

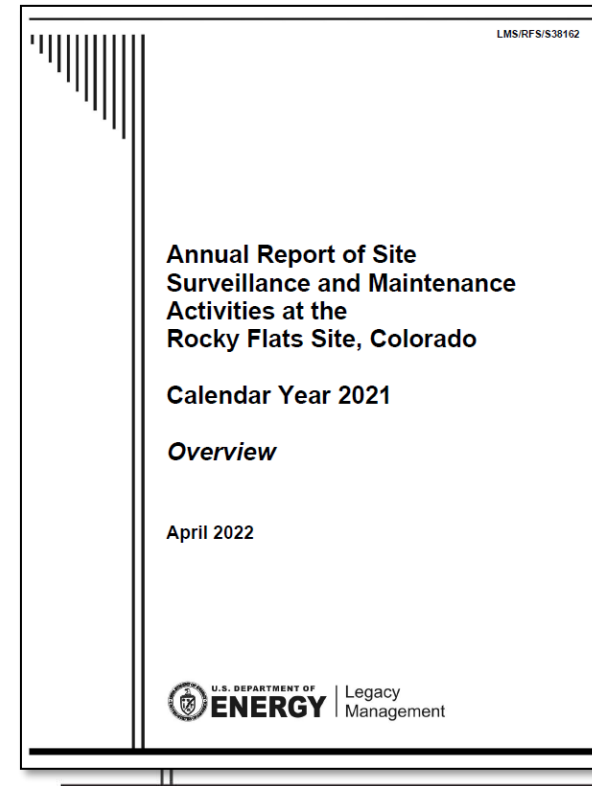


# Rocky Flats Site, Colorado Annual Report Summary

Calendar Year 2021

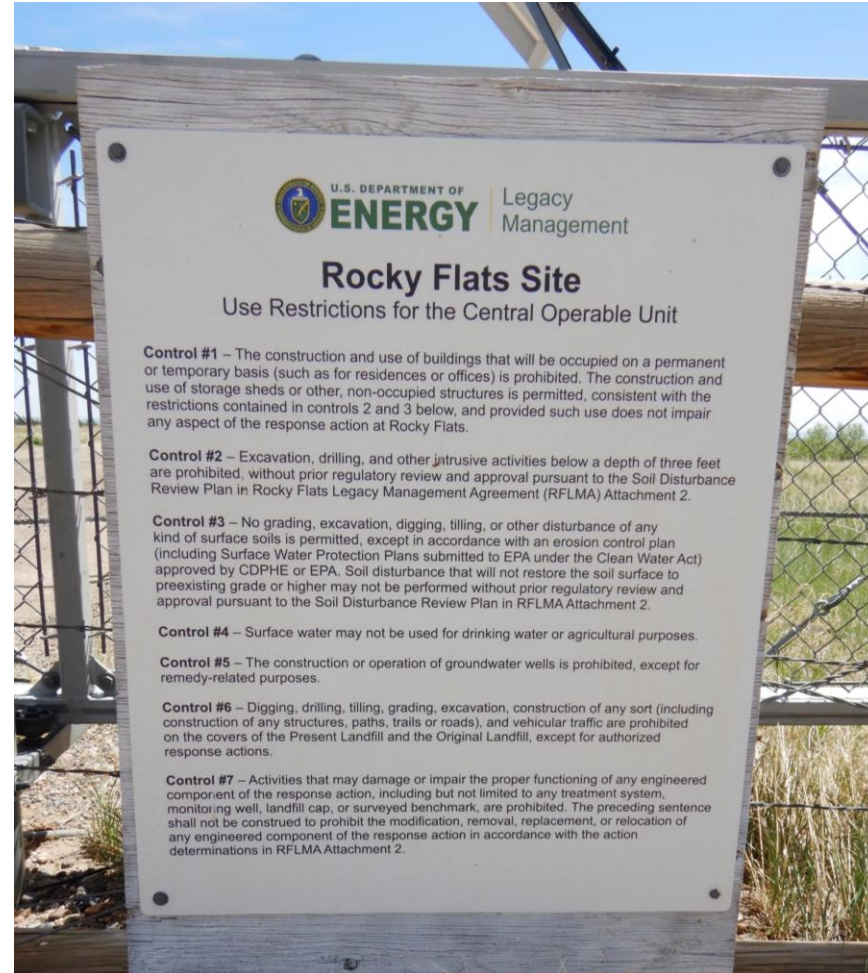
# Annual Monitoring and Reporting

- Annual reports are required as part of the Rocky Flats Legacy Management Agreement (RFLMA) to document that the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedy continues to be protective of people and the environment.
- Rocky Flats Site remedy components include:
  - Maintain two landfill covers
  - Maintain three groundwater treatment systems
  - Monitor surface water and groundwater
  - Maintain physical controls
    - Signage
    - Access restriction



