Sandia National Laboratories

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ANNUAL SITE **ENVIRONMENTAL REPORT**



U.S. DEPARTMENT OF ENERGY

NNSA National Nuclear Security Administration

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U.S. Department of Energy, National Nuclear Security Administration,
Sandia Field Office, Albuquerque, New Mexico

2017 Annual Site Environmental Report for Sandia National Laboratories, New Mexico

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for
Department of Energy
National Nuclear Security Administration
Sandia Field Office

Abstract

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's (DOE's), National Nuclear Security Administration. The National Nuclear Security Administration's Sandia Field Office administers the contract and oversees contractor operations at Sandia National Laboratories, New Mexico.

DOE and its management and operating contractor for Sandia are committed to safeguarding environmental protection, compliance, and sustainability and to ensuring the validity and accuracy of the monitoring data presented in this *Annual Site Environmental Report*. This report summarizes data and the compliance status of sustainability, environmental protection, and monitoring programs at Sandia National Laboratories, New Mexico, during 2017. Environmental topics include air quality, ecology, environmental restoration, oil storage, site sustainability, terrestrial surveillance, waste management, water quality, and implementation of the National Environmental Policy Act. This report is prepared in accordance with and as required by DOE O 231.1B, Admin Change 1, *Environment, Safety, and Health Reporting* and has been approved for public distribution.

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Note to the Reader

The Sandia National Laboratories, New Mexico, *Annual Site Environmental Report* presents summary data regarding environmental performance and compliance with environmental standards and requirements. In addition, the U.S. Department of Energy views this document as a valuable tool for maintaining a dialogue with our community about the environmental health of this site and the commitment to protect our valuable resources. We continually strive to improve the quality of the contents of this report as well as to include information that is important to you. Please provide feedback, comments, questions, or requests for copies of this report to:

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The Sandia National Laboratories, New Mexico, *Annual Site Environmental Report* can be found at the following website:
http://www.sandia.gov/news/publications/environmental/index.html

Contents

List of Figures v

List of Tables v

Acronyms and Abbreviations viii

Units of Measure ix

Executive Summary 1

Chapter 1. Introduction 6

1.1 History 6
1.2 Mission 7
1.2.1 Operating Contract and DOE Directives 7
1.3 Location Description 8
1.4 Activities and Facilities at SNL/NM 10
1.4.1 The Technical Areas 10
1.4.2 Other Facilities and Areas 11
1.5 Environmental Setting 11
1.5.1 Geology and Hydrology 12
1.5.2 Ecology 14
1.5.3 Climate 16

Chapter 2. Compliance Summary 17

2.1 Environmental Management System 18
2.2 Site Sustainability Plan 19
2.3 Environmental Performance Measures 20
2.4 National Environmental Policy Act 20
2.5 Clean Air Act 20
2.5.1 Fugitive Dust Permitting 21
2.5.2 New Source Performance Standard Requirements 21
2.5.3 New Source Review Requirements 21
2.5.4 Open-Burn Permitting 21
2.5.5 Ozone-Depleting Substances Requirements 21
2.5.6 Radionuclide Emissions 22
2.5.7 Reciprocating Internal Combustion Engine NESHAP Requirements 22
2.5.8 Title V Operating Permit 22
2.6 Cultural and Natural Resources 22
2.6.1 Cultural Resources Acts 22
2.6.2 Bald and Golden Eagle Protection Act 24
2.6.3 Endangered Species Act 24
2.6.4 Fish and Wildlife Conservation Act 24
2.6.5 Floodplain Management 24
2.6.6 Memorandum of Understanding between the U.S. Department of Energy and the U.S. Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds" 24
2.6.7 Migratory Bird Treaty Act 24
2.6.8 New Mexico State Statutes Related to Natural Resources 25
2.6.9 Planning for Federal Sustainability in the Next Decade 25
2.6.10 Protection of Wetlands 25
2.6.11 Sikes Act 25
2.7 Comprehensive Environmental Response, Compensation, and Liability Act 25
2.8 Chemical Management 26
2.8.1 Emergency Planning and Community Right-to-Know Act 26
2.8.2 Toxic Substances Control Act 27
2.8.3 Federal Insecticide, Fungicide, and Rodenticide Act 27

2.9 Hazardous Waste 28
2.9.1 Federal Facility Compliance Act 28
2.9.2 Resource Conservation and Recovery Act and New Mexico Hazardous Waste Act 28
2.10 Pollution Prevention and Waste Minimization 29
2.10.1 Pollution Prevention Goals of Site Sustainability Plan 29
2.10.2 Pollution Prevention Act 29
2.11 Radiation Protection and the Atomic Energy Act 29
2.12 Water Quality and Protection 31
2.12.1 Clean Water Act 31
2.12.2 Safe Drinking Water Act 32
2.13 Energy Independence and Security Act 33
2.14 Department of Energy Directives 34
2.15 Audits, Appraisals, and Inspections in 2017 34
2.16 Summary of Reporting Requirements 34
2.17 Occurrence Reporting in 2017 35
2.17.1 DOE O 232.2 Reportable Occurrences 36
2.18 Summary of Environmental Permits 37

Chapter 3. Environmental Programs Information 38
3.1 Chemical Information System and Chemical Exchange Program 39
3.2 Environmental Education Outreach Program 40
3.3 Environmental Life-Cycle Management Program 40
3.4 Environmental Restoration Operations 40
3.4.1 Waste Cleanup and Site Closures 41
3.4.2 Groundwater Monitoring at Areas of Concern 42
3.5 Long-Term Stewardship Program 42
3.5.1 Chemical Waste Landfill Post-Closure Care 43
3.5.2 Corrective Action Management Unit Post-Closure Care 44
3.5.3 Mixed Waste Landfill Long-Term Monitoring and Maintenance 45
3.5.4 Long-Term Monitoring and Maintenance of Additional Solid Waste Management Units Granted Corrective Action Complete with Controls 46
3.5.5 Groundwater Monitoring 46
3.6 National Environmental Policy Act Program 47
3.6.1 National Environmental Policy Act Activities in 2017 48
3.6.2 Site-Wide Environmental Impact Statement 49
3.7 Waste Management Program 49
3.7.1 2017 Waste Management Activities 51
3.7.2 Radioactive Waste and Mixed Waste 51
3.7.3 Hazardous Waste 53
3.7.4 Other Regulated Waste 53
3.8 Materials Sustainability and Pollution Prevention Program 54
3.8.1 Waste Minimization 54
3.8.2 Sustainable Acquisition 55
3.8.3 Electronic Stewardship 55
3.8.4 Recycling of Solid Waste 56
3.8.5 Awareness and Outreach 56

Chapter 4. Terrestrial Surveillance Program 57
4.1 Regulatory Criteria 57
4.2 Sample Locations and Media 58
4.3 Field Methods, Analytical Parameters, and Quality Control Procedures 62
4.4 Sample Results Analysis and Methodology 62
4.4.1 Statistical Analysis and Methodology 62
4.4.2 Other Standards for Comparison 63

4.5 Summary of Terrestrial Surveillance Program Activities and Results in 2017 64
4.5.1 Radiological Results 64
4.5.2 Nonradiological Results 66
4.5.3 Additional Activities and Variances 67

Chapter 5. Air Quality Compliance and Related Programs 68
5.1 Air Quality Compliance Program 68
5.1.1 Stationary Sources 69
5.1.2 Stratospheric Ozone Protection 70
5.1.3 Vehicles 70
5.1.4 Open-Burn Permits 70
5.1.5 Fugitive Dust 71
5.2 Ambient Air Surveillance Program 71
5.2.1 Monitoring Stations 72
5.2.2 Ambient Air-Monitoring Results for Fiscal Year 2017 72
5.3 Meteorology Program 73
5.3.1 Meteorological Monitoring Network 74
5.3.2 Meteorological Monitoring Results 74
5.3.3 Wind Analysis 75
5.4 Radionuclide National Emission Standards for Hazardous Air Pollutants Program 77
5.4.1 Compliance Reporting 78
5.4.2 Facilities 78
5.4.3 Assessment of Potential Dose to the Public 80
5.4.4 Dose Assessment Results 82

Chapter 6. Water Quality Programs 85
6.1 Environmental Release, Response, and Reporting Program 86
6.1.1 Events Reported to the New Mexico Environment Department 86
6.1.2 Events Categorized as a DOE Reportable Occurrence 86
6.2 Oil Storage Program 86
6.3 Safe Drinking Water Protection Program 87
6.3.1 Summary of Wastewater Monitoring Results and Inspection Activities in 2017 87
6.4 Stormwater Program 88
6.4.1 Surface Waters and Stormwater Drainage 88
6.4.2 National Pollutant Discharge Elimination System Permitting 90
6.4.3 Stormwater Sampling and Parameters 92
6.4.4 Summary of Stormwater Program Activities in 2017 94
6.4.5 Stormwater Data Quality Assurance 96
6.5 Surface Discharge Program 96
6.5.1 Surface Discharge Approvals 96
6.5.2 Activities at Evaporation Lagoons 96
6.6 Wastewater Discharge Program 97
6.6.1 Albuquerque Bernalillo County Water Utility Authority Permitting and Reporting 98
6.6.2 Wastewater Monitoring Stations and Sampling Parameters 99
6.6.3 Technical Area V Wastewater Radiological Screening 100
6.6.4 Sanitary Sewer System Releases in 2017 100

Chapter 7. Ecology Program 102
7.1 Vegetation Surveillance 103
7.1.1 Vegetation Monitoring Strategy 103
7.1.2 Vegetation Monitoring in 2017 104
7.2 Herpetofauna Surveillance 104
7.2.1 Drift Fence Trapping 104
7.2.2 Herpetofauna Survey Results 105
7.3 Remote Camera Surveillance 107
7.3.1 Remote Camera Stations 107

7.3.2 Madera Canyon Guzzler Results 107
7.3.3 Range Canyon Guzzler Results 110
7.4 Avian Surveillance 112
7.4.1 Bird Surveys Using Transects 112
7.4.2 Bird Banding Monitoring 116
7.5 Eco Ticket System for Monitoring Wildlife 118
7.5.1 Eco Ticket Responses 119
7.5.2 Results 119
7.6 Ecological Restoration 121
7.6.1 Ecological Restoration Support Role 121
7.7 Threatened, Endangered, and Sensitive Species 122

Chapter 8. Quality Assurance 125
8.1 Environmental Monitoring for Quality Assurance 125
8.1.1 Sample Management Office 126
8.1.2 Contract Laboratory Selection 126
8.1.3 Quality Control for Samples 126
8.1.4 Data Validation and Records Management 127
8.2 Sample Management Office Activities in 2017 127
8.2.1 Sample Handling and Analyses 127
8.2.2 Laboratory Quality Assurance Assessments and Validation 128
8.2.3 Quality Assurance Audits 128

Chapter 9. Permits, Regulations, and Standards for Environmental Programs 129
Appendix A. 2017 Summary of Groundwater Monitoring 138
Appendix B. 2017 Terrestrial Surveillance Analytical Results 144
Appendix C. FY 2017 Ambient Air Surveillance Results 171
Appendix D. 2017 Wastewater Monitoring Results 287
Appendix E. 2017 Stormwater Sampling Results 352
Notes: Appendices SNL/NM 361
Glossary 363
References 371

List of Figures

Figure 1-1. Sandia National Laboratories, New Mexico, including technical areas and permitted areas 8
Figure 1-2. State of New Mexico, including counties 9
Figure 1-3. Faults and hydrogeologically distinct areas 14
Figure 4-1. Terrestrial Surveillance Program on-site and perimeter sampling locations 58
Figure 4-2. Terrestrial Surveillance Program off-site sampling locations 59
Figure 4-3. TLD exposure rates by fiscal year and location classification 65
Figure 5-1. Clean air network of meteorological towers and ambient air-monitoring stations 71
Figure 5-2. Annual wind roses at towers A36, CL1, and SC1 76
Figure 5-3. Annual wind roses for daytime and nighttime frequency at tower A36 76
Figure 5-4. Locations of facilities that provided radionuclide inventories 78
Figure 5-5. Atmospheric releases of argon-41 and tritium, 2013–2017 81
Figure 6-1. Multi-Sector General Permit stormwater sampling point locations 89
Figure 6-2. Northern Municipal Separate Storm Sewer System drainage areas and monitoring locations 93
Figure 6-3. Wastewater monitoring station locations 98
Figure 7-1. Temporarily closed funnel traps along a drift fence in a desert grassland habitat 105
Figure 7-2. Eastern Collared Lizard (Crotaphytus collaris) (left) and Striped Whipsnake (Masticophis taeniatus) in funnel traps at the SC Dome site 105
Figure 7-3. An American hog-nosed skunk (Conepatus leuconotus) at the Madera Canyon Guzzler 108
Figure 7-4. Black bears (Ursus americanus) at the Madera Canyon Guzzler 109
Figure 7-5. A mountain lion (Puma concolor) at the Madera Canyon Guzzler 109
Figure 7-6. Mule deer (Odocoileus hemionus) at the Madera Canyon Guzzler 110
Figure 7-7. A mule deer (Odocoileus hemionus) at the Range Canyon Guzzler 111
Figure 7-8. A pair of coyotes (Canis latrans) were documented at the Range Canyon Guzzler throughout 2017 112
Figure 7-9. A bobcat (Felis rufus) at the Range Canyon Guzzler 112
Figure 7-10. Linear trend of all birds captured during the MAPS monitoring project, 2003–2017 117
Figure 7-11. Lazuli Bunting (Passerina amoena) 117
Figure 7-12. Linear trend of all birds captured during the fall migration monitoring project, 2003–2017 118

List of Tables

Table 1-1. Plants and animals commonly identified in various life zones across KAFB 15
Table 2-1. Site Sustainability Plan performance status for key areas 19
Table 2-2. Applicable EPCRA reporting requirements, 2017 27
Table 2-3. Environmental-related external audits, appraisals, inspections, and violations, 2017 34
Table 2-4. Reporting requirements to outside agencies (other than DOE) for releases of pollutants or hazardous substances 34
Table 2-5. Occurrence reports per DOE O 232.2, 2017 36
Table 3-1. NEPA reviews completed in 2017 48
Table 3-2. Waste shipped by waste management facilities, 2017 49
Table 3-3. Waste recycled, 2017 50
Table 4-1. On-site terrestrial surveillance locations, sample media, and parameters 60
Table 4-2. Perimeter terrestrial surveillance locations, sample media, and parameters 61
Table 4-3. Off-site terrestrial surveillance locations, sample media, and parameters 61
Table 4-4. Priority decision matrix and actions 63
Table 4-5. Various reference values for metals in soil 63
Table 4-6. Radiological summary statistics for Priority-3 sample locations, 2017 64
Table 4-7. TLD exposure rate summary statistics by location classification, FY 2001–2017 65
Table 4-8. Metals summary statistics for Priority-2 and Priority-3 sample locations, 2017 66

Table 5-1. Permitted and registered stationary source emission data, 2017 69
Table 5-2. Monthly and annual averages for $PM_{2.5}$, FY 2017 72
Table 5-3. Volatile organic compound average concentrations, FY 2017 73
Table 5-4. Annual climatic summary from Tower A36, 2017 74
Table 5-5. Variations and extremes in meteorological measurements across the tower network, 2017 75
Table 5-6. Predominant wind directions by tower, 2017 77
Table 5-7. Radiological dose and release reporting, 2017 77
Table 5-8. Summary of radionuclide releases from NESHAP sources, 2017 79
Table 5-9. Annual source-specific effective dose equivalent for off-site receptors, 2017 82
Table 5-10. Annual source-specific effective dose equivalent for on-site receptors, 2017 82
Table 5-11. Calculated dose assessment results for on-site and off-site receptors and for collective populations, 2017 83
Table 6-1. Sites with coverage under the Multi-Sector General Permit and associated stormwater sampling points 91
Table 6-2. Multi-Sector General Permit stormwater sampling requirements and benchmark values 92
Table 6-3. Discharge Permit (DP)-530 monitoring and reporting requirements 97
Table 6-4. Wastewater discharge permits and station characteristics 99
Table 7-1. Sampling locations with vegetation habitat 103
Table 7-2. Herpetofauna site captures by trapping period, 2017 106
Table 7-3. Madera Canyon Guzzler species occurrences, 2017 107
Table 7-4. Range Canyon Guzzler species occurrences, 2017 110
Table 7-5. Winter bird survey species detections, 2017 113
Table 7-6. Breeding bird survey species detections, 2017 114
Table 7-7. Eco Tickets by number and type, 2013–2017 119
Table 7-8. Eco Tickets for snake species, 2014–2017 120
Table 7-9. Threatened, endangered, and other sensitive species occurring or potentially occurring in Bernalillo County, New Mexico 123
Table 9-1. Summary of environmental permits and registrations in effect, 2017 129
Table 9-2. Summary of compliance history with regard to mixed waste 134
Table 9-3. Quantity of mixed waste subject to the Federal Facility Compliance Order, end of FY 2017 137

Table A-1. Sample collection dates for groundwater quality monitoring at SNL/NM, 2017 139
Table A-2. Summary of SNL/NM groundwater monitoring analytical results, 2017 140
Table A-3. Summary of exceedances[a] for SNL/NM groundwater monitoring wells and springs sampled, 2017 142
Table B-1. Summary of radiological results in soil, 2017 145
Table B-2. Summary of radiological results in sediment, 2017 149
Table B-3. Summary of thermoluminescent dosimeter measurements, fiscal year 2017 151
Table B-4. Summary of nonradiological results in soil, 2017 152
Table B-5. Summary of nonradiological results in sediment, 2017 163
Table B-6. Summary of perchlorate results in soil, 2017 168
Table B-7. Summary of high explosives results in soil, 2017 169
Table C-1. Summary of ambient air metals analysis, FY 2017 172
Table C-2. Summary of ambient air radiological analysis, FY 2017 199
Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 226
Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 288
Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017 295
Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 300
Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 312

Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 320
Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017 327
Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 332
Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 340
Table E- 1. Multi-Sector General Permit stormwater sampling results, 2017 353
Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 355

Acronyms and Abbreviations

Term	Definition
A	
ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AGMR	*Annual Groundwater Monitoring Report*
B	
BSG	Burn Site Groundwater
C	
CFR	Code of Federal Regulations
CFU	colony-forming unit
CO	carbon monoxide
D	
DOE	U.S. Department of Energy
DP	discharge permit
E	
EISA	Energy Independence and Security Act
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
EPEAT	Electronic Product Environmental Assessment Tool
ES&H	Environment, Safety, and Health
F	
FY	fiscal year
I	
ISO	International Organization for Standardization
K	
KAFB	Kirtland Air Force Base
M	
MAPS	Monitoring Avian Productivity and Survivorship
MCL	maximum contaminant level
Module IV	Hazardous and Solid Waste Amendments Module
MS4	Municipal Separate Storm Sewer System
MSGP	Multi-Sector General Permit
N	
N/A	not applicable
ND	not detected
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPN	nitrite plus nitrate
NTESS	National Technology & Engineering Solutions of Sandia, LLC
O	
Order, the	Compliance Order on Consent
P	
PCB	polychlorinated biphenyl
Permit, the	Resource Conservation and Recovery Act Facility Operating Permit
pH	potential of hydrogen
PL	Public Law
PM_{10}	particulate matter that has a diameter equal to or less than 10 microns
R	
RCRA	Resource Conservation and Recovery Act
S	
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories, New Mexico
SO_2	sulfur dioxide
SWMU	Solid Waste Management Unit
SWSP	stormwater sampling point
T	
TA	technical area
TCE	trichloroethene
TLD	thermoluminescent dosimeter
U	
U.S.	United States
USAF	U.S. Air Force
USC	United States Code
V	
VOC	volatile organic compound

Units of Measure

Unit	Definition
°C	degree Celsius
Ci/year	curies per year
cm	centimeter
°F	degrees Fahrenheit
km	kilometer
µ	micron
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
m	cubic meter
mb	millibar
mg/kg	milligrams per kilogram
mg/L	milligrams per liter

Unit	Definition
mL	milliliter
mph	miles per hour
mrem	millirem
mrem/year	millirems per year
mR/year	milliroentgen per year
m/sec	meters per second
pCi/g	picocuries per gram
person-rem	person-roentgen equivalent, man
person-rem/year	person-roentgen equivalent, man per year
tpy	tons per year

Executive Summary



Sandia National Laboratories, New Mexico

Sandia National Laboratories (hereinafter referred to as Sandia) is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the DOE's National Nuclear Security Administration. DOE and its management and operating contractor for Sandia are committed to safeguarding environmental protection, compliance, and sustainability and to ensuring the validity and accuracy of the monitoring data presented in this report.

The DOE National Nuclear Security Administration Sandia Field Office administers the contract and oversees contractor operations at the site. This *Annual Site Environmental Report* was prepared in accordance with and as required by DOE O 231.1B, Admin Change 1, *Environment, Safety, and Health Reporting* and is approved for public release.

This report summarizes the environmental protection, restoration, and monitoring programs in place at Sandia National Laboratories, New Mexico (SNL/NM) during calendar year 2017. While all 2017 program activities were performed continuously, they are reported in this *Annual Site Environmental Report* on a calendar year basis unless noted otherwise (programs based on the fiscal year operate from October 1 through September 30, annually).

This report also discusses compliance with environmental statutes, regulations, and DOE directives; permit provisions; and it highlights significant environmental program efforts and accomplishments. Sandia environmental and waste management programs comply with the requirements of federal, state, and local environmental requirements, as well as with DOE directives in the Sandia Prime Contract.

This *Annual Site Environmental Report* is a key component of DOE efforts to keep the public informed about environmental conditions throughout the DOE complex.

Environmental Management System

Sandia has a robust Environmental Management System in place to help personnel fulfill their responsibility to protect the environment, prevent pollution, and conserve natural resources. The system is International Organization for Standardization (ISO) 14001 certified for Sandia's primary operating locations. In 2017, environmental management and work processes continued to be improved and an International Organization for Standardization 14001 surveillance audit was completed. See Section 2.1 for more information.

Site Sustainability Plan

Sustainability strategies and goals are defined in the annual Site Sustainability Plan. As of fiscal year 2017, Sandia programs are meeting or exceeding sustainability goals in several key areas. See Section 2.2 for more information.

Environmental Performance Measures

Environmental performance and performance measures are assessed as part of Sandia's Performance Evaluation Measurement Plan. In the most recent evaluation, the Sandia earned a site-wide excellent rating, exceeded expectations in several areas, and overall met expectations for delivering effective, efficient, and responsive environment, safety, and health management and processes. See Section 2.3 for more information.

Chemical Information System and Chemical Exchange Program

The Chemical Information System is a comprehensive chemical information management tool that provides workplace chemical container tracking as well as information about the chemical hazards found in associated Safety Data Sheets. The Chemical Exchange Program was developed to reduce the number of usable chemicals disposed of as waste, resulting in cost savings for both new acquisitions and disposals. ChemPro, an acquisition request module, was added to improve chemical management by requiring approval to purchase chemicals. See Section 3.1 for more information.

Environmental Education Outreach Program

Environmental Education Outreach Program personnel interact with the community through various events and provide environmental information to Sandia personnel. Using an integrated approach, program personnel communicate environmental awareness via newsletters, awareness campaigns, and outreach events. In 2017, Outreach Program personnel participated in several outreach and awareness events. See Section 3.2 for more information.

Environmental Life-Cycle Management Program

Environmental Life-Cycle Management Program personnel ensure long-term protection of human health and the environment. This is achieved through implementing environmental life-cycle management practices that focus on sustainable use and protection of natural and cultural resources. In 2017, Environmental Life-Cycle Program personnel reviewed 46 projects and documented the environmental impacts. See Section 3.3 for more information.

Environmental Restoration Operations

Environmental Restoration Operations personnel identify, assess, and remediate sites potentially contaminated by past spill, release, or disposal activities. In 2017, 11 Environmental Restoration sites remain that require corrective action, including three groundwater areas of concern, three active test facilities, and five sites that meet New Mexico Environment Department (NMED) criteria for Corrective Action Complete. See Section 3.4 for more information.

Long-Term Stewardship Program

The Long-Term Stewardship Program provides protection for human health and the environment from hazards associated with residual contamination at legacy sites and minimizes Sandia

environmental liability. Long-Term Stewardship Program personnel conduct compliance oversight, institutional control, and stakeholder involvement activities. In 2017, Long-Term Stewardship compliance oversight activities encompassed various types of monitoring, including groundwater monitoring at legacy sites to meet regulatory requirements. Inspections performed and site conditions observed at legacy sites verified that the administrative and physical institutional controls in place are effectively providing continued protection for human health and the environment. Post-closure care activities are conducted at two permitted units: the Chemical Waste Landfill and the Corrective Action Management Unit. Long-term monitoring and maintenance activities are conducted at the Mixed Waste Landfill and numerous solid waste management units (SWMU) and areas of concern. See Section 3.5 for more information.

National Environmental Policy Act Program

National Environmental Policy Act (NEPA) Program personnel and DOE coordinate compliance with NEPA and the National Historic Preservation Act for all Sandia locations. In 2017, NEPA Program personnel reviewed a total of 1,580 proposed projects. To support mission activities, 107 NEPA checklists were transmitted to DOE for review and determination. See Section 3.6 for more information. Also in 2017, NEPA Program personnel continued to assist DOE in the development of a new SNL/NM Site-Wide Environmental Impact Statement.

Waste Management Program

Waste at SNL/NM is managed at the following permitted units: the Hazardous Waste Handling Unit, the Thermal Treatment Unit, the Radioactive and Mixed Waste Management Unit, the Auxiliary Hot Cell Unit, and five Manzano Storage Bunkers. Two additional bunkers are used for radioactive storage. Also, recyclable and nonrecyclable solid waste generated by operations is collected and processed at the Sandia Solid Waste Collection and Recycling Center. See Section 3.7 for more information.

