ROCKY FLATS STEWARDSHIP COUNCIL

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Jefferson County ~ Boulder County ~ City and County of Broomfield ~ City of Arvada ~ City of Boulder
City of Golden ~ City of Northglenn ~ City of Thornton ~ City of Westminster ~ Town of Superior
League of Women Voters ~ Rocky Flats Cold War Museum ~ Rocky Flats Homesteaders

Board of Directors Meeting – Agenda
Monday, February 6, 2017, 8:30 – 11:45 AM
Rocky Mountain Metropolitan Airport, Terminal Building, Mount Evans Room
11755 Airport Way, Broomfield, Colorado

8:30 AM Convene/Introductions/Agenda Review

8:35 AM Chairman's Review of January 18th Executive Committee meeting

8:40 AM Business Items (briefing memo attached)

1. Election of Stewardship Council Officers for 2017

   Action Item: Elect Officers

2. Consent Agenda
   - Approval of meeting minutes, checks and meeting protocols

3. 2017 Meeting Schedule and Notice Provisions Resolution

   Action item: Adopt Resolution

4. Executive Director's Report

9:10 AM Public Comment

9:20 AM Host DOE Quarterly Meeting (briefing memo attached)
- DOE will brief the Stewardship Council on site activities for the third quarter of 2016 (July – September).
- Activities include surface water monitoring, groundwater monitoring, ecological monitoring, and site operations (inspections, maintenance, etc.).
- DOE will also provide an update on the CERCLA Five-Year Review

10:20 AM Briefing/Discussion on Original Landfill (briefing memo attached)
- This briefing will provide an update on its work to stabilize the Original landfill.

- The briefing will prepare the foundation for the April meeting. That meeting will focus on the technical report DOE commissioned examining long-term stability needs and options.

11:20 AM Public comment

11:30 AM Board Roundtable – Big Picture/Additional Questions/Issue Identification
Adjourn

Upcoming Meetings: All dates are proposed and will be set at this meeting

April 3
June 5
September 11
October 30

Acronym or Term	Means	Definition
Alpha Radiation		A type of radiation that is not very penetrating and can be blocked by materials such as human skin or paper. Alpha radiation presents its greatest risk when it gets inside the human body, such as when a particle of alpha emitting material is inhaled into the lungs. Plutonium, the radioactive material of greatest concern at Rocky Flats, produces this type of radiation.
Am	americium	A man-made radioactive element which is often associated with plutonium. In a mass of Pu, Am increases in concentration over time which can pose personnel handling issues since Am is a gamma radiation-emitter which penetrates many types of protective shielding. During the production era at Rocky Flats, Am was chemically separated from Pu to reduce personnel exposures.
AME	Actinide Migration Evaluation	An exhaustive years-long study by independent researchers who studied how actinides such as Pu, Am, and U move through the soil and water at Rocky Flats
AMP	Adaptive Management Plan	Additional analyses that DOE is performing beyond the normal environmental assessment for breaching the remaining site dams.
AOC well	Area of Concern well	A particular type of groundwater well
B	boron	Boron has been found in some surface water and groundwater samples at the site
Be	beryllium	A very strong and lightweight metal that was used at Rocky Flats in the manufacture of nuclear weapons. Exposure to beryllium is now known to cause respiratory disease in those persons sensitive to it
Beta Radiation		A type of radiation more penetrating than alpha and hence requires more shielding. Some forms of uranium emit beta radiation.

BMP	best management practice	A term used to describe actions taken by DOE that are not required by regulation but warrant action.
BZ	Buffer Zone	The majority of the Rocky Flats site was open land that was added to provide a "buffer" between the neighboring communities and the industrial portion of the site. The buffer zone was approximately 6,000 acres. Most of the buffer zone lands now make up the Rocky Flats National Wildlife Refuge.
CAD/ROD	corrective action decision/record of decision	The complete final plan for cleanup and closure for Rocky Flats. The Federal/State laws that governed the cleanup at Rocky Flats required a document of this sort.
CCP	Comprehensive Conservation Plan	The refuge plan adopted by the U.S. Fish and Wildlife Service in 2007.
CDPHE	Colorado Department of Public Health and Environment	State agency that regulates the site.
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act	Federal legislation that governs site cleanup. Also known as the Superfund Act
cfs	cubic feet per second	A volumetric measure of water flow.
COC	Contaminant of Concern	A hazardous or radioactive substance that is present at the site.
COU	Central Operable Unit	A CERCLA term used to describe the DOE-retained lands, about 1,500 acres comprised mainly of the former Industrial Area where remediation occurred
CR	Contact Record	A regulatory procedure where CDPHE reviews a proposed action by DOE and either approves the proposal as is or requires changes to the proposal before approval. CRs apply to a wide range of activities performed by DOE. After approval the CR is posted on the DOE-LM website and the public is notified via email.
Cr	chromium	Potentially toxic metal used at the site.
CRA	comprehensive risk assessment	A complicated series of analyses detailing human health risks and risks to the environment (flora and fauna).

D&D	decontamination and decommissioning	The process of cleaning up and tearing down buildings and other structures.
DG	discharge gallery	This is where the treated effluent of the SPPTS empties into North Walnut Creek.
DOE	U.S. Department of Energy	The federal agency that manages portions of Rocky Flats. The site office is the Office of Legacy Management (LM).
EA	environmental assessment	Required by NEPA (see below) when a federal agency proposes an action that could impact the environment. The agency is responsible for conducting the analysis to determine what, if any, impacts to the environment might occur due to a proposed action.
EIS	environmental impact statement	A complex evaluation that is undertaken by a government agency when it is determined that a proposed action by the agency may have significant impacts to the environment.
EPA	U.S. Environmental Protection Agency	The federal regulatory agency for the site.
EEOICPA	energy employees occupational illness compensation program act	This act was passed by Congress in 2000 to compensate sick nuclear weapons workers and certain survivors. Unfortunately the program has been fraught with difficulties in getting benefits to these workers over the years.
ETPTS	east trenches plume treatment system	The treatment system near the location of the east waste disposal trenches which treats groundwater contaminated with organic solvents emanating from the trenches. Treated effluent flows into South Walnut Creek.
FC	functional channel	Man-made stream channels constructed during cleanup to help direct water flow.
FACA	Federal Advisory Committee Act	This federal law regulated federal advisory boards. The law requires balanced membership and open meetings with published Federal Register meeting dates.
Gamma Radiation		This type of radiation is very penetrating and requires heavy shielding to keep it from exposing people. Am is a strong gamma emitter.
GAO	Government Accountability Office	Congressional office which reports to Congress. The GAO did 2 investigations of

		Rocky Flats relating to the ability to close the site for a certain dollar amount and on a certain time schedule. The first study was not optimistic while the second was very positive.
g	gram	metric unit of weight
gpm	gallons per minute	A volumetric measure of water flow in the site's groundwater treatment systems and other locations.
GWIS	groundwater intercept system	Refers to a below ground system that directs contaminated groundwater toward the Solar Ponds and East Trenches treatment systems.
IA	Industrial Area	Refers to the central core of Rocky Flats where all production activities took place. The IA was roughly 350 of the total 6,500 acres at the site.
IC	Institutional Control	ICs are physical and legal controls geared towards ensuring the cleanup remedies remain in place and remain effective.
IGA	intergovernmental agreement	A cooperative agreement between local governments which sets up the framework of the Stewardship Council.
IHSS	Individual Hazardous Substance Site	A name given during cleanup to a discrete area of known or suspected contamination. There were over two hundred such sites at Rocky Flats.
ITPH	interceptor trench pump house	The location where contaminated groundwater collected by the interceptor trench is pumped to either the Solar Ponds and East Trenches treatment systems
L	liter	Metric measure of volume, a liter is slightly larger than a quart.
LANL	Los Alamos National Laboratory	One of the US government's premier research institutions located near Santa Fe, NM. LANL is continuing to conduct highly specialized water analysis for Rocky Flats. Using sophisticated techniques LANL is able to determine the percentages of both naturally-occurring and man-made uranium which helps to inform water quality decisions.
LHSU	lower hydrostratigraphic unit	Hydrogeology term for deep unweathered bedrock which is hydraulically isolated from the upper hydrostratigraphic unit (see

		UHSU). Data shows that site contaminants have not contaminated the LHSU.
LM	Legacy Management	DOE office responsible for overseeing activities at closed sites.
LMPIP	Legacy Management Public Involvement Plan	This plan follows DOE and EPA guidance on public participation and outlines the methods of public involvement and communication used to inform the public of site conditions and activities. It was previously known as the Post-Closure Public Involvement Plan (PCPIP).
M&M	monitoring and maintenance	Refers to ongoing activities at Rocky Flats.
MOU	Memorandum of Understanding	MOU refers to the formal agreement between EPA and CDPHE which provides that CDPHE is the lead post-closure regulator with EPA providing assistance when needed.
MSPTS	Mound site plume treatment system	The treatment system for treating groundwater contaminated with organic solvents which emanates from the Mound site where waste barrels were buried. Treated effluent flows into South Walnut Creek.
NEPA	National Environmental Policy Act	Federal legislation that requires the federal government to perform analyses of environmental consequences of major projects or activities.
nitrates		Contaminant of concern found in the North Walnut Creek drainage derived from Solar Ponds wastes. Nitrates are very soluble in water and move readily through the aquatic environment
Np	neptunium	A man-made radioactive isotope that is found as a by-product of nuclear reactors and plutonium production.
NPL	National Priorities List	A listing of Superfund sites. The refuge lands were de-listed from the NPL while the DOE-retained lands are still on the NPL due to ongoing groundwater contamination and associated remediation activities.
OLF	Original Landfill	Hillside dumping area of about 20 acres which was used from 1951 to 1968. It underwent extensive remediation with the

		addition of a soil cap and groundwater monitoring locations.
OU	Operable Unit	A term given to large areas of the site where remediation was focused.
PCE	perchloroethylene	A volatile organic solvent used in past operations at the site. PCE is also found in environmental media as a breakdown product of other solvents.
pCi/g	picocuries per gram of soil	A unit of radioactivity measure. The soil cleanup standard at the site was 50 pCi/g of soil.
pCi/L	picocuries per liter of water	A water concentration measurement. The State of Colorado has a regulatory limit for Pu and Am which is 0.15 pCi/L of water. This standard is 100 times stricter than the EPA's national standard.
PLF	Present Landfill	Landfill constructed in 1968 to replace the OLF. During cleanup the PLF was closed under RCRA regulations with an extensive cap and monitoring system.
PMJM	Preble's Meadow Jumping Mouse	A species of mouse found along the Front Range that is on the endangered species list. There are several areas in the Refuge and COU that provide an adequate habitat for the mouse, usually found in drainages. Any operations that are planned in potential mouse habitat are strictly controlled.
POC	Point of Compliance (surface water)	A surface water site that is monitored and must be found to be in compliance with federal and state standards for hazardous constituents. Violations of water quality standards at the points of compliance could result in DOE receiving financial penalties.
POE	Point of Evaluation (surface water)	These are locations at Rocky Flats at which surface water is monitored for water quality. There are no financial penalties associated with water quality exceedances at these locations, but the site may be required to develop a plan of action to improve the water quality.
POU	Peripheral Operable Unit	A CERCLA term used to describe the Wildlife Refuge lands of about 4,000 acres.

Pu	plutonium	Plutonium is a metallic substance that was fabricated to form the core or "trigger" of a nuclear weapon. Formation of these triggers was the primary production mission of the Rocky Flats site. Pu-239 is the primary radioactive element of concern at the site. There are different forms of plutonium, called isotopes. Each isotope is known by a different number. Hence, there are plutonium 239, 238, 241 and others.
RCRA	Resource Conservation and Recovery Act	Federal law regulating hazardous waste. In Colorado, the EPA delegates CDPHE the authority to regulate hazardous wastes.
RFCA	Rocky Flats Cleanup Agreement	The regulatory agreement which governed cleanup activities. DOE, EPA, and CDPHE were signors.
RFCAB	Rocky Flats Citizen Advisory Board	This group was formed as part of DOE's site-specific advisory board network. They provided community feedback to DOE on a wide variety of Rocky Flats issues from 1993-2006.
RFCLOG	Rocky Flats Coalition of Local Governments	The predecessor organization of the Rocky Flats Stewardship Council
RFETS	Rocky Flats Environmental Technology Site	The moniker for the site during cleanup years.
RFLMA	Rocky Flats Legacy Management Agreement	The post-cleanup regulatory agreement between DOE, CDPHE, and EPA which governs site activities. The CDPHE takes lead regulator role, with support from EPA as required.
RFNWR	Rocky Flats National Wildlife Refuge	The approximate 4,000 acres which compose the wildlife refuge.
RFSOG	Rocky Flats Site Operations Guide	The nuts-and-bolt guide for post-closure site activities performed by DOE and its contractors.
SEP	Solar Evaporation Ponds	In the 1950's when the site's liquid waste treatment capability was surpassed by the liquid waste generation rate, the site resulted to transferring liquid wastes to open-air holding ponds where solar energy was utilized to evaporate and concentrate the waste. The original SEPs were not impermeable and substantial quantities of uranium and nitrates made their way into

		groundwater. As a result the solar ponds plume treatment system was necessary to treat the contaminated groundwater before it emerged as surface water in North Walnut Creek.
SPPTS	solar ponds plume treatment system	System used to treat groundwater contaminated with uranium and nitrates. The nitrates originate from the former solar evaporation ponds which had high levels of nitric acid. The uranium is primarily naturally-occurring with only a slight portion man-made. Effluent flows into North Walnut Creek
SVOCs	semi-volatile organic compounds	These compounds are not as volatile as the solvent VOCs. They tend to be similar to oils and tars. They are found in many environmental media at the site. One of the most common items to contain SVOCs is asphalt.
TCE	trichloroethlyene	A volatile organic solvent used in past operations at the site. TCE is also found in environmental media as a breakdown product of other solvents.
U	uranium	Naturally occurring radioactive element. There were two primary isotopes of U used during production activities. The first was enriched U which contained a very high percentage (>90%) of U-235 which was used in nuclear weapons. The second isotope was U-238, also known as depleted uranium. This had various uses at the site and only had low levels of radioactivity.
UHSU	upper hydrostratigraphic unit	A hydrogeology term describing the surficial materials and weathered bedrock found at Rocky Flats. The UHSU is hydraulically isolated from the lower hydrostratigraphic unit (see LHSU). Groundwater in some UHSU areas of the site is contaminated with various contaminants of concern while groundwater in other UHSU areas is not impacted. All groundwater in the UHSU emerges to surface water before it leaves the site.

USFWS	United States Fish & Wildlife Service	An agency within the US Department of the Interior that is responsible for maintaining the nation-wide system of wildlife refuges, among other duties. The regional office is responsible for the RFNWR.
VOC	volatile organic compound	These compounds include cleaning solvents that were used in the manufacturing operations at Rocky Flats. The VOCs used at Rocky Flats include carbon tetrachloride (often called carbon tet), trichloroethene (also called TCE), perchloroethylene (also called PCE), and methylene chloride.
WCRA	Woman Creek Reservoir Authority	This group is composed of the three local communities, the Cities of Westminster, Northglenn, and Thornton, who use Stanley Lake as part of their drinking water supply network. Water from the site used to flow through Woman Creek to Stanley Lake but the reservoir severed that connection. The Authority has an operations agreement with DOE to manage the Woman Creek Reservoir.
WQCC	Water Quality Control Commission	State board within CDPHE tasked with overseeing water quality issues throughout the state. DOE has petitioned the WQCC several times in the last few years regarding water quality issues.
ZVI	zero valent iron	A type of fine iron particles used to treat VOC's in the ETPTS and MSPTS.

Business Items

- Cover memo
- October 31, 2016, draft board meeting minutes
- List of Stewardship Council checks
- Meeting Protocols and Resolution
- 2017 meeting dates resolution

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MEMORANDUM

TO: Board
FROM: David Abelson
SUBJECT: Business Items
DATE: January 20, 2017

In addition to approving the consent agenda (minutes, checks and meeting protocols), the Board will need to (1) elect officers for 2017, and (2) adopt a resolution regarding 2017 meeting schedule

Election of officers
In accordance with the Stewardship Council bylaws, "the Chair, Vice Chair, and Secretary/Treasurer shall be elected annually by the Board of Directors." The terms commence at this meeting, and there are no limitations as to the number of terms one can serve. The following people have expressed interest in serving:

Joyce Downing (Northglenn) – Chair
Chris Hanson (Superior) – Vice Chair
Lisa Morzel (Boulder) – Secretary/Treasurer
Jeannette Hillery (League of Women Voters) – Secretary/Treasurer

If you are interested in serving, please let me know. Additional names can be added for consideration at the meeting.

Action Item: Elect Officers

Resolution Re: 2017 Meeting Schedule and Notice Provisions
Each year, the Board is required to adopt a resolution establishing the meeting dates for the year.

February 6 (first Monday of the month)
April 3 (first Monday of the month)
June 5 (first Monday of the month)
September 11 (second Monday of the month)
October 30 (fourth Monday of the month)

The attached notice provisions track the Stewardship Council's bylaws.

Action item: Adopt Resolution

ROCKY FLATS STEWARDSHIP COUNCIL
Monday, October 31, 2016, 8:30 A.M. – 12:00 P.M.
Rocky Mountain Metropolitan Airport, Terminal Building, Mount Evans Room
11755 Airport Way, Broomfield, Colorado

Board Members in attendance: Mark McGoff (Director, Arvada), Sandra MacDonald (Alternate, Arvada), Deb Gardner (Director, Boulder County), Megan Davis (Alternate, Boulder County), Lisa Morzel (Director, Boulder), Martha Derda (Alternate, Broomfield), David Allen (Alternate, Broomfield), Laura Weinberg (Director, Golden), Libby Szabo (Director, Jefferson County), Pat O'Connell (Alternate, Jefferson County), Joyce Downing (Director, Northglenn), Shelley Stanley (Alternate, Northglenn), Joe Cirelli (Director, Superior), Emily Hunt (Alternate, Thornton), Bruce Baker (Director, Westminster), Shannon Bird (Alternate, Westminster), Mary Fabisiak (Alternate, Westminster), Jeannette Hillery (Director, League of Woman Voters), Arthur Widdowfield (Director, Rocky Flats Cold War Museum), Ron Heard (Alternate, Rocky Flats Cold War Museum), Susan Flack (Alternate, Rocky Flats Cold War Museum), Roman Kohler (Director, Rocky Flats Homesteaders).

Stewardship Council staff members and consultants in attendance: David Abelson (Executive Director), Barbara Vander Wall (Seter & Vander Wall, P.C.), Chelsie Gonzalez (Seter & Vander Wall, P.C.), Rik Getty (Technical Program Manager)

Attendees: Shirley Garcia (Broomfield), Karen Edson (DOE), Davina Castilla (DOE), Janice Roberts (citizen), Bruce Roberts (citizen), Ann Parker (Boulder), LeRoy Moore (RMPJC), Gwen Hooten (DOE), Lindsay Masters (CDPHE), Carl Spreng (CDPHE), Jeremy Rodriguez (Rep. Ed Perlmutter), Susan Griffin (EPA), Bonnie Graham-Reed (citizen), Marian Whitney (citizen), S. Shank (citizen), Scott Surovchak (DOE), Patty Gallo (Navarro), Christine Hawley (Hydros/WCRA), Martha Hyder (WREC), Diane Vigil (citizen), Sandy Pennington (Superior), Rita Dozal (Superior), Jody Reeds (Navarro), Linda Keiser (Navarro), David Wall (Navarro), Bob Darr (Navarro), John Boylan (Navarro), Vera Moritz (EPA), Kim Griffiths (citizen), Ian Paton (Wright Water Engineers), Ed Lanyon (Thornton/WCRA), Bob Fiehweg (FEC).

Convene / Agenda Review

Chair Lisa Morzel convened the meeting at 8:36 a.m. The first order of business was introductions of Board members and the audience.

Consent Agenda

Roman Kohler motioned to approve the consent agenda. The motion was seconded by Mark McGoff. The motion to accept the minutes and checks passed 12-0.

Executive Director's Report

David Abelson noted that Joe Cirelli (Superior Town Trustee) is term limited and is attending his final Stewardship Council meeting as a Board member. Joe spoke about how much he enjoyed serving on the Stewardship Council.

David then discussed the two CORA requests that have been submitted since September, both by the same person. The first was submitted before the September 12th Board meeting. That request sought information related to the executive session proposed to be held at that meeting and the negotiation of the personnel contracts. The request was denied because the records are not open for public inspection. The second CORA request was submitted following the September 12th meeting. It sought a copy of the minutes and audio recording of the executive session held by the Stewardship Council at its September 12th meeting. The request was denied because such records are not open for public inspection. David explained that when he gets a CORA request he confers with legal counsel on how to respond with the request and then proceeds accordingly. This process increases the Stewardship Council's legal costs, and David wanted the Board to be aware of the reason behind the increased costs.

Next, David discussed an email he received from a Board member asking about the Executive Committee appointment process. David explained the Executive Committee terms start at the February 6, 2017 Board meeting. There are three positions—Chair, Vice Chair and Secretary/Treasurer. The first order of business at the February 6th meeting will be the appointment of the Executive Committee positions. All Committee members must be Directors. David will email the Board in December outlining in further detail the process and responsibilities, and seeking interest in serving on the Executive Committee.

Public Comment

Leroy Moore began by quoting the monthly status report presented by DOE at the Stewardship Council's September 12th meeting. He noted "the 12-month rolling average for SW027 continues to exceed the standard." Leroy asked what DOE is doing to rectify the exceedance. He specifically wants to know what steps are being taken to dilute the surface water before the monitors reach the point of exceedance, and what is the likely result if the terminal ponds are breached. Lisa said the Board would forward his questions on to DOE. (Moore's comments and DOE's response can be found at http://www.rockyflatssc.org/public_comment.html)

Marian Whitney spoke next. Her community group, Rocky Flats Right to Know, has had 4 meetings since the Stewardship Council's September meeting. Recordings of their meetings are available online. Marian said her main concern was protecting the children who visit the Rocky Flats wildlife refuge. She said former state Rep. Wes McKinley told her group that the Stewardship Council was going to post signs about the cleanup and asked about the status of those signs. She has guided people on trails outside of Rocky Flats in the past, and has always trusted park rangers and officials to present accurate information about potential hazards, but she cannot trust what is being told about the safety of Rocky Flats. David Abelson responded that the Stewardship Council was not charged with developing or posting signs on the Refuge—that's the domain of the USFWS—and that McKinley's assertion that the Stewardship Council would post its own signs was not accurate. (Whitney's comment can be found at http://www.rockyflatssc.org/public_comment.html)

Board Approval of 2017 Work Plan

The 2017 work plan was reviewed at the September 12, 2016, Board meeting. The draft being presented at this meeting include the Board's requested changes. Roman Kohler motioned to

accept the proposed 2017 work plan. Joe Cirelli seconded the motion. The motion was approved 13-0.

Board Approval of 2017 Budget

The 2017 budget was reviewed at the September 12, 2016, Board meeting. No changes were offered at that meeting. The only change that was made was to account under 2017 anticipated expenditures the contract amendment. Barb Vander Wall explained the budget review process. Prior to finalizing the budget, the Board must hold a budget hearing and allow time for public comment. Following the public hearing, the Board must approve the budget resolution. Approval must occur before the end of each year. She also noted that after the budget is approved, it is filed with the Division of Local Government by the end of January.

Barb reminded those in attendance that notice of the 2017 budget hearing was published in advance of this meeting, and that an official public hearing must be held before approval.

Lisa officially opened the hearing for the 2017 budget. She asked for any public comments. There being no public comments, the budget hearing was closed. Jeannette Hillery motioned to accept the 2017 budget. The motion was seconded by Joyce Downing. The motion to approve the 2017 budget, appropriate the funds and adopt the budget resolution was approved 13-0.

Board Meeting Protocols

The Board's intention in developing the protocols is to provide guidance on public participation and related matters. David Abelson began by discussing the proposed changes he received from Board members prior to the meeting. The first suggestion stated that interruptions are not allowed from either Board members or members of the public. The second suggestion was to include a clear definition of a "personal attack." The third suggestion was a penalty for not adhering to the first two protocols.

David discussed that he did not include a definition of a "personal attack" in the protocols since he was not sure how to tackle that question. He also recommended that there should not be a penalty for disruptive behavior. Lisa agreed, adding that everyone just needs to focus on the issues of Rocky Flats and not personal feelings about Rocky Flats. David Allen suggested that there should be some kind of clarification that the public comment portion of the meetings are meant for public comment and should not be treated as a Q&A session.

Lisa stated that there is an opportunity for public comment at the beginning and ending of each meeting. Mark McGoff commented that the public interjects even when the Board is not engaged in the public comments portion of the meeting. He wanted clarification on whether the public is able to do that during presentations and discussions between the Board members. Mark mentioned that the public does not interject out-of-turn at other board meetings he attends outside of the Stewardship Council. Joe Cirelli mentioned that their Town of Superior meetings have time allotted for public comment for non-agenda items, and time allotted for agenda items. He suggested that this may be something that could be implemented for the Stewardship Council meetings. Deb Gardner stated that she finds the publics' questions during DOE presentations helpful. She suggested the Board open up a Q&A session right after the presentations to help

clarify things for both the public and the Board. Lisa mentioned that in the spirit of being the LSO for Rocky Flats, the Board's main objective is to serve as a conduit for the public to easily engage with the designated officials tasked with management of Rocky Flats. Part of what the Board is trying to do with the protocols is to curb the personal attacks.

Laura Weinberg wanted clarification as to how exactly the Board is supposed to engage with the public, and whether the Board wants to set an expectation of a response to the public. Lisa explained that sometimes the answers the public is seeking from the Board will be delayed. Laura asked if the public is expecting a response from the Board for any given question. David Abelson responded that it depends on the comment given by the public. He said the public is not always looking for a response, but rather just making a statement, and often the Board does not have the answer at hand. He also noted that most often the appropriate entity to respond is DOE, and upon request, David forwards those comments to DOE for a formal response.

Lisa asked if anything needed to be changed in the public comment protocol. Laura did not think so. Jeannette Hillery commented that the Board is always open with the public in regards to its ability to answer a question or not. She also liked the suggestion of a public Q&A and/or comments immediately following the DOE presentations. David said the meeting protocols will need to be edited to clarify that the public comment is not a Q&A session between the public and the Board. The meeting protocols will be approved at the February 2017 meeting.

DOE Quarterly Report for 2nd Quarter 2016

Bob Darr began by noting this report is in accordance with the Rocky Flats Legacy Management Agreement (RFLMA). The purpose is to inform the regulatory agencies and stakeholders of the remedy-related surveillance, monitoring, and maintenance activities conducted at Rocky Flats during the second quarter 2016 (April 1 through June 30).

The quarterly reports document the CERCLA remedy. The primary goal is surface-water protection. The regulatory response actions are to maintain 2 landfill covers and 4 groundwater treatment systems, monitor surface water and groundwater, and maintain physical controls. DOE is also required to enforce institutional controls.

Surface Water Monitoring – George Squibb

George began by discussing the surface water monitoring stations. At the Original Landfill, when routine surface-water sampling was performed in Woman Creek, downstream of the OLF (GS59), the mean concentrations for all analytes were below the applicable surface-water standards. At the Present Landfill, routine second-quarter sampling showed vinyl chloride above the applicable RFLMA standard. The vinyl chloride concentration was 0.27 µg/L, exceeding the limit of 0.2 µg/L. The result required DOE to increase the sampling frequency from quarterly to monthly. For the following monthly sample, vinyl chloride was not detected, so sampling frequency returned to quarterly.

At surface water monitoring station SW027, the 12-month rolling averages for plutonium (Pu) and americium (Am) were reportable as of April 30, 2015, and June 30, 2015. As of the end of the quarter, 12-month rolling averages were: Pu 0.18 pCi/L and Am 0.20 pCi/L. The site-specific standard for both is 0.15 pCi/L. There was very little flow during the quarter.

Mitigating actions included enhancing upstream erosion controls. RFLMA Contact Record 2015-05 discusses these issues. Concentrations at WOMPOC (located downstream) are not reportable.

No other RFLMA point of evaluation analyte concentrations were reportable during the quarter, and all point of compliance concentrations remained below reportable levels.

Groundwater – John Boylan

The second quarter is the heaviest sampling quarter. Sampling includes 10 Resource Conservation and Recovery Act (RCRA) wells, 9 Area of Concern (AOC) wells, 1 Surface-Water Support location, twenty-seven Sentinel wells, forty-two Evaluation wells, and 9 treatment system locations.

RCRA wells results are consistent with previous data. The data will be evaluated as part of the 2016 annual report. AOC well 1034 reported trichloroethene (TCE). The RFLMA standard is 2.5 µg/L; the sample was 49 µg/L. This well has been reportable since fourth quarter 2015. (See Contract Record CR 2015-10 for more information.) TCE is not detected in surface water. TCE is also found at the East Trenches (3.1 µg/L vs. 2.5 µg/L). The system has been adjusted, and sampling conducted during the third quarter showed compliance at the East Trenches.

John next discussed changes to the groundwater treatment systems. The Solar Ponds Plume Treatment System (SPPTS) was taken offline on April 11, 2016. The "Big Box" and Phase II uranium treatment cell were emptied, and converted to full-scale, interim test lagoon for nitrate treatment. A new "sidecar" vault was installed to support uranium treatment testing. Following additional changes, the project was completed and flow through the Big Box lagoon established on July 28th.

At the Mound Site Plume Treatment System (MSPTS), the system was redesigned to route water to the East Trenches Plume Treatment System for treatment.

Site Operations – John Boylan

DOE conducted the annual inspection on April 13th. There was no evidence of violations of institutional or physical controls. All signs are in good condition.

At the Original Landfill, DOE performed monthly inspections on April 20, May 18, and June 21. As has been discussed with the Board, the OLF showed signs of movement at the same locations as those repaired in 2015.

After significant precipitation event in April, additional subsidence was noted in former building 881 area. The area filled was where subsidence had been previously filled. The hole was approximately 4 feet in diameter, 3-to-4 feet deep; the area was backfilled with soil

Rocky Flats Overview: Actinide Migration Evaluation in the Rocky Flats Environment

Scott Surovchak, Carl Spreng, Ian Patton, and Martha Hyder presented the Actinide Migration Evaluation and associated issues. The presentation, which covered 68 slides, included:

- Background
- Contaminant Characterization
- Regulatory Process and Controls
- Site Cleanup
- Long-Term Site Management
- Summary

The presentation can be found at: http://www.lm.doe.gov/Rocky_Flats/Sites.aspx?view=5 (click on "Rocky Flats General Overview Briefing, RFSC, Oct. 2016."

Background

Scott Surovchak opened the presentation with any overview of site operations and cleanup. The site operated from 1951-1989. Most of the contamination was found inside the buildings, but some was found in the environment. Cleanup included building decommissioning decontamination, and demolition. It also included environmental restoration. To remediate Rocky Flats, waste and special nuclear materials were shipped off-site to more than 10 locations.

There are two main drainages at Rocky Flats—Walnut Creek is to the north, and Woman Creek to the south. Shallow groundwater is a potential transport pathway. The deep groundwater, which lies 200-300 meters below the surface, is isolated from the shallow groundwater and is not a transport pathway.

Historic contaminants include plutonium, americium, uranium, metals, nitrate and organic compounds.

Contaminant Characterization

The Historical Release Report (HRR) was originally compiled in 1992 to capture existing information on historical incidents and site practices involving hazardous substances. It was updated periodically over the next 12 years, and identified areas for additional characterization and potential remediation (individual hazardous substance sites, potential areas of concern, potential incidents of concern, and under building contamination)

Surface soils – off-site

Surface soils off-site of Rocky Flats are contaminated. The highest level recorded is 6.5 picocuries/gram (pCi/g). The final regulatory decision for Operable Unit 3 (offsite areas) was that no cleanup was necessary to protect human health or the environment because contaminant levels were so low.

This decision was based on a 3-volume RCRA Facility Investigation/Remedial Investigation report that provided data on surface water, groundwater, surface soil, subsurface soil, sediments, and air. See Volume I: http://www.lm.doe.gov/cercla/documents /rockyflats_docs/OU03/OU03-A-000465.pdf

Surface soils -- on-site

Surface soils on-site at Rocky Flats are also contaminated. More than 7200 locations were sampled since 1991, and more than 220,000 results were used to evaluate the nature and extent of surface-soil contamination.

Air

With air, the concern is particles. Most radionuclides were released and dispersed as particles. Their behavior in air depends on shape and density. Plutonium in the environment exists as PuO2 particles attached to the soil matrix, not as individual plutonium particles. Because very small particles condense or stick together to form larger aerosols, most plutonium is found with particles >3 microns (µm) diameter. Radioactive particles can damage lung tissue when they are inhaled and deposited in the lungs. Larger particles (>10 µm) are screened out in the nose and upper airway and are not retained by the body. With respect to plutonium and the inhalation pathway, air monitoring must be able to effectively capture particles. Additionally, filters collect particles via the same mechanisms as the human respiratory tract. Filters used in air monitors at Rocky Flats were tested and shown to be >99 percent efficient in capturing inhalable particles.

