Department of Energy
Washington, DC 20585

September 24, 2019

MEMORANDUM FOR **JOSH SILVERMAN, DIRECTOR**
OFFICE OF ENVIRONMENTAL PROTECTION AND ES&H REPORTING
OFFICE OF ENVIRONMENT, HEALTH, SAFETY AND SECURITY

Jay D. Glascock Digitally signed by Jay D. Glascock
Date: 2019.09.24 20:57:44 -06'00'

FROM: **DAVID S. SHAFER, Ph.D., DIRECTOR**
OFFICE OF SITE OPERATIONS
OFFICE OF LEGACY MANAGEMENT

SUBJECT: Annual Site Environmental Reporting for Department of Energy Office of Legacy Management Sites (2018)

The U.S. Department of Energy Office of Legacy Management (LM) is submitting the attached *Summary of Annual Site Environmental Reports Calendar Year 2018* to meet the intent of DOE Order 231.1B, *Environment, Safety and Health Reporting*, with a scaled-down approach as identified in the Annual Site Environmental Report (ASER) preparation guidance. LM is committed to ensuring environmental protection, compliance, and sustainability in the performance of our mission, vision, and operating principles.

Please review the summary and attachments and contact Tracy Ribeiro at (303) 410-4817 if you have any comments or questions.

Attachment

cc: w/o attachment
R. Natoli, DOE-AU-20 (e)
C. Melendez, DOE-LM (e)
P. O'Konski, DOE-LM (e)
T. Ribeiro, DOE-LM (e)
T. Smith Taylor, DOE-LM (e)
S. Browning, Navarro (e)
E. Millikin, Navarro (e)
S. Osborn, Navarro (e)
File: ADM 0115.02 (records)

Summary of Annual Site Environmental Reports Calendar Year 2018

LMS/S14598

U.S. DEPARTMENT OF ENERGY | Legacy Management

Cover photo captions:

Top left: A 2-acre section of the Burrell, Pennsylvania, Disposal Site, a Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I site, was identified as a test plot for prairie establishment. During the fall of 2018 the area was seeded with a Pennsylvania native pollinator-friendly mix. The plot will be monitored and, if vegetation establishment is successful, it will become a candidate for future prairie expansion.

Middle left: In 2018, the Office of Legacy Management (LM) began developing a nomination package for the Gasbuggy, New Mexico, Site to be listed on the National Register of Historic Places. The Gasbuggy test was conducted in 1967 as part of Operation Plowshare to explore peaceful uses for nuclear energy, such as the production of natural gas.

Bottom left: A water truck is used to minimize dust as a heavy equipment operator mixes and compacts materials delivered to the Grand Junction, Colorado, Disposal Site. Between July and August 2018, residual radioactive material from the city of Grand Junction and multiple LM sites was received and disposed at the disposal cell.

Top right: Butterflies (such as this viceroy), moths, beetles, dragonflies, and fireflies were abundant in 2018 at the ecologically restored Fernald Preserve, Ohio, Site. These tiny invertebrates play an important role in the stable and diverse population of plant and animal species at this site.

Bottom right: This burro at the Bluewater, New Mexico, Disposal Site is representative of the diverse wildlife that can be observed at sites managed under Title II of UMTRCA.

Contents

Abbreviations iii
1.0 Reporting Requirement 1
2.0 Introduction 1
2.1 CERCLA/RCRA Sites 1
2.2 Nevada Offsites 1
2.3 UMTRCA Sites 2
2.4 FUSRAP Sites 2
2.5 D&D Sites 2
2.6 NWPA Section 151 Site 3
2.7 MED/AEC Legacy Sites 3
2.8 State Water Quality Standards Site 3
2.9 Additional LM Activities and Programs 3
3.0 Summary of General Environmental Reporting 5
3.1 Oversight 5
3.2 Summary of Site-Specific Activities 5
4.0 Summary of Environmental Management System and Sustainability 7
4.1 Performance Measures 8
4.2 Accomplishments, Awards, and Recognition 9
5.0 Summary of Environmental Compliance 9
5.1 Environmental Remediation and Waste Management Compliance 9
5.2 Air Quality and Protection Compliance Status 12
5.3 Water Quality and Protection Compliance Status 12
5.4 Other Environmental Statutes Compliance Status 15
5.5 Summary of Environmental Notices 19
6.0 Additional Natural Resources Management 19
7.0 Summary of Groundwater Protection Program 20
8.0 Summary of Environmental Radiation Protection Program 21
8.1 Unplanned Radiological Releases 22
8.2 Clearance of Property 22
9.0 Summary of Fire Protection Management and Planning 23
10.0 Summary of Quality Assurance 23

Table

Table 1: Contracted Analytical Laboratories and TSDFs 25

Appendix

Appendix A Legacy Management Sites and Related Reports and Summary of Groundwater Monitoring Program

This page intentionally left blank

Abbreviations

AEA	Atomic Energy Act
AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
ASER	Annual Site Environmental Report
AS&T	Applied Studies and Technology
BLM	U.S. Bureau of Land Management
BMP	best management practice
BO	Biological Opinion
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	contaminant of concern
CWA	Clean Water Act
CXE	Categorical Exclusion Evaluation
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DOECAP	Department of Energy Consolidated Audit Program
DRUM	Defense-Related Uranium Mines
EA	Environmental Assessment
EISA	Energy Independence and Security Act
EM	Office of Environmental Management
EMS	Environmental Management System
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
EPEAT	Electronic Product Environmental Assessment Tool
ESA	Endangered Species Act
FFCA	Federal Facility Compliance Agreement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIMS	Facilities Information Management System
FUSRAP	Formerly Utilized Sites Remedial Action Program
GEMS	Geospatial Environmental Mapping System

HSWA	Hazardous and Solid Waste Amendments
ISO	International Organization for Standardization
LEHR	Laboratory for Energy-Related Health Research
LLRW	low-level radioactive waste
LM	Office of Legacy Management
LMBC	Legacy Management Business Center
LMS	Legacy Management Support
LTS&M	long-term surveillance and maintenance
MBTA	Migratory Bird Treaty Act
MED	Manhattan Engineer District
mrem	millirem
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NNHPD	Navajo Nation Historic Preservation Department
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
PFAS	per- or polyfluorinated alkyl substances
PFOS	perfluorooctanesulfonic acid
POC	point of compliance
QAPP	Quality Assurance Project Plan
Q&PA	Quality and Performance Assurance
RCRA	Resource Conservation and Recovery Act
RPP	Radiation Protection Program
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SPCC	Spill Prevention, Control, and Countermeasure
SSP	Site Sustainability Plan
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
ULP	Uranium Leasing Program

UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
V&V	verification and validation

This page intentionally left blank

1.0 Reporting Requirement

U.S. Department of Energy (DOE) Order 231.1B Admin Chg 1, *Environment, Safety and Health Reporting*, requires each DOE site to prepare an Annual Site Environmental Report (ASER) documenting the site's environmental conditions and the reporting requirements specified in Attachment 2 of the order. The ASER is submitted to the Office of ES&H Reporting and Analysis (AU-23) annually and is available to the public. DOE's *Guidance for the Preparation of the 2018 Department of Energy Annual Site Environmental Reports* (April 2019) recognizes that Office of Legacy Management (LM) sites have unique characteristics and suggests two alternatives to the preparation of the ASER: (1) prepare a scaled-down or streamlined version of the ASER reflecting the current nature and extent of site operations and monitoring programs, or (2) submit equivalent documentation providing the results of relevant environmental monitoring programs. This scaled-down report (alternative 1) meets the intent of DOE Order 231.1B Admin Chg 1 and provides a summary of LM's programmatic and site-specific environmental activities, including reporting, for calendar year 2018. When practical, this report provides website links where programmatic and site-specific documents are publicly accessible. The document versions in effect for the ASER reporting period may have been updated with newer versions.

2.0 Introduction

LM was established in 2003 to manage DOE's postclosure responsibilities at sites under its care and ensure the future protection of human health and the environment at those sites. The histories of the legacy sites vary, as do the regulatory regimes under which the sites are managed. Long-term surveillance and maintenance (LTS&M) plans or equivalent documents are prepared for the sites. These documents are available to the public and include site descriptions and information about site history, the nature and extent of contamination, closeout condition of the site, present and future monitoring and surveillance programs, and institutional controls. In 2018, LM managed the long-term care of 92 sites. The number of sites managed during the reporting period and their regulatory framework are described below and on the DOE website at https://energy.gov/lm/sites/lm-sites/programmatic-framework. Site counts are updated annually and are obtained from the LM *Site Management Guide* (July 2018), available at https://energy.gov/lm/downloads/site-management-guide/July2018.

2.1 CERCLA/RCRA Sites

LM managed eight sites where remediation was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA), or both. Federal milling, processing, research, or nuclear weapons-manufacturing operations at these sites resulted in radiological or chemical contamination, or both.

2.2 Nevada Offsites

LM managed nine sites under the Nevada Offsites program, which includes sites where underground nuclear tests and experiments were performed outside of the Nevada National Security Site (formerly called the Nevada Test Site). Underground nuclear testing was conducted

for various purposes, including stimulating natural gas production and cataloging seismic detonation signatures. Two sites in Nevada are managed under the regulatory authority of a Nevada-administered Federal Facility Agreement and Consent Order, and the remaining seven sites are managed in collaboration with the host-state environmental agencies.

2.3 UMTRCA Sites

The Uranium Mill Tailings Radiation Control Act (UMTRCA) (Title 42 *United States Code* Section 7901, as amended [42 USC 7901]) addresses the remediation and regulation of uranium mill tailings at uranium mill sites addressed under Title I and Title II.

- Title I of UMTRCA identified inactive uranium ore–processing sites requiring remediation. The responsibility for remediation was assigned to DOE. Uranium mill tailings and associated contaminated material are stored in disposal cells on some Title I sites. LM managed 21 UMTRCA Title I sites during the reporting period.
- Title II of UMTRCA identified the remediation and reclamation of uranium mill sites under specific license on or after January 1, 1978; the reclamation of these sites was assigned to the licensee. LM managed six remediated UMTRCA Title II sites during the reporting period. The number will increase as ongoing site reclamations are completed and the sites are transferred from the licensee to LM for LTS&M.

2.4 FUSRAP Sites

The U.S. Atomic Energy Commission (AEC), predecessor to DOE, established the Formerly Utilized Sites Remedial Action Program (FUSRAP) to remediate sites where radioactive contamination remained from the Manhattan Engineer District (MED) projects and early AEC operations. DOE assessed more than 600 candidate facilities and determined 46 would be eligible for remediation under FUSRAP. DOE remediated 25 sites from 1974 to 1997, when Congress directed the U.S. Army Corps of Engineers (USACE) to assume responsibility for the remediation work of the remaining 21 designated FUSRAP sites. Congress transferred the administration and execution of FUSRAP from DOE to USACE with the Energy and Water Development Appropriations Act for fiscal year 1998. USACE was subject to the administrative, procedural, and regulatory provisions of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan.

USACE retains responsibility for each site for 2 years after remediation is complete and then transfers the long-term stewardship responsibilities of the site to LM. Long-term stewardship may include surveillance and maintenance of remediated sites or be limited to management of site records and responding to stakeholder inquiries. LM managed 31 FUSRAP sites during the reporting period. The number will increase as ongoing site reclamations are completed and the sites are transferred to LM for LTS&M.

2.5 D&D Sites

DOE established the Defense Decontamination and Decommissioning (D&D) Program for the remediation of surplus DOE facilities. D&D sites have been transferred to LM for LTS&M. LM

managed five D&D sites during the reporting period. Four of these sites are former nuclear power plants, and the fifth was a uranium ore pilot processing and shipping center.

