Annual Report of Site Surveillance and Maintenance Activities at the Rocky Flats Site, Colorado

Calendar Year 2015

April 2016
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Available on DVD:
Ecology DVD: 2015 Annual RFS Ecology Reports
### Abbreviations

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<th>Description</th>
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<tr>
<td>AC</td>
<td>alternating current</td>
</tr>
<tr>
<td>ac-ft</td>
<td>acre-feet</td>
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<tr>
<td>Ag</td>
<td>silver</td>
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<tr>
<td>Am</td>
<td>americium</td>
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<td>AMP</td>
<td>Adaptive Management Plan</td>
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<td>ANOVA</td>
<td>Analysis of Variance</td>
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<tr>
<td>AOC</td>
<td>Area of Concern</td>
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<tr>
<td>B</td>
<td>boron</td>
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<tr>
<td>B&lt;nnn&gt;</td>
<td>building number (for example, B371 = Building 371)</td>
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<tr>
<td>Be</td>
<td>beryllium</td>
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<tr>
<td>BMP</td>
<td>best management practice</td>
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<tr>
<td>CAD/ROD</td>
<td>Corrective Action Decision/Record of Decision</td>
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<tr>
<td>Cd</td>
<td>cadmium</td>
</tr>
<tr>
<td>CDPHE</td>
<td>Colorado Department of Public Health and Environment</td>
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<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act (also known as “Superfund”)</td>
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<tr>
<td>cfs</td>
<td>cubic feet per second</td>
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<tr>
<td>COU</td>
<td>Central Operable Unit</td>
</tr>
<tr>
<td>Cr</td>
<td>chromium</td>
</tr>
<tr>
<td>Cu</td>
<td>copper</td>
</tr>
<tr>
<td>CY</td>
<td>calendar year</td>
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<tr>
<td>DCB</td>
<td>dichlorobenzene</td>
</tr>
<tr>
<td>DCE</td>
<td>dichloroethene</td>
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<td>DER</td>
<td>duplicate error ratio</td>
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<td>DG</td>
<td>Discharge Gallery</td>
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<td>dh/dl</td>
<td>hydraulic gradient</td>
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<tr>
<td>DNAPL</td>
<td>dense nonaqueous-phase liquid</td>
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<tr>
<td>DOC</td>
<td>dissolved organic carbon</td>
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<td>DOE</td>
<td>U.S. Department of Energy</td>
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<tr>
<td>DQA</td>
<td>data quality assessment</td>
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<tr>
<td>DUP</td>
<td>duplicate sample</td>
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<tr>
<td>Symbol</td>
<td>Definition</td>
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<td>--------</td>
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<tr>
<td>µg/L</td>
<td>micrograms per liter (sometimes expressed as ug/L)</td>
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<tr>
<td>mg/L</td>
<td>milligrams per liter</td>
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<tr>
<td>mL</td>
<td>milliliters</td>
</tr>
<tr>
<td>MS</td>
<td>matrix spike</td>
</tr>
<tr>
<td>MSD</td>
<td>matrix spike duplicate</td>
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<tr>
<td>MSPTS</td>
<td>Mound Site Plume Treatment System</td>
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<tr>
<td>n</td>
<td>effective porosity</td>
</tr>
<tr>
<td>N</td>
<td>nitrogen</td>
</tr>
<tr>
<td>Ni</td>
<td>nickel</td>
</tr>
<tr>
<td>NOIPD</td>
<td>Notice of Intent for Partial Deletion</td>
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<td>NPL</td>
<td>National Priorities List</td>
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<td>NREL</td>
<td>National Renewable Energy Laboratory</td>
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<tr>
<td>OBP</td>
<td>Oil Burn Pit</td>
</tr>
<tr>
<td>OLF</td>
<td>Original Landfill</td>
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<tr>
<td>OU</td>
<td>operable unit</td>
</tr>
<tr>
<td>PARCC</td>
<td>precision, accuracy, representativeness, completeness, and comparability</td>
</tr>
<tr>
<td>PBA</td>
<td>Programmatic Biological Assessment</td>
</tr>
<tr>
<td>PCE</td>
<td>tetrachloroethene</td>
</tr>
<tr>
<td>pCi</td>
<td>picocuries</td>
</tr>
<tr>
<td>pCi/L</td>
<td>picocuries per liter</td>
</tr>
<tr>
<td>PIP</td>
<td>Public Involvement Plan</td>
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<tr>
<td>PLF</td>
<td>Present Landfill</td>
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<tr>
<td>PLFTS</td>
<td>Present Landfill Treatment System</td>
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<td>POC</td>
<td>Point of Compliance</td>
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<td>POE</td>
<td>Point of Evaluation</td>
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<tr>
<td>POU</td>
<td>Peripheral Operable Unit</td>
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<tr>
<td>PQL</td>
<td>practical quantitation limit</td>
</tr>
<tr>
<td>psi</td>
<td>pounds per square inch</td>
</tr>
<tr>
<td>Pu</td>
<td>plutonium</td>
</tr>
<tr>
<td>PU&amp;D</td>
<td>Property Utilization and Disposal</td>
</tr>
<tr>
<td>QA</td>
<td>quality assurance</td>
</tr>
<tr>
<td>QC</td>
<td>quality control</td>
</tr>
<tr>
<td>R</td>
<td>For sampling data, a laboratory and/or validation qualifier that indicates a value rejected as unusable.</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>WQP</td>
<td>water quality parameter</td>
</tr>
<tr>
<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
</tr>
<tr>
<td>Zn</td>
<td>zinc</td>
</tr>
<tr>
<td>ZVI</td>
<td>zero-valent iron</td>
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Executive Summary