The two types of air monitoring were effluent and ambient. Effluent monitoring was for exhaust emissions from building stacks and vents. This monitoring was conducted from 1953 until the flow in ducts was disrupted by building decommissioning. Regarding ambient monitoring, contaminant concentrations were measured in the outside air. That monitoring occurred onsite, at the site boundary, and in the neighboring communities. That monitoring was conducted from 1952 until 2008.

Monitoring equipment was upgraded periodically as regulations changed and science and technology advanced. Air quality results were a small fraction of the allowable levels under federal regulatory laws.

Surface Water and Sediment

More than 400 surface-water locations were sampled since June 1991. Samples consisted of both grabs and automated flow-paced composites. More than 38,000 results were used to evaluate the nature and extent of surface-water contamination. More than 360 sediment locations were sampled since June 1991. More than 44,000 results were used to evaluate the nature and extent of sediment contamination.

Groundwater

More than 1,000 wells were sampled since June 1991, with more than 500,000 results. That data was used to evaluate the nature and extent of groundwater contamination. Groundwater was sampled at various depths using standard sampling techniques.

Uranium, Plutonium and Americium

Uranium -- Both natural and man-made forms are present at Rocky Flats. Man-made uranium was used in weapons production.

Plutonium – Plutonium is man-made. It was used in weapons production.

Americium – Americium is caused by radioactive decay of plutonium.

Aboveground nuclear testing—more than 500 tests from 1945 to early 1960s—resulted in world-wide distribution of plutonium and americium.

Actinide Migration Evaluation at Rocky Flats

The Actinide Migration Evaluation was undertaken to understand how actinides move in the environment at Rocky Flats. The transport mechanisms/pathways are air, biological, surface water and groundwater. Oxidation affects movement in the environment. In short, plutonium is virtually insoluble at Rocky Flats. The dominant pathway is soil erosion, which is triggered by air and surface water movement. Uranium can move as both a particle and soluble. That means uranium is mobilized by the four pathways.

Regulatory Process

The presenters discussed the process for determining cleanup levels at Rocky Flats. Input parameters included: Soil ingestion rate, inhalation rate and mass loading, average annual wind speed, exposure duration, depth of soil mixing layer, and cancer slope factors. The calculation was based on input from various working groups, citizen organizations, and computer models. The final values adopted for plutonium surface soils represent a $1x10^{-5}$ lifetime excess cancer risk.

Cleanup

Surface soils contaminated with plutonium at concentrations greater than the 50 picocuries per gram (pCi/g) were excavated. Individual Hazardous Substance Sites (IHSSs) were investigated and characterized using EPA-approved methods in accordance with RFCA. Contaminated soil was excavated, packaged and removed. Remedial actions were completed and documented, then reviewed by regulatory agencies. Approved actions were compiled in the historic release report.

The presentation next focused on remediation of the 903 Pad and Lip Area.

Long-Term Site Management

DOE next provided an overview of the ongoing site management. The historic Rocky Flats site is divided into the Central Operable Unit (the DOE-retained lands) and the Peripheral Operable Unit (the Rocky Flats National Wildlife Refuge).

Central Operable Unit (COU) -- Response actions: Institutional controls, physical controls, and continued monitoring (because of residual contamination and to protect the remedy from human intrusion). The COU is closed to recreational visitors. Continued monitoring is accomplished through extensive sampling of surface water and groundwater.

Peripheral Operable Unit (POU) – The POU was released for unlimited use and unrestricted exposure. That means there are no use restrictions related to Rocky Flats as a nuclear weapons

facility, including low levels of radiation on the POU. All use restrictions are driven by the Rocky Flats refuge act and USFWS refuge regulations, not contaminant concerns.

Water monitoring is governed by the Rocky Flats Legacy Management Agreement (RFLMA). There are eight automated gaging stations, 11 surface-water grab-sampling locations, eight treatment-system locations, and 88 monitoring wells. Calendar year 2016 samples (to date) include 90 composites (5,000+ aliquots) and 200 grab samples. During 2016 (to date) Non-regulatory water monitoring (governed by the Adaptive Management Plan) includes samples (to date) 50 composites (1,800+ aliquots) and 130 grab samples.

Surface-water monitoring provides a direct measurement of soil contamination being transported in water. Measured changes in concentrations of contaminants in surface water are an indicator of changes in the environment.

Board/Public Comments and Questions

Deb Gardner began the Board questions by asking why the actinides decreased between the point of evaluation (POE) and the point of compliance (POC). George Squibb (Navarro) explained that more water comes in downstream naturally, and particles tend to schlep off onto the ground and other surrounding matter. Bruce Baker asked how testing for plutonium is conducted. George explained that, in general, they have a machine that counts how much alpha radiation particles are present, but since he does not know the details of the testing, he will forward Bruce's question on to his colleagues.

David Allen stated that he thinks the process is a bit flawed. As he sees it, if the water stops flowing, the monitors are essentially starting over. That leads David to question the accuracy of using a rolling average at the points of compliance is when there is no water present. George mentioned they monitor a rolling 12-month average as well as a 30-day average, and that the 30-day cycle only kicks in when water is present. David stated that with the extend dry periods, the 12-month rolling average is not an accurate calculation. George Squibb explained that if there is no water flowing, it does not affect the calculations because nothing is there. David just wanted his concerns stated for the record. He fears that if elevated levels of actinides are detected in the future, they will not be taken seriously because of the 12-month rolling average. Bruce asked why Woman Creek started flowing the week before the Board meeting. George said natural groundwater and flow from Rocky Flats go into Woman Creek. George said it is very normal to see water flow this time of year at Woman Creek.

Mary Fabisiak asked if there is an alarm system and overflow capacity at the lift station. John Boylan said yes, that if the water gets too high it starts to flow into the treatment facility. Shelly Stanley asked if there is a risk of freezing. John said yes, but the risk is very low as the lift station is insulated.

Mary asked what why certain actinides move further into the ground than others. He said there are a variety of factors that can move contaminants in different ways, but if a contaminant moves that does not necessarily mean it is soluble. Mary also asked if there was ever remediation done in OU2 (the former Rocky Flats buffer zone) or OU3 (off-site lands). John said no.

Deb Gardner asked how the air measurements translate to picocuries like soil and water samples. Martha Hyder said it is a physics conversion to get those numbers, but she does not know the details. The source of the sampling determines the unit of measure. Martha stated the air is measure in picocuries in the air, which is the volume of particles. Deb wanted clarifications as to how the air monitoring was done. DOE stated the air was sampled monthly and that the average was based on a calendar year.

Bruce asked how they can determine what a healthy dose of exposure is for a full grown human. Scott answered that they take into account background radiation. Bruce said he was just trying to make the point that we get our exposer to actinides through gamma rays and once it is breathed into the body, it creates the alpha particles that can then create cancerous cells. Bruce thinks there is a heightened threat at Rocky Flats because of the contaminants in the soil that can than get into the air that has not been monitored. Scott explained that DOE took those concerns into account during their risk calculations. Bruce stated there was no air sampling after closure, even though there has been residual contamination from the 903 Pad. The new trails are going to go through the hot spot of Rocky Flats. Scott explained that the elevated levels of contaminants in the air are still well below the standard for exposure.

Mary Harlow asked why one of the slides showed that they test for contaminants three feet below surface level, but George said during the presentation that they go six feet below surface level. George answered that the current team has created internal standards for themselves and that going deeper was one standard DOE set.

Marianne Whitney asked how much of the living part of the wildlife refuge was being considered for monitoring. She is concerned about what the kids will be exposed to at Rocky Flats. Scott responded DOE took into account the visitor risk as well as the Rocky Flats employee risk when looking at exposure on site. They looked at contamination in someone who would be exposed to Rocky Flats for 250 hours a year. They specifically looked at exposure to children ages 1-6. Exposure to the public was considered when developing guidelines for opening the wildlife refuge. They also monitored fish in the area, and did a deer tracking study with tracking collars to see what the deer would carry offsite. That was the most extensive tracking of living biological contamination.

Leroy Moore asked about plutonium movement. He cited an article discussing the rapid migration of plutonium. Leroy quoted from the article “we need to get away from the idea that plutonium doesn’t move, because it does.” Ian Patton responded that in wet conditions, macrospore and physical pathways created by creatures underground such as worms create ways for plutonium to move. They also noted that there will almost certainly be plutonium movement when in water. The initial cleanup called for the drilling of wells around 903 Pad to do ultrafiltration studies to detect what kind of contamination may be at those depths. They found very low concentrations deep in the soil. Ongoing monitoring of groundwater is important for this reason.

Lisa Morzel closed the comments on the presentation due to time constraints and thanked DOE and the others for the briefing.

Public Comment

Marianne Whitney said she studied biology and that plants uptake contaminants. Carl Spreng said plants only uptake contaminants if the contaminants are soluble.

Sandy Pennington stated future presentations should be more up to date and integrate the AME findings with the current data. Rita Dozul that the Rocky Flats wildlife refuge opened without current testing since the last testing on the flood plan was in 2013. Bonnie Graham-Reed stated she was concerned there are 20 times more particles in the air during a windy event. She asked why there is no air monitoring when these events occur. She is also concerned about erosion and how it is being monitored. She feels the wildlife refuge should be used strictly as wildlife sanctuary and not be used for human recreation.

Big Picture Review

February 6, 2017

Potential Business Items

- Elect 2017 officers
- Adopt resolution re: 2017 meeting dates

Potential Briefing Items

- DOE quarterly update
- Original Landfill – path forward
- CERCLA Five-Year Review

April 3, 2017

Potential Business Items

- TBD

Potential Briefing Items

- CERCLA Five Year Review
- TBD

Issues to watch:

- Uranium exceedances
- Plutonium levels at SW027
- Pu/Am levels at SW093
- Groundwater treatment systems
- Plutonium movement in soil column

Barb Vander Wall reminded the Board members that they will soon receive their notices regarding the designation of directors and alternates to the Board.

Lisa Morzel adjourned the meeting at 12:29 p.m.

Respectfully submitted by Chelsie Gonzalez.

Rocky Flats Stewardship Council
Check Detail 2017
October 5, 2016 through January 21, 2017

Type	Num	Date	Name	Account	Paid Amount	Original Amount
Check		**10/28/2016**		**CASH-Wells Fargo-Oper...**		**-3.50**
				Admin Services-Misc Ser...	-3.50	3.50
TOTAL					-3.50	3.50
Check		**11/29/2016**		**CASH-Wells Fargo-Oper...**		**-3.50**
				Admin Services-Misc Ser...	-3.50	3.50
TOTAL					-3.50	3.50
Check		**12/28/2016**		**CASH-Wells Fargo-Oper...**		**-3.50**
				Admin Services-Misc Ser...	-3.50	3.50
TOTAL					-3.50	3.50
Check	**1827**	**11/11/2016**	**Century Link**	**CASH-Wells Fargo-Oper...**		**-27.04**
				Telecommunications	-27.04	27.04
TOTAL					-27.04	27.04
Bill Pmt -Ch...	**1828**	**11/11/2016**	**Blue Sky Bistro**	**CASH-Wells Fargo-Oper...**		**-290.00**
Bill	2468	10/31/2016		Misc Expense-Local Gov...	-290.00	290.00
TOTAL					-290.00	290.00
Bill Pmt -Ch...	**1829**	**11/11/2016**	**Crescent Strategies, LLC**	**CASH-Wells Fargo-Oper...**		**-7,959.88**
Bill	10/31/16 Bill...	10/31/2016		Personnel - Contract	-7,150.00	7,150.00
				Telecommunications	-130.59	130.59
				TRAVEL-Local	-35.10	35.10
				Postage	-15.99	15.99
				TRAVEL-Out of State	-628.20	628.20
TOTAL					-7,959.88	7,959.88
Bill Pmt -Ch...	**1830**	**11/11/2016**	**Jennifer A. Bohn**	**CASH-Wells Fargo-Oper...**		**-323.00**
Bill	16-70	10/31/2016		Accounting Fees	-323.00	323.00
TOTAL					-323.00	323.00
Bill Pmt -Ch...	**1831**	**11/11/2016**	**Seter & Vander Wall, P.C.**	**CASH-Wells Fargo-Oper...**		**-6,709.37**
Bill	73717	09/30/2016		Attorney Fees	-4,287.60	4,287.60
Bill	73952	10/31/2016		Attorney Fees	-2,421.77	2,421.77
TOTAL					-6,709.37	6,709.37
Check	**1832**	**12/09/2016**	**Century Link**	**CASH-Wells Fargo-Oper...**		**-26.62**
				Telecommunications	-26.62	26.62
TOTAL					-26.62	26.62
Bill Pmt -Ch...	**1833**	**12/09/2016**	**Crescent Strategies, LLC**	**CASH-Wells Fargo-Oper...**		**-8,321.55**
Bill	11/30/16 Bill...	11/30/2016		Personnel - Contract	-7,150.00	7,150.00
				Telecommunications	-130.59	130.59
				TRAVEL-Local	-155.52	155.52
				Postage	-15.99	15.99
				TRAVEL-Out of State	-869.45	869.45
TOTAL					-8,321.55	8,321.55

Rocky Flats Stewardship Council
Check Detail 2017
October 5, 2016 through January 21, 2017

Type	Num	Date	Name	Account	Paid Amount	Original Amount
Bill Pmt -Ch...	**1834**	**12/09/2016**	**Jennifer A. Bohn**	**CASH-Wells Fargo-Oper...**		**-256.00**
Bill	16-74	11/30/2016		Accounting Fees	-256.00	256.50
TOTAL					-256.00	256.50
Bill Pmt -Ch...	**1835**	**12/09/2016**	**Seter & Vander Wall, P.C.**	**CASH-Wells Fargo-Oper...**		**-926.00**
Bill	74005	11/30/2016		Attorney Fees	-926.00	926.00
TOTAL					-926.00	926.00
Check	**1836**	**01/06/2017**	**Century Link**	**CASH-Wells Fargo-Oper...**		**-26.53**
				Telecommunications	-26.53	26.53
TOTAL					-26.53	26.53
Bill Pmt -Ch...	**1837**	**01/06/2017**	**Crescent Strategies, LLC**	**CASH-Wells Fargo-Oper...**		**-7,389.75**
Bill	12/31/16 Bill...	12/31/2016		Personnel - Contract	-7,150.00	7,150.00
				Telecommunications	-132.61	132.61
				TRAVEL-Local	-76.14	76.14
				Postage	-15.99	15.99
				Supplies	-15.01	15.01
TOTAL					-7,389.75	7,389.75
Bill Pmt -Ch...	**1838**	**01/06/2017**	**Jennifer A. Bohn**	**CASH-Wells Fargo-Oper...**		**-304.50**
Bill	16-74	11/30/2016		Accounting Fees	-0.50	256.50
Bill	16-81	12/31/2016		Accounting Fees	-304.00	304.00
TOTAL					-304.50	560.50

ROCKY FLATS STEWARDSHIP COUNCIL

P.O. Box 17670
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www.rockyflatssc.org

(303) 412-1200
(303) 600-7773 (f)

Jefferson County ~ Boulder County ~ City and County of Broomfield ~ City of Arvada ~ City of Boulder
City of Golden ~ City of Northglenn ~ City of Thornton ~ City of Westminster ~ Town of Superior
League of Women Voters ~ Rocky Flats Cold War Museum ~ Rocky Flats Homesteaders

Rocky Flats Stewardship Council – Meeting Overview and Protocols

The central purpose of the meeting of the Rocky Flats Stewardship Council Board of Directors is for the Board and public to learn about current site activities and monitoring results, to be briefed on any issues or challenges DOE and the regulatory agencies are facing, and other issues that come before the Board. The Board reserves time at each meeting to address governance-related issues. Those issues are identified in the meeting agenda, and could include the budget, work plan, minutes, and related items.

All meetings of the Board of Directors are open to the public. From time-to-time, and in accordance with § 24-6-402(4), Colorado Revised Statutes, the Board may go into executive session. Public notice of the executive session is provided in the meeting agenda.

Public Engagement Protocols: Time is allotted at each meeting for the public to address the Board of Directors and presenters. The following procedures apply to all meetings of the Board of Directors. The Chair reserves the right to modify these procedures.

1. Public comment periods: The public comment periods are identified on the meeting agenda. The goal is to have two public comment periods—one near the start of the meeting and another near the end. The public comment periods are not a Q&A with the Board.
2. Time limit: The Board requests that comments be to the point. If individual comments are too long and/or if there are a number of people who wish to speak, the Chair reserves the right to enact a time limit.
3. Additional public comment: As time allows, and as called on by the Chair, the public is allowed to ask questions or express an opinion during presentations. The Board will have the first opportunity to ask questions or make comments.

No personal attacks: All people speaking at the meeting must refrain from personal attacks and address the issues at hand.

Public Comment on Stewardship Council Website: The Stewardship Council website includes a section for public comment. To have your comment posted, you must email a copy of your comments to David Abelson (dabelson@rockyflatssc.org).

Noise: In order to help reduce background noise, sidebar and backroom conversations should be taken into the hall.

To be added to the Stewardship Council's email distribution list, please email David Abelson (dabelson@rockyflatssc.org).

RESOLUTION
OF THE
BOARD OF DIRECTORS
OF
ROCKY FLATS STEWARDSHIP COUNCIL
ADOPTING
BOARD MEETING PROTOCOLS

WHEREAS, all regular and special meetings of the Rocky Flats Stewardship Council Board of Directors are open to the public; and

WHEREAS, the meetings of the Stewardship Council's Board of Directors are important tools by which the Board and public learn about current activities, monitoring results, issues and challenges being faced, and other issues to come before the Board of Directors; and

WHEREAS, the Board of Directors desires and encourages comment and feedback from members of the public at its meetings and allocates time at each Stewardship Council Board of Directors meeting for members of the public to address the Board; and

WHEREAS, to better facilitate discourse with the public, promote respectful dialogue, ensure opportunity for members of the public to speak, and allow for effective communication between the Board of Directors and the public, certain protocols and guidelines are desirable; and

WHEREAS, the Board of Directors has drafted meeting protocols to be adopted and followed at all regular and special meetings of the Board.

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ROCKY FLATS STEWARDSHIP COUNCIL THAT:

The meeting protocols attached to this Resolution, entitled "Rocky Flats Stewardship Council – Meeting Overview and Protocols," are hereby adopted by the Board.

APPROVED AND ADOPTED THIS 6TH DAY OF FEBRUARY, 2017.

ROCKY FLATS STEWARDSHIP COUNCIL

By: _____
Chair

ATTEST:

By: _____

RESOLUTION
OF THE
BOARD OF DIRECTORS
OF
ROCKY FLATS STEWARDSHIP COUNCIL

regarding

2017 MEETING SCHEDULE AND NOTICE PROVISIONS

WHEREAS, pursuant to an Intergovernmental Agreement dated as of February 13, 2006, and as amended thereafter, (the "IGA"), the Rocky Flats Stewardship Council ("Stewardship Council") was established; and

WHEREAS, the Stewardship Council was created to allow local governments to work together on the continuing local oversight of the activities occurring on the Rocky Flats site to ensure that government and community interests are met with regards to long term stewardship of residual contamination and refuge management; and

WHEREAS, the Board of Directors of the Stewardship Council has a duty to perform certain obligations in order to assure the efficient operation of the Stewardship Council; and

WHEREAS, on March 6, 2006, the Board of Directors of the Stewardship Council adopted Bylaws regarding the operations of the Stewardship Council, governing, *inter alia*, meeting and notice requirements; and

WHEREAS, § 24-6-402, C.R.S., of the Colorado Sunshine Law, specifies the duty of the Board of Directors at its first regular meeting of the calendar year to designate a public posting place within the boundaries of the Stewardship Council for notices of meetings, in addition to any other means of notice; and

WHEREAS, pursuant to its Bylaws and Colorado laws, the Stewardship Council desires to establish its regular meeting schedule and location, and to designate its public posting place(s) for 2017.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE ROCKY FLATS STEWARDSHIP COUNCIL THAT:

1. Meeting Schedule/Location. The Board of Directors determines to hold regular meetings the **first Monday of February, April and June, the second Monday of September, and the fourth Monday of October at 8:30 AM** at the Rocky Mountain Metropolitan Airport Terminal Building, 11755 Airport Way, Broomfield, Colorado; and to hold special meetings as may be necessary, in accordance with the Bylaws of the Stewardship Council.

2. Regular Meeting Notice. The Board of Directors determines to annually post its regular meeting schedule at the Clerk and Recorder's office of the following counties: Jefferson, Boulder, Broomfield, Adams and Weld; and at the City or Town Clerk's Office of the following cities and/or towns: Arvada, Boulder, Broomfield, Westminster, Golden, Superior, Thornton, and Northglenn, for posting in a public place. In addition, the Board shall post its regular meeting schedule on the website established for the Stewardship Council. These notices shall remain posted throughout the year. At least seven (7) days advance notice of the regular meeting time, place and date shall be provided to the directors and

alternate directors, and to those members of the public who so request. The general nature of the business proposed to be transacted or the purpose of any meeting of the Board of Directors shall be specified in the notices of such meeting where possible.

3. Special Meeting Notice. In the event of a special meeting, a notice of such special meeting shall be posted at least seventy-two (72) hours in advance at the clerks' offices of the counties, cities and towns indicated above, for posting in a public place. At least seventy-two (72) hours advance notice of the special meeting time, place and date shall be provided to the directors and alternate directors, and to those members of the public who so request. The general nature of the business proposed to be transacted at or the purpose of any meeting of the Board of Directors shall be specified in the notices of such meeting where possible. The Board of Directors' ability to act on matters brought before it at a special meeting is restricted to those items specified in the notice.

4. Emergency Meeting Notice. Should the Board of Directors determine an emergency special meeting is necessary, a notice of such emergency meeting shall be posted at least twenty-four (24) hours in advance at the clerks' offices of the counties, cities and towns indicated above in accordance with the Colorado Open Meetings Act. The general nature of the business proposed to be transacted at, or the purpose of, any meeting of the Board of Directors shall be specified in the notices of such meeting where possible. The Board of Directors' ability to act on matters brought before it at a special meeting is restricted to those items specified in the notice.

5. Additional Notification. The Stewardship Council shall maintain a list of persons who, within the previous two years, have requested notification of all meetings, or of meetings with discussions of certain specified policies, and shall provide reasonable advance notification of such meetings to the individuals.

APPROVED AND ADOPTED THIS 6th DAY OF February, 2017.

(SEAL)

ROCKY FLATS STEWARDSHIP COUNCIL

By: _____
Chair

ATTEST:

By: _____

DOE Quarterly Report Briefing & Five Year Review

- Cover memo
- Section of quarterly report
- Comments on Five Year Review:
  - City and County of Broomfield
  - Town of Superior
  - Woman Creek Reservoir Authority
  - Rocky Mountain Peace and Justice Center/Rocky Flats Technical Group (minus attachments)

ROCKY FLATS STEWARDSHIP COUNCIL

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League of Women Voters ~ Rocky Flats Cold War Museum ~ Rocky Flats Homesteaders

MEMORANDUM

TO: Stewardship Council Board
FROM: Rik Getty
SUBJECT: Quarterly Report and CERCLA Five Year Review Briefing
DATE: January 19, 2017

We have scheduled one hour for DOE to present its quarterly update for the third quarter of 2016 (July - September), and an update on the CERCLA Five Year Review. The quarterly report, minus the figures, tables and appendices, is attached. The full report can be found here (2nd bullet): http://www.lm.doe.gov/Rocky_Flats/Documents.aspx

Executive Summary – The following are highlights from the quarter:

- Present Landfill (PLF) – No issues were identified.
- Original Landfill (OLF) –
  - DOE reports there is a new crack at the end of berm 4, and 4 small cracks reopened on the east side below berm 5. All of these cracks were outside of the waste footprint.
  - Slumping was observed within and upgradient of the East Perimeter Channel (EPC); DOE took steps to repair the problem.
- Mound Site Plume Treatment System (MSPTS) – The reconfiguration project was completed. Groundwater that is intercepted at the MSPTS is now pumped to the East Trenches Plume Treatment System (ETPTS) for treatment.
- Solar Ponds Plume Treatment System (SPPTS) – The interim reconfiguration project, initiated in April 2016, was nearing completion. Tanks were installed in the concrete carbon storage vault to store the liquid nutrient solution used to feed the denitrifying bacteria in the lagoon. DOE continued testing using microcells to treat uranium.
- Water Monitoring – Sampling met the targeted objectives.[1]
  - Analytical results for samples collected at WALPOC and WOMPOC are pending.

[1] The RFLMA network consists of eight automated surface water gaging stations, 11 surface water grab-sampling locations, eight treatment-system locations, and 88 monitoring wells. Additional locations are occasionally sampled in support of investigations in response to reportable conditions. During the quarter, six flow-paced composite samples, three surface-water grab samples, 24 treatment-system samples, and 10 groundwater samples were collected and submitted for analysis.

- Uranium – During the first quarter a reportable condition existed at WALPOC (30-day moving average exceeded standard). During the second and third quarters, levels dropped.
- Plutonium – Reportable conditions were observed at SW027 (Woman Creek drainage near terminal pond C2 located in the south interceptor ditch) starting in 2015 and extending into the third quarter of 2016. As of September 30, 2016, the 12-month rolling average for plutonium remained reportable at 0.18 pCi/L. Americium was no longer reportable.

- Perimeter signs – Two signs posted on the perimeter of the COU were missing information and were replaced.

CERCLA Five Year Review Update
DOE will provide an update on the CERCLA Five Year Review. As a reminder, the review focuses on three questions:

1. Is the remedy functioning as intended?
2. Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives still valid?
3. Has any other information come to light that could call into question the protectiveness of the remedy?

DOE tells me that the following submitted comments:

- City and County of Broomfield
- Town of Superior
- Woman Creek Reservoir Authority
- Peace Center/Rocky Flats Technical Group.

Those letters minus any attachments are attached.

Please let me know if you have any questions.

LMS/RFS/S15209

Rocky Flats Site, Colorado, Quarterly Report of Site Surveillance and Maintenance Activities Third Quarter Calendar Year 2016

January 2017

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

AOC	Area of Concern
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
COU	Central Operable Unit
CR	Contact Record
CY	calendar year
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
EPC	East Perimeter Channel
ESSD	East Subsurface Drain
ETPTS	East Trenches Plume Treatment System
ICs	institutional controls
LM	Office of Legacy Management
µg/L	micrograms per liter (sometimes expressed as ug/L)
mg/L	milligrams per liter
M&M	monitoring and maintenance
MSPTS	Mound Site Plume Treatment System
OLF	Original Landfill
OLF M&M Plan	*Rocky Flats Site Original Landfill Monitoring and Maintenance Plan*
pCi/L	picocuries per liter
PLF	Present Landfill
PLF M&M Plan	*Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan*
PLFTS	Present Landfill Treatment System
PMJM	Preble's meadow jumping mouse
POC	Point of Compliance
POE	Point of Evaluation
RCRA	Resource Conservation and Recovery Act
RFLMA	*Rocky Flats Legacy Management Agreement*
RFSOG	Rocky Flats Site Operations Guide
SID	South Interceptor Ditch
Site	Rocky Flats Site
SPPTS	Solar Ponds Plume Treatment System
TCE	trichloroethene

USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds
ZVI	zero-valent iron

Executive Summary

This quarterly report for the third quarter (July 1 through September 30) of calendar year (CY) 2016 includes information on the remedy-related surveillance, monitoring, and maintenance activities conducted at the Rocky Flats Site. This report summarizes the maintenance and inspection of the two site landfills and four groundwater treatment systems, inspection of the perimeter signs of the Central Operable Unit (COU), erosion control and revegetation activities, and routine water monitoring.

The routine quarterly inspection of the Present Landfill (PLF) was performed on August 17, 2016. No issues were identified. Settlement monuments at the PLF are surveyed annually; the 2016 survey was completed in December.

The Original Landfill (OLF) is inspected monthly and the third quarter inspections were conducted on July 18, August 22, and September 20. The only notable change observed during the third quarter of 2016 was a newly discovered crack at the end of berm 4 and four small cracks that have reopened on the east side below berm 5. All of these cracks were outside of the waste footprint. The OLF settlement monuments were surveyed in September; data indicate the vertical settling was within limits specified in the *Rocky Flats Site, Original Landfill Monitoring and Maintenance Plan* (2009).

As a result of the wet conditions at the OLF during early 2016, slumping was observed within and upgradient of the East Perimeter Channel (EPC) during the second quarter of CY 2016. For the purpose of restoring the ground surface and promoting positive drainage, the OLF EPC Maintenance Project was initiated on September 20. Materials were removed from the toe of the eastern end of the OLF that were protruding into the EPC. The area just north of berm 6, as well as the eastern ends of berms 4 and 5, was graded to promote positive drainage. Erosion control mat and turf reinforcement mat were then installed and the area was seeded. The project was completed in October 2016.

In the third quarter of 2016, the Mound Site Plume Treatment System (MSPTS) Reconfiguration Project was completed. Among other activities, a water transfer pipeline was constructed between the new MSPTS lift station and the East Trenches Plume Treatment System (ETPTS) influent manhole. Routine flow was restored on September 7. Groundwater that is intercepted at the MSPTS is now accumulated in the lift station and then pumped through the transfer line to the ETPTS for treatment. The annual report for 2016 will provide additional information and discussion on the MSPTS and this project.

After September 7, routine maintenance activities associated with the MSPTS were to confirm water was accumulating in the lift station, the pump was operating, and water transfer to the ETPTS was proceeding according to design. All operations in the balance of the third quarter of CY 2016 were as expected, and there were no problems.

Routine maintenance at the ETPTS in the third quarter of 2016 included checking the batteries and other power components, adjusting valves and settings to modify flow rates and maintain air stripper operation, and greasing the blower motor. In addition, the data logger software was updated.

As the third quarter of 2016 began, the Solar Ponds Plume Treatment System (SPPTS) Interim Reconfiguration Project, initiated in April 2016, was nearing completion. Tanks were installed in the concrete carbon storage vault to store the liquid nutrient solution used to "feed" the denitrifying bacteria in the lagoon. The sidecar vault was equipped with racking to support continued testing of uranium treatment using microcells. The annual report for 2016 will include more information on the reconfiguration project.

Routine maintenance activities continued at the Present Landfill Treatment System (PLFTS) through the third quarter of CY 2016. These activities generally consisted of inspecting the system for potential problems.

The signs posted on the perimeter of the COU were inspected on August 23, 2016. Two signs that were missing information were replaced later that week.

Maintenance of the Site's erosion-control features required continued effort throughout the third quarter of CY 2016, especially following high-wind and precipitation events. Erosion wattles and matting loosened and displaced by high winds and rain were repaired. Erosion controls were installed and maintained for the various projects that were ongoing during the third quarter of CY 2016.

During the third quarter of CY 2016, the water monitoring met the targeted monitoring objectives established for the Site. During the quarter, 6 flow-paced composite samples, 3 surface-water grab samples, 24 treatment-system samples, and 10 groundwater samples were collected and submitted for analysis.

Groundwater monitoring results will be evaluated as part of the annual report for CY 2016.

Analytical results are pending for samples collected at surface water Points of Compliance WALPOC and WOMPOC during the third quarter of CY 2016.

Reportable conditions for plutonium and americium were observed at Point of Evaluation (POE) SW027 starting in CY 2015 and extending into the third quarter of CY 2016. There has been no flow, and therefore no samples collected, at SW027 since June 2, 2016. As of September 30, 2016, the 12-month rolling average for plutonium at SW027 remained reportable and americium was no longer reportable. All other analytes were not reportable through the third quarter of CY 2016.

All analyte evaluation concentrations at POEs GS10 and SW093 remained below the applicable water-quality standards throughout the third quarter of CY 2016.

During the third quarter of CY 2016, routine Preble's meadow jumping mouse mitigation monitoring, wetland mitigation monitoring, and revegetation monitoring were conducted. Other ecological monitoring conducted during the third quarter included weed mapping, wetland and vegetation mapping, wetland delineations, prairie dog surveys, forb nursery monitoring, and photopoint monitoring. Revegetation activities were conducted at several project locations. Approximately 57 acres along the roadsides at the Site were treated with herbicides to help control various noxious weed species during the third quarter.

1.0 Introduction

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is responsible for implementing the final response action selected in the *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit* (CAD/ROD) (DOE, EPA, and CDPHE 2006), issued on September 29, 2006, and amended on September 21, 2011 (DOE, EPA, and CDPHE 2011), for the Rocky Flats Site, Colorado (the Site). DOE, the U.S. Environmental Protection Agency (EPA), and the Colorado Department of Public Health and Environment (CDPHE) are implementing the monitoring and maintenance (M&M) requirements of the CAD/ROD as described in the *Rocky Flats Legacy Management Agreement* (RFLMA) (CDPHE, DOE, and EPA 2012). Attachment 2 of the RFLMA (DOE 2012a) defines the surveillance and maintenance requirements of the Central Operable Unit (COU) remedy, the frequency for each required activity, and the M&M locations. The requirements include environmental monitoring; maintenance of the erosion controls, access controls (signs), landfill covers, and groundwater treatment systems; and operation of the groundwater treatment systems. The RFLMA also requires that the institutional controls (ICs), in the form of use restrictions as established in the CAD/ROD, be maintained.