In January and February 2017, representatives of the NMED conducted an annual no-notice hazardous waste compliance evaluation inspection and issued one Notice of Violation. See Chapter 2 and Chapter 3 for more information.

Materials Sustainability and Pollution Prevention Program

Materials Sustainability and Pollution Prevention Program personnel provide assessment, guidance, and assistance for implementing measures that reduce resource use, reduce generated waste, and enhance the overall efficiency of processes and organizations at SNL/NM. Additionally, program personnel worked with several facilities to investigate or initiate new recycling avenues for certain waste streams. See Section 3.8 for more information.

Terrestrial Surveillance Program

Terrestrial Surveillance Program personnel collect and analyze surface soil, arroyo and river sediment, and vegetation samples to determine whether there has been a radiological or nonradiological release to the environment due to Sandia operations. In addition to collecting environmental media (soil, sediment, and vegetation), thermoluminescent dosimeter (TLDs) are used to measure ambient external gamma radiation levels. These surveillance activities are conducted at designated locations on and near SNL/NM. Results of the 2017 sampling events are consistent with previous years. See Chapter 4 for more information.

Air Quality Compliance Program

Air Quality Compliance Program personnel support Sandia in complying with air quality regulations promulgated by the local and federal governments in accordance with the Clean Air Act and the Clean Air Act Amendments of 1990. Program personnel maintain numerous permits from the City of Albuquerque, including open burning and detonation permits, stationary source registrations and

permits, and fugitive dust control construction and demolition permits. See Chapter 5 and Chapter 9 for more information.

Ambient Air Surveillance Program

Ambient Air Surveillance Program personnel measure ambient air quality at six locations throughout SNL/NM for particulate matter and volatile organic compounds (VOCs). See Section 5.2 for more information.

Meteorology Program

Meteorology Program personnel provide decision support services, data, and analyses to all programs and operations that require atmospheric information. Monitoring activities within the program provide data that are used to assist with health and safety operations, emergency management and response, regulatory permitting and reporting processes, and general research and development activities. See Section 5.3 for more information.

National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities

Subpart H of the National Emission Standards for Hazardous Air Pollutants regulates radionuclide air emissions from DOE facilities, with the exception of naturally occurring radon. Facilities that have the potential to release emissions to the environment are evaluated annually. In 2017, the primary radionuclides released from SNL/NM facilities were argon-41 and tritium. Calculated doses were well below the 10 mrem/year standard set by the U.S. Environmental Protection Agency (EPA) and DOE. See Section 5.4 for more information.

Oil Storage Program

The Spill Prevention Control and Countermeasures Plan (required under the Clean Water Act) describes the oil storage facilities on-site and the mitigation controls in place to prevent inadvertent discharges of oil. Forty-six stationary aboveground storage tanks and three underground storage tanks are currently operated at SNL/NM. Additional oil storage capacity in 55-gallon drums, mobile and portable containers, mobile refuelers, and oil-filled operational equipment (transformers, hydraulic elevators, etc.) occurs throughout the site on an as needed basis.

Facilities at SNL/NM subject to the requirements in the Spill Prevention Control and Countermeasures Plan include those having the following types of oil storage containers: aboveground storage tanks, underground storage tanks, generator base tanks, drum storage areas, mobile or portable containers, mobile refuelers, and oil-filled operational equipment (transformers, hydraulic elevators, etc.). See Section 6.2 for more information.

Safe Drinking Water Protection Program

Safe Drinking Water Protection Program personnel ensure the availability of safe drinking water for individuals at Sandia-operated facilities. Kirtland Air Force Base (KAFB) supplies water to the DOE-owned SNL/NM drinking water distribution system. The KAFB water system is registered with the NMED Drinking Water Bureau as a nontransient community Public Water System. Because KAFB is identified as the sole registered party, the DOE-owned and Sandia personnel-operated and maintained distribution system on KAFB is regulated by the NMED Drinking Water Bureau as a component of the KAFB Public Water System. See Section 6.3 for more information.

Environmental Release Response and Reporting Program

Environmental Release Response and Reporting Program personnel are contacted in the event of an accidental spill or any type of release to the environment. In 2017, one accidental release to the environment was reported to NMED, and one accidental release met the criteria for a DOE reportable occurrence near miss. See Section 6.3.1 for more information.

Stormwater Program

Stormwater Program personnel ensure compliance with three EPA National Pollutant Discharge Elimination System (NPDES) permits: the Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer Permit, the Multi-Sector General Permit, and the Construction General Permit. Compliance with the permits included the following activities: preparing and maintaining Stormwater Pollution Prevention Plans and a Stormwater Management Program Plan, conducting site inspections, completing annual reports, and collecting samples for visual observation and laboratory analysis at the designated stormwater sampling points. In 2017, NPDES monitoring data was reviewed and submitted to EPA in discharge monitoring reports, as required. Multi-Sector General Permit stormwater monitoring was performed from July 1 through October 31, 2017, when there was adequate runoff to collect required samples. Municipal Separate Storm Sewer System stormwater monitoring was performed from July 1, 2016, through June 30, 2017, following qualifying storm events. See Section 6.4 for more information.

Surface Discharge Program

All water that will be released to the ground surface, either directly or to lined containments, is defined as a surface discharge. These discharges must meet State of New Mexico surface water quality standards. All internally approved discharges in 2017 met New Mexico Water Quality Control Commission standards. Routine surface discharges are made to two evaporation lagoons that service the pulsed power facilities under an existing discharge permit. In 2017, all permit requirements were met for both NMED-permitted lagoons. See Section 6.5 for more information.

Wastewater Discharge Program

Wastewater is discharged from six on-site outfalls permitted by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA). Wastewater monitoring is conducted to ensure that all discharges meet the standards set by the ABCWUA's Sewer Use and Wastewater Control Ordinance requirements. In 2017, there was one Notice of Violation. All discharge parameters at the other permitted locations were met. See Section 6.6 for more information.

Ecology Program

Ecology Program personnel monitor biota as an element of the overall environmental monitoring process and to support compliance with wildlife regulations and laws via biological evaluations and surveys. Ecological data on plants and wildlife are collected to support documentation, land-use decisions, and ecological and wildlife awareness campaigns to ensure safe work environments and sustainable decision-making strategies. See Chapter 7 for more information.

Quality Assurance

All environmental monitoring (which includes sampling) is conducted in accordance with program-specific sampling and analysis plans, work plans, or quality assurance plans, which contain applicable quality assurance elements. These documents meet appropriate federal, state, and local requirements for conducting sampling and analysis activities. Personnel in various programs collect environmental samples and analyze the samples for radiological and nonradiological contaminants. See Chapter 8 for more information.

Chapter 1. Introduction



Sunrise over the Sandia foothills

OVERVIEW ■ Sandia National Laboratories, located on KAFB in Albuquerque, New Mexico, was designated a national laboratory in 1979. Operating for the National Nuclear Security Administration, the core mission is to provide science and engineering support for the nation's nuclear weapons stockpile. In addition, Laboratories personnel collaborate with government agencies, the industrial sector, and universities to develop and commercialize new technologies.

This *Annual Site Environmental Report* was prepared in accordance with and as required by DOE per DOE O 231.1B, Admin Change 1, *Environment, Safety, and Health Reporting*. This report describes the environmental protection programs currently in place at Sandia National Laboratories, New Mexico (SNL/NM). This report is made available to the public in electronic form.

Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the DOE's National Nuclear Security Administration. The DOE National Nuclear Security Administration Sandia Field Office administers the contract and oversees contractor operations at the site. Building on its original nuclear weapons mission, the Laboratories maintain research and development programs to support a wide variety of national security missions, resulting in technologies for nonproliferation, homeland security, energy and infrastructure, and defense systems and assessments.

While all 2017 program activities were performed continuously, they are reported in this *Annual Site Environmental Report* on a calendar year basis unless otherwise noted (programs based on the fiscal year operate from October 1 through September 30, annually).

1.1 History

Laboratory operations began in 1945 as Z Division, the ordnance design, testing, and assembly arm of Los Alamos Scientific Laboratory (now Los Alamos National Laboratory). The division moved to Sandia Base (now merged into KAFB), located on the perimeter of Albuquerque, to be near an airfield and to work closely with the military. Z Division became a separate branch of the Los Alamos Scientific Laboratory in 1948, and was renamed Sandia Laboratory at that time. On November 1, 1949, Sandia Corporation, a wholly owned subsidiary of Western Electric, began

managing Sandia Laboratory. In 1979, Congress recognized the facility as a national laboratory. From 1993 to mid-2017, Sandia was a wholly owned subsidiary of Martin Marietta (Lockheed Martin Corporation). In May 2017, the Laboratories became a wholly owned subsidiary of Honeywell International Inc.



Sandia National Laboratories designation

1.2 Mission

Sandia National Laboratories—providing the synergy and interdependence between our nuclear deterrence mission and broader national security missions to forge a robust capability base and empower us to solve complex national security problems—accomplishes our mission by anticipating and resolving emerging national security challenges, innovating and discovering new technologies to strengthen our nation's technological superiority, creating value through products and services that solve important national security challenges, and informing the national debate for which technology policy is critical to preserving security and freedom throughout the world. Information about recent technologies developed at Sandia National Laboratories can be found at the following website:

http://www.sandia.gov/news/index.html

1.2.1 Operating Contract and DOE Directives

The Prime Contract for management and operations of Sandia defines the corporation's contractual obligations. The DOE directives that pertain to environmental protection and management are as follows:

- DOE O 231.1B, Admin Change 1, *Environment, Safety, and Health Reporting*, ensures that DOE receives information about the events that have affected or could adversely affect the health, safety, and security of the public or workers, the environment, the operations of DOE facilities, or DOE credibility. This Annual Site Environmental Report is prepared in accordance with this directive.
- DOE O 232.2 Admin. Change 1, *Occurrence Reporting and Processing of Operations Information*, requires timely notification to the DOE complex about events that could adversely affect the health and safety of the public or workers, the environment, DOE missions, or DOE's credibility.
- DOE O 435.1 Change 1, *Radioactive Waste Management*, ensures that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety and of the environment. Under this directive, contractors who manage and operate DOE facilities are required to plan, document, execute, and evaluate the management of DOE radioactive waste.

- DOE O 436.1, *Departmental Sustainability*, places Environmental Management Systems and site sustainability at the forefront of environmental excellence. Sandia personnel implement this directive through an ISO 14001-certified (ISO 2004) Environmental Management System.
- DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment*, establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities under the control of DOE pursuant to the Atomic Energy Act.

1.3 Location Description

Figure 1-1 shows the KAFB boundary, its land designations, and the agencies that operate within the boundaries. The location, characteristics, and physical setting of SNL/NM are described on a regional basis as follows.

New Mexico is the fifth-largest state in the United States, comprising approximately 121,000 square miles. Based on recent projections, New Mexico's estimated 2017 population was 2,088,070 (Census 2018). Albuquerque is the largest city in the state, with an estimated population in 2017 of 562,572 (USPopulation2017 2018). The estimated population within a 50-mile radius of the SNL/NM zip code is approximately 965,711 residents (Searchbug 2018). Nine counties are contained or partially included in that radius (Figure 1-2).

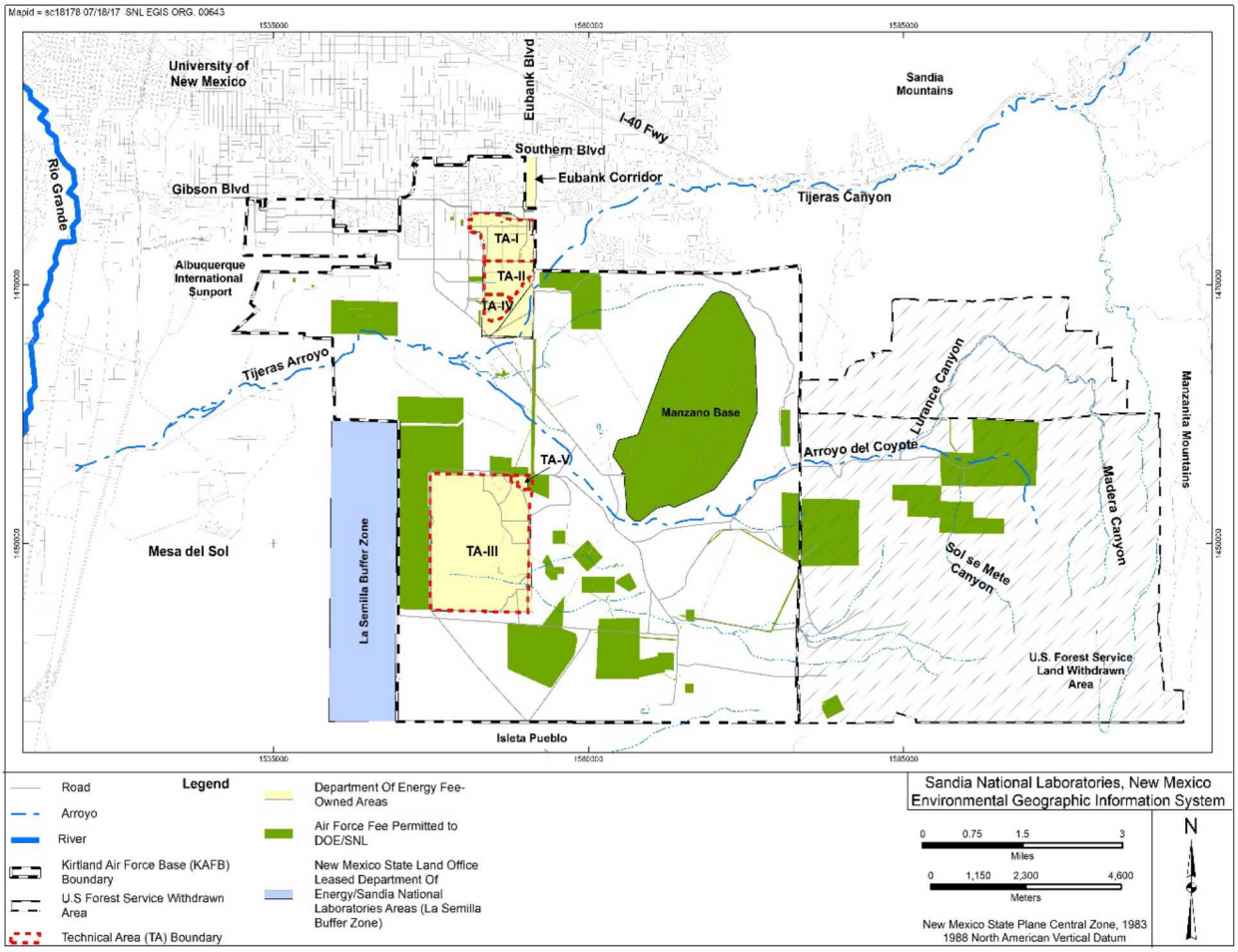


Figure 1-1. Sandia National Laboratories, New Mexico, including technical areas and permitted areas

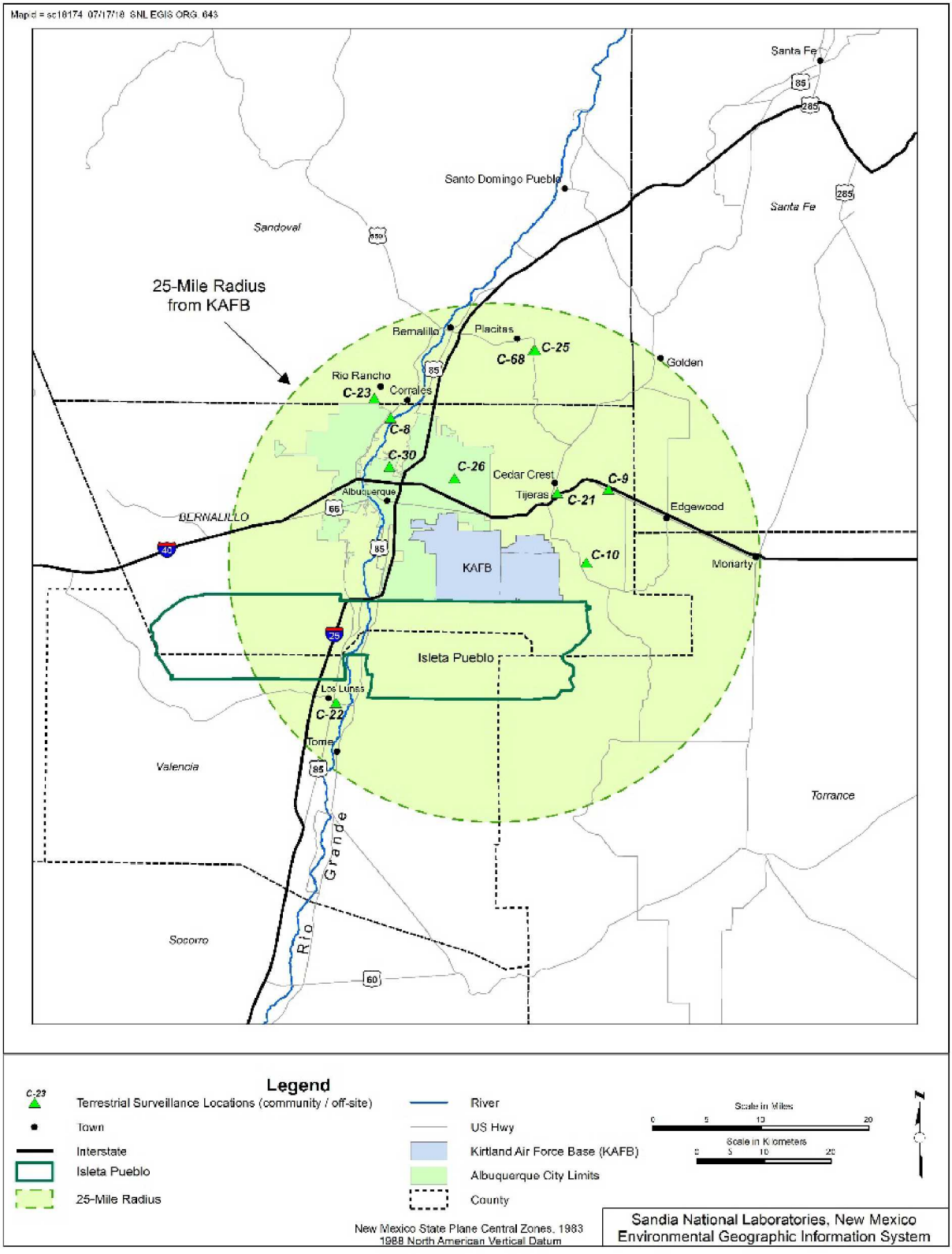


Figure 1-2. State of New Mexico, including counties

KAFB is a military installation that spans 51,559 acres, including 20,486 acres that are withdrawn from the Cibola National Forest through an agreement with the U.S. Forest Service (DOE 1999). Located at the foot of the Manzanita Mountains, KAFB has a mean elevation of 5,384 feet and a maximum elevation of 7,986 feet. KAFB is host to more than 450 federal government and private sector tenants and associated units (U.S. Air Force [USAF 2012). KAFB and SNL/NM are adjacent to the city of Albuquerque, which borders KAFB on the base's north, northeast, west, and southwest boundaries. The Albuquerque International Sunport (airport) and Mesa del Sol—a 12,800-acre mixed-use urban area under development—are located west of KAFB. Isleta Pueblo is located south of the KAFB boundary.

Sandia operations are conducted on DOE-owned property assigned for operational use, non-DOE-owned property contracted from other federal agencies, and privately owned leased property. Sandia sites located on DOE-owned property comprise 2,938 acres and include five technical areas (TAs) (DOE 1999). At non-DOE-owned property, Sandia personnel conduct operations on 5,637 acres of land permitted from the U.S. Air Force, a portion of which are on land withdrawn by the U.S. Forest Service (SNL/NM 2006b). DOE leases approximately 2,750 acres from the New Mexico State Land Office (La Semilla Buffer Zone) west of the KAFB boundary. This area serves as a margin of safety and a sound buffer for testing operations. In addition, Sandia personnel conduct operations at off-site leased facilities. At the end of fiscal year 2016, the Sandia workforce in New Mexico was comprised of approximately 10,922 employees and contractors. There are approximately 6.53 million gross square feet of existing facilities at SNL/NM (SNL/NM 2016c).

1.4 Activities and Facilities at SNL/NM

SNL/NM consists of five secured TAs (TA-I, TA-II, TA-III, TA-IV, and TA-V); buildings and structures in nonsecured leased areas; and several remote testing areas (Figure 1-1).

1.4.1 The Technical Areas

TA-I is located in the northern portion of KAFB, and operations there include the main administrative center and numerous laboratories and offices. A majority of activities performed in TA-I are dedicated to weapon design, research and development on weapon systems, limited production of weapon systems components, technology transfer, high-performance computing, and energy research programs. Facilities in TA-I include the Ion Beam Laboratory; the main technical library; several assembly and manufacturing areas; environmental test facilities; and various laboratories, such as the Advanced Manufacturing Processes Laboratory, the Neutron Generator Facility, the Processing and Environmental Technology Laboratory, the Joint Computational Engineering Laboratory, the Sandia Tomography and Radionuclide Transport Laboratory, and the Microsystems and Engineering Sciences Applications Complex.

TA-II, located south of TA-I, includes both technical facilities and infrastructure support. The Explosives Components Facility, the Hazardous Waste Handling Unit, the Solid Waste Collection and Recycling Center, the Construction and Demolition Recycle Center, and the National Infrastructure Simulation and Analysis Center are located in TA-II.

TA-III, located in the south-central part of KAFB, is the largest and most remote of the TAs. There are large outdoor test areas as well as facilities that can accommodate indoor testing. The area is used for engineering test activities that require large-scale safety and/or security buffers, such as collision testing sled tracks, centrifuges, vibration test facilities, and impact test complexes. A few of the outdoor test areas include the Rocket Sled Test Facility, the Water Impact/Drop Tower Complex, and the Terminal Ballistics Facility. A few of the indoor test facilities include the Centrifuge Facility, the Mechanical Shock Facility, and the Thermal Test Complex. The Radioactive and Mixed Waste

Management Unit is located in the southern portion of TA-III. The Mixed Waste Landfill, the Chemical Waste Landfill, and the Corrective Action Management Unit are also located in TA-III.

TA-IV, located south of TA-II, includes facilities used to conduct research and development activities in inertial confinement fusion, pulsed power, and nuclear particle acceleration. Accelerators located in TA-IV include the Z Accelerator, the Advanced Pulsed Power Research Module, the Radiographic Integrated Test Stand, the High-Energy Radiation Megavolt Electron Source III, the Saturn Accelerator, the Repetitive High-Energy Pulsed Power I Accelerator, the High-Power Microwave Laboratory, and the Short-Pulse High Intensity Nanosecond X Radiator.

TA-V, located adjacent to the northeast section of TA-III, includes facilities that routinely handle radioactive materials used in experimental research and development programs. Capabilities include reactor technology, radiation transport techniques, radiation damage on materials, and radiation vulnerability assessments. Some of the facilities in TA-V include the Gamma Irradiation Facility, the Annular Core Research Reactor, and the Auxiliary Hot Cell Unit.



Greater Roadrunner (*Geococcyx californianus*)

1.4.2 Other Facilities and Areas

Several remote test areas are located east and southeast of TA-III and within the canyons and foothills of the U.S. Forest Service withdrawn area—Arroyo del Coyote, Lurance Canyon, Madera Canyon, and Sol se Mete Canyon (Figure 1-1). The remote test areas are known collectively as the Coyote Test Field and are located in the canyons on the west side of the Manzano Mountains. These areas are used for environmental and developmental testing, including explosive ordnance testing, impact testing, rocket firing experiments, and open-burn thermal testing.

Sandia personnel operate several facilities outside the boundaries of KAFB. These are a combination of properties leased or owned by DOE. The Center for Integrated Nanotechnologies, the Microsystems and Engineering Sciences Applications Technology and Operations Prototype, the International Programs Building, the Innovation Parkway Office Center, and the National Museum of Nuclear Science and History are all located on Eubank Boulevard Southeast within one mile of KAFB. There are many other small-scale, off-site projects, including the Advanced Materials Laboratory at the University of New Mexico.

1.5 Environmental Setting

SNL/NM is set in the high desert region of central New Mexico. The mountains on the east and the plateaus on the west create a diverse range of geological, hydrological, ecological, and climatic

settings, as discussed in the following sections. A maximum elevation of 7,986 feet occurs on the eastern edges of KAFB; the mean elevation is 5,384 feet.

The most prominent topographic feature in the Albuquerque area is the Sandia Mountains to the east of the city. The Sandia Mountains form a 13-mile-long escarpment distinguished by steep cliffs, pinnacles, and narrow canyons; the tallest point is Sandia Crest at 10,678 feet. The Sandia Mountains are divided from the Manzanita Mountains (to the south) by Tijeras Canyon (Figure 1-1).

Tijeras Arroyo is a major topographic feature that is situated diagonally northeast to southwest on KAFB. The watershed drained by Tijeras Arroyo includes the southern Sandia Mountains, the Manzanita Mountains, and the north end of the Manzano Mountains. The arroyo is normally dry except during heavy downpours, which can cause significant flash floods. The arroyo originates in Tijeras Canyon and runs coincident with the Tijeras Fault for several miles before deviating to the southwest; it discharges to the Rio Grande approximately 10 miles from the western boundary of KAFB.

1.5.1 Geology and Hydrology

SNL/NM and KAFB are situated in a geologic setting that has been subjected to relatively recent episodes of basaltic volcanism and ongoing regional rifting (crustal extension). The Rio Grande Rift has formed a series of connected down-dropped basins filled with sedimentary deposits. The Rio Grande Rift extends for about 450 miles from Leadville, Colorado, into New Mexico; Albuquerque and KAFB are within this rift valley.

