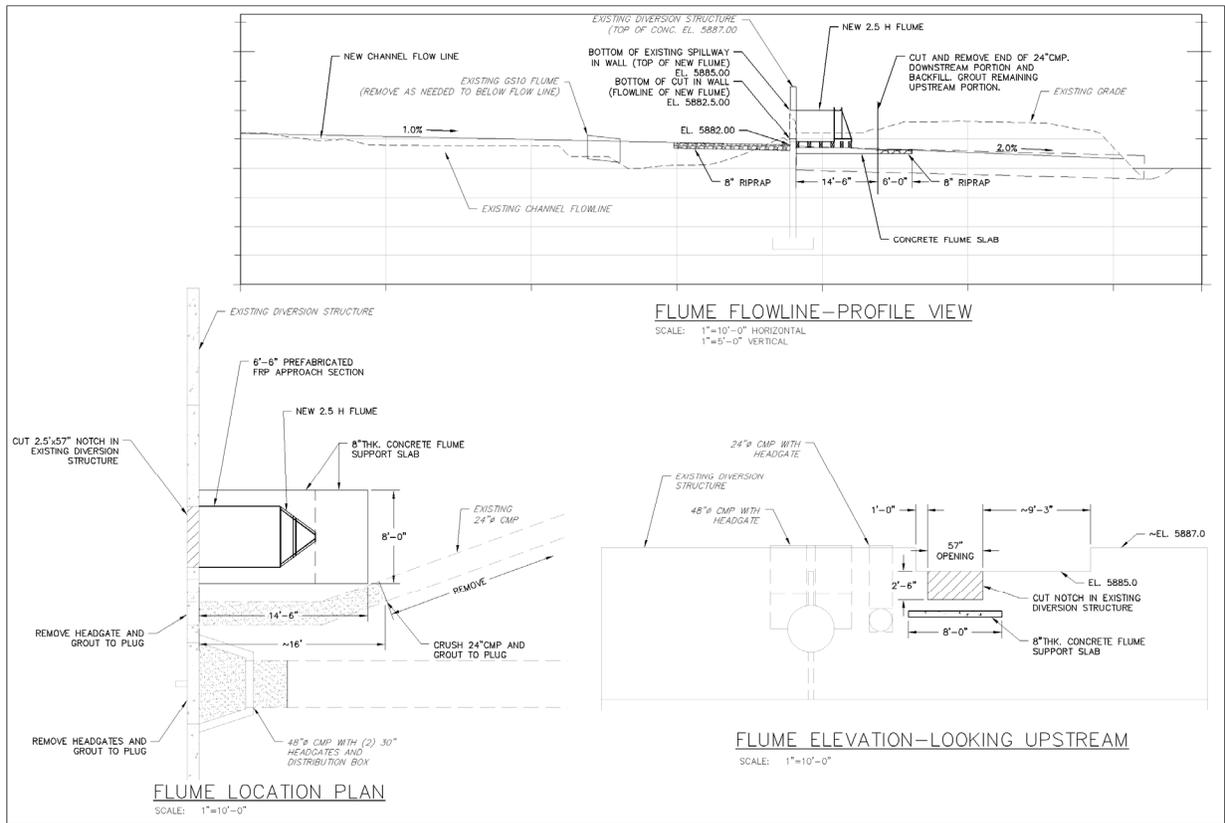


Figure 3. GS10 Flume Replacement Features

The work will be sequenced as follows to provide continual monitoring at GS10 to the extent practicable during the anticipated 2- to 3-week active construction period.

1. Construction perimeter and access points will be marked, and preconstruction erosion controls will be installed.
2. The notch will be cut at the top of the cutoff wall and concrete pads for the new fiberglass flume and the associated monitoring equipment will be installed.
3. At an appropriate time during the grading of the downstream channel, the 24-inch-diameter CMP headgate will be closed, and the downstream end of the CMP will be removed and the area filled to the extent needed to complete grading of the downstream channel.
4. The area downstream of the new flume will be graded and contoured to form a channel to convey the water flowing through the new flume to former retention pond B-1.
5. The new flume and associated monitoring equipment will be installed and made operational on the downstream side of the cutoff wall.
6. A cofferdam will be constructed using imported fill upstream of GS10 to block the flow of creek water.
7. Water that accumulates behind the cofferdam and at the closed headgates will be pumped through the new GS10 flume and sampled in accordance with RFLMA requirements during the rest of the construction.

8. The headgates will be removed and the CMP openings plugged with grout or other suitable material to seal the openings and provide long-term stability to eliminate this potential flow path.
9. The current GS10 flume will be removed to the extent needed for grading the channel, and the monitoring equipment for the current flume location will be removed. The concrete base for the flume and concrete equipment pad will be removed to a depth suitable for backfilling the remnants in place for the final grading.
10. Filling, grading, and contouring of the area upstream of the cutoff wall will be completed.
11. The cofferdam will be removed.
12. Post construction erosion controls and revegetation will be completed.

Excess soil generated by grading the area downstream of the diversion structure and clean imported fill will be used to raise the elevation of the area upstream of the diversion structure. No excavation below the current elevation will be done upstream of the diversion structure. The final fill elevation will be above the current headgate elevation.

Removed pieces of the current GS10 flume, 24-inch-diameter CMP, headgates, and associated hardware and concrete that is removed will be properly managed as waste, or recycled if eligible for recycling.

The 48-inch-diameter CMP bypass line will be left in place, sealed at the upstream end, at the completion of this project. After the upstream end is sealed, there is no present geotechnical reason to remove or fill the remaining bypass line.

*Institutional Controls Evaluation:* The construction will involve some excavation deeper than 3 feet below existing grade to remove portions of the 24-inch-diameter CMP, to construct the concrete pad and to place riprap, as needed. Subsequent filling and grading to complete construction will result in some portions of the area downstream of the cutoff wall being slightly below the preconstruction elevation. Filling and grading upstream of the cutoff wall will result in elevations higher than the preconstruction elevation.

The soil disturbance work is subject to the *Rocky Flats Legacy Management Agreement*, Attachment 2, Institutional Controls (ICs) 2 and 3. The work also involves an engineered component of the remedy, surface water monitoring location GS10, so it is also subject to IC 7. Table 1 recaps these ICs.

Table 1. Institutional Controls

IC 2	Excavation, drilling, and other intrusive activities below a depth of three feet are prohibited, without prior regulatory review and approval pursuant to the Soil Disturbance Review Plan in RFLMA Attachment 2.
	<p><b>Objective:</b> Prevent unacceptable exposure to residual subsurface contamination.</p> <p><b>Rationale:</b> Contaminated structures, such as building basements, exist in certain areas of the Central OU, and the Comprehensive Risk Assessment did not evaluate the risks posed by exposure to this residual contamination. Thus, this restriction eliminates the possibility of unacceptable exposures. Additionally, it prevents damage to subsurface engineered components of the remedy.</p>
IC 3	No grading, excavation, digging, tilling, or other disturbance of any kind of surface soils is permitted, except in accordance with an erosion control plan (including Surface Water Protection Plans submitted to EPA under the Clean Water Act) approved by CDPHE or EPA. Soil disturbance that will not restore the soil surface to preexisting grade or higher may not be performed without prior regulatory review and approval pursuant to the Soil Disturbance Review Plan in RFLMA Attachment 2.
	<p><b>Objective:</b> Prevent migration of residual surface soil contamination to surface water.</p> <p><b>Rationale:</b> Certain surface soil contaminants, notably plutonium-239/240, were identified in the fate and transport evaluation in the Remedial Investigation as having complete pathways to surface water if disturbed. This restriction minimizes the possibility of such disturbance and resultant impacts to surface water. Restoring the soil surface to preexisting grade maintains the current depth to subsurface contamination or contaminated structures.</p>
IC 7	Activities that may damage or impair the proper functioning of any engineered component of the response action, including but not limited to any treatment system, monitoring well, landfill cap, or surveyed benchmark, are prohibited. The preceding sentence shall not be construed to prohibit the modification, removal, replacement, or relocation of any engineered component of the response action in accordance with the action determinations in RFLMA Attachment 2.
	<p><b>Objective:</b> Ensure the continued proper functioning of engineered portions of the remedy.</p> <p><b>Rationale:</b> This restriction helps ensure the integrity of other engineered components of the remedy, including monitoring and survey points.</p>

