ROCKY FLATS SITE REGULATORY CONTACT RECORD 2017-03

Purpose: North Walnut Creek Slump 2017 Maintenance and Soil Disturbance Review Plan

Contact Record Approval Date: March 27, 2017

Site Contact(s)/Affiliation(s): Scott Surovchak, U.S. Department of Energy (DOE); Jeremy Wehner, Linda Kaiser, and David Ward, Navarro Research and Engineering, Inc. (Navarro)

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: May 27, 2016; January 10, 2017; and February 6, 2017

Consultation Meeting Participants: Scott Surovchak and Jeff Murl, DOE; Carl Spreng and Lindsay Masters, CDPHE; Vera Moritz, EPA; Linda Kaiser, Jeremy Wehner, John Boylan, Michelle Hanson, George Squibb, Jody Nelson, Patty Gallo, and David Ward, Navarro

Related Contact Records: None

Introduction: The North Walnut Creek Slump (NWCS) was first observed as a surface crack prior to Rocky Flats Site (Site) closure. The hillside was identified as a "landslide deposit that consists of masses of earth and rock that have moved downslope as earthflows and slumps" in the Rocky Flats Solar Ponds Plume Treatment System (SPPTS) Geotechnical Investigation Report (Tetra Tech, October 2009). This feature is noted in *Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats Site, Colorado, Calendar Year 2015* (2016) and is east of the SPPTS. The NWCS is threatening to damage some components of the SPPTS. The SPPTS collects and treats nitrate and uranium in contaminated groundwater from the former Solar Evaporation Ponds.

Slumps, such as the NWCS, are common on the hillsides at the Site and also along much of the Front Range of Colorado because of the local geology. The Rocky Flats Alluvium on the pediment surface typically overlays less permeable, low-strength claystone, and as water from precipitation infiltrates through the alluvium, it meets the claystone. Rather than continuing to move downward through the less permeable claystone material, this groundwater moves laterally on top of the claystone and often daylights as seeps on the hillsides. When above-average precipitation is received and the claystone beneath the steep hillsides adjacent to the pediment becomes saturated, slumping of the hillsides can occur.

The NWCS has existed for several years. Aerial photographs indicate it was present in the early 2000s, and anecdotal evidence suggests the slump crack was evident even prior to that time. This slump is of greater interest than most others on the Site because of its potential impact to subsurface and aboveground components of the SPPTS. Informal tracking of the slump

movement began in the 2012 timeframe. In fall 2013 and again in spring 2015, the Site received above-average precipitation, after which substantial movement of the hillside at the NWCS was observed; that movement continued in 2016. The crack at the top of the slump, which until relatively recently showed only 1–2 feet of vertical displacement, now shows approximately 10 feet of vertical displacement in places (Figure 1), and lateral movement is also evident. As a result, several problem areas have been identified on the hillside.

- A critical component of the SPPTS is the subsurface groundwater collection trench (CT), which intercepts contaminated groundwater and routes it to the treatment components of the SPPTS. Most of this groundwater CT (the green line on Figure 1) is adjacent to the northern edge of the road to the SPPTS. The groundwater CT is approximately 1100 feet long and 20–30 feet deep; it consists of an impermeable barrier along its downgradient side, and along its length is a 4-inch-diameter perforated pipe bedded in sand above a bentonite layer on the upgradient side of the barrier. Small cracks have been observed as far south as the north edge of the road, potentially indicating movement in the vicinity of the groundwater CT. If the top of the slump is allowed to migrate southward, this could potentially damage the groundwater CT.
- Also present in the subsurface of this hillside is the preexisting and more extensive Interceptor Trench System (ITS) composed of 4-inch-diameter perforated pipes seated in gravel (the system of orange lines on Figure 1). This ITS also collects groundwater from the hillside. Part of the ITS is intercepted by the SPPTS groundwater collection trench, as described above and illustrated on Figure 1. The parts of the ITS that are beyond the SPPTS trench (to the northeast and downgradient) feed water to the Interceptor Trench System Sump (ITSS), which pumps collected water up the hill to the SPPTS treatment components. Given the location of the NWCS in relation to the ITS, it is possible that a portion of the ITS may be damaged or broken as a result of the movement on the hillside.
- Some cracking and uplifting of the soils are now observed directly adjacent to some of the ITSS components in the valley bottom (Area #5 on Figure 1), suggesting that parts of the ITSS may be at risk from further movement of the slump.
- The road used for access to the ITSS components of the SPPTS (in the valley bottom near the stream) has been destroyed by vertical and horizontal displacement, and it has been buried by part of the slump (Area #3 on Figure 1). As a result, vehicle access is no longer possible and maintenance must be conducted on foot. This creates potential health and safety issues and also limits possible activities to those that can be achieved by hand-carrying maintenance equipment into the area. At some point, heavy items that cannot be manually transported, such as the batteries that connect to the solar panels to power the ITSS pump, will need to be replaced. Vehicle access needs to be restored (Area #3 on Figure 1).
- A different slump (referred to as the Road Slump) near the intersection of the SPPTS and ITSS Roads is threatening the road and must be repaired and recontoured (Area #2 on Figure 1).
- At the toe of the main part of the NWCS, *Rocky Flats Legacy Management Agreement* (RFLMA) groundwater monitoring well B210489 is also threatened by the toe of the slump (Area #4 on Figure 1).