This report is required in accordance with Section 7.0, "Periodic Reporting Requirements," of RFLMA Attachment 2 (DOE 2012a). The purpose of this report is to inform the regulatory agencies and stakeholders of the remedy-related surveillance, monitoring, and maintenance activities conducted at the Site during the third quarter (July 1 through September 30) of calendar year (CY) 2016. LM provides periodic communications through several means, such as this report, web-based tools, and public meetings.

LM prepared the *Rocky Flats Site Operations Guide* (RFSOG) (DOE 2013) to serve as the primary internal document to guide work to satisfy the requirements of the RFLMA and to implement best management practices at the Site.

Several other site-specific documents provide additional detail regarding the requirements described in RFLMA Attachment 2 (DOE 2012a), including all aspects of surveillance, monitoring, and maintenance activities, as well as data evaluation protocols.

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

This report addresses remedy-related surveillance, monitoring, and operations and maintenance activities conducted at the Site during the third quarter of CY 2016. This report summarizes the following activities:

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

2.0 Site Operations and Maintenance

2.1 Landfills

2.1.1 Present Landfill

The PLF is inspected quarterly in accordance with the requirements of the *Present Landfill Monitoring and Maintenance Plan and Post-Closure Plan* (PLF M&M Plan) (DOE 2014) and Attachment 2 of the RFLMA (DOE 2012a). Settlement monuments are surveyed annually in December and results are reported in the annual report.

2.1.1.1 Inspection Results

The routine PLF inspection for the third quarter of CY 2016 was performed on August 17, 2016. Copies of the landfill inspection forms are presented in Appendix A.

2.1.1.2 Settlement Monuments

The 2015 annual survey of the PLF settlement monuments was performed on December 9, 2015. Survey data indicate that vertical settling at each monument is within the limits specified in the PLF M&M Plan (DOE 2014). The 2016 annual survey was performed on December 12, 2016.

2.1.2 Original Landfill

The OLF is inspected monthly in accordance with the requirements in the *Rocky Flats Site Original Landfill Monitoring and Maintenance Plan* (OLF M&M Plan) (DOE 2009a) and the RFLMA. It was expected that after the first year, the inspection frequency might be reduced to quarterly for an additional 4 years. However, because localized slumping and seep areas have been observed, and because of the investigation of, and subsequent repairs to, the OLF cover, completed in 2009, no change to the frequency of inspections was recommended in the *Third Five-Year Review Report for the Rocky Flats Site, Jefferson and Boulder Counties, Colorado* (DOE 2012b).

2.1.2.1 Inspection Results

Routine OLF inspections during the third quarter of CY 2016 were performed on July 18, August 22, and September 20, 2016.

The National Renewable Energy Laboratory reported 2.08 inches of precipitation for the third quarter of 2016. The crack that occurred earlier this spring (during the second quarter) at the top of the East Perimeter Channel (EPC), which runs through berm 4 and ends at berm 5, remains the only movement at the waste footprint. The only notable change observed during the third quarter of 2016 was a newly discovered crack (approximately 1/2 to 1 inch in size) at the end of berm 4 and four small cracks that have reopened on the east side below berm 5. The cracks that occurred this quarter were all outside of the waste footprint. The completed inspection forms are presented in Appendix A.

2.1.2.2 Settlement Monuments

The OLF settlement monuments were surveyed on September 12, 2016. Survey data indicate that vertical settling at each monument is within the limits specified in the OLF M&M Plan (DOE 2009a). The survey results are presented in Appendix A.

2.1.2.3 Inclinometers

All inclinometer monitoring at the OLF has been discontinued.

As discussed in the quarterly report for the second quarter of CY 2009 (DOE 2009b), seven inclinometers were installed in boreholes at the OLF in 2008 as part of the geotechnical investigation of localized areas of instability. Since then, movement of the inclinometers was monitored approximately monthly until the majority of inclinometers were broken. (Inclinometers are deflected by lateral movement of the ground in which they are located, and if the deflection is enough to break the inclinometer tubes, then the inclinometer is no longer monitored. As stated in Section 3.3.1, "Monitoring Locations and Procedures," in the OLF M&M Plan, "Once an inclinometer tube breaks, it will no longer be monitored.")

2.1.2.4 Precipitation Response Repairs

As a result of the wet conditions at the OLF during early 2016, movement (i.e., slumping) was observed within and upgradient of the EPC during the second quarter of CY 2016. For the purpose of restoring the ground surface and promoting positive drainage, the OLF EPC Maintenance Project was initiated in September 2016.

On September 20, subcontractors mobilized to the Site and began removing materials from the toe of the eastern end of the OLF that were protruding into the EPC. The lower slumping area below the lower scarp beginning just north of berm 6 was graded to promote positive drainage. The eastern end of berms 4 and 5 were also regraded to promote positive drainage. When all grading was completed, erosion control mat and turf reinforcement mat were installed and the area was seeded. The project was completed in October 2016.

Additional actions to improve the diversion of groundwater away from the EPC include the repair and upgrade of the East Subsurface Drain (ESSD) in the northeast corner of the OLF so that it functions as intended and is less likely to clog. The ESSD is upgradient of the area that exhibited the most significant slumping in 2016, and it no longer operates as installed. The ESSD was constructed as an open, graded rock drain with no geotextile filter fabric to reduce the potential for clogging. The drain cannot be cleaned without being excavated. It is not known when the ESSD stopped working, but very little water, if any, flows out of the drain. The excavation of portions of the ESSD in the summer of 2015 (performed under Contact Record [CR] 2015-06) failed to provide an outlet for water that might have been collecting in the buried rock drain.

Based on the information above, the ESSD needs to be repaired and upgraded so that it properly functions and is less likely to clog. This action should be completed before the spring of 2017, when groundwater levels are anticipated to rise again and additional hillside movement is more likely. CR 2016-04 describes this effort.

2.1.2.5 Seeps

Seeps at the OLF were evaluated during the monthly inspections. Estimates for individual seep flow rates are given in the monthly OLF inspection reports.

2.2 Subsidence Observed Near Former Buildings

Former building areas, including those for Buildings 371, 771, 881, and 991, are routinely inspected (i.e., quarterly and as part of weather-related inspections) for evidence of subsidence. The quarterly inspection performed on August 23, 2016, indicates no new subsidence.

2.3 North Walnut Creek Slump

Slumping was noted on the hillside east of the Solar Ponds Plume Treatment System (SPPTS) after the heavy precipitation events of 2015. The toe of the slump encroached on the road leading to the SPPTS discharge gallery but the slumping did not appear to be causing other issues. During the spring precipitation of 2016, the slumping became more pronounced. Site staff determined that if additional movement occurred in the future, a groundwater monitoring well, the SPPTS Interceptor Trench System Sump, and/or the SPPTS trench could potentially be impacted. A statement of work was prepared and a geotechnical engineering firm was hired to evaluate the slumping area and the potential effect on SPPTS components.

The final report from the geotechnical engineers was completed in December 2016. This report indicates that continued movement is likely and that further movement would likely impact SPPTS components. The final report includes recommendations; however, additional investigation such as borings to evaluate soil types and groundwater levels will be required to support the design of the stabilization effort.

2.4 Site Road Maintenance

Watering for dust control was the only routine maintenance on the site roads to occur during the third quarter of 2016.

2.5 Groundwater Treatment Systems

Four groundwater treatment systems are monitored, operated, and maintained in accordance with requirements defined in the RFLMA and the RFSOG. Three of these systems (the Mound Site Plume Treatment System [MSPTS], the East Trenches Plume Treatment System [ETPTS], and the SPPTS) include a groundwater intercept trench (collection trench), which is similar to a French drain with an impermeable membrane on the downgradient side. The fourth system, the PLF Treatment System (PLFTS), passively treats water from the northern and southern components of the Groundwater Intercept System and water that flows from the PLF seep.

2.5.1 Mound Site Plume Treatment System

The MSPTS was installed in 1998 to treat groundwater contaminated with low concentrations of volatile organic compounds (VOCs). Groundwater that is intercepted by the collection trench is

routed to treatment cells that are filled with zero-valent iron (ZVI). Dissolved VOCs are treated by the ZVI in these cells. The water then flows to an effluent manhole and is subsequently discharged to the subsurface. In 2011, a small air stripper, designed and built by site staff, was installed within this effluent manhole. This solar/battery-powered air stripper was revised and optimized after it was installed to more effectively polish the effluent from the ZVI-filled treatment cells, further reducing residual concentrations of VOCs. This configuration was in effect until June 27, 2016, when flow to the MSPTS treatment components and effluent discharge gallery was curtailed to support the MSPTS Reconfiguration Project.

In the third quarter of 2016, the MSPTS Reconfiguration Project was completed. (Refer to RFLMA CRs 2015-04 and 2016-02.) The ZVI was removed, treatment cells were converted to backup storage containers, and the effluent manhole was replaced by a concrete lift station. A water transfer pipeline was constructed between the lift station and the ETPTS influent manhole. The MSPTS was completely offline through the months of July and August, 2016, during which time the intercepted groundwater was stored in the collection trench. Groundwater flow was episodic during the first days of September as components were tested. Routine flow was restored on September 7, 2016. Groundwater that is intercepted at the MSPTS is now accumulated in the lift station, from which it is pumped through the transfer line to the ETPTS for treatment. The annual report for 2016 will provide additional information and discussion on the MSPTS and this project.

Little in the way of routine maintenance was performed at the MSPTS during the third quarter of CY 2016, given that it did not operate for the first two months of the quarter and routine operation did not resume until early September. After September 7, the primary activities associated with the MSPTS were to confirm water was accumulating in the lift station, the pump was operating, and water transfer to the ETPTS was proceeding according to design. All operations in the balance of the third quarter of CY 2016 were as expected, and there were no problems.

Refer to Section 3.1.9.1 for information on water-quality monitoring.

2.5.2 East Trenches Plume Treatment System

The ETPTS was installed in 1999 to treat groundwater contaminated with low concentrations of VOCs, and was based on the design of the MSPTS. In its original configuration, groundwater that was intercepted by the ETPTS collection trench was routed to treatment cells filled with ZVI. Dissolved VOCs were treated by the ZVI in these cells and the treated effluent then flowed to an effluent manhole and was subsequently discharged to the subsurface. Following tests at the MSPTS that began in 2011, a small air stripper designed and built by site staff was installed in the ETPTS influent manhole in 2013. This pre-treated water (i.e., the water from which some of the VOCs were removed) was then routed to the ZVI-filled treatment cells. A reconfiguration project was undertaken in 2014–2015, and since that project was completed, the ETPTS no longer relies on ZVI for treatment. Instead, a full-scale, commercial air stripper using only solar/battery power treats the VOCs in collected groundwater. This reconfiguration project made no changes to the groundwater intercept trench, effluent manhole, or discharge gallery. Reconfiguration of the ETPTS was completed in January 2015. Refer to the annual reports for 2014 (DOE 2015a) and 2015 (DOE 2016a) and the first quarter 2015 report (DOE 2015b) for more information on the reconfiguration project.

Routine maintenance at the ETPTS in the third quarter of 2016 included checking the batteries and other power components, adjusting valves and settings to modify flow rates and maintain air stripper operation, and greasing the blower motor. In addition, the data logger software was updated. A sump pump was used to assist the installed effluent pump in moving treated water from the effluent tank to the discharge gallery in July, but as conditions dried (and the pump was replaced, as noted below) this was no longer needed.

The MSPTS Reconfiguration Project, summarized above in Section 2.5.1, also affected the ETPTS. Primary impacts were the transfer line that adds MSPTS water to the ETPTS, the addition of more batteries and solar panels to the power facility, replacement of the effluent pump with a higher-flow pump, and minor electrical modifications to support these adjustments. This project will be discussed at greater length in the annual report for 2016.

Refer to Section 3.1.9.2 for information on water-quality monitoring.

2.5.3 Solar Ponds Plume Treatment System

The SPPTS was installed in 1999 to treat groundwater contaminated with nitrate and uranium, and is based on the design of the MSPTS and ETPTS. In its original configuration, groundwater that was intercepted by the SPPTS collection trench was routed to a larger treatment cell filled with sawdust and a small percentage of ZVI, and then to a smaller treatment cell filled with gravel and ZVI. Nitrate was treated in the first cell and uranium in the second. Effluent from the treatment cells is routed to an effluent manhole, from which it is piped to a subsurface discharge gallery. Several upgrades to the SPPTS have been installed and modified over the years, and numerous treatability studies have been conducted to improve its effectiveness. Additional treatment cells were installed as was a pilot-scale nitrate treatment system that uses a lagoon approach.

As the third quarter of 2016 began, the SPPTS Interim Reconfiguration Project (approved in RFLMA CRs 2015-08 and 2015-09, and begun in April 2016) was nearing completion, as described in the report on the second quarter of 2016 (DOE 2016b). A pipe break identified in late June was repaired in July and the full-scale, interim lagoon was placed online July 28. (Water was diverted into the lagoon in the Big Box before that, but it took several days to fill the lagoon to the desired depth and allow water to begin to exit the lagoon.)

Three tanks were installed in the concrete carbon storage vault, which stores the liquid nutrient solution used to "feed" the denitrifying bacteria in the lagoons. These tanks were plumbed together and filled with the nutrient solution; they are now used in place of the smaller totes of nutrient solution used for the pilot-scale lagoons. Those smaller lagoons were kept active throughout the reconfiguration project and beyond, as they continued to provide some nitrate treatment. The sidecar vault was equipped with suitable racking to support continued testing of uranium treatment using microcells.

Refer to recent annual reports for additional information on this treatment system and the upgrades and studies conducted here. The annual report for 2016 will include more information on the reconfiguration project conducted in 2016.

Refer to Section 3.1.9.3 for information on water-quality monitoring.

2.5.4 Present Landfill Treatment System

Routine maintenance activities continued at the PLFTS through the third quarter of CY 2016. These activities generally consisted of inspecting the system for potential problems. Cracking in the grout surrounding the lip of the north and south manhole covers, observed during the first quarter, was still evident. The cracking was minimal and did not affect the treatment system. The grout was repaired during the third quarter of 2016. No other deficiencies were noted in third quarter of 2016.

Refer to Section 3.1.9.4 for information on water-quality monitoring.

2.6 Sign Inspection

It is required that "U.S. Department of Energy – No Trespassing" signs be posted at defined intervals around the perimeter of the COU to notify persons that they are at the boundary of the COU. It is also required that signs listing the ICs and providing contact information be posted at access points to the COU. The signs are required by the remedy as physical controls, are inspected quarterly, and are maintained through repair or replacement as needed. Physical controls protect the engineered components of the remedy, including landfill covers, groundwater treatment systems, and monitoring equipment, which are also inspected routinely during M&M activities.

The signs were inspected on August 23, 2016. One sign was missing letters and another one near the access gates did not have a contact phone number. These signs were replaced on August 25, 2016.

2.7 Erosion Control and Revegetation

Maintenance of the Site's erosion-control features required continued effort throughout the third quarter of CY 2016, especially following high-wind or precipitation events. Erosion wattles and matting loosened and displaced by high winds or rain were repaired. Erosion controls were installed and maintained for the various projects that were ongoing during the third quarter of CY 2016.

3.0 Environmental Monitoring

This section summarizes the environmental monitoring conducted in accordance with RFLMA Attachment 2 (DOE 2012a). RFLMA Attachment 2, Table 1, "Surface Water Standards," establishes the concentrations that determine reportable conditions in accordance with RFLMA Attachment 2, Section 6.0, "Action Determinations." Reportable conditions require DOE to consult with CDHPE and EPA to determine the appropriate actions.

3.1 Water Monitoring

This section includes:

- A discussion of analytical results for the Point of Compliance (POC), Point of Evaluation (POE), PLF, and OLF surface-water monitoring objectives.
- Summaries of groundwater monitoring at the Area of Concern (AOC) wells, the Sentinel wells, the Evaluation wells, and the Resource Conservation and Recovery Act (RCRA) wells; treatment-system monitoring; and Surface Water Support monitoring at the Site.

RFLMA Attachment 2 and the RFSOG offer details about the monitoring locations, sampling criteria, and evaluation protocols for the water monitoring objectives mentioned in the following sections. Appendix B provides analytical water-quality data for the third quarter of CY 2016. The annual report for CY 2016 will provide a more detailed interpretation and discussion of the water quality data.

3.1.1 Water Monitoring Highlights

During the third quarter of CY 2016, the water monitoring met the targeted monitoring objectives required by the RFLMA and was in conformance with RFSOG implementation guidance. The routine RFLMA network consists of 8 automated gaging stations, 11 surface-water grab-sampling locations, 8 treatment-system locations, and 88 monitoring wells (DOE 2015a). Additional locations are occasionally sampled in support of investigations in response to reportable conditions. During the quarter, 6 flow-paced composite samples, 3 surface-water grab samples, 24 treatment-system samples, and 10 groundwater samples were collected (in accordance with RFLMA protocols) and submitted for analysis.[1]

Groundwater monitoring results will be evaluated as part of the annual report for CY 2016.

Analytical results are pending for samples collected at POCs WALPOC and WOMPOC during the third quarter of CY 2016.

Reportable conditions for plutonium and americium were observed at RFLMA POE SW027 (Figure 1) starting in CY 2015 and extending into the third quarter of CY 2016. There has been no flow, and therefore no samples collected, at SW027 since June 2, 2016. As of September 30, 2016, the 12-month rolling average for plutonium at SW027 remained reportable at 0.18 picocurie per liter (pCi/L) and americium is no longer reportable. SW027 data are presented and discussed further in Section 3.1.3.2. All other analytes were not reportable through the third quarter of CY 2016.

All analyte evaluation concentrations at RFLMA POE locations GS10 and SW093 remained below the applicable water-quality standards throughout the third quarter of CY 2016.

[1] Composite samples consist of multiple aliquots ("grabs") of identical volume. Each grab is delivered by the automatic sampler to the composite container at each predetermined flow volume or time interval. During the third quarter of CY 2016, the 6 flow-paced composites comprised 233 individual grabs.

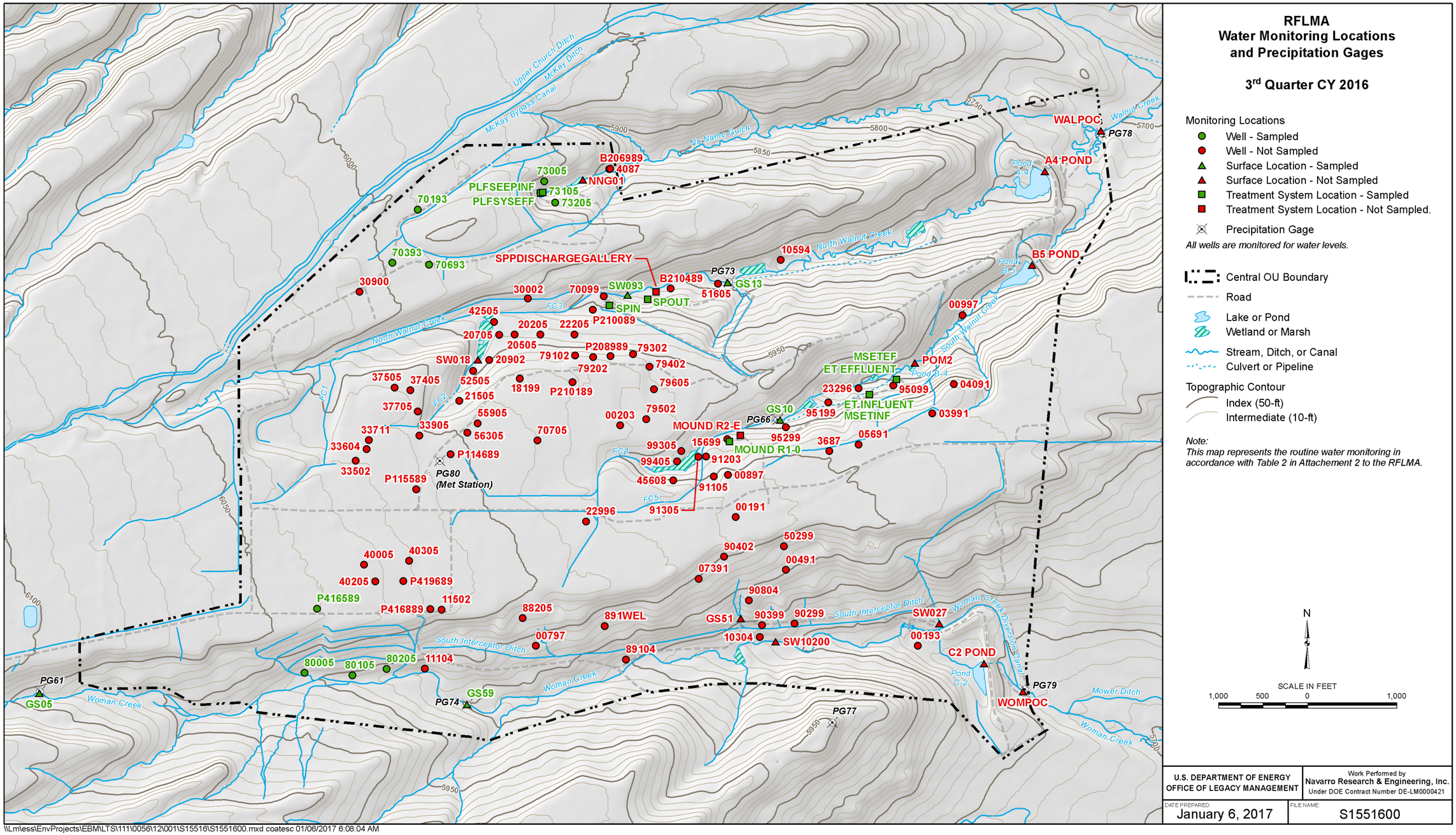

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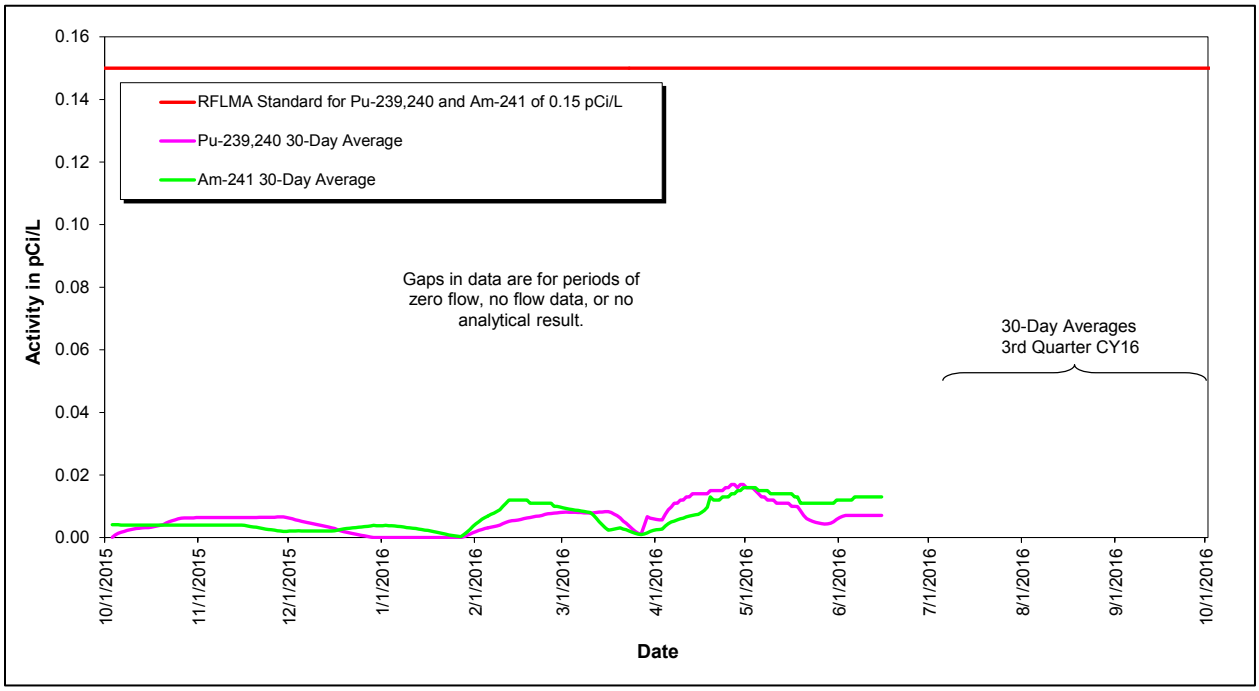
Figure 1. Water Monitoring Locations and Precipitation Gages

3.1.2 POC Monitoring

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

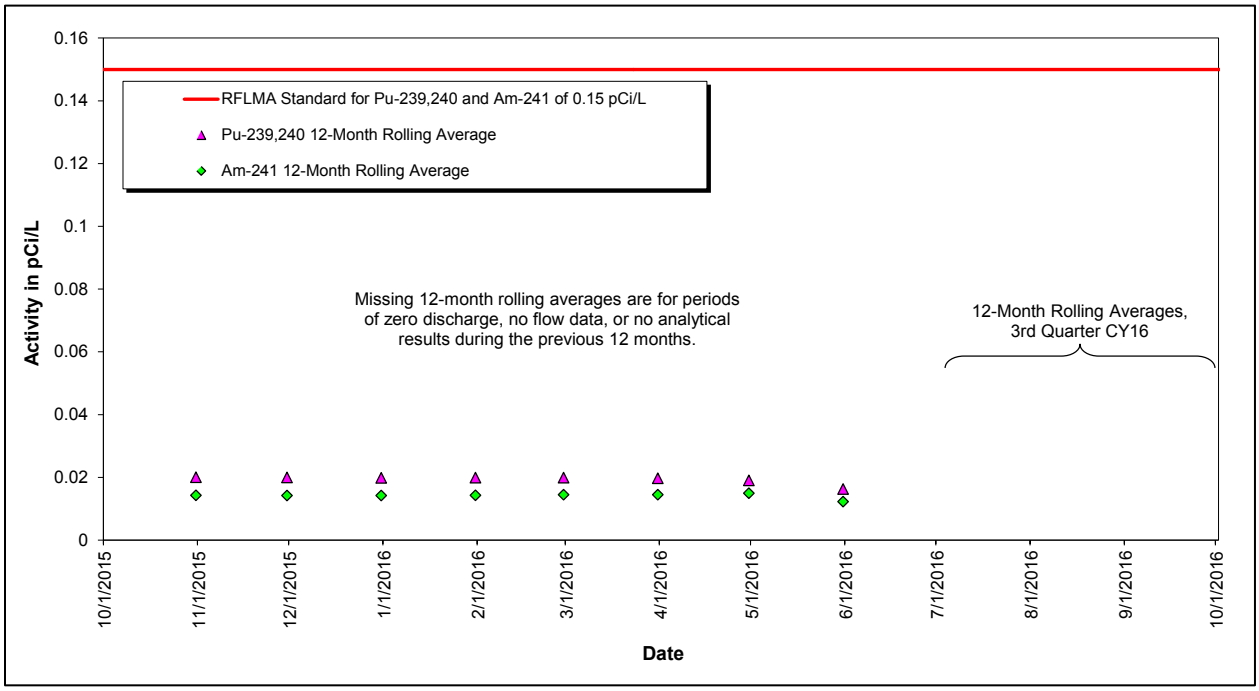
3.1.2.1 Monitoring Location WALPOC

Monitoring location WALPOC is on Walnut Creek at the eastern COU boundary. Third quarter sampling results for plutonium, americium, and uranium are pending. Figure 4 and Figure 5 show no occurrences of reportable 12-month rolling or 30-day averages during the quarter for nitrate + nitrite as nitrogen (in milligrams per liter [mg/L]). The methods for calculating the 30-day and 12-month rolling averages are detailed in the annual report.



Note: The composite sample started on 6/16/2016 is still in progress.

Figure 2. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WALPOC: Year Ending Third Quarter CY 2016



Note: The composite sample started on 6/16/2016 is still in progress.

Figure 3. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WALPOC: Year Ending Third Quarter CY 2016

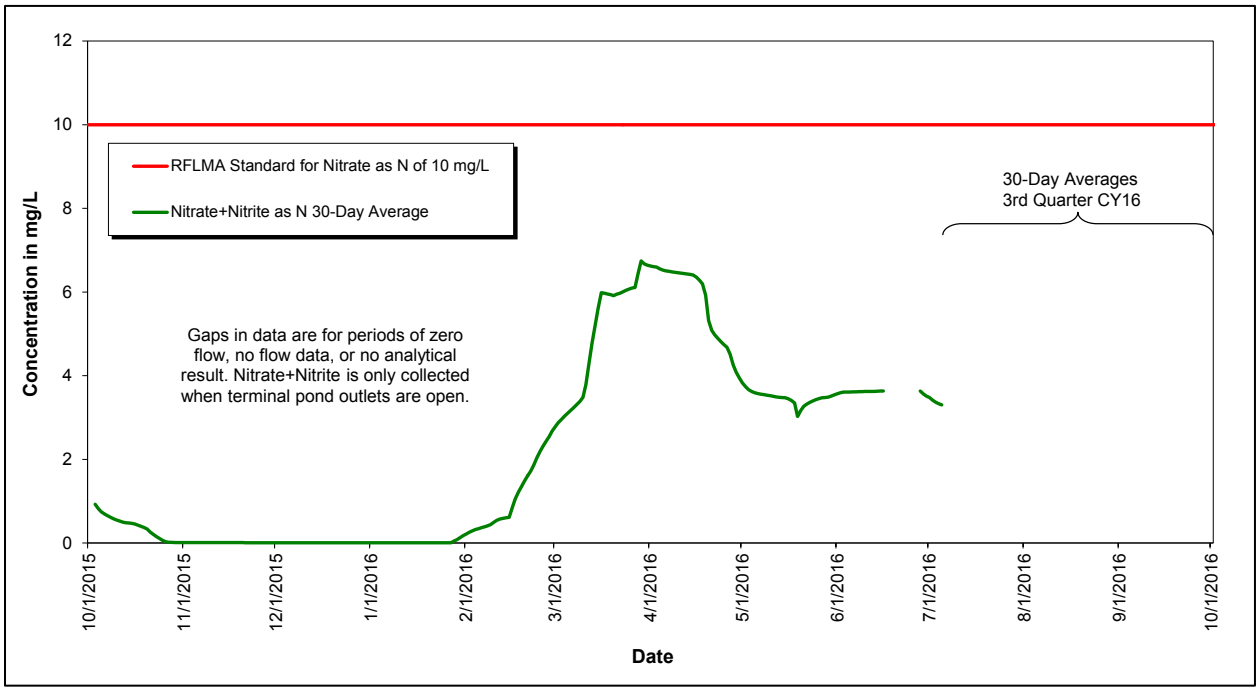
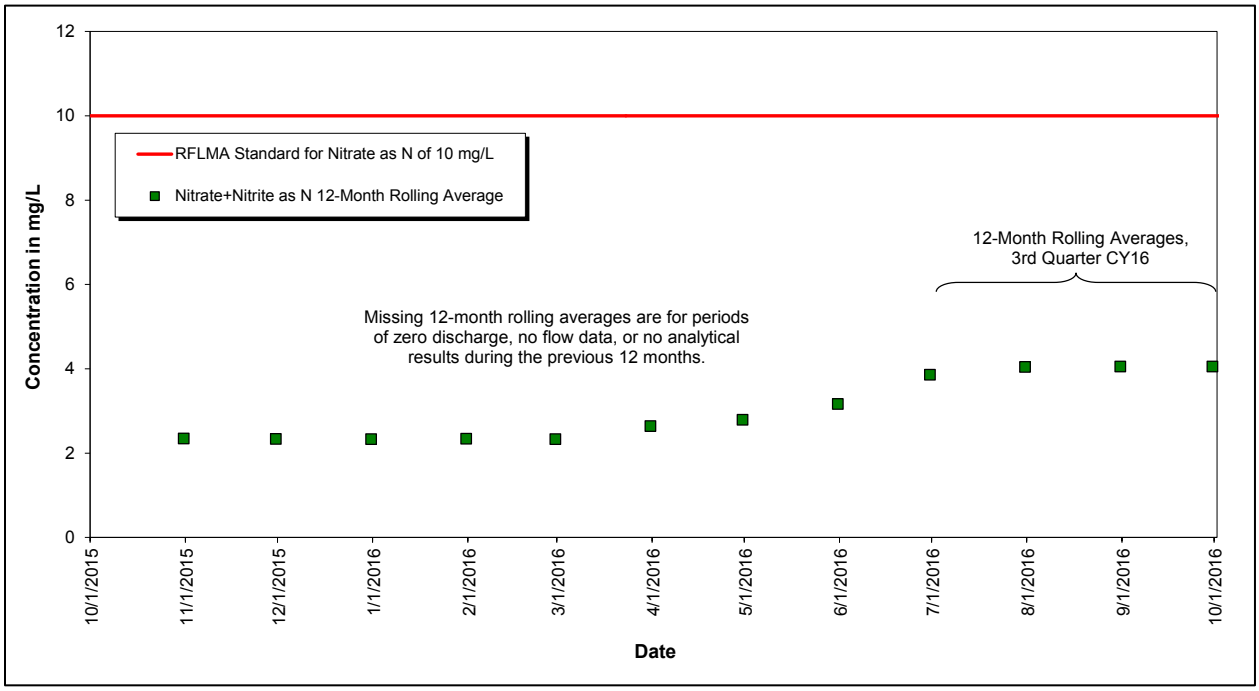


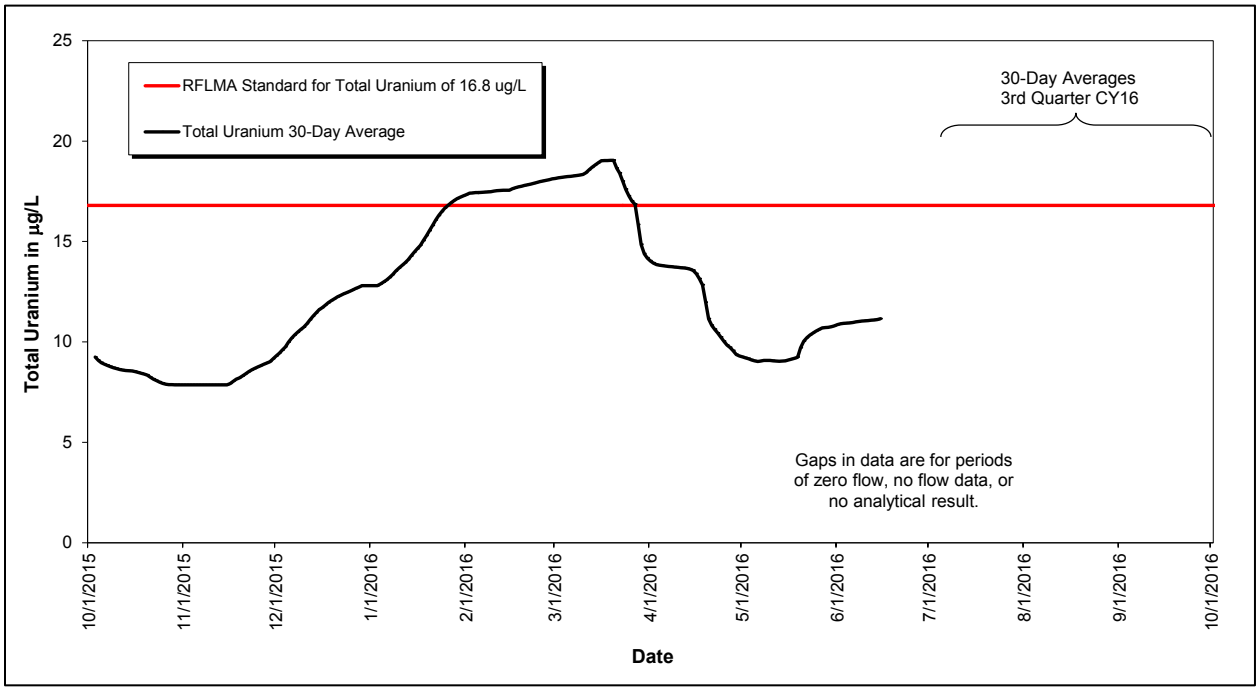
Figure 4. Volume-Weighted 30-Day Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending Third Quarter CY 2016



Notes: Nitrate + nitrite as nitrogen 12-month averages are conservatively compared to the nitrate standard only.