The required Soil Disturbance Review Plan is in Attachment 1. The information in the Discussion section demonstrates that the Objective and Rationale of IC 7 will be met.

**Resolution:** CDPHE has reviewed information regarding the proposed soil disturbance and excavation and, after consultation with EPA, has approved the proposed activity. CDPHE has determined that the proposed activity will not compromise or impair the function of the remedy or result in an unacceptable release or exposure to residual subsurface contamination. CDPHE has also determined that the proposed project meets the rationale and objectives of ICs 2, 3, and 7.

DOE will not conduct the approved soil disturbance and excavation until 10 calendar days after this Contact Record is posted on the Rocky Flats website and stakeholders are notified of the posting in accordance with the RFLMA Public Involvement Plan.

**Closeout of Contact Record:** This Contact Record will be closed when the work is completed, post construction reseeded has been performed, and post construction erosion controls are in place.

**Approval:** Carl Spreng, CDPHE, approved this Contact Record.

**Contact Record Prepared by:** Rick DiSalvo

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**Distribution:**

Carl Spreng, CDPHE

Scott Surovchak, DOE

Linda Kaiser, Stoller

Rocky Flats Contact Record File

**Rocky Flats Legacy Management Agreement (RFLMA)  
Soil Disturbance Review Plan**

**Proposed Project:** Soil Disturbance Review Plan—GS10 Flume Replacement Project

This Soil Disturbance Review Plan provides information required by RFLMA Attachment 2, “Legacy Management Requirements,” Section 4.1, “Soil Disturbance Review Plan,” regarding the work proposed by DOE.

Description of the proposed project, including the purpose, the location, and the lateral and vertical extent of excavation.

The purpose of the project is to replace the flume for RFLMA POE GS10, as described in Contact Record 2013-01.

Contact Record 2013-01 Figures 2 and 3 show the location and the lateral and vertical extent of the excavation. The material excavated from the cut areas, plus an additional approximately 11 cubic yards of clean fill will be placed in the fill areas shown in Figures 2 and 3. The source of the additional clean fill will be from onsite stockpiled soil remaining from construction and maintenance of gravel road rock crossings, from the temporary soil ramp and pad made from imported clean fill used to support the geoprobe unit in sampling of the Solar Ponds Plume Treatment System media and from the regrading of the eastern end of the Original Landfill diversion berm 7. Clean fill material may also be imported from the Bestway, Inc. commercial gravel pit located directly west of the Central Operable Unit. Depending on the availability and pricing of suitable fill material from the Bestway, Inc. pit, an alternative commercial source, such as the Pioneer, Inc. supply yard on Highway 93 just north of Golden, CO will be used. When completed, the new surface elevations will be tapered into the north and south side of the creek as shown in Figure 2, and the creek flowline will be consistent with the profile view shown in Figure 3.

Information about any remaining subsurface structures in the vicinity of the proposed project.

Remaining subsurface structures in the vicinity of the proposed project include the diversion structure and buried CMP and the concrete base for the current GS10 flume components. A downstream portion of the 24-inch-diameter CMP will be removed, and the concrete base for the current GS10 flume will be removed to an appropriate depth below the planned finished grade. The headgates and associated components on the upstream side of the diversion structure will be removed, and the CMP openings sealed. The portion of the 24-inch-diameter CMP not removed and all of the 48-inch-diameter CMP will remain in the subsurface. The upstream side of the diversion structure will be filled and graded so that the sealed CMP openings and former headgates will be in the subsurface.

Process knowledge (i.e., familiarity based on past experience at the site) regarding the characteristics for each removed item will be confirmed by visual inspection. If process knowledge cannot be confirmed by visual inspection, additional characterization will be performed to determine proper disposal. Based on process knowledge, it is expected that removed items will be disposed of offsite as solid waste or recycled, as appropriate. However, routine radiological field screening of these waste items which will be accessible when they are removed will also be performed to determine if offsite

disposal under DOE directives and policy as radioactive waste is required. Items removed for disposal will be staged in a manner to prevent run-on and runoff of precipitation pending offsite disposition.

Information about any former Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), or other known or potential soil or groundwater contamination in the vicinity of the proposed project.

The project area is located in former IHSS 190, Caustic Leak (also referred to as Central Avenue Ditch). Approximately 1,000 to 1,500 gallons of 2.5 Normal sodium hydroxide was released from a tank in 1978 into the Central Avenue Ditch and was diverted into South Walnut Creek. A 1- to 3-gallon spill of concentrated sodium hydroxide also occurred from the same tank in 1989. The 1978 release was neutralized with alum. Based on the steps taken to neutralize the caustic solution, the large volume of water conveyed in the creek since the spill, and results of characterization soil sampling, the IHSS was approved for No Further Action in 2004. The summary for this IHSS is in Appendix B, "Historical Release Report," in the June 2006 *RCRA Facility Investigation – Remedial Investigation/Corrective Measures Study – Feasibility Study Report for the Rocky Flats Environmental Technology Site (RI/FS)*.

The project area is in the Upper Walnut Drainage Area Exposure Unit (EU) evaluated in the Comprehensive Risk Assessment, in Appendix A of the RI/FS. The only contaminant of concern (COC) identified for this EU is benzo(a)pyrene in surface soil/surface sediment, resulting in an estimated total excess lifetime cancer risk of  $2 \times 10^{-6}$  based on the wildlife refuge worker exposure scenario. There were no COCs identified for subsurface soil or subsurface sediment in this EU.

Concentrations of americium, plutonium, and uranium have been measured above their respective RFLMA standards at GS10, which constitutes an RFLMA reportable condition, as described in Contact Records 2011-04, 2011-05, and 2012-08. DOE is currently implementing an evaluation plan consisting of additional monitoring at locations upstream and downstream of GS10 and expedited analysis of samples collected at GS10. Information regarding the evaluation monitoring is reported in RFLMA quarterly and annual reports.

The RFLMA standards for americium, plutonium, and uranium are based on Colorado health-based standards for a drinking water exposure scenario. Incidental contact with contaminated surface water was determined to be a complete, but insignificant, exposure pathway for the Comprehensive Risk Assessment exposure scenario. There is no actual drinking water use onsite, and incidental exposure resulting from the work to complete this project will be minimized by DOE hazard control procedures (no eating, drinking, or smoking in the construction area), construction worker personal protective equipment (gloves, eye protection, and work boots) use, and good hygiene practices (hand washing before eating or drinking).