The Albuquerque Basin, a major structural feature, is approximately 30 miles wide and 100 miles long.

The Albuquerque Basin is a major structural feature and is one of several north–south-trending sediment-filled basins formed by the Rio Grande Rift. The Albuquerque Basin is approximately 30 miles wide, 100 miles long, and 3,000 square miles in area (Grant 1982). On the east, uplifted fault blocks manifested by the Sandia, Manzanita, and Manzano mountains bound the basin. The western side of the basin is bound by the Lucero Uplift to the south and by the Rio Puerco Fault Belt and the Nacimiento Uplift at the northern end. There is major structural relief but relatively little topographic relief along the Rio Puerco Fault Belt on the northwestern side of the basin. The Albuquerque Basin is drained to the south through the Rio Puerco and the Rio Grande.

Several faults run through KAFB (Figure 1-3). The Tijeras Fault, which has been traced as far north as Madrid, New Mexico, trends southwesterly through Tijeras Canyon and across KAFB. The Tijeras Fault is a strike-slip fault on which movement is horizontal and parallel to the strike of the fault. Early movement along the Tijeras Fault can be traced to the late Precambrian Period, 570 million years ago, and traces of the fault 20 miles northeast of KAFB have been active as recently as the late Pleistocene epoch, 12,000 years ago. The system of minor faults associated with the Tijeras Fault on KAFB is collectively referred to as the Tijeras Fault Complex. The Tijeras Fault Complex marks a distinct boundary between the Precambrian and Paleozoic bedrock geology on the east and the Tertiary and Quaternary sediment-filled basin to the west. This geologic boundary also forms a boundary between the two major groundwater regimes at KAFB.

The Sandia Fault establishes the eastern boundary of the Albuquerque Basin on KAFB. The up-thrown side of the fault is manifested as the Sandia and Manzanita mountains. The total vertical structural offset is on the order of 4.3 miles. South of KAFB, the basin's eastern boundary is the Hubbell Spring Fault. The Sandia Fault and Hubbell Spring Fault systems are north-trending, down-to-the-west, en echelon normal faults, which formed in the mid- to late-Tertiary Period (25 million

years and younger) (Lozinsky and Tedford 1991; Woodward 1982; Kelley 1977). The Sandia Fault converges with the Tijeras Fault and the Hubbell Spring Fault in the region of KAFB, identified as the Tijeras Fault Complex.

The hydrogeological system at KAFB is divided into two areas separated by the Tijeras Fault Complex (Figure 1-3; modified from SNL/NM 1995, *Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report.*). To the east of the Tijeras Fault Complex, the hydrogeology is characterized by fractured and faulted bedrock covered by a thin layer of mostly dry alluvium. Depths to groundwater east of the Tijeras Fault Complex range from approximately 44 to 325 feet below ground surface. On the west side of the Tijeras Fault Complex, groundwater in the regional aquifer is contained in alluvial sediments, and depths to groundwater range from approximately 451 to 571 feet below ground surface.

A perched groundwater system overlies the regional aquifer in the north portion of KAFB. The system extends from TA-I south to the Tijeras Arroyo Golf Course. The western extent of the perched groundwater system lies between Wyoming Boulevard and the Albuquerque International Sunport's east–west runway. The eastern extent is just east of the KAFB landfill and may be bounded by the West Sandia Fault. The groundwater gradient within the perched groundwater system is to the southeast, and the depth to groundwater is approximately 269 feet below ground surface in the west and 350 feet below ground surface in the east.

Sandía means *watermelon* in Spanish, and is popularly believed to be a reference to the reddish color of the mountains at sunset. Also, when viewed from the west, the profile of the mountains is a long ridge, with a thin zone of green conifers near the top, suggesting the rind of a watermelon. However, as Robert Julyan notes, "The most likely explanation is the one believed by the Sandia Indians: the Spaniards, when they encountered the Pueblo in 1540, called it Sandia, because they thought the squash gourds growing there were watermelons, and the name Sandia soon was transferred to the mountains east of the pueblo" (Julyan 1998). Julyan also notes that the Sandia Pueblo Indians call the mountain *Bien Mur*, "big mountain."

Two perennial springs are located on KAFB (Coyote Springs and Sol se Mete Spring). Additionally, one perennial spring (Hubbell Spring) is located immediately south of the KAFB boundary on Isleta Pueblo. Numerous ephemeral springs occur within the foothills and in the eastern reach of Arroyo del Coyote.

The primary regional aquifer in the Albuquerque Basin is within the upper unit and, to a lesser degree, the middle unit of the Santa Fe Group Aquifer System. ABCWUA water supply wells are primarily located in the most productive portion of the aquifer on the east side of the Rio Grande. The highest-yield wells are screened in the sediments associated with Ancestral Rio Grande deposits (Figure 1-3). Prior to extensive urban development in the Albuquerque area beginning in the 1950s, regional groundwater in the KAFB area primarily flowed to the southwest. As a result of groundwater withdrawal, the local water table has dropped by as much as 141 feet (Thorn, McAda, and Kernodle 1993). Groundwater withdrawal from KAFB and ABCWUA wells at the north end of KAFB have created a trough-like depression in the water table, causing flow to be diverted northeast in the direction of the well fields.

Until recently, water levels were declining nearly 1.5 feet per year, which was associated with long-term pumping of KAFB and ABCWUA production wells. However, since late 2008, hydrographs for regional aquifer wells in the northern part of KAFB show an increasing trend in groundwater

elevations. Presumably, this is in response to ABCWUA transitioning to surface water withdrawals for potable water supplies and decreasing dependence on production wells immediately north of KAFB.

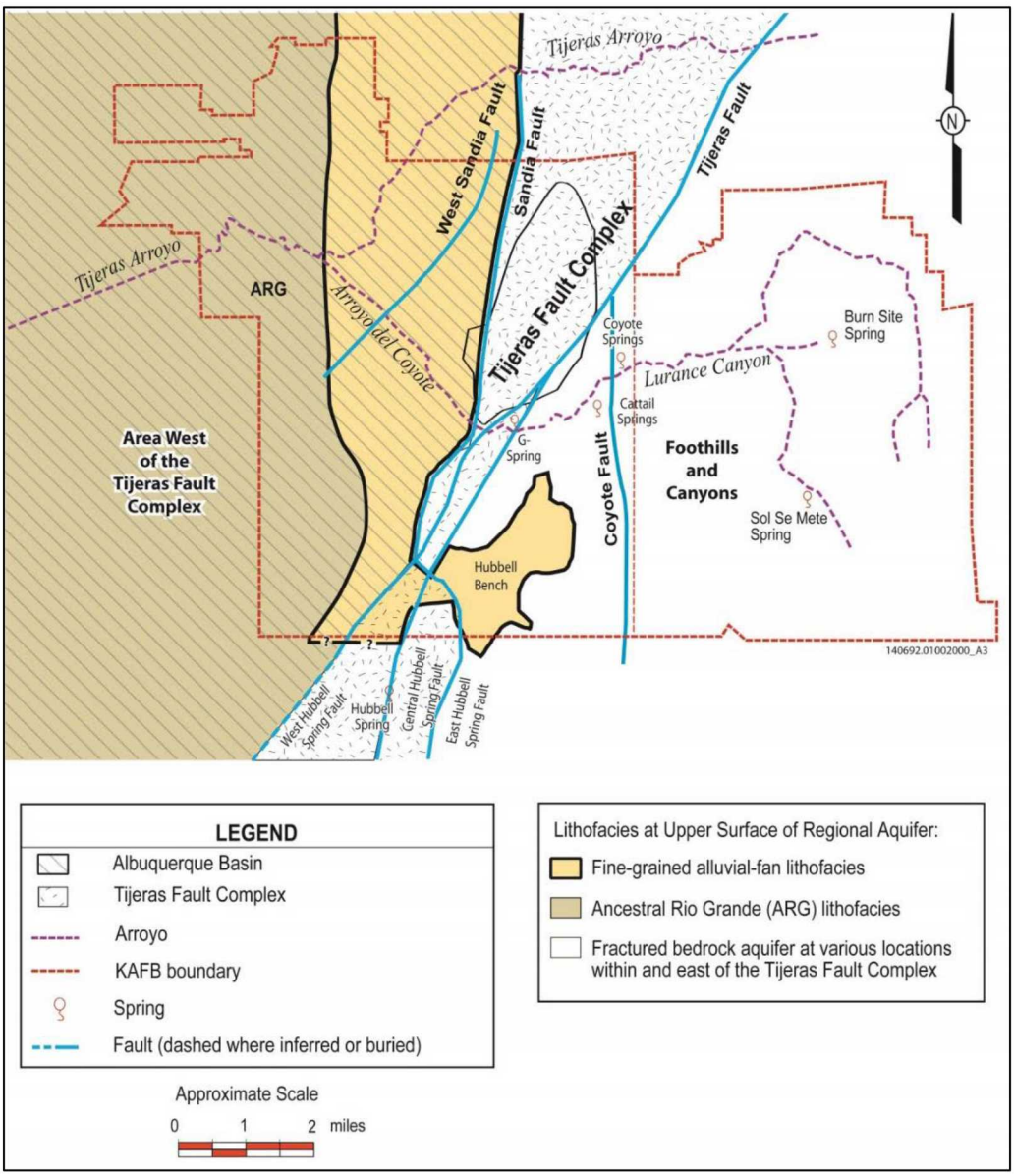


Figure 1-3. Faults and hydrogeologically distinct areas

1.5.2 Ecology

An ecosystem is a network of living organisms and nonliving components that interact with one another to comprise the overall environment. The ecosystem at SNL/NM includes the interactions of human, animal, insect, plant, fungal, and many other living component varieties within several habitat types. Nonliving components within the ecosystem include air, water, mineral soil, buildings, structures, roads, and paved surfaces. The habitats of the SNL/NM ecosystem include: grasslands, woodland, arroyo shrub, scattered piñon-juniper, and closed canopy piñon-juniper. This ecosystem is a dynamic entity that is impacted by external and internal factors. External factors include such things as climate, time, topography, and biota. Internal factors include the introduction

of nonnative species to the ecosystem, and human disturbance and interactions (through development) within the various habitats.

The desert grasslands of New Mexico have been heavily disturbed over the last 150 years, with a steady transition of what was once extensive grassland into shrubland (Dick-Preddie, Moir, and Spellenberg 1996; McClaran and Van Devender 1997). SNL/NM and KAFB grasslands have been excluded from grazing since the 1940s. Prior to this time, the grasslands were affected by anthropogenic activities. The extent and severity of alteration to the grasslands has not been well documented. Grasslands at SNL/NM and KAFB are found both within and outside the Sandia TAs between elevations of 5,200 and 5,700 feet. The SNL/NM and KAFB grasslands, which can best be described as fragments of historic grasslands, are bordered by urban Albuquerque to the north and west, forest lands to the east, and cattle-grazing shrublands to the south. These grasslands provide necessary habitat to support many species of birds, reptiles, amphibians, and mammals.

An *ecosystem* is a network of living organisms and nonliving components (e.g., air, water, mineral soil, buildings, and roads) that interact to comprise an overall environment.

SNL/NM and KAFB woodland areas rise to the east from the grassland areas. The woodlands are typical of those in central New Mexico, consisting almost entirely of piñon-pine and juniper species mosaics, commonly referred to as piñon-juniper habitat. At the highest elevations of SNL/NM and KAFB-managed lands, scattered ponderosa pines are present in low numbers.

There are large tracts within the SNL/NM and KAFB area that are undeveloped. These undeveloped areas provide the considerable diversity of plant and animal communities found within KAFB. Table 1-1 lists some of the common species of birds, mammals, reptiles, amphibians, and plants that have been encountered on-site. See Chapter 7 for more information on the ecology of the area.

Table 1-1. Plants and animals commonly identified in various life zones across KAFB

Common Name	Scientific Name	Common Name	Scientific Name
Birds			
American Kestrel	*Falco sparverius*	Ladder-backed Woodpecker	*Picoides scalaris*
Black-chinned Hummingbird	*Archilochus alexandri*	Loggerhead Shrike	*Lanius ludovicianus*
Black-throated Sparrow	*Amphispiza bilineata*	Northern Mockingbird	*Mimus polyglottos*
Common Raven	*Corvus corax*	Red-tailed Hawk	*Buteo jamaicensis*
Dark-eyed Junco	*Junco hyemalis*	Spotted Towhee	*Pipilo maculatus*
Horned Lark	*Eremophila alpestris*	Western Kingbird	*Tyrannus verticalis*
House Finch	*Haemorhous mexicanus*	Western Meadowlark	*Sturnella neglecta*
Mammals			
American black bear	*Ursus americanus*	deer mouse	*Peromyscus maniculatus*
banner-tailed kangaroo rat	*Dipodomys spectabilis*	desert cottontail	*Sylvilagus audubonii*
black-tailed jackrabbit	*Lepus californicus*	gray fox	*Urocyon cinereoargenteus*
bobcat	*Felis rufus*	Gunnison's prairie dog	*Cynomys gunnisoni*
coyote	*Canis latrans*	mule deer	*Odocoileus hemionus*

Table continued on next page.

Table 1-1. Plants and animals commonly identified in various life zones across KAFB (continued)

Common Name	Scientific Name	Common Name	Scientific Name
Reptiles and Amphibians			
Chihuahuan Spotted Whiptail	*Aspidoscelis exsanguis*	Great Plains Skink	*Eumeces obsoletus*
Desert Side-blotched Lizard	*Uta stansburiana*	Long-nosed Snake	*Rhinocheilus lecontei*
Eastern Collared Lizard	*Crotaphytus collaris*	New Mexico Spadefoot Toad	*Spea multiplicata*
Gopher Snake	*Pituophis catenifer*	New Mexico Whiptail	*Aspidoscelis neomexicana*
Greater Short-horned Lizard	*Phrynosoma hernandesi*	Prairie Rattlesnake	*Crotalus viridis*
Plants			
Apache plume	*Fallugia paradoxa*	New Mexico feathergrass	*Hesperostipa neomexicana*
black grama	*Bouteloua eriopoda*	one-seed juniper	*Juniperus monosperma*
blue grama	*Bouteloua gracilis*	piñon pine	*Pinus edulis*
bush muhly	*Muhlenbergia porteri*	purple three-awn	*Aristida purpurea*
intermediate yucca	*Yucca intermedia*	ring muhly	*Muhlenbergia torreyi*
James' Galleta	*Hilaria jamesii*	shrub live oak	*Quercus turbinella*

KAFB = Kirtland Air Force Base

1.5.3 Climate

Large diurnal temperature ranges, summer monsoons, and frequent drying winds are characteristic of the regional climate in the Albuquerque Basin and the Sandia, Manzanito, and Manzano mountains.

Temperatures are typical of midlatitude dry continental climates, with summer high temperatures in the basin around 90°F and winter high temperatures around 50°F. Daily low temperatures range from around 60°F in the summer to around 20°F in the winter. The dry continental climate also produces low average humidity in the late spring and early summer prior to the onset of the monsoon season. Daytime relative humidity can be between 10 and 20 percent in the spring and early summer, with an average humidity near 30 percent. Winter relative humidity averages near 50 percent.

Precipitation varies across the region, with many locations in the higher elevations of the mountains receiving annual rainfall twice that of locations in the Albuquerque Basin. The winter season in the Albuquerque Basin and around SNL/NM is generally dry, with an average of less than 1.5 inches of precipitation falling between December and February. Most precipitation falls between July and October, mainly in the form of brief, heavy rain showers. According to the National Climatic Data Center, the average annual precipitation is approximately 9.45 inches for the Albuquerque area (NCDC 2015).

Site-specific meteorology is influenced by the proximity to topographic features, such as mountains, canyons, and arroyos. These features influence local wind patterns across the site. Canyons and arroyos tend to channel or funnel wind, whereas mountains create upslope and downslope diurnal wind flow patterns. Winds tend to blow toward the mountains or up the Rio Grande Valley during the day, and nocturnal winds tend to blow down the mountain toward the Rio Grande Valley. These topographically induced wind flows can be enhanced or negated by weather systems that move across the southwestern United States. The strongest winds occur in the spring when monthly wind speeds average 10.3 mph. Wind gusts commonly reach 50 mph.

Chapter 2. Compliance Summary



Black-tailed jackrabbit (*Lepus californicus*)

OVERVIEW ■ Sandia National Laboratories operations comply with federal, state, and local environmental regulations, statutes, Executive Orders (EOs), and DOE directives. Regular audits, appraisals, and inspections identify areas for improvement as well as noteworthy practices.

SNL/NM operations are in compliance with federal, state, and local environmental requirements, including DOE directives and Presidential EOs. As part of this compliance, Sandia operations adhere to reporting and permitting requirements. Current permits are listed in Chapter 9.

The NMED DOE Oversight Bureau provides independent verification of environmental monitoring results obtained by Sandia personnel on behalf of DOE. The Oversight Bureau achieves verification through the following:

- Assesses DOE management of its New Mexico facilities to ensure attainment of public health and environmental standards
- Provides inputs to DOE for prioritization of its cleanup and compliance activities
- Develops and implements an independent monitoring and oversight program
- Increases public knowledge and awareness of environmental matters at DOE facilities in New Mexico

The NMED DOE Oversight Bureau performs sampling and monitoring activities in conjunction with Sandia environmental programs. In 2017, this included air, water, vegetation, and soil/sediment sampling. The samples were analyzed by independent laboratories under contract to the NMED DOE Oversight Bureau. More information can be found at the following website:

https://www.env.nm.gov/doeob/

All Sandia operations and activities, including those that are part of environmental programs, are performed under the Environment, Safety, and Health (ES&H) policy, ESH100, which states:

> "It is the policy of Sandia to perform work safety, in a manner that ensures adequate protection for the worker, the public, and the environment; to be accountable for safe performance of work; and to integrate environment, safety and health management into work planning and execution processes."

An Integrated Safety Management System is used to incorporate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. Thus, the management of safety functions becomes an integral part of mission accomplishment and meets requirements outlined by DOE. The following five core functions guide management in integrating safety into all work practices: define the scope of work, analyze the hazards, develop and implement hazard controls, perform work within controls, and provide feedback and continuous improvement.

2.1 Environmental Management System

Sandia management takes the responsibility of protecting the environment seriously and requires employees, contractors, and visitors to prevent pollution and conserve natural resources by adhering to the ES&H policy. An Environmental Management System—the primary management approach to minimizing environmental impact and supporting environmental compliance and sustainability practices—is implemented through environmental programs.

The Environmental Management System encompasses all Sandia activities, products, and services that have the potential to interact with the environment. Specifically, the Environmental Management System is a set of interrelated elements used to establish policy, objectives, and targets that enable personnel to reduce environmental impacts and increase operating efficiencies through a continuing cycle of planning, implementing, evaluating, and improving processes.

DOE O 436.1, *Departmental Sustainability*, was established to ensure that environmental management systems and site sustainability are at the forefront of environmental excellence. This directive is implemented through an ISO 14001-certified (ISO 2004) Environmental Management System. Sandia National Laboratories received initial ISO 14001 certification in June 2009 and retained certification in the 2015 recertification audit.

In May 2017, an ISO 14001 third-party surveillance audit was completed. Additional information can be found at the following external Environmental Management System website:

www.sandia.gov/about/environment/environmental_management_system/index.html

The Environmental Management System provides the following benefits:

- Improved environmental performance
- Enhanced compliance with environmental regulations
- Strengthened pollution prevention efforts
- Improved resource conservation
- Increased environmental efficiencies and reduced costs
- Enhanced image with the public, regulators, and potential new hires
- Heightened awareness of environmental issues and responsibilities

For fiscal year (FY) 2017, the Environmental Management System identified natural resource use, hazardous materials use, and hazardous waste production as the top three significant aspects of SNL/NM operations. When significant aspects and negative impacts have been identified, objectives

and measurable targets—at all operating levels—are established to guide efforts toward minimizing those aspects and impacts (see Section 2.2).

Aspects are any elements of activities, products, or services that can interact with the environment, and *impacts* are any changes in the environment, whether adverse or beneficial, wholly or partially resulting from activities, products, or services.

2.2 Site Sustainability Plan

Sustainability strategies and goals are defined in an annual Site Sustainability Plan, and many of these efforts have been adopted as Environmental Management System objectives and targets. The FY 2017 Site Sustainability Plan (SNL/NM 2016a) describes the performance status and planned actions for meeting DOE Strategic Sustainability Performance Plan (DOE 2017) goals and the broader sustainability program set forth in EO 13693, *Planning for Federal Sustainability in the Next Decade*. The Environmental Management System is used as a platform for implementing the Site Sustainability Plan and other programs with objectives and measurable targets that contribute to meeting sustainability goals. As of FY 2017, sustainability goals are being met or exceeded in several key areas. Table 2-1 presents FY 2017 performance status for several selected key areas (SNL/NM 2016a).

Table 2-1. Site Sustainability Plan performance status for key areas

DOE SSPP and Goal/Sandia Objective	Sandia Performance Status through FY 2017
Greenhouse Gas Reduction	
Reduce Scope 1 and Scope 2 GHG emissions by 50% by FY 2025 from a FY 2008 baseline (2017 target: reduce by 25%). Reduce Scope 3 GHG emissions by 25% by FY 2025 from a FY 2008 baseline (2017 target: 12%).	Met this objective by reducing Scope 1 and Scope 2 GHG emissions by 62% in FY 2017 relative to a FY 2008 baseline. The Scope 3 GHG goal is not on track; emissions have continued to increase in parallel with site population increases. There was a 23% increase in FY 2017 relative to the FY 2008 baseline.
Sustainable Buildings	
Reduce energy intensity by 25%, and achieve 2.5% reductions annually by FY 2025 from a FY 2015 baseline.	Met this objective by reducing energy intensity 3.76% in FY 2017 relative to a FY 2015 revised baseline for goal-subject buildings.
Clean and Renewable Energy	
Use no less than 10% clean energy in FY 2017, working toward a 25% reduction by FY 2025.	Met this objective by purchasing renewable energy credits in FY 2017.
Water Use Efficiency and Management	
Reduce potable water intensity by 36% by FY 2025 from a FY 2007 baseline (2017 target: reduce by 20%).	Exceeded this objective with a 38.70% decrease in potable water intensity in FY 2017 relative to an FY 2007 baseline.
Fleet Management	
Purchase light-duty vehicles so that 75% are alternative fuel vehicles (FY 2017 target: 75%).	This goal was not met in FY 2017 (62%). Light-duty vehicle purchases for SNL/TTR have no access to alternative fuel, such as E85.

Table continued on next page.

Table 2-1. Site Sustainability Plan performance status for key areas (continued)

DOE SSPP and NNSA Goal/Sandia Objective	Sandia Performance Status through FY 2017
Sustainable Acquisition	
Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring that BioPreferred and biobased provisions and clauses are included in 95% of applicable contracts.	Met this objective through purchasing agreements and procurement documents.
Pollution Prevention and Waste Reduction	
Divert at least 50% of nonhazardous solid waste, excluding C&D debris.	Met this objective by diverting 67.0% of waste from landfills in FY 2017.
Electronic Stewardship	
Purchase eligible acquisitions so that 95% are EPEAT-registered products each year.	Met this objective with 97.6% of eligible electronics acquisitions being EPEAT-registered products in FY 2017.
Climate Change Resilience	
Update policies to provide incentives for planning for and addressing the impacts of climate change.	Began to meet this objective by developing a Climate Change Vulnerability Assessment in FY 2017. This will aide in developing a future climate change resilience plan in order to meet this objective.

% = percent
C&D = construction and demolition
DOE = U.S. Department of Energy
EPEAT = Electronic Product Environmental Assessment Tool
FY = fiscal year
GHG = greenhouse gas
NNSA = National Nuclear Security Administration
SNL/TTR = Sandia National Laboratories, Tonopah Test Range
SSPP = Strategic Sustainability Performance Plan

2.3 Environmental Performance Measures

Environmental performance is tracked through performance measures and indicators. The results are reported through the internal ES&H Assurance Dashboard, the Sandia Performance Scorecard, the management review process, and management reports.

Environmental performance and the performance measures are also assessed as part of the annual Performance Evaluation Measurement Plan with DOE. On the basis of the Performance Evaluation Measurement Plan, DOE prepares a Performance Evaluation Report (DOE/NNSA/SFO 2017). The 2017 report assessed the management and operating contractor's performance for October 1, 2016, through April 30, 2017. Sandia earned a site-wide excellent rating, exceeded expectations in several areas, and overall met expectations for delivering effective, efficient, and responsive ES&H management and processes.

2.4 National Environmental Policy Act

The NEPA of 1969 requires federal agencies to consider human health and environmental issues associated with proposed actions, be aware of the potential environmental impacts associated with these issues, and include this information in early project planning and decision-making. NEPA review of federally funded proposed actions is conducted in accordance with Chapter 10, Code of Federal Regulations [CFR], Part 1021 (10 CFR 1021), *National Environmental Policy Act Implementing Procedures* (DOE 2011). Additional information is provided in Chapter 3.

2.5 Clean Air Act

The Clean Air Act of 1970, as amended, is the comprehensive federal law that regulates air emissions from stationary and mobile sources. The EPA is responsible for describing and regulating air pollutants from stationary and mobile sources by establishing ambient air quality standards. The City

of Albuquerque has direct delegation from EPA Region 6 to administer these standards and issue specific air emission permits and registrations, as shown in Table 9-1. See Chapter 5 for further information on compliance with air quality regulations.

The Clean Air Act requires EPA to develop a list of air pollutants from all sources that could harm public health or the environment. EPA identified six substances as criteria pollutants, and subsequently developed National Ambient Air Quality Standards for these pollutants.