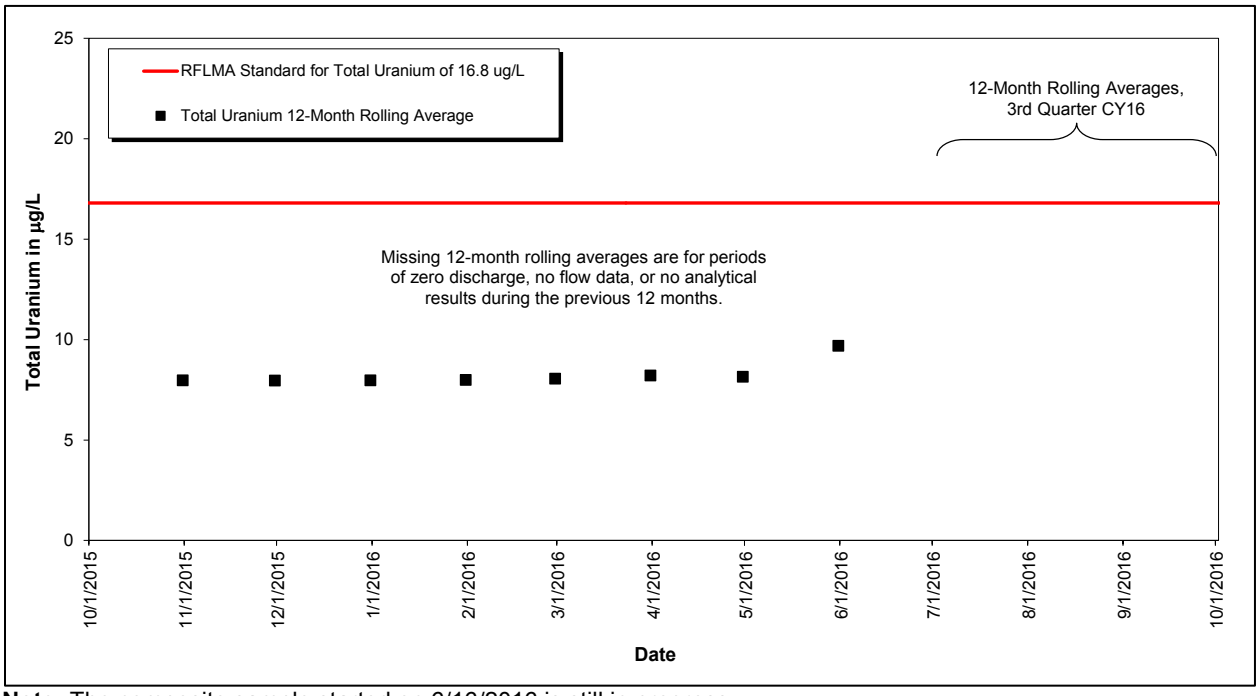
Figure 5. Volume-Weighted 12-Month Rolling Average Nitrate + Nitrite as Nitrogen Concentrations at WALPOC: Year Ending Third Quarter CY 2016

Figure 6 shows that the 30-day average for uranium exceeded the RFLMA standard of 16.8 micrograms per liter (µg/L) during the first quarter, triggering a reportable condition under the RFLMA. For details on this reportable condition, see the first quarter CY 2016 report (DOE 2016b). As of March 28, 2016, the 30-day average for uranium at WALPOC is no longer reportable. The 12-month rolling average remains well below the RFLMA water-quality standard for uranium (Figure 7).



Note: The composite sample started on 6/16/2016 is still in progress.

Figure 6. Volume-Weighted 30-Day Average Total Uranium Concentrations at WALPOC: Year Ending Third Quarter CY 2016

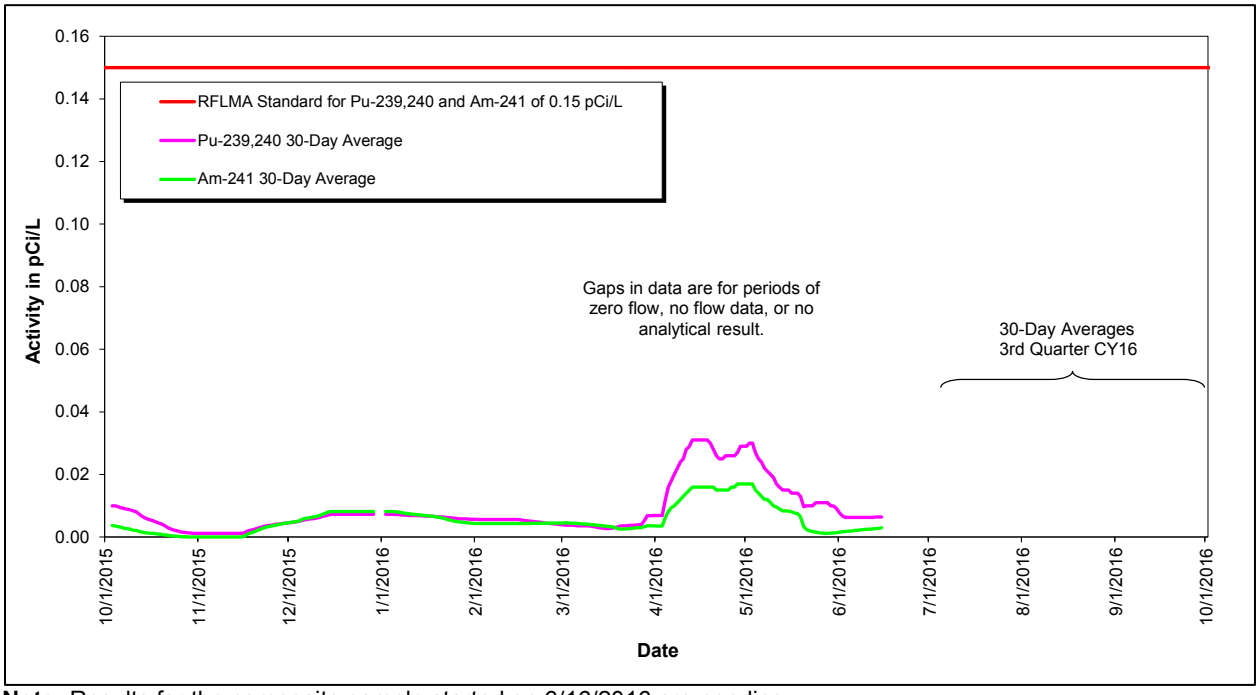


Note: The composite sample started on 6/16/2016 is still in progress.

Figure 7. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at WALPOC: Year Ending Third Quarter CY 2016

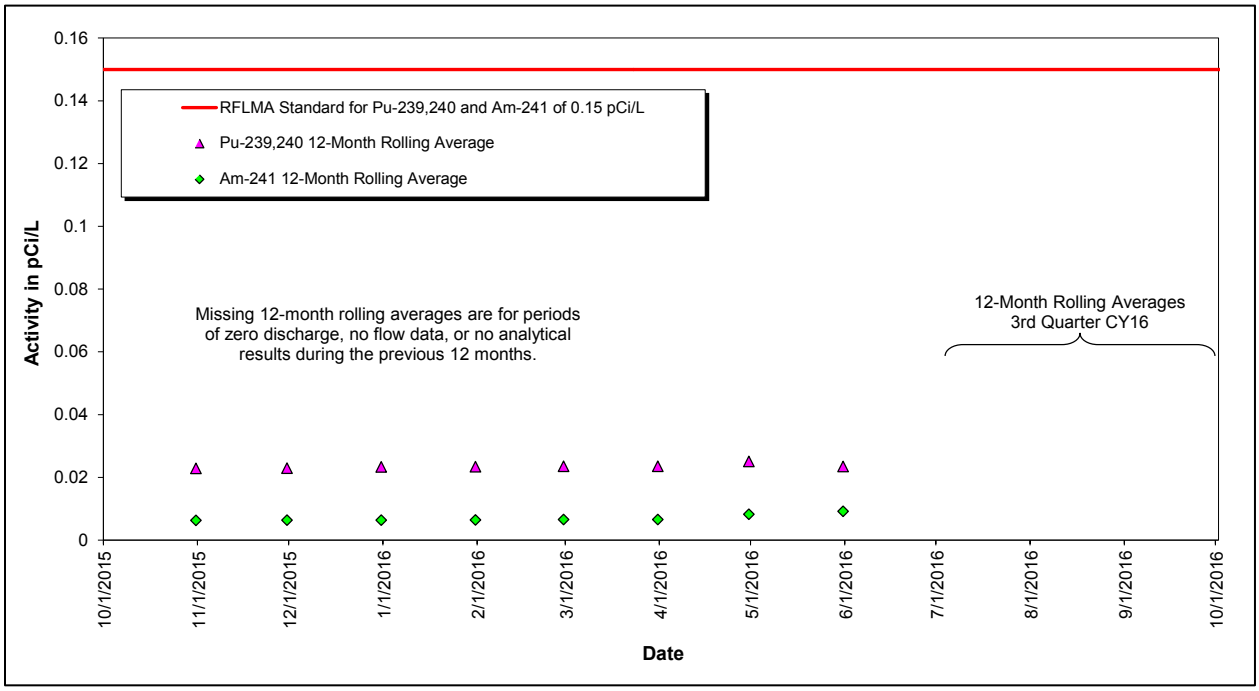
3.1.2.2 Monitoring Location WOMPOC

Monitoring location WOMPOC is on Woman Creek at the eastern COU boundary. Third quarter sampling results for plutonium, americium, and uranium are pending. Figure 8 through Figure 11 show the available 12-month rolling and 30-day averages. The methods for calculating the 30-day and 12-month rolling averages are detailed in the annual report.



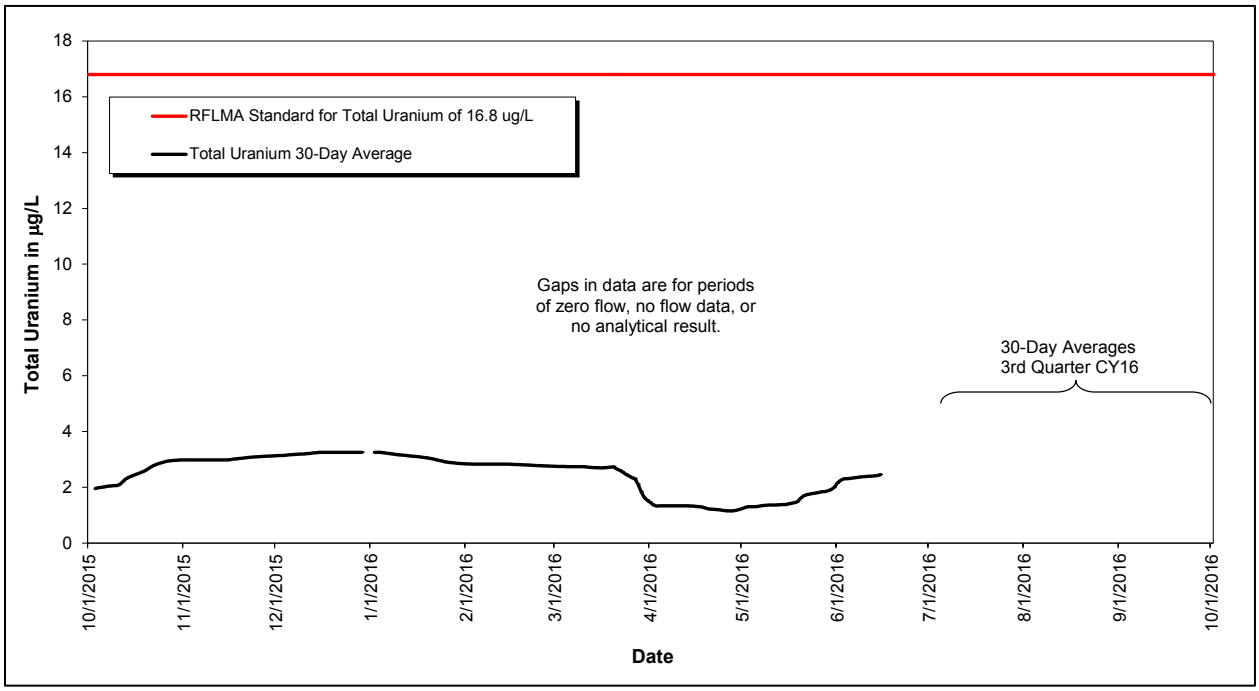
Note: Results for the composite sample started on 6/16/2016 are pending.

Figure 8. Volume-Weighted 30-Day Average Plutonium and Americium Activities at WOMPOC: Year Ending Third Quarter CY 2016



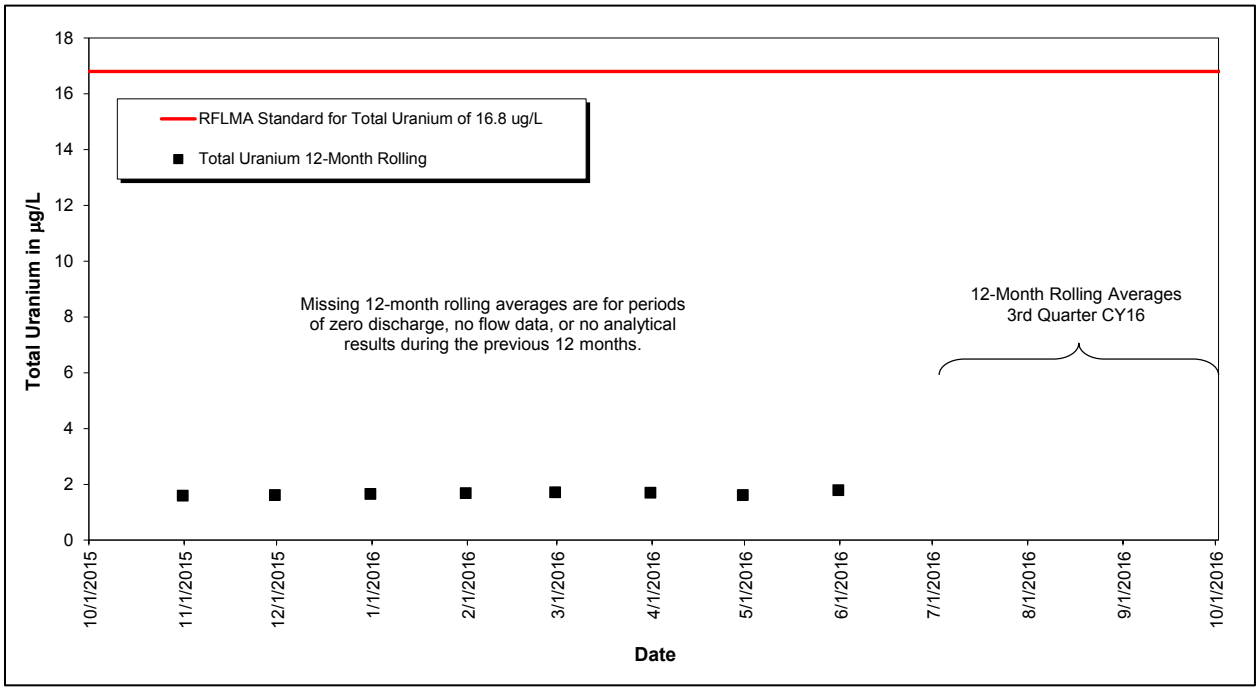
Note: Results for the composite sample started on 6/16/2016 are pending.

Figure 9. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at WOMPOC: Year Ending Third Quarter CY 2016



Note: Results for the composite sample started on 6/16/2016 are pending.

Figure 10. Volume-Weighted 30-Day Average Total Uranium Concentrations at WOMPOC: Year Ending Third Quarter CY 2016



Note: Results for the composite sample started on 6/16/2016 are pending.

Figure 11. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at WOMPOC: Year Ending Third Quarter CY 2016

3.1.3 POE Monitoring

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

3.1.3.1 Monitoring Location GS10

Monitoring location GS10 is on South Walnut Creek just upstream of the B-Series ponds. Figure 12 and Figure 13 show no occurrences of reportable 12-month rolling averages for plutonium, americium, or total uranium values during the quarter. The method for calculating the 12-month rolling averages is detailed in the annual report.

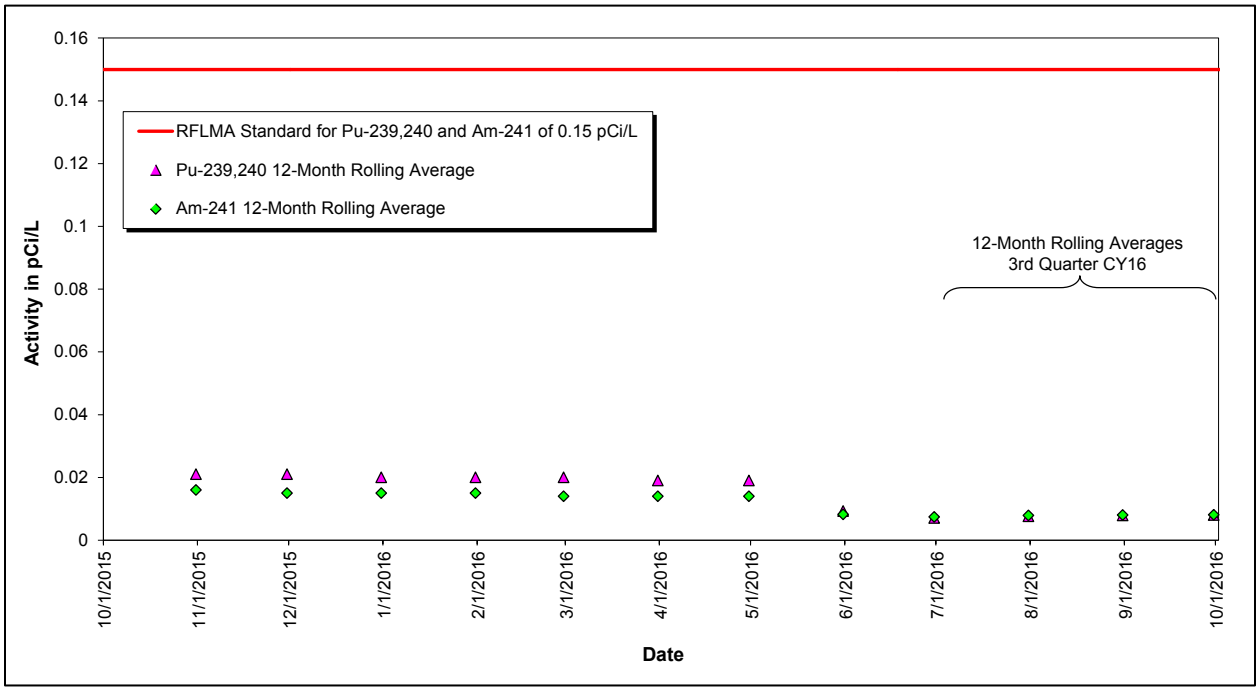


Figure 12. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at GS10: Year Ending Third Quarter CY 2016

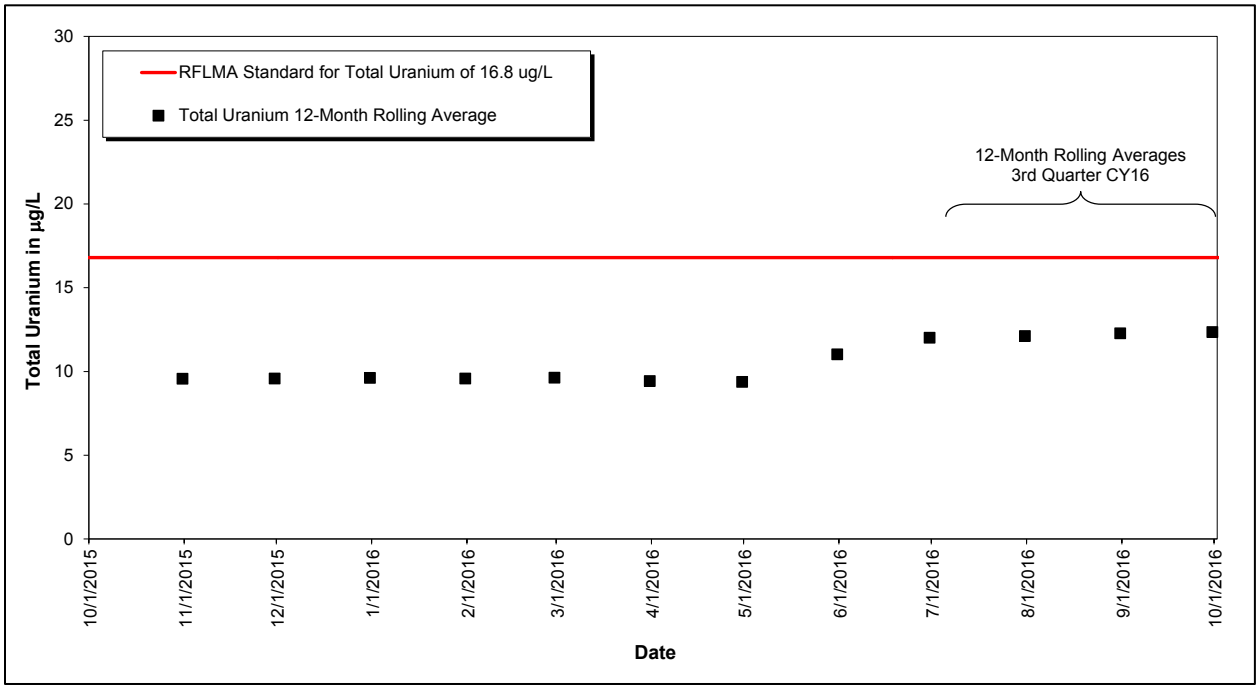


Figure 13. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at GS10: Year Ending Third Quarter CY 2016

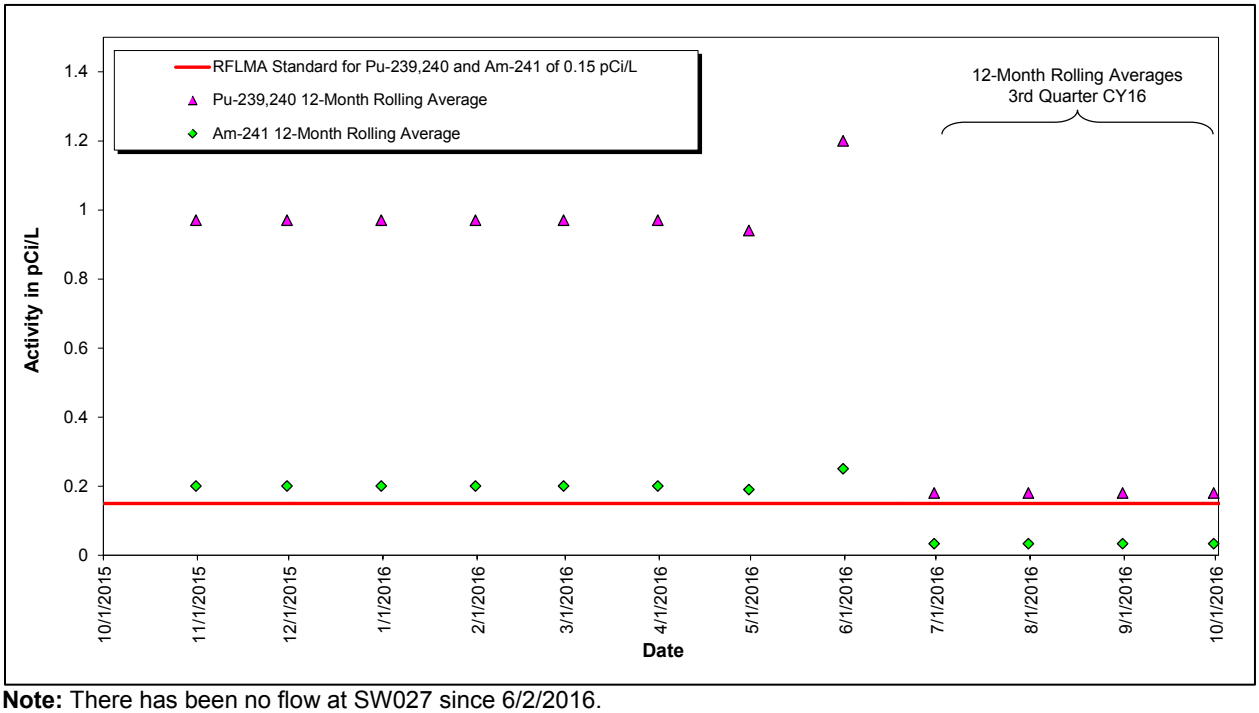
3.1.3.2 Monitoring Location SW027

Monitoring location SW027 is at the end of the South Interceptor Ditch (SID) at the inlet to Pond C-2. Figure 14 and Figure 16 show the 12-month rolling averages for plutonium, americium, and total uranium values during the quarter. The method for calculating the 12-month rolling averages is detailed in the annual report.

Figure 14 shows that the 12-month rolling average for plutonium and americium exceeded the RFLMA standard of 0.15 pCi/L, starting with the April 30 and June 30, 2015, evaluations. Due to the relatively small volumes of water monitored at SW027 in 2016 compared to 2015, the 12-month rolling averages have not changed significantly, even though 2016 concentrations are measurably lower than 2015 concentrations. There has been no flow, and therefore no samples collected, at SW027 since June 2, 2016. As of September 30, 2016, the 12-month rolling average for plutonium remained reportable at 0.18 pCi/L and americium was no longer reportable. All other analytes were not reportable through the third quarter of CY 2016.

Figure 15 shows water-quality data for plutonium and americium from CY 2005 through the third quarter of CY 2016. This figure shows the recent reportable values in comparison to the entire post-closure period.

Table 1 lists the americium, plutonium, and uranium results for composite samples collected during CY 2015 and 2016.



Note: There has been no flow at SW027 since 6/2/2016.

Figure 14. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW027: Year Ending Third Quarter CY 2016

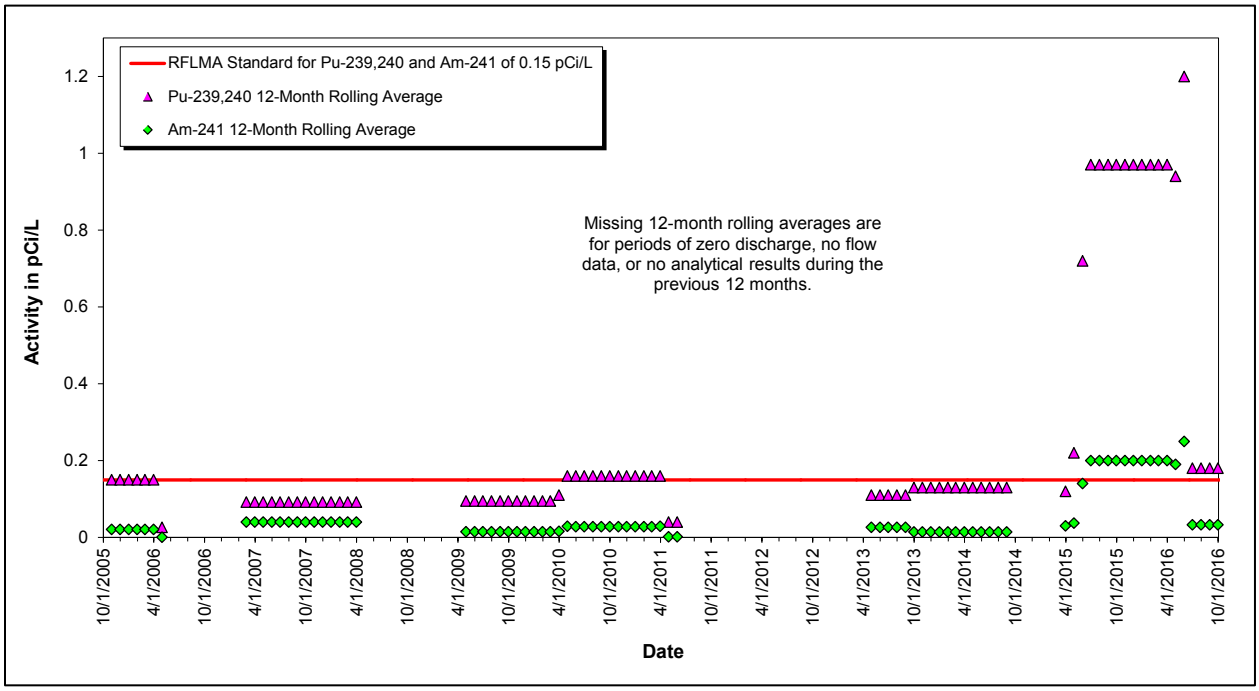
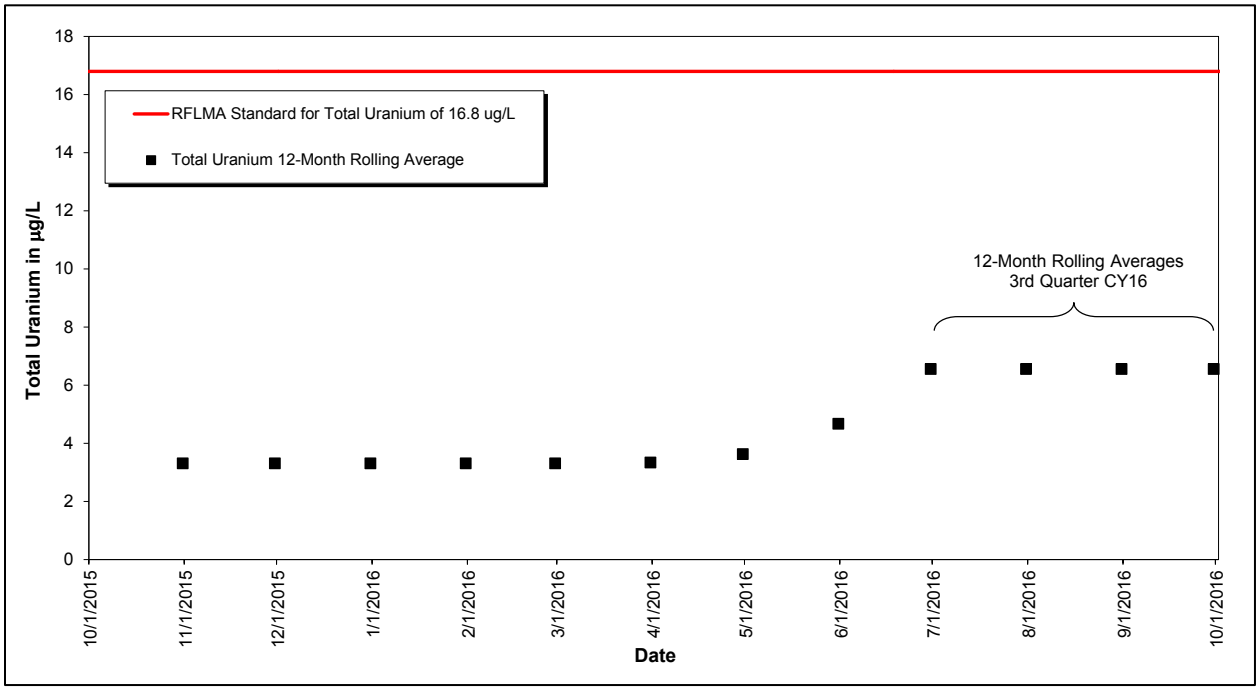


Figure 15. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW027: Post-Closure Period Ending Third Quarter CY 2016



Note: There has been no flow at SW027 since 6/2/2016.