2.6 NWPA Section 151 Site

Under the U.S. Nuclear Regulatory Commission (NRC) Site Decommissioning Management Program, owners can transfer certain sites with low-level radioactive contamination after site remediation to the federal government under Section 151 of the Nuclear Waste Policy Act (NWPA). LM managed one NWPA Section 151 site for LTS&M during the reporting period.

2.7 MED/AEC Legacy Sites

LM is responsible for the records management and stakeholder support of 10 remediated MED/AEC sites. MED sites were associated with the program during World War II to produce the first nuclear weapons, whereas AEC sites were associated with early nuclear weapons development.

2.8 State Water Quality Standards Site

LM is responsible for the records management and stakeholder support of one site remediated to state requirements only, where no federal requirements are applied. For this site, DOE completed the cleanup activities based on an order from a regional water quality control board. The U.S. Bureau of Land Management (BLM) then relinquished and terminated the right of way.

2.9 Additional LM Activities and Programs

In addition to the responsibilities at postclosure sites described above, the following LM activities were conducted:

- Maintenance of five radiometric calibration facilities used to calibrate instruments for measurements of uranium, thorium, and potassium. LM grants access to these facilities to non-LM users upon request. The primary calibration facilities are in Grand Junction, Colorado (at the Grand Junction Regional Airport and at the Grand Junction, Colorado, Site) and at secondary facilities at Grants, New Mexico; George West, Texas; and Casper, Wyoming.
  - Additional information is available at: https://www.energy.gov/lm/services/calibration-facilities.
- Managing the Uranium Leasing Program (ULP), including administrative, oversight, and inspection activities for 31 uranium mining lease tracts in southwestern Colorado.
  - Additional information is available at: https://www.energy.gov/lm/services/property-management/uranium-leasing-program.
- Managing the Defense-Related Uranium Mines (DRUM) Program, which was established by LM in 2016 under the authority of the National Defense Authorization Act for Fiscal Year 2013. LM implements the program by conducting verification and validation (V&V) and reclamation activities at more than 4000 DRUM Program sites, most of which are in Arizona, Colorado, New Mexico, Utah, and Wyoming. V&V activities include mine location reconciliation; field inventory of mine-related features; collection of radiological

data (gamma radiation surveys), soil samples, and water samples (when applicable); determination of reclamation or remediation status; and risk screening to determine potential physical safety hazards and risks to human health. Reclamation activities include filling or blocking hazardous openings (i.e., adits), installing minor devices such as gates, and removing structures and materials of no historical value to protect public safety, human health, and the environment.

  - Additional information is available at: https://www.energy.gov/lm/defense-related-uranium-mines-program.

- Evaluating potential environmental and safety DOE liabilities at historical sites associated with the Plowshare and Vela Uniform programs in which AEC-sponsored activities were conducted off the Nevada National Security Site.
- Managing the Applied Studies and Technology (AS&T) Program, established to incorporate science and technology with management strategies to improve cleanup effectiveness, protectiveness, and sustainability, which can result in long-term cost savings. The program includes the management of studies that involve collaboration with other federal agencies, national laboratories, universities, and the scientific and environmental community.

  - Additional information is available at: https://www.energy.gov/lm/services/AST.

- Managing the LM Business Center (LMBC) at Morgantown, West Virginia, which is certified by the National Archives and Records Administration as an official repository for the storage of federal records. The facility is environmentally controlled and capable of storing approximately 150,000 cubic feet of physical records; it features a cold storage vault for microfilm, negatives, photographs, and other media.

  - Additional information is available at: https://www.energy.gov/lm/services/records-management.

- Supporting LM programmatic activities at the following 10 occupied office locations:

  - Fernald Preserve, Ohio
  - Grand Junction, Colorado
  - Monticello, Utah
  - Morgantown, West Virginia
  - Pinellas County, Florida
  - Tuba City, Arizona
  - Washington, DC
  - Weldon Spring, Missouri
  - Westminster, Colorado
  - Window Rock, Arizona

3.0 Summary of General Environmental Reporting

3.1 Oversight

DOE assigns an LM site manager or program manager to each LM site or activity to oversee the scope, schedule, and budget of work, address stakeholder concerns, and ensure activities are compliant and protective of human health and the environment. The site or project manager thoroughly reviews all reports associated with site projects or activities to ensure data are accurately reported.

3.2 Summary of Site-Specific Activities

LM classifies sites as Category 1, Category 2, or Category 3 based on the actual or anticipated LTS&M activities associated with the site. In general, fewer activities and less environmental monitoring are performed at the lower category sites, resulting in less documentation and reporting. However, a site's category can change depending on site conditions (e.g., changes in groundwater remediation strategies or regulatory requirements). The three categories of LM sites and their site counts according to the *Site Management Guide*, available at https://energy.gov/lm/downloads/site-management-guide/July2018, are as follows:

1. Category 1 sites
    - Category 1 sites are listed in Table A-1 of Appendix A and include 39 LM sites.
    - LM activities include records-related activities and stakeholder support. Historical site information is available online and accessible for stakeholders.
    - LM is not required to routinely inspect or sample these sites for environmental monitoring data, and there are no annual reporting requirements.
2. Category 2 sites
    - Category 2 sites are listed in Table A-2 of Appendix A and include 44 LM sites.
    - LM activities may include:
        - Conducting required inspections (typically annually) and maintenance
        - Sampling for environmental monitoring data, as required
        - Managing site records and providing support on stakeholder inquiries and requests for information (historical site information and monitoring results are accessible online for stakeholders)
        - Implementing and managing administrative controls (e.g., access agreements or land use control through federal ownership) and institutional controls
        - Preparing inspection, monitoring, and compliance reports, as required
3. Category 3 sites
    - Category 3 sites are listed in Table A-3 of Appendix A and include nine LM sites.
    - LM activities may include:
        - Operating and maintaining remedial action systems (e.g., active treatment systems for contaminated groundwater or surface water)

- Conducting required inspections (typically annually) and maintenance
- Sampling for environmental monitoring data, as required
- Managing site records and providing support on stakeholder inquiries, requests for information, and routine communications (historical site information and monitoring results are accessible online for stakeholders)
- Implementing and managing administrative and institutional controls
- Preparing inspection, monitoring, and compliance reports, as required

Tables A-1 through A-4 in Appendix A summarize the monitoring and associated reporting for each site; sites geographically grouped as one in the *Site Management Guide* are addressed individually in the tables. Most of the information in the tables is available on site-specific websites accessible from the LM Sites website (https://www.energy.gov/lm/sites/lm-sites) and from the site-specific links in Appendix A of this report. Additional reporting information is available upon request. LM is providing Appendix A as a summarized version of the environmental reporting in lieu of individual reports.

In addition to long-term care of categorized sites, the following LM facility and program activities were performed during the reporting period:

1. Radiometric Calibration Facility Activities
   - Facility maintenance, annual inspections, and records-related activities
2. ULP Activities
   - Annual inspections of mining operations to ensure leaseholders adhere to lease stipulations
   - Oversight of leaseholder routine maintenance activities
   - Preparation of an annual status and activities report summarizing LM activities for the ULP during the calendar year
   - Due to a court-ordered injunction, leaseholders did not perform any exploration, development, mining or extraction, or reclamation activities on the DOE lease tracts during the reporting period
3. DRUM Program Activities
   - Completed reconciliation, inventory, and field verification and validation of approximately 750 BLM, U.S. Forest Service, state, and private mines in Colorado, New Mexico, and Utah
   - Prepared summary reports for each mine or group of mines to be transmitted to the appropriate agency
4. Plowshare and Vela Uniform Activities
   - Conducted historical research to obtain additional information about the sites
   - Performed site visits at five sites to document current conditions

5. AS&T Program Activities

   The following studies were conducted to enhance LM's strategic capabilities by optimizing current LM operations and advancing technology applications:

   - Effects of Soil-Forming Processes on Cover Engineering Properties
   - Water Balance Cover Monitoring
   - Enhanced Cover Assessment Project
   - Unmanned Aerial System Evapotranspiration
   - Aeolian Deposition
   - Educational Collaboration
   - Persistent Secondary Contaminant Sources
   - Supporting collaboration between LM and the Office of Environmental Management (EM) National Laboratory Network
   - Supporting collaboration between LM and EM's Crescent Junction, Utah, disposal site for converting the disposal cell cover from a prescriptive rock cover to an evapotranspiration cover
   - Preparation of an internal annual report documenting application of AS&T project outcomes to improve LTS&M and reduce costs

4.0 Summary of Environmental Management System and Sustainability

As required by prior DOE orders and DOE Order 436.1, *Departmental Sustainability*, LM has had a fully implemented Environmental Management System (EMS) since October 2005. LM has declared full implementation of the EMS every 3 years starting in 2009, with the latest declaration on September 20, 2018. LM's EMS is a comprehensive system to incorporate life-cycle environmental considerations into all aspects of the LM mission to maximize beneficial resources, minimize wastes and adverse environmental impacts, and meet or exceed compliance with applicable regulations and DOE requirements. The EMS serves as the platform for adhering to, implementing, and tracking environmental requirements for compliance and sustainability. The LM EMS is consistent with the framework of International Organization for Standardization (ISO) standard 14001, *Environmental Management Systems*; the Integrated Safety Management System requirements of DOE Policy 450.4A Chg 1, *Integrated Safety Management Policy*; the *Worker Safety and Health Program* (LMS/POL/S14697), and Title 10 *Code of Federal Regulations* Section 851 (10 CFR 851).

The associate undersecretary of DOE's Office of Environment, Health, Safety, and Security issued memorandum AU21-16-N1-0050, *Departmental Use of Environmental Management Systems*, in October 2016 requiring DOE sites to conform to the new ISO 14001:2015 version by October 1, 2018. LM contracted an external auditor to conduct an assessment to ensure compliance with the new standard in early 2018. The assessment team reported no findings and concluded that the LM EMS elements reviewed were adequately documented in the EMS procedures and that the program is effective and is being satisfactorily implemented.

The LM EMS public website describes the EMS and provides links to many of the documents and reports identified in this section (https://energy.gov/lm/services/joint-environmental-management-system-ems). The following programmatic documents describe LM's EMS and are accessible on the LM EMS public website on the "Guiding Documents and Links" webpage (https://energy.gov/lm/services/joint-environmental-management-system-ems/guiding-documents-and-links).

- LM's *Environmental Policy* (LM Policy 436.1C)
- LM's EMS Description (LM Procedure-3-20-12.0, LMS/POL/S04346)

4.1 Performance Measures

The following is a summary of reporting mechanisms for the EMS, some of which are available on the LM EMS public website on the "EMS Goals/Progress/Plans/Reports" webpage (https://energy.gov/lm/services/joint-environmental-management-system-ems/ems-goalsprogressplansreports).

The following documents are available on the EMS Goals/Progress/Plans/Reports webpage:

- *LM Site Sustainability Plan* (SSP) (LMS/S07225): LM reports past performance and future plans for meeting sustainability goals in the SSP. This assists DOE with meeting its sustainability requirements in DOE Order 436.1. Executive Order (EO) 13834, *Efficient Federal Operations,* was issued May 17, 2018 (revoking EO 13693). LM continued to follow the targets and objectives outlined in EO 13693 during 2018 as directed by the Council of Environmental Quality while awaiting implementing instructions and guidance from DOE.
- Consolidated Energy Data Report: This annual report contains information on electronics stewardship, energy and water usage, waste diversion data, renewable energy generation, greenhouse gas emissions, high-performance sustainable buildings, and sustainability projects. Information is entered into the DOE Sustainability Dashboard.
- *LM Facility EMS Annual Report*: This report identifies the scope of LM's EMS and the status of sustainability goal performance and conformance with the EMS standard.
- *LM Significant Environmental Aspects*: This document describes the four categories of significant environmental aspects from LM operations, including land use, resource consumption, waste management, and releases to the environment. Environmental aspects are the attributes of project and program activities, products, and services that interact with the environment and may create a significant impact if not controlled.