The U.S. Department of Energy (DOE) Office of Legacy Management (LM) is responsible for implementing the final response action selected in the final Corrective Action Decision/Record of Decision for Rocky Flats Plant (USDOE) Peripheral Operable Unit and Central Operable Unit (CAD/ROD) (DOE 2006a) issued September 29, 2006, for the Rocky Flats Site (Site or RFS).

Under the CAD/ROD, two operable units were established within the boundaries of the Rocky Flats property: the Peripheral Operable Unit (POU) and the Central Operable Unit (COU). The COU consolidates all areas of the Site that require additional remedial or corrective actions while also considering practicalities of future land management. The POU includes the remaining, generally unimpacted portions of the Site and surrounds the COU. The response action in the Final CAD/ROD is no action for the POU and institutional and physical controls with continued monitoring for the COU. The CAD/ROD determined that conditions in the POU were suitable for unrestricted use. The U.S. Environmental Protection Agency (EPA) subsequently published a Notice of Partial Deletion from the National Priorities List for the POU on May 25, 2007.

DOE, EPA, and the Colorado Department of Public Health and Environment (CDPHE) have chosen to implement the monitoring and maintenance requirements of the CAD/ROD under, and as described in, the Rocky Flats Legacy Management Agreement (RFLMA), executed March 14, 2007, and subsequently revised in 2012 (CDPHE et al. 2012). RFLMA Attachment 2 defines the COU remedy surveillance and maintenance requirements. 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.

LM prepared and updates the Rocky Flats Site Operations Guide (DOE 2013b). It is the primary document to guide work performed to satisfy the requirements of RFLMA and to implement best management practices at the Site.

This report addresses surveillance and maintenance activities conducted at the Site during calendar year (CY) 2015 (January 1 through December 31, 2015). Highlights of the surveillance and maintenance activities are as follows:

- Extremely heavy precipitation was recorded in CY 2015, specifically in the first two quarters of the year. By the end of July the Site had received 14.76 inches of precipitation. Historically, the Site receives an average of 12.07 inches of precipitation annually. As a result of this heavy precipitation, groundwater levels were higher in 2015, as were flows to the groundwater treatment systems.

- The RFLMA references the use of contact records to document CDPHE approvals of field modifications to implement approved response actions. RFLMA Attachment 2 references the use of contact records to document the outcome of consultation related to addressing any reportable conditions. This report discusses the 10 RFLMA contact records issued in 2015 and the contact record status as of December 31, 2015.

- The Original Landfill (OLF) was inspected monthly during CY 2015. In addition, nine weather-related inspections were also conducted as a result of the heavy precipitation the Site received. Even with all the precipitation during CY 2015 the majority of the OLF and the waste footprint remained stable. In August and September, an interim action project was
performed to smooth cracking and slumping observed in isolated areas. Since completion of the project, the regraded areas have remained in a satisfactory configuration.

- The Present Landfill (PLF) was inspected quarterly during CY 2015. Additionally, as at the OLF, nine weather-related inspections were conducted. No significant problems were observed during these inspections.