The EPA program for the attainment and maintenance of National Ambient Air Quality Standards requires local agencies to develop a comprehensive permitting program. The Albuquerque Bernalillo County Air Quality Control Board has developed a set of regulations that govern mobile and stationary sources of air pollution in Bernalillo County, New Mexico.

In addition to the regulations for criteria pollutants, the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Program prescribes emission standards for hazardous air pollutants.

2.5.1 Fugitive Dust Permitting

The City of Albuquerque implements 20.11.20 New Mexico Administrative Code (NMAC) to ensure that every person shall use reasonably available control measures or other effective measures on an ongoing basis to prevent or abate fugitive dust, if the fugitive dust may with reasonable probability injure human health or animal or plant life, or may unreasonably interfere with public welfare, visibility, or the reasonable use of property.

2.5.2 New Source Performance Standard Requirements

As part of an effort to control pollution in the U.S., EPA provides New Source Performance Standard requirements that dictate the level of pollution that a new stationary source may produce. These standards are authorized by Section 111 of the Clean Air Act, and the regulations are published in 40 CFR 60, which the City of Albuquerque implements in Bernalillo County. A New Source Performance Standard has been established for a number of source categories, including boilers and stationary engines.

2.5.3 New Source Review Requirements

The New Source Review permitting program was established as part of the Clean Air Act Amendments of 1977. The City of Albuquerque implements this program in Bernalillo County, New Mexico. New Source Review requirements provide assurance to the public that any large, new, or modified source of air pollutants in their neighborhood will be protective of human health and the environment, and that advances in pollution control will occur concurrently with industrial expansion.

2.5.4 Open-Burn Permitting

The City of Albuquerque enforces 20.11.21 NMAC to ensure that all persons conduct open burning in a manner that prevents or abates emissions that are visible and that produce noxious by-products of combustion.

2.5.5 Ozone-Depleting Substances Requirements

Based on the requirements of Title VI of the Clean Air Act, EPA has established regulations to protect the stratospheric ozone layer by managing ozone-depleting substances.

2.5.6 Radionuclide Emissions

The NESHAP, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (40 CFR 61) establishes radiation protection standards, monitoring requirements, and annual reporting requirements for radionuclide air emissions. Additional requirements pertaining to radionuclide emissions are contained in DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment*. An annual NESHAP report summarizes radionuclide air emission releases from Sandia facilities and results of the annual dose assessment.

2.5.7 Reciprocating Internal Combustion Engine NESHAP Requirements

As part of an effort to control pollution in the U.S., EPA provides NESHAP requirements that dictate the level of pollution that stationary sources may produce. These standards are authorized by Section 111 of the Clean Air Act, and the regulations are published in Chapter 40, CFR Part 63 (40 CFR 63), which the City of Albuquerque implements in Bernalillo County, New Mexico. A Reciprocating Internal Combustion Engine NESHAP has been established to address existing stationary engines and their potential air impact.

2.5.8 Title V Operating Permit

The Clean Air Act Amendments of 1990 contained provisions under Title V that require an operating permit for all existing major air emission sources. A *major* source is defined as a facility with the potential to emit:

- 100 tpy or greater of any criteria pollutant,
- 10 tpy of any hazardous air pollutant, or
- 25 tpy of any combination of hazardous air pollutants

Operating permits are issued by the City of Albuquerque. Details on the applicability of Title V to Sandia activities are provided in Chapter 5.

2.6 Cultural and Natural Resources

Cultural and natural resources are protected at Sandia National Laboratories.

2.6.1 Cultural Resources Acts

Cultural resources management responsibilities apply to Sandia. The three primary relevant cultural resources acts are:

- National Historic Preservation Act, enacted in 1966 and amended in 2000
- American Indian Religious Freedom Act, enacted in 1978 and amended in 1994
- Archaeological Resources Protection Act, enacted in 1979 and amended in 1988

NEPA Program personnel coordinate cultural resources compliance. Actions that could adversely affect cultural resources are analyzed initially in a NEPA checklist. Historic properties, as defined by the National Historic Preservation Act and its implementing regulations, include both archaeological sites and historic buildings and structures. Historic buildings and structures may include structures over 50 years of age that are historically significant or younger structures that are of exceptional significance. There are historic buildings on DOE-owned property and on KAFB land that is permitted to DOE. Planning through the NEPA process identifies potential impacts to these sites, and appropriate historic documentation is undertaken to mitigate adverse effects when necessary.

Archaeological sites have been identified on DOE land in the Cibola National Forest in the U.S. Forest Service withdrawn area, as well as on and near DOE-permitted property and environmental restoration sites. Sandia personnel plan activities to avoid potential impacts to these cultural resources sites. DOE is responsible for ensuring that impacts to cultural resources are assessed and appropriate actions are taken to mitigate impacts.

Historic Building Assessment

In 2010, Sandia personnel performed a site-wide survey and historic building assessment to determine areas and structures that may be eligible for the National Register of Historic Places. The final recommendation to DOE identified eight historic districts and three individually eligible buildings. DOE consults with the New Mexico State Historic Preservation Office (SHPO) on properties that face renovation. DOE has not completed the consultation with the SHPO regarding the 2010 recommendation. The cumulative effect of actions taken since the 2010 survey has resulted in changes to the built environment; therefore, the survey will be revised prior to DOE consultation with the SHPO. The current recommendation to DOE is that there are seven historic districts and two individually eligible buildings at SNL/NM. The properties recommended for eligible status are being treated as historic until final determinations are made. Documentation of buildings previously determined to be eligible for the National Register of Historic Places is ongoing.

In 2017, Sandia personnel provided historic building assessments in response to 68 proposed actions on 62 properties. Three of the proposed actions were terminated. DOE consulted with SHPO on 28 actions; 25 consultations were completed and three are ongoing. DOE did not consult on 23 of the actions based on the results of previous consultations. Fourteen actions await decisions.

In 2015, Sandia personnel proposed removal of test structures at 15 environmental restoration sites. In 2016, Sandia personnel provided historic property assessments of the sites to DOE, and KAFB consulted with the SHPO. One of the sites included historic properties, which Sandia personnel are collecting appropriate documentation for in coordination with KAFB prior to demolition.

Archeological Assessment

In 2017, DOE worked with KAFB on consultation with the SHPO regarding archeological sites within the environmental restoration sites (see Section 3.6.1) Consultation was completed on all but one of the sites.



Rock in the sun

2.6.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (U.S. Code [USC] 668-668d), enacted in 1940 and later amended, prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Ecology Program personnel coordinate compliance with this act.

2.6.3 Endangered Species Act

The Endangered Species Act of 1973, amended in 1982, applies to both private individuals and federal agencies. Federal agencies must ensure that any action authorized, funded, or carried out by them will not jeopardize the continued existence of a threatened or endangered species, or result in adverse modifications of its habitat. NEPA Program and Ecology Program personnel address Endangered Species Act compliance. If potentially significant impacts to sensitive species or habitats are found as a result of a proposed action, an environmental assessment or an environmental impact statement must be prepared. See Chapter 7 for more information on the Endangered Species Act and Sandia's Ecology Program.

2.6.4 Fish and Wildlife Conservation Act

The Fish and Wildlife Conservation Act (Public Law [PL] 96-366), enacted in 1980, and the Lacey Act Amendments (PL 97-79), enacted in 1981, were established so that wildlife will receive equal consideration with other natural resources in regard to maintaining the ecosystem. Relevancy toward an ecological program is stated in 16 USC 661; the purpose is: "(1) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species . . . (2) to make surveys and investigations of the wildlife public domain." Ecology Program personnel consider Fish and Wildlife Conservation Act compliance when evaluating NEPA checklists.

2.6.5 Floodplain Management

As amended, EO 11988 of 1977, *Floodplain Management*, requires federal agencies to consider impacts associated with the occupancy and modification of floodplains; reduce the risk of flood loss; to minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. All active Sandia facilities located on KAFB are outside the 500-year floodplain, as described by the U.S. Army Corps of Engineers (USACE 1979). This applies to both major on-site drainages: Tijeras Arroyo and Arroyo del Coyote.

2.6.6 Memorandum of Understanding between the U.S. Department of Energy and the U.S. Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"

The purpose of the Memorandum of Understanding between the U.S. Department of Energy (DOE) and the U.S. Fish and Wildlife Service Regarding Implementation of Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, signed in 2013, is to strengthen migratory bird conservation through enhanced collaboration between DOE and the Fish and Wildlife Service in coordination with state, tribal, and local governments. The Memorandum of Understanding identifies specific areas in which cooperation between DOE and the Fish and Wildlife Service will substantially contribute to the conservation and management of migratory birds and their habitats. Ecology Program personnel coordinate this Memorandum of Understanding with requirements of the Migratory Bird Treaty Act (MBTA) through NEPA reviews.

2.6.7 Migratory Bird Treaty Act

The MBTA of 1918 (and amendments) implemented the 1916 Convention for the Protection of Migratory Birds. The original statute implemented the agreement between the U.S. and Great Britain

(for Canada), and later amendments implemented treaties between the U.S. and Mexico; the U.S. and Japan; and the U.S. and Russia. The MBTA prevents taking, killing, possessing, transporting, and importing migratory birds, their eggs, parts, or nests. Federal institutions are not exempt from the MBTA. Ecology Program personnel coordinate the MBTA through NEPA reviews and Ecology Program activities.

2.6.8 New Mexico State Statutes Related to Natural Resources

The following New Mexico statutes related to natural resources are applicable to Sandia operations:

- Hunting and Fishing, New Mexico Statutes Annotated (NMSA) 1978, §§ 17-2-13 through 17-2-15 protecting songbirds, hawks, vultures, owls and horned toads, respectively
- Wildlife Conservation Act, NMSA 1978, §§ 17-2-37 through 17-2-46
- Habitat Protection, NMSA 1978, §§ 17-6-1 through 17-6-11
- Endangered Plants, NMSA 1978, § 75-6-1
- Protection of Native American Plants, NMSA 1978, §§ 76-8-1 through 76-8-4

2.6.9 Planning for Federal Sustainability in the Next Decade

Issued in March 2015, EO 13693 establishes an integrated strategy toward sustainability to safeguard the health of our environment and make the reduction of greenhouse gas emissions and enhanced climate resilience a priority for all federal agencies. EO 13693 sets goals to promote sustainable buildings, increase renewable energy, reduce water use, promote electronics stewardship through sustainable acquisition, prevent pollution, and reduce solid waste. Sustainability-related data were reported to the Site Sustainability Plan team for submittal to DOE.

2.6.10 Protection of Wetlands

As amended, EO 11990 of 1977, *Protection of Wetlands*, requires federal agencies to minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands. There are several natural springs on KAFB with a limited wetland setting. These springs, located on lands withdrawn from Cibola National Forest, are managed by the U.S. Air Force and the U.S. Forest Service. These springs provide an important source of drinking water for wildlife and create a unique biological niche in an otherwise arid habitat.

2.6.11 Sikes Act

The Sikes Act (PL 86-97), enacted in 1960, and the amendments of 1986 (PL 99-561) and 1997 (PL 105-85 Title XXIX) were reauthorized in 2013. The Sikes Act protects and enhances fish, wildlife, and other natural resources that exist on and are associated with military lands in the U.S. Ecology Program personnel consider the Sikes Act when evaluating NEPA checklists.

2.7 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and amended in 1986, also known as the "Superfund," provides cleanup funds and/or assessment requirements for inactive hazardous waste sites at all federal facilities. A Preliminary Assessment/Site Inspection, as required by CERCLA, was performed at SNL/NM in 1988. This inspection confirmed that there are no sites that would qualify for the National Priorities List, which lists the nation's high-priority cleanup, or Superfund, sites. Therefore, with respect to inactive hazardous waste sites, there are no CERCLA reporting requirements. The Superfund Amendments and Reauthorization Act

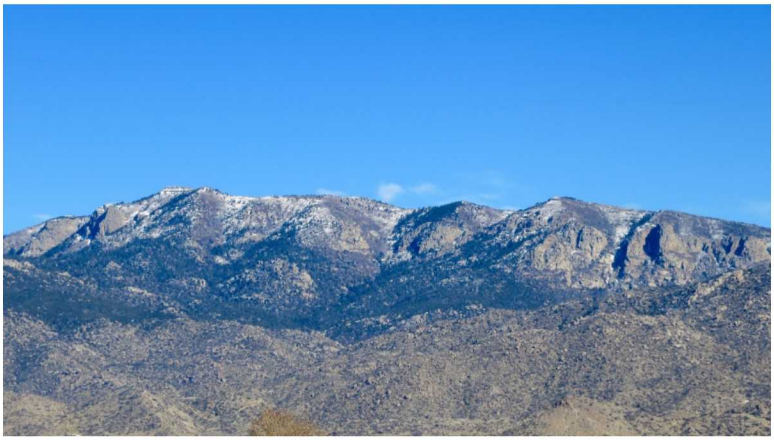
(SARA) requires reporting of toxic chemical usage and releases. In 2017, full compliance with CERCLA/SARA was met.

2.8 Chemical Management

Chemicals are managed through compliance with several requirements. Reporting is specified in these requirements, which are discussed in the following sections.

2.8.1 Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, also known as SARA Title III, establishes emergency planning and reporting requirements for federal, state, and local governments and industry.



Sandia Mountains

EPCRA ensures that communities have the right to know and be informed of potential hazards, including the type and location of large quantities of hazardous and toxic chemicals used and stored by facilities in or near the community. EPCRA specifically mandates that chemical information be made available to local emergency planning committees, which include police, fire, civil defense, and public health professionals. Any inadvertent release above established threshold levels must be reported to appropriate state and local authorities. The four major reporting requirements designated by specific sections of EPCRA are shown in Table 2-2.

Emergency Release Notification

The Emergency Release Notification requirements were established under Section 304 of EPCRA. In 2017, there were no reportable quantity releases of extremely hazardous substances requiring notification.

Toxic Release Inventory Reporting

The Toxic Release Inventory reporting requirement was established under Section 313 of EPCRA. Environmental releases and other waste management quantities of chemicals listed on the EPCRA Section 313 list of toxic chemicals must be reported for certain facilities in covered industry sectors if they manufacture, process, or otherwise use more than established threshold quantities of these chemicals.

In 2017, the use, potential releases, and other waste management activities at SNL/NM met the threshold that required a Toxic Release Inventory report for lead and lead compounds.

Table 2-2. Applicable EPCRA reporting requirements, 2017

Section	EPCRA Section Title	Requires Reporting?		Description
		Yes	No	
301–303	Emergency Planning	✓		Prepare an annual report that lists chemical inventories above the reportable Threshold Planning Quantities listed in 40 CFR 355 (Appendix B), including the location of the chemicals and emergency contacts. DOE distributes the report to the required entities.
304	Emergency Release Notification		✓	Provide notification of reportable quantity releases of extremely hazardous substances, as defined by CERCLA, to the required entities.
311–312	Hazardous Chemical Inventory	✓		Report on two "Community Right-to-Know" requirements: • Complete EPA Tier II forms for (1) all hazardous chemicals present at the facility at any one time in amounts equal to or greater than 10,000 pounds and (2) all extremely hazardous substances present at the facility in amounts equal to or greater than 500 pounds or the Threshold Planning Quantity, whichever is lower. This report is provided to DOE prior to distribution to the required entities. • Record Safety Data Sheets for each chemical entry on a EPA Tier II form and provide the report to DOE prior to distribution to the required entities.
313	Toxic Release Inventory	✓		Submit a Toxic Release Inventory report to the required entities for facilities that release toxic chemicals listed in SARA Title III over a threshold value.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
SARA = Superfund Amendments and Reauthorization Act

Information on EPCRA can be found at the following EPA website:

http://www.epa.gov/epcra

2.8.2 Toxic Substances Control Act

The Toxic Substances Control Act, enacted in 1976 and later amended, provides regulations regarding the manufacture, processing, distribution, use, and disposal of specific chemical substances and/or mixtures. Sandia personnel comply with the Toxic Substances Control Act when handling and disposing chemical substances. Details related to the Toxic Substances Control Act are in Chapter 3.

2.8.3 Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act, enacted in 1910 and amended in 1972, regulates pesticide use and is enforced under the New Mexico Pesticide Control Act. Herbicides are used to control weeds, rodenticides to control mice, and insecticides to control insects in food service and work areas. Licensed pest control applicators administer EPA-registered pesticides. In 2017, Sandia was in compliance with the Federal Insecticide, Fungicide, and Rodenticide Act.

2.9 Hazardous Waste

Hazardous waste is handled and managed in compliance with the following requirements.

2.9.1 Federal Facility Compliance Act

The Federal Facility Compliance Act of 1992 requires federal facilities to comply with all federal, state, and local requirements for hazardous and solid waste, including full compliance with the restrictions and prohibitions on extended storage of wastes that do not meet the applicable hazardous waste treatment standards.

Federal Facility Compliance Order

On October 4, 1995, NMED issued a Federal Facilities Compliance Order to DOE and Sandia National Laboratories (NMED 1995). The order was developed pursuant to the Federal Facility Compliance Act, and provides requirements for achieving compliance with the requirements of 40 CFR 268.50 for mixed waste. A Site Treatment Plan was developed with an inventory of wastes subject to the Compliance Order and a schedule for processing the waste.

2.9.2 Resource Conservation and Recovery Act and New Mexico Hazardous Waste Act

The Resource Conservation and Recovery Act (RCRA), enacted in 1976, regulates (1) the generation, transportation, treatment, storage, and disposal of hazardous chemical waste and nonhazardous solid waste and (2) the storage of hazardous or petroleum products in underground storage tanks. Under the authority of the New Mexico Hazardous Waste Act of 1978 and with delegated authority from EPA under RCRA, NMED administers hazardous and solid waste regulatory programs in New Mexico. Hazardous and solid waste management activities are conducted pursuant to NMED regulations. Applicable regulations are listed in Chapter 9.

The hazardous waste component of hazardous and radioactive mixed waste is subject to the requirements of state and federal regulations for hazardous waste. The radioactive component of mixed waste is regulated under the Atomic Energy Act.

NMED, DOE, and Sandia entered into a Compliance Order on Consent on April 29, 2004 (NMED 2004). This order provides requirements and establishes schedules and deliverables for corrective action pursuant to the New Mexico Hazardous Waste Act, as well as requirements concerning perchlorate and nitrate pursuant to the New Mexico Solid Waste Act.

Hazardous waste and mixed waste may be generated at SNL/NM through normal operations. An active and successful waste management program minimizes hazardous waste and mixed waste through product substitutions, process changes, material reuse, and recycling. See Chapter 3 for more information on hazardous waste management activities.

Operating Permits

Hazardous and mixed waste management units are currently operated under two permits issued by NMED:

- RCRA Facility Operating Permit (the Permit), effective February 26, 2015 (NMED 2015)
- Post-Closure Care Permit for the Chemical Waste Landfill, effective June 2, 2011

Resource Conservation and Recovery Act Facility Operating Permit

The Permit addresses operations at the following Sandia waste management units: the Hazardous Waste Handling Unit, the Thermal Treatment Unit, the Radioactive and Mixed Waste Management Unit, the Auxiliary Hot Cell Unit, and five Manzano Storage Bunkers. The permit also requires post-closure care at the Corrective Action Management Unit and corrective action at SWMU and areas of

concern facility-wide at SNL/NM. Finally, the Permit addresses long-term monitoring and maintenance at sites where corrective action has been completed. Semiannual DOE Public Meetings are conducted as described in the Permit Community Relations Plan. Details about waste management activities under the Permit are provided in Chapter 3.

Post-Closure Care Permit for the Chemical Waste Landfill

The Chemical Waste Landfill was used for hazardous waste disposal under interim status until 1985. Closure activities included two voluntary corrective measures: extraction of solvent vapors (primarily trichloroethylene) and excavation. In 2011, NMED issued a Post-Closure Care Permit. Details about post-closure care activities are provided in Chapter 3.

2.10 Pollution Prevention and Waste Minimization

Pollution prevention concepts first appeared in RCRA. An expressed concern was to minimize the generation of hazardous waste through process substitution, materials recovery, recycling, reuse, and treatment. RCRA established the reduction or elimination of hazardous waste as national policy (Pollution Prevention Act), and required that hazardous waste generators and RCRA permit holders have a program in place to minimize waste. As required, waste generation and recycling information is reported annually to DOE through the Site Sustainability Plan.

2.10.1 Pollution Prevention Goals of Site Sustainability Plan

The Site Sustainability Plan establishes a commitment to meet pollution prevention goals identified in the DOE Strategic Sustainability Performance Plan and EO 13693. Pollution prevention and waste minimization data are reported in the Site Sustainability Plan. Additional information about pollution prevention activities is provided in Chapter 3.

2.10.2 Pollution Prevention Act

The Pollution Prevention Act of 1990 declares, as national policy, that pollution should be prevented or reduced at the source (42 USC § 13101 et seq.). Facilities that meet the reporting requirements under EPCRA, Section 313, are required to file a toxic chemical source reduction and recycling report. See Section 2.8.1 for additional information on EPCRA reporting requirements.

Operations at Sandia National Laboratories comply with DOE requirements for managing radioactive waste in a manner that protects worker and public health and safety and the environment.

2.11 Radiation Protection and the Atomic Energy Act

The Atomic Energy Act of 1946 assures the proper management of source, special nuclear, and by-product materials (42 USC § 2011 et seq.). DOE sets radiation protection standards and retains authority for radionuclides through Department directives and CFRs. Sandia operations are subject to DOE requirements established in DOE O 435.1 Change 1, *Radioactive Waste Management*, DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment, 10 CFR 830, Nuclear Safety Management*, and 10 CFR 835, *Occupational Radiation Protection.*

The radiation protection standards are set for DOE operations so that exposures to members of the public and the environment are as low as reasonably achievable and are maintained within established

limits. DOE O 458.1 limits the annual total effective dose of all potential exposure pathways to the public (including air, water, and the food chain) to 100 mrem/year. Pathway guidelines are as follows:

- **Water pathways.** For a drinking water system operated by DOE, DOE facilities must provide a level of radiation protection equivalent to that provided to members of the public by the community drinking water standards in 40 CFR 141, i.e., not exceed the radionuclide maximum contaminant levels. DOE O 458.1 references the derived concentration technical standards for radionuclides in drinking water that could be consumed continuously (365 days a year). This is a conservative approach, which assumes that a member of the public resides at the location continuously.
  The KAFB Public Water System provides potable water for SNL/NM facilities, and KAFB is responsible for meeting drinking water requirements (see Chapter 6). The DOE-derived concentration technical standards for a drinking water pathway are, therefore, not applicable.
- **Air pathways.** DOE facilities are required to comply with EPA standards for radiation protection as given in NESHAP Subpart H, specific to radionuclides emitted from DOE facilities (with the exception of radon). This rule sets a limit on the emissions of radionuclides from DOE facilities that ensures no member of the public receives an effective dose equivalent of more than 10 mrem/year. The only current pathway for potential exposure from Sandia operations is through air (see Chapter 5 for details).

For sanitary sewer discharges, DOE O 458.1 provides the criteria to limit concentration of each radionuclide discharged to publicly owned treatment works (see Chapter 3 for details).

In addition to requirements in DOE O 458.1, DOE O 435.1 establishes requirements for managing radioactive waste in a manner that protects worker and public health and safety and the environment. Under this order, DOE contractor-operated facilities are required to plan, document, execute, and evaluate the management of radioactive waste (see Chapter 3 for details).

Derived concentration technical standards are concentrations of radionuclides in water and air that could be consumed continuously or inhaled for one year and not exceed the DOE primary radiation standard for the public (100 mrem/year effective dose equivalent).

The control and clearance of real and personal property with residual radioactivity is specified in DOE O 458.1. Personal property can include vehicles, equipment, materials, and trackable property (equipment with an acquisition value of $10,000 or greater). Personal property with residual radioactivity above the limits specified in DOE O 458.1 is not cleared from radiological control. Pursuant to written procedures, personal property that is potentially contaminated or activated is surveyed prior to clearance, or a process knowledge evaluation is conducted to verify that the personal property has not been exposed to radioactive material or to energy capable of inducing radioactivity in the material. In some cases, both a radiological survey and a process knowledge evaluation are performed. In 2017, Radiation Protection Department personnel processed 404 personal property clearance surveys; no trackable property was cleared.

DOE issued a moratorium in January 2000 that prohibited the clearance of volume-contaminated metals, and subsequently in July 2000 suspended the clearance of metals from DOE radiological areas for recycling purposes.

Excess property with residual radioactivity above the limits established in DOE O 458.1 is either retained for continued use within DOE facilities or transferred to the Radioactive and Mixed Waste Management Unit for disposal as radioactive waste.

A summary of 2017 property clearance activities includes the following:

- Radiation Protection Department personnel processed 404 personal property clearance surveys.
- No trackable property was cleared.
- No metals subject to the moratorium or the suspension were cleared.
- No real property was cleared.

Protection of biota, as specified in DOE O 458.1, ensures that radiological activities having the potential to impact the environment must be conducted in a manner that protects aquatic animal, terrestrial plant, and terrestrial animal populations in local ecosystems from adverse effect due to radiation and radioactive material released from DOE operations. Currently, terrestrial plants are monitored; no other biota sampling is conducted due to low-impact operations. However, if changing operations or conditions warrant, sampling will be initiated on a case-specific basis to ensure compliance with DOE O 458.1. See Chapter 4 for Terrestrial Surveillance Program activities.



Tarantula hawk wasp (*Pepsis formosa*), the official state insect of New Mexico

2.12 Water Quality and Protection

Sandia operations are subject to the requirements of the Clean Water Act and corresponding New Mexico statutes.