# Annual Monitoring and Reporting (continued)

- Rocky Flats Site remedy components also include:
  - Institutional controls
    - No occupied building construction
    - Excavation and soil-disturbance restrictions
    - No surface water consumption or agricultural use
    - No groundwater wells, except for monitoring
    - Protection of landfill covers and engineered remedy components



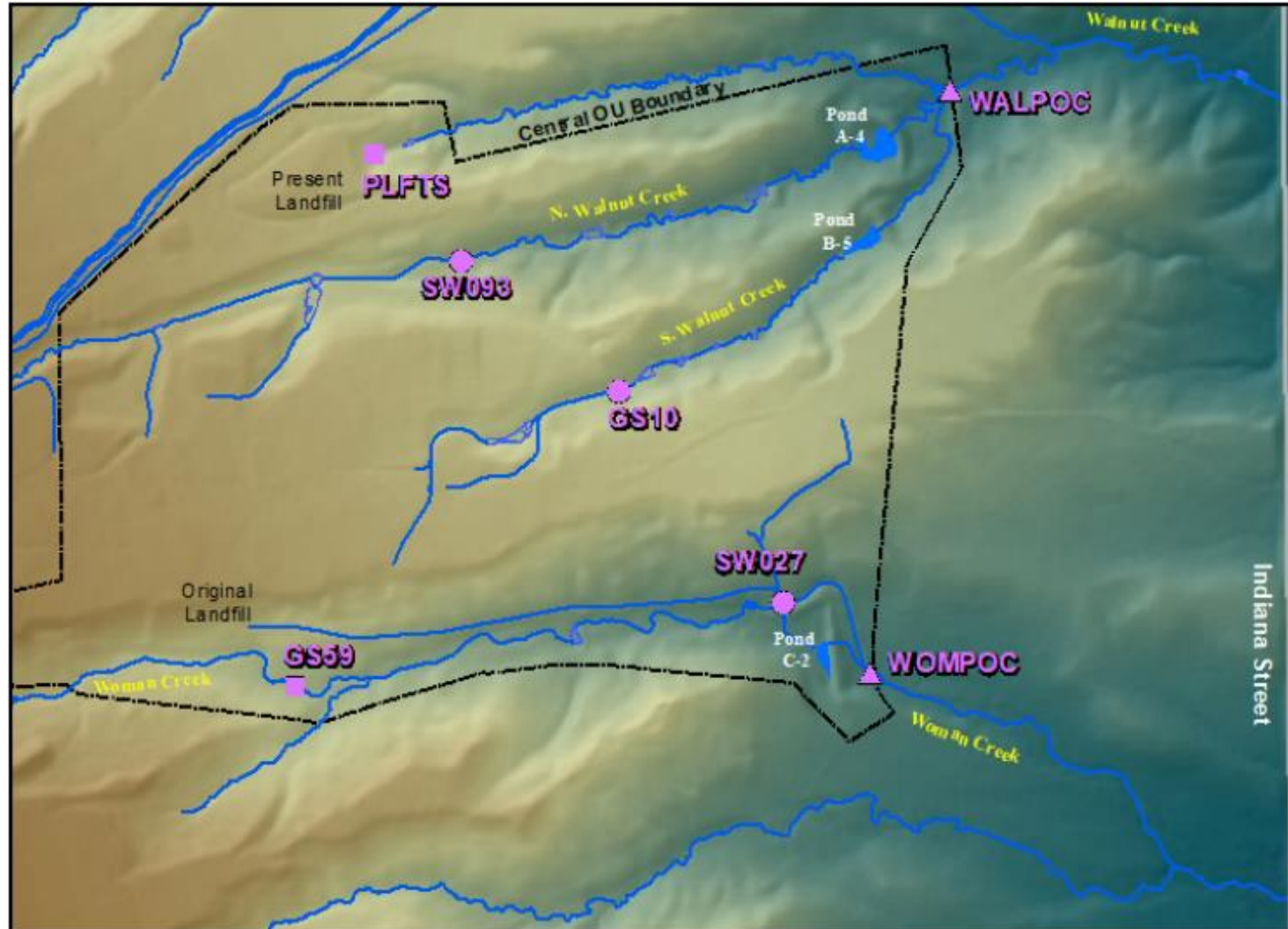


# Surface Water Monitoring



*GS10*

# Select RFLMA Surface Water Monitoring Locations



# Original Landfill Performance Monitoring

- Original Landfill (OLF) — Woman Creek
  - Quarterly concentrations for all analytes were below applicable RFLMA standards during all of calendar year 2021