Other reporting mechanisms for the EMS include:

- Energy Independence and Security Act (EISA) Section 432 Report: Section 432 requires federal agencies to identify facilities that consume at least 75% of the agency's facility energy use. Comprehensive energy and water evaluations of 25% of facilities are reported each year, and an evaluation of each facility is completed once every 4 years. Information is uploaded to the DOE Sustainability Dashboard annually.

- Facilities Information Management System (FIMS) updates: FIMS collects information about real property attributes and use, including compiling a list of assets excluded from the energy intensity reduction goal. The database also stores data on buildings assessed against the high-performance and sustainable building goals.
- Federal Acquisition Statistical Tool updates: This tool collects data about current and past federal fleet fuel use, inventory, and acquisitions.

4.2 Accomplishments, Awards, and Recognition

LM received the following awards and recognitions for EMS-related activities:

- LM was awarded the Electronic Product Environmental Assessment Tool (EPEAT) Purchasers Award for purchasing EPEAT-rated electronic equipment.
- The Fernald Preserve, Ohio, Site was named a regional "Greenspace Gem" by the greater Cincinnati regional environmental sustainability alliance, Green Umbrella. The award is recognition for the remediation, restoration, and community engagement work done at the site, which resulted in a regional, community asset that features expansive greenspace.
- The Fernald Preserve was presented with the Conservation Educator of the Year Award for the continued commitment to educating the public on the importance of conserving our natural resources and environmental remediation.
- The LM office at Westminster, Colorado, received Energy Star Charter Tenant Space Recognition for meeting the U.S. Environmental Protection Agency (EPA) energy design criteria for advancing energy efficiency in commercial buildings.

5.0 Summary of Environmental Compliance

The following subsections summarize compliance with applicable regulations and the related 2018 reporting. Because LM manages sites under different regulatory frameworks, postclosure environmental requirements vary based on the activities being conducted.

5.1 Environmental Remediation and Waste Management Compliance

CERCLA: CERCLA was enacted by Congress in 1980 to enforce cleanup and reporting requirements applicable to abandoned or uncontrolled hazardous waste sites. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA). Typically, the lead agency at the federal facility (DOE) initiates a response action under CERCLA if there is a release or a substantial threat of a release of a hazardous substance into the environment. Remedial actions have been completed at LM sites regulated by EPA with the expectation of long-term monitoring and active groundwater remediation at several sites. The status of the activities at each site is available on site-specific links provided in Appendix A of this report. A Five-Year Review report is required for a CERCLA site with residual contamination (see Table A-2 and Table A-3) to evaluate whether the remedy at the site remains protective of human health and the environment.

- There were no Five-Year Review reports scheduled to be completed during the reporting period.

- In July 2018 an addendum to the first Five-Year Review (2016) for the Laboratory for Energy-Related Health Research (LEHR) site at the University of California, Davis, was submitted to EPA. The first Five-Year Review concluded that a protectiveness determination for the vapor intrusion pathway could not be made without (1) further evaluation of existing data and (2), if needed, the collection and evaluation of soil gas data from certain locations within the DOE areas. The addendum reported the finding that potential vapor intrusion risks were acceptable and that the remedy was protective for areas of the site monitored by DOE. The addendum was approved by EPA on October 25, 2018.

RCRA: RCRA was enacted by Congress in 1976 to govern the management of solid and hazardous waste and establish standards by which waste generators and treatment, storage, and disposal facilities are regulated. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments (HSWA). Among other requirements, HSWA mandated waste minimization, corrective action, and land disposal restrictions for hazardous waste. RCRA remains an applicable or relevant and appropriate requirement (ARAR) at many LM sites for disposal cell maintenance and groundwater monitoring, and the sites maintain compliance with this ARAR.

- Each site generating hazardous waste maintained a Very Small Quantity Generator status.
- Hazardous waste was shipped from the Grand Junction site to a local county hazardous waste collection facility for Very Small Quantity Generators for treatment and disposal.
- Hazardous waste was shipped from the LM office at Westminster, Colorado, to a local hazardous waste collection facility for treatment and disposal.
- An active RCRA HSWA corrective action permit issued by the State of Florida is maintained for the Pinellas County, Florida, Site. The permit includes requirements for remedial action at the site under state Global Risk-Based Corrective Action regulations.

Federal Facility Compliance Agreement (FFCA): Enacted in 1992, FFCA amended RCRA with the objectives of (1) bringing all federal facilities into compliance with applicable federal and state hazardous waste laws, (2) waiving federal sovereign immunity under those laws, and (3) allowing the imposition of fines and penalties. The FFCA gives EPA the authority to issue administrative compliance orders to federal agencies in violation of hazardous waste laws and requires EPA to conduct annual inspections of RCRA Part B–permitted federal treatment, storage, and disposal facilities.

- Programmatic policies and plans and site-specific plans and procedures are maintained for LM sites, as needed, to comply with all applicable requirements under the FFCA.

Emergency Planning and Community Right-to-Know Act (EPCRA) and SARA: EPCRA was enacted by Congress in 1986 to help communities plan for chemical emergencies. It also requires industry to report to federal, state, and local governments on the storage, use, and releases of hazardous substances. EPCRA reports under SARA Section 312 are required annually for sites storing chemicals in amounts exceeding threshold planning quantities.

- An EPCRA report was submitted for the Rocky Flats Site, Colorado, for the storage of lead-acid batteries.
- An EPCRA report was submitted for the LMBC for the storage of diesel fuel in an emergency power generator aboveground storage tank.

Toxic Substances Control Act (TSCA): TSCA was enacted in 1976 and regulates the control (manufacturing, use, distribution in commerce, abatement, and disposal) of toxic substances, including polychlorinated biphenyls, asbestos, lead, mercury, and radon. LM's management of some older buildings may require assessment and abatement of TSCA-regulated substances, especially asbestos.

- LM did not perform any TSCA abatement or disposal activities during the reporting period.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA): FIFRA regulates the distribution, use, and sale of pesticides and requires a certified applicator to supervise the application of "restricted use" herbicides or pesticides.

- LM uses herbicides and pesticides at many LM sites as part of land stewardship responsibilities. Policies, procedures, and manuals are in place to ensure herbicides and pesticides are applied in compliance with FIFRA.

Radioactive Waste Management: The type of radioactive waste generated at an LM site is dependent on the source and characteristics of the radioactivity and the regulatory driver(s) associated with radioactive material at the site. For example:

- Radioactive waste generated at an UMTRCA site is characterized as one of the following:
  - Residual radioactive material (UMTRCA Title I site)
  - Atomic Energy Act (AEA) Section 11e. (2) byproduct material (UMTRCA Title II site)
- Radioactive waste generated at a CERCLA or RCRA site is typically characterized as one of the following:
  - Low-level radioactive waste (LLRW)
  - Naturally occurring radioactive material

Management and disposal requirements differ for these specific waste types. Radioactive wastes are managed in accordance with the AEA; UMTRCA; 10 CFR 40, "Domestic Licensing of Source Material"; and DOE Order 435.1 Chg 1, *Radioactive Waste Management.*

- Grand Junction, Colorado, Disposal Site: LM continues to operate and receive radioactive materials. This site is used for the permanent disposal of specific residual radioactive materials described in Sections 101 and 102 of Title I of UMTRCA and other radioactive material as defined in the disposal facility waste acceptance criteria. The disposal cell is authorized by Congress to remain open until it reaches capacity or until 2023, whichever comes first. Legislation has been proposed to extend Congress's authorization to keep the disposal site open until 2048. Radioactive materials from the following locations were disposed at the Grand Junction, disposal site:
  - Grand Junction, Colorado, Site
  - UMTRCA Title I vicinity properties in Grand Junction, Colorado
- Fernald Preserve: LLRW associated with routine site inspections, construction projects, and the decommissioning and dismantlement of some elements of the Converted Advanced Wastewater Treatment Facility was shipped to the Waste Control Specialists facility in

Andrews, Texas, for disposal. LLRW is managed and stored in accordance with DOE Order 435.1.

- Rocky Flats Site: LLRW consisting of spent treatment media from the Solar Ponds Plume Treatment System treatability study was shipped offsite to the EnergySolutions Inc. Clive disposal facility in Grantsville, Utah.
- Shiprock, New Mexico, Disposal Site: Residual radioactive material was generated because of minor work performed at the site. The waste is being stored while awaiting disposal at the Grand Junction disposal site.

5.2 Air Quality and Protection Compliance Status

Clean Air Act (CAA): The CAA was enacted in 1970 to control sources of air pollution from the following three categories: new and existing sources subject to ambient air quality regulations through source-specific emission limits; new sources subject to more stringent control technologies and permitting requirements; and specific air pollution problems, including hazardous air pollutants and visibility impairment subject to National Emission Standards for Hazardous Air Pollutants (NESHAPs). A comprehensive operating permit program was established in 1990 to consolidate all applicable requirements for a given source of air pollution under one program. Title V regulations and permits are a part of this program.

- Initiated preparation of a West Virginia General Permit G65 application to obtain an air permit for the operation of the LMBC emergency generator.
- NESHAPs requirements that pertain to asbestos abatement were identified as part of the project planning for the Piqua, Ohio, Decommissioned Reactor Site. These requirements were incorporated into the abatement specifications for the project.
- There were no major sources of criteria air pollutants or hazardous air pollutants identified at other LM sites.

5.3 Water Quality and Protection Compliance Status

Clean Water Act (CWA): The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating water quality standards for surface waters. Under the CWA, EPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges. In 2018, multiple LM sites maintained NPDES permits. These NPDES permits include discharge permits and storm water permits as described below:

- At the Fernald Preserve, compliance sampling of nonradiological pollutants is conducted from storm water runoff and treated effluent discharges in compliance with a state-administered NPDES permit.
  - A subproject of the Fernald Preserve wastewater optimization project (to construct a down-sized wastewater treatment system) was completed in 2018 under a permit-to-install that was granted by the Ohio EPA in 2017. The final subproject, refurbishing the existing backwash basin, is planned for 2019.
  - At the Mound, Ohio, Site, an NPDES permit is maintained. This permit covers the discharge of treated groundwater under a CERCLA authorization demonstrating compliance with the CWA. No discharge has occurred since September 15, 2014, to

allow for an undisturbed evaluation of the enhanced attenuation field demonstration involving the injection of edible vegetable oil into the groundwater.

  - The enhanced attenuation was extended for 1 year to observe how the system responded to aquifer changes caused by the City of Miamisburg's dewatering at utility upgrade projects. The results show very consistent behavior and the continuation of faster degradation of the volatile organic compounds (VOCs) in the groundwater at Operational Unit 1. After completing the final year of the study, the regulators agreed to keep the pump and treatment system in standby mode so current treatment zones would not be altered and to maintain an interim monitoring program to focus on the best indicators of the microbial community, the geochemistry of the aquifer, and the VOCs. LM is evaluating a potential amendment to the current groundwater remedy of pump and treatment to an attenuation-based remedy. If it is approved, the agency anticipates a Record of Decision amendment within 2 years.
  - At the Weldon Spring, Missouri, Site, an NPDES permit is maintained with the Missouri Department of Natural Resources. This permit covers discharges from the Leachate Collection and Removal System and is maintained as a contingency to current disposal methods.

- Preparation of a self-certified Spill Prevention, Control, and Countermeasure (SPCC) Plan was initiated for the LMBC in accordance with 40 CFR 112. The SPCC rule is applicable to the LMBC as diesel fuel is stored in a 3000 gallon aboveground storage tank.
- Pest management programs at LM sites are implemented in accordance with EPA's Pesticide General Permit (issued under the CWA NPDES program) or a state-issued general permit (for geographic areas where EPA is not the NPDES permitting authority). Such permits regulate point source discharges of residue producing biological and chemical pesticides.