- All RFLMA Point of Compliance analyte concentrations/activities remained below reportable levels throughout CY 2015.

- Reportable 12-month rolling average americium and plutonium activities were observed during the second half of CY 2015 in surface water at RFLMA Point of Evaluation (POE) monitoring station SW027, which is located on the South Interceptor Ditch upstream of Pond C-2. Details regarding the subsequent regulatory consultation and plan to address the reportable condition can be found in regulatory Contact Record 2015-05.

- All other RFLMA POE analyte concentrations/activities remained below reportable levels throughout CY 2015.

- The results of statistical evaluations of groundwater quality at the OLF and PLF were similar to the results of these evaluations performed for 2014.

- Water monitoring at the Present Landfill Treatment System during CY 2015 showed three analytes (arsenic, selenium, and vinyl chloride) detected above the applicable standards for individual sample results collected at the system effluent during routine quarterly sampling. The observed arsenic and selenium concentrations did not reoccur and RFLMA consultation regarding these analytes was not required during CY 2015.

  Vinyl chloride was detected above the standard in three successive monthly samples following the routine quarterly sample. In accordance with the evaluation protocols in RFLMA Attachment 2, Figure 11, “Groundwater Treatment Systems,” these consecutive results triggered consultation among the RFLMA Parties and sampling at location NNG01 (outfall of the former PLF Pond area) for vinyl chloride. NNG01 was sampled on July 27, 2015. Vinyl chloride was not detected in the sample from NNG01, and consequently the PLFSYSEFF quarterly sampling frequency was resumed. The consultation is documented in Contact Record 2015-07.

- The report Evaluation of Water Quality Variability for Uranium and Other Selected Parameters in Walnut Creek at the Rocky Flats Site (WWE 2015) was posted to the DOE Legacy Management website on April 9, 2015, and subsequently updated on September 30, 2015. This report summarized the findings from an extensive study initiated to address specific questions regarding uranium in surface water at the RFS. The study addresses the distribution, transport mechanisms, sources, and composition of uranium, in terms of its natural versus anthropogenic fractions, with a focus on the North and South Walnut Creek drainages. Other water-quality parameters related to the transport of uranium at RFS are also evaluated. The report is available at http://www.lm.doe.gov/Rocky_Flats/Documents.aspx.

- East Trenches Plume Treatment System (ETPTS) effluent water quality in 2015 reflected the most dramatic reduction in volatile-organic-compound load ever achieved at this treatment system. This was a result of the completion of the ETPTS Reconfiguration Project in January 2015. This project replaced the passive, zero-valent iron (ZVI)-based treatment
system with a solar/battery-powered active treatment system utilizing a proven, commercial air stripper.

- The Mound Site Plume Treatment System (MSPTS) continued to treat groundwater throughout CY 2015. However, the ZVI treatment media has become increasingly clogged and its effectiveness has decreased. As part of the MSPTS Reconfiguration Project, scheduled for the summer of 2016, groundwater will continue to be intercepted by the MSPTS groundwater intercept trench but then will be pumped to the ETPTS for treatment by the commercial air stripper installed there in 2014–2015.

- Treatment by the Solar Ponds Plume Treatment System (SPPTS) was limited throughout much of 2015 due to clogging of the media and plumbing in the concrete structure containing the two original treatment cells (the “Big Box”). The SPPTS Interim Reconfiguration Project, scheduled for construction in 2016, includes removing and disposing of the Big Box contents and converting it to a full-scale, test lagoon for nitrate treatment. This approach is based on the results of the Phase III pilot-scale lagoons.

- Groundwater quality data were obtained for all monitored areas in 2015 (including Sentinel well 95299, which has never before produced water for sampling). Groundwater quality and flow were generally consistent with previous years. A reportable condition was identified at well 10304 after data collected in the second and fourth quarters of CY 2015 showed concentrations of trichloroethene (TCE) at this well exceeded the RFLMA Attachment 2, Table 1 value. A surface water sample from Woman Creek was subsequently collected; no TCE concentrations were detected in this sample. The consultation is documented in Contact Record 2015-10.

- Revegetation monitoring data continued to demonstrate the establishment and sustainability of desirable grassland species at the Site.

- The annual data quality assessment showed that the Site continues to collect high-quality data sufficient for decision making.