2.12.1 Clean Water Act

The Clean Water Act of 1972 as amended establishes a permitting structure and regulatory direction to protect the "waters of the United States" by restoring and maintaining the chemical, physical, and biological integrity of U.S. waters; protecting fish, wildlife and recreation; and reducing pollutant discharges. The Clean Water Act applies to sanitary and septic system wastewater effluents, stormwater runoff, and surface water discharges from Sandia operations.

The Clean Water Act is implemented through the following local, state, and federal water quality requirements and standards:

- EPA has authority over NPDES permits.

- NMED establishes state surface water quality standards (20.6.4 NMAC).
- The ABCWUA administers regulations for sanitary sewer discharges based on federal pretreatment standards.
- EPA and NMED administer regulations concerning oil storage and surface discharges (20.6.2 NMAC).

National Pollutant Discharge Elimination System and New Mexico Surface Water Quality Standards

EPA Region 6 is the constituent agency responsible for regulating stormwater discharges under NPDES in New Mexico. NPDES permitting requirements apply to "waters of the United States" as defined in the Clean Water Act. Stormwater that is discharged from Sandia operations flows to federal and state waters. Processes are in place to evaluate stormwater discharges for coverage and compliance with their respective NPDES permits, which include the Municipal Separate Storm Sewer System Permit, the Multi-Sector General Permit, and the Construction General Permit. For additional information on NPDES permits, refer to Chapter 6.

While the NMED Surface Water Quality Bureau lacks primacy for permitting and enforcement, it is responsible for proposing water quality standards, developing antidegradation rules, and conducting a triennial review. The New Mexico Water Quality Control Commission has adopted "Standards for Interstate and Intrastate Surface Waters" (20.6.4 NMAC) and the Clean Water Act § 303(d)/ § 305(b), *Integrated List and Report*, to protect the quality of the state's surface waters, including waters of the United States. NMED Surface Water Quality Bureau assists EPA Region 6 by performing inspections, tracking compliance, and serving as a local point of contact for NPDES permit holders.

Albuquerque Bernalillo County Water Utility Authority Sewer Discharge Regulations

Six wastewater monitoring stations, or outfalls, are operating under the ABCWUA Industrial Wastewater permits. For additional information refer to Chapter 6.

Surface Discharge

All discharges made to the ground or to containment areas must be evaluated for compliance with regulations implemented through New Mexico Water Quality Control Commission standards for the protection of groundwater and surface water prior to discharge (NMAC 20.6.2).

Two evaporation lagoons are maintained in TAIV, which are permitted through the NMED Ground Water Quality Bureau in Discharge Permit (DP)-530. The TA-IV lagoons are used to contain and evaporate accumulated stormwater pumped from secondary containment areas around seven oil tanks that support pulsed power accelerators. See Chapter 6 for more information.

Oil Pollution Act

As required under the Oil Pollution Act of 1990 (§ 311) (with implementing regulations in 40 CFR 112, *Oil Pollution Prevention*), Sandia personnel are required to maintain and implement a Spill Prevention, Control, and Countermeasure Plan that describes oil handling operations, spill prevention practices, discharge or drainage controls, and the personnel, equipment, and resources that are used to prevent oil spills from reaching waters of the U.S. In addition, SNL/NM personnel comply with NMED Petroleum Storage Tank Bureau regulations for oil storage tanks found in 20.5 NMAC, *Petroleum Storage Tanks*. For additional information refer to Chapter 6.

2.12.2 Safe Drinking Water Act

The Safe Drinking Water Act of 1974 as amended authorizes EPA to set national standards for drinking water sources, treatment systems, and water distribution. EPA promulgates these standards as primary and secondary drinking water regulations. Specific drinking water quality criteria are

established to protect human health, limiting the maximum contaminant level (MCL) of specific organic and inorganic chemical substances and biological organisms in potable water. Under the authority of the Safe Drinking Water Act, and with delegated authority from EPA, NMED administers the safe drinking water regulatory program in New Mexico. Safe drinking water protection activities are conducted under NMED regulations in accordance with 20.7.10 NMAC. These state drinking water regulations have requirements not covered by the Safe Drinking Water Act. For additional information, refer to Chapter 6.

Drinking Water Supply

The KAFB Public Water System provides potable water for most facilities on KAFB (including Sandia facilities). The system derives its water from deep groundwater production wells. KAFB routinely samples its groundwater from production wells and conducts analyses to establish that water quality conforms to the EPA MCL standards (EPA, 2017). In support of KAFB compliance with NMED drinking water standards, Sandia personnel operate the water distribution system on DOE property in accordance with Safe Drinking Water Act regulations. Sandia personnel provide DOE with an annual certification for KAFB that all backflow preventers installed in the potable water distribution system have been properly tested and maintained. This same information is provided to Sandia personnel and DOE.

KAFB publishes specific drinking water quality data and system performance in the *Annual Consumer Confidence Report on Drinking Water Quality* that can be found at the following website:

http://www.kirtland.af.mil/Home/Environment



Mule deer family (*Odocoileus heminonus*)

2.13 Energy Independence and Security Act

The Energy Independence and Security Act (EISA) of 2007, Section 438, requires federal agencies to manage stormwater runoff from federal development projects for the protection of water resources.

Sandia projects planned through the NEPA process are reviewed for EISA § 438 eligibility. If applicable, EISA § 438 requires the use of site planning, design, construction, and maintenance strategies to maintain or restore predevelopment site hydrology (stormwater runoff), ensuring that receiving surface waters (such as the Rio Grande) are not impacted negatively. Stormwater can be managed through green infrastructure and low-impact development features, including, for example, vegetated swales and permeable surfaces.

2.14 Department of Energy Directives

DOE directives in the Management and Operating Contract for Sandia National Laboratories define the primary contractual obligations for management and operation of Sandia. Directives that pertain to environmental protection and management are discussed in Chapter 1. In 2017, the management and operating contractor adhered to requirements stated in these DOE directives.

2.15 Audits, Appraisals, and Inspections in 2017

Environmental programs are routinely subjected to audits, appraisals, and/or inspections by external agencies. Table 2-3 summarizes the 2017 audits, including the findings, Notices of Violation, and other environmental occurrences. Sandia's internal audit group also conducts assessments, including reviews of implementation of applicable policies, processes, or procedures; evaluations of corrective action validation assessments; and surveillances and walkthroughs. Self-assessments evaluate performance and compliance and identify deficiencies and opportunities for improvement as well as noteworthy practices and lessons learned.

Table 2-3. Environmental-related external audits, appraisals, inspections, and violations, 2017

Appraising Agency	Title	Date	Summary
Albuquerque Bernalillo County Water Utility Authority	Inspection of Facilities within Flow Basins 2069F, 2069G, and 2238A	February 2017	Routine inspections, no issues identified
Albuquerque Bernalillo County Water Utility Authority	Failure to Immediately Report a Slug Discharge to the Sanitary Sewer	August 2017	Notice of Violation issued
National Quality Assurance	International Organization for Standardization 14001 Surveillance Audit	May 2017	Finding: 1 Noteworthy practices: 6
NMED, Hazardous Waste Bureau	Fiscal Year 2017 Annual Hazardous Waste Compliance Evaluation Inspection	January and February 2017	Notice of Violation issued

NMED = New Mexico Environment Department

2.16 Summary of Reporting Requirements

External reporting requirements (other than to DOE) are necessary for both routine and nonroutine releases of pollutants or hazardous substances. Release information may be used to evaluate facility operation compliance, waste handling activities, and emergency response programs. Table 2-4 summarizes the primary reporting requirements for applicable releases.

Table 2-4. Reporting requirements to outside agencies (other than DOE) for releases of pollutants or hazardous substances

Report Title	Description	Agency and Regulation
Annual NESHAP Dose Assessment Report	EPA requires reporting on the dose assessment of the calculated effective dose equivalent to the maximally exposed individual, based on the assumption that an exposed individual resides 24 hours per day at an area of highest incident radiation. Dose assessment is discussed in Chapter 5.	EPA 40 CFR 61, Subpart H

Table continued on next page.

Table 2-4. Reporting requirements to outside agencies (other than DOE) for releases of pollutants or hazardous substances (continued)

Report Title	Description	Agency
Reportable Quantity Accidental Release Reporting	CERCLA and EPCRA require reportable quantity release reporting to the National Response Center and to state and local emergency response commissions. CERCLA and EPCRA are discussed in sections 2.7 and 2.8, respectively.	EPA 40 CFR 355, Subpart C
Toxic Release Inventory Report	Section 313 of EPCRA requires that facilities that release toxic chemicals listed in SARA Title III over a threshold value must submit a Toxic Release Inventory report.	EPA 40 CFR 372, Subpart B
Notification of Environmental Release	NMED requires reporting of any discharge from any facility of oil or other water contaminants, in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life; or property; or unreasonably interfere with the public welfare or use of the property. The owner/operator shall report to the appropriate agency within NMED as follows: • Verbal notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter. • Written notification within one week verifying the prior verbal notification. • Written notification within 15 days describing any corrective actions taken and/or to be taken relative to the discharge. Environmental release events reported to NMED are discussed in Chapter 6.	NMED 20.6.2.1203 NMAC
Notification of Unauthorized Non-Stormwater Discharge	EPA requires reporting of unauthorized non-stormwater discharges that may endanger human health or the environment. The owner/operator shall report to EPA Region 6 office as follows: • Verbal notification as soon as possible after learning of such a discharge, but in no event more than 24 hours thereafter. • Written notification within five days to EPA Region 6 Office for the NPDES Stormwater Program. There were no discharge events reportable to EPA in 2017.	EPA NPDES Multi-Sector General Permit Part 7.7
Accidental Slug Discharge Notification	ABCWUA requires immediate notification to its Wastewater Utility Division of any accidental or slug discharge that may cause potential problems for the publicly owned treatment works. The user shall report to the ABCWUA as follows: • A detailed written report to the industrial pretreatment engineer within five days following such occurrence describing the cause of the discharge and measures to be taken to prevent similar future occurrences. There was one release to the sanitary sewer in 2017, which is discussed in Chapter 6.	ABCWUA Sewer Use and Wastewater Control Ordinance

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
EPCRA = Emergency Planning and Community Right-to-Know Act
NESHAP = National Emission Standards for Hazardous Air Pollutants
NMAC = New Mexico Administrative Code
NMED = New Mexico Environment Department
NPDES = National Pollutant Discharge Elimination System
SARA = Superfund Amendments and Reauthorization Act

2.17 Occurrence Reporting in 2017

Under DOE O 232.2 Admin. Change 1, *Occurrence Reporting and Processing of Operations Information*, the current order for occurrence reporting, an occurrence is defined as "one or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect, DOE or contractor personnel, the

public, property, the environment, or the DOE mission. Events or conditions meeting the criteria thresholds identified in this order, or determined to be recurring through performance analysis, are occurrences." There are environmental releases that may not meet DOE O 232.2 reporting thresholds; however, they may still be reportable to outside agencies.

2.17.1 DOE O 232.2 Reportable Occurrences

All 2017 occurrences that met DOE O 232.2 criteria were entered into the DOE Occurrence Reporting and Processing System (ORPS) database. Corrective actions and closure of occurrence reports are also tracked in ORPS. For this *Annual Site Environmental Report*, the ORPS database was queried for occurrences in the following groups (as defined by DOE O 232.2):

- Group 5, Environmental
- Group 9, Noncompliance Notifications
- Group 10, Management Concerns and Issues
- Any occurrence that involved a Sandia environmental program

Qualifying occurrences that took place within a building are not included in this report.

Per DOE, an *occurrence* is defined as "one or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect, DOE or contractor personnel, the public, property, the environment, or the DOE mission. Events or conditions meeting the criteria thresholds identified in this order, or determined to be recurring through performance analysis, are occurrences."

During 2017, four DOE O 232.2 reportable occurrences met the query criteria for reporting in this *Annual Site Environmental Report*. Table 2-5 lists the four occurrences. Three were categorized as Significance Category 4 (the lowest level occurrence), and one was categorized as Significance Category 3 (events or circumstances with localized implications including personnel injury, environmental releases, equipment damage, or hazardous circumstances that were locally contained and did not immediately suggest broader systemic concerns). Table 2-5 also cross-references DOE O 232.2 reportable occurrences that were reportable to an outside agency as defined in Table 2-4, as applicable.

Table 2-5. Occurrence reports per DOE O 232.2, 2017

Reporting Criteria	Month	Significance Category	Report Number and Title	Also Reported to Outside Agency
Group 9, Noncompliance Notifications 9(1)—Any written notification from an outside regulatory agency that a site/facility is considered to be in noncompliance with a schedule or requirement (e.g., Notice of Violation, Notice of Intent to Sue, Notice of Noncompliance, Warning Letter, Finding of Violation, Finding of Alleged Violation, Administrative Order, or equivalent notification or enforcement action).	March	SC4	**NA--SS-SNL-4000-2017-0003** NMED, Hazardous Waste Compliance Inspection, Notice of Violation See Chapter 3	N/A
	August	SC4	**NA--SS-SNL-NMSITE-2017-0003** ABCWUA Waste Water Notice of Violation Failure to Immediately Notify Water Authority of Slug Discharge See Chapter 6	**N/A**

Table continued on next page.

Table 2-5. Occurrence reports per DOE O 232.2, 2017 (continued)

Reporting Criteria	Month	Significance Category	Report Number and Title	Also Reported to Outside Agency
Group 10, Management Concerns and Issues 10(2)—An event, condition, or series of events that does not meet any of the other reporting criteria, but is determined by the Facility Manager or line management to be of safety significance or of concern for that facility or other facilities or activities in the DOE complex.	February	SC4	**NA--SS-SNL-4000-2017-0002** Soil disturbance at an Environmental Restoration Site Located Near a Cultural Resource Site Boundary See Chapter 3	N/A
Group 10, Management Concerns and Issues 10(3)—A near miss to an otherwise ORPS reportable event, where something physically happened that was unexpected or unintended, or where no or only one barrier prevented an event from having a reportable consequence.	July	SC3	**NA--SS-SNL-1000-2017-0006** Contained Oil Spill at the Saturn Facility See Chapter 6	N/A

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
DOE = U.S. Department of Energy
N/A = not applicable
NMED = New Mexico Environment Department
ORPS = Occurrence Reporting and Processing System
SC = significance category
SNL = Sandia National Laboratories

2.18 Summary of Environmental Permits

Table 9-1 lists all Sandia environmental permits and registrations that were in effect in 2017.

Chapter 3. Environmental Programs Information



Greater Roadrunner (*Geococcyx californianus*)

OVERVIEW ■ Sandia National Laboratories personnel take the responsibility of protecting the environment seriously. Numerous program teams monitor the environment to help prevent pollution and conserve natural resources. A site sustainability plan and best management practices ensure a healthy environment.

Sandia personnel collect environmental data to determine and report the impact of existing operations on the environment. Environmental Systems Department personnel monitor and surveil air, water, soil, and biota. These environmental program activities meet or exceed federal, state, and local environmental requirements, as well as DOE directives in Sandia's Prime Contract. Presidential EOs and DOE guidance documents are also used to establish program criteria.

Sandia's Environmental Management System is the primary management approach used to address environmental aspects of operations and activities, including environmental programs, energy, and transportation functions. Environmental monitoring began in 1959, when the principal objective was to monitor radioactive effluents and determine any associated environmental impacts. Since then, environmental programs and waste management, along with other ES&H activities, have greatly expanded. The current environmental programs and focus areas include:

- Environmental Management System
- Chemical Information System and Chemical Exchange Program
- Environmental Education Outreach Program
- Environmental Life-Cycle Management Program
- Environmental Restoration Operations
- Long-Term Stewardship (LTS) Program
- NEPA Program
- Site Sustainability Plan
- Waste Management and Material Sustainability and Pollution Prevention (MSP2) Program

The following additional environmental programs are presented in separate chapters:

- Terrestrial Surveillance Program (Chapter 4)
- Air Quality Compliance and Related Programs (Chapter 5)
- Water Quality Programs (Chapter 6)
- Ecology Program (Chapter 7)

3.1 Chemical Information System and Chemical Exchange Program

The Chemical Information System is a comprehensive chemical information tool that tracks workplace chemical and biological containers by location. The primary drivers for the Chemical Information System are state and federal regulations, including EPCRA. The Chemical Information System compiles information concerning chemical hazards and appropriate protective measures for the workforce, Emergency Management Operations, and other ES&H programs.

The inventory system provides the chemical or product name, its location and quantity, and information about who is responsible for the chemical. Chemical hazards are reported on Safety Data Sheets, and the Chemical Information System currently contains over 115,000 Safety Data Sheets in its library. This electronic inventory helps chemical users and their managers assess and manage workplace hazards. Easy access to this inventory facilitates availability searches. It also improves the ability to share chemicals and thus help reduce sources, which helps to minimize chemical purchases and waste disposal expenses.

In 2017, a site-wide reconciliation effort was completed using Radio Frequency Identification technology to gather the data. Capturing data electronically improved the safety and efficiency of the inventory collection process. The reconciliation process improved inventory accuracy; thereby improving the quality of data reported using the chemical and biological material inventory information.

A pre-procurement module, ChemPro, is used to request permission for new chemical purchases. The system runs a series of queries, comparing the requested purchasing information to regulatory limits and determines whether the requested chemical and volume is approved for use and storage in the specified location. If approved, the requestor is given a chemical approval number, which must be provided to the chemical vendor as part of the purchasing process. ChemPro allows for proactive environmental and safety planning.

The Chemical Exchange Program reduces the amount of usable chemicals disposed of as waste and instead makes them available for reuse, thereby lowering the cost for both new acquisitions and disposal.

The Chemical Exchange Program was developed in 1989 as a Hazardous Waste Management Waste Minimization program. The goal is to reduce the amount of usable chemicals disposed of as waste and instead make them available for reuse, thereby lowering the cost for both new acquisitions and disposal. This program has been through multiple transformations since its inception, and in 2008 the Chemical Exchange Program was introduced as a module within the Chemical Information System. The Chemical Information System/Chemical Exchange Program team continues to develop a more user-friendly, web-based interactive tool for using the Chemical Exchange Program. In 2017, the same queries used for the ChemPro module were added to the Chemical Exchange Program tool. The addition of these queries allows for proactive environmental and safety planning.

3.2 Environmental Education Outreach Program

Environmental Education Outreach Program personnel reach out to the community through organized events and provide environmental information to Sandia personnel. In addition to complying with requirements, it is recognized that communicating with personnel and the local community about reducing environmental impacts at work and at home is important. An integrated approach is employed to communicate environmental awareness to personnel via newsletters, annual campaigns, and outreach events.

Currently, the outreach team participates in or hosts several in-house and public outreach and awareness events annually. Events conducted in 2017 included Earth Day and the annual Environmental Management System Excellence Awards Program. When working with children, team members often demonstrate environmental education models on topics such as local air quality, landfills, groundwater, and watersheds. The outreach team also encourages Sandia personnel and community members to provide feedback and to ask questions about environmental programs.

The annual Environmental Management System Excellence Awards Program recognizes personnel who demonstrate environmental excellence in areas such as energy and water conservation, environmental protection, waste minimization, and recycling. Since its inception in 2006, the Environmental Management System team has received 257 nominations for individuals and teams who are contributing to the vision of environmental excellence.

3.3 Environmental Life-Cycle Management Program

The mission of the Environmental Life-Cycle Management Program is to ensure long-term protection of human health and the environment. This is achieved by implementing environmental life-cycle management practices that focus on sustainable use and protection of natural and cultural resources.

Using the NEPA process, Environmental Life-Cycle Management Program personnel review proposed projects and activities that have the potential to impact the environment. In 2017, 46 projects were reviewed and documented the environmental impacts.

3.4 Environmental Restoration Operations

The Environmental Restoration Project (now Environmental Restoration Operations) was created under the DOE Office of Environmental Management to identify, assess, and remediate sites potentially contaminated by past spill, release, or disposal activities in accordance with the RCRA, as amended by the Hazardous and Solid Waste Amendments of 1984. Hazardous and Solid Waste Amendments requirements apply to environmental restoration sites that include SWMUs or Areas of Concern. A SWMU is any unit "from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous waste" (EPA 1985).

Additional Areas of Concern at SNL/NM that are not regulated as SWMUs (primarily closed-out septic systems) have been investigated as part of Environmental Restoration Operations. These Areas of Concern were not identified in the initial list of sites when the Hazardous and Solid Waste Amendments Module (Module IV) of Permit NM5890110518-1 was issued in 1993 (EPA 1993); however, the NMED identified them as requiring investigation (Bleakly 1996). Later modifications to Permit NM5890110518-1 included additional revisions to the list of SWMUs and Areas of Concern. Permit NM5890110518-1 expired in August 2002 but remained in effect until the NMED issued the RCRA Facility Operating Permit (the Permit) effective February 2015 (NMED 2015) with all approved modifications.

A Compliance Order on Consent (the Order), which was effective in 2004 (NMED 2004), governs investigation and corrective action requirements at SNL/NM. The Order will terminate upon completion of its requirements, and the current Permit will remain as the enforceable document.

3.4.1 Waste Cleanup and Site Closures

The initial identification of environmental restoration sites was completed in 1987. At that time, 117 sites were identified under Sandia jurisdiction in the initial *Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment* (DOE/AL 1987); those sites were also identified in subsequent years and were incorporated into the list of sites that were subject to the RCRA corrective action requirements in Module IV of Permit NM5890110581-1 (EPA 1993).

Since 1993, approximately 500 individual sites, potential sites, or individual historical activities have been identified for investigation. Many of these sites were investigated and confirmed to contain little or no contaminants of concern. In 1992, the Environmental Restoration Project (now Environmental Restoration Operations) was officially initiated to implement assessment and remediation activities for sites that had been contaminated or potentially contaminated because of past Sandia operations. In addition to the SNL/NM sites, other Sandia sites included in the original scope of Environmental Restoration Operations were SNL, California; Kauai Test Facility, Hawaii; and Tonopah Test Range, Nevada. There were also a few miscellaneous sites located in other areas nationally and internationally.

DOE and Sandia personnel propose environmental restoration sites to NMED for Corrective Action Complete status when the sites meet NMED criteria. The criteria require the site to be at acceptable levels of risk to human health and the environment. Remediation is performed where needed to meet NMED criteria for Corrective Action Complete status.

All Corrective Action Complete proposals and Class 3 Permit modifications are available for review at the University of New Mexico Zimmerman Library.

After NMED grants Corrective Action Complete status to an environmental restoration site, DOE and Sandia personnel submit a request for a Class 3 Permit modification in order to (1) remove the site from the list of SWMUs and Areas of Concern requiring corrective action and then (2) add the site to the list of SWMUs and Areas of Concern for which corrective action is complete. The current Hazardous Waste Facility Operating Permit (NMED 2015 and all approved modifications) includes two tables of SWMUs and Areas of Concern for which corrective action is complete: one is a list of SWMUs and Areas of Concern requiring controls, and the other is a list of SWMUs and Areas of Concern that do not require controls. Risk to human health and the environment is calculated for sites with residual contamination according to EPA and NMED guidelines. The remaining level of contamination and the appropriate land-use category (i.e., industrial, residential, or recreational use) are combined with the available information and conceptual model for each site to determine the risk and whether site controls are needed. SWMUs and Areas of Concern requiring controls present a higher level of risk to human health and the environment.

All Corrective Action Complete proposals and Class 3 Permit modifications are available in hard copy for review at the University of New Mexico Zimmerman Library.

In 2017, 302 SWMUs and Areas of Concern no longer required corrective action, and 11 SWMUs and Areas of Concern required corrective action (Davis 2012). The status of the 11 SWMUs is as follows:

- Three groundwater Areas of Concern require final remedies through public input and NMED process: TA-V Groundwater (TAVG), Tijeras Arroyo Groundwater (TAG), and Burn Site Groundwater (BSG).
- Three SWMUs at active test facilities have potential soil contamination that will be evaluated at the end of their test operations: SWMUs 83, 84, and 240.
- Five SWMUs suitable for Corrective Action Complete have met NMED groundwater monitoring requirements and have been proposed for Corrective Action Complete: SWMUs 8, 58, 68, 149, and 154. In November 2017, NMED published their Intent to Approve a Modification to the RCRA Permit that would classify the five SWMUs as Corrective Action Complete (NMED 2017a).

3.4.2 Groundwater Monitoring at Areas of Concern

Routine groundwater samples for the three groundwater Areas of Concern (TAVG, TAG, and BSG) were collected in 2017 by LTS Program personnel. A summary of 2017 activities and results is provided in Section 3.5.5 and in Appendix A, "Summary of Groundwater Monitoring Activities." The *Annual Groundwater Monitoring Report, Calendar Year 2017* (SNL/NM 2018a), herein referred to as the AGMR, documents the results of all groundwater monitoring activities for 2017. The report is available at:

http://www.sandia.gov/news/publications/environmental_reports/index.html



Painted lady butterflies (*Vanessa cardui*) on a chamisa (*Ericameria Nauseosa*)

3.5 Long-Term Stewardship Program

The LTS Program's mission is to protect human health and the environment from hazards associated with residual contamination at legacy sites, and to minimize environmental liability by ensuring compliance with the environmental requirements in multiple NMED permits. Stewardship of legacy sites also protects natural and cultural resources from hazards associated with residual radioactivity and hazardous contamination. LTS activities are increasing as remedial activities are completed, and are discussed below.

LTS Program personnel perform post-closure care for:

- The Chemical Waste Landfill
- The Corrective Action Management Unit

LTS Program personnel perform long-term monitoring and maintenance for:

- The Mixed Waste Landfill (MWL)
- SWMUs with Corrective Action Complete with Controls status

LTS Program personnel prepare annual reports for the NMED on each of these post-closure care and long-term monitoring and maintenance sites. In addition, LTS Program personnel prepare the five-year review on the MWL excavation reevaluation (due in 2019).