CWA Storm Water Management and the EISA: A storm water management program was established by the CWA to reduce runoff and improve water quality. Under Section 438 of EISA, federal agencies are required to reduce storm water runoff from federal development and redevelopment projects to protect water resources. LM evaluates all construction projects to ensure preconstruction and post-construction storm water management standards are met and erosion controls are implemented as required based on the area of disturbance of the property.

- At the Rocky Flats Site, LM managed storm water in accordance with the site *Erosion Control Plan for Rocky Flats Property Central Operable Unit* (DOE-LM/1497-2007*)*, which meets the substantive requirements for storm water permitting. EPA and the Colorado Department of Public Health and Environment have approved this approach. Soil disturbances are controlled by institutional controls managed through the *Rocky Flats Legacy Management Agreement*.
- At the Fernald Preserve, LM managed sitewide and construction storm water in accordance with the *Fernald Preserve, Fernald, Ohio, Storm Water Pollution Prevention Plan* (LMS/FER/S03161) and the current Fernald Preserve NPDES permit.
- LM inspected erosion control best management practices (BMPs) at the Durango disposal site in association with a 2017 construction project to decommission an onsite evaporation pond. The use of erosion control BMPs is expected to be unnecessary after 2019 because of improved vegetation density.

Safe Drinking Water Act (SDWA): The SDWA, enacted in 1974, authorized EPA to regulate contaminants in drinking water and required EPA to establish national standards to be implemented and enforced by authorized states.

- SDWA is an ARAR for many LM sites regarding groundwater contamination. ARAR information is detailed in the environmental monitoring reports for each site, if applicable.

Emerging Contaminants: Emerging contaminants refer to a large variety of chemicals (e.g., pharmaceuticals, household products, agricultural products, and fire retardants) that are not currently regulated but have been researched and evaluated since the 1990s regarding potential impacts to human health and the environment with a focus on water quality. Although these contaminants are not currently regulated, EPA has been consulting with federal facilities regarding unique issues and challenges related to site-specific emerging contaminants including at CERCLA sites where cleanup actions are complete. The following LM CERCLA/RCRA sites are engaged in activities associated with emerging contaminants:

- Rocky Flats Site: In late 2018, LM received a letter from the state of Colorado regarding per- or polyfluorinated alkyl substances (PFAS). Colorado adopted two specific PFAS compounds into its hazardous waste regulations: perfluorooctanoic acid and perfluorooctanesulfonic acid (PFOS), both of which may be found in fire retardant foams and other products. The Rocky Flats Site subsequently initiated planning to screen for these chemicals in site groundwater and surface water.
- Fernald Preserve: In the CERCLA *Fourth Five-Year Review Report for the Fernald Preserve* (August 2016), DOE was required to address the presence of the emerging contaminants PFAS through two deliverables. To fulfill these deliverable requirements, DOE submitted the *Draft Perfluorinated Compound Groundwater Screening Sampling and Analysis Plan* to EPA in December 2016, and in March 2018, DOE submitted *the Draft Polyfluorinated Alkyl Substances (PFAS) Investigation Plan for the Fernald Preserve*. Based on information presented in both documents, PFAS are not a widespread issue at the Fernald Preserve. Because of a lack of published groundwater sampling guidelines, as well as a commercially available EPA-approved analytical method for the groundwater matrix, implementing the proposed sampling plan would likely cause false positive results. EPA has been making a regulatory determination on whether to initiate development of a national primary drinking water regulation for PFAS since approximately 2009. DOE will continue to work with EPA and will address any site-specific PFAS issues when regulations are in place for these contaminants in groundwater. The fifth CERCLA Five-Year review scheduled for 2021 provides an opportunity to revisit the issue.
- Mound site: The CERCLA *Fourth Five-Year Review for the Mound, Ohio, Site, Miamisburg, Ohio* (September 2016) identified two recommendations to address emerging contaminants. In January 2017, DOE submitted a report that demonstrated that PFAS and PFOS were never used at the Mound site. This report was approved by EPA in calendar year 2018, and no further action was required. For the vapor-forming chemicals, an assessment would be conducted to sample for these chemicals at various locations at the Mound site and compare the data to the vapor intrusion screening level. In May 2017, DOE submitted a phase I assessment report that provided results of the preliminary screening and source assessment. Areas were identified that required soil gas sampling as part of phase II. This report was approved by EPA in 2019.

- LEHR site: In July 2018, LM submitted the results of a vapor intrusion investigation concluding that vapor-forming constituents of concern in the DOE areas do not present an unacceptable risk under current or potential future land-use scenarios.

Executive Order 11988, *Floodplain Management*: EO 11988, enacted in 1977, requires federal agencies to avoid, to the extent possible, short- or long-term work, activities, or disruption causing adverse impacts in floodplains and direct and indirect development in floodplain areas wherever there is a practical alternative.

- LM considers working alternatives to avoid floodplains when possible and complies with this EO and other federal, state, tribal, and local requirements, as applicable. Changes to flood hazard determinations are noted in the *Federal Register*, tracked for LM sites, and identified for evaluation in the Legacy Management Support (LMS) *Environmental Compliance Regulatory Review Quarterly Report*.

Executive Order 11990, *Protection of Wetlands*: The purpose of EO 11990 is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." To meet these objectives, EO 11990 requires LM to consider alternatives to work in or near wetland sites and to limit potential damage if an activity affecting a wetland cannot be avoided. When unavoidable, LM complies with the requirements specific to the applicable nationwide permit and any applicable state or tribal requirements. LM promotes the ecological sustainability and enhancement of wetlands when considering the disposition and reuse of federal lands.

- Fernald Preserve staff continued long-term monitoring of mitigation wetlands with vegetation surveys, amphibian surveys, and hydrologic monitoring using shallow piezometers.
- A list of BMPs when working in and around wetlands was developed for work that occurred near Montezuma Creek at the Monticello, Utah, Disposal and Processing Sites.

5.4 Other Environmental Statutes Compliance Status

National Environmental Policy Act (NEPA): NEPA was enacted in 1970 to help public officials make decisions based on an understanding of environmental consequences, to foster public participation, and to take actions to protect, restore, and enhance the environment. It requires federal agencies—including LM—to evaluate the potential environmental effects of proposed federal agency actions. NEPA documentation is typically not required for CERCLA sites that considered NEPA values in their decision documents. Actions at non-CERCLA LM sites are typically within categorically excluded classes of actions. The evaluations of these actions are documented using a Categorical Exclusion Evaluation (CXE) and a *NEPA Categorical Exclusion Determination Form*. Recent categorically excluded actions are accessible for public review on the following website: https://energy.gov/lm/services/joint-environmental-management-system-ems/national-environmental-policy-act-nepa.

- LM NEPA documents completed during the reporting period included:
  - CXEs: 25
  - Environmental Assessments (EAs): 0
  - Environmental Impact Statements: 0

- An EA was initiated by USACE on behalf of LM for the proposed demolition of the buildings at the Piqua site (in progress).
- Preparations of EAs, in coordination with BLM as the applicant for land withdrawals, were ongoing for the Central Nevada Test Area and the Bear Creek, Wyoming, Disposal Site during the reporting period.

Endangered Species Act (ESA): Under Section 7 of the ESA, DOE consults with the U.S. Fish and Wildlife Service (USFWS) on any action that may affect threatened or endangered species or their designated critical habitat. LM evaluates the potential presence of federally listed threatened or endangered species or their designated critical habitat during the project planning or NEPA process or whenever relevant changes in listings occur. For example, LM performs an evaluation if a candidate species is elevated to threatened or endangered status or if designated critical habitat is established at or near an LM site. USFWS's Information for Planning and Consultation online tool is used to obtain information on species occurrence and habitat. If LM determines a listed species may be affected by its activities, a Section 7 consultation with USFWS is initiated and a Biological Assessment is prepared. Additional consultation with tribal authorities may be required on tribal lands.

- In February 2018, a Biological Opinion (BO) was received from USFWS for routine operations at the Monticello, Utah, sites. The BO was in response to a 2017 consultation prompted by the federal listing for Gunnison sage-grouse and included impacts to endangered Colorado River fish. USFWS determined that water depletions were minor and did not result in significant impacts to the fish or their designated critical habitat and that routine operations did not result in significant impacts to sage-grouse or their designated critical habitat.
- In April 2018, with submittal of a Biological Assessment, LM initiated consultation with USFWS for routine activities at LM sites in the Upper Colorado River Basin. A concurrence letter was received from USFWS in September 2018 that these activities are not likely to significantly affect threatened or endangered species or their designated critical habitat.
- In August 2018, LM initiated consultation with USFWS for routine activities at LM sites in the San Juan River Sub-basin of the Upper Colorado River Basin. LM determined that the Colorado pikeminnow and razorback sucker and their designated critical habitat were likely to be adversely affected by water depletion but beneficially affected by intercepting contaminated groundwater. LM also determined that Mesa Verde cactus may be affected, but not likely adversely, by site activities. The BO was not received from USFWS in 2018.
- In 2018, LM received concurrence from USFWS for 120 acres of Preble's meadow jumping mouse habitat that resulted from the Rocky Flats cleanup and closure activities. Prior to site closure, most of the 120 acres were part of the Industrial Area (buildings, parking lots, roads). These areas were revegetated and turned into habitat for the mouse. The 120 acres of credit can be used to offset future project impacts to Preble's mouse habitat. Several other project notifications were made to USFWS in accordance with the requirements in the Rocky Flats Site programmatic Biological Assessment.
- In 2018, Fernald Preserve staff conducted a survey for the federally endangered running buffalo clover prior to starting the erosion repairs at two locations onsite. No running buffalo clover was found.

- In 2018, LM continued working with USFWS and the Cincinnati Zoo to introduce the federally endangered American burying beetle to the Fernald Preserve. The parties renewed a cooperative agreement in October 2017, extending the partnership through 2022. The Cincinnati Zoo raises beetles for release at Fernald Preserve. A release of 148 pairs of beetles occurred in June 2018.

Invasive Species Management: In accordance with the Federal Noxious Weed Act of 1974, LM cooperates with federal, state, and local agencies as well as farmers' associations and private individuals to control, eradicate, or prevent the spread of noxious weeds. The *Procedure for Handling Herbicides at Western Legacy Management Sites* (LMS/PRO/S12853) outlines the process followed to implement treatment of invasive species at LM sites. LM also complies with EO 13751, *Safeguarding the Nation from the Impacts of Invasive Species* (December 5, 2016), which amended EO 13112, *Invasive Species* (February 3, 1999), and calls on federal agencies to prevent the introduction, establishment, and spread of invasive species and to eradicate and control populations of invasive species that are already established.

In 2018, LM treated 41 different species of noxious weeds on 481.77 acres over 27 different sites. From 2017 to 2018, 18 sites decreased their acreage of noxious weeds sprayed, 11 sites increased their acreage sprayed, and 4 sites experienced no change in acreage sprayed. Canada thistle (*Cirsium arvense)* was the most widespread noxious weed treated, occurring at 11 different sites. Both Russian knapweed (*Rhaponticum repens*) and musk thistle (*Carduus nutans*) were the next most widespread, occurring at seven different sites.

Migratory Bird Treaty Act (MBTA): The MBTA prohibits the possession or destruction of migratory birds or their parts, eggs, and nests without a permit from USFWS. Additionally, EO 13186*, Responsibilities of Federal Agencies to Protect Migratory Birds*, directs executive department and agencies to take certain actions to further implement the MBTA. Most birds present at LM sites are protected under this act, and compliance is often achieved by timing disruptive activities to avoid the nesting season of migratory bird species.

- DRUM Program field activities were scheduled during specific windows to avoid significant impacts to migratory birds.
- The Original Landfill Geotechnical Investigation Project at the Rocky Flats Site was completed without any impacts to nesting migratory birds. Most of the field activities were scheduled outside the nesting window for the site.
- The Fernald Preserve maintains a Nest Destruction Permit issued by the Ohio Department of Natural Resources. This permit is for the removal of Canada goose nests and eggs, if they are determined to be a nuisance.