Upstream from the GS10 project area is the Mound Site Plume Treatment System (MSPTS). The MSPTS intercepts volatile organic compound (VOC)-contaminated groundwater to remove VOC loading from South Walnut Creek from the groundwater to surface water pathway. The MSPTS discharges treated water to a subsurface discharge gallery located upgradient of GS10, and GS10 serves as the RFLMA surface water performance monitoring location for the MSPTS. Groundwater

treated by the MSPTS meets RFLMA standards at the effluent monitoring location and water at GS10 meets RFLMA standards for VOCs.

To the south of the GS10 project area is the western end of the groundwater intercept barrier for the East Trenches Plume Treatment System (ETPTS). Like the MSPTS, the ETPTS intercepts VOC-contaminated groundwater to remove VOC loading from South Walnut Creek from the groundwater to surface water pathway. The ETPTS subsurface discharge gallery is located to the south of former retention pond B-4. The project will not impact the ETPTS intercept barrier.

# ROCKY FLATS SITE REGULATORY CONTACT RECORD

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**Purpose:** Reportable Condition at the Original Landfill (OLF)

**Contact Record Approval Date:** October 21, 2013

**Site Contact(s)/Affiliation(s):** Scott Surovchak, U.S. Department of Energy (DOE); Rick DiSalvo, S.M. Stoller Corporation (Stoller); Linda Kaiser, Stoller; Jeremiah McLaughlin, Stoller

**Regulatory Contact(s)/Affiliation(s):** Carl Spreng, Colorado Department of Public Health and Environment (CDPHE); Vera Moritz, U.S. Environmental Protection Agency (EPA)

**Date of Consultation Meeting:** September 18, 2013

**Consultation Meeting Participants:** Carl Spreng, CDPHE; Vera Moritz, EPA; Scott Surovchak, DOE; John Boylan Stoller; Rick DiSalvo, Stoller; Linda Kaiser, Stoller

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**Introduction:** A rainfall event from September 9 through September 16, 2013, caused catastrophic flooding in northeastern Colorado. Based on preliminary data, the amount of rainfall received at the Rocky Flats Site during this event was at least 8 inches.

Because the event produced more than 1 inch of rainfall within a 24-hour period, the OLF cover and storm water management system were inspected after this storm event in accordance with the Rocky Flats Legacy Management Agreement (RFLMA) Attachment 2, Table 3, "Present and Original Landfill Inspection and Maintenance Requirements."

Localized surface cracking and differential settlement in the northeastern portion of the cover were noted during the inspection on September 16, 2013. In accordance with RFLMA Attachment 2, Section 6.0, "Action Determinations," DOE determined this was a reportable condition affecting the effectiveness of the OLF cover. Section 6.0 provides:

When reportable conditions occur (except in the case of evidence of violation of institutional controls as described below), DOE will inform CDPHE and EPA within 15 days of receiving the inspection reports or validated data. Within 30 days of receiving inspection reports or validated analytical data documenting a reportable condition, DOE will submit a plan and a schedule for an evaluation to address the condition. DOE will consult as described in RFLMA Paragraph 11 to determine if mitigating actions are necessary. Final plans and schedules for mitigating actions, if any, will be approved by CDPHE in consultation with EPA. DOE is not, however, precluded from undertaking timely mitigation once a reportable condition has been identified.

Cracks with vertical displacement of up to approximately 2 feet and cracks up to approximately 0.5 feet wide were observed during the inspection. The cracking and settling extended through portions of Diversion Berms 4 and 5, and a minor depression was formed in the Diversion Berm 4 channel between the cracks. Figure 1 shows the general location of the observed cracks based on handheld GPS measurements.

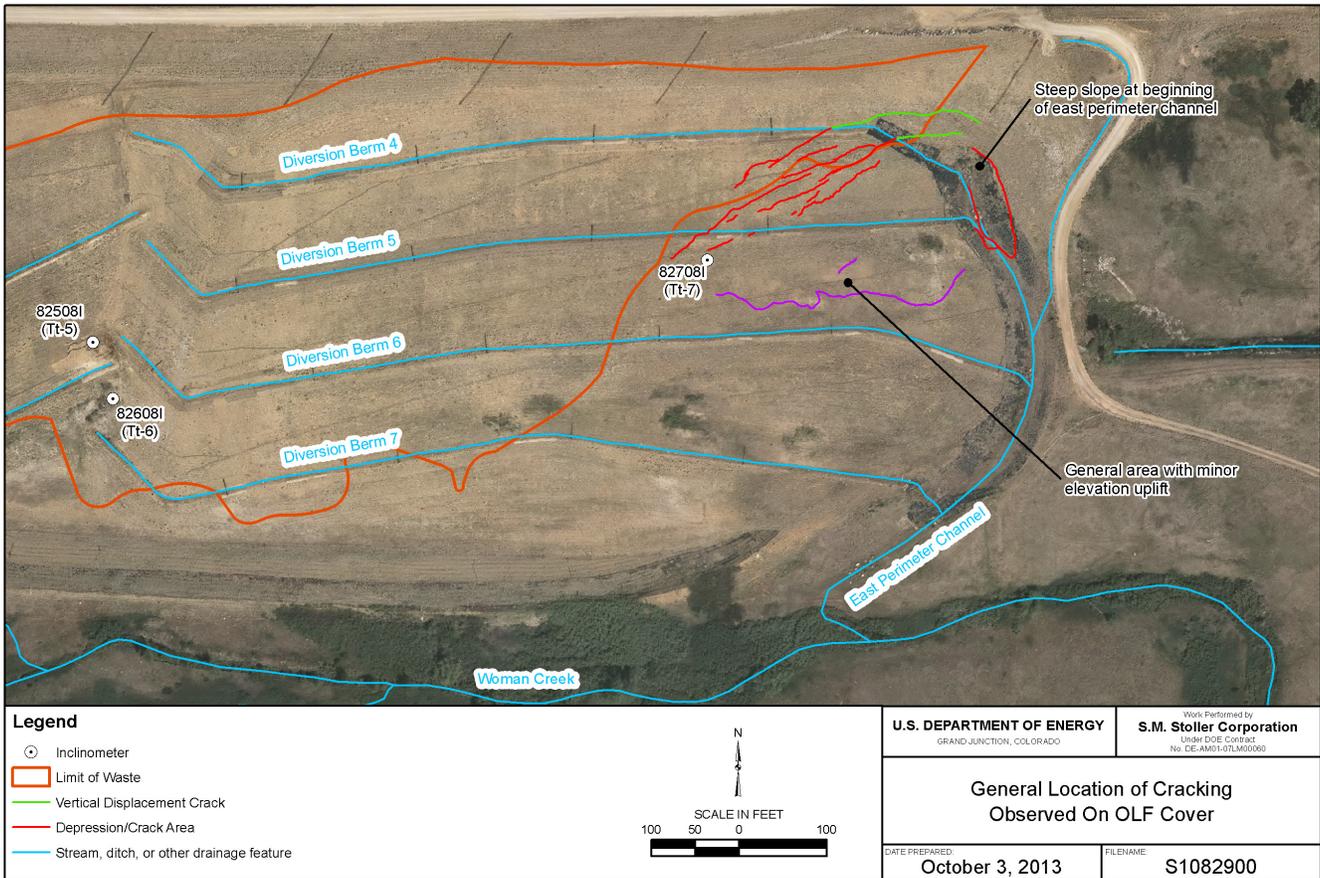


Figure 1. General Location of Cracking Observed on OLF Cover

DOE informed CDPHE and EPA of the cracking on the northeast side of the OLF on September 17, 2013. DOE, CDPHE, and EPA personnel toured the area on September 18 to start the consultative process to develop a proposed course of action.