LTS Program personnel perform groundwater monitoring for:

- Chemical Waste Landfill post-closure care
- MWL long-term monitoring and maintenance
- Three groundwater Areas of Concern (TAVG, TAG, and BSG)
- The Groundwater Monitoring Program

The analytical results are compared with MCLs established by the EPA. The AGMR documents the results of groundwater monitoring activities for 2017. Appendix A, "Summary of Groundwater Monitoring Activities," provides an overall summary for 2017.

Groundwater levels are measured in wells on a quarterly or monthly basis from approximately 100 wells. Wells that have stable trends are measured quarterly; wells that have fluctuating water levels due to seasonal pumping at nearby extraction wells are measured monthly. Water-level data are used to generate a regional water table elevation contour map from which groundwater flow directions can be obtained. Groundwater elevation tables, hydrographs, and contour maps derived from the data are provided in the AGMR.

3.5.1 Chemical Waste Landfill Post-Closure Care

The Chemical Waste Landfill is a 1.9-acre remediated hazardous waste landfill in the southeastern corner of TA-III undergoing post-closure care. From 1962 until 1985 the Chemical Waste Landfill was used for the disposal of hazardous, radioactive, and mixed waste, and from 1981 through 1989 as a hazardous waste drum storage facility. In June 2011, NMED approved closure of the Chemical Waste Landfill (Kieling 2011), and the Chemical Waste Landfill Post-Closure Care Permit (PCCP) (NMED 2009) took effect. The PCCP defines all post-closure requirements for the Chemical Waste Landfill, including groundwater monitoring.

The groundwater monitoring network at the Chemical Waste Landfill consists of four wells. In 2017, semiannual groundwater monitoring was performed in January and July in accordance with PCCP requirements. Groundwater samples were analyzed for trichloroethene (TCE), nickel, and chromium; January samples were also analyzed for additional VOCs. Results were consistent with previous years; TCE was the only VOC detected above reporting limits, and no analytes were detected at concentrations exceeding the EPA MCLs or PCCP-defined hazardous concentration limits. Groundwater monitoring activities and results are detailed in the AGMR along with additional site background information.

In addition to semiannual groundwater monitoring, the PCCP requires other monitoring, inspections, maintenance, and repair activities associated with the landfill. Inspections conducted in 2017 confirm that the evapotraspirative cover was in good condition with even coverage of native

perennial grasses. VOC soil vapor monitoring continues to confirm the residual VOC soil vapor plume is stable, slowly dissipating through diffusion, and not a threat to groundwater. All PCCP-required activities for 2017 are documented in the *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017* (SNL/NM 2018b).

3.5.2 Corrective Action Management Unit Post-Closure Care

The Corrective Action Management Unit, a containment cell located near the Chemical Waste Landfill, holds treated soils generated from the Landfill Excavation Voluntary Corrective Measure of the Chemical Waste Landfill. LTS Program personnel conduct post-closure care for the Corrective Action Management Unit in accordance with the Permit issued on January 27, 2015 (NMED 2015), with an effective date of February 26, 2015.

The Corrective Action Management Unit containment cell consists of engineered barriers and a final cover system, and incorporates a bottom liner system with a leachate collection system and a vadose zone monitoring system. The monitoring system, which provides information on soil conditions under the containment cell for early detection of leaks, consists of three monitoring subsystems: a primary subliner, a vertical sensor array, and the Chemical Waste Landfill sanitary sewer line. All three monitoring subsystems are monitored quarterly for soil moisture content. The vertical sensor array and Chemical Waste Landfill sanitary sewer monitoring subsystems are sampled annually for the composition of soil vapors.

The 2017 soil-vapor monitoring results continue to show the edge of the residual soil vapor plume emanating from the nearby former Chemical Waste Landfill. This is consistent with the conceptual model of the Chemical Waste Landfill residual soil vapor plume (SNL/NM 2004). VOC concentrations at the vertical sensor array monitoring subsystem locations continue to correlate with seasonal soil temperature variations, increasing when the soil temperature is warmer and decreasing when the soil temperature is cooler. The VOC concentrations are not attributed to the material in the Corrective Action Management Unit containment cell. Baseline data for soil vapor and soil moisture were established between October 2003 and September 2004.

The 2017 soil moisture monitoring results remained consistent with the baseline data for the primary subliner and vertical sensor array monitoring subsystems. Slight increases at two of the Chemical Waste Landfill sanitary sewer monitoring subsystem locations (recorded September 2005 and March 2007) were attributed to a leak in the sanitary sewer system that parallels the Chemical Waste Landfill sanitary sewer monitoring subsystem. A liner was inserted into the sanitary sewer system in September 2010 to seal any leaks. Soil moisture values have since stabilized at the two Chemical Waste Landfill sanitary sewer monitoring locations.

Leachate is water that collects contaminants as it percolates through wastes, pesticides, or fertilizers. Leaching may occur in farming areas, feedlots, or landfills, and may result in hazardous substances entering surface water, groundwater, or soil.

In 2017, 245 gallons of leachate (a listed hazardous waste) were removed from the leachate collection system compared to 276 gallons of leachate removed in 2016. The evapotraspirative cover continues to meet successful revegetation criteria and is in excellent condition with even coverage of mature, native perennial grasses. Additional information on activities conducted, including inspections, monitoring, and sampling details, can be found in the *Corrective Action Management Unit Report of Post-Closure Care Activities Calendar Year 2017* (SNL/NM 2018c).

3.5.3 Mixed Waste Landfill Long-Term Monitoring and Maintenance

The MWL is a 2.6-acre SWMU with Corrective Action Complete with Controls status. The MWL is located in the north-central portion of TA-III and is undergoing long-term monitoring and maintenance. The MWL consists of two distinct disposal areas: the classified area (occupying 0.6 acres) and the unclassified area (occupying 2.0 acres). From March 1959 through December 1988, the MWL was used for the disposal of low-level radioactive, hazardous, and mixed waste. The MWL has undergone corrective action in accordance with two NMED Orders (NMED 2004; NMED 2005) and 20.4.1 NMAC. The NMED Final Order for Corrective Action Complete with Controls (NMED 2016) became effective in March 2016, granting the Class 3 Permit Modification to reflect that the MWL is Corrective Action Complete with Controls. All controls required for the MWL are defined in the MWL Long-Term Monitoring and Maintenance Plan (LTMMP), which was implemented upon NMED approval (Blaine 2014) and included in Sandia's RCRA Facility Operating Permit (Kieling 2016a; Kieling 2016b).

The groundwater monitoring network at the MWL consists of four compliance wells and three wells monitored for groundwater elevation only. In 2017, semiannual groundwater monitoring was performed at the MWL in May and October in accordance with the MWL LTMMP. All groundwater samples were analyzed for VOCs; metals including cadmium, chromium, nickel, and uranium; specific radionuclides by gamma spectroscopy; gross alpha and gross beta; tritium; and radon-222. Results were consistent with previous years, and no analytes were detected at concentrations exceeding EPA MCLs or LTMMP-defined trigger levels. Groundwater monitoring activities and results are summarized in the AGMR along with further site background information.

In addition to semiannual groundwater monitoring, the MWL LTMMP requires other monitoring, inspections, maintenance, and repair activities. Ongoing LTMMP activities are documented comprehensively in an MWL Annual Long-Term Monitoring and Maintenance Report submitted to NMED in June of each year. In 2017, the evapotraspirative cover was in excellent condition with even coverage of mature native perennial grasses. Based on all monitoring, inspection, and maintenance results, the evapotraspirative cover and monitoring systems are functioning as designed and site conditions remain protective of human health and the environment. All LTMMP-required monitoring activities for 2017 are documented in the *Mixed Waste Landfill Annual Long-Term Monitoring and Maintenance Report, April 2017 through March 2018*, which will be submitted to NMED in June 2018.



Cooper's Hawk, *Accipiter cooperii*

In 2017 preparations began for the first Five-Year Report for the MWL, as required by the NMED Final Orders (NMED 2005; NMED 2016) and LTMMP approval (Blaine 2014). The purpose of this report is to analyze the continued effectiveness of the MWL evapotraspirative cover (i.e., a remedy selected by the NMED) and reevaluate the feasibility of excavating the MWL. This report is due to the NMED in January 2019.

3.5.4 Long-Term Monitoring and Maintenance of Additional Solid Waste Management Units Granted Corrective Action Complete with Controls

The LTMMP addresses measures that provide protection of human health and the environment from constituents of concern present at additional SWMUs granted Corrective Action Complete with Controls status per the Hazardous Waste Facility Operating Permit that was issued on January 27, 2015 (NMED 2015). Measures include surveillance of site conditions and maintenance of institutional controls.

Based on the 2017 inspections performed and site conditions observed, the administrative and physical institutional controls in place at the SWMUs are effectively providing continued protection of human health and the environment. In 2017 Sandia personnel completed an erosion control design package for the Tijeras Arroyo escarpment by TA-IV. The project construction, planned to start in 2018, will resolve SWMU 45 erosion that was observed during the 2017 inspections and will implement a best management practice to prevent erosion for SWMUs 46 and 229. Other 2017 actions completed were replacement of three weathered SWMU identification signs: one for SWMU 46 and two for SWMU 87. *The Solid Waste Management Unit and Areas of Concern Annual Long-Term Monitoring and Maintenance Report for Calendar Year 2017* (SNL/NM 2018f) was submitted to NMED.

3.5.5 Groundwater Monitoring

LTS Program personnel collected routine groundwater samples for the Chemical Waste Landfill PCCP; the MWL LMMP; three groundwater Areas of Concern (TAVG, TAG, and BSG) identified in the Permit issued on January 27, 2015 (NMED 2015); and the Groundwater Monitoring Program (to satisfy the Compliance Order on Consent Section IV Background [NMED 2004] as well as DOE O 231.1B for groundwater surveillance). The 2017 water quality results for this sampling were consistent with results from past years. A summary of results is provided in Appendix A, "Summary of Groundwater Monitoring Activities," and in the AGMR.

Groundwater is the water found beneath the earth's surface in pore spaces and in fractures of rock formations.

Analyses were conducted as follows:

- TAVG wells—Target Analyte List metals, inorganics (including nitrite plus nitrate [NPN], major anions, and perchlorate), total alkalinity, VOCs, gross alpha, gross beta, and selected radionuclides
- TAG wells—Target Analyte List metals, inorganics (including NPN and major anions), total alkalinity, VOCs, gross alpha, gross beta, and selected radionuclides
- BSG wells—Target Analyte List metals, inorganics (including NPN, major anions, and perchlorate), total alkalinity, VOCs, diesel range organics, gasoline range organics, high explosive compounds, gross alpha, gross beta, and selected radionuclides
- Groundwater Monitoring Program wells—Target Analyte List metals (plus mercury), inorganics (including NPN, major anions, and total cyanide), total phenols, total alkalinity, VOCs, total halogenated organics, gross alpha, gross beta, selected radionuclides (e.g., uranium-234, uranium-235, and uranium-238), and high explosive compounds (at six wells)

For the TAVG Area of Concern, 18 of the 20 wells were sampled. Several analytical results exceeded the MCLs for TCE and NPN: TCE exceeded the MCL of 5 µg/L in four wells, with a maximum concentration of 17.4 µg/L; NPN exceeded the MCL of 10 mg/L in three wells, with a maximum concentration of 12.2 mg/L. For the TAG Area of Concern, 18 wells located in either the regional or perched aquifer were sampled. NPN exceeded the MCL in five wells, with a maximum concentration of 26.0 mg/L. For the BSG Area of Concern, 10 wells were sampled. NPN exceeded the MCL in seven wells, with a maximum concentration of 44.9 mg/L. All other analytical results for groundwater samples from the three Areas of Concern were below established MCLs.

For the Groundwater Monitoring Program, 12 wells and one spring were sampled. Fluoride was detected above the maximum allowable concentration in two groundwater wells and at Coyote Springs. Beryllium concentrations in Coyote Springs exceeded the EPA MCL. The exceedance for each of these elements is attributable to the elevated natural concentrations associated with bedrock groundwater systems at the sampling locations. All other analytical results for groundwater samples from the Groundwater Monitoring Program were below established MCLs.

Field quality control samples associated with these groundwater sampling programs included duplicate environmental, equipment blank, field blank, and trip blank samples.



Flame Skimmer (*Libellula saturata*)

3.6 National Environmental Policy Act Program

NEPA Program personnel provide DOE with technical assistance in support of Sandia compliance with NEPA and the National Historic Preservation Act at all SNL locations: SNL/NM; SNL/California; Tonopah Test Range, Nevada; Kauaʻi Test Facility, Hawaiʻi; and other remote locations as needed. The NEPA team reviews projects for conformance with existing DOE NEPA documents and determinations. NEPA Docs software is used to facilitate NEPA reviews and quality assurance activities by providing a consistent framework for reporting and making NEPA documentation readily available for reference.

When required, a DOE NEPA checklist and an Air Force Form 813 (AF813) are prepared for DOE review and determination if a proposed action meets any of the following concerns:

- DOE and the USAF directs an AF813.

- The activity is not covered by existing Sandia NEPA documentation.
- The proposed activity is outside the scope of the existing permit.
- The activity is at a KAFB location that is not permitted to Sandia.

3.6.1 National Environmental Policy Act Activities in 2017

The NEPA team participated in or completed the following environmental activities in 2017:

- Updated the archeological review process.
- Conducted internal assessment regarding NEPA checklist requirements.
- Updated NEPA checklist permits sections.
- Provided support to Facilities Deferred Maintenance Special Emphasis Program personnel.
- Participated in the NEPA Checklist Structured Improvement Activity.
- Began coordination and procurement of the Kaua'i Test Facility Environmental Assessment.

An event involving ground disturbance within the boundary of an archeological site determined eligible for listing to the National Register of Historic Places occurred in January 2017. Work at the site was stopped and addressed. This discovery indicated several opportunities for improvement in the NEPA and archeological review process of the project. The NEPA team addressed several subsequent corrective actions as a result, including hiring an archeologist, making NEPA checklist format and module changes, and incorporating process changes.

In addition to these activities, NEPA Program personnel reviewed a total of 1,580 proposed projects in 2017. Of this total, 242 checklist reviews were completed internally and 107 NEPA checklists were transmitted to DOE for review and determination (Table 3-1).

The NEPA team supported a total of 349 checklists (Table 3-1); many additional NEPA checklists were processed. For example, 445 checklists were created, with 51 terminated for various reasons and 47 still being actively managed by the NEPA team.

Table 3-1. NEPA reviews completed in 2017

NEPA Reviews	Review Breakouts		Quantity
NEPA software system	Reviews completed by NEPA team		242
	Reviews completed by DOE		107
Other NEPA reviews	Reviews completed by NEPA team		1,207
DOE and USAF NEPA documents	*New land-use permit reviews*	*0*	
	Land-use permit renewal reviews	*6*	
	Land-use permit termination reviews	*0*	
	Project-specific reviews	*18*	
	Environmental assessments under USAF activities	*0*	
	Subtotal for NEPA reviews completed by DOE and USAF		***24***
Total NEPA Reviews			**1,580**
Percentage of Total NEPA Reviews Completed by DOE[a]			**8%**
Percentage of NEPA Software System Reviews Completed by DOE[b]			**38%**

[a]Total DOE reviews (107 + 24 = 131) divided by total NEPA reviews (1,580) = 8%.
[b]Total DOE reviews (107 + 24 = 131) divided by total NEPA software system reviews (349) = 38%
DOE = U.S. Department of Energy
NEPA = National Environmental Policy Act
USAF = U.S. Air Force

3.6.2 Site-Wide Environmental Impact Statement

During 2017, Sandia personnel continued to assist DOE in the development of a new Site-Wide Environmental Impact Statement (SWEIS). Sandia personnel and a subcontractor updated the SWEIS Implementation Plan, which Sandia personnel use to ensure successful implementation of SWEIS requirements and parameters. The SWEIS subcontractor also completed draft documents and posters for upcoming public meetings.

3.7 Waste Management Program

Sandia personnel follow the waste management hierarchy dictated in the Pollution Prevention Act of 1990 and reinforced in amendments to RCRA. The objective of the waste management and MSP2 focus areas is to make every attempt to reduce, reuse, or recycle waste (in that order), as appropriate, before any treatment or disposal. Waste management activities are conducted in accordance with applicable permits and regulations as discussed in Chapter 2.

Wastes are generated during daily activities that include research and testing; production; maintenance and support operations; construction, renovation, decommissioning, and demolition; environmental protection; and waste management. The wastes include the following:

- Radioactive waste (including low-level radioactive waste and transuranic waste)
- Mixed waste (including low-level radioactive mixed waste and mixed transuranic waste)
- Hazardous waste
- Toxic Substance and Control Act-regulated waste
- Other regulated wastes, including special waste and industrial solid waste
- Construction and demolition waste
- Commercial solid waste

Processes at waste management units vary according to the specific waste type, but generally tasks are to collect, screen, sort, bale, repackage, treat, and/or store material in preparation for shipment to off-site facilities for recycling, storage, treatment, or disposal.

Types of waste handled and shipped in 2017 are summarized in Table 3-2. Wastes recycled in 2017 are summarized in Table 3-3.

Table 3-2. Waste shipped by waste management facilities, 2017

Waste Categories	2017 Waste Shipped (pounds)
Radioactive Waste	
Low-level radioactive waste	65,635
Transuranic waste	0
Subtotal	**65,635**
Mixed Radioactive and Hazardous Waste	
Mixed low-level radioactive waste	97,113
Mixed transuranic waste	0
Subtotal	**97,113**
RCRA Waste	
Hazardous waste	183,051
Subtotal	**183,051**

Table continued on next page.

Table 3-2. Waste shipped by waste management facilities, 2017 (continued)

Waste Categories	2017 Waste Shipped (pounds)
Toxic Substances Control Act	
PCBs	2,771
PCBs and hazardous waste mixture	0
Subtotal	**2,771**
Other Regulated Wastes	
Infectious waste	6,064
Asbestos	128,138
Chemical waste (includes special waste and industrial solid waste)	327,337
Used oil (not recycled)	0
Subtotal	**461,539**
Commercial, Construction, and Demolition Solid Waste	
Solid waste collection and recycling center dry waste	1,373,620
Off-site office waste (Sandia Science and Technology Park)	124,089
Cafeteria wet waste	41,360
Construction and demolition waste	7,825,236
Subtotal	**9,364,305**
2017 Total Waste Shipped	**10,174,414**

NOTES: (1) All wastes were shipped off-site for treatment and/or disposal. Wastes that were treated on-site and shipped off-site for disposal are included in the quantities of wastes shipped off-site.
(2) Waste treatment may increase waste quantity (e.g., adding inert material to treat the waste through macroencapsulation within an outer container).
(3) Waste containers are included in the quantities of wastes shipped off-site, and some containers (e.g., containers with lead shielding for radiation protection) may increase the quantity significantly.
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act

Table 3-3. Waste recycled, 2017

Recycle Categories	Waste Recycled (pounds)
Regulated or Chemical Waste Recycled	
Batteries	154,500
Capacitors	5,594
Computer electronics	726,042
Fuel filters	1,294
Lead	2,364
Light ballasts (non-PCB)	527
Light bulbs	11,758
Oil, grease, and fuel	82,423
Soil	8,643
Toner and ink cartridges	16,736
Subtotal	**1,009,881**
Commercial, Construction, and Demolition Solid Waste Recycled	
3-D printer cartridges	6,832
Batteries	5,160
Cardboard	436,690
Carpet	91,354

Table continued on next page.

Table 3-3. Waste recycled, 2017 (continued)

Recycle Categories	Waste Recycled (pounds)
Ceiling tiles	19,900
Chairs	80,030
Compost (food, green, paper, and plywood)	314,210
Food grease	49,800
Metals	2,186,592
Nitrile gloves	2,489
Paper (mixed and white)	235,879
Plastics	50,477
Tires	19,200
Wood	114,840
Subtotal	**3,613,453**
2017 Total Waste Recycled	**4,623,334**

3-D = three dimensional
PCB = polychlorinated biphenyl

3.7.1 2017 Waste Management Activities

Waste management takes place at the following locations: the Hazardous Waste Handling Unit, the Radioactive and Mixed Waste Management Unit, seven Manzano Storage Bunkers, the Auxiliary Hot Cell Unit, the Thermal Treatment Unit, and the Solid Waste Collection and Recycling Center.

At each location, wastes are tracked, inspected, and managed at all times to protect human health and the environment. Wastes are not disposed of at SNL/NM. Waste management activities at individual units during 2017 are summarized as follows:

- At the Hazardous Waste Handling Unit, wastes were screened, sorted, repackaged, and stored.
- At the Radioactive and Mixed Waste Management Unit, wastes were screened, sorted, repackaged, stored, and treated. Wastes were treated by one or more of the following methods: solidification and stabilization, chemical deactivation and neutralization, macroencapsulation, or physical treatment (volume reduction).
- At the Manzano Storage Bunkers, wastes were stored. Five of the seven bunkers are included in the RCRA permit.
- At the Auxiliary Hot Cell Unit, wastes were generated and stored.
- At the Thermal Treatment Unit, small quantities of unique explosives waste generated by research and test activities at an adjacent facility were treated on-site.
- At the Solid Waste Collection and Recycling Center, commercial waste was screened.

Compliance Inspection

Representatives of the NMED Hazardous Waste Bureau performed an annual Hazardous Waste Compliance Evaluation Inspection in January and February 2017. The inspectors identified one violation regarding two containers that were not labeled properly; the containers were labeled immediately. NMED issued a Notice of Violation and Resolution in February 2017.

3.7.2 Radioactive Waste and Mixed Waste

DOE and Sandia personnel manage low-level radioactive waste and low-level radioactive mixed waste that is generated through a variety of processes, including production, research, and waste

management activities. DOE and Sandia personnel also manage transuranic and mixed transuranic wastes, which are generated through research and waste management activities. During 2017, legacy wastes (wastes originally generated between 1990 and 1998) were also managed at SNL/NM.

Low-level radioactive waste generally consists of laboratory waste, debris from maintenance, debris from decontamination and demolition activities, and personal protective equipment. Low-level radioactive waste is contaminated primarily with one or more isotopes of strontium, plutonium, cobalt, americium, thorium, cesium, tritium, and/or uranium (plutonium and americium in low-level radioactive waste are below the activity level designated for transuranic waste).

Transuranic waste may derive from sealed instrument sources, decontamination and demolition waste, personal protective equipment, and/or laboratory waste. The radioactive components in transuranic waste are generally americium, plutonium, neptunium, and/or curium.

Low-level radioactive mixed waste and mixed transuranic generally consist of inorganic debris and radioactive metallic objects with hazardous waste constituents, and include wastes that have been treated to meet hazardous waste treatment standards. The radioactive components of low-level radioactive mixed waste and mixed transuranic are similar to those in low-level radioactive waste or transuranic waste.

No high-level radioactive waste is generated at SNL/NM. Although Sandia personnel operate several nuclear research reactors, these are not used for power production; therefore, spent fuel that would be removed from the research reactors would not be classified as high-level radioactive waste.

All low-level radioactive waste, low-level radioactive mixed waste, transuranic, and mixed transuranic generators are instructed to contact Radioactive Waste Program personnel to obtain approval before generating waste. This promotes waste minimization and allows a pathway to be developed for waste treatment and disposal before the waste is generated. Radioactive wastes typically are shipped to off-site facilities within one year, but may remain on-site longer than one year if necessary to complete the process for acceptance at an off-site facility and/or to achieve full utilization of transport vehicles.



Thirty-nine thousand pounds of ceiling tiles recycled

As discussed in Chapter 2, Sandia personnel manage mixed waste that is subject to the Federal Facilities Compliance Order (NMED 1995). The compliance requirements include: (1) deadlines for processing and/or disposing of various types of waste as specified in the annual Site Treatment Plan (NMED 1995) and (2) instructions for providing an annual update of activities and a current inventory of stored waste still on-site. During 2017, DOE and Sandia personnel met all regulatory deadlines and provided an annual update of mixed waste activities (SNL/NM 2018f). During 2017, 1.92 cubic meters of mixed transuranic waste subject to the Federal Facility Compliance Order was managed by Sandia personnel. Table 9-3 lists the quantities of mixed waste subject to the Federal

Facility Compliance Order at the end of fiscal year 2017. The wastes are subject to a Site Treatment Plan compliance deadline of December 31, 2020.

3.7.3 Hazardous Waste

Hazardous waste generated at SNL/NM includes a wide variety of wastes from research and testing, together with larger quantities of wastes from decontamination and demolition, production, maintenance, and support operations, including waste management activities. Hazardous wastes that cannot be recycled or treated on-site are sent to off-site facilities for treatment, as needed, before disposal at permitted off-site facilities. Applicable regulations for hazardous waste handled at SNL/NM are listed in Chapter 9.

Certain types of explosives waste generated at SNL/NM are treated at the Radioactive and Mixed Waste Management Unit or the Thermal Treatment Unit. Explosives waste is generally managed at the point of generation until it is shipped to an off-site facility for treatment in accordance with regulatory requirements.

In accordance with Section 2.5 of the Permit (NMED 2015), DOE and Sandia personnel annually certify that there is a "program in place to reduce the volume and toxicity of hazardous waste generated by the facility's operation to the degree determined by the Permittee to be economically practicable" at SNL/NM. Many types of hazardous waste are recycled where feasible. Recycled hazardous waste includes various batteries, silver compounds, mercury compounds, lamps, capacitors, and toxic metals such as lead. Waste minimization efforts are investigated and implemented by line organizations with support and technical assistance from MSP2 Program personnel (see Section 3.8). Hazardous and mixed waste minimization activities are described in an annual report to NMED (SNL/NM 2017), which is available to the public in hard copy at the University of New Mexico's Zimmerman Library. An index of RCRA-related documents is available in the Information Repository at:

http://www.sandia.gov/RCRA/

3.7.4 Other Regulated Waste

Additional types of waste have specific requirements. These regulations are as follows.