Bald and Golden Eagle Protection Act: This act provides additional protection to bald and golden eagles by prohibiting the "take" of these species, which includes possession, destruction, harassment, or disturbance without a permit from the secretary of the interior.

- No specific actions were taken under the Bald and Golden Eagle Protection Act at LM sites during this reporting period.

National Historic Preservation Act (NHPA): This act established a comprehensive national policy concerning historic and archaeological resource protection. Section 106 of NHPA compels federal agencies to consider the effect of their projects on historic and archaeological

resources, even if projects are not located on their lands. Section 110 of NHPA states federal agencies must identify and manage historic properties under their jurisdiction or control.

LM initiated the Section 106 consultation process 30 times in 2018. LM completed most of these consultations in 2018. None of these consultation efforts resulted in findings of adverse effect to historic property. Some consultations involved both State Historic Preservation Officers (SHPOs) and Tribal Historic Preservation Officers; some undertakings required more than one letter on the topic; and some SHPOs were consulted for more than one site in 2018.

LM conducts archaeological surveys to identify any prehistoric and historic archaeological resources that could be affected by an undertaking. LM completed the following four archaeological surveys and one archaeological monitoring effort in 2018.

- A survey was completed at the Monument Valley, Arizona, Processing Site where 534 acres of land were subjected to new survey and an additional 1711 acres of previously surveyed land was updated due to the age of the initial survey. One new site was identified in the newly surveyed area. The Navajo Nation Historic Preservation Department (NNHPD) concurred with the findings of the archaeological report, and the findings will be used to support the development of consultation material in support of additional groundwater monitoring at this location.
- A survey was completed at the Shiprock site that involved updating 903 acres of land that had not been surveyed since the 1980s. No new archaeological sites were identified; four previously identified archaeological sites were revisited and reverified. The NNHPD concurred with the findings of the archaeological report. The report will be used to support the consultation needed for the proposed removal of a 10-acre evaporation pond at this location.
- A 4.6-acre archaeological survey was completed at the Shirley Basin South, Wyoming, Disposal Site in support of a study of the soil forming factors at that location; no new sites were identified.
- A 0.5-acre survey was completed at the Rocky Mountain Metropolitan Airport, in Broomfield, Colorado, in support of the construction of a new DOE parking facility at that location; no new sites were found.
- Archaeological monitoring was completed at the Lakeview, Oregon, Disposal Site to support the study of the soil forming factors at that location. A completion report was provided to the Oregon SHPO and interested tribes in the area regarding the monitoring effort. No new sites were identified.

Section 110 of the NHPA requires all federal agencies to establish historic preservation programs for the identification, evaluation, and protection of historic properties. LM completed two historic building surveys of decommissioned nuclear reactors in 2018, at Hallam, Nebraska, and Site A/Plot M, Illinois.

- LM completed the initial Section 110 consultation for the Hallam, Nebraska, site with the Nebraska SHPO. LM recommended that the Hallam decommissioned reactor building be considered historic property. The Nebraska SHPO concurred.
- LM is continuing to consult with the Ohio SHPO regarding the decommissioned reactor in Piqua, Ohio. The consultation is needed to address the possible demolition of the reactor building, which was determined to be historic property by LM in 2017.

5.5 Summary of Environmental Notices

This subsection identifies unique instances of noncompliance and enforcement actions (e.g., notices of violation, notices of deficiency, and environmental occurrences) related to operations and activities at sites under LM's management.

- During the reporting period there were no notices received from external agencies or stakeholders.

Environmental instances of noncompliance are listed below:

- Fernald Preserve staff self-identified two missed dissolved oxygen samples during the third week of January that were required to be collected under the NPDES permit. The well field had been shut down to accommodate treatment system construction activities. When it was restarted, the samples were not collected. The January electronic discharge monitoring report was revised to include the appropriate data substitution code and explanation, and Ohio EPA's Division of Surface Water was notified. No notice of nonconformance or notice of violation was received from the state.
- Amchitka, Alaska, Site staff self-identified that an Aquatic Resource Permit for using minnow traps was not obtained by Aleutian Pribilof Islands Association Inc., the stakeholder that performed the work. The corrective action to submit an Aquatic Resource Permit Data Submission Form was completed and submitted by LM to the Alaska Department of Fish and Game. No notice of nonconformance or notice of violation was received from the state.

6.0 Additional Natural Resources Management

In addition to the actions taken under specific regulations, as listed above in Section 5.4, LM completes the following activities for natural resources management:

- On May 19, 2015, the secretary of the U.S. Department of Agriculture and the administrator of EPA, on behalf of the Pollinator Health Task Force, issued the *National Strategy to Promote the Health of Honey Bees and Other Pollinators*. Developed through a collaborative effort across the executive branch, this strategy outlines a comprehensive approach to tackling and reducing the impact of multiple stressors on pollinator health, including pests and pathogens, reduced habitat, lack of nutritional resources, and exposure to pesticides. LM formed a group to assess pollinator health and potential efforts to reduce pollinator stressors at LM sites.
    - LM's Ecosystem Management Team tracks the acreage and types of pollinator-friendly BMPs implemented at LM sites each year between May 1 and April 30 of the following year. In April 2018, the *Office of Legacy Management Sites Pollinator Health Best*

Management Practices report documented the implementation of BMPs over 2567 acres of land since land management activities began in the late 1990s.

- LM annually renews the following permits:
  - Scientific Collecting Permit for wild animals at the Fernald Preserve issued by the Ohio Department of Natural Resources.
  - Special-Purpose Salvage Permit for the Fernald Preserve issued by the USFWS.

7.0 Summary of Groundwater Protection Program

There are 41 LM sites with a groundwater protection program consisting of monitoring chemical and radiological constituents. For each site, monitoring requirements, the number of DOE-owned wells, the frequency of sampling, and contaminant of concern (COC) are site-specific. For example, groundwater samples are collected at some sites annually, and others are sampled every 2, 3, or 5 years. Twenty LM sites have wells designated as point of compliance (POC) wells. The rationale for a POC well varies depending upon the regulatory framework (e.g., CERCLA versus UMTRCA). For this report POC wells are monitoring wells at which regulatory standards apply as defined in site-specific documents (e.g., Long-Term Surveillance Plans and Groundwater Compliance Action Plans).

Table A-4 summarizes the site-specific groundwater monitoring program for applicable LM sites by presenting the following information:

- Whether the site is regularly sampled for radiological analytes (including uranium isotopes)
- Whether the site is regularly sampled for nonradiological analytes (including elemental uranium)
- A list of the COCs
- The number of active DOE-owned monitoring wells sampled for groundwater monitoring purposes
- The number of DOE-owned POC wells
- COC exceedances at POC wells sampled during the reporting period

Exceedances of regulatory standards were reported for nine sites with POC monitoring wells sampled during the reporting period. Exceedances of COCs may not result in violations, as violations are conditional to the regulatory framework for each site. Reports discussing COC exceedances at POC wells are referenced in Table A-4 footnotes and are available on the LM public website. Data on COC exceedances at UMTRCA processing sites and D&D sites are presented in Table A-5, as this information is not easily obtainable on the LM public website.

8.0 Summary of Environmental Radiation Protection Program

LM's Radiation Protection Program (RPP) implements the requirements necessary to ensure radiological operations at LM sites and facilities are protective of employees, the public, and the environment. The implementing documents of the RPP include the *Environmental Radiation Protection Program Plan* (LMS/POL/S13339), the *Radiation Protection Program Plan* (LMS/POL/S04373), and the *Radiological Control Manual* (LMS/POL/S04322). The purpose of the RPP is to implement the applicable requirements of 10 CFR 835, "Occupational Radiation Protection," and DOE Order 458.1, *Radiation Protection of the Public and the Environment.*

LM implements the RPP at applicable LM sites and activities to ensure radiation exposure to workers and the public and releases of radioactivity to the environment are maintained below regulatory limits and are "as low as reasonably achievable" (ALARA). Environmental remediation at LM sites was completed or is ongoing in accordance with all applicable statutes and regulations. LM conducts LTS&M to verify site conditions have not changed and established institutional controls remain effective.

LM's RPP also includes ensuring that activities are conducted in accordance with the following laws:

AEA: The purpose of the AEA is to ensure the proper management of source, special nuclear, and byproduct material. The AEA and the statutes amending it delegate the control of nuclear energy primarily to DOE, NRC, and EPA. DOE established LM to ensure DOE's postclosure responsibilities are met and to provide DOE programs for LTS&M, records management, work force restructuring and benefits continuity, property management, land use planning, and community assistance.

UMTRCA: UMTRCA is a federal law providing for the safe and environmentally sound disposal, long-term stabilization, and control of uranium mill tailings to minimize or eliminate radiation health hazards to the public. Under Title I of UMTRCA, DOE remediated inactive uranium ore–processing sites (i.e., those without an active license to process uranium ore) in accordance with standards promulgated by EPA. Uranium ore–processing sites addressed by Title II of UMTRCA were active when the act was passed in 1978. DOE administers Title I and Title II sites under the provisions of NRC general licenses. LM manages UMTRCA Title I and Title II sites, including inspection, monitoring, and maintenance activities.

- Requirements for inspections, monitoring, and maintenance activities are specified in site-specific Long-Term Surveillance Plans, LTS&M Plans, and Groundwater Compliance Action Plans, which are reviewed and agreed to by NRC.
- Two LM-wide inspection and monitoring reports, one for Title I sites (https://energy.gov/lm/downloads/title-i-disposal-sites-annual-report-0) and one for Title II sites (https://energy.gov/lm/downloads/title-ii-disposal-sites-annual-report), are compiled and submitted annually to NRC. These reports present the results of LTS&M activities at each of the UMTRCA sites as part of the general license requirements.

DOE Order 458.1 Chg 3, *Radiation Protection of the Public and the Environment*:
DOE Order 458.1 establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities conducted under the control of DOE.

- LM implements the *Environmental Radiation Protection Program Plan* to ensure that work involving radiological hazards is compliant with the requirements of DOE Order 458.1. The implemented processes and measures are tailored to LM activities and reflect a graded approach commensurate with the hazard or risk to the public and the environment.
- Two routine semiannual ALARA meetings were held in 2018. These ALARA meetings provide the opportunity for LM and Legacy Management Support (LMS) personnel to be involved in the ALARA process, including environmental and public aspects of ALARA. No project-specific ALARA meetings were held in 2018.

8.1 Unplanned Radiological Releases

There were no unplanned radiological releases in 2018.

8.2 Clearance of Property

This section summarizes the property (real and personal) clearance activities for LM, including application of authorized limits, the type of material or property, and the expected end-use scenario (e.g., disposal, recycle, and reuse). This information is provided in accordance with DOE Order 458.1 which requires a summary of the clearance of property to be reported in the ASER.

The clearance of property from an LM site or project location is performed in accordance with the *Radiological Control Manual*. As such, surface contamination limits identified in Table 2 (derived from 10 CFR 835 Appendix D) of the *Radiological Control Manual* are considered preapproved authorized limits. LM does not release property to the public (e.g., vehicles, equipment, or other materials) with residual radioactivity above the preapproved authorized limits.

The *Radiological Control Manual* (in accordance with 10 CFR 835) identifies annual dose limits to members of the public to be 100 millirem (mrem) to the whole body, 1500 mrem to the lens of the eye, and 5000 mrem to the skin and extremities. These annual dose limits are considered preapproved authorized limits. Temporary dose limits and their requirements listed in DOE Order 458.1 were determined to be not applicable for LM activities. The airborne radioactivity control limits of the *Radiological Control Manual* are also considered preapproved authorized limits.

- No DOE-owned property (real or personal) was cleared from LM sites in 2018 other than radioactive waste shipments identified in Section 5.1.