**Background:** Minor surface cracking north of the beginning of the East Perimeter Channel (EPC) was noted in August 2010. A qualified geotechnical engineer evaluated the observed cracking in August 2010 and in September 2011. The evaluations concluded that, based on the proximity and shape of the cracks, they appeared to be related to the abrupt slope change at the beginning of the EPC. The geotechnical engineer recommended in 2010 that the cracks be monitored for expansion and be filled and tamped to prevent infiltration of precipitation as part of routine maintenance. This routine maintenance has been performed since that time. The condition of the observed cracking has also been noted on the OLF monthly inspection reports.

This repair methodology is (1) consistent with the conclusions and recommendations in the June 2008 geotechnical investigation report, which is discussed in Contact Record 2008-07, and (2) related to localized instability cracking on the northwest side of the OLF observed in 2007. The new cracking on the northeast side of the OLF appears similar to the cracking that was previously observed and repaired on the northwest side.

The geotechnical engineer's recommendation was reiterated after observation of the area in 2011, and no significant expansion of the cracking was observed until the September 16, 2013, inspection. The 2008 geotechnical investigation concluded for the northwest side OLF instability that a weak clay layer containing organic materials at or near the bedrock contact appeared to be a weak interface area. Modeling predicted small-scale instability due to percolating moisture that lubricates this weak interval. It is likely that the northeast side OLF instability is also associated with the effects of moisture from this precipitation event.

The localized instability observed in 2008 in the northwest side of the OLF was addressed by adding fill to reduce the depth of the West Perimeter Channel (WPC), regrading the relatively steep side slopes of portions on the WPC, and adding additional drainage features to reduce potential water infiltration. This work, done in 2008, along with routine maintenance to address minor surface cracking by smoothing and tamping cracks to fill any openings, appears to be successful.

**Discussion:** The "Maintenance Action Activities" subsections in Section 3.2, "Subsidence and Consolidation"; Section 3.3, "Slope Stability"; Section 3.4, "Soil Cover"; and Section 3.6, "Stormwater Management Systems," of the *Original Landfill Monitoring and Maintenance Plan* (OLF M&M Plan) are relevant to development of a plan and schedule to address the new reportable condition.

The goals of the maintenance actions that are or may be required after further evaluation by a qualified geotechnical engineer are as follows:

- To eliminate the potential for ponding and to correct the slope of the surface
- To address any potential slope failure that would likely compromise the remedy
- To maintain the minimum soil cover thickness and diversion-berm design heights
- To remove and relocate eroded soils (if necessary)
- To remove blockages in diversion berm channels, repair any channel disturbances, and replace temporary erosion control mats

In general, the new maintenance actions may include, but are not limited to, regrading affected areas, filling areas, maintaining positive drainage of surface water, constructing seep drains, and regrading steep EPC slopes to achieve side slopes grade of no greater than 4 horizontal:1 vertical. If soil is needed, Rocky Flats Alluvium (RFA) is to be used.

Prior to the September 2013 precipitation event, diversion berm height maintenance had been planned to begin on September 23, 2013. This work involves adding RFA to the tops of those portions of the diversion berms that, due to minor settling of the berms over time, do not meet the minimum height

requirements. Generally, measurements show that most portions needing adjustment are low by an inch or two, but the planned maintenance approach is to add RFA to the berm tops in 6-inch lifts, compact the lifts, seed the added RFA, and cover the added RFA with erosion matting.

The minimum diversion berm heights were calculated (based on modeling) to be sufficient to convey the runoff from a 100-year/24-hour storm event to the perimeter channels, with additional height (freeboard) based on a projected 1,000-year/24-hour storm event. Inspections of the OLF during and after the precipitation event demonstrated that the diversion berms were more than adequate to convey the runoff without causing significant water level elevations in the berm channels. It appeared that runoff collected and conveyed by the diversion berms was approximately 6 to 10 inches deep in the berm channels. The fast moving water did cause some erosion and gulying at the ends of several diversion berms where they joined the perimeter channels. However, there was no evidence of any significant erosion of the OLF cover or the perimeter channels or loss of existing vegetation from run on and runoff.

Based on these observations, it appears that, except for the northeast side of the OLF, the storm water management systems performed very well and that these features are robust. The RFLMA parties agreed that the planned berm-height maintenance can be delayed until DOE can compare performance of the diversion berms in relation to this event and then evaluate a possible modification to the minimum berm-height criteria.

Previous instances of localized instability and cracking have been successfully addressed by (1) regrading and filling cracks to maintain the integrity of the cover and (2) adding drainage features to minimize infiltration of precipitation. Since such repair activities involve the use of construction machinery, any needed berm-height maintenance can be performed at the same time as the repair activities.

*Initial Response:* Initial mitigation steps were undertaken by DOE to minimize the potential for infiltration of precipitation. Initial steps included (1) regrading the differential displacement cracks to seal the openings using the RFA from the adjacent area and (2) filling minor cracks by smoothing and tamping the surrounding surface. Erosion mats were placed over the regraded area. This work was completed on September 20, 2013. This area will be inspected weekly and any continuation of the cracking will be filled by smoothing out and tamping the surface as needed.

A qualified geotechnical engineer and Stoller engineering staff visited the OLF on September 24, 2013, to view the affected area, to provide recommendations for additional near term repairs, and to assist in developing a plan and schedule to address the conditions.

EPA and CDPHE concurred with the initial mitigation steps outlined above and with the need for additional work to maintain positive drainage in the Diversion Berm 4 channel.

The cracks with vertical displacement running through Diversion Berm 4 created a slight depression about 50 feet long in the berm channel. The depression prevents positive storm water drainage. This was temporarily corrected by installing perforated drain pipe and drain rock in the channel to convey runoff and to prevent ponding in this channel.

The work is subject to the *Rocky Flats Legacy Management Agreement*, Attachment 2, Section 4.0, “Institutional Controls” (ICs). The work involves an authorized response action on the OLF cover, which is subject to IC 6, shown in Table 1.

*Table 1. Institutional Controls*

IC 6	Digging, drilling, tilling, grading, excavation, construction of any sort (including construction of any structures, paths, trails or roads), and vehicular traffic are prohibited on the covers of the Present Landfill and the Original Landfill, except for authorized response actions.
	<p><b>Objective:</b> Ensure the continued proper functioning of the landfill covers.</p> <p><b>Rationale:</b> This restriction helps ensure the integrity of the landfill covers.</p>

The initial response information in this contact record demonstrates that the objective and rationale of IC 6 will be met.

**Evaluation Plan and Schedule:** The evaluation of localized instability and recommendations by a qualified geotechnical engineer is included in Attachment 1.

Drawings of the proposed grading and additional drainage features and an estimate of the time needed to complete the repairs to the OLF cover will be submitted by November 25, 2013, for CDPHE review and approval, as required under RFLMA. The schedule for completing the repairs will be dependent upon CDPHE’s review and any changes that are required for DOE to obtain CDPHE approval of the final design.