*Woman Creek, facing east*



*Performance monitoring location GS59*



# Present Landfill Performance Monitoring

- Present Landfill (PLF) — location PLFSYSEFF (system effluent)
  - Quarterly concentrations for all analytes were below applicable RFLMA standards during all of calendar year 2021



*Present Landfill Treatment System (PLFTS)*



# Point of Evaluation (POE) Monitoring

- 12-month rolling average uranium (U) concentrations at location GS10 were above the RFLMA standard of 16.8 micrograms per liter ( $\mu\text{g/L}$ ) for April 2021 — a reportable condition under the RFLMA
  - See RFLMA Contact Record (CR) 2021-02
  - The reportable condition was 18.1  $\mu\text{g/L}$  for April 30, 2021
  - Concentrations at the Walnut Creek Point of Compliance (WALPOC), downstream of GS10, remained well below 16.8  $\mu\text{g/L}$



*POE monitoring location GS10*





# Point of Evaluation Monitoring

- 12-month rolling average plutonium (Pu) concentrations at location SW027 were above the RFLMA standard of 0.15 picocuries per liter (pCi/L) for April 2021 — a reportable condition under the RFLMA
  - RFLMA Contact Record (CR) 2021-03 is being finalized
  - The reportable condition was 0.9 pCi/L on April 30, 2021
  - Concentrations at the Woman Creek Point of Compliance (WOMPOC), downstream of SW027, remained well below 0.15 pCi/L