9.0 Summary of Fire Protection Management and Planning

Wildland fire management plans are in place for the LM sites listed below. These plans describe the current site-specific fire environment and fire prevention and mitigation strategies to meet the fire protection objectives of DOE Order 420.1C Chg 2, *Facility Safety*. This includes compliance with the following standards of the National Fire Protection Association (NFPA): Standard 1143, *Standard for Wildland Fire Management* (NFPA 2018), and Standard 299, *Standard for Protection of Life and Property from Wildfire* (NFPA 1997). Wildland fire management strategies implemented include use of fire protection equipment, vegetation management, site access controls, job safety analyses or procedures, and prescribed burns. The Fernald Preserve and the Weldon Spring site conducted prescribed burns during the reporting period.

LM sites with wildland fire management plans include:

- Fernald Preserve
- Grand Junction disposal site
- Monticello disposal and processing sites
- Rocky Flats Site
- Tuba City disposal Site
- Weldon Spring site

Although unoccupied sites do not have wildland fire management plans (since work is performed so infrequently), wildland fire hazards and controls are addressed in safety and health documents such as the *Job Safety Analysis*. It is recognized that fires may occur when no one is onsite to make initial notifications or to give information to responders. Signs are posted at the unoccupied sites that include a 24-hour telephone number so information can be reported.

10.0 Summary of Quality Assurance

LM and the LMS contractor have implemented Quality and Performance Assurance (Q&PA) programs to perform work in a compliant manner that consistently meets or exceeds mission objectives while minimizing potential hazards to the environment, the public, and workers. The management systems incorporate the requirements of DOE Order 414.1D Chg 1, *Quality Assurance*, using ISO standard 9001:2015, *Quality Management Systems–Requirements*, as the chosen national standard. Implementing documents include the LM *Quality Assurance Policy* (Policy 414.1B); the *Quality Assurance Program Plan* (LM-Plan-1-10.0-1.0); the LMS *Quality Assurance Manual* (LMS/POL/S04320); and the *Quality Assurance Program Description* (LMS/POL/S13806).

LM performs oversight of its programs, processes, and contractors as required by DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, to ensure programs are achieving their intended results and outputs in a safe, compliant, and efficient manner.

The Q&PA management systems ensure requirements are identified and integrated into LM procedures and work activities are adequately described in documents such as statements of

work, project-specific work plans, procedures, and other documented control measures. Assessments are performed to confirm compliance and evaluate LM and LMS contractor performance. Assessments are planned and recorded according to an annual schedule, and identified issues are tracked in the Corrective Action Tracking System. The annual assessment schedule includes:

- External assessments conducted by DOE, program sponsors, other regulatory agencies, corporate personnel, and external agencies to ensure adequate management system implementation
- Independent assessments conducted by Q&PA staff independent of the area or function being assessed
- Management assessments conducted by LM or LMS contractor staff as self-assessments and surveillances

The Q&PA program includes the identification and control of items and equipment for sampling control and analysis. Additional site-specific requirements for sampling activities at LM sites are defined in site-specific or program-specific Quality Assurance Project Plans (QAPPs) or in the *Sampling and Analysis Plan for the U.S. Department of Energy Office of Legacy Management Sites*, also called the LM Sampling and Analysis Plan (LMS/PRO/S04351). These documents provide detailed procedures for sampling environmental media in a consistent and technically defensible manner. These procedures are reviewed and updated as required to ensure the most up-to-date processes are used.

Guidelines for evaluating sample collection and field measurement activities against the requirements found in QAPPs and the LM Sampling and Analysis Plan are detailed in the *Environmental Data Validation Procedure* (LMS/PRO/S15870). Validation of environmental data is performed to determine whether data meet the specific technical and quality criteria established in the applicable quality system documents and to establish the usability and extent of bias of any data not meeting those criteria. Validation can include evaluation of all activities impacting data quality. The Standard Practice for Validation of Environmental Data, a data validation method specified in the *Environmental Procedures Catalog* (LMS/POL/S04325) includes guidelines for evaluating laboratory analyses against the requirements found in the referenced analytical procedures, the statement of work, and *Quality Systems for Analytical Services*, which is prepared and maintained by the Department of Energy Consolidated Audit Program (DOECAP).

Field quality assurance processes include:

- Completing training and qualification programs
- Following QAPPs, procedures, or the LM Sampling and Analysis Plan
- Collecting and analyzing quality control samples, including field duplicates, equipment blanks, and trip blanks
- Reviewing field documentation
- Performing independent surveillances of field activities by Q&PA staff
- Inspecting and maintaining monitoring wells

Soil and surface water samples are also collected for the DRUM Program in accordance with the *Defense-Related Uranium Mines Quality Assurance Program Plan* (LMS/DRM/S15867). Procedures for sampling and analysis are in the *Defense-Related Uranium Mines Verification and Validation Work Plan* (LMS/DRM/S13690).

LM uses contracted analytical laboratories and treatment, storage, and disposal facilities (TSDFs) when required and ensures these providers participate in DOECAP or the Mixed Analyte Performance Evaluation Program. Table 1 lists all contracted analytical laboratories and TSDFs used in 2018.

Table 1: Contracted Analytical Laboratories and TSDFs

Laboratory	Location
GEL Laboratories LLC	2040 Savage Road Charleston, SC 29407
Test America	13715 Rider Trail North Earth City, MO 63045
Paragon Analytics	225 Commerce Drive Fort Collins, CO 80524
Sanford Cohen & Associates	1608 Spring Hill Rd Suite 400 Vienna, VA 22182
ALS Global+ (Formerly Paragon Analytics)	225 Commerce Drive Fort Collins, CO 80524
ARS International LLC	2609 North River Road Port Allen, LA 70767
Test America Laboratories Inc.	4995 Yarrow Street Arvada, CO 80002
TSDF	**Location**
EnergySolutions Inc. Clive Disposal Facility	Interstate 80 Exit 49 Grantsville, UT 84029
Waste Control Specialists Disposal Facility	9998 West State Highway 176 Andrews, TX 79714

This page intentionally left blank

Appendix A

Legacy Management Sites and Related Reports and Summary of Groundwater Monitoring Program

This page intentionally left blank

Table A-1: Category 1 Sites
(Typically involves records-related activities and stakeholder support)

CERCLA/RCRA Sites
Maxey Flats, KY, Disposal Site https://www.lm.doe.gov/maxey_flats/Sites.aspx
Nevada Offsites
Chariot, AK, Site https://www.lm.doe.gov/Chariot/Sites.aspx‡
FUSRAP Sites
Acid/Pueblo Canyon, NM, Site https://www.lm.doe.gov/Acid/Sites.aspx
Adrian, MI, Site https://www.lm.doe.gov/Adrian/Sites.aspx
Albany, OR, Site https://www.lm.doe.gov/Albany/Sites.aspx
Aliquippa, PA, Site https://www.lm.doe.gov/Aliquippa/Sites.aspx
Berkeley, CA, Site https://www.lm.doe.gov/berkeley/Sites.aspx
Beverly, MA, Site https://www.lm.doe.gov/beverly/Sites.aspx
Buffalo, NY, Site https://www.lm.doe.gov/buffalo/Sites.aspx
Chicago North, IL, Site https://www.lm.doe.gov/chicago_north/Sites.aspx
Chicago South, IL, Site https://www.lm.doe.gov/chicago_south/Sites.aspx
Chupadera Mesa, NM, Site https://www.lm.doe.gov/chupadera/Sites.aspx
Columbus East, OH, Site https://www.lm.doe.gov/columbus_east/Sites.aspx
Fairfield, OH, Site https://www.lm.doe.gov/fairfield/Sites.aspx
Granite City, IL, Site https://www.lm.doe.gov/granite_city/Sites.aspx
Hamilton, OH, Site https://www.lm.doe.gov/hamilton/Sites.aspx
Indian Orchard, MA, Site https://www.lm.doe.gov/indian_orchard/Sites.aspx
Jersey City, NJ, Site https://www.lm.doe.gov/jersey_city/Sites.aspx
Madison, IL, Site https://www.lm.doe.gov/madison/Sites.aspx
New York, NY, Site https://www.lm.doe.gov/new_york/Sites.aspx
Niagara Falls Storage Site Vicinity Properties, NY, Site https://www.lm.doe.gov/niagara/vicinity/Sites.aspx
Oak Ridge, TN, Warehouses Site https://www.lm.doe.gov/oakridge/Sites.aspx
Oxford, OH, Site https://www.lm.doe.gov/oxford/Sites.aspx
Seymour, CT, Site https://www.lm.doe.gov/seymour/Sites.aspx
Springdale, PA, Site https://www.lm.doe.gov/springdale/Sites.aspx
Toledo, OH, Site https://www.lm.doe.gov/toledo/Sites.aspx
Tonawanda North, NY, Site Unit 1 https://www.lm.doe.gov/tonawanda/Sites.aspx
Tonawanda North, NY, Site Unit 2 https://www.lm.doe.gov/tonawanda/Sites.aspx
Wayne, NJ, Site https://www.lm.doe.gov/wayne/Sites.aspx

Table A-1: Category 1 Sites (continued)
(Typically involves records-related activities and stakeholder support)

MED/AEC Legacy Sites
Ashtabula, OH, Site https://www.lm.doe.gov/Ashtabula/Sites.aspx
Center for Energy and Environmental Research, PR, Site https://www.lm.doe.gov/CEER/Sites.aspx
Columbus, OH, Site https://www.lm.doe.gov/Columbus/Sites.aspx
El Verde, PR, Site https://www.lm.doe.gov/El_Verde/Sites.aspx
General Atomics Hot Cell Facility, CA, Site https://www.lm.doe.gov/general_atomic/Sites.aspx
Inhalation Toxicology Laboratory, NM, Site https://www.lm.doe.gov/ITL/Sites.aspx
Missouri University Research Reactor, MO, Site https://www.lm.doe.gov/MURR/Sites.aspx
Oxnard, CA, Site https://www.lm.doe.gov/oxnard/Sites.aspx
Vallecitos Nuclear Center, CA, Site https://www.lm.doe.gov/Vallecitos/Sites.aspx
State Water Quality Standards Site
Geothermal Test Facility, CA, Site https://www.lm.doe.gov/geothermal/Sites.aspx

Table A-2: Category 2 Sites
(Typically involves routine inspection and maintenance, records-related activities, and stakeholder support)

Site Name	Type of Data Collected					Where Data Are Reported					
	Inspection	Groundwater and/or Surface Water Monitoring	Production Water or Gas Monitoring	Chemical Inventory[a]	Other Environmental Monitoring (biological, soil, etc.)	Site Inspection Report	CERCLA Five-Year Review Report	Annual Site Inspection and Monitoring Report for UMTRCA Title I or Title II Sites	Environmental Monitoring Report[b]	EPCRA Report[a]	GEMS[c]
CERCLA/RCRA Sites											
Laboratory for Energy-Related Health Research, CA, Site https://www.lm.doe.gov/LEHR/Sites.aspx	x	x				x	x		x		x
Nevada Offsites											
Amchitka, AK, Site https://www.lm.doe.gov/Amchitka/Sites.aspx	x				x	x			x		x
Central Nevada Test Area, NV, Site https://www.lm.doe.gov/CNTA/Sites.aspx	x	x				x			x		x
Gasbuggy, NM, Site https://www.lm.doe.gov/Gasbuggy/Sites.aspx			x						x		x
Gnome-Coach, NM, Site https://www.lm.doe.gov/Gnome/Sites.aspx	x	x				x			x		x
Rio Blanco, CO, Site https://www.lm.doe.gov/Rio_Blanco/Sites.aspx		x	x						x		x
Rulison, CO, Site https://www.lm.doe.gov/Rulison/Sites.aspx		x	x						x		x
Salmon, MS, Site https://www.lm.doe.gov/salmon/Sites.aspx		x							x		x
Shoal, NV, Site https://www.lm.doe.gov/Shoal/Sites.aspx	x	x				x			x		x
UMTRCA Sites											
Ambrosia Lake, NM, Disposal Site https://www.lm.doe.gov/Ambrosia/Sites.aspx	x	x						x			x
Bluewater, NM, Disposal Site https://www.lm.doe.gov/bluewater/Sites.aspx	x	x						x			x
Burrell, PA, Disposal Site https://www.lm.doe.gov/burrell/Sites.aspx	x	x						x	x		x
Canonsburg, PA, Disposal Site https://www.lm.doe.gov/canonsburg/Sites.aspx	x	x						x	x		x
Durango, CO, Processing Site https://www.lm.doe.gov/Durango/Processing/Sites.aspx		x							x		x
Durango, CO, Disposal Site https://www.lm.doe.gov/Durango/Disposal/Sites.aspx	x	x						x	x		x
Edgemont, SD, Disposal Site https://www.lm.doe.gov/edgemont/Sites.aspx	x							x			x
Falls City, TX, Disposal Site https://www.lm.doe.gov/falls/Sites.aspx	x	x						x			x
Green River, UT, Disposal Site https://www.lm.doe.gov/green_river/Sites.aspx	x	x						x			x