In accordance with RFLMA, DOE is not prohibited from taking any mitigating actions it deems necessary while the evaluation and design is being completed. The RFLMA Parties shall use the consultative process to discuss DOE’s mitigating actions as necessary. DOE will document mitigating actions in e-mail or other written correspondence, and will provide summaries of the actions taken in RFLMA quarterly or annual reports of site surveillance and maintenance activities.

**Resolution:** CDPHE concurs with DOE’s conduct of the initial response work described above. The work meets the objective and rationale of IC 6.

CDPHE, after consultation with EPA, approves the plan and schedule for evaluation.

DOE will provide information regarding the outcome of further consultation related to this reportable condition and the progress of the evaluation in RFLMA quarterly and annual reports.

**Closeout of Contact Record:** This contact record will be closed when the construction is completed, post-construction reseeding has been performed, and post-construction erosion controls are in place.

**Approval:** Carl Spreng, CDPHE, approved this contact record.

**Contact Record Prepared By:** Rick DiSalvo

**Distribution:**

Carl Spreng, CDPHE

Scott Surovchak, DOE

Linda Kaiser, Stoller

Rocky Flats Contact Record File

## **Attachment 1**

# **Geotechnical Engineer Technical Memorandum**



## Technical Memorandum

To: Mr. Rick DiSalvo  
Mr. Melvin Madril, PE  
Mr. Stephen Pitton From: Thomas A. Chapel, CPG, PE  
Company: S.M. Stoller Corporation Date: October 10, 2013  
Re: Rocky Flats OLF Berm 4 Grading  
and Drainage Project No.: 114-181750

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This memorandum summarizes Tetra Tech's observations, opinions, and recommendations regarding recent soil movement near Berm 4 at the Original Land Fill (OLF) area within the Rocky Flats Environmental Technology Site (RFETS). Minor cracking and localized slope distress have been observed occasionally in the area of Berm 4 since approximately 2010 (see Tetra Tech's 2010 memorandum). Cracks were also noted during a walk down in September 2011. Similar movements have been observed elsewhere on and adjacent to the OLF.

Such cracking and associated movement were evaluated as part of a geotechnical engineering investigation conducted by Tetra Tech for S. M. Stoller in 2008. Results of that investigation were published in a report titled Rocky Flats Original Landfill Geotechnical Investigation Report, dated June 4, 2008. The investigation included site visits and "walk downs", geophysical seismic and resistivity surveys, test excavations, exploratory borings, laboratory testing, slope stability modeling, and engineering analyses. The report concluded that the distress generally includes small-scale, localized slump features that typically originate in a comparatively weak, native clay layer that underlies the OLF. During extreme precipitation events or prolonged periods of wet weather, surface water penetrates the cover and shallow soil deposits, reducing the stability of the shallow subsurface. Computer modeling indicated that large scale, global failure of the OLF slopes is unlikely.

Recommendations in the geotechnical report included a range of possible measures that could be implemented to mitigate the localized distress. In accordance with approved procedures, S.M. Stoller selected a method of hand tamping soil in and adjacent to cracks to reduce water infiltration in distressed areas. This measure seems to have been successful, because little movement has been noted by S.M. Stoller during periods of typical precipitation that occurred between 2010 and the recent heavy and prolonged precipitation event.

## RECENT EVENTS

During the period September 11 through September 13, 2013, rainfall of historic proportions fell in the vicinity of the OLF. Shortly after that event S.M. Stoller conducted a walk down of the OLF and observed several curvilinear cracks near the eastern terminus of Berm 4. The most significant of these cracks was located upslope from the area where Berm 4 outfalls into the East Perimeter Channel (EPC), and was on the order of 200 feet long with up to approximately two feet of downward displacement on the downhill side of the crack. Informal measurements of the crack depth indicated it progressed more than 18 inches below the ground surface and had a width of two to three inches. S.M. Stoller mapped the cracks, then filled them in by hand and using lightweight construction equipment to prevent additional surface water and precipitation from entering the cracks.

On September 24, S.M. Stoller and Tetra Tech met and walked the OLF to examine the ground, specifically the eastern portion of Berm 4 and nearby areas. At the time of our visit, no new movement was visible after the crack described above had been repaired. Traces of minor additional cracks were visible and had a similar alignment to the larger crack described above.

As a result of the crack and displacement described above, a segment of Berm 4 is now lower than adjacent segments of Berm 4, which may impact the ability of Berm 4 to convey the needed surface water volume in the event of future precipitation events similar in magnitude to those that occurred in September 2013. Further, the lower segment of channel will hold water and cause increased surface water infiltration in the distressed area.

Any condition that results in an increase in water in the shallow subsurface will contribute to instability of the slope. Localized failures can be expected under these conditions. We do not believe that a broad-scale, global failure of the OLF slope is more likely at this time than was predicted during the previous study. Recommendations to mitigate the localized instability of the eastern portion of the OLF are described below.

## RECOMMENDATIONS

We recommended a phased approach to repair, monitor, and mitigate the localized instability observed in the vicinity of Berm 4. Items 1 and 2 are considered immediate and short-term measures; items 3 and 4 are longer-term engineering remedies. In order of implementation, we suggest the following:

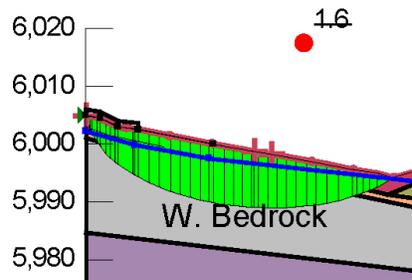
1. **Monitor the distress.** Frequency of observations of the OLF should be increased to approximately weekly in the short term to look for evidence of additional movement of the existing cracks or development of new distress. If or as distress is observed, cracks should continue to be filled in accordance with existing procedures. New cracks should be mapped if or as they occur. This process has been used successfully in other parts of the OLF. The repair methodology is consistent with the conclusions and recommendations in Tetra Tech's geotechnical investigation report dated June 4, 2008, and with the recommendations described in our Technical Memorandum dated August 10, 2010.
2. **Evaluate and repair Berm 4.** In its current condition, Berm 4 will hold water in the distressed area should additional precipitation and runoff occur. Ponding water in this area will exacerbate the instability and could result in additional or accelerated movement of localized, marginally stable zones. This condition should be repaired as soon as practical to reduce the risk of additional movement.

We have considered two alternative, short-term methods for reducing the occurrence of standing water in this area. Fill could be placed on the berm and in the channel invert to raise the lower portion so that positive drainage will occur across the zone. This alternative adds additional weight to the cracked area which tends to decrease the stability. Using previous slope stability models that we constructed as part of our geotechnical engineering evaluation, Tetra Tech simulated a wet condition and placement of additional fill by increasing the water level in the model and adding a surcharge to the ground surface at the failure plane. The surcharge applied approximates a two-foot layer of Rocky Flats Alluvium placed at the upper portion of the failure zone. Figure 1 (below) illustrates these conditions. Figure 1(a) shows the slope and localized failure with no surcharge, but with an elevated water level. The model calculated a minimum factor of safety (FoS) of 1.6, with failure occurring in the upper portion of the weathered claystone bedrock. Figure 1(b) shows the effect of adding a two-foot layer of fill as a surcharge. The calculated minimum FoS dropped

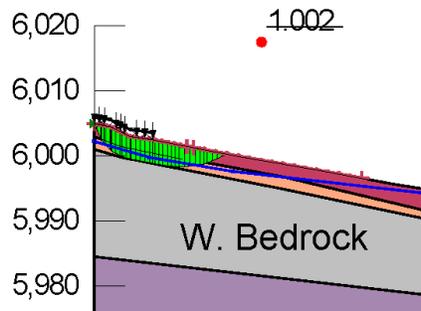
to 1.002 and the failure is predicted to occur in the organic layer at the surface of the weathered bedrock. These results indicate that the slope is marginally stable and on the verge of failure following the addition of two feet of fill. Because a localized, minor failure did actually occur when the water level increased, but without an additional surcharge, the model results may actually under-predict the potential risk of additional failures if surcharge is added.