Discussion:

In order to prevent damage to the SPPTS and the other infrastructure, the NWCS area will be the subject of a series of activities, from investigation (such as evaluating groundwater distribution and characteristics and evaluating subsurface soil conditions) to repairs (such as regrading, adding or restoring groundwater collection components, and others as warranted). The initial action planned for early 2017 is intended to minimize further slumping resulting from precipitation and investigate soil and groundwater characteristics for a slope stabilization analysis. The slope stabilization analysis will be utilized to develop future projects in this area. The actions addressed in this contact record are the following:

- Use a Geoprobe at multiple locations upgradient of the slump and in the slump area to evaluate groundwater characteristics and bedrock depth. The expected average depth of the Geoprobe boreholes is approximately 20 feet. Temporary piezometers may be installed in these boreholes.
- Conduct geophysical testing of the slopes and slump area to attempt to identify depth to bedrock and attempt to locate ITS lines prior to construction activities (i.e., grading, excavating, or other intrusive activities near the ITS lines).
- Regrade the hillside and slump areas to fill cracks, regrade the scarps, and create positive drainage to reduce the potential for ponding of water on the hillslope. Cracks 4 inches wide and wider will be excavated to a depth of 4 feet and backfilled with native soil. This will help reduce the amount of water infiltrating to the subsurface and reduce the potential for further slumping. Area #1 on Figure 1 outlines the area of the hillside to receive this attention.
- Repair and recreate the two-track road, providing vehicle access to the ITSS area for maintenance activities (Area #3 on Figure 1).
- Regrade that part of the slump toe that threatens monitoring well B210489 in the valley bottom, moving slump material away from the well (Area #4 on Figure 1).
- Regrade and stabilize slopes near the SPPTS ITSS to protect this infrastructure from damage (Area #5 on Figure 1).
- Regrade the slump that threatens the upper east end of the A-Pond Road and repair this road as necessary (Area #2 on Figure 1).
- Possibly add seep drains to improve slope stability as the need is identified during regrading.
- Conduct a geotechnical drilling project that includes drilling up to 15 borings throughout the project area to evaluate geotechnical properties of soils and install piezometers for groundwater level monitoring and characteristics. Borings may be up to 14 inches in diameter and will penetrate unweathered bedrock up to 5 feet. The estimated total depth of each boring will be approximately 50 feet.

The regrade work for the hillside slump (Area 1 on Figure 1) will follow a "field fit" approach, cutting scarps and mid-slope elevated areas and using that soil to fill depressions to obtain a generally uniform slope of approximately 4 to 1 (horizontal to vertical). Excess material from the hillside slump area may also be used to repair the slump threatening the upper east end of the road to the ITSS Area 2 on Figure 1 to obtain a uniform slope of approximately 3 to 1. It is anticipated that to obtain a 4 to 1 slope for the hillside slump, the mid-slope bulge of the slump will be leveled and the crown of the scarp laid back. The mid-slope scarp is estimated to be

approximately 15 feet in height. The existing trees on this hillside are providing some stability and will be kept, to the extent possible.

A portion of the proposed work is in the Preble's Mouse Critical Habitat and Protection Area (Figure 1). A Consultation Biological Assessment for this project has been submitted to U.S. Fish and Wildlife Service (USFWS) for approval. Intrusive work will not begin within these areas prior to receipt of this approval from USFWS.

Surface water runoff will be diverted around the construction area. Water (surface or ground) collected in the construction area during construction will be characterized using test strips for nitrate. The water will be dispositioned upgradient of SPPTS CT as previously approved in Contact Records 2008-06 and 2015-08.

IC Evaluation: This maintenance action will require excavating soil greater than 3 feet and will not return the surface to preexisting grade. Therefore, the soil disturbance work for this maintenance action is subject to Institutional Controls (ICs) 2 and 3, and requires approval of this contact record (2017-03). Table 1 recaps these ICs.