Industrial Solid and Special Wastes

Industrial solid waste and special waste include a wide variety of wastes generated from research and testing, production, maintenance and support operations, decontamination and demolition, and waste management activities. Wastes that cannot be recycled or treated on-site are sent to off-site facilities for treatment as needed before disposal at permitted off-site facilities.

An ongoing initiative to dispose of chemicals that were no longer needed and/or that expired resulted in an increase in chemical waste shipped in 2017 (Table 3-2).

Many categories of nonhazardous waste are recycled, including alkaline batteries, fluorescent lamps, oils, and ballasts not containing polychlorinated biphenyl (PCB). Waste minimization efforts are also applicable to nonhazardous waste, as discussed in Section 3.8.

Polychlorinated Biphenyl and Asbestos Wastes

PCBs are a class of organic chemicals that were used widely in the past in industrial applications due to their practical, physical, and chemical properties. PCBs were used in dielectric fluids (e.g., fluids in transformers or capacitors), hydraulic fluids, and other applications requiring stable, fire-retardant materials. The domestic production and distribution of PCBs was banned in 1979, and their use continues to be phased out.

Most PCBs and PCB-containing equipment have been identified and replaced. There are currently no known PCB-containing items remaining in use that require tracking per regulations. There are buildings that contain PCB spill contamination sites on concrete floors (from old electrical transformers that have since been removed from service), which are being actively managed in compliance with an EPA Toxic Substances and Control Act use authorization. Table 3-2 summarizes the PCB waste shipped in 2017.

Asbestos-containing materials are present in older buildings, and abatement is ongoing. Asbestos material is only removed if the material is an inhalation hazard or if the building is slated to be torn down or renovated. Typical asbestos-containing building materials are present in floors, ceilings, roofing tile, certain types of insulation, and other fire-retardant construction materials. Typical asbestos waste generated from equipment abatement consists of fume hoods, ovens, and cable insulation. In instances where laboratory equipment has asbestos-containing material in good condition and in a nonfriable form (which poses no inhalation risk), these items are allowed to remain in service or are redistributed through the Property Management and Reapplication Department. Table 3-2 summarizes the quantities of asbestos waste shipped in 2017.

3.8 Materials Sustainability and Pollution Prevention Program

The MSP2 Program is a central element in the Environmental Management System and applies to all activities that use resources and generate waste. MSP2 Program personnel provide programmatic guidance and specify strategies, activities, and methods to reduce the quantity and toxicity of waste and pollutants, conserve energy and resources, and purchase environmentally preferable products. Program focus areas include waste minimization, sustainable acquisitions, electronics stewardship, recycling and composting of solid waste, and awareness and outreach. MSP2 Program personnel promote and integrate materials sustainability into all operations.

3.8.1 Waste Minimization

Waste minimization is accomplished by reducing or eliminating the generation of wastes and other pollutants at the source, including segregation, substitution, and reuse of materials that could otherwise create future environmental legacies. Since establishing the goal of Zero Waste by 2025, the generation of commercial solid waste has dropped 36 percent—from 1,048 metric tons in 2008 to 670 metric tons in 2017. The goal will be considered accomplished when operations meet the internationally accepted definition of Zero Waste, which means reducing waste by 90 percent from the baseline year, i.e., generating less than 105 metric tons of commercial solid waste per year.



Zero Waste by 2025

3.8.2 Sustainable Acquisition

Sustainable acquisition is one way to reduce environmental impacts. This includes integrating products with reduced environmental impact into purchase agreements and ongoing operations and maintenance. Products containing recycled and biobased content, those designed with identified environmentally preferable attributes, and those with third-party-certified green labels are preferred. In 2017, the office supply contract replaced many common products with those containing higher recycled content or reusability; the on-site cafeteria stopped carrying disposable foam cups, advocating washable glasses and reusable to-go cups; and the corporate cell phone contract integrated the new green equipment standard.

In 2017, two DOE Sustainability Awards were presented to Sandia personnel. The Life-Cycle Management Award for Waste Reduction and Pollution Prevention honored a green team in the neutron generator organization that looked for opportunities to make environmental and process improvements. Among their successes were a series of waste assessments on their buildings that measured the pounds of waste generated per person and identified ways to reduce waste for each building. They also developed a pilot project that replaced water coolers with built-in, bottle-refilling-capable water fountains in the same buildings, and measured the positive environmental impact and return on investment. The award recognized the team for identifying, conducting pedigree research, and then safely disposing of a large inventory of obsolete classified equipment, freeing up additional classified storage, reducing nearly 3,000 classified holdings, and eliminating associated security risks.

The second Life-Cycle Material Management Award recognized an individual as a Change Agent of Sandia Waste Management. The award recognized the individual's tireless efforts in leading the Zero Waste 2025 program and helping to inspire organizations both large and small to recycle and institute a wide range of creative programs that cut down on the waste sent to landfills. This individual was also recognized for adding computer automation to several key processes and customer communication to improve accuracy, turnaround time, and user satisfaction.

2017 DOE Sustainability Awards

Life-Cycle Management Award for Waste Reduction and Pollution Prevention to a green team. The team measured pounds of waste generated per person and identified ways to reduce that waste; developed a pilot project that replaced water coolers with built-in, bottle-refilling-capable water fountains; and safely disposed of a large inventory of obsolete classified equipment, reducing nearly 3,000 classified holdings and eliminating associated security risks.

Life-Cycle Material Management Award to a Change Agent of Sandia Waste Management. The individual tirelessly led Zero Waste 2025 program efforts, inspired recycling, and instituted a wide range of creative programs that cut down on the waste sent to landfills; added computer automation to several key processes; and increased customer communication to improve accuracy, turnaround time, and user satisfaction.

3.8.3 Electronic Stewardship

Sandia management is committed to purchasing computer systems, such as green electronics, designed with the environment in mind. *Green* electronics are defined as equipment whose manufacture, operation, and end of life disposition have as little environmental impact as possible.

Members of the Workforce are encouraged to eliminate personal desktop printers in favor of high-capacity all-in-one network machines that copy, print, fax, and scan. This saves energy, maintenance, and the need for on-hand inventory of parts and consumables. Additionally, the procurement contracts for printers and scanners are restricted and standardized to just a few models to reduce the variety of parts and consumables maintained.

3.8.4 Recycling of Solid Waste

Materials suitable for reuse and/or recycling are diverted from landfills, thereby minimizing the economic and environmental impacts of waste disposal. Instead of paying to throw material away in a landfill, those avoided fees and any realized value are leveraged to support diverse recycling and composting programs. This business model has created two permanent jobs and supported numerous positions at local and regional companies.

Screening solid waste is not a regulatory requirement, but it is a best management practice that Sandia personnel implement to prevent prohibited materials from inadvertently being sent to a landfill.

3.8.5 Awareness and Outreach

MSP2 Program personnel promote the use of green initiatives and available resources to decrease the environmental impact of existing operations. Over 110 recycling bins for paper, plastics, and aluminum were added to buildings in 2017, and composting collection bins were added to five new buildings. Team members partner with a local business to process compost waste into a valuable commodity.

The MSP2 Program personnel use various communication tools to increase awareness about and bolster participation in recycling, composting resources, and sustainable acquisition. Major outreach efforts include Earth Day, Pollution Prevention Week, and America Recycles Day activities. Sandia is also a sponsor of the New Mexico Recycling Coalition.

Additional information on MSP2 Program initiatives, events, and accomplishments can be found at the following website:

http://p2.sandia.gov

Chapter 4. Terrestrial Surveillance Program



Gunnison's prairie dog (*Cynomys gunnisoni*)

OVERVIEW ■ Terrestrial Surveillance Program personnel collect soil, sediment, and vegetation samples, and these samples are analyzed for radiological, metal, and other site-specific constituents. Samples are taken from on-site locations and then compared with samples from perimeter and off-site locations.

Terrestrial Surveillance Program personnel at SNL/NM collect environmental media (soil, sediment, and vegetation) samples, and these are analyzed for radiological constituents, as required. As a best management practice, samples are also collected in order to analyze metals and other site-specific constituents.

In addition to the environmental samples collected, ambient external gamma radiation levels are measured using TLDs. These surveillance activities are conducted at designated locations that are on-site, off-site, and around the perimeter of DOE fee-owned areas, leased property, and KAFB.

Environmental radiological surveillance began at SNL/NM in 1959 (SNL/NM 1973). Nonradiological surveillance sampling began in 1993 with the implementation of the Terrestrial Surveillance Program and included the collection of samples for metal analyses. The data from 2000 to the present is used for evaluation.

4.1 Regulatory Criteria

The Terrestrial Surveillance Program is designed and conducted to address DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment*, which establishes standards and requirements to protect the public and the environment from undue risk from radiation associated with radiological activities under the control of DOE.

The Terrestrial Surveillance Program is also conducted to satisfy Sandia's Environmental Management System, which is certified to the International Organization for Standardization 14001 standard. Reporting is done in accordance with DOE O 231.1B, Admin Change 1, *Environment, Safety and Health Reporting*.

4.2 Sample Locations and Media

Terrestrial Surveillance Program personnel use three sample location classifications: on-site, perimeter, and off-site (the latter was previously referred to as community locations).

The on-site sampling locations (Figure 4-1) are in areas of known contamination (such as SWMU), areas of potential release (sites with current outdoor testing activities), and/or areas where contamination may be concentrated naturally (arroyos and river banks). The perimeter sample locations are located around the boundaries of KAFB (Figure 4-1). The off-site sample locations are located within a 25-mile radius of KAFB (Figure 4-2). Off-site sample results are used for comparison to the on-site and the perimeter sample results.

The various environmental sample media that are collected include surface soil (less than 2 inches deep), arroyo and river sediment samples, and vegetation. Vegetation samples, which are collected from native grasses and small leafy plants, are used to monitor the potential uptake of radioactive and nonradiological materials from the soil. Table 4-1, Table 4-2, and Table 4-3 list the sampling locations, the type of media that is collected, and the analytical parameters sampled for at the on-site, perimeter, and off-site locations, respectively. See Section 4.3 for the analytical parameters. Environmental TLDs are used to measure the cumulative ambient external radiation dose and to closely approximate the dose potentially received from natural and nonnatural sources.

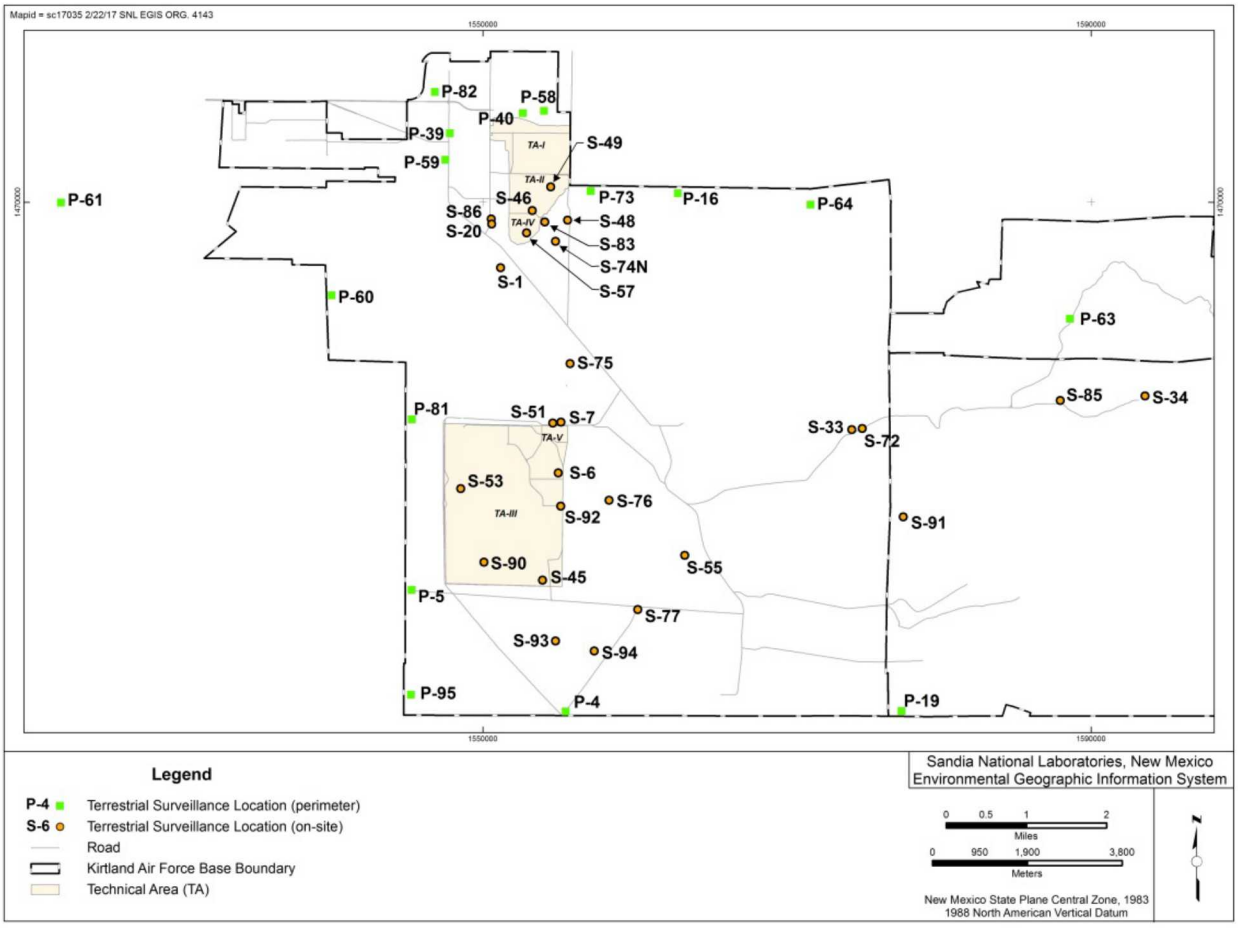


Figure 4-1. Terrestrial Surveillance Program on-site and perimeter sampling locations

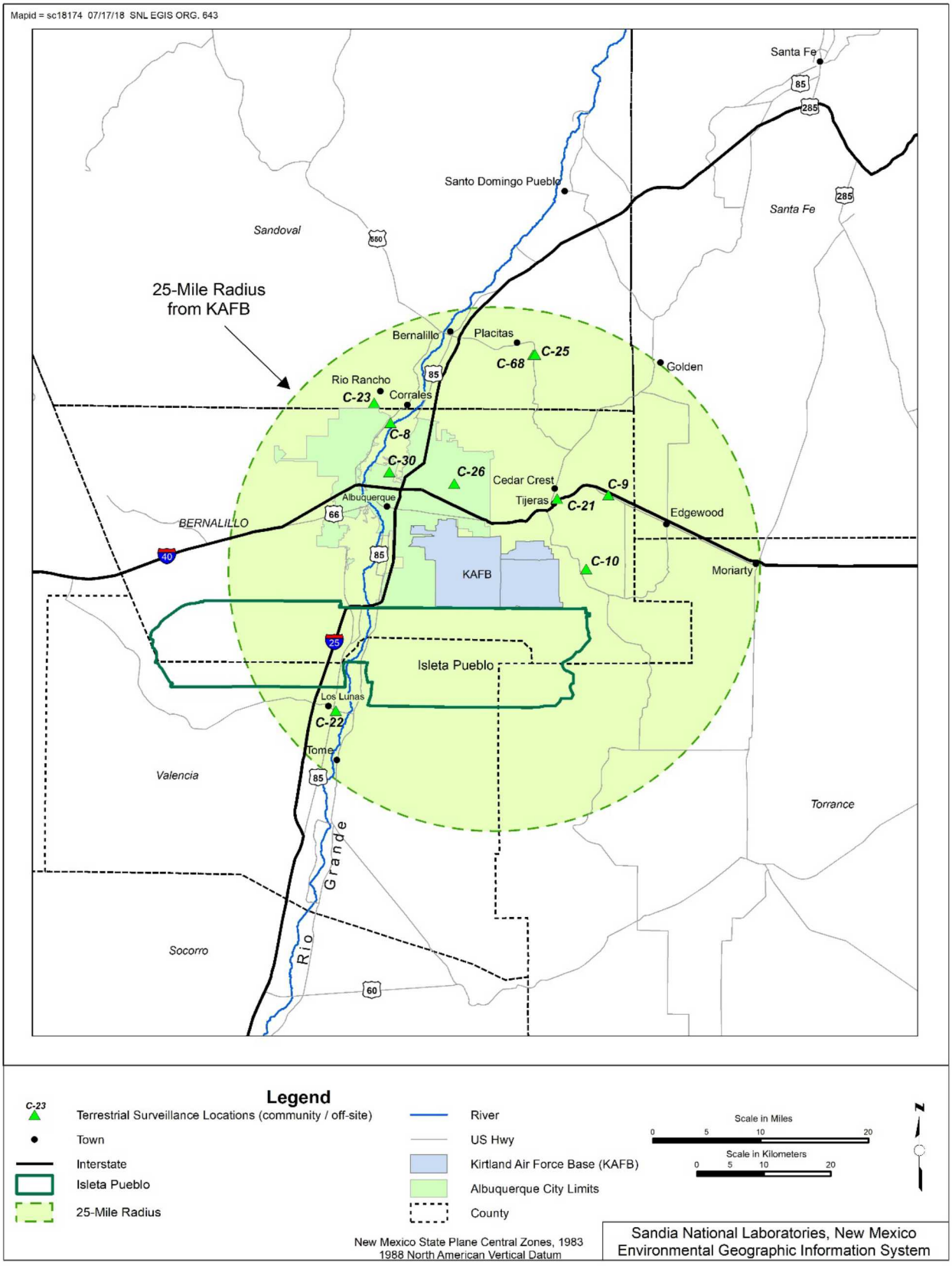


Figure 4-2. Terrestrial Surveillance Program off-site sampling locations

Table 4-1. On-site terrestrial surveillance locations, sample media, and parameters

Location Number	Sampling Location	Soil[a]	Sediment[a]	Vegetation[b]	TLD[c]
S-1	Pennsylvania Avenue	X			X
S-6	TA-III (east of the water tower)	X		X	X
S-7	Unnamed Arroyo (north of TA-V)				X
S-20	TA-IV (southwest)				X
S-33	Coyote Springs	X		X	
S-34	Lurance Canyon Burn Site	X		X	
S-45	RMWMU, TA-III (northwest corner)	X		X	X
S-46	TA-II (south corner)	X[d]		X	X
S-48	Tijeras Arroyo (east of TA-II)				X
S-49	Near the Explosives Components Facility	X[d]		X	
S-51	TA-V (north of culvert)	X		X	
S-53	TA-III (south of the Long Sled Track)	X[e]			
S-55	Large Melt Facility, Building 9939	X		X	
S-57	TA-IV, Building 970 (northeast corner)	X			
S-72	Arroyo del Coyote (midstream)		X		
S-74N	TA-IV, Tijeras Arroyo (midstream)		X		
S-75	Arroyo del Coyote (downstream)		X		
S-76	Thunder Range (north)	X[d]			
S-77	Thunder Range (south)	X[d]			
S-83	TAG well		X		
S-85	Arroyo del Coyote Cable Site		X		
S-86	Corner of Wyoming and S Street	X[d]		X[d]	
S-90	TA-III Land Mine Test Site	X[f]			
S-91	Background Arroyo near SWMU 87		X[d]		
S-92	TA-III Classified Waste Landfill	X			
S-93	Thunder Range Explosives Test Area	X[f,g]			
S-94	Thunder Range (southeast of Range 5)	X[f,g]			

[a]Soil and sediment samples are collected annually (except as noted) and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[b]Vegetation samples are collected annually (except as noted) and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[c]TLDs are analyzed for gamma radiation.
[d]Terrestrial surveillance metals are not included in the sample analysis.
[e]Perchlorate is included in the sample analysis.
[f]High explosives are included in the sample analysis.
[g]Radionuclides, tritium, and metals are not included in the sample analysis.
RMWMU = Radioactive and Mixed Waste Management Unit
S = on-site terrestrial surveillance location
SWMU = Solid Waste Management Unit
TA = technical area
TAG = Tijeras Arroyo Groundwater
TLD = thermoluminescent dosimeter

Table 4-2. Perimeter terrestrial surveillance locations, sample media, and parameters

Location Number	Sampling Location	Soil[a]	Sediment[a]	Vegetation[b]	TLD[c]
P-4	Isleta Reservation gate	X		X	X
P-5	McCormick gate	X		X	X
P-16	Four Hills	X		X	X
P-19	USGS Seismic Center gate	X			X
P-39	Northwest DOE complex				X
P-40	TA-I (northeast)				X
P-58	North KAFB housing	X		X	
P-59	Zia Park (southeast)	X			
P-60	Tijeras Arroyo (downstream)		X		
P-61	Albuquerque International Sunport	X			
P-63	No Sweat Boulevard	X			
P-64	North Manzano base	X			
P-73	Tijeras Arroyo (upstream)		X		
P-81	KAFB (west fence)	X			X
P-82	Commissary	X		X	
P-95	Southwest corner KAFB	X			

[a]Soil and sediment samples are collected annually and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[b]Vegetation samples are collected annually and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[c]TLDs are analyzed for gamma radiation.
DOE = U.S. Department of Energy
KAFB = Kirtland Air Force Base
P = perimeter terrestrial surveillance location
TA = technical area
TLD = thermoluminescent dosimeter
USGS = U.S. Geological Survey

Table 4-3. Off-site terrestrial surveillance locations, sample media, and parameters

Location Number[a]	Sampling Location	Soil[b]	Sediment[b]	Vegetation[c]	TLD[d]
C-8	Rio Grande, Corrales Bridge (upstream)		X		
C-9	Sedillo Hill, Interstate 40	X		X	
C-10	Oak Flats	X		X	
C-21	Bernalillo Fire Station 10, Tijeras				X
C-22	Los Lunas Fire Station				X
C-23	Rio Rancho Fire Station, 19th Avenue				X
C-25	Placitas Fire Station	X		X	X
C-26	Albuquerque Fire Station 9, Menaul Boulevard NE				X
C-30	Albuquerque Fire Station 6, Griegos Road NW				X
C-68	Las Huertas Creek		X		

[a]Off-site samples were previously called "community locations," thus the *C* label in the location number (maintained for the database).
[b]Soil and sediment samples are collected annually and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[c]Vegetation samples are collected annually and analyzed for terrestrial surveillance metals, radionuclides, and tritium.
[d]TLDs are analyzed for gamma radiation.
C = off-site terrestrial surveillance location
NE = northeast
NW = northwest
TLD = thermoluminescent dosimeter

4.3 Field Methods, Analytical Parameters, and Quality Control Procedures

All samples were collected in accordance with applicable field operating procedures for soil, sediment, and vegetation sampling activities and in accordance with the *Quality Assurance Project Plan for Terrestrial Surveillance at Sandia National Laboratories, New Mexico* (SNL/NM 2016b).

Off-site laboratories analyzed all samples in accordance with applicable EPA analytical methods. All chemical data was reviewed and qualified in accordance with Administrative Operation Procedure 00-03, *Data Validation Procedure for Chemical and Radiochemical Data* (SNL/NM 2014). Samples were analyzed) for the following parameters: specific metals, high explosives, perchlorate, tritium, and radionuclides, as specified in Table 4-1, Table 4-2, and Table 4-3. The specific metals list is referred to as the terrestrial surveillance metals and includes the following: aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, iron, lead, magnesium, nickel, selenium, silver, thallium, zinc, and uranium (total).

The Radiation Protection Dosimetry Program owns, issues, and processes environmental TLDs. The technical basis for the environmental TLD monitoring program is provided in *Description and Procedures of the Environmental Radiation Dosimetry Program* (SNL/NM 1987). Dosimeters are issued and processed quarterly following established Radiation Protection Dosimetry Program protocols.

Field quality control samples were collected and included triplicate environmental samples and equipment blank samples. These samples were prepared in accordance with applicable field operating procedures. Laboratory quality control samples are prepared and analyzed as specified in Chapter 8.

4.4 Sample Results Analysis and Methodology

Statistical analyses were performed to compare the results from on-site and perimeter samples to off-site results, and to establish any trends that may indicate the potential for a release of contaminant(s).

Soil is all loose, unconsolidated mineral or organic materials on the immediate surface of the earth that support plant growth. *Sediment* is transported and deposited particles or aggregates derived from rocks, soil, or biological material. *Vegetation* is plant life or the total plant cover of an area.

4.4.1 Statistical Analysis and Methodology

Samples are collected from specified locations to enable effective statistical comparisons with results from previous years. Statistical analyses are performed to determine whether a specific on-site sample result differs from perimeter and off-site sample results and to identify trends at specific sampling locations (see Section 4.5.3). The statistical analysis results are used to prioritize sample results for possible follow-up actions, such as resampling, additional investigation, and/or notifications to applicable entities.

A decision-making tool is used to help determine the appropriate level of concern for each sample result. The statistical analysis prioritization methodology (Shyr, Herrera, and Haaker 1998) is based on a matrix of four priority levels (Table 4-4).

Table 4-4. Priority decision matrix and actions

Priority[a]	Are Results Higher Than Off-Site and Perimeter?[b]	Is There an Increasing Trend?	Action
1	Yes	Yes	Immediate attention is needed. Specific investigation is planned and/or notifications will be made to applicable entities.
2	Yes	No	Some concern is warranted. Further investigation and/or notifications may be necessary.
3	No	Yes	A minor concern. Further investigation and/or notifications may be necessary.
4	No	No	No concern. No investigation will be required.

[a]Based on a statistical analysis prioritization methodology (Shyr, Herrera, and Haaker 1998).
[b]Modified in 2017 to include perimeter.