**Figure 1. Slope Stability Model Results**

(a) Elevated water table, no surcharge.



(b) Elevated water table and a surcharge approximating a two foot fill in the upper portion of the failure zone.



Another alternative that would appear to have a lower risk for decreasing stability of the area is the construction of a temporary drain in the invert of Berm 4 to convey water from the low segment eastward to the outfall. This could be a trench and flexible drain pipe constructed such that the upper end of the drain is at the downstream end of the low segment and the drain outfall is at the eastern end of Berm 4 or in the EPC. This drain could be removed when longer term remedies have been designed and constructed (see below).

3. **Trench Drains and EPC Grading.** To improve drainage within the channels of Berms 4 through 7, thus decreasing the risk of future localized failures, a shallow trench drain could

be designed and constructed in the invert of each of the berms. Details would need to be designed, but the concept involves a trench excavated approximately one foot wide by one foot deep from a location upstream of the distressed area to the channel outfall in the EPC. This concept was used on some channels on the west side of the OLF, and it appears to have been successful in reducing the cracking and localized slope failures in that area.

The upstream terminus of the EPC includes a steep "headwall" that is adjacent to berm 4 at its east end. The steep slopes of this headwall may contribute to slope instability of the areas upslope from the EPC. The EPC should be re-graded to reduce the slopes to 3H:1V or shallower. This should be possible by placing approximately 5 feet of fill at the toe of the existing headwall and by "laying back" the existing slope at the upper end, generally on the north and east over a small area. The capacity of the EPC must be maintained and should be verified as part of the hydraulic analysis described below.

4. **Hydraulic Modeling and Design Review.** Because of the recent record setting precipitation and flood events, there is an opportunity to evaluate rainfall intensity and other hydrologic data at the OLF to evaluate the berm height in order to protect the area from damage due to future events. The analysis would require an engineer to obtain and review the daily precipitation records from Rocky Flats. A statistical analysis would be performed on the data to compare the rainfall event that occurred the week of September 11, 2013 to the projected period of record. This could be evaluated against previous recommendations for berm height along the drainage channels at the OLF to determine the actual level of protection that exists for the berms.

# ROCKY FLATS SITE REGULATORY CONTACT RECORD

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**Purpose:** Soil Disturbance Review Plan (SDRP) for Regrading the East Perimeter Channel (EPC) and Associated Diversion Berms at the Original Landfill (OLF)

**Contact Record Approval Date:** November 22, 2013

**Site Contact(s)/Affiliation(s):** Scott Surovchak, U.S. Department of Energy (DOE); Rick DiSalvo, S.M. Stoller Corporation (Stoller); Linda Kaiser, Stoller; Jeremiah McLaughlin, Stoller

**Regulatory Contact(s)/Affiliation(s):** Carl Spreng, Colorado Department of Public Health and Environment (CDPHE); Vera Moritz, U.S. Environmental Protection Agency (EPA)

**Date of Consultation Meeting:** November 19, 2013. Continuation of consultation process that began September 18, 2013

**Consultation Meeting Participants:** Carl Spreng, CDPHE; Scott Surovchak, DOE; Rick DiSalvo, Stoller; Linda Kaiser, Stoller

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**Introduction:** Rocky Flats Legacy Management Agreement (RFLMA) Contact Record (CR) 2013-02 documents the outcome of consultation between the DOE, CDPHE and EPA (the RFLMA parties) regarding DOE's response to localized distress cracking conditions on the OLF soil cover. These conditions were noted after the heavy precipitation event along the Front Range of Colorado from September 9 through September 16, 2013. The localized distress resulted in a reportable condition under RFLMA Attachment 2, Legacy Management Requirements. CR 2013-02 provides an evaluation plan and schedule for addressing the reportable condition, which included proposed regrading of the EPC and associated diversion berm ends to reduce slope grades in this area to improve soil cover stability and adding drainage features to further minimize the potential for infiltration of precipitation.

In accordance with the evaluation plan and schedule, drawings of the proposed grading and additional drainage features and an estimate of the time needed to complete the repairs to the OLF cover are to be submitted by November 25, 2013, for CDPHE review and approval. The schedule for completing the repairs will be dependent upon CDPHE's review and any changes that are required for DOE to obtain CDPHE approval of the final design.

**Discussion:** DOE and CDPHE met on November 19, 2013, to review DOE's proposed grading plan which results primarily in raising the EPC elevations but some areas will have slightly lower elevations. Figure 1 shows the location and anticipated aerial extent of the soil disturbance. A slotted drain pipe bedded in crushed rock was installed in the eastern end of diversion berm 4 as part of the initial response to the localized distress (see CR 2013-02) and this will be left in place.

The soil disturbance, filling and grading on the OLF cover is subject to the requirements of certain RFLMA institutional controls (ICs) as discussed below. An approved SDRP is required and the RFLMA parties agree that the preliminary design provides sufficient information for the SDRP for the proposed work.

*Institutional Controls Evaluation:* The soil disturbance work is subject to ICs 3 and 6. Table 1 recaps these ICs.

*Table 1. Institutional Controls*

IC 3	No grading, excavation, digging, tilling, or other disturbance of any kind of surface soils is permitted, except in accordance with an erosion control plan (including Surface Water Protection Plans submitted to EPA under the Clean Water Act) approved by CDPHE or EPA. Soil disturbance that will not restore the soil surface to preexisting grade or higher may not be performed without prior regulatory review and approval pursuant to the Soil Disturbance Review Plan in RFLMA Attachment 2.
	<b>Objective:</b> Prevent migration of residual surface soil contamination to surface water. <b>Rationale:</b> Certain surface soil contaminants, notably plutonium-239/240, were identified in the fate and transport evaluation in the Remedial Investigation as having complete pathways to surface water if disturbed. This restriction minimizes the possibility of such disturbance and resultant impacts to surface water. Restoring the soil surface to preexisting grade maintains the current depth to subsurface contamination or contaminated structures.
IC 6	Digging, drilling, tilling, grading, excavation, construction of any sort (including construction of any structures, paths, trails or roads), and vehicular traffic are prohibited on the covers of the Present Landfill and the Original Landfill, except for authorized response actions.
	<b>Objective:</b> Ensure the continued proper functioning of the landfill covers. <b>Rationale:</b> This restriction helps ensure the integrity of the landfill covers.

The required SDRP is in Attachment 1. The *Erosion Control Plan for Rocky Flats Property Central Operable Unit*, which has been approved by CDPHE and EPA, provides erosion control best management practices that meet the IC 3 requirements.