*POE monitoring location SW027*



# Point of Compliance (POC) Monitoring

- No RFLMA POC analyte concentrations were reportable during 2021



*POC monitoring location WOMPOC*





# Groundwater Monitoring and Operations

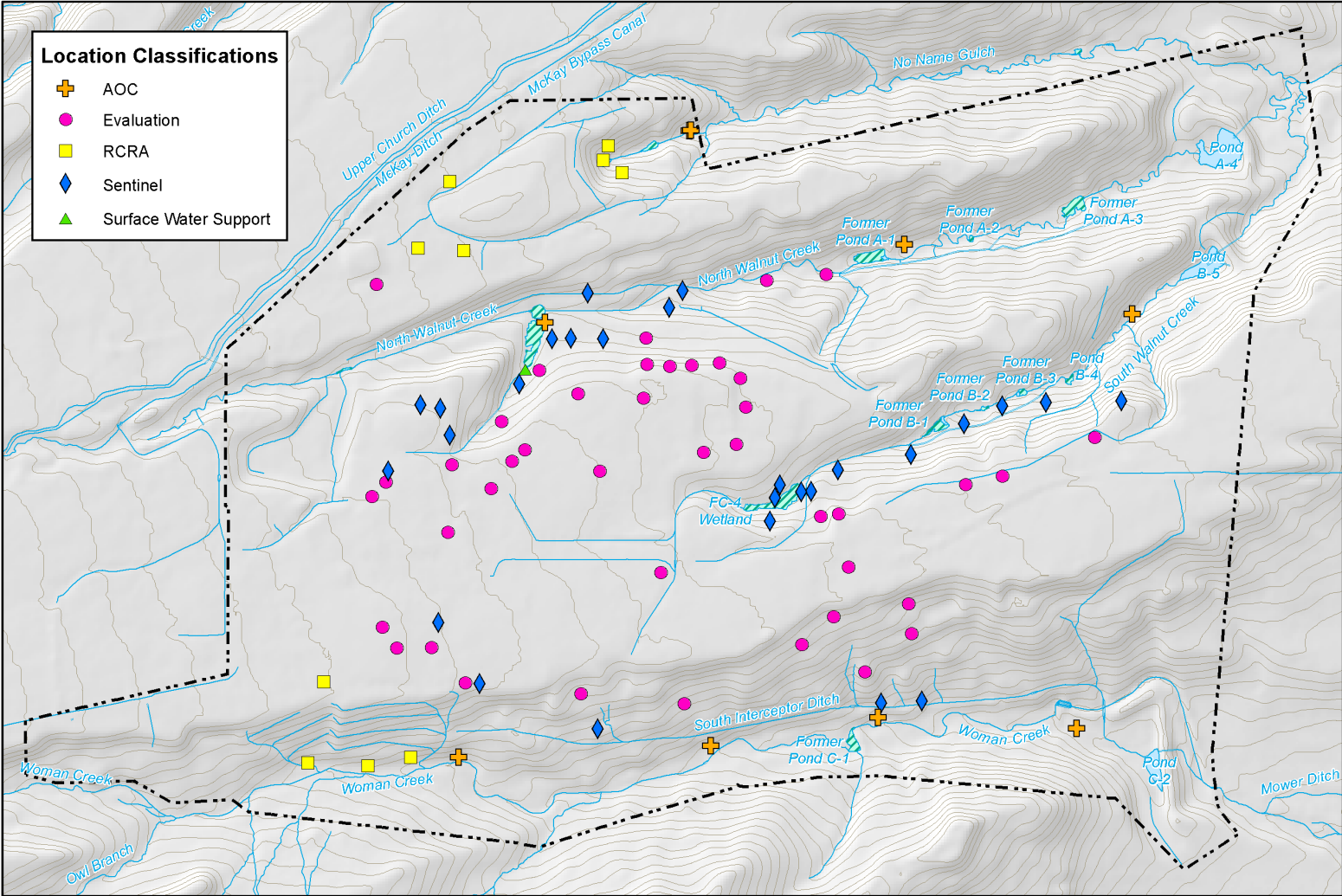


# RFLMA Groundwater Monitoring Network Overview

- No changes in 2021
- 10 Resource Conservation and Recovery Act (RCRA) wells (quarterly)
  - Evaluate potential impacts from OLF and PLF
- Nine Area of Concern (AOC) wells and 1 Surface Water Support location (semiannually)
  - Located in drainages downstream of contaminant plumes
  - Evaluate for plumes discharging to surface water
- 27 Sentinel wells (semiannually)
  - Downgradient of treatment systems, near edges of plumes, and in drainages
  - Look for plumes migrating to surface water and treatment system problems
- 42 Evaluation wells (biennially)
  - Within plumes, near source areas, and interior of Central Operable Unit (COU)
  - Evaluate whether monitoring of an area or plume can cease
- Nine treatment system locations (seven semiannually, two quarterly)



# Groundwater Within the Central Operable Unit



*\*Groundwater treatment system locations omitted for clarity*



# RFLMA Monitoring in 2021

- Sampled all except Evaluation wells (sampled on even years)
- Results were generally consistent with previous data
- AOC well 10304 in 2021 was not reportable for trichloroethene (TCE)
  - Adjacent to Woman Creek near former Pond C-2
  - Less than the 2.5 ug/L RFLMA standard for TCE in second quarter but higher (8.2 ug/L) in fourth quarter
  - If above standard in second quarter of 2022, will be reportable (Update: As of May 21, 2022, preliminary results were below the standard and therefore the reportable conditions will not be triggered.)
- AOC well B206989 in fourth quarter 2021 produced sample with uranium above the RFLMA threshold of 120 ug/L
  - Adjacent to former East Landfill Pond dam
  - If above that in second quarter of 2022, will be reportable (Update: As of May 21, 2022, preliminary results were below the standard and therefore the reportable conditions will not be triggered.)
  - Similar concentrations previously reported here



# RFLMA Monitoring in 2021 (continued)

- Results of statistical evaluations of OLF and PLF data
  - Comparisons of downgradient water quality with upgradient water quality, and whether downgradient groundwater shows increasing concentration trends, identical or nearly so to results in previous years
  - None of the constituents identified in these statistical evaluations are volatile organic compounds (VOCs) or semi-volatile organic compounds (SVOCs)
  - Also identified decreasing trends in downgradient groundwater and increasing trends in upgradient groundwater



# RFLMA Monitoring in 2021 (continued)

- In addition to RCRA wells, performed statistical trending calculations for Sentinel wells
  - As in other years, identified numerous concentration trends, both increasing and decreasing
- Statistical evaluations followed two different approaches
  - Same as in annual reports issued since 2018
  - Differences in how non-detects are treated
    - “Conventional” approach is the same as has been used since pre-closure era
    - “Alternate” approach focuses on data collected starting in 2009, for constituents detected in at least 40% of the samples from a given well
  - Summarized and presented fully in appendix B of the report





# RFLMA Monitoring in 2021 (continued)

- Groundwater treatment systems continued to remove contaminants
  - East Trenches Plume Treatment System (ETPTS)
    - Met all treatment objectives for both collection/treatment systems (Mound and East Trenches)
    - Total flow was less than annual post-closure average at Mound, and approximately equal to post-closure average at East Trenches
  - Solar Ponds Plume Treatment System (SPPTS)
    - Met nitrate treatment objectives
    - Removed approximately 25% of the uranium
    - Total flow was less than annual post-closure average