Table A-2: Category 2 Sites (continued)
(Typically involves routine inspection and maintenance, records-related activities, and stakeholder support)

Site Name	Type of Data Collected					Where Data Are Reported					
	Inspection	Groundwater and/or Surface Water Monitoring	Production Water or Gas Monitoring	Chemical Inventory[a]	Other Environmental Monitoring (biological, soil, etc.)	Site Inspection Report	CERCLA Five-Year Review Report	Annual Site Inspection and Monitoring Report for UMTRCA Title I or Title II Sites	Environmental Monitoring Report[b]	EPCRA Report[a]	GEMS[c]
UMTRCA Sites (continued)											
Gunnison, CO, Processing Site https://www.lm.doe.gov/Gunnison/Processing/Sites.aspx		x							x		x
Gunnison, CO, Disposal Site https://www.lm.doe.gov/Gunnison/Disposal/Sites.aspx	x	x						x	x		x
Lakeview, OR, Processing Site https://www.lm.doe.gov/Lakeview/Processing/Sites.aspx		x									x
Lakeview, OR, Disposal Site https://www.lm.doe.gov/Lakeview/Disposal/Sites.aspx	x	x			x			x			x
L-Bar, NM, Disposal Site https://www.lm.doe.gov/Lbar/Sites.aspx	x	x			x			x			x
Lowman, ID, Disposal Site https://www.lm.doe.gov/lowman/Sites.aspx	x							x			x
Maybell, CO, Disposal Site https://www.lm.doe.gov/Maybell/Sites.aspx	x							x			x
Maybell West, CO, Disposal Site https://www.lm.doe.gov/Maybell_West/Sites.aspx	x							x			x
Mexican Hat, UT, Disposal Site https://www.lm.doe.gov/Mexican_Hat/Sites.aspx	x				x			x			x
Monument Valley, AZ, Processing Site https://www.lm.doe.gov/MonValley/Sites.aspx		x			x				x		x
Naturita, CO, Processing Site https://www.lm.doe.gov/Naturita/Processing/Sites.aspx		x									x
Naturita, CO, Disposal Site https://www.lm.doe.gov/Naturita/Disposal/Sites.aspx	x							x			x
Rifle, CO, Processing (Old) Site https://www.lm.doe.gov/Rifle/Old_Processing/Sites.aspx		x							x		x
Rifle, CO, Processing (New) Site https://www.lm.doe.gov/Rifle/New_Processing /Sites.aspx		x							x		x
Rifle, CO, Disposal Site https://www.lm.doe.gov/Rifle/Disposal/Sites.aspx	x	x						x	x		x
Riverton, WY, Processing Site https://www.lm.doe.gov/Riverton/Sites.aspx		x							x		x
Salt Lake City, UT, Processing Site https://www.lm.doe.gov/Salt_Lake/Processing /Sites.aspx											x
Salt Lake City, UT, Disposal Site https://www.lm.doe.gov/Salt_Lake/Disposal/Sites.aspx	x							x			x
Sherwood, WA, Disposal Site https://www.lm.doe.gov/sherwood/Sites.aspx	x	x			x			x	x		x

Table A-2: Category 2 Sites (continued)
(Typically involves routine inspection and maintenance, records-related activities, and stakeholder support)

Site Name	Type of Data Collected					Where Data Are Reported					
	Inspection	Groundwater and/or Surface Water Monitoring	Production Water and Gas Monitoring	Chemical Inventory[a]	Other Environmental Monitoring (biological, soil, etc.)	Site Inspection Report	CERCLA Five-Year Review Report	Annual Site Inspection and Monitoring Report for UMTRCA Title I or Title II Sites	Environmental Monitoring Report[b]	EPCRA Report[a]	GEMS[c]
UMTRCA Sites (continued)											
Shirley Basin South, WY, Disposal Site https://www.lm.doe.gov/Shirley_Basin/Sites.aspx	x	x						x			x
Slick Rock, CO, Processing Site https://www.lm.doe.gov/Slick_Rock/Processing/Sites.aspx		x							x		x
Slick Rock, CO, Disposal Site https://www.lm.doe.gov/Slick_Rock/Disposal/Sites.aspx	x							x			x
Spook, WY, Disposal Site https://www.lm.doe.gov/Spook/Sites.aspx	x							x			x
FUSRAP Sites[d]											
Bayo Canyon, NM Site https://www.lm.doe.gov/bayo/Sites.aspx											x
New Brunswick, NJ, Site https://www.lm.doe.gov/New_Brunswick/Sites.aspx											x
Painesville, OH, Site https://www.lm.doe.gov/Painesville/Sites.aspx											x
Tonawanda, NY, Site https://www.lm.doe.gov/tonawanda/Sites.aspx											x
D&D Sites											
BONUS, PR, Decommissioned Reactor Site https://www.lm.doe.gov/bonus/Sites.aspx	x					x					x
Grand Junction, CO, Site https://www.lm.doe.gov/Grand_Junction/Sites.aspx	x	x		x		x					x
Hallam, NE, Decommissioned Reactor Site https://www.lm.doe.gov/hallam/Sites.aspx	x	x				x			x		x
Piqua, OH, Decommissioned Reactor Site https://www.lm.doe.gov/Piqua/Sites.aspx	x					x					x
Site A/Plot M, IL, Decommissioned Reactor Site https://www.lm.doe.gov/SiteA_PlotM/Sites.aspx	x	x				x			x		x

Table A-2: Category 2 Sites (continued)
(Typically involves routine inspection and maintenance, records-related activities, and stakeholder support)

Site Name	Type of Data Collected					Where Data Are Reported					
	Inspection	Groundwater and/or Surface Water Monitoring	Production Water and Gas Monitoring	Chemical Inventory[a]	Other Environmental Monitoring (biological, soil, etc.)	Site Inspection Report	CERCLA Five-Year Review Report	Annual Site Inspection and Monitoring Report for UMTRCA Title I or Title II Sites	Environmental Monitoring Report[b]	EPCRA Report[a]	GEMS[c]
Nuclear Waste Policy Act Section 151 Site											
Parkersburg, WV, Disposal Site https://www.lm.doe.gov/parkersburg/Sites.aspx	x	x				x			x		x
MED/AEC Legacy Site											
Burris Park, CA, Site https://www.lm.doe.gov/BurrisPark/Sites.aspx	x					x					x

Notes:

[a] Certain sites conduct chemical inventories to ensure compliance with EPCRA. EPCRA reports are only required when a chemical is stored in an amount exceeding the associated threshold planning quantity.

[b] Types of environmental monitoring reports include:

- Verification monitoring reports
- Groundwater monitoring reports
- Postclosure inspection and monitoring reports
- Hydrologic and natural gas sampling and analysis reports

[c] GEMS (Geospatial Environmental Mapping System) https://gems.lm.doe.gov: This is a custom, web-based application to gather validated information for sites transferred to LM. Stakeholders, regulators, and project personnel can use GEMS to design interactive tabular reports, graphs, and geospatial displays. Available data include:

- Historical air monitoring locations
- Analytical chemistry data
- Groundwater depths and elevations
- Well logs and well construction data
- Georeferenced boundaries
- Site physical features
- Sampling locations

[d] The FUSRAP sites currently do not require LTS&M activities other than periodically assessing site conditions, managing site records, responding to stakeholder inquiries, and maintaining information on site fact sheets and websites. Site boundaries are provided on GEMS website.

Table A-3: Category 3 Sites
(Typically involves operation and maintenance of remedial action system, routine inspection and maintenance, records-related activities, and stakeholder support)

Site Name	Type of Data Collected					Where Data Are Reported						
	Inspection	Groundwater and/or Surface Water Monitoring	Discharge Monitoring	Other Environmental Monitoring (biological, soil, etc.)	Chemical Inventory[a]	Site Inspection Report	CERCLA Five-Year Report	Annual Site Inspection and Monitoring Report for UMTRCA Title I or Title II Sites	EPCRA Report[a]	NPDES Report	Environmental Monitoring Report[b]	GEMS[c]
CERCLA/RCRA Sites												
Fernald Preserve, OH, Site[d] https://www.lm.doe.gov/Fernald/Sites.aspx	x	x	x	x	x	x	x			x	x	x
Monticello, UT, Processing Site https://www.lm.doe.gov/Monticello/Sites.aspx	x	x				x	x				x	x
Monticello, UT, Disposal Site https://www.lm.doe.gov/Monticello/Sites.aspx	x	x				x	x				x	x
Mound, OH, Site https://www.lm.doe.gov/Mound/Sites.aspx	x	x	x		x	x	x			x	x	x
Pinellas County, FL, Site https://www.lm.doe.gov/pinellas/Sites.aspx	x	x				x					x	x
Rocky Flats Site, CO https://www.lm.doe.gov/Rocky_Flats/Sites.aspx	x	x		x	x	x	x		x		x	x
Weldon Spring, MO, Site https://www.lm.doe.gov/Weldon/Sites.aspx	x	x			x	x	x				x	x
UMTRCA Sites												
Grand Junction, CO, Processing Site https://www.lm.doe.gov/Grand_Junction_DP/Processing/Sites.aspx	x	x				x					x	x
Grand Junction, CO, Disposal Site https://www.lm.doe.gov/Grand_Junction_DP/Disposal/Sites.aspx	x	x						x			x	x
Shiprock, NM, Disposal Site https://www.lm.doe.gov/Shiprock/Sites.aspx	x	x						x			x	x
Tuba City, AZ, Disposal Site https://www.lm.doe.gov/Tuba/Sites.aspx	x	x						x			x	x

Notes:

[a] Certain sites conduct chemical inventories to ensure compliance with EPCRA. EPCRA reports are only required when a chemical is stored in an amount exceeding the associated threshold planning quantity.

[b] Types of Environmental Monitoring Reports include:

- Verification monitoring reports
- Groundwater monitoring reports
- Hydrologic and natural gas sampling and analysis reports
- Federal facility agreement quarterly reports

[c] GEMS (Geospatial Environmental Mapping System) https://gems.lm.doe.gov: This is a custom, web-based application to gather validated information for sites transferred to LM. Stakeholders, regulators, and project personnel can use GEMS to design interactive tabular reports, graphs, and geospatial displays. Available data include:

- Historical air monitoring locations
- Analytical groundwater and surface water data
- Groundwater depths and elevations
- Well logs and well construction data
- Georeferenced boundaries
- Site physical features
- Sampling locations

[d] This site has an annual Site Environmental Report as required in the *Comprehensive Legacy Management and Institutional Controls Plan* (LMS/FER/S03496). It is available on the site-specific webpage.