Figure 16. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at SW027: Year Ending Third Quarter CY 2016

Table 1. CY 2015–2016 Composite Sampling Results at SW027

Start Date and Time	End Date and Time	Am-241(pCi/L)	Pu-239,240 (pCi/L)	Uranium (µg/L)
3/6/2014 11:59	3/9/2015 13:00	NSQ	NSQ	NSQ
3/9/2015 13:00	3/11/2015 12:57	0.030	0.116	5.92
3/11/2015 12:57	4/17/2015 17:50	0.030	0.139	4.04
4/17/2015 17:50	5/6/2015 12:42	0.040	0.251	3.78
5/6/2015 12:42	5/9/2015 12:43	0.169	0.887	3.45
5/9/2015 12:43	5/14/2015 9:56	0.034	0.306	3.07
5/14/2015 9:56	5/19/2015 14:13	0.068	0.432	3.17
5/19/2015 14:13	5/26/2015 16:32	0.109	0.501	3.55
5/26/2015 16:32	6/5/2015 10:37	1.260	5.590	2.19
6/5/2015 10:37	6/12/2015 14:51	0.321	1.520	3.05
6/12/2015 14:51	1/5/2016 12:40	NSQ	NSQ	NSQ
1/5/2016 12:40	3/30/2016 11:30	0.007	0.041	7.24
3/30/2016 11:30	4/20/2016 11:30	0.027	0.161	5.61
4/20/2016 11:30	4/21/2016 12:36	0.072	0.393	5.27
4/21/2016 12:36	6/3/2016 11:00	0.012	0.061	9.21
6/3/2016 11:00	In progress	[a]	[a]	[a]

Note:
[a] Sample in progress

Abbreviation:
NSQ = nonsufficient quantity for analysis

CR 2015-05 describes the plan and schedule for addressing the reportable conditions of plutonium and americium. The plan and schedule for evaluation, and the status of actions related to the plan, are described below:

- Evaluation of the steps taken in 2010, when it was anticipated that the 12-month rolling average for plutonium would exceed the standard at SW027 as reported in CR 2010-06, "Monitoring Results at Surface Water Point of Evaluation (POE) SW027." This includes a review of "Status Report of Steps Taken Regarding Monitoring Results at Surface Water Point of Evaluation (POE) SW027," August 31, 2010, and "Calendar Year (CY) 2011 Status Report of Actions Taken in Point of Evaluation SW027 Drainage," January 2012.
- On June 17, 2015, Site personnel walked the SID drainage area and identified opportunities to enhance the revegetation and erosion controls previously implemented in 2010 and 2011 (depicted on Figure 1 of CR 2015-05). Limited areas in the SID showed evidence of local erosion and sediment deposition. Based on these general observations, a geotechnical engineer was scheduled to inspect the areas and provide recommendations.
- During the June 17, 2015, inspection, locations were identified for immediate installation of new wattles (Figure 2 of CR 2015-05); installation was completed on June 22, 2015.
- On June 29, 2015, geotechnical engineers, CDPHE, and Site personnel walked down the SID to evaluate the potential for using water and sediment management devices or structures. The geotechnical engineers provided several recommendations for water and sediment management in the SID, most of which will be implemented in the longer term as appropriate. Recent implementation of recommendations include the following:

  - — Additional erosion control methods were implemented in the SW027 drainage, predominantly on the hillside above GS51. These measures included adding matting, wattles, GeoRidge berms, and organic mulch. Several areas in the SID also received erosion matting. This work was completed on August 20, 2015. These erosion control measures are periodically inspected to confirm adequate performance.
  - — Additional erosion control matting was installed at various locations in the SID on March 10, 2016.
- Sampling will continue as currently scheduled when surface-water runoff is available.

Downstream of SW027, monitoring at WOMPOC continues to show plutonium and americium concentrations that are not reportable, as explained in Section 3.1.2.2. Recent analytical results from WOMPOC are given in Table 2.

Table 2. CY 2015–2016 Composite Sampling Results at WOMPOC

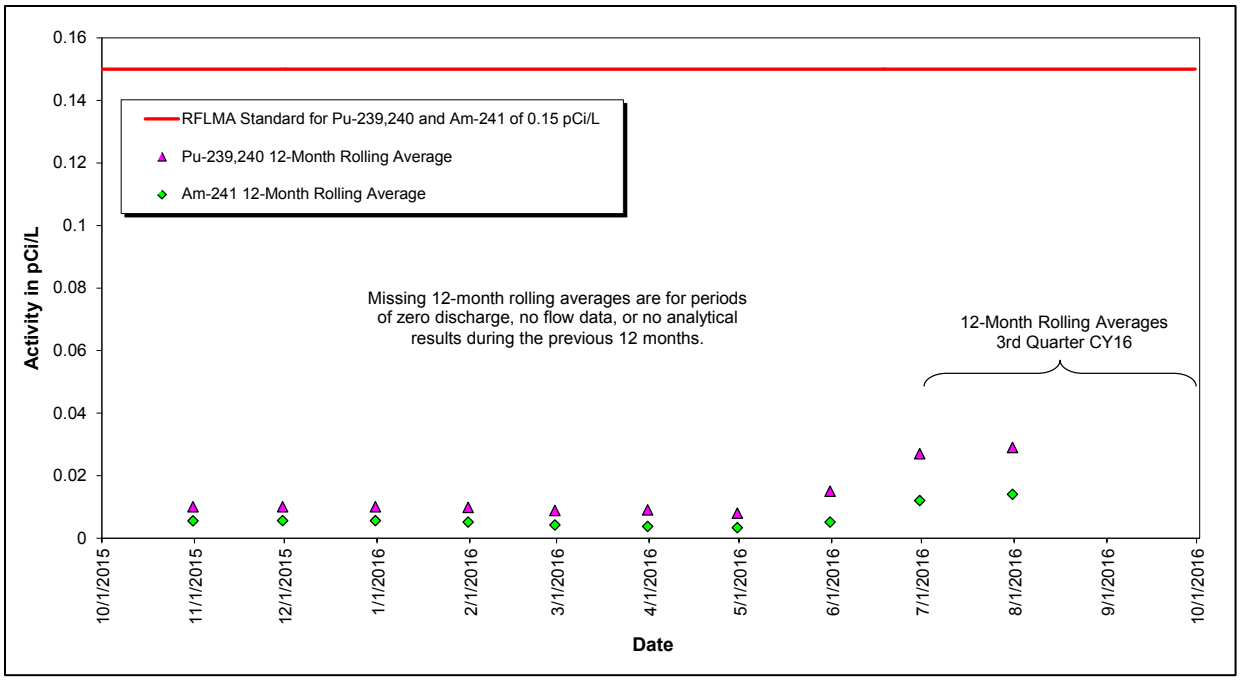
Start Date and Time	End Date and Time	Am-241 (pCi/L)	Pu-239,240 (pCi/L)	Uranium (µg/L)
3/9/2015 15:47	3/11/2015 13:28	0.003	0.006	1.30
3/11/2015 13:28	3/18/2015 12:44	0.002	0.006	1.58
3/18/2015 12:44	4/1/2015 10:53	0.002	0.005	2.28
4/1/2015 10:53	4/13/2015 13:13	0.005	0.007	2.72
4/13/2015 13:13	4/17/2015 13:22	0.005	0.005	1.75
4/17/2015 13:22	4/20/2015 11:08	0.011	0.030	1.55
4/20/2015 11:08	4/27/2015 11:12	0.006	0.011	1.30
4/27/2015 11:12	5/5/2015 10:25	0.006	0.010	1.62
5/5/2015 10:25	5/8/2015 13:22	0.003	0.016	1.37
5/8/2015 13:22	5/9/2015 16:04	0.017	0.084	1.23
5/9/2015 16:04	5/18/2015 16:25	0.006	0.015	1.28
5/18/2015 16:25	5/26/2015 16:49	0.003	0.018	1.65
5/26/2015 16:49	6/8/2015 15:22	0.008	0.057	1.50
6/8/2015 15:22	6/12/2015 16:52	0.021	0.045	1.85
6/12/2015 16:52	7/7/2015 14:41	0.008	0.011	2.36
7/7/2015 14:41	8/20/2015 11:58	0.003	0.010	1.85
8/20/2015 11:58	11/16/2015 14:02	0.000	0.001	2.98
11/16/2015 14:02	1/5/2016 13:11	0.008	0.007	3.25
1/5/2016 13:11	2/16/2016 13:27	0.004	0.006	2.83
2/16/2016 13:27	3/3/2016 11:47	0.005	0.001	2.63
3/3/2016 11:47	3/21/2016 11:30	0.000	0.006	2.84
3/21/2016 11:30	3/28/2016 13:51	0.004	0.003	2.01
3/28/2016 13:51	3/30/2016 11:48	0.005	0.011	1.24
3/30/2016 11:48	4/4/2016 14:32	0.003	0.007	0.89
4/4/2016 14:32	4/14/2016 10:14	0.085	0.165	1.73
4/14/2016 10:14	4/21/2016 12:17	0.015	0.022	1.16
4/21/2016 12:17	4/28/2016 10:04	0.008	0.007	1.21
4/28/2016 10:04	5/5/2016 16:09	0.001	0.015	1.49
5/5/2016 16:09	5/26/2016 12:43	0.001	0.006	2.21
5/26/2016 12:43	6/16/2016 12:17	0.006	0.007	2.78
6/16/2016 12:17	11/22/2016 11:27	[a]	[a]	[a]
6/16/2016 12:17	In progress	[b]	[b]	[b]

Notes:
[a] Results pending.
[b] Sample in progress.

3.1.3.3 Monitoring Location SW093

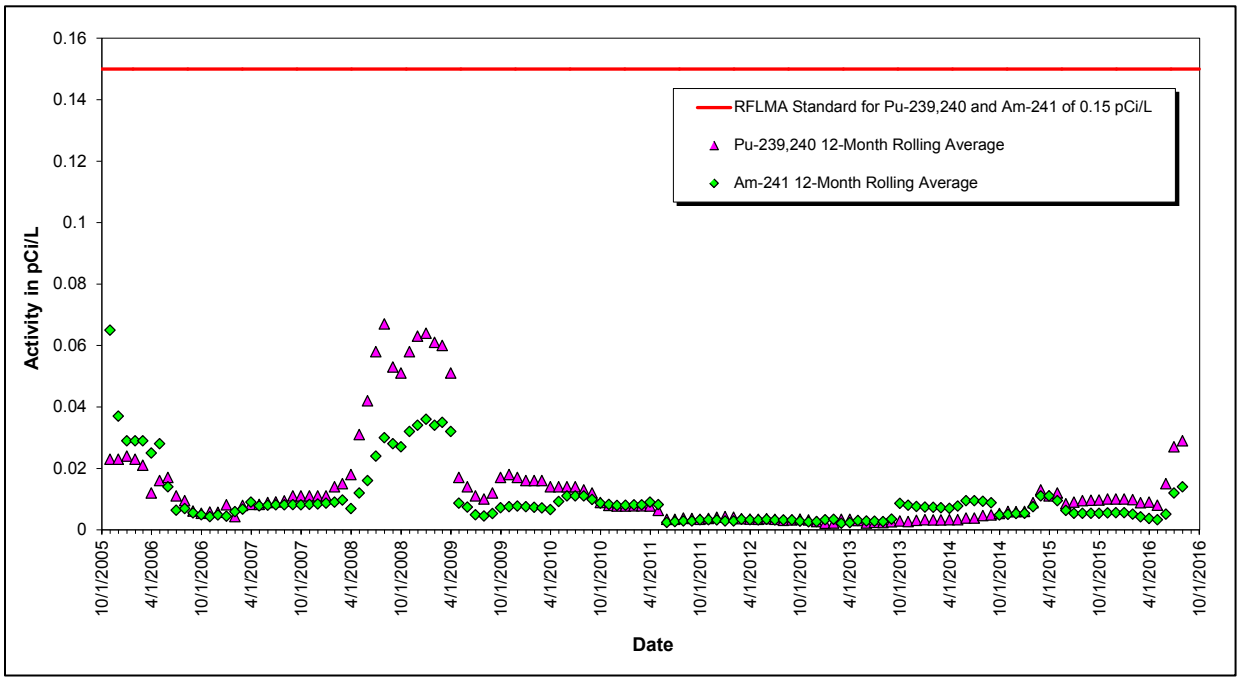
Monitoring location SW093 is on North Walnut Creek, 1300 feet upstream of former Pond A-1. Figure 17 and Figure 19 show no occurrences of reportable 12-month rolling averages for plutonium, americium, or total uranium values during the quarter. Figure 18 and Figure 20 show

sampling data from 2005 through the third quarter of CY 2016. The method for calculating the 12-month rolling averages is detailed in the annual report.



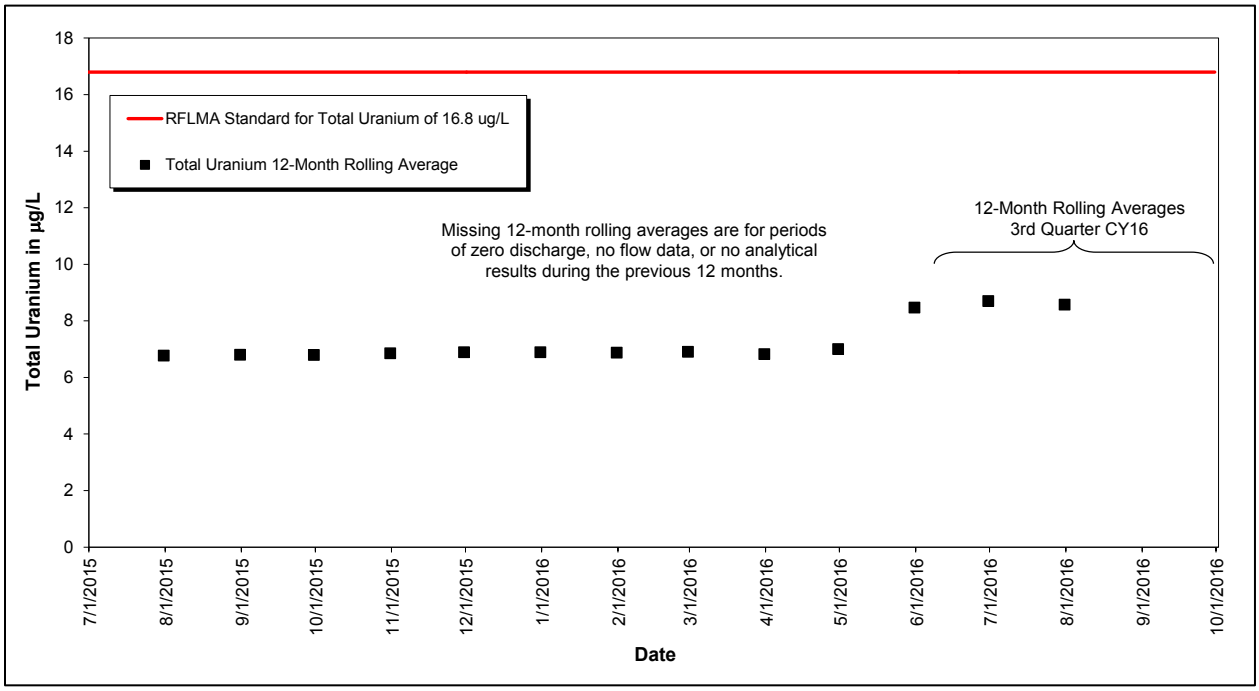
Note: Results for the composite sample started on 8/11/2016 are pending.

Figure 17. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW093: Year Ending Third Quarter CY 2016



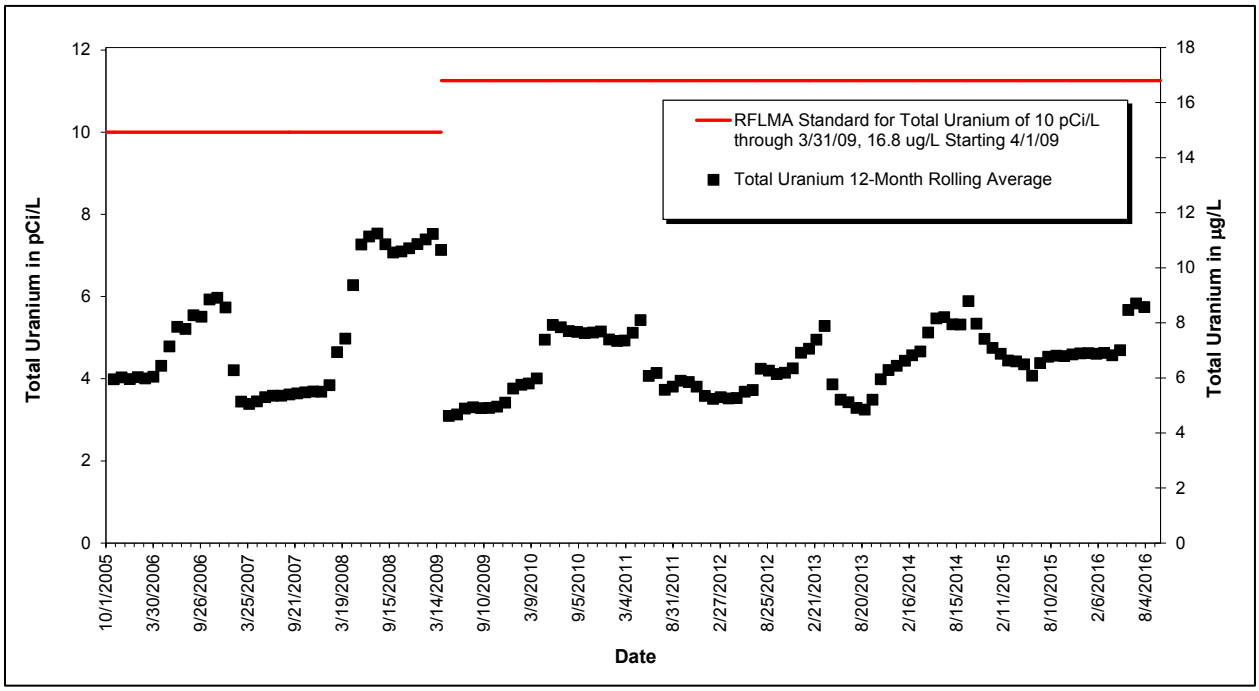
Note: Results for the composite sample started on 8/11/2016 are pending.

Figure 18. Volume-Weighted 12-Month Rolling Average Plutonium and Americium Activities at SW093: Post-Closure Period Ending Third Quarter CY 2016



Note: Results for the composite sample started on 8/11/2016 are pending.

Figure 19. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at SW093: Year Ending Third Quarter CY 2016



Note: Results for the composite sample started on 8/11/2016 are pending.

Figure 20. Volume-Weighted 12-Month Rolling Average Total Uranium Concentrations at SW093: Post-Closure Period Ending Third Quarter CY 2016

3.1.4 AOC Wells and Surface Water Support Location SW018

None of the AOC wells or the Surface Water Support location SW018 were scheduled for RFLMA monitoring in the third quarter of CY 2016.

3.1.5 Sentinel Wells

None of the Sentinel wells were scheduled for RFLMA monitoring in the third quarter of CY 2016.

3.1.6 Evaluation Wells

None of the Evaluation wells were scheduled for RFLMA monitoring in the third quarter of CY 2016.

3.1.7 PLF Monitoring

All RCRA groundwater monitoring wells at the PLF were sampled during the third quarter of CY 2016. Analytical results (Appendix B) were generally consistent with those of past samples and will be discussed and statistically evaluated as part of the annual report for CY 2016. Section 3.1.9.4 discusses monitoring the PLFTS.

3.1.8 OLF Monitoring

All RCRA groundwater monitoring wells at the OLF were sampled during the third quarter of CY 2016. Analytical results (Appendix B) were generally consistent with those of past samples and will be discussed and statistically evaluated as part of the annual report for CY 2016.

During the third quarter of CY 2016, when routine surface-water sampling was performed in Woman Creek downstream of the OLF (GS59), the mean concentrations for all analytes were below the applicable surface-water standards.

3.1.9 Groundwater Treatment System Monitoring

As described in Section 2.5, contaminated groundwater is intercepted and treated at several treatment systems. The MSPTS, ETPTS, and SPPTS all include a groundwater intercept trench. The PLFTS treats water from the northern and southern components of the Groundwater Intercept System and water that flows from the PLF seep.

The MSPTS and SPPTS Reconfiguration Projects were completed and the ETPTS was modified to support the MSPTS project during the third quarter of CY 2016. The MSPTS did not operate for most of this quarter because of that effort. Construction for the MSPTS Reconfiguration Project began on June 27 and was confirmed as complete on September 12, 2016. There were short periods of flow between those dates, particularly in early September, but the treatment system was otherwise offline for the duration.

The ETPTS was affected by the MSPTS project, but was only offline for very short times, such as when electrical work was conducted or piping was installed in the influent manhole. Since the MSPTS Reconfiguration Project was completed, water collected at the MSPTS has been pumped

to the ETPTS influent manhole, where it commingles with intercepted East Trenches Plume groundwater to comprise the influent to the ETPTS. The ETPTS air stripper treats this commingled water and discharges the treated water to the ETPTS subsurface discharge gallery.

The SPPTS was offline at the beginning of the quarter but resumed operation on July 28, 2016. Since that date, all flow is managed the same rather than diverting portions through different components. Groundwater from the intercept trench is routed through a vault where it is dosed with a nutrient solution. From there, it continues through the pilot-scale lagoons (a.k.a. Phase III cells) and then into the full-scale, interim test lagoon that now occupies the original treatment cell structure. Original treatment Cell 1 of the SPPTS is now operated as a lagoon, and Cell 2 is operated as a clarifying tank. Water is pumped from Cell 2 through a new "Sidecar" vault, then to the effluent manhole, and finally to the SPP Discharge Gallery.

3.1.9.1 Mound Site Plume Treatment System

The MSPTS monitoring locations were not scheduled for routine RFLMA sampling in the third quarter of CY 2016. However, samples were collected late in the quarter to evaluate and optimize the effectiveness of the air stripper at the ETPTS as a result of the MSPTS Reconfiguration Project. The corresponding results are included in Appendix B, and show the air stripper treated the combined waters effectively. Note that monitoring locations for the MSPTS were adjusted per CR 2015-04; the influent location is still identified as MOUND R1-0, but because this water is now treated at the ETPTS, the effluent and performance monitoring locations have changed. The effluent monitoring location, which supports both the MSPTS and ETPTS, is identified as MSETEF; similarly, the performance monitoring location supports both systems and is POM2.

The annual report for 2016 will provide more detailed discussion of the MSPTS Reconfiguration Project and water quality at the MSPTS.

3.1.9.2 East Trenches Plume Treatment System

The ETPTS monitoring locations were not scheduled for routine RFLMA sampling in the third quarter of CY 2016. However, samples were collected to confirm the effectiveness of adjustments made in the second quarter in response to concentrations of trichloroethene (TCE) above the RFLMA standard. In addition, later in the third quarter, several non-routine samples were collected to support the MSPTS Reconfiguration Project. The primary objective for taking these samples was to evaluate any effects on air stripper effluent water quality that might occur after contaminated groundwater from the MSPTS was added. Results are included in Appendix B, and show the air stripper continued to operate effectively. The monitoring locations for the ETPTS use new identifications to reflect the MSPTS Reconfiguration Project: the influent location is now referred to as MSETINF (because influent reflects commingled Mound Site Plume groundwater and East Trenches Plume groundwater) and the effluent monitoring location is MSETEF. The performance monitoring location remains POM2.

The annual report for 2016 will provide more detailed discussion of water quality at the ETPTS.

3.1.9.3 Solar Ponds Plume Treatment System

The SPPTS monitoring locations were not scheduled for routine RFLMA sampling in the third quarter of CY 2016. Nonroutine samples were collected, both to support the SPPTS Interim Reconfiguration Project (completed in the third quarter) and to support the Adaptive Management Plan (DOE 2015c). The associated results showed the interim lagoon was increasingly effective at treating nitrate as the quarter ended. Uranium concentrations were generally consistent with recent data.

The annual report for 2016 will provide more detailed discussion of the SPPTS Reconfiguration Project and water quality at the SPPTS.

3.1.9.4 PLF Treatment System

Breaching of the PLF dam was completed in June 2012, and since then any PLFTS effluent flows through the remaining wetland area. This flow configuration is now essentially equivalent to the historical open valve configuration.

During collection of the July 18, 2016, sample at the system influent (monitoring location PLFSEEPINF), the flow rate was 1.59 gallons per minute. The routine quarterly effluent sample of the PLFTS (monitoring location PLFSYSEFF) collected on July 18, 2016, showed a concentration for arsenic that was above the applicable surface-water standard from RFLMA Attachment 2, Table 1, "Surface Water Standards." The arsenic concentration was 14 µg/L, exceeding the standard of 10 µg/L.

In accordance with RFLMA evaluation protocols, the arsenic result triggers an increase in sampling frequency from quarterly to monthly. However, due to a data entry error in mid-August when the sample results were received, the elevated concentration was not recognized. Therefore, monthly sampling was not conducted (no samples were collected in August and September). The routine quarterly sample was collected as scheduled on October 12, 2016, and arsenic was not detected.

It is important to reiterate that arsenic was not detected in the October 12, 2016 sample results. Therefore, even if the August and September results for arsenic were above the standard (these samples were not collected due to the data entry error), the October result would have ended the monthly frequency sampling, and consultation would not have been triggered. It is also important to note that arsenic concentrations at the system effluent above the RFLMA 10 µg/L standard have been observed several other times. None of these instances triggered a RFLMA consultation or sampling of the downstream surface-water performance location (location NNG01, formerly PLFPONDEFF).

All other analyte concentrations were below the RFLMA standards for the quarter.

3.1.10 Predischarge Monitoring

Predischarge samples are collected prior to opening the valves to initiate a discharge period at Ponds A-4, B-5, and C-2 on North Walnut Creek, South Walnut Creek, and Woman Creek, respectively.

No predischarge samples were collected at Ponds A-4, B-5, or C-2 during the third quarter of CY 2016. All three ponds have been operated in a flow-through configuration since September 2011.

4.0 Adverse Biological Conditions

No evidence of adverse biological conditions (e.g., unexpected mortality or morbidity) was observed during monitoring and maintenance activities in the third quarter of CY 2016.

5.0 Ecological Monitoring

During the third quarter of CY 2016, Preble's meadow jumping mouse (PMJM) mitigation monitoring, wetland mitigation monitoring, and revegetation monitoring were conducted. The PMJM monitoring data will be summarized and delivered to U.S. Fish and Wildlife Service (USFWS) in the 2016 annual mitigation monitoring report for the PMJM at the Site. This report was due to USFWS on December 1, 2016. The wetland mitigation monitoring was conducted to evaluate the status of selected mitigation wetlands. Revegetation monitoring was conducted at several monitoring locations throughout the COU to evaluate the status of the revegetation parcels. These data will be summarized in the annual report for CY 2016. Other ecological monitoring conducted during the third quarter included weed mapping, wetland and vegetation mapping, wetland delineations, prairie dog surveys, forb nursery monitoring, and photopoint monitoring. The shrubs and trees planted last spring as a habitat enhancement project continue to be irrigated through the end of the growing season. Revegetation activities were conducted at several project locations. Approximately 57 acres along the roadsides at the Site were treated with herbicides to help control various noxious weed species during the third quarter.

6.0 References

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

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CITY AND COUNTY MANAGER
One DesCombes Drive • Broomfield, CO 80020 • 303.438.6300 • www.broomfield.org

December 29, 2016

Ms. Vera Moritz
U.S. Environmental Protection Agency, Region 8
Mail Code 8EPA-F
1595 Wynkoop St.
Denver, CO 80202-1129

Mr. Scott Surovchak
Rocky Flats Site Manager
DOE Office of Legacy Management
11025 Dover St. Suite 1000
Westminster, CO 80021

RE: Input for the Fourth CERCLA Five-Year Review of the Rocky Flats Site

The City and County of Broomfield (Broomfield) is providing comments and recommendations to the upcoming Fourth Five-Year Review of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedy at the Rocky Flats Environmental Technology Site, Colorado (Site). Although this is referenced as the Fourth CERCLA Five-Year Review, Broomfield would like to note that this is only the second CERCLA Five-Year Review since the final physical and regulatory closure occurred at the Site in 2006. The intent of this letter is to provide the Department of Energy, Office of Legacy Management (DOE-LM), and the Environmental Protection Agency (EPA) with Broomfield's issues that should be acknowledged and addressed in final determination of the Fourth Five-Year Review Report for the Rocky Flats site.

Broomfield has been, and continues to be, very involved with the remedy and long-term stewardship activities at the Site. Based on the variability of the analytical data and Site inspection reports, it is clear the Site has not fully stabilized. The Site continues to have reportable conditions at points of evaluation (POE) on Woman Creek and Walnut Creek. In addition, the water quality sampling at the Walnut Creek point of compliance (WALPOC) recently exceeded the uranium standards. Although the sampling result at WALPOC didn't exceed the 12-month rolling average, it was the first time that elevated levels have been observed at a regulatory point of compliance after closure.

With the documented instability in the water sampling results, continued ground surface movements, and ongoing revegetation efforts, there has not been an opportunity to develop a reliable baseline and ensure the remedy is functioning per its intended design. Because Site conditions directly impact our community, Broomfield continues to have concerns and requests that the following issues/recommendations be addressed and included in the Fourth CERCLA Five-Year Review:

1. **Terminal Dam Breaching**
   In 2010, Broomfield worked diligently with DOE-LM to develop an Adaptive Management Plan (AMP) to identify a process to address the downstream communities' "Critical Concerns" and develop criteria to determine if and when the terminal dams could be breached.

   The terminal ponds serve as the downstream communities' last measure of defense against water-borne contamination migrating from the Site and provide a crucial mechanism to effectively remove plutonium, americium, and potentially uranium. Broomfield opposes breaching the terminal dams until the successful demonstration that the remedy continues to function properly without significant issues, changes to site conditions, or water quality exceedances for two consecutive CERCLA

Five-Year reviews. Successful demonstration of the remedy should be based on the following criteria, and the criteria should be cited in the Fourth CERCLA Five-Year Review:

- No water quality exceedances or elevated levels at any surface water Points of Compliance (POC), surface water Points of Evaluation (POE), surface water monitoring at Indiana Street (regardless of the designation as a POC, or not), and groundwater Area of Concern (AOC) wells.
- Surface water and groundwater monitoring are not showing increasing trends.
- Sustained functional performance of the groundwater treatment units without changes, modifications, enhancements, or alterations to the treatment process.
- No significant erosion activities, landslides, slippage, slope failure or other geological activity where surface or subsurface soils are mobilized or disturbed.
- No abnormal or unforeseen condition that could have an adverse effect on the breaching of the dams.