**Resolution:** CDPHE has reviewed information regarding the proposed soil disturbance and excavation and, after consultation with EPA, has approved the proposed activity and the proposed grading plan. CDPHE has determined that the proposed activity will not compromise or impair the function of the remedy or result in an unacceptable release or exposure to residual subsurface contamination. CDPHE has also determined that the proposed project meets the rationale and objectives of ICs 3 and 6.

The work will be conducted after CDPHE approval of the final grading design, but DOE will not conduct the approved soil disturbance until 10 calendar days after this CR is posted on the Rocky Flats website and stakeholders are notified of the posting in accordance with the RFLMA Public Involvement Plan. The work is planned to be conducted and completed in mid-December, 2013.

CDPHE approval of the final grading design, progress and the completion of the work will be reported by DOE in RFLMA quarterly and annual reports of surveillance and maintenance activities for the period(s) in which these activities occur.

**Closeout of Contact Record:** This Contact Record will be closed when the work is completed, post construction reseeding has been performed, and post construction erosion controls are in place.

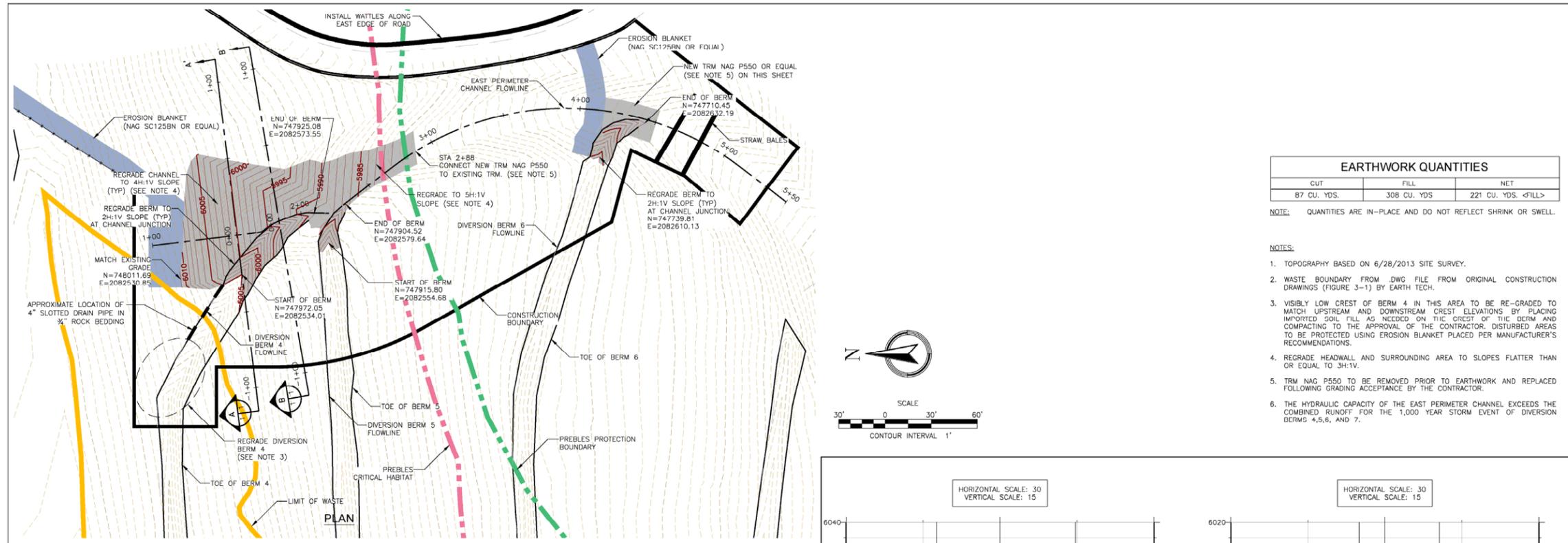
**Approval:** Carl Spreng, CDPHE, approved this contact record.

**Contact Record Prepared By:** Rick DiSalvo

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**Distribution:**

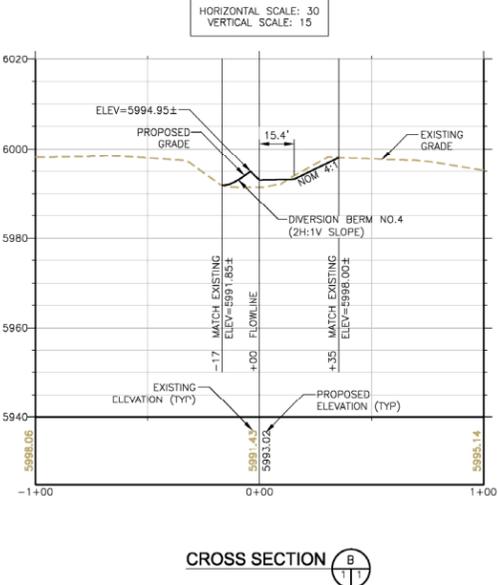
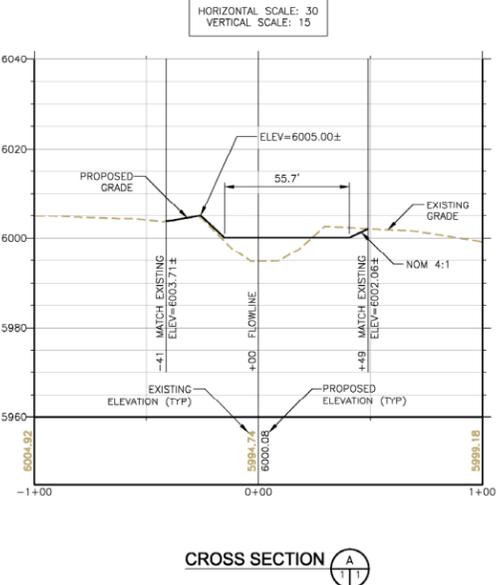
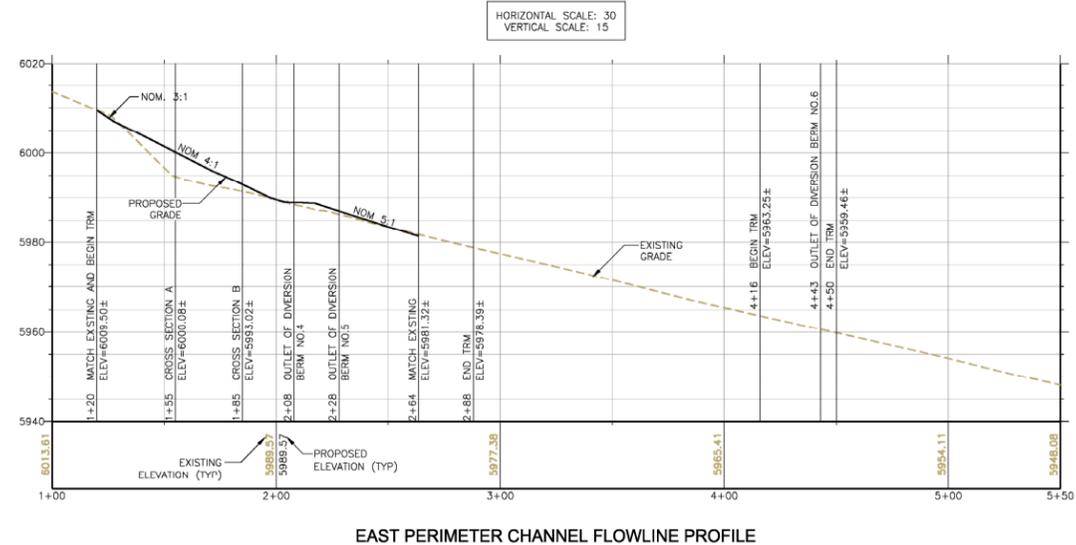
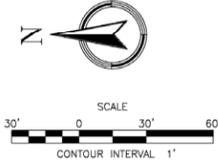
Carl Spreng, CDPHE  
Scott Surovchak, DOE  
Linda Kaiser, Stoller  
Rocky Flats Contact Record File



EARTHWORK QUANTITIES		
CUT	FILL	NET
87 CU. YDS.	308 CU. YDS	221 CU. YDS. <FILL>

NOTE: QUANTITIES ARE IN-PLACE AND DO NOT REFLECT SHRINK OR SWELL.