# Other Activities in 2021

- SPPTS path forward for uranium treatment
  - Prepared procurement package
    - Field-based testing and design
    - Leads to construction of full-scale uranium treatment component
- Collected data from line of piezometers west of SPPTS collection trench
  - Evaluated groundwater in an area that was not accessible when SPPTS was built
  - Being considered for future collection and treatment



*Piezometers west of  
SPPTS groundwater  
collection trench*



# Site Operations



*North Walnut Creek Hillside*

# Quarterly Sign Inspections

- RFLMA physical control
- Signs inspected quarterly
  - Signs reattached or replaced as needed



*Main COU gate with signs*



# Additional Inspections and Records Confirmations

- Annual Verification of Restrictive Notice (formerly the Environmental Covenant)
  - Confirmed in Administrative Record and on file in Jefferson County records (April 12, 2021)
- Annual site inspection completed on May 24, 2021
  - No evidence of violations of institutional or physical controls was observed
  - No adverse biological conditions were noted
- Additional inspections of former building areas (B371, B771, B881, and B991) as a best management practice
  - Conducted quarterly and in response to significant precipitation



# Site Operations: Present Landfill (PLF)

- Performed quarterly inspections and weather-related inspections in the second and third quarters of 2021
- Landfill in good condition
  - No significant issues identified during inspections
- Settlement monuments surveyed annually
  - Vertical settling at each monument was within design limits



*East Face of the PLF*



# Site Operations: Original Landfill (OLF)

- Performed monthly inspections
- Additional weather-related inspections  
May 5, June 29, July 2, 2021
- Landfill in good condition
- No slumping observed during 2021
  - Erosion rills and sediment buildup found during inspections addressed
- Settlement monuments surveyed monthly
  - Vertical settling at each monument was within design limits



*Berm Seven of the OLF with  
turf reinforcement mat*



# North Walnut Creek Slump

- Measurement of groundwater elevations in the functioning piezometers continued in 2021
- Slump monitoring points surveyed monthly as a best management practice
  - Visual observations and monitoring data show slope creep (approximately 5 feet lateral movement since August 2017)
  - Majority of movement occurs between May and July
- Data are being collected and evaluated to develop a more comprehensive hillside stabilization path forward





# Miscellaneous

- Site roads regraded and dust suppressant applied to the primary routes in fall 2021; a few other spots repaired
- Added or refurbished rock crossings as needed
- Site erosion controls monitored and maintained



*Rock crossing repair*





# Ecological Monitoring



*Spiderwort with pollinator insect*

# Vegetation Management

- Targeted herbicide application
  - Approximately 152 acres treated in 2021
- Seeding and revegetation
  - Less than 1 acre seeded – disturbance associated with North Walnut Creek Slump (NWCS)
- Showy milkweed seeding
  - Plants established at 3 of the 16 seeded locations (seeded in 2017)



*Sunflower with  
pollinator insect*



# Vegetation Monitoring



*Showy milkweed with pollinator insect*

- Revegetation monitoring
  - 16 areas monitored – including OLF (revegetated in August 2020)
  - 11 areas continue to meet success criteria, 5 areas were newer revegetation areas, and have not yet met success criteria
- Preble’s Meadow Jumping Mouse habitat monitoring
  - Habitat continues to establish at mitigation locations
- Wetland mitigation monitoring
  - Conducted at OLF, NWCS project, and area near SPPTS



# Vegetation Monitoring (continued)

- Forb nursery monitoring
  - Wildflowers continue to establish and spread
- Two new records of plants
  - Blue Wildrye (*Elymus glaucus*), native species often used in revegetation seed mixes
  - Hairy Willow-Herb (*Epilobium hirsutum*), noxious weed (on the Colorado Noxious Weed A-list) found in the southern COU



*Prairie Coneflower*



# Wildlife Monitoring

- Prairie dog
  - No active prairie dog towns within the COU. Prairie dog activity noted on refuge: northeast of COU and south of COU.
- Nest boxes
  - 8 of 29 nest boxes were active in 2021 (Tree Swallows and House Wrens)
  - Others had evidence of activity
- Raptor nests
  - No active raptor nests were observed in 2021 in the COU
- Elk
  - Over 300 elk in late 2021
  - Noted increased elk damage to survey equipment, habitat, and vegetation



*Portion of the Rocky Flats elk herd*



**For more information, visit:**  
<https://www.energy.gov/lm/rocky-flats-site-colorado>

**For additional details on any items noted here, please view the Rocky Flats 2021 annual report at [https://lmpublicsearch.lm.doe.gov/lmsites/s38162\\_rfs\\_cy21.pdf](https://lmpublicsearch.lm.doe.gov/lmsites/s38162_rfs_cy21.pdf)**