Broomfield believes our proposal is a solution that meets the intent of the Purpose and Needs noted in the Environmental Assessment for dam breaching.

2. **Rocky Flats Uranium Surface Water Issues**

The Site continues to have issues meeting uranium surface water standards at WALPOC. As recent as January 4, through January 28, 2016, WALPOC had a reportable condition for uranium since the calculated 30-day average resulted in a concentration of 16.9 micrograms per liter. The Rocky Flats Legacy Management Agreement (RFLMA) standard is 16.8 micrograms per liter. A previous uranium exceedance is documented at the same location for the time period from November 1, 2013, to October 23, 2014. The sampling results for the 2013/2014 event had a value of 17.2 micrograms per liter. Without the terminal ponds in place, there is a potential risk for contamination migrating off-site into our watersheds and communities.

Based on continuing issues at the WALPOC and GS-10, along with the variability in the quality of surface water, the Fourth Five-Year Review should include a detailed action plan to evaluate and address these ongoing problems. Based on these recent exceedances, it is clear that the remedy has not stabilized and uranium continues to migrate both on and off-site.

With the ongoing issues with uranium, Broomfield will oppose any proposal to amend the uranium standard that results in a higher regulatory concentration, reduces the monitoring frequency, or alters the method of data averaging for reporting. The CERCLA review should not make references to the current EPA drinking water standard for uranium since the drinking water standard does not apply to the Site. The site-specific standard for uranium should be the only threshold used to determine whether or not the uranium concentrations leaving the Site comply with the regulatory requirements.

3. **Present Landfill**

Since regulatory closure in 2016, the treated effluent downstream for the Present Landfill Treatment System (PLFTS) has frequently exceeded the Site's water quality standards. In fact, the consultative process between DOE-LM and federal and state regulators has been triggered every calendar year since closure. Vinyl chloride, boron, and selenium are the contaminants that have registered elevated levels and the concentrations for these contaminants downstream of the PLFTS continue to fluctuate.

Broomfield opposed the breaching of the Present Landfill dam since it eliminated a physical mechanism to prevent contaminated water from migrating off-site. The past two Five-Year CERCLA Reviews identified continuing problems with the water quality at the Present Landfill. Broomfield requests that the Fourth CERCLA Five-Year Review include a clearly defined corrective action plan to address this ongoing water quality issue. When the water quality in the Present Landfill pond exceeds applicable standards, any discharge or release from the pond should immediately cease until subsequent sampling demonstrates that the water quality meets the RFLMA standards.

4. **Effectiveness of Groundwater Treatment Units**

We appreciate DOE-LM's efforts to continually modify the groundwater treatment units so they are more efficient and effective. However, the Solar Pond Treatment (SPT) Unit has been operating in "treatability mode" since closure. Broomfield recommends that DOE-LM develop and implement a long-term corrective action for the SPT unit. The uranium and nitrate levels entering the SPT unit, as well as the levels leaving the SPT unit, continue to be elevated. The Fourth CERCLA Five-Year Review should include a specific list of water treatment criteria that the SPT unit needs to meet. In the absence of such criteria, the ability to demonstrate the short- and long-term effectiveness of the groundwater treatment units becomes highly suspect and questionable.

5. **Effectiveness of Communication**

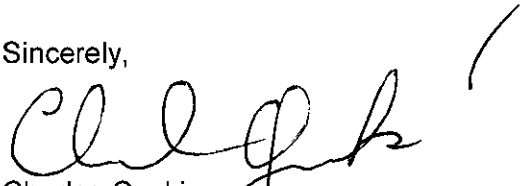
The Quarterly Technical Meetings between DOE-LM and the downstream communities are crucial for maintaining the relationships that support the long-term stewardship activities at the Site. We would like to thank DOE-LM and the federal and state regulators for engaging in such a valuable communication process that includes the communities most directly impacted by the Site. We recommend the continuation of the Quarterly Technical Meetings and request that the value of these meetings be acknowledged in the Fourth CERCLA Five-Year Review. The Quarterly Technical Meeting should occur four months after RFLMA technical documents are released. This will provide the downstream communities with sufficient time to evaluate the data, activities, and other information contained in the documents prior to the meetings. Broomfield recently provided DOE-LM with the proposed technical meeting dates for 2017.

In closing, Broomfield would formally request a sixty-day (60-day) public comment period when the Fourth CERCLA Five-Year Review document is released in 2017. Our request is based on the complexity of the Site, and the amount of documents and data that needs to be reviewed concurrent with the Fourth CERCLA Five-Year Review.

Broomfield looks forward to your response to our comments. In addition, we would like to schedule a future meeting to review the disposition of Broomfield's comments. Finally, we ask that DOE-LM respond to our comments on an individual basis rather than grouping comments and providing general responses. This request is intended to demonstrate your due diligence and commitment to the long-term stewardship of the Site.

Thank you for the opportunity to provide advance comments on this important document. If you have any questions regarding our comments, please contact Mr. David Allen, Director of Public Works, at (303) 438-6348. We look forward to seeing our comments addressed, and recommendations included, in the Fourth CERCLA Five-Year Review.

Sincerely,



Charles Ozaki
City and County Manager

cc:
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Senator Michael F. Bennet
Congressman Jared Polis
Congressman Ed Perlmutter
Thomas Pauling, Acting Director, DOE/LM
Gina McCarthy, EPA Administrator
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Rocky Flats Site
Fourth Five-Year Review Comments
11025 Dover Street, Ste 1000
Westminster CO 80021

Re: Fourth Five-Year Review Comments

Dear DOE:

On behalf of our client, the Town of Superior, we appreciate this opportunity to comment in anticipation of the Fourth Five-Year Review of the remedy at Rocky Flats.

There are issues we have not emphasized in this comment letter that, while relevant to the adequate performance of the remedies, are not central to scope of the Five-Year Review. For example, we remain very concerned with the continued lack of air monitoring. As discussed below, various land use changes are planned in areas impacted by contamination historically coming from the Legacy Management Area. To justify deletion of the areas now constituting the Wildlife Refuge from CERLCA, assumptions were made about the lack of soil disturbance and human exposures that are now very questionable given plans for a DOE funded visitor center, trail construction as part of the Greenway project and future highway construction. No assessment has been made of the potential for these activities to disturb contaminated soils and mobilize them off of the Site or to create unanticipated exposures of people on the Site. [1]

Guesswork does not suffice to answer these critical questions. That the soils and dusts mobilized during construction will have contamination should be assumed and as DOE is responsible for that contamination, DOE must be in a position, using actual data rather than guesses and

[1] Given the variability in how the various agencies and parties have referred to portions of Rocky Flats over time and for different purposes, this comment letter adopts the term "Site" to include both the Wildlife Refuge and Legacy Management lands.

assumptions, to reassure everyone from construction workers to members of the downwind public, that they are safe.

We are also quite concerned about the ultimate disposal of dirt and other debris removed during construction activities on the Site regardless of whether generated during construction of the visitor's center, Greenway underpass and trails, or the proposed highway. One assumes all of this dirt and debris is potentially contaminated. Will it be evaluated so that fully appropriate and lawful handling and disposal practices will be followed? Where will it be disposed? How will it be hauled if removed off of the Site?

We move now to specific comments on issues for the Five-Year review:

<u>The Adequacy of Remedies at Rocky Flats are Limited by Specific Land Use Assumptions that are No Longer Valid</u>

The history of Rocky Flats as a site being managed under CERCLA is well documented and will not be repeated here. Instead, our focus is on an examination of the assumptions that went into the selection of remedies on the Rocky Flats Site, including both the area under Legacy Management and the Wildlife Refuge, and whether those assumptions are still valid. In particular, the impacts on human use and occupancy in the Wind Blown Exposure Area which runs east from the former industrial zone to Indiana Street. Much of this area was incorporated into the Central Operating Unit now under Legacy Management while the rest is in the Wildlife Refuge. Our primary focus is on those lands within both the Woman Creek and Walnut Creek drainages.

The key assumptions, upon which the foundation for remedy selection within the Legacy Management area rest, all regard land use at the site. The assumed land use drives the analysis of potential human exposures as it allows those exposures to be minimized or even ignored. In evaluation of this assumption within the context of the five-year review we begin with the Site Conceptual Model and other work done as part of the Remedial Investigation and Corrective Measures Study. [2]

> The Site Conceptual Model (SCM) provides an overview of potential human exposures at RFETS [Rocky Flats Environmental Technology Site]. It describes what kind of human populations may be present, through which environmental media humans may be exposed, and through which pathways exposure may occur. The SCM is illustrated on Figure 7.4 and is described in the following sections.

[2] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report for the Rocky Flats Environmental Technology Site, Section 7.0 Summary and Conclusions of the Comprehensive Risk Assessment*, at §7.5.2, P. 6.

The future land use for RFETS is a wildlife refuge and, therefore, human populations who may be present include wildlife refuge worker (WRW) and wildlife refuge visitor (WRV) receptors. Workers may staff a visitor center, monitor and maintain the trail system, and track the on-site wildlife populations. Visitors may hike, bike, and bird watch at RFETS. WRW receptors are assumed to be adults, while WRV receptors will likely include both adults and children.

Workers and visitors could theoretically contact contaminants in surface soil, subsurface soil, sediment, surface water, and groundwater. All exposure pathways included in the SCM are identified as complete (meaning that exposure through the pathway is at least theoretically possible). In addition, the pathways are identified as either significant or insignificant. Insignificant pathways are those that are associated with such low exposure that there will be negligible risk even if exposure occurs. The significant pathways were evaluated on an EU [Exposure Unit] basis and risk calculations are only performed for significant pathways in the individual EU volumes (Volumes 3 through 14 of Appendix A of the RI/FS Report). However, pathways considered to be insignificant are evaluated to ensure that the pathways are appropriately identified as such.

The following exposure pathways are identified as potentially complete and significant in the SCM:

- Incidental ingestion of surface soil/surface sediment;
- Inhalation of dust released from surface soil/surface sediment;
- Dermal exposure to surface soil/surface sediment;
- External irradiation exposure from surface soil/surface sediment;
- Incidental ingestion of subsurface soil/subsurface sediment;
- Inhalation of particulates released from subsurface soil/subsurface sediment;
- Dermal exposure to subsurface soil/subsurface sediment; and
- External irradiation exposure from subsurface soil/subsurface sediment.[3]

Each of these exposure pathways was then evaluated against the limited assumptions on human occupants - the wildlife refuge worker and wildlife refuge visitor. Within the Wind Blown Exposure Unit, the focus was on surface soil/surface sediment. Arsenic and plutonium-239/240 were selected as the contaminants of concern and further evaluated quantitatively.[4] For reasons that are not clear, "exposure to subsurface soil/subsurface sediment was not evaluated for the WRV."[5] Apparently, the assumption was that a WRV was never going to touch any dirt or breathe in any dust.[6] This is obviously an error as the documents cited above demonstrate that the exposure pathways to the Contaminants of Concern (COCs) are complete and significant.

[3] *Id.* at P.6-7.

[4] *RCRA Facility Investigation-Remedial Investigation/ Corrective Measures Study-Feasibility Study Report, Appendix A, Volume 9, Wind Blown Area Exposure Unit* at P. 13.

[5] *Id* at P. 16

[6] Obviously it is impossible to keep children and pets on the trails. They will get in the dirt and will be

Wildlife refuge worker and wildlife refuge visitor were the only human receptors evaluated in the RI/FS for Rocky Flats. This highly limited view of human receptors and equally limited exposure scenarios were based upon the assumed land use as a wildlife refuge.[7] Other human receptors such as construction workers building highways or bike paths, or volunteers working on trails and other maintenance activities, were never considered and no such exposures have been formally evaluated. These limiting assumptions are no longer valid and "guesses" as to lower exposures to the contrary are not helpful nor reassuring.[8]

The potential use of volunteers to build trails now planned for the first time in the Woman and Walnut Creek drainages is especially concerning. These people would most certainly encounter soils that must be assumed to be contaminated with a variety of contaminants including VOCs, arsenic and radio action elements such as plutonium.

The actual exposure scenarios are important.

> The WRW exposure scenario for the CRA [Comprehensive Risk Assessment] is consistent with the WRW scenario for development of RFETS radionuclide soil action levels (RSALs) (EPA et al. 2002). The CRA assumes that the WRW works 250 days per year for 18.7 years, and spends 50 percent of his or her work day outdoors on the site and the remaining 50 percent in an indoor office.
>
> The WRV scenario is based on the open space scenario used in the RSAL Report (EPA 2002) and is consistent with the preferred alternative presented by the USFWS in the CPP (USFWS 2004a). The WRV includes both a child and adult who visit the site 100 days per year for 2.5 hours per day, for a total of 250 hours per year. The remaining time is spent off site. Outdoor recreational activities will primarily be on and near established hiking trails. Hunting may be allowed on a very limited basis (USFWS 2004a). It is assumed that the WRV will not participate in activities that result in significant exposures to subsurface soil or surface water. In general, the risks to the WRV are less than for the WRW primarily because the exposure time at the site for the WRV is shorter than for the WRW (250 hours per year versus 2000 hours annually). [9]

Several of the cited documents make it clear that exposure assessments assumed neither of these human receptors is engaged in construction activities or will experience substantial exposure to

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exposed to whatever is in that dirt by ingestion or inhalation of blowing dust caused by the routine high wind events.

[7] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report, Appendix A, Volume 2 CRA Methodology and Data Description*, §2.2.2 at P. 5.

[8] USFWS has anticipated the use of volunteers in constructing trails from the beginning of its evaluation of the management of the Refuge. The exposures to these people will be much greater than for WRV. *Rocky Flats National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Impact Statement, September 2004*, (CCP/EIS) §2.23, P. 31.

[9] *Id* §2.2.6 at P. 16

contaminated soils. These limitations, while convenient, are not consistent with the fashion in which USFWS intends to manage the Refuge which was described as follows:

> Workers may staff a visitor center, monitor and maintain the trail system, and track the on-site wildlife populations. Visitors may hike, bike, and bird watch at RFETS. WRW receptors are assumed to be adults, while WRV receptors will likely include both adults and children.[10]
>
> Hands-On Work: Programs developed to recruit volunteer participation in prairie restoration may include seed collection, weed removal, or seeding. The work activities would include information sessions on restoration techniques and the benefits of restoring prairie habitat. Volunteers also may be involved with Refuge enhancement projects such as trail construction and general maintenance.[11]

The most extensive soil disturbance apparently anticipated for WRW was post-hole digging and vegetation management.[12] The RI/FS did not calculate the risks to construction workers building trails or highways.[13] None of these assessments anticipated that WRW or volunteers would be engaged in construction of trails such as are now proposed as part of the Greenway project.

It is also important to note that the Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS) created by USFWS in an attempt to comply with the National Environmental Policy Act (NEPA) at the creation of the Refuge, did not evaluate any land use proposals involving the construction or use of a highway or bike trails across the Woman Creek and Walnut Creek drainages. Apparently because of this limitation, none of the evaluation of exposures or remedies at the site considered these issues.

While the CCP/EIS dealt conceptually only with the size of possible transportation improvements, it did not address any specific proposal. Further, and more importantly, the CCP/EIS makes clear that a "definitive analysis of the direct impacts of potential transportation improvements is outside the scope of this CCP/EIS." In fact, the CCP/EIS specifically excluded what is now being presented as the Jefferson Parkway Public Highway Authority proposal when it stated that "a detailed analysis of any specific type of transportation improvement along Indiana Street, such as creation of a four-lane divided highway, is outside the scope of this

[10] *RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report, Appendix A, Volume 1 Executive Summary*, §5.2.1 at P. 6.

[11] CCP/EIS at P. 31

[12] *Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit Jefferson and Boulder Counties, Colorado*, Sept 2006, [CAD/ROD] at P.21.

[13] Letter from Carl Spreng, CDPHE, and Vera Mortiz, EPA, to David Lucas, USFWS, dated September 21, 2011.

CCP/EIS."[14] Likewise, the only trail systems described in the CCP/EIS accessed the Refuge well North of Walnut Creek and outside of the Wind Blown Exposure Unit.[15]

The performance and adequacy of the remedies for the Central Operating Unit, have never been evaluated in light of the actual and planned land use changes. As the operation of these remedies directly impacts the migration of contamination into the Refuge east of the Central Operating Unit, this Five-Year Review must now require that evaluation.

Elements of the Five-Year Review

The point of a Five-Year Review is to determine whether the remedy at the site is protective of human health and the environment. According to EPA guidance[16,17] there are three key questions to be answered in assessing the protectiveness of the remedy. Of the three, two of the questions must be answered in a fashion reflecting the need for new study and evaluation. These are:

- Question B - Are the exposure assumptions, toxicity date, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

- Question C - Has any other information come to light that could call into question the protectiveness of the remedy?

Question B must be answered negatively because the exposure assumptions are no longer valid. These assumptions must be reevaluated because the planned land use of the areas of the Refuge impacted by the remedies on the Central Operating Unit have changed. The Site Conceptual Model and assumption that the most conservative exposure scenario for a human receptor is a wildlife refuge worker [18] is no longer valid because of proposed and actual changes to land use, and because of USFWS' plans to use volunteers.

Increased human use is anticipated in the form of the construction activities for the trail/bike path of the Greenway proposal[19] and construction of a highway in the right-of-way granted to

[14]CCP/EIS at §4.16, P. 192.

[15]*Rocky Flats National Wildlife Refuge Record of Decision Final Comprehensive Conservation Plan*, February 2005, P. 5.

[16]*Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews, SEP 13, 2012; OSWER 9200.2-111*

[17]*Comprehensive Five-Year Review Guidance (EPA 540-R-01-007), June 2001*

[18]*Third Five-Year Review Report for the Rocky Flats, Colorado Site, US DOE, July 2012, at P. 75.*

[19] In its current form the Greenway proposal would bring a bike path and trail under Indiana and through areas downhill of the Legacy Management Area crossing Walnut and Woman Creeks. All of these areas are known to be contaminated and were further impacted by the flooding events of 2013 and 2015. This type of land use was never evaluated because it was never intended that the public would access these areas. The contamination levels in

Jefferson Parkway Public Highway Authority during this most recent five-year period. Both of these proposals would place humans routinely in the Walnut Woman Creek drainages and Wind Blown Exposure Unit.

Neither of these proposed land use activities was evaluated in the RI/FS. In fact, the RI/FS and CAD/ROD did not evaluate the specific risks in the wind blown area because none of the then planned land uses involved construction or even meaningful human use in this area. There were to be no trails or facilities, so even visits by a WRW would be rare.

These land use changes are critical because while most of the Peripheral Operating Unit has suffered only small amounts of known impact from the industrial activities at Rocky Flats, "plutonium-239/240 exists above background in surface soil in the Wind Blown EU".[20] There can be no valid assumptions about human exposures from changed land uses in the Wind Blown Exposure Unit, especially in the Woman and Walnut Creek drainages, based upon prior work because these changed land uses and resulting exposures were not previously considered.

Additionally, increased exposures to radioactive materials mobilized during flooding events has not been evaluated. These radioactive materials may be found in sediment or groundwater. The Comprehensive Five-Year Review Guidance at section 4.0 specifically calls out natural disasters, such as a 100-year flood event, as requiring an affirmative answer to Question C from the EPA Guidance. This makes further evaluation of the adequacy of the remedy in light of the flooding event a necessary outcome of this five-year review.

That there has been a 100-year flood event cannot be disputed.[21] Unfortunately this Contact Record minimized the impact of that flooding because it relied only on preliminary data. In fact, much of the desired data does not seem to exist due to equipment limitations, equipment failures and because of road damage on both Indiana and Hwy 93 caused by the flooding.[22]

More recent studies by Wright Water Engineers[23] have documented that the flooding event has had an impact on the distribution of contaminants such as anthropogenic (not naturally occurring) uranium on the site. That extreme storm events can mobilize uranium in unexpected ways seems obvious. The resulting discharge of contaminants was not anticipated when the remedy was selected and due to the equipment failures is unmeasured and unevaluated. Because

these areas are higher than any other part of the Refuge.

[20] CAD/ROD at P. 49.

[21] Rocky Flats Site Regulatory Contact Record 2015-01 at P.2

[22] See May 17, 2016 Letter from S. Surovchak, DOE Legacy Site Manager, to C. Hanson and J. Cirelli, Town of Superior Board of Trustees.

[23] *Evaluation of Water Quality Variability for Uranium and Other Selected Parameters in Walnut Creek at the Rocky Flats Site, Revision 1, September 2015, Project 071-091.020*

of these issues whether or not the remedies are protective of human health and the environment, is in question and was discussed at length in the Wright Water Engineers study as follows:

> The effect of very large storms is an initial short-term dilution period caused by increased runoff which first results in lower uranium concentrations in surface water. This is followed by a prolonged long-term effect of increased dissolved oxygen in groundwater entering the Walnut Creek drainages. Where anaerobic waters become aerobic, immobilized U(IV) species can be oxidized to soluble U(VI) species, helping to mobilize and increase concentrations of uranium in surface water.[24,25]
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> At specific monitoring locations, limited isotopic data collected from samples following the September 2013 flood indicate that during the post-flood period the percentage of natural uranium decreased slightly when concentrations of total uranium increased. While this relationship is apparent at several locations, particularly in South Walnut Creek, GS10 is the only location to have more than three sample results to base this observation. Since both natural and anthropogenic uranium respond in the same way to changes in water chemistry, the relatively minor increase in the anthropogenic fraction may indicate contributions from other anthropogenic sources that don't normally contribute to the uranium load in the stream. These other intermittent sources could potentially include sub-surface anthropogenic uranium that is mobilized when exposed to increased levels of groundwater and/or increased contributions from sources with higher than average anthropogenic fractions, such as an increased volume of groundwater from the former Solar Evaporation Ponds area that is not collected by the SPPTS [Solar Ponds Plume Treatment System]. This suggests that during and following the September 2013 flood event, previously immobile anthropogenic uranium sources may have been mobilized, possibly by a rising groundwater table contacting anthropogenic uranium that normally is above the groundwater elevation, and/or by increased mobilization by surface flows of specific anthropogenic sources, such as bed sediments located near anthropogenic inputs to stream flow. [26]
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> In North Walnut Creek, the measured fraction of natural uranium (versus anthropogenic uranium) at SW093 (approximately 90 percent) is higher than at downstream locations GS13 (approximately 71 to 75 percent) and in discharges from Pond A-4 (74 to 75 percent). The decrease of the natural uranium fraction at the further downstream locations reflects inputs of anthropogenic uranium from potentially multiple sources (e.g., SPOUT

[24] Uranium species occur predominantly in the sparingly soluble reduced state U(IV) or in the more highly soluble and mobile oxidized state U(VI). *Id* at P. ES-4

[25] *Id* at P. ES-5

[26] *Id* at P. ES-9

> discharges, groundwater not collected by the SPPTS, and channel sediments with anthropogenic uranium).[27]
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> • • •
>
> Isotopic data collected from samples following the September 2013 flood period indicate that, during this period, the percentage of natural uranium decreases slightly when concentrations of total uranium increase, at specific locations (based on limited data). This suggests that previously immobile anthropogenic uranium sources were mobilized during and following the flood event. A potential explanation is that a rising groundwater table might contact anthropogenic uranium that previously existed above the pre-storm groundwater level.[28]
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> • • •
>
> In comparison with SPOUT, a more significant source of anthropogenic uranium in North Walnut Creek appears to come from groundwater from the former Solar Evaporation Ponds area that is not collected by the SPPTS. The effect of anthropogenic uranium in groundwater not collected by the SPPTS is reflected at station GS13 and at other monitoring locations further downstream. All of these downstream locations contain substantially less natural uranium (approximately 75 percent) compared to the upper part of the drainage, as measured at SW093, which has approximately 90 percent natural uranium.[29]

There has been no effort to sample sediments or groundwater to the east of the Central Operating Unit along the Walnut or Woman Creek drainages even though the magnitude of the flooding events and the Wright Water Engineering report make it clear that contaminated sediments and water moved from the Central Operating Unit onto the Refuge and perhaps even East of Indiana. The flooding event makes it critical that new sampling activities take place in order to evaluate whether flood control efforts on the Central Operating Unit are adequate to protect the remedies and whether additional remedial efforts to reduce the potential for human exposures east of the Central Operating Unit are necessary.

Of great interest to us is whether or not the flooding events mobilized contamination from the terminal ponds. It's clear that the terminal ponds were intended to and have functioned as locations where contamination from upstream locations is allowed to settle. Data shows that this function is critical as water quality above the ponds has not always met the water quality standards.[30] That, of course, calls into question any decision to breach these ponds, but that is an

[27] *Id* at P.74
[28] *Id* at P. 75
[29] *Id* at P. 76
[30] https://www.colorado.gov/pacific/cdphe/rocky-flats-water-quality-measure

issue for another day as the ponds are surprisingly not a formal part of the current remedy. Without the ponds, however, we believe that the remedies are much more vulnerable to failure and that consequences would be more significant.

For the purpose of the five-year review, the question is more fundamental. It is clear that the engineering features in place did not function well during the flooding event. Sampling systems were off-line and overwhelmed, so there is simply no data from which any conclusion can be reached about the degree to which contaminants were mobilized and, therefore, redeposited in areas where the land use changes will create public contact and exposure. The lack of data does not justify the cavalier assumption that nothing bad has happened. In fact, the opposite is true and because DOE has not bothered to look, we do not know whether substantial contaminant levels now exist in areas where increased human contact and use is planned. The inability of the remedies to cope with the flooding event must be corrected or nobody can have faith in whether or not public health and environment is being adequately protected.

Given the changes in proposed land use in these areas and the flooding event, it is not reasonable to conclude that exposure assumptions conducted ten or more years ago are still valid. New exposure pathways now exist that have never been evaluated due to changes in land use and the 100-year flooding event. Both of these very significant changes happened within the last five years and directly impact the reliability of the human exposures scenarios previously used to select the remedies.

These new land use activities each will involve substantial construction and dirt moving activities in areas certainly impacted by the flooding conditions. DOE and EPA specifically rejected remedies for the Wind Blown Exposure Area and Central Operating Unit that involved soil removal because of the increased risk posed to workers involved in the removal of contaminated soil (associated with the operation of heavy equipment), and the risk posed to the public from transportation of these soils to disposal sites.[31] These concerns pre-dated the flooding event which may well have deposited additional contaminated soils and mobilized contamination in groundwater potentially magnifying the problems.

In rejecting a soil removal option, the CAD/ROD notes:

> Even though standard earthmoving and transportation equipment is readily available, implementing the alternative without impacting surface water quality is difficult. Weather, wind, and precipitation will increase the potential for soil erosion and sediment loads to the Rocky Flats drainages.[32]

[31] These risks still exist and cannot now be ignored due to the land use changes. See *Third Five-Year Review Report for the Rocky Flats, Colorado Site, USDOE Doc. No S07693, July 2012 at P. 29;* CAD/ROD at P. 65

[32] CAD/ROD at P. 62

Certainly these concerns are still valid and we see no reason that DOE, EPA, FWS or CDPHE can now simply ignore their earlier positions. The planned new land uses make it impossible to ignore these risks as they will involve precisely the same uncontrolled exposure risks previously noted. There is no data or other information sufficient to establish that the current remedies are adequate to protect human health in the face of the planned land use changes or the impacts of the flooding event. The Five-Year review must recommend either a reevaluation of the remedies to address these issues or call for a halt to the land use changes.

Conclusion

Only a "Short-Term Protective" finding is appropriate under the Comprehensive Five-Year Review Guidance.[33] It is clear that much more must be done before it is reasonable or appropriate to conclude that the remedies will be protective in the long-term. These additional activities must include sampling of soils and sediments in the areas downstream of the Central Operating Unit along Woman and Walnut Creeks in anticipation of construction activities and the resulting human exposures. Protection of the sampling equipment and other aspects of the remedies so that they function during flood events must also occur.

The point of a Five-Year Review is to determine whether or not the remedies are still adequate to protect human health and the environment. That new standards, new data, new technologies and new land use might result in the need to reevaluate the remedy under CERCLA is a given. In this case, that reevaluation must occur. *Ohio v. United States EPA*, 997 F.2d 1520, 1536 (D.C. Cir. 1993)

Sincerely,

Timothy R Gablehouse
for Gablehouse Granberg LLC

TRG/tg

ec: Town of Superior

[33] *See sections 4.2 and 4.3 of the Comprehensive Five-Year Review Guidance.*

Woman Creek Reservoir Authority
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Sent Via Email and USPS

December 19, 2016

Fourth, 5 Year CERCLA Review Comments
United States Department of Energy
11025 Dover Street
Suite 1000
Westminster, CO 80021

Re: Recommendations for the Fourth Five-Year CERCLA Review of the Rocky Flats Site
Attachment: WCRA Technical Memorandum - Opposition to DOE Proposal to Breach Pond C-2 Dam and Proposed Solution

Dear Mr. Surovchak:

I am writing on behalf of Woman Creek Reservoir Authority (the "Authority"), a political subdivision and public corporation of the State of Colorado created under C.R.S. 29-2-204.2. The Authority is the owner and operator of Woman Creek Reservoir, located on Woman Creek just west of Indiana Street, immediately adjacent to the historical boundaries of what has been formerly known as the Rocky Flats Plant Buffer Zone. The Reservoir physically separates Standley Lake, the drinking water source for the Cities of Northglenn, Thornton and Westminster, from surface water leaving the Rocky Flats Site. I am writing to provide input for your consideration as you develop the Fourth Five-Year Review Report for the Rocky Flats Site.

Based on the Authority's long-term and ongoing participation in technical meetings and review of Rocky Flats Site data, the following two recommendations for the Five-Year Review are offered:

Recommendation #1: Continue to Require a Monthly Frequency for Inspections of the Original Landfill and Require Additional Monitoring of Up-Gradient Groundwater Levels

Major hillside failures/rotational slumping events have occurred at the Original Landfill (OLF) in recent years, as documented in contact records from 2008, 2013, and 2015 (CR 2008-07, CR 2013-02, and CR 2015-03). As recommended in the Third Five-Year Review, it seems appropriate that ongoing monthly monitoring of the OLF again be required. Further, as DOE/LM is in the process of determining appropriate engineering solutions to this ongoing issue attributable to ground slopes and groundwater, it seems prudent that recommendations in the Fourth Five Year review include direction for up-gradient groundwater level monitoring at a frequency of at least weekly. DOE/LM has reported that they are conducting higher frequency up-gradient groundwater level monitoring, but specifically requiring it in the five year review

will ensure that it will continue as engineering solutions are developed, implemented, and ultimately tested by nature over the next five years.

Recommendation #2: Include Discussion of the Adaptive Management Plan, Including Technical Points from the Authority's Position Paper

The Third Five-Year Review described the Adaptive Management Plan (AMP), which was triggered by concern about proposed breaching of the terminal pond dams. This included a discussion of the data to be collected and noted the delayed timeframe for reconsidering breaching of the terminal pond dams (delayed to 2018-2020). It seems appropriate to provide an update on that effort in the upcoming five-year review. For consideration as part of that update, the Authority offers the findings from its evaluation of historical and AMP data. That analysis is presented in a position paper describing a technical basis for continued opposition to breaching the Pond C-2 dam. That paper is attached to this letter and summarized briefly below:

The Authority asserts that breaching of the Pond C-2 dam would represent an irreversible loss of an effective contingency to protect downstream water quality. The ponds have been shown to remove ~90% of Pu and Am in surface water when operated in batch-and-release mode. It is acknowledged that no reportable conditions have occurred at WOMPOC during the AMP sampling period over a wide range of hydrologic events; however, there is still a need for the Pond C-2 dam in certain circumstances. Specifically, wildfire is an as-yet untested event that is inevitable. Such an event could pose a significant threat to downstream water quality if the C-2 dam could not be closed.

WCRA recommends not breaching the Pond C-2 dam, but instead continuing to operate in flow-through mode with a contingency plan to trigger closing the dam to retain water under specific critical circumstances. This proposed solution would reduce pre-AMP operating costs by eliminating routine batch-and-release operations and evaporative depletions, while expanding habitat. WCRA believes this proposed solution is supported by the Site data and meets the Purpose and Needs noted by DOE in the Environmental Assessment for dam breach, while maintaining a proven-effective contingency to protect downstream water quality.

Thank you for your time and consideration.

Sincerely,

Tamara Moon, President
Woman Creek Reservoir Authority

Ec: Carl Spreng, Colorado Department of Public Health and Environment
Vera Moritz, U.S. Environmental Protection Agency
David Abelson, Rocky Flats Stewardship Council
Josh Nims, Woman Creek Reservoir Authority
James Boswell, Woman Creek Reservoir Authority

Lee Johnson, Attorney for Woman Creek Reservoir Authority

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By Electronic Mail

December 31, 2016

Mr. Scott Surovchak
Rocky Flats Site Manager
DOE Office of Legacy Management
11025 Dover St., Suite 1000.
Westminster, CO 80021-5573.