- NOTES:
- TOPOGRAPHY BASED ON 6/28/2013 SITE SURVEY.
  - WASTE BOUNDARY FROM DWG FILE FROM ORIGINAL CONSTRUCTION DRAWINGS (FIGURE 3-1) BY EARTH TECH.
  - VISIBLY LOW CREST OF BERM 4 IN THIS AREA TO BE RE-GRADED TO MATCH UPSTREAM AND DOWNSTREAM CREST ELEVATIONS BY PLACING IMPORTED SOIL FILL AS NEEDED ON THE CREST OF THE BERM AND COMPACTING TO THE APPROVAL OF THE CONTRACTOR. DISTURBED AREAS TO BE PROTECTED USING EROSION BLANKET PLACED PER MANUFACTURER'S RECOMMENDATIONS.
  - REGRADE HEADWALL AND SURROUNDING AREA TO SLOPES FLATTER THAN OR EQUAL TO 3H:1V.
  - TRM NAG P550 TO BE REMOVED PRIOR TO EARTHWORK AND REPLACED FOLLOWING GRADING ACCEPTANCE BY THE CONTRACTOR.
  - THE HYDRAULIC CAPACITY OF THE EAST PERIMETER CHANNEL EXCEEDS THE COMBINED RUNOFF FOR THE 1,000 YEAR STORM EVENT OF DIVERSION BERMS 4,5,6, AND 7.



**GENERAL PROJECT NOTES:**

PLOTTING OR PRINTING OF THESE DRAWINGS TO ANY SHEET SIZE OTHER THAN 24x36 OR BY USING FORMATS OTHER THAN AutoCAD PLOT FILES WILL RESULT IN INCORRECT SCALES AND HATCH PATTERN DISTORTIONS. THE USER IS CAUTIONED AND SHOULD EITHER OBTAIN A HARD COPY PRINT-OUT FROM THE CONTRACTOR OR APPROPRIATELY SCALE ALL MEASUREMENTS FROM THE BAR-SCALES PROVIDED.

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	DESIGNED BY	PROJECT A.C.	APPROVAL
<p><b>U.S. DEPARTMENT OF ENERGY</b> GRAND JUNCTION, COLORADO</p> <p><b>S.M. Stoller Corporation</b> Under DOE Contract No. DE-AM01-DTUM0080</p> <p><b>ROCKY FLATS SITE</b> JEFFERSON COUNTY, CO.</p> <p><b>ORIGINAL LANDFILL</b> <b>OLF SOIL DISTURBANCE</b> <b>FILLING AND GRADING LOCATION</b></p>						
<p>APPROVALS</p> <p>BY: DANIEL MONTEZ 11/22/13</p> <p>BY: TOM CHAPEL 11/22/13</p> <p>BY: STEPHEN PITTON 11/22/13</p> <p>BY: MELVIN MADRILL 11/22/13</p> <p>BY: RICK DISALVO 11/22/13</p> <p>BY: LINDA KAISER 11/22/13</p>		<p>PROJECT NO. <b>1TS-111-0056-07-001H</b></p> <p>SHEET NO. <b>1</b> OF <b>1</b></p>				

Montez, Daniel - X:\181750 - Rocky Flats\CAD\2013 Design\Sheet Files\10-08-13\PROFILE SHEET-FIGURE.dwg - 11/22/2013 4:49 PM

Figure 1. OLF Soil Disturbance, Filling and Grading Location

**Rocky Flats Legacy Management Agreement (RFLMA)  
Soil Disturbance Review Plan**

**Proposed Project:** Soil Disturbance Review Plan (SDRP) for Regrading the East Perimeter Channel (EPC) and Associated Diversion Berms at the Original Landfill (OLF)

This Soil Disturbance Review Plan provides information required by RFLMA Attachment 2, "Legacy Management Requirements," Section 4.1, "Soil Disturbance Review Plan," regarding the work proposed by DOE.

Description of the proposed project, including the purpose, the location, and the lateral and vertical extent of excavation.

The purpose of the proposed project is regrading of the EPC and associated diversion berm ends to reduce slope grades in this area to improve soil cover stability, and adding drainage features to further minimize the potential for infiltration of precipitation.

Contact Record 2013-03 Figure 1 shows the location and the lateral and vertical extent of the excavation and soil disturbance. The material (Rocky Flats Alluvium) (RFA) excavated from the cut areas will be used as fill in the fill areas. Additional clean RFA fill will be needed to complete the regrading. The additional clean RFA fill material will come from the Bestway, Inc. commercial gravel pit located directly west of the Central Operable Unit.

Information about any remaining subsurface structures in the vicinity of the proposed project.

There are no remaining subsurface structures in the vicinity of the proposed project. A buried natural gas line operated by Xcel Energy is in the utility easement corridor north of the OLF. The location and alignment of the natural gas line is well known and marked with signs. It is well outside of the soil disturbance area.

Information about any former Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PACs), or other known or potential soil or groundwater contamination in the vicinity of the proposed project.

The OLF is former IHSS 115. The OLF has a 2 foot thick soil cover over the location of the disposed waste materials and clean RFA fill surrounding the disposed materials for the placement and configuration of stormwater and seepwater management features. Limits of the waste area are shown in Contact Record 2013-03 Figure 1.

The project area is in the Upper Woman Drainage Exposure Unit (EU) evaluated in the Comprehensive Risk Assessment, in Appendix A of the RI/FS. The only contaminant of concern (COC) identified for this EU are benzo(a)pyrene and dioxins/furans for surface soil/surface sediment.

Dioxin/furan concentrations were converted to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalents (TEQs) for COC screening and risk characterization. Noncancer risks for benzo(a)pyrene and 2,3,7,8-TCDD (TEQ) were not evaluated because those COCs do not have noncancer toxicity values. Risks were calculated for benzo(a)pyrene and 2,3,7,8 TCDD (TEQ). The estimated Tier 1 total

excess lifetime cancer risk to the wildlife refuge worker (WRW) at the UWOEUE is  $8E-06$ , and the Tier 2 risk is  $4E-06$ . It is important to note that the samples with the highest benzo(a)pyrene concentrations are located in an area that is now several feet beneath OLF cover. There were no COCs identified for subsurface soil or subsurface sediment in this EU.

The soil disturbance, regarding and drainage feature installation work will not intrude below the 2 foot thick soil cover within the limits of the waste location. The work primarily involves filling portions of the EPC to reduce the slope grades.