Table 1. Institutional Controls

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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.		
	Objective: Prevent unacceptable exposure to residual subsurface contamination. Rationale: Contaminated structures, such as building basements, exist in certain areas of the Central OU (Central Operable Unit), 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.		
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		
	Objective: Prevent migration of residual surface soil contamination to surface water. Rationale: 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.		

The required Soil Disturbance Review Plan (SDRP) for IC 2 and IC 3 (for not restoring surface to preexisting grade) 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 requirements of IC 3.

Resolution: CDPHE, after reviewing information regarding the proposed soil disturbance and excavation and after consultation with EPA, will approve, approve with modification, or disapprove the proposed activity. CDPHE will determine whether the proposed activity (1) will not compromise or impair the function of the remedy or (2) will result in an unacceptable release or exposure to residual subsurface contamination. CDPHE will also determine whether the proposed project meets the rationale and objectives of IC 2 and IC 3.

The work will be conducted after CDPHE's approval, but DOE will not conduct the approved soil disturbance work until 10 calendar days after this Contact Record is posted on the Rocky Flats Site's website and stakeholders are notified of the posting in accordance with the RFLMA Public Involvement Plan. In addition, no intrusive work will be conducted within the Preble's Mouse Protected Area or Critical Habitat without USFWS approval to perform this work.

Progress and the completion of the work will be reported by DOE in RFLMA quarterly and annual reports of surveillance and maintenance activities for period(s) in which these activities occur.

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.

Contact Record Prepared by: David Ward and Jeremy Wehner, Navarro

Distribution: Scott Surovchak, DOE Carl Spreng, CDPHE Vera Moritz, EPA Linda Kaiser, Navarro Document_Determination Records File: RFS 0025.02 RF Contact Record File



Figure 1

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	U.S. DEPARTMENT OF ENERGY OFFICE OF LEGACY MANAGEMENT	Work Performed by Navarro Research & Engineering, Inc. Under DOE Contract Number DE-LM0000421	
	North Walnut Creek Slump, Maintenance Project		
	March 14, 2017	S1577001	

Attachment 1

Rocky Flats Legacy Management Agreement Soil Disturbance Review Plan

Proposed Project: Soil Disturbance Review Plan (SDRP) for the North Walnut Creek Slump Maintenance Activities

This SDRP provides information required by Rocky Flats Legacy Management Agreement (RFLMA) Attachment 2, "Legacy Management Requirements," Section 4.1, "Soil Disturbance Review Plan," regarding the work proposed by the U.S. Department of Energy.

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

The North Walnut Creek Slump maintenance project for early 2017 includes investigating the groundwater and bedrock, regrading the hillside east of the Solar Ponds Plume Treatment System (SPPTS) and, as needed, installing seep drains. This effort is intended to improve hillslope drainage, minimize further slumping, and reduce the risk of damage to the SPPTS from further hillside movement. The total disturbed area is approximately 6 acres. The soil from the cut areas will be completely used in the fill areas and there will be no imported soils. The depths of cuts are expected to be less than 10 feet in most areas. Portions of the project will be within the Preble's Mouse Protection Area and Critical Habitat. Since portions of the area will not be returned to the preexisting grade the area will be surveyed after the regrading is complete to document the finish grade.

Information about any remaining subsurface structures in the vicinity of the proposed project (or state that there are none if that is the case).

The only remaining subsurface structures in the area are used in current operations and are not abandoned contaminated structures. They are the following:

- Interceptor Trench System (ITS) lines
- SPPTS collection trench (CT) and associated components (e.g., piezometers and cleanouts)
- Collection sump, transfer lines, and electrical lines associated with the Interceptor Trench System Sump (ITSS)
- Monitoring well B210489

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

This area is IHSS 101, Solar Evaporation Ponds. In accordance with Environmental Restoration RSOP Notification #02-08 (DOE 2002), soil was removed from six hot spot locations. Confirmation sampling was conducted in the excavations to confirm that sufficient soil had been removed. All contaminant concentrations and activities were less than Rocky Flats Cleanup Agreement (RFCA) Tier II Soil Action Levels (SAL), except for one beryllium concentration, which was slightly greater than the RFCA Tier II SAL (1.10 milligrams per kilogram [mg/kg] vs 1.04 mg/kg). None of the results exceeded the wildlife refuge worker (WRW) SALs (DOE 2003).

After completion of accelerated actions, No Further Action was recommended for IHSS 101 based on the following:

- Contaminant concentrations and activities were less that RFCA Tier II SALs, with minor exceptions. No Tier I SALs were exceeded
- Results of an evaluation indicated additional action was not necessary

After reviewing the Closeout Report for IHSS Group 000-1, CDPHE approved the Solar Evaporation Pond Area of Concern (IHSS 101) for No Further Accelerated Action on July 25, 2003.

Any water encountered will be dispositioned upgradient of SPPTS CT.