Table A-4. Calendar Year 2018 Groundwater Monitoring Program Summary

Site Name	Rad Monitoring[a]	Non-Rad Monitoring[b]	COCs[c]	Active Wells	POC Wells[d]	Exceedance at POC Wells
CERCLA/RCRA Sites						
Fernald Preserve, OH, Site	X	X	Alpha-chlordane, antimony, aroclor-1254, arsenic, barium, beryllium, benzene, bis(2-chloroisopropyl) ether, bis(2-ethylhexyl) phthalate, boron, bromodichloromethane, bromoform, bromomethane, cadmium, carbazole, carbon disulfide, chloroethane, chloroform, chromium (VI), cobalt, copper, fluoride, lead, manganese, mercury, methylene chloride, **molybdenum**, neptunium-237, nickel, **nitrate + nitrite**, octachlorodibenzo-*p*-dioxin, radium-226, radium-228, selenium, silver, strontium-90, **technetium-99**, thorium-228, thorium-230, thorium-232, **trichloroethene**, **total uranium**, vanadium, vinyl chloride, **zinc**, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, 4-methylphenol, 4-nitrophenol, and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin	172[e]	172[e]	Yes[e]
Monticello, UT, Disposal and Processing Sites	X	X	Arsenic, gross alpha activity, gross beta, isotopic uranium, manganese, molybdenum, nitrate, selenium, uranium, vanadium	157	0	N/A
Mound, OH, Site	X	X	Tetrachloroethene, trichloroethene, tritium, vinyl chloride, *cis*-1,2-dichloroethene, *trans*-1,2-dichloroethene	54	0	N/A
Pinellas County, FL, Site		X	Benzene, trichloroethene, vinyl chloride, 1,1-dichloroethene, 1,4-dioxane, *cis*-1,2-dichloroethene, *trans*-1,2-dichloroethene	142	0	N/A
Rocky Flats Site, CO	X	X	Volatile organic compounds, semivolatile organic compounds, metals, plutonium, americium, uranium, nitrate (for a detailed list of COCs, see the site webpage)	88	0	N/A
Weldon Spring, MO, Site	X	X	Nitrate, nitrobenzene, trichloroethene, uranium, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2,4,6-trinitrotoluene	106	0	N/A
Nevada Offsites						
Central Nevada Test Area, NV	X		Carbon-14, iodine-129, tritium	10	9	No
Gasbuggy, NM, Site	X		tritium	3	0	N/A
Gnome-Coach, NM, Site	X		Cesium-137, strontium-90, tritium	5	0	N/A
Rio Blanco, CO, Site	X		Gamma-emitting nuclides, tritium	3	0	N/A
Rulison, CO, Site	X		Gamma-emitting nuclides, tritium	1	0	N/A
Salmon, MS, Site	X	X	*cis*-1,2- dichloroethene, *trans*-1,2-dichloroethene, trichloroethene, tritium, vinyl chloride	32	0	N/A
Shoal, NV, Site	X	X	Carbon-14, iodine-129, tritium, isotopic uranium, elemental uranium, and gross alpha	13	9	No

Table A-4. Calendar Year 2018 Groundwater Monitoring Program Summary (continued)

Site Name	Rad Monitoring[a]	Non-Rad Monitoring[b]	COCs[c]	Active Wells	POC Wells[d]	Exceedance at POC Wells
UMTRCA Sites						
Ambrosia Lake, NM, Disposal Site		X	Molybdenum, nitrate + nitrite as nitrogen, selenium, sulfate, uranium	3	0	N/A
Bluewater, NM, Disposal Site		X	Molybdenum, polychlorinated biphenyls, selenium, uranium	19	5	No
Burrell, PA, Disposal Site		X	Calcium, chloride, iron, lead, magnesium, manganese, molybdenum, nitrate as nitrogen, potassium, selenium, sodium, sulfate, total dissolved solids, uranium	8	0	N/A
Canonsburg, PA, Disposal Site		X	Uranium	5	3	No[f]
Durango, CO, Disposal Site		X	Molybdenum, selenium, uranium	9	3	No
Durango, CO, Processing Site		X	**Cadmium**, **manganese**, molybdenum, selenium, **sulfate**, **uranium**	14	8	Yes[g]
Falls City, TX, Disposal Site		X	Uranium	12	0	N/A
Grand Junction, CO, Disposal Site		X	Molybdenum, nitrate as nitrogen, polychlorinated biphenyls, selenium, sulfate, total dissolved solids, uranium, vanadium	3	0	N/A
Grand Junction, CO, Processing Site		X	Ammonia (as NH_4), molybdenum, uranium	4	0	N/A
Green River, UT, Disposal Site		X	**Nitrate, sulfate, uranium**	21	6	Yes[h]
Gunnison, CO, Disposal Site		X	Calcium, chloride, iron, magnesium, manganese, potassium, sodium, sulfate, total dissolved solids, uranium	16	6	No
Gunnison, CO, Processing Site		X	**Manganese**, **uranium**	28	26	Yes[g]
Lakeview, OR, Disposal Site		X	Arsenic, cadmium, uranium	9	8	No
L-Bar, NM, Disposal Site		X	Chloride, nitrate + nitrite as nitrogen, selenium, sulfate, total dissolved solids, uranium	10	4	No
Monument Valley, AZ, Processing Site		X	Nitrate, sulfate, uranium	53	0	N/A
Naturita, CO, Processing Site		X	Arsenic, uranium, vanadium	8	0	N/A
Rifle, CO Processing (New) Site		X	Arsenic, molybdenum, nitrate as nitrogen, selenium, uranium, vanadium	16	4	No
Rifle, CO Processing (Old) Site		X	Selenium, uranium, vanadium	8	8	No
Riverton, WY, Processing Site		X	Manganese, **molybdenum**, **sulfate**, **uranium**	47	47	Yes[g]
Sherwood, WA, Disposal Site		X	Chloride, sulfate, total dissolved solids	3	0	N/A
Shiprock, NM, Disposal Site		X	Ammonium, manganese, nitrate, selenium, strontium, sulfate, uranium	128	0	N/A

Table A-4. Calendar Year 2018 Groundwater Monitoring Program Summary (continued)

Site Name	Rad Monitoring[a]	Non-Rad Monitoring[b]	COCs[c]	Active Wells	POC Wells[d]	Exceedance at POC Wells
Shirley Basin South, WY, Disposal Site	X	X	Cadmium, chromium, lead, nickel, radium-226, **radium-228**, selenium, thorium-230, uranium	14	4	Yes[i]
Slick Rock, CO, Processing Site	X	X	Benzene, manganese, **molybdenum**, **nitrate**, radium-226, radium-228, **selenium**, toluene, **uranium**	13	13	Yes[g]
Tuba City, AZ, Disposal Site		X	**Molybdenum, nitrate, selenium, uranium**	124	124	Yes[j]
D&D Sites						
Grand Junction, CO, Site		X	Manganese, **molybdenum**, **selenium**, sulfate, **uranium**	7	7	Yes[g]
Hallam, NE, Decommissioned Reactor Site	X	X	Gamma-emitting nuclides, gross alpha, gross beta, nickel-63, tritium, uranium	19	0	N/A
Site A/Plot M, IL, Decommissioned Reactor Site	X		Strontium-90, tritium	19	0	N/A
Nuclear Waste Policy Act Section 151 Site						
Parkersburg, WV, Disposal Site	X	X	Antimony, barium, beryllium, cadmium, calcium, chloride, chromium, gross alpha, gross beta, lead, magnesium, mercury, nickel, nitrate + nitrite, potassium, radium-226, radium-228, selenium, sodium, sulfate, thallium, thiocyanate, uranium, zirconium	6	0	N/A

Notes:

[a] Rad or radiation absorbed dose monitoring refers to groundwater sampling for radiological analytes (including uranium isotopes).

[b] Non-rad monitoring refers to groundwater sampling for nonradiological analytes (including elemental uranium).

[c] COCs exceeding applicable standards at POC wells during the reporting year are in **bold** type.

[d] For the purposes of this report, a POC well is an active monitoring well at which regulatory standards apply.

Reports and information documenting COC exceedances:

COCs may be exceeded at POC wells without a resultant violation; violations are conditional to the regulatory framework for each site. See the site-specific documents listed below for more information on the exceedances (available at https://www.energy.gov/lm/sites/lm-sites). See Table A-5 for data on COC exceedances at UMTRCA processing sites and D&D sites.

[e] Fernald Preserve, OH, Site: *Fernald Preserve 2018 Site Environmental Report* (May 2019). The number of wells reported includes non-DOE owned wells that are part of the monitoring program due to the location of the contaminant plume.

[f] Canonsburg, PA, Disposal Site: Regulatory framework provides for alternative concentration levels for monitoring of COCs, but there were no exceedances that met these criteria. Detailed monitoring data can be found in the *2018 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title Disposal Sites* (March 2019).

[g] See Table A-5 for exceedances at UMTRCA processing sites and D&D sites.

[h] Green River, UT, Disposal Site: *2018 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* (March 2019).

[i] Shirley Basin South, WY, Disposal Site: *2018 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title II Disposal Sites* (December 2018).

[j] Tuba City, AZ, Disposal Site: *2018 Annual Site Inspection and Monitoring Report for Uranium Mill Tailings Radiation Control Act Title I Disposal Sites* (March 2019).

Abbreviation:

N/A = not applicable

Table A-5. Data for COC Exceedances at UMTRCA Processing Sites and D&D Sites

Site Name	COC	Result[a] (mg/L)	Limit[b] (mg/L)	Analytical Data
Durango, CO, Processing Site	Cadmium	0.052	0.01	https://gems.lm.doe.gov/#site=DUP
	Manganese	5.7	1.7	
	Sulfate	8200	1500	
	Uranium	1.6	0.044	
Gunnison, CO, Processing Site	Manganese[c]	3.58	1.60	https://gems.lm.doe.gov/#site=GUP
	Uranium[c]	0.641	0.044	
	Manganese[d]	1.42	1.60	
	Uranium[d]	0.005	0.02	
Grand Junction, CO, Site (D&D Site)	Molybdenum	0.11	0.1	https://gems.lm.doe.gov/#site=GJO
	Selenium	0.025	0.01	
	Uranium	0.57	0.044	
Riverton, WY, Processing Site	Molybdenum	1.3	0.1	https://gems.lm.doe.gov/#site=RVT
	Uranium	2.2	0.044	
Slick Rock, CO, Processing Site	Molybdenum	1.9	0.1	https://gems.lm.doe.gov/#site=SRW
	Nitrate	55	44	
	Selenium	3.4	0.01	
	Uranium	0.086	0.044	

Notes:

[a] Result represents maximum concentration detected.

[b] Regulatory limits are defined in the following site-specific documents and may be a combination of risk-based limits, maximum concentration limits, alternate concentration limits, or other:

Durango, CO, Processing Site: *Ground Water Compliance Action Plan for the Durango, Colorado, UMTRA Project Site* (February 2008)

Gunnison, CO, Processing Site: *Final Groundwater Compliance Action Plan for the Gunnison, Colorado, Processing Site* (April 2010)

Grand Junction, CO, Site: *Long-Term Surveillance and Maintenance Plan for the Grand Junction, Colorado, Site* (June 2006)

Riverton, WY, Processing Site: *Final Ground Water Compliance Action Plan for the UMTRA Project Site at Riverton, Wyoming* (February 1998)

Slick Rock, CO, Processing Site: *Draft Final Ground Water Compliance Action Plan for the Slick Rock, Colorado, Processing Sites* (September 2006)

[c] Groundwater compliance monitoring results and regulatory limits for the Gunnison, CO, Processing Site.

[d] Domestic well water quality monitoring results and regulatory limits for the Gunnison, CO, Processing Site.

Abbreviation:

mg/L = milligram per liter

This page intentionally left blank