Re: Comments, Rocky Flats CERCLA Five-Year Review

Dear Mr. Surovchak,

Thank you very much for the opportunity to provide comments on the Rocky Flats Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA') Five-Year Review ("FYR"). These comments are offered on behalf of the Rocky Mountain Peace and Justice Center and the undersigned members of the Rocky Flats Technical Group.

The Boulder County Commissioners discussed the FYR when they met on May 12, 2016.[1] Boulder County Policy Analyst Megan Davis said at that meeting that the FYR is not restricted to the Department of Energy ("DOE") Central Operable Unit ("COU") Superfund site but also includes the former buffer zone, now the Rocky Flats National Wildlife Refuge ("Refuge"). In September, 2015, the DOE began monetary transfers to US Fish and Wildlife Service pursuant to a seven-year $8.3M Interagency Agreement ("IA") for construction of a Multipurpose Building on the Refuge, reinforcing the ongoing interconnectedness of these sites. The DOE's continuing involvement at the Refuge reinforces that the public should express their concerns about likely exposure to plutonium and other toxins among people present on Refuge land. In an apparent reference to the Refuge, Davis said the FYR should include off-site, or Refuge, testing. The County Commissioners also expressed concern about poor communication and public dismissal by the DOE. Their views are widely held.

Also, newly discovered significant information, the *Cook v. Rockwell* Jury Findings dated February 13, 2006, indicate that based on all of the evidence and testimony presented in that case, plutonium was spread on the class action area. (Exhibit A) This map logically includes

[1] http://bouldercountyco.suiteonemedia.com/web/Player.aspx?id=546&key=-1&mod=-1&mk=-1&nov=0

areas of the COU and the Refuge that also were contaminated because they stand between the source of the contamination in the COU and the off-site properties included as class members. (Exhibit B) Significant changes in circumstances, including burgeoning housing developments adjacent to the site and proposed increased public access to the Refuge, have rendered the COU remedy's physical and institutional controls obsolete and ineffective.

It is imperative that the Environmental Protection Agency ("EPA") take a hard look at the quality and completeness of the data it receives from the DOE during this process. A critical issue to the Community is the obvious conflict of interest posed by a DOE-lead FYR, considering that the actions of the contractors the DOE hired and supervised, Dow, Rockwell and EG&G Rocky Flats, were directly responsible for the need for this massive, expensive and ultimately incomplete cleanup. In 1992, Rockwell pled guilty to 10 federal environmental crimes and paid a fine of $18.5 million to settle its liability for its actions at Rocky Flats.[2]

The Grand Jury empanelled to determine any criminal liability attached to the DOE and contractor actions at Rocky Flats found indictments were warranted against DOE employees but these efforts were refused by the Department of Justice and sealed by the Court:

> "At the end of its service on March 24, 1992, the (Rocky Flats) grand jury submitted to the district court a report of its findings; draft indictments purporting to charge current and former Rockwell and DOE employees with crimes; and documents, designated as "presentments," that alleged wrongdoing without any formal charges. *See In re Grand Jury Proceedings,* 813 F.Supp. 1451, 1456 (D.Colo.1992). The United States Attorney refused to sign the indictments. On September 25, 1992, the supervising court issued an order prohibiting the report from being released to the public."[3]

During the legal conflict over the contamination at Rocky Flats Rockwell actually went so far as to file suit against the DOE claiming that fulfilling its contract with the DOE would expose Rockwell to civil and criminal liability for additional environmental crimes.

> "Operator of government-owned facility at which nuclear weapons components were produced moved for preliminary injunction against Government's demand that it perform on contract for treatment and disposal of radioactive waste to extent that performance might subject it to liability and/or against prosecution or imposition of civil or criminal liability for any actions it took while it was being compelled to perform contract."[4]

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[2] *United States v. Rockwell Int'l Corp.,* 124 F.3d 1194, 1196 (10th Cir. 1997) (citing *United States v. Rockwell Int'l Corp.*, 92-CR-00107-RPM-1, (D. Colo. 1992)).

[3] *In re Special Grand Jury 89-2*, 450 F.3d 1159, 1163 (10th Cir. 2006)

[4] *Rockwell Int'l Corp. v. United States*, 723 F. Supp. 176 (D.D.C. 1989).

The EPA retains final responsibility for the determination of whether the Rocky Flats COU remedy remains protective of human health. The EPA has the statutory authority to reach its own conclusions about the protectiveness of the remedy and to pursue further action to protect public health and the environment.

The following comments focus on issues generally overlooked in the Rocky Flats "cleanup" and in subsequent FYR reports. They should be thoroughly addressed in this Review.

A. Statement of the Issues

The DOE announced the kickoff of the 2017 CERCLA FYR during a presentation to the Rocky Flats Stewardship Council on June 6, 2016. The presentation documents the review process the DOE intends to follow. The evaluation processes rely primarily on verification of Remedial Action Objectives set out in the Corrective Action Decision/Record of Decision ("CAD/ROD") dated September 2006. This CAD/ROD was based on a secondary investigation, the RCRA Facility Investigation – Remedial Investigation/ Corrective Measures Study – Feasibility Study Report for the Rocky Flats Environmental Technology Site, conducted by Kaiser-Hill and dated June 2006.

In July 1996 the parties had entered into the Rocky Flats Cleanup Agreement ("RFCA") detailing exactly what assumptions were made and cleanup actions would be taken.

> "In 1995, the US DOE estimated that Rocky Flats cleanup would take about 65 years and cost over $37 billion (US DOE/LM, 2008). But in July 1996, the US DOE, US EPA, and DPHE replaced previous agreements and consent orders with a Final Rocky Flats Cleanup Agreement, anticipating a final cleanup by 2021 (Colorado DPHE et al., 1996). Appendix 9 of the agreement was the Rocky Flats Vision, signed by senior policy and regulatory authorities, including the governor and lieutenant governor of Colorado, officials of the US EPA and DPHE, and the US DOE officials, including Jessie Roberson, the Rocky Flats manager at the time. The Vision included a commitment to achieve accelerated cleanup and closure of the site in a safe, environmentally protective manner. Goals in support of the Vision were to be "accomplished in the shortest possible time, in the most cost effective manner, and within a streamlined, flexible, and effective regulatory framework."[5]

The original estimates of 65 years and $37 billion became a political liability for the DOE.

> "During 1996, the US DOE viewed Rocky Flats as a site small enough to be capable of achieving cleanup and closure within about a decade, and chose it as the second of two accelerated cleanup projects (the first being the Fernald site in

[5] John Abbotts *Remediation, Land Use, and Risk at Rocky Flats, and a Comparison with Hanford*, Vol. 21(3) Remediation, 145, 151 (July 2011).

> Ohio; see Exhibit 2). With the signing of the new Rocky Flats Cleanup Agreement in 1996, the Department announced that the "agreement will mean that DOE starts moving dirt, not paper." Initial plans were for cleanup and site "closure," a formal process to certify that cleanup is complete, to be accomplished by 2010. But **for political appearances,** the US DOE needed a site to close in ten years, and the Department pushed Rocky Flats closure to 2006, and negotiated with its Rocky Flats Field Office over the measures necessary to achieve that goal (US DOE/RFPO, 2006)."[6] (emphasis added)

When the artificially accelerated 2006 deadline loomed Kaiser-Hill performed a Remedial Investigation - Feasibility Study and Comprehensive Risk Assessment ("RI/FS/CRA") to support the 2006 CAD/ROD. Kaiser-Hill had a conflict of interest in that it stood to reap significant monetary bonuses for delivering the contract on time and under budget. The DOE had a conflict of interest from political pressure to issue a finding that no further "cleanup" was necessary.

The DOE has never adequately explained how the Rocky Flats cleanup could legitimately be reduced from 65 years and $37billion to 10 years and $7billion without substantial compromises in the work that would be completed resulting in compromises to the remedy's protectiveness of human health and the environment.

For example, the RFCA "accelerated actions" did not completely describe the environmental conditions at Rocky Flats, nor did the final response action ensure that residual contamination did not present an unacceptable risk to human health or the environment. Any data collected from gamma spectroscopy or x-ray fluorescence are inappropriate for decision making in the RI/FS/CRA conducted by Kaiser-Hill because they do not meet specific RI/FS quality assurance requirements established by the EPA.

This FYR evaluation process proposed by the DOE is entirely circular logic riddled with conflicts of interest. The history of what actually took place during the cleanup is complex, secretive and poorly documented, particularly related to how specific "actions" were tied to changes in the cleanup standards. Trade-off decisions about standards and promised levels of cleanup were inappropriately and unilaterally made by the DOE, and according to the DOE's own study these decisions were more driven by Congressional pressures on funding and deadlines than based on scientific evidence of protectiveness.[7] The Community's only recourse, to challenge the cleanup decision criteria, has led to the DOE dismissively portraying the Community as confrontational. The DOE also has used the shield of National Security to close the site, essentially controlling every aspect of data collection and analysis. The entire history of this site lacks transparency and oversight by anyone outside of the DOE's influence.

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[6] John Abbotts *Remediation, Land Use, and Risk at Rocky Flats, and a Comparison with Hanford,* Vol.21(3) Remediation, 145, 152 (July 2011).

[7] Theresa Satterfield and Josh Levin, Risk Communication, Fugitive Values, and the Problem of Tradeoffs at Rocky Flats, A Report for the U.S. Department of Energy Low Dose Radiation Research Program, 12/6/02, p. 14-15.

There is significant long-standing distrust and discord between the Community and the DOE as a result of the conduct of the DOE and its contractors during the actual operations of the Rocky Flats Plant, the incomplete cleanup and the stonewalling of post-cleanup concerns. The Community, whose health and safety the DOE has a duty to protect, believe that the cleanup standards were inappropriately compromised. They also believe that sampling data for analysis is selectively collected or presented in summary form to support findings that favor the DOE.

For reasons discussed below, for this FYR to be successful and meet the CERCLA requirements:

1. The DOE must base its findings on a fresh and expanded analysis methodology incorporating an independent authority to perform a scientifically rigorous evaluation of the protectiveness of the COU remedy.
2. The DOE must fully engage with the Community to finally resolve the distrust and discord that are the natural consequences of the DOE's responsibility for the contamination of this site, the incomplete cleanup, and its subsequent stonewalling of the Community's concerns.
3. The EPA must intervene with a finding of non-concurrence if it finds reasonable grounds that the DOE refuses to provide sufficient data and observations to support its protectiveness determination.

B. Discussion

The Rocky Flats Legacy Management Agreement ("RFLMA") is the current Federal Facility Agreement and Consent Order, a civil enforcement action, that details the roles, responsibilities and regulatory framework each agency will have at the Rocky Flats site for implementing the final response action to ensure protection of human health and environment.[8] Because the chosen final response action resulted in "hazardous substances, pollutants or contaminants remaining above levels that allow for unrestricted use and unlimited exposure" a FYR is required.[9] The EPA, which is responsible for overseeing the FYR process, defines its purpose as:

> "The purpose of a five-year review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is or will be protective of human health and the environment. Protectiveness is generally defined in the National Contingency Plan (NCP) by the risk range and the hazard index (HI). Evaluation of the remedy and the determination of protectiveness should be based on and sufficiently supported by data and observations."[10]

[8] Rocky Flats Legacy Management Agreement, February 2007, p. 4.
[9] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 10.
[10] Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (5204G), June 2001, p. 1-1.

1. **The DOE must base its findings on a fresh and expanded analysis methodology incorporating an independent authority to perform a scientifically rigorous evaluation of the protectiveness of the COU remedy.**

   a. The contaminants sampling data collected under the current RFLMA is inadequate to assess the protectiveness of the COU remedy.

      Because the Rocky Flats COU is a Federal facility NPL site, the procedures for conducting the five year review should be specified in detail within the RFLMA.[11] The agencies' commitments for the CERCLA 5-Year review are documented in Section 7.3 of the RFLMA,[12] which refers to an earlier Part 11 Periodic Review.[13] These procedures refer to "discussion" of both ground and surface water monitoring data.[14]

      The DOE FYR leadership has stated it intends to use data collected through existing water quality monitoring processes to assess the protectiveness of the remedy.[15] The RFLMA includes no provision for soil sampling or air monitoring.[16] The only identifiable standards included are those for surface water contaminants.[17]

      Examples of the data that WILL NOT be collected through the DOE's proposed approach:

      i. **Burrowing animals.** Groundwater is not the only means of Pu transport. In the spring of 1996 ecologist Shawn Smallwood identified 18 species of burrowing animals on the Rocky Flats site, some of which dig down to as much as 16 feet below the surface, all of them bringing soil and its contents, including Pu, to the surface in a wholly random way. Pu in the environment at the current Rocky Flats Superfund site was partially remediated down to 6 feet and not at all below that level or on what is now the Refuge. The Pu in the environment of both the DOE and Refuge land is being constantly re-circulated. Smallwood estimated that burrowing animals disturb 11 to 12% of surface soil at Rocky Flats in any given year. What is now buried is likely someday to be brought to the surface for wider dispersal by wind, water, fires or other means.[18] Pu particles too tiny to be seen but not too small to

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[11] Comprehensive Five-Year Review Guidance, U.S. EPA, June 2001, p 2-7.
[12] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 10.
[13] Rocky Flats Legacy Management Agreement, February 2007, p. 20,
[14] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 9.
[15] Overview: CERCLA Five-Year Review Process, Rocky Flats Site, Colorado, Central Operable Unit, Rocky Flats Stewardship Council Meeting, June 6, 2016, Slide 17.
[16] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 8-10.
[17] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 10-14.
[18] Shawn Smallwood, "Soil Bioturbation and Wind Affect Fate of Hazardous Materials that Were Released at the Rocky Flats Plant, Colorado" (November 23, 1996), Report submitted for plaintiff's counsel in *Cook v. Rockwell Int'l*

do harm are being made available to be inhaled, the worst way to be exposed to Pu.

ii. **Air sampling:** Though CDPHE has said that air is the most dangerous pathway by which Pu can reach people and be inhaled, with completion of the cleanup all sampling of the air ceased at Rocky Flats. This is not meant to say that air sampling in the past was adequate. Harvey Nichols and W. Gale Biggs, scientists knowledgeable in this field, sharply criticize the inadequacy of earlier air sampling.[19] Competent ongoing air sampling should occur on both the DOE site at Rocky Flats and the Wildlife Refuge.

iii. **Dust sampling.** Carl Johnson, MD, head of the Jefferson County Health Department, and colleagues from USGS realized that the real danger regarding Pu at Rocky Flats was inhaling dust particles with Pu attached. To determine whether the Jefferson County Commissioners should permit construction of a residential development on land just east of the Rocky Flats site, they introduced the innovative method of sampling respirable dust on the surface of soil rather than the whole-soil sampling that was practiced by the Colorado Department of Health. CDH had already approved the residential development. Johnson and his colleagues found plutonium in dust on average 44 times greater than CDH found at the same locations with its whole-soil method. Several of their readings exceeded what CDH found by 100 times or more, one by 285 times.[20] Ongoing sampling of respirable dust should occur on both DOE land and the Refuge.

iv. **PCBs (polychlorinated biphenyls).** Highly toxic PCBs are being air-stripped from goundwater into the environment, mainly in the Original Land Fill. The amount of dispersal has never been measured. There is no capturing of PCBs released into the air. This air-stripping may help DOE reduce PCBs on the Superfund site but only by sending them elsewhere, the Refuge being the closest place. The PCBs must be monitored. If an exposure standard does not exist, it must be created, along with a method for monitoring the PCBs.

v. ***Cook v. Rockwell*: surface soil plutonium contamination.** The *Cook v. Rockwell* Jury Findings indicate that plutonium contamination on the surface of the area included in the class map "will continue to be present ...

Corp., No. 90-CV-00181 (D. Colo.) ; see also the transcript of Smallwood's appearance in court in this case, pp. 3912-4130.

[19] Go to http://media.wix.com/ugd/cff93e_eef7aa6815f245e18c1357249382ed97.pdf for Nichols and to http://www.rockyflatsnuclearguardianship.org/technical-resources-table-of-contents?lightbox=i23t0j for Biggs.

[20] Johnson et al., "Plutonium hazard in respirable dust on the surface soil," *SCIENCE* (August 6, 1976), vol. 193, pp. 488-490. Johnson et al. answered criticisms regarding dust particle size made by John A. Hayden of Rockwell in *SCIENCE* (June 3, 1977), vol. 196, p. 1126.

indefinitely."[21] The jury based this verdict on the totality of the evidence and testimony presented to it. This class map logically includes surface area in COU and the Refuge, because these sites stand between the source of the contamination and the offsite properties included in the class action. DOE's refusal to institute a soil sampling protocol means that no data will be collected or reported about this judicial finding of fact.

b. <u>The water sampling protocol the DOE has in place is limited by flawed assumptions and weather-related failures.</u>

An example is the DOE's assumptions about plutonium migration. What happens with Pu in the Rocky Flats environment in unusually wet conditions, such as the flood of September 11-13, 2013 and heavy rain in February to mid-June, 2015? It is often said that the 2013 flood was a 1,000-year event. This means we should not see another flood like this for 1,000 years. But global warming is changing conditions rapidly. Both severe floods and drought occur more often. Human activity has robbed us of the concept of a 1,000-year flood. We should be aware of Pu migration rather than take risks.

i. The Actinide Migration Evaluation (AME), a study of nearly 10 years, concluded that Pu is "relatively immobile in the soil and after groundwater.[22] What they said became a key principle for the Rocky Flats cleanup.

ii. However, before the AME existed, environmental engineer M. Iggy Litaor, with instruments set up in soil at Rocky Flats during the unusually wet spring of 1995, detected substantial movement of a large quantity of Pu in sub-surface soil. This was a well known, highly publicized fact at the time. Yet DOE, EPA and CDPHE set exposure standards for the "cleanup" based on the AME conclusion.

iii. The AME conclusion that migration of Pu oxide at Rocky Flats would be insignificant is countered by findings at other locations. Research has focused on the propensity of minuscule Pu oxide particles to attach to submicrometer-size colloids consisting of organic or inorganic compounds. Such colloids can transport the Pu considerable distances in groundwater. Annie B. Kersting, a geochemist at DOE's Livermore Lab, reported that Pu released from an underground bomb test at the Nevada Test Site moved at least 1.3 kilometers (0.8 mile) in 30 years, with "colloidal groundwater migration" the likely means of transport.[23] A recent study concludes that colloidal transport accounts for the migration of Pu more than 4 kilometers

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[21] *Cook v. Rockwell* Jury Findings, 90-CV-181-JLK, (D. Colo.) February 13, 2006, p. 2-3.

[22] *Actinide Migration Evaluation Pathway Analysis Summary Report*, ER-108 (2002), p. 28.

[23] A. B. Kersting et al., *Migration of plutonium in ground water at the Nevada Test Site*, Nature, vol. 397, no. 7 (January 7, 1999).

(2.5 miles) in about 55 years in the subsurface environment at the Mayak facility in Russia. Other studies show similar long-distance Pu transport in the subsurface environment at DOE's Los Alamos and Savannah River sites.[24] After reviewing the Mayak findings, Kersting said, "we need to get away from this idea that Pu doesn't move, because it does."[25]

iv. Kersting has intensified her research on actinide migration because of its significance at various sites worldwide, including Rocky Flats. She is driven by the recognition that, despite very low concentrations of actinides transported from the original source, their "long half-lives combined with their high toxicity make them of particular concern." Thanks to her team's research on Pu, "the most perplexing element on the periodic table is slowly losing some of its mystery about how it travels underground faster and further than anyone at first expected."[26]

v. To return briefly to the 2013 flood, no samples of Pu or other toxins leaving the site during the flood were taken, because the radiation monitors were so inundated with water that they shut down. So we have no record of the quantity of toxins passing the monitors and leaving the site. Besides monitors that didn't work, sheet flooding occurred in the 2013 event, and no effort has ever been made to monitor Pu or other toxins leaving the site under sheet flooding conditions. DOE manager Scott Surovchak says that when the flow of water is so great as in 2013 the contaminants are diluted and the percentage of contaminant per gallon of water is less. However, in this situation, as Litaor discovered, a large quantity of Pu may move in soil and groundwater and wash off the site onto the Wildlife Refuge or beyond.

vi. Given the 24,110 year half-life of Pu-239 and the danger it poses if minuscule particles are taken into the body, the cleanup at Rocky Flats, based as it is on the work of the AME team, looks like a short-term solution to a long-term problem. The AME researchers, with all their confidence in modeling, made no effort to predict conditions at and near Rocky Flats 500 years from now, much less 10,000 or 100,000 years from now.

vii. The AME team's conclusion of inconsequential Pu migration at Rocky Flats flies in the face of one of their own reports. This report maintains that cleanup of Pu in the soil at Rocky Flats even to citizen-recommended 10

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[24] Alexander P. Novikov et al., *Colloid Transport of Plutonium in the Far-Field of the Mayak Production Association, Russia, SCIENCE*, vol. 314 (October 27, 2006); notes 6 and 8 of this article reference similar long-distance plutonium migration at DOE's Los Alamos and Savannah River sites.

[25] Kersting is quoted in David Biello, *Colloids in Russia: Have Plutonium, Will Travel, Scientific American.Com*, November 10, 2006.

[26] Arnie Heller, *Plutonium Hitches a Ride on Subsurface Particles*, Science & Technology Review, Lawrence Livermore National Laboratory, October/November 2011, pp. 16-18.

picocuries per gram,[27] rather than the 50+ actually adopted, would result in conditions of either a 10-year or a 100-year storm in failure at certain downstream areas to meet the Colorado State standard for Pu in surface water of 0.15 picocuries per liter.[28] Though this contradictory report was part of the AME work, it is not cited in the final AME report.[29]

viii. The above discussion refers to Pu migration in soil and groundwater. It shows that DOE and the regulators are far from reality when they accept the AME conclusion that Pu "is relatively immobile."

ix. The EPA maintains RCRA Info Facility Information that lists the Rocky Flats Site as a Hazardous Waste Generator, Handler ID: CO7890010526. The Resource Conservation and Recovery Act (RCRA) permit for the Rocky Flats Site is limited to Hazardous Waste Generator. The last documented biennial report was in 2005. Yet DOE-LM currently utilizes erosion control materials (wattles, air stripping and matting) to mitigate the migration of contaminants of concern. DOE-LM has not documented the sample analysis of such media, filed any RCRA biennial reports nor provided regulatory authority to treat, store or dispose of the contaminants of concern at the Rocky Flats Site. [30]

c. <u>The DOE is collecting insufficient or incorrect data because the existing sampling/data collection protocol is not supporting permanent resolution of failures of the COU remedy.</u>

The stated purpose of the protocols set out in the RFLMA is to "specify the legacy management requirements that will ensure the response action selected and approved" in the 2006 CAD/ROD "remains protective of human health."[31] "Remedy performance standards and requirements are enforceable numerical values or narrative descriptions of conditions or restrictions, designed to protect existing or potential uses, against which remedy performance can be measured."[32]

The actual purpose of the long-term stewardship of sites where "hazardous substances, pollutants or contaminants remaining above levels that allow for

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[27] Establishing the cleanup level for plutonium in soil at 10 picocuries per gram or less was recommended in a report prepared for the Rocky Mountain Peace and Justice Center by Arjun Makhijani and Sriram Gopal, "Setting Cleanup Standards to Protect Future Generations: The Scientific Basis of the Subsistence Farmer Scenario and Its Application to the Estimation of Radionuclide Soil Actions Levels for Rocky Flats" (Takoma Park, MD: Institute for Energy and Environmental Research, December, 2001). http://www.ieer.org/reports/rocky/toc.html

[28] Win Chromec, Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluation at the Rocky Flats Environmental Technology Site, 00-RF-01823/DOE-00-93258 (August 2000), p. 51.

[29] *Actinide Migration Evaluation Pathway Analysis Summary Report* (2002), pp iii-iv.

[30] (https://oaspub.epa.gov/enviro/rcrainfoquery_3.facility_information?pgm_sys_id=CO7890010526).

[31] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 1.

[32] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 1.

unrestricted use and unlimited exposure" is the protection of human health and the environment.[33] The endless collection, discussion and reporting of sampling data fails in this purpose if it does not provide the information needed to support actual actions taken at the site that permanently fix failures of the remedy.

Examples of ongoing long-term unresolved failures of the COU remedy are:

i. **Problems with the Original Landfill.** Due to extended heavy precipitation mid-February through mid-July, 2015, there was cracking and slumping along the eastern and western edges of the waste footprint. Is this not a persisting problem? Does the DOE understand what is happening? Does it have a remedy? If so, what is it? Can necessary remedies be taken without violating the agreement about depth of digging on the site?

ii. **Exceedances at POCs and POEs**. "Reportable Conditions" occur when results of sampling for a contaminant in surface water or groundwater exceed the agreed upon state standard, which is the legal limit for that particular contaminant on the site. As noted earlier, had proper care been taken to recognize Pu migration and to establish protective radiation exposure standards, we would not now have the persistent problem of reportable conditions at POCs and POEs.

Rocky Flats Reportable Conditions 2013 – 2016

Contaminant	Media	Month(s) when concentrations resulted in reportable conditions	Statistical Base Intervals
Uranium	Surface Water	01/2016, 11/2013 – 10/2014, 12/2013	30-day average, 12-month rolling average, 30-day average
Trichloroethene (TCE)	Groundwater	05/2015 & 10/2015	Semi-annual sampling
Vinyl Chloride	Surface Water	03/2015 - 06/2015, 10/2013 – 02/2014	Quarterly sampling and triggered monthly subsequent sampling
Plutonium	Surface Water	05/2014 – 05/2015	12-month rolling average

This table, prepared by Andrew Moscovich, shows exceedances for five listed contaminants in surface water or groundwater at specific times. Reportable conditions on the chart are averages of samples collected in the periods shown. The table relies on DOE reports.[34]

[33] Rocky Flats Legacy Management Agreement, February 2007, Attachment 2, December 2012, p. 10.
[34] See http://www.lm.doe.gov/Rocky_Flats/ContactRecords.aspx

The DOE's limited water sampling data collection strategy overlooks the possibility that a failure of the remedy will cause contaminants to rise to the surface and also possibly become airborne rather than flow out through the surface or groundwater. The Community's repeated requests for soil sampling and air monitoring has been unilaterally denied to date.

For these reasons, the DOE must base its FYR findings on a fresh and expanded analysis methodology incorporating an independent authority to perform a scientifically rigorous evaluation of the protectiveness of the COU remedy.

2. **The DOE must fully engage with the Community to finally resolve the distrust and discord that are the natural consequences of the DOE's responsibility for the contamination of this site, the incomplete cleanup and its subsequent stonewalling of the Community's concerns.**

Community involvement is such a key component of the FYR process that EPA provides significant direction to the Federal agencies about requirements that must be fulfilled.[35] "At high profile sites or those with significant public interest, (the Federal agency) should carefully consider methods for informing the community about the review."[36]

The EPA has issued additional guidance about partnership in its efforts to streamline the oversight of Federal facility sites.[37] The EPA's direction about communication with Communities is refreshingly frank:

> "The history of federal facilities cleanup has been one marked with considerable distrust between the communities, the regulators, and the federal facility. One outcome of this distrust was a need for extensive regulator and community oversight of cleanup activities. At some facilities, the atmosphere of distrust has changed or is being changed. At other facilities, much needs to be done...."[38]

A complete depiction of the distrust and discord between the Community and the DOE at Rocky Flats would fill volumes and solve little. Suffice it to say that years of misdirection, stonewalling and dismissal of public concerns by the DOE has

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[35] Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (5204G), June 2001, p. A1-8.

[36] Comprehensive Five-Year Review Guidance, OSWER No. 9355.7-03B-P, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response (5204G), June 2001, p. A5.

[37] Jim Woolford and Craig Hooks, Memorandum: Federal Facilities Steamlined Oversight Directive, OSWER Directive No. 9230.0-75, November 29, 1996, p. 7.

[38] Jim Woolford and Craig Hooks, Memorandum: Federal Facilities Steamlined Oversight Directive, OSWER Directive No. 9230.0-75, November 29, 1996, p. 7.

compromised its credibility and destroyed any trust that the DOE is serving and protecting much beyond but its own interests.

The clearest admission that the DOE was motivated to "manage" public input came ironically from a study commissioned by the DOE:

> "... we were explicitly informed by agency personnel that the DOE and Congress had produced an agreement that guaranteed yearly appropriation of funds for the Rocky Flats cleanup as long as three conditions were met: 1) the cleanup be completed by 2006; 2) the cost and scope of the cleanup be contained (i.e., remain as negotiated); 3) **conflict in the community be curtailed (given the history of public protest at Rocky Flats).** This agreement, made in trust, was (and continues to be) validated through ongoing annual appropriations to Rocky Flats. Rocky Flats was in an advantageous position in that very few of the other sites in the DOE complex had been guaranteed (albeit conditionally so) annual appropriations. But as those funds were "conditional", **the contractor and the agencies were placed in the position of having to 'minimize conflict' while meeting bottom-line budget limitations regardless of any certainty that cleanup could actually be achieved with the available resources and within the agreed upon time line.**"[39] (emphasis added)

An example of the distrust in the Community for trade-off decisions and actions taken by the DOE is how the cleanup standards were literally backed into when the DOE ran out of time and funding for the cleanup.

> **Radiation exposure standards.** What is the effect of the radiation exposure standards set for Rocky Flats as part of cleanup? When DOE, EPA and CDPHE personnel call the site "safe," they mean that the radiation exposure standards they established are, with minor exceptions, not violated. However, the National Academy of Sciences affirmed in their 2006 BEIR study that there is no such thing as a safe radiation exposure; any exposure is potentially harmful.[40]

i. In the words of Ulrich Beck, "Whoever *limits* pollution has also *concurred* in it." Exposure standards "may indeed prevent the very worst from happening, but they are at the same time 'blank checks' to poison nature and mankind *a bit*."[41]

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[39] Theresa Satterfield and Josh Levin, Risk Communication, Fugitive Values, and the Problem of Tradeoffs at Rocky Flats, A Report for the U.S. Department of Energy Low Dose Radiation Research Program, 12/6/02, p. 26.

[40] *Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII* (Washington, DC: National Academies Press, 2006), p. 246.

[41] Ulrich Beck, *Risk Society*, translated by Mark Ritter (London: Sage Publications, 1992), p. 64.

ii. As for Pu, the most common contaminant at Rocky Flats, Columbia University scientists found that a single Pu particle taken into the body can be harmful, possibly fatal.[42] Once inside the body, the Pu lodges in a specific location, where it will remain for the rest of one's life, constantly bombarding nearby cells with radioactive alpha particles. The effect is likely to be cancer, a compromised immune system, or genetic harm to offspring. Given that exposure to a single particle of Pu taken into the body can be harmful, protecting what CERCLA calls the maximally exposed individual (the Wildlife Refuge worker) is senseless. Anyone who inhales plutonium may be harmed; the most vulnerable is a child.

iii. The developing field of epigenetics points to greater environmental dangers to the genome than was previously imagined, so the Precautionary Principle must be employed here. Instead of caution, the government agencies responsible for Rocky Flats call the site "safe." This is a misuse of language and gambles with the health of people now and in future generations.

iv. The biggest problem with the Rocky Flats site is not the occasional failure to meet existing radiation exposure standards at a Point of Compliance or a Point of Evaluation. The biggest problem is the existing radiation exposure standards themselves. They allow exposure that will harm some. This is true on the DOE Superfund site but also on the Rocky Flats Wildlife Refuge and in exposed areas off the site.

v. There is no reason to relax about Pu in off-site areas. Above it is shown that radiation exposure standards don't prevent harm but actually allow it. Consider briefly what the jury in the recently settled Cook v. Dow and Rockwell case said as they reached a verdict. The jury found that Dow and Rockwell had released plutonium onto the Class Properties and that "it appears that this Pu will continue to be present on the Class Properties indefinitely."[43] The Pu on property in the roughly 30 square-mile area covered by this case will pose a danger to people in that area indefinitely. The health of some is likely to be harmed. The jury decision is important, because it shows that a group of people not familiar with details regarding Rocky Flats became convinced of the guilt of Dow and Rockwell when presented with evidence that the companies released contamination from Rocky Flats into the environment.

vi. When Rocky Flats was producing parts for nuclear weapons, it could be argued that one price of national security was to set radiation exposure

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[42] Tom K. Hei et al., *Mutagenic effects of a single and exact number of particles in mammalian cells*, Proceedings of the National Academy of Sciences, vol. 94 (April 1997), pp. 3765-3770.

[43] *Cook v. Rockwell* Jury Findings, 90-CV-181-JLK, (D. Colo.) February 13, 2006, p. 2-3.

standards that allow some exposure to plant workers as well as affected public. Now that the plant is closed, there is no excuse for exposing anyone on or off the site. The Rocky Flats Future Site Use Working Group, after a year's study, in a consensus decision called for cleaning the site to the average background level for Pu from global fallout (0.04 pCi/g). They recognized that technologically this could not be done now, but they wanted it done as quickly as possible. The technology to accomplish this could be developed at Rocky Flats, then made available to Pu-contaminated sites elsewhere.[44] This proposal quickly became the most widely publicly supported recommendation for the cleanup, but it was ignored by DOE, even though they had requested it. In October 1996 DOE and the regulators officially adopted a Pu cleanup standard of 651 pCi/g, 16,275 times the 0.04 pCi/g the Future Site Use Group had recommended. Al Alm, then head of DOE's cleanup operations nationally, was at the meeting where this standard was revealed, and he heard the public's overwhelming rejection and anger at having been ignored. He ordered Rocky Flats officials to begin anew. This led, after a period of intense conflict, to the stratified three-level cleanup standard finally adopted in 2003. Only near the end of time-consuming discussions of the cleanup did the public finally learn that in a secret deal with Congress DOE had agreed to a fiscal cap and a time limit for the Rocky Flats cleanup.[45]

The FYR Leadership team has indicated that the only public input to this process after this comment period will be through the Rocky Flats Stewardship Council regular meetings.[46] This process is a golden opportunity to re-establish a partnership between the Community and the DOE. For any chance of a successful FYR process, the DOE must fully engage with the Community to finally resolve the distrust and discord that are the natural consequences of the DOE's responsibility for the contamination of this site, the incomplete cleanup, and its subsequent stonewalling of the Community's concerns.

3. **The EPA must intervene with a finding of non-concurrence if it finds reasonable grounds that the DOE refuses to provide sufficient data and observations to support its protectiveness determination.**

Although CERCLA and Executive Order 13016 delegate authority to Federal Agencies, in this case the DOE, to lead the cleanup and long-term stewardship of Federal facility

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[44] *Rocky Flats Future Site Use Working Group Recommendations* (July 1995).

[45] Details are available in LeRoy Moore, *Rocky Flats: The Bait and Switch Cleanup*, Bulletin of the Atomic Scientists, January/February 2005, pp. 50-57; on line at http://media.wix.com/ugd/cff93e_7711d2b2a9d84f28ab1986706f1cda75.pdf

[46] Overview: CERCLA Five-Year Review Process, Rocky Flats Site, Colorado, Central Operable Unit, Rocky Flats Stewardship Council Meeting, June 6, 2016, Slide 17.

NPL sites, the EPA retains a key role as a check and balance to this inherent conflict of interest.[47]

> "EPA has an obligation when signing or approving CERCLA decision documents to ensure that the remedies, including institutional controls (ICs) which are components of remedies, are protective and will remain so in the future. This responsibility is consistent with this Agency's obligation under CERCLA remedy-selection criteria established in the National Contingency Plan at 40 C.F.R. §300.430(e)(9)(iii), to assess the long-term reliability of ongoing remedial measures as part of evaluating a remedy's effectiveness in protecting public health and the environment."[48]

The EPA itself is imposing stricter guidelines on its concurrence process for Federal facility NPL sites.

> "The long-term effectiveness of remedies, including ICs, is a high priority for EPA's federal facility program. Consequently, we are requesting Regions to take prompt action to ensure that, **for federal facilities, EPA Regions only approve decision documents which adequately document the means of ensuring the short- and long-term effectiveness of ICs.** Regions are directed to scrutinize all proposed plans, draft and final RODs and post-ROD documents which address ICs, to ensure that they adequately document the objectives of the ICs, and clearly identify who has responsibility for implementation, monitoring, reporting and enforcement of the ICs. Your review should ensure that EPA is provided a sufficient oversight role in the implementation and maintenance of the selected remedy and that the documents are consistent with CERCLA, the NCP, and EPA policy and guidance or that they provide an adequate justification to explain the variance...
>
> If the regional review finds an insufficient oversight role for EPA in the post-remedy implementation and maintenance of the IC or you make a determination that the remedy decision document is inconsistent with CERCLA, the National Contingency Plan or EPA policy and guidance, particularly with respect to the adequacy of the IC information, **the Region should not approve the document under review.**"[49] (emphasis added)

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[47] The RMFLA omits this Executive Order, along with EO 13423 and 13514) [https://www.epa.gov/enforcement/select-executive-orders-environmental-compliance-requirements-federal-facilities].

[48] Memorandum: EPA Concurrent/Approval of Federal Facility Proposed Plans and Records of Decision and other Documents, James Woolford, Director, 17 August 2001.

[49] Memorandum: EPA Concurrent/Approval of Federal Facility Proposed Plans and Records of Decision and other Documents, James Woolford, Director, 17 August 2001.

The EPA has the jurisdiction to issue an independent finding disagreeing with the DOE's determination as to the protectiveness of the COU remedy. "If the Region cannot reach an informal resolution of the issue, the Region should be prepared to follow the dispute resolution process outlined in the Federal Facility Agreement. "[50]

If the DOE is unable or unwilling to cure the shortcomings in its approach to this FYR then the EPA must intervene with a finding of non-concurrence if finds reasonable grounds that the DOE refuses to provide sufficient data and observations to support its protectiveness determination.

C. Conclusion

The June 16, 2016, DOE presentation to the Rocky Flats Stewardship Council posed three material questions.[51] The undersigned would respectfully answer them as follows:

A. **Is the remedy functioning as intended?** This must be answered NO because of ongoing exceedances at POCs and POEs and the slumping of the Original Landfill. In addition is the sampling failure, especially in the flood of September 2013 when monitors did not work at the peak of the storm, so that there is no record of what actually happened at monitoring points. Of course there's also no record of what was carried off the DOE site in sheet flooding. And there was at the time of the flood and never has been sampling of air and of surface soil dust. Nor has there been any recognition of the reality of plutonium migration.

B. **Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) still valid?** This must be answered NO for several reasons. A) Pu migration in groundwater is well-documented as is its movement due to the activity of burrowing animals. B) The radiation exposure standards set for the cleanup are not adequately protective on either the DOE site or the Wildlife Refuge. Though the public recommended standards for a more rigorous cleanup, they were ignored. Scientific studies referenced above support the public, not the action taken by DOE and the regulators. C) Neither air sampling or dust sampling occur on DOE or Refuge land. Without this no one really knows what is happening in the environment. Both must occur on an ongoing basis. D) Only recently did DOE decide to air strip PCBs, but there is no monitoring. If this is done it must be monitored to meet an exposure standard that is protective.

C. **Has any other information come to light that could call into question the protectiveness of the remedy?** Yes, as spelled out above. Everything referred to has

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[50] Memorandum: EPA Concurrent/Approval of Federal Facility Proposed Plans and Records of Decision and other Documents, James Woolford, Director, 17 August 2001.

[51] Overview: CERCLA Five-Year Review Process, Rocky Flats Site, Colorado, Central Operable Unit, Rocky Flats Stewardship Council Meeting, June 6, 2016, Slides 11-13.

long been available, but it has been ignored. The only thing new is the air-stripping of PCBs. According to a report published in 2000, The National Research Council "finds that much regarding DOE's intended reliance on long-term stewardship is at this point problematic."[52] This is a polite way of saying that long-term stewardship doesn't work at all DOE sites. It won't work at Rocky Flats without starting over, setting exposure standards that are actually protective and then cleaning the site to the maximum extent possible with existing technology.

Although there is no statutory requirement for the government agencies doing the CERCLA FYR to prepare the text of the review without the public having the opportunity to see it and comment on it such a process would benefit all parties. The DOE's Review and the EPA's Review concurrence letter must be completed and made available to the public well in advance of the final date for completion of the Review. The public should have at least one month in which to comment on the Review, and the DOE and the EPA must provide their responses to the public by the date for completion of the Review. The rules for commenting and receiving responses must be similar to those used in the CERCLA process.

Sincerely,

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[52] *Long-term Institutional Management of U.S. Department of Energy Legacy Waste Sites* (Washington, DC: National Academy of Sciences, National Research Council, August 2000).

//s// Randall M. Weiner

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on behalf of:

The Rocky Mountain Peace and Justice Center
The Rocky Flats Technical Group, comprised of:

- LeRoy Moore, PhD
- Jon Lipsky, Former FBI Agent
- Harvey Nichols, PhD
- W. Gale Biggs, PhD
- Judith Mohling
- Christopher Hormel
- Lynn Segel

cc: Vera Moritz, Environmental Protection Agency, Remedial Project Manager, Rocky Flats Site, Carl Spreng, Colorado Department of Public Health and Environment, State Project Manager, Rocky Flats Site

Original Landfill Briefing

- Cover memo
- Selection of April 4, 2016, minutes
- Contact Record 2016-04

ROCKY FLATS STEWARDSHIP COUNCIL

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City of Golden ~ City of Northglenn ~ City of Thornton ~ City of Westminster ~ Town of Superior
League of Women Voters ~ Rocky Flats Cold War Museum ~ Rocky Flats Homesteaders

MEMORANDUM

TO: Board of Directors
FROM: David Abelson
SUBJECT: Original Landfill briefing
DATE: January 25, 2017

DOE will provide an update on the Original Landfill (OLF). The briefing will focus on work DOE is undertaking to reduce groundwater infiltration into the OLF. DOE will also present a high-level overview of the independent report the agency commissioned. That report, which will be posted in DOE's website in the coming days, evaluates remedial options, and presents costs and value added. DOE will discuss those findings and path forward in greater depth at the April 3rd meeting.

In preparation for this meeting, attached are two items – the relevant section of the minutes from the Board's April 4, 2016, meeting, and Contact Record 2016-04. The contact record discusses in detail the upgrades to the east subsurface drain. Those repairs were completed in January 2017.

We will forward the aforementioned report when it is posted.

Please let Rik and me know what questions you have.

RFSC April 4, 2016 Meeting – Partial Minutes

Briefing/Discussion on Original Landfill

Chair Lisa Morzel introduced the next briefing, which the Board requested regarding the independent review of the Original Landfill, including options for stabilizing the OLF.

Linda Kaiser, Site Manager with Navarro, contractor to DOE, was on hand to give the briefing. She began by displaying a map of the landfill area, which showed the waste footprint, location of berms and seeps, and key surface water features in the area. She then recapped key events from 2015 that affected the landfill. The site experienced extended, heavy precipitation from mid-February through mid-July (approximately 18 inches). Cracking and slumping developed in areas along the eastern and western edges of the waste footprint (mostly outside waste footprint). Water ponding occurred in areas affected by cracking and slumping. The East Perimeter Channel (EPC) experienced significant slumping. However, most of the landfill area did not experience cracking, slumping, or movement. Linda showed another map which depicted these post-precipitation conditions at the landfill.

DOE issued Contact Record 2015-03 in May 2015, which was approved for immediate response actions without public notice. This included draining and diverting surface water and groundwater, and also approved the use of excavation below three feet, if needed. In July, 2015, Contact Record 2015-06 was approved for interim actions to re-establish surface water management. This included:

- Regrading to fill cracks and smooth irregularities (then reseeding/erosion matting)
- Installing above-ground drain pipes
- Berm heights and cover thickness might not be maintained in some areas

These interim actions were completed September 22, 2015. Linda showed photos of some of the work, as well as an aerial image showing the 4-acre area of soil disturbance.

She said DOE was now working on developing a path forward evaluation for the landfill. A geotechnical engineering firm had been evaluating technical alternatives to increase slope stability and enhance water-management features. As part of this evaluation, the engineers were reviewing previous geotechnical investigations, the remedial action decision documents, and observations and experience since the 2005 closure. Linda said they reviewed over 20 documents and reports (there was a partial list in the presentation materials).

DOE received a draft Options Analysis Report from the geotechnical subcontractor, which identified three primary factors contributing to slope instability at the landfill:

- Naturally weak soils underlying the OLF
- Slope angle that is sufficiently steep that soils can mobilize downslope
- Water that is introduced into the already weak soils from sources including:
    - Surface water run-on and runoff
    - Precipitation and infiltration
    - Groundwater

The geotechnical subcontractor identified a set of options to be evaluated individually and combined, as appropriate, to address slope instability:

- Options for addressing naturally weak soils
- Consideration of slope angle
- Options for water management
    - Berm redesign
    - Groundwater control

The subcontractor also provided a preliminary evaluation of options. DOE will select a subset of these options (individually or in combination) for more detailed evaluation. Evaluation criteria include:

- Satisfy the Remedial Action Objectives (RAOs)
- Maintain protectiveness to human health and the environment
- Effectively contribute to reducing one or more factors contributing to slope instability:
    - Technical effectiveness
    - More effective than current design
- Minimize effect on other areas (industrial area plume and stable portions of the landfill)
- Provide reasonable cost/benefit
- Safe implementation
- Regulatory approval

Linda also reviewed the Remedial Action Objectives for the landfill:

- Prevent direct contact with landfill soil and commingled waste
- Control erosion caused by storm water run-on and runoff

She also spoke about the remedy components necessary to address these RAOs:

- Uranium-contaminated surface soils removal (completed July 2004)
- Stable landfill cover to prevent direct contact with landfill soil or debris
- Landfill cover that adequately controls erosion caused by storm water run-on and runoff
- Institutional controls

Jon Lipsky referred to the objective of preventing contact between landfill soil and co-mingled waste. He said he had read that there was no depleted uranium left in the landfill and asked how they could have removed just uranium from co-mingled waste. Scott Surovchak said that Linda was talking about surface uranium contamination, which was addressed through a series of removal actions. Anne Fenerty asked how much DOE had spent on the landfill since 2005. Linda said she did not have that number in her head. Lisa Morzel asked Linda to follow-up on this question. Jon Lipsky referred to a Contact Record showing that the OLF had subsided, and he asked how many feet. Linda said that most of the OLF had not subsided. There was a crack that was beginning of a rotational slump, which slid in circular motion. This area was about 15 feet tall at its highest. She added that they did not see movement within the waste footprint area. Sandy Pennington asked if they sampled the pooled water for contaminants. Linda said they did not, and added that there were several standard monitoring points in the area. She said that, in general, very little contamination was showing up in wells associated with the landfill, and none in surface water. Sandy asked why they did not test the pools of water before they dispersed. Linda explained that the monitoring system was set up based on a network of sampling points designed to meet all necessary criteria. Lisa Morzel said she was also surprised that DOE would not sample even just

out of curiosity. Linda said someone could discuss this with DOE. Mike Shelton asked if wells at the bottom of the slope were monitored, and how they could know that none of the contamination was associated with the OLF. Linda said they were seeing constituents like selenium, and nothing at levels that would cause them to have to go back and take another look.

Deb Gardner referred to water getting into the landfill through weak soils, and asked where this was and how deep. Linda said it was about 20-28 feet. Deb asked if water was coming from percolation and other sources. Linda said it was, including from groundwater and natural seeps. Deb asked which factors caused the slumping. Linda said that groundwater was a significant factor, and noted that some of the path forward options were related to groundwater. Bruce Baker asked if there was a spring to the east of the landfill. Linda said there were seeps. Bruce asked Scott to weigh in and characterized him as the person in charge of these decisions. Scott noted that they did not know what the exact contributions were from groundwater vs. water from the surface, but that it was primarily a surface water problem. Bruce said he would have thought opposite. Scott explained that groundwater moved very slowly, especially in this area of low permeability soils. He said the soil contained a lot of pebbles and boulders, and that the matrix was essentially clay. Bruce said that this type of soil would act like reservoir or sponge. Scott reiterated that groundwater controls were part of the equation moving forward.

Shelley Stanley asked if there was any new cracking in 2016. Linda said there was not. Laura Weinberg asked how many alternatives were being considered. Linda said there were 16. They included options such as building a slurry wall, drain trenches, reconfiguring berms, installing low permeability covers, and extending the buttresses. She said that the solution would likely involve some combination of actions. Scott Surovchak clarified that the contractor provided the list of options, while DOE would be conducting the evaluation. Linda said they expected that a design would be ready in federal fiscal year 2016. Steven Franks asked how they were getting baseline data to use for future actions since the inclinometers were removed or broken. Linda said that the evaluation would be looking at all factors and that most of the problems could be seen on a visual basis. Linda added that they conduct a detailed survey every two years. Lisa asked whether they used physical markers. Linda said that settlement monuments provided data for vertical movement, as well as some indications of horizontal movement.

Joe Cirelli referred to the ponded water being channeled to automated sampling points, and asked if they were functioning during the time of extended precipitation. Linda said that, to the best of her knowledge, the sampler beneath the landfill was operating at that time. Lisa asked Linda to follow-up with answers to any questions she did not know the answers to. Sue Vaughan asked if the geotechnical engineer provided any recommendations. Linda said that they did provide some technical evaluation. They noted that groundwater and surface water controls would likely be the most effective, while changing the landfill cover would probably be less effective. She added that a change to the slope angle would have to be very significant to be effective in this kind of geology, and that this was not likely to be feasible. Deb Gardner said it would be helpful if the Board could see list of the recommendations and to see the criteria DOE was going to use to review them. She said there was a lot of interest in finding a long-term fix. Linda noted that DOE was really looking for a long-term fix as well. She pointed to the criteria she shared in her presentation, which defined how the alternatives would be evaluated. She added that they were also doing a cost-benefit analysis. Lisa asked if this could be shared with the Board. Scott Surovchak said they would share it when they were done. Lisa said that the Board would appreciate being able to see the options before it was a done deal.

Michael Ketterer said he did not see isotopic analyses in the DOE reports he reviewed and asked how much of the uranium was naturally-occurring. Linda said that samples were sent to the Lawrence

Berkeley labs to determine isotopic ratios. She said some groundwater wells showed 100% natural uranium, while others had a mixture. She said they found 68-82% natural uranium in Walnut Creek, and Scott said that Woman Creek was 99% natural. He added that all of this data was online. Mike Shelton asked why the DOE/Navarro water experts were not present for this briefing. Linda said that they were not expecting that level of detail and questions for this presentation. She added that they would come in the future if needed. Mike said he thought this was needed.

Complete minutes can be found at --
http://www.rockyflatssc.org/RFSC_meeting_minutes/RFSC_minutes_4_4_16%20FINAL.pdf

ROCKY FLATS SITE
REGULATORY CONTACT RECORD 2016-04

Purpose: Upgrade of the East Subsurface Drain Located in the East Perimeter Channel of the Original Landfill, with Soil Disturbance Review Plan

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Contact Record Approval Date: October 19, 2016

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

Dates of Consultation Meeting: July 18, September 20, and October 12, 2016

Consultation Meeting Participants: Scott Surovchak, DOE; Carl Spreng, CDPHE; Vera Moritz, EPA; Clay Carpenter, Linda Kaiser, John Boylan, George Squib, David Ward, and Michelle Hanson, Navarro

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Introduction:

The actions described in this contact record should improve the diversion of groundwater away from the East Perimeter Channel (EPC) by repairing and upgrading the East Subsurface Drain (ESSD) in the NE corner of the Original Landfill (OLF) so that it functions as intended and is less likely to clog. These actions are consistent with the investigation done under the Rocky Flats Legacy Management Agreement (RFLMA) Contact Record (CR) 2016-03.

The purpose of the investigation approved in CR 2016-03 (installation of wells and piezometers with a Geoprobe) was to provide additional information about the groundwater regime in the areas that potentially have the greatest contribution to the slumping in the OLF. CR 2016-03 states that geotechnical consultants have determined that slope instability at the OLF can be attributed to three factors:

1. Comparatively weak soils that naturally underlie the OLF area;
2. A slope angle that is sufficiently steep such that the soils can mobilize downslope; and
3. Water that is introduced into the already weak soils from one or more sources, including surface run-on and runoff, precipitation and infiltration, and groundwater.

Of these three factors, options for reducing the volume of water entering the OLF area are the most practical.

The ESSD was installed in the northeast corner of the EPC during site closure as a field modification of the OLF area to intercept and divert groundwater away from the northeastern portion of the OLF during construction of the EPC and the eastern portion of the final land surface of the OLF area. The ESSD is upgradient of the area that exhibited the most significant slumping in 2016, and it no longer operates as installed. The ESSD was constructed as a rock drain with no geotextile filter fabric to reduce the potential for clogging. The drain cannot be cleaned without excavating it. It is not certain when the ESSD stopped working, but very little water, if any, flows out of the drain. The excavation of portions of the ESSD in the summer of 2015 (performed under CR 2015-06) failed to provide an outlet for water that might have been collecting in the buried rock drain.

Discussion:

Based on the information above, the ESSD needs to be repaired and upgraded so that it properly functions and is less likely to clog. This action should be completed before the spring of 2017, when groundwater levels are again anticipated to rise and additional hillside movement is more likely. The repair and upgrade include excavating and replacing approximately 134 feet of the 234 feet of existing clogged rock drain and replacing the westernmost 100 feet of the original ESSD with a segment that is slightly south of the current drain alignment (see Figure 1). This realignment will avoid digging in the steepest portion of the slope. The total length of the excavation will be approximately 234 feet, and it will range from a depth of approximately 15 feet at the upgradient end to zero feet where the drain daylights. An 8-inch perforated pipe, with cleanout risers appropriately located for observation and cleanout, will be contained within a gravel bed that will be wrapped in geotextile filter fabric as shown in Figure 1. The pipe and cleanouts will allow the continued maintenance of the drain and will therefore extend its operable lifetime. The trench that is excavated for this work will be entirely outside the waste footprint but inside the original OLF construction boundary. Some construction equipment may be placed on the OLF cover above the waste footprint to safely install the upgraded ESSD.

A portion of the repair and upgrade work to the ESSD will be performed in an already disturbed Preble's meadow jumping mouse critical habitat, within the OLF original construction boundary (see Figure 1). As required by the United States Fish and Wildlife Service (USFWS) Biological Opinion for the Preble's meadow jumping mouse at Rocky Flats, the USFWS will be a notified prior to start of construction.

As stated above, the groundwater appears to have the greatest potential impact on slope instability around the EPC and the eastern edge and western side of the OLF. Several stabilization methods are being evaluated, and data are being collected to determine the preferred approach for managing the groundwater before it enters the OLF and for improving the OLF slope stabilization. A second 8-inch pipe (nonperforated) will be installed within the excavated trench in case the alternative that is eventually selected to manage groundwater requires a method to convey groundwater from upgradient of the OLF to the hillside east of the OLF (see Figure 1). Precisely how or if this second pipe eventually would be used has not been determined; additional data must be collected and geotechnical conclusions evaluated before any approach to groundwater diversion can be finalized. However, it is most efficient to install this pipe as part of the ESSD action rather than to dig up the area again to install the pipe. This second pipe will be installed with an inlet riser located at the upgradient end of the pipe, about where the upgraded ESSD turns southeast (Figure 1).

IC Evaluation: The soil disturbance work is subject to Institutional Controls (ICs) 2, 3, and 6. 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.
	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.
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.
	Objective: Ensure the continued proper functioning of the landfill covers. **Rationale:** This restriction helps ensure the integrity of the landfill covers.

The required Soil Disturbance Review Plan (SDRP) for IC 2 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. Construction equipment may need to be positioned on the cover over the easternmost portion of the OLF waste footprint in order to construct the west end of the upgraded ESSD. Approval of this contact record provides authorization for this response action as required by IC 6.

Resolution: CDPHE reviewed the information regarding the proposed soil disturbance and excavation and after consultation with EPA, has approved this contact record. 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 IC 2 (IC 3 and IC 6 rationale and objectives have been addressed as stated above).

The work will be conducted after CDPHE's approval, but DOE will not conduct the approved soil disturbance 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.

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, Clay Carpenter, and Jeremy Wehner, Navarro

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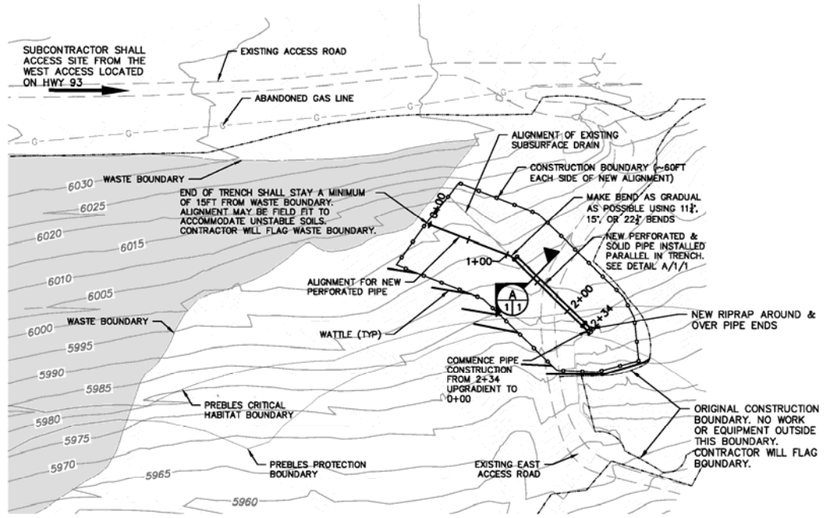
Distribution:
Scott Surovchak, DOE
Carl Spreng, CDPHE
Vera Moritz, EPA
Linda Kaiser, Navarro
rc-westminster
File: RFS 0025.02
RF Contact Record File



ORIGINAL LANDFILL PLAN

N

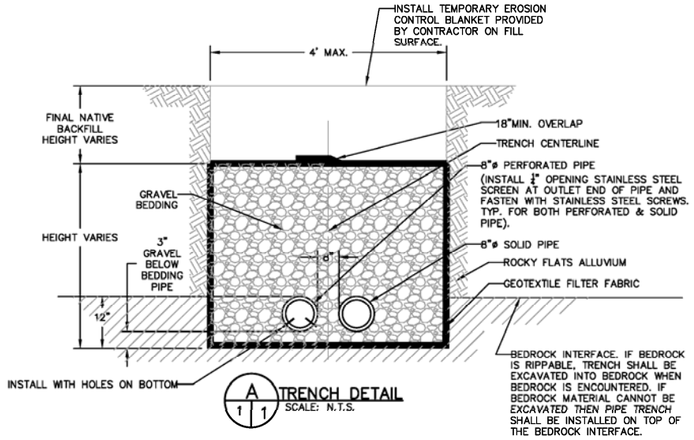
SCALE IN FEET
80 40 0 80 160 240
CONTOUR INTERVAL = 1 FEET

NOTES:

1. FIELD FIT ALIGNMENT AND LOCATIONS OF THE VERTICAL PIPES PER CONTRACTOR DIRECTION.
2. NATIVE BACKFILL SHALL BE COMPACTED IN 8" LOOSE LIFTS WITH THREE PASSES OF A VIBRATORY ROLLER. MOISTURE CONDITION BACKFILL AS NECESSARY TO PROVIDE COHESION OF BACKFILL TO CONTRACTORS SATISFACTION.
3. NO EXCAVATION SHALL TAKE PLACE INSIDE WASTE BOUNDARY.
4. INSTALL ACCESS-CONTROL FENCING ALONG CONSTRUCTION BOUNDARY TO RESTRICT ACCESS BY UNAUTHORIZED PERSONNEL INTO THE PROJECT WORK AREA. FENCING SHALL BE MINIMAL AND ONLY PLACED AROUND THE WORK AREAS. ACCESS-CONTROL FENCING SHALL, AT A MINIMUM:
   - BE 4 FT IN HEIGHT.
   - POSTS SET 10 FOOT ON CENTERS.
   - HIGH VISIBILITY PLASTIC, SAFETY FENCING OR APPROVED EQUAL.
   - POSTS AND FABRIC SHALL BE SECURE AND TIGHT AT ALL TIMES.
5. GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS. PROVIDE 18" OVERLAP ON ALL SEAMS. MATERIAL WILL BE PROVIDED BY CONTRACTOR.
6. GRAVEL BEDDING SHALL BE IN ACCORDANCE WITH CDOT 2011 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 703.02, COARSE AGGREGATE FOR CONCRETE, GRADATION NO. 67.
7. REMOVE EXISTING ROCK DRAIN WHEN ENCOUNTERED AND PLACE REMOVED MATERIAL AT CONTRACTOR'S STOCKPILE AREA.
8. ALL PIPE SHALL BE HDPE PE4710 DR 17 WITH BUTT FUSION WELDED JOINTS. PERSONNEL PERFORMING THE PIPE WELDING SHALL BE A MANUFACTURE'S AUTHORIZED TRAINED FUSION TECHNICIAN. WELDING QUALIFICATIONS AND PIPE MATERIAL PRODUCT SHEET SHALL BE SUBMITTED TO THE CONTRACTOR.
9. PERFORATED PIPE SPECIFICATIONS:

NOMINAL PIPE SIZE	HOLE SIZE	LONGITUDINAL HOLE SPACING	PERIMETER HOLE SPACING
8"	3/8"	5" +/- ½"	2@120° (+/-5°)

10. INSTALL PIPE FROM DOWN GRADIENT (STATION 2+34) TO UPGRADIENT (0+00)
11. INSTALL D50 = 6 INCH RIPRAP AT OUTLET END OF DRAIN LINE. BLEND WITH EXISTING RIPRAP.
12. PLACE WATTLES ALONG THE SOUTHERN EDGE OF THE CONSTRUCTION BOUNDARY AND MAINTAIN THROUGHOUT THE DURATION OF CONSTRUCTION. MATERIAL WILL BE PROVIDED BY CONTRACTOR.



A/1/1 TRENCH DETAIL
SCALE: N.T.S.

FIGURE 1

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	PROJECT A/E	APPROVAL

U.S. DEPARTMENT OF ENERGY | Legacy Management
GRAND JUNCTION, COLORADO

NAVARRO
Work Performed Under DOE Contract No. DE-LM0000421
Navarro Research and Engineering, Inc.
Contractor to the U.S. Department of Energy Office of Legacy Management

PROJECT LOCATION: ROCKY FLATS SITE, GOLDEN, COLORADO
REFERENCE:

APPROVALS		
DRAWN BY	S. PITTON	9/29/16
CHECKED	S. PITTON	9/29/16
PROJECT ENGINEER	S. PITTON	9/29/16
ENGINEERING MANAGER	D. BRENNECKE	9/29/16
PROJECT LEAD	J. WEHNER	9/29/16
SITE MANAGER/LEAD	L. KAISER	9/29/16

OLF EAST SUBSURFACE DRAIN UPGRADE

PLAN, PROFILE, DETAILS

PROJECT NO. LTS-111-0056-07-001K
DRAWING NO. S15057-R00-C01-D
SHT. 1 OF 1

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Attachment 1

Rocky Flats Legacy Management Agreement Soil Disturbance Review Plan

Proposed Project: Soil Disturbance Review Plan (SDRP) for the upgrade of the East Subsurface Drain (ESSD) located in the East Perimeter Channel (EPC) of the Original Landfill (OLF)

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 proposed project is to repair and upgrade the clogged ESSD located in the northeast corner of the EPC of the OLF. It will include digging up a portion of the existing rock ESSD, which is approximately 15 feet below surface at its deepest location and runs approximately 234 feet to its zero-depth riprap outlet. A new 8-inch perforated pipe for collecting groundwater in that area and diverting it away from the OLF and EPC will be installed. Also, a new solid 8-inch pipe will be installed with an inlet riser for possible future use as a method for conveying groundwater from upgradient of the OLF to the South Interceptor Ditch SID. Both pipes will be buried together in graded gravel wrapped in a geotextile filter fabric (see Figure 1).

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

There are no remaining subsurface structures in the vicinity of the proposed project. An abandoned buried natural gas line operated by Xcel Energy is in the utility easement corridor north of the OLF. The location and alignment of this abandoned 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, or other known or potential soil or groundwater contamination in the vicinity of the proposed project.

The OLF is former IHSS 115. The OLF design had a 2-foot-thick soil cover over the location of the disposed waste materials and clean Rocky Flats Alluvium fill surrounding the waste materials for the placement and configuration of stormwater and seep-water management features. Limits of the waste area are shown in Contact Record 2016-04 Figure 1. The work that will be conducted to repair and upgrade the ESSD will not extend into the waste footprint. Work instructions are in place to appropriately manage any debris if encountered during this response action.

Contaminated groundwater of the "Industrial Area Plume" is present in the subsurface upgradient of the work area. This area of the plume is characterized by low (part-per-billion) concentrations of volatile organic compounds (VOCs). The recently installed wells and piezometers (CR 2016-03) that are upgradient of the construction area will be sample and analyzed for VOCs to support the evaluation of worker safety – primarily, potential exposures to workers during repair and upgrading of the ESSD, and for associated personal protective equipment (PPE) to be used when handling excavated materials or working in the excavation.

The project area is in the Upper Woman Creek Drainage Exposure Unit (EU) evaluated in the Comprehensive Risk Assessment, Appendix A, of the Remedial Investigation/Feasibility Study. The only contaminants of concern (COCs) 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 total excess lifetime cancer risk to the wildlife refuge worker at the EU is 8E-06.It is important to note that samples with the highest benzo[*a*]pyrene concentrations are located in an area that is now under 20 feet of soil following the closure of the OLF (i.e., re-grading and constructing the OLF cover). The dioxin/furan and benzo[a]pyrene are present in areas within the waste footprint, and therefore those contaminants are vertically and laterally separated from the excavation described in this contact record. There were no COCs identified for subsurface soil or subsurface sediment in this EU.