4.4.2 Other Standards for Comparison

In addition to the statistical analyses, analytical results for metals in soil and sediment samples may be compared to values in the following references (presented in Table 4-5):

- Local and regional soil concentrations (Dragun and Chekiri 2005)
- NMED soil screening levels (NMED 2017b)
- U.S. surface soil surface concentrations (Kabata-Pendias 2000)

Table 4-5. Various reference values for metals in soil

Analyte	NM Soil Concentrations[a]		NMED Soil Screening Levels[b]		U.S. Soil Concentrations[c]	
	Lower Limit (mg/kg)	Upper Limit (mg/kg)	Residential (mg/kg)	Industrial (mg/kg)	Lower Limit (mg/kg)	Upper Limit (mg/kg)
Aluminum	5,000	100,000	78,000	1,290,000	4,500	100,000
Antimony	0.2	1.3	31.3	519	0.25	0.60
Arsenic	2.5	19	7.07	35.9	0.1	30
Beryllium	1.0	2.3	156	2,580	0.04	2.54
Cadmium	ND	11	70.5	1,110	0.08	0.47
Chromium, total	7.6	42	96.6	505	7.0	1,500
Copper	2.1	30	3,130	51,900	1.0	70
Iron	1,000	100,000	54,800	908,000	5,000	45,000
Lead	7.8	21	—	—	10	70
Magnesium	300	100,000	—	—	—	—
Nickel	2.8	19	1,560	25,700	5.0	150
Selenium	0.2	0.8	391	6,490	0.1	4.0
Silver	0.5	5.0	391	6,490	0.2	3.2
Thallium	—	—	0.782	13.0	0.02	2.8
Zinc	18	84	23,500	389,000	5.0	164

[a]Dragun and Chekiri 2005.
[b]NMED 2017b.
[c]Kabata-Pendias 2000.
— = not available
ND = not detected
NM = New Mexico
NMED = New Mexico Environment Department
U.S. = United States

In some instances, a qualitative inspection of the data may be augmented by the graphical evaluation methodology described and documented in *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005* (SNL/NM 2006a). Results in 2017 did not warrant this type of evaluation.

Environmental TLD data may be compared to background radiation levels in the Albuquerque area. Levels in the Albuquerque area are elevated when compared to much of the U.S. due to the higher elevation and the presence of radionuclides in the soil and rock. The local annual radiation dose from natural background sources (indoor radon not included) estimated equivalent is 140 mrem (Brookins 1992).

No regulatory limits are available to directly compare concentrations of radiological constituents in surface soils, sediments, or vegetation.

4.5 Summary of Terrestrial Surveillance Program Activities and Results in 2017

The following Terrestrial Surveillance Program activities occurred in 2017:

- The annual sampling of soil and sediment occurred in early May 2017 at designated locations.
- The annual sampling of vegetation occurred in September 2017 at designated locations.
- The quarterly exchange (deployment and retrieval) of environmental TLDs occurred at designated locations quarterly.

The analytical results for radiological (including environmental TLDs) and nonradiological parameters for the 2017 sampling events are summarized below, and the data are provided in Appendix B, "2017 Terrestrial Surveillance Results."

4.5.1 Radiological Results

Radiological analyses were performed on soil, sediment, and vegetation samples. The results of the statistical analysis identified one location as Priority-3 (Table 4-6). There were no Priority-1 or Priority-2 soil or sediment samples for any radiological constituents.

Table 4-6. Radiological summary statistics for Priority-3 sample locations, 2017

Priority	Analyte	Location	Sample Matrix	Mean (pCi/g)	Standard Deviation (pCi/g)	Minimum (pCi/g)	Maximum (pCi/g)	2017 Result (pCi/g)
Priority-3	Cesium-137	S-85	Sediment	0.16	0.15	0.015	0.51	0.18

NOTE: Statistical data is for 2000–2017.
S = on-site terrestrial surveillance location

Cesium-137

One on-site location (S-85 sediment sample) was identified as Priority-3 for cesium-137 with a result of 0.18 pCi/g. Location S-85 is located in the east-central portion of KAFB (Figure 4-1). This location is at a slightly higher elevation than other sampling locations, thus receiving greater precipitation and slightly higher cesium-137 levels from fallout than the lower areas. Cesium-137 is prevalent in surface soils worldwide as a result of historical nuclear weapons testing. Results for cesium-137 at this location have ranged from 0.015 to 0.51 pCi/g.

All remaining soil, sediment, and vegetation samples were identified as Priority-4 for radiological constituents.

Thermoluminescent Dosimeter

TLD exposure rates for FY 2017 are provided in Appendix B, "2017 Terrestrial Surveillance Results." Data for FY 2001 through FY 2017 were analyzed to determine whether any statistical differences were observed for either location classification or year. There was an increase in average annual dose for all three location classifications in FY 2016. This was due to an update that Radiation Protection Dosimetry Program personnel made in the dose calculation, which caused the dose results to increase by approximately 15 percent. In addition, the background calculation was adjusted to account for how the controls were being stored. The raw signal values, background values, and calculation methods for the past three years were reviewed in detail and were determined to be similar.

In FY 2017, there was no statistical difference between on-site, perimeter, and off-site locations. Table 4-7 shows the overall exposure rate summary statistics for FY 2001 through FY 2017. Figure 4-3 shows the TLD exposure rates by year and location classification.

Table 4-7. TLD exposure rate summary statistics by location classification, FY 2001–2017

Location Classification	Number of Observations	Average (mR/year)	Median (mR/year)	Standard Deviation (mR/year)	Minimum (mR/year)	Maximum (mR/year)	FY 2017 Average Results (mR/year)
On-site	237	101	100	11	61	137	123
Perimeter	132	103	102	13	80	144	123
Off-site	184	102	100	16	72	147	122

FY = fiscal year
TLD = thermoluminescent dosimeter

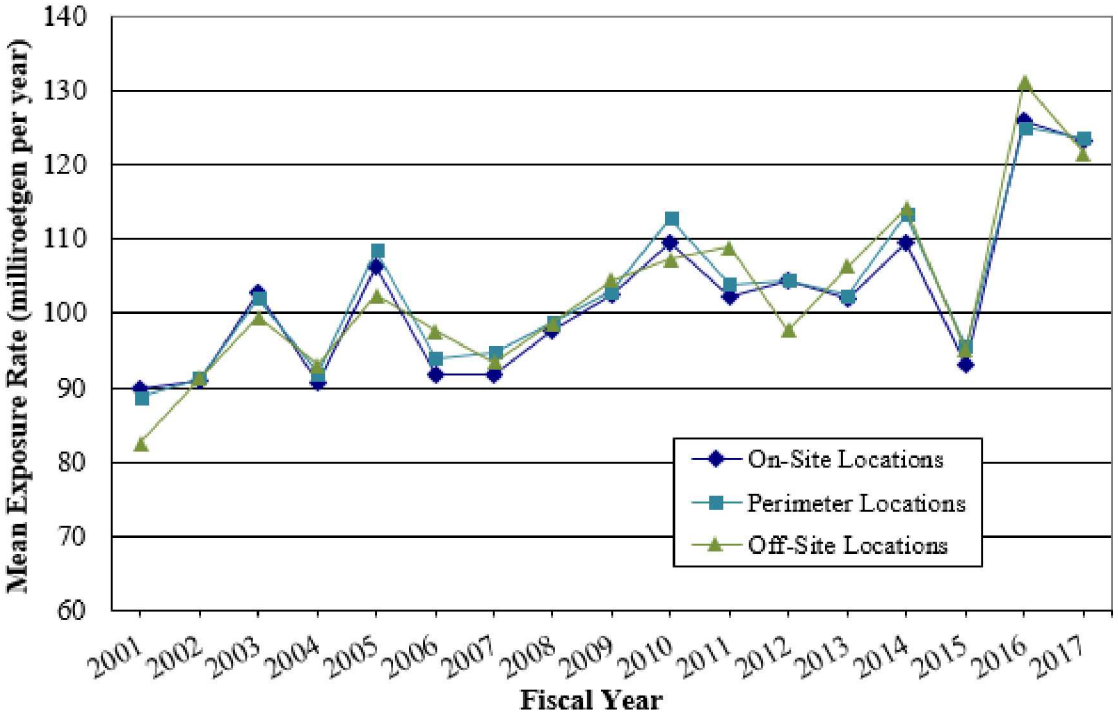


Figure 4-3. TLD exposure rates by fiscal year and location classification

Tritium

Tritium is not a significant indicator radionuclide for operations at SNL/NM, and the low soil moisture in the area will always make low-activity assay difficult. There were no unusual tritium values noted for any of the soil, sediment, or vegetation samples collected in 2017.

4.5.2 Nonradiological Results

Nonradiological parameters include terrestrial surveillance metals, high explosive compounds, and perchlorate. In addition to a statistical analysis, all metals results may also be compared to values from the references listed in Section 4.4.2 and provided in Table 4-5. The results of the statistical analysis for metals (Table 4-8) identified two locations as Priority-2 and two locations as Priority-3. Details for each parameter and location are provided in Table 4-8. There were no results identified as Priority-1, and all remaining soil, sediment, and vegetation samples were identified as Priority-4 for nonradiological parameters.

Table 4-8. Metals summary statistics for Priority-2 and Priority-3 sample locations, 2017

Priority	Analyte	Location	Sample Matrix (mg/kg)	Mean (mg/kg)	SD (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	NMED Soil Screening Level[a]		2017 Result (mg/kg)
								Residential (mg/kg)	Industrial (mg/kg)	
Priority-2	Beryllium	S-33	Soil	1.0	0.33	0.54	1.6	156	2,580	0.54
	Chromium (total)	S-51	Soil	37	20	6.9	70	97	505	65
Priority-3	Aluminum	S-1	Soil	13,745	3,222	4,380	17,200	78,000	1,290,000	17,200 J
	Lead	S-1	Soil	13	3.2	3.6	19	—	—	19
	Magnesium	S-85	Sediment	3,705	650	2,700	4,940	—	—	3,860
	Nickel	S-85	Sediment	11	2.0	8.2	14	1,560	25,700	10

NOTE: Statistical data is for 2000–2017.
[a]NMED 2017b.
— = not available
J = the associated numerical value is an estimated quantity
NMED = New Mexico Environment Department
S = on-site terrestrial surveillance location
SD = standard deviation

Aluminum

One on-site location (S-1 soil sample) was identified as Priority-3 for aluminum with a result of 17,200 J mg/kg. The J-qualified data indicates the result is an estimated value. The result was below the NMED soil screening level for residential use. The results at all locations were within the range of values for aluminum in New Mexico surface soils.

Beryllium

One on-site location (S-33 soil sample) was identified as Priority-2 for beryllium with a result of 0.54 mg/kg. The result was below NMED soil screening levels for residential use. The results at all locations were within the range of values for beryllium in New Mexico surface soils.

Chromium (Total)

One on-site location (S-51 soil sample) was identified as Priority-2 for chromium (total) with a result of 65 mg/kg. The result was below the NMED soil screening level for residential use. The results at all locations were within the range of values for chromium (total) in U.S. surface soils.

Lead

One on-site location (S-1 soil sample) was identified as Priority-3 for lead with a result of 19 mg/kg. There is no NMED soil screening level for lead. The results at all locations were within the range of background values for lead in New Mexico surface soils.

Magnesium

One on-site location (S-85 sediment sample) was identified as Priority-3 for magnesium with a result of 3,860 mg/kg. There is no NMED soil screening level for magnesium. The results at all locations were within the range of values for magnesium in New Mexico surface soils.

Nickel

One on-site location (S-85 sediment sample) was identified as Priority-3 for nickel with a result of 10 mg/kg. The result was below the NMED soil screening level for residential use. The results at all locations were within the range of background values for nickel in New Mexico surface soils.

High Explosives

Three on-site locations (S-90, S-93, and S-94; all soil samples) were analyzed for high explosive compounds. There were no detections above the method detection limit for any high explosive compounds.

Perchlorate

One on-site location (S-53 soil sample) was analyzed for perchlorate, and it was not detected above the method detection limit.

4.5.3 Additional Activities and Variances

The sampling in 2017 followed the Terrestrial Surveillance Program plan with the following variances:

- There was insufficient vegetation for collection at locations P-5, P-16, P-58, S-86, C-9, C-10, and C-25.
- At locations where vegetation samples were collected, the radiological and nonradiological results did not warrant further evaluation of biota.

Due to the reduction of off-site sampling locations in the 2016 Terrestrial Surveillance Program plan revision, the statistical analysis was modified. For the comparison of population groups, the analytical results of the on-site locations are now compared to the off-site plus the perimeter analytical results. Thus the priority ratings will only be determined for on-site locations.

Chapter 5. Air Quality Compliance and Related Programs



Great horned Owl (*Bubo virginianus*)

OVERVIEW ■ Air quality, ambient air, meteorological, and radiological emissions programs collectively monitor the air and atmosphere associated with Sandia facilities.

Air quality and meteorological monitoring and surveillance activities are conducted through the following programs:

- Air Quality Compliance Program
- Ambient Air Surveillance Program
- Meteorology Program
- Radionuclide NESHAP Program

5.1 Air Quality Compliance Program

Air Quality Compliance Program personnel support Sandia in complying with air quality regulations. In Bernalillo County, New Mexico, the City of Albuquerque Air Quality Division implements air quality regulations and standards established by the EPA and the Albuquerque Bernalillo County Air Quality Control Board.

5.1.1 Stationary Sources

Stationary source registrations are required for sources that emit more than 2,000 pounds of any air contaminant per year or any amount of a hazardous air pollutant (HAP). Stationary source permits are required for sources that have the potential to emit 10 pounds per hour or more or 25 tpy or more of any single regulated air contaminant; 2 tpy of a single HAP; or 5 tpy of any combination of HAPs. Permits are also required for any equipment or process that is subject to federal New Source Performance Standards or NEHAPs. Permits include requirements for monitoring source emissions and maintaining records of operations to ensure compliance with regulations, emission limits, and other conditions of the permit. Regulated air contaminants include criteria pollutants and HAPs. Criteria pollutants include sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, particulate matter, and lead. DOE air quality permits and registrations for Sandia stationary sources are provided in Table 9-1.

Most of the Sandia permitted stationary sources are boilers used for comfort heat and emergency generators. Criteria pollutant emissions from combustion are monitored based on operation and/or fuel use. In 2017, sources were in compliance with permitted emission limits. Emissions data for permitted and registered sources are provided in Table 5-1.

Table 5-1. Permitted and registered stationary source emission data, 2017

Emissions[a]					
NOx	**CO**	**PM_{10}**	**SO_2**	**VOC**	**HAP**
9.4	10.8	2.7	0.4	3.3	11.4

[a] Measured in tpy.
CO = carbon monoxide
HAP = hazardous air pollutant
NOx = nitrogen oxides
SO_2 = sulfur dioxide
VOC = volatile organic compound
PM_{10} = particulate matter that has a diameter equal to or less than 10 microns

Site-Wide Volatile Organic Compound and Hazardous Air Pollutant Emissions

Site-wide Chemical Permit 1901-M1 includes all HAP and VOC emissions from general laboratory research and development uses. During 2017, potential emissions were 11.4 tpy of HAPs and 3.3 tpy of VOCs. These emissions were below the major source HAP threshold of 25 tpy and the regulated air contaminant threshold of 100 tpy.

Title V

DOE submitted a Title V Operating Permit application (Permit 515) (DOE 2002) to the City of Albuquerque on March 1, 1996, since potential emissions from Sandia operations were greater than 100 tpy of criteria pollutants annually. An application update was submitted in 2002. The City of Albuquerque has not issued the final permit, and a new updated application is currently being negotiated with the City of Albuquerque.

Greenhouse Gas Emissions

On May 13, 2010, EPA issued a final rule that addressed greenhouse gas emissions (GHGs) from stationary sources under the Clean Air Act permitting programs. This final rule sets thresholds for GHGs that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. A GHG, as defined in 40 CFR 86.1818–12(a), is an air pollutant comprised of an aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Major stationary sources that emit at least 100,000 tpy carbon dioxide equivalent will be required to include GHGs in their Title V permit applications. The fugitive emissions are only included in the

major source determination when the source belongs to a listed source category in Section 302(j) of the Clean Air Act. Sandia is not a listed source category, and stack GHG emissions are much less than 100,000 tpy carbon dioxide equivalent annually.

During FY 2017, Sandia operations emitted a total of 141,117 tpy carbon dioxide equivalent (including fugitive GHG emissions).

EPA defines a *greenhouse gas emission* as being an air pollutant comprised of an aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

In 2009, EPA issued the GHG Reporting Rule (codified in 40 CFR 98), which requires reporting of GHG data from specific categories of large sources and suppliers that meet designated emissions thresholds. Sandia activities resulting in GHG emissions are currently below reporting thresholds.

The Site Sustainability Plan is prepared annually by Sandia personnel to support DOE sustainability goals. The Site Sustainability Plan documents sustainability goals, including GHG reductions, projected performance, and current status.

5.1.2 Stratospheric Ozone Protection

Title VI of the Clean Air Act Amendments of 1990 required EPA to establish regulations to phase out the production and consumption of ozone-depleting substances. Ozone-depleting substances are defined as chlorofluorocarbons, hydrochlorofluorocarbons, and other halogenated chemicals that have been found to contribute to the depletion of the stratospheric ozone layer. EPA has established regulations in 40 CFR 82 that require the following: recycling ozone-depleting substances and other refrigerants when servicing equipment, establishing requirements for recycling and recovering equipment, repairing substantial leaks in refrigeration equipment containing greater than 50 pounds of refrigerant, and establishing safe disposal standards.

At SNL/NM, ozone-depleting substances are mainly used for comfort cooling for buildings, air conditioning units in vehicles, and water cooling units in drinking fountains. Halon is contained in some fire-suppression systems and fire extinguishers.

5.1.3 Vehicles

As required by 20.11.100 NMAC, *Motor Vehicle Inspection Decentralized*, an annual Vehicle Inventory and Inspection Plan was submitted to the City of Albuquerque for applicable vehicles owned by Sandia.

5.1.4 Open-Burn Permits

As required by 20.2.60.113 NMAC, *Open Burning of Hazardous Waste*, open-burn permits are required for the following activities:

- Treating explosives waste by open burning (hazardous waste treatment)
- Open burning or detonating explosives related to research and development activities (no limit)
- Detonating explosives aboveground (over 20 pounds)
- Disposing of explosives by burning to avoid transport or handling hazards (no limit)
- Igniting rocket motors (greater than 4,000 pounds of fuel)

A list of 2017 permits can be found in Table 9-1.

5.1.5 Fugitive Dust

As required by 20.11.20 NMAC, *Fugitive Dust Control*, DOE obtains fugitive dust permits for each of the applicable Sandia projects that will disturb more than three-quarters of an acre of soil. A list of 2017 permits is included in Table 9-1.

5.2 Ambient Air Surveillance Program

Ambient air is surveilled through a network of air-monitoring stations located on or near Sandia property (Figure 5-1). In FY 2017, the stations monitored ambient air for VOCs, particulate matter that has a diameter equal to or less than 10 microns (PM_{10}), and particulate matter that has a diameter equal to or less than 2.5 microns ($PM_{2.5}$).

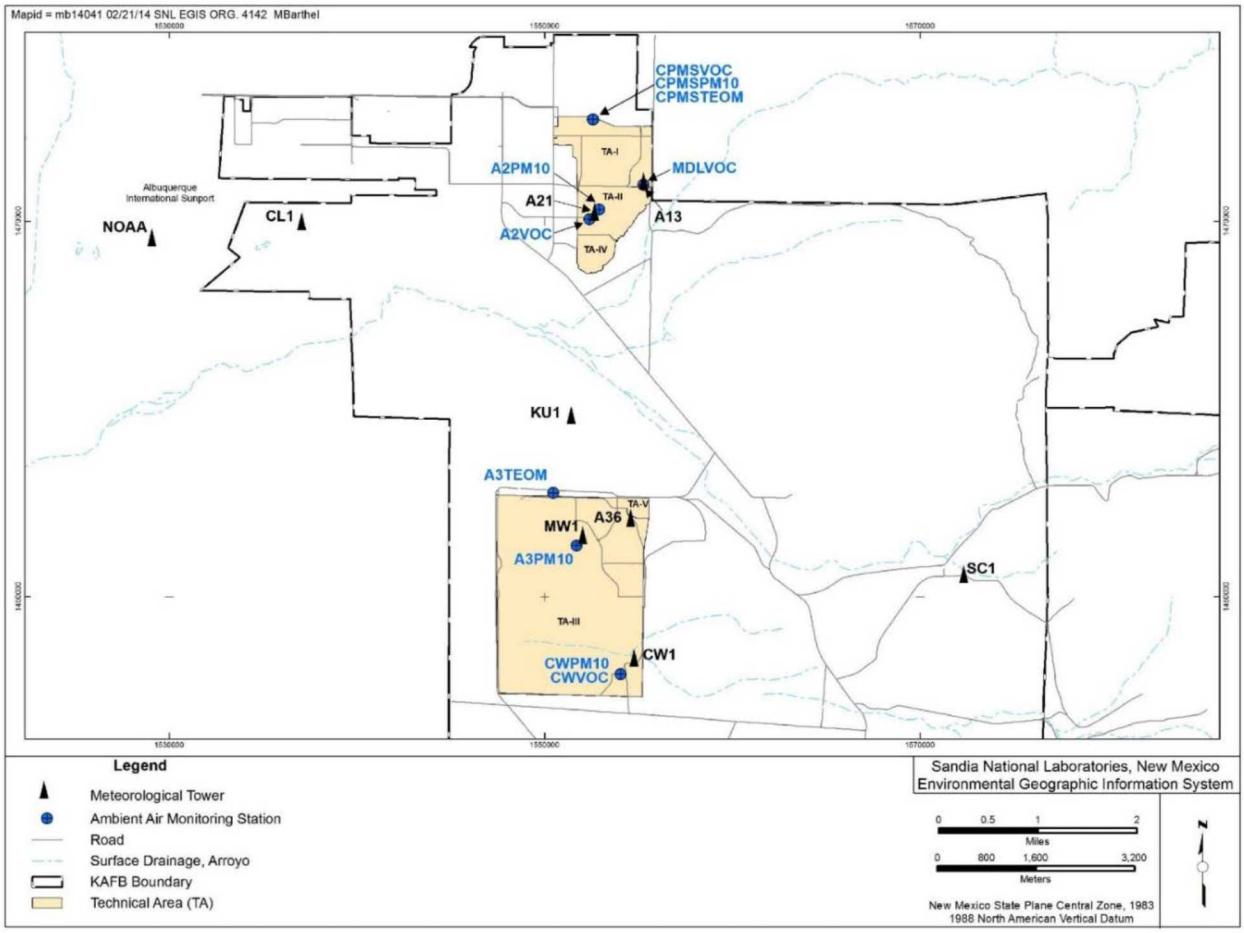


Figure 5-1. Clean air network of meteorological towers and ambient air-monitoring stations

The City of Albuquerque has been delegated authority by the EPA monitor the ambient air in Bernalillo County to determine compliance with the National Ambient Air Quality Standards and New Mexico Ambient Air Quality Standards. The ambient air-monitoring data is essential to the City of Albuquerque Environmental Health Department for regulating stationary source emissions, issuing air permits, and complying with the National Ambient Air Quality Standards.

Ambient air data collected by the City of Albuquerque is available at:

https://www.cabq.gov/airquality/air-quality-monitoring

Sandia has no regulatory obligation to conduct ambient air surveillance and provides data as a community service.

Ambient air is any unconfined portion of the atmosphere: open air, surrounding air.

5.2.1 Monitoring Stations

Sandia's ambient air-monitoring stations used in FY 2017 include the following:

- **$PM_{2.5}$ stations.** $PM_{2.5}$ was measured at two monitoring locations (CPMSTEOM and A3TEOM). $PM_{2.5}$ was measured continuously and recorded in hourly concentrations 24 hours a day, 365 days per year, contingent on equipment functionality.
- **PM_{10} stations.** PM_{10} was measured at four monitoring locations (CPMSPM10, A2PM10, A3PM10, and CWPM10). The air was sampled for a 24-hour period, starting and ending at midnight, every six days, contingent on equipment functionality.
- **VOC stations.** VOC samples were taken at four monitoring stations (CPMSVOC, MDLVOC, CWVOC, and A2VOC). VOC samples were collected once a month over a 24-hour period, contingent on equipment functionality.

5.2.2 Ambient Air-Monitoring Results for Fiscal Year 2017

Ambient air-monitoring data is presented for the FY 2017. Laboratory data is available in Appendix C, "FY 2017 Ambient Air Surveillance Results" and are summarized below.

$PM_{2.5}$

The monthly and annual averages for FY 2017 for $PM_{2.5}$ are listed in Table 5-2.

Table 5-2. Monthly and annual averages for $PM_{2.5}$, FY 2017

Sample Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average FY 2017
CPMSTEOM	3.36	3.31	3.51	–	–	–	–	–	–	–	–	–	3.39
A3TEOM	3.28	3.29	3.32	3.36	3.29	3.31	3.27	3.25	3.20	3.21	3.16	3.17	3.28

NOTES: (1) All units are in $\mu g/m^3$.
(2) CPMSTEOM equipment malfunctioned January 2017 through September 2017.
— = no measurement collected
FY = fiscal year
$PM_{2.5}$ = particulate matter (diameter equal to or less than 2.5 microns)

PM_{10}

The PM_{10} samples were analyzed for metals and radiological constituents at an external laboratory. PM_{10} concentration ($\mu g/m^3$) data were limited and were not of sufficient quality to publish; the monthly and annual averages for FY 2017 for PM_{10} are not provided.

Volatile Organic Compounds

Monthly samples were analyzed for VOCs. The FY 2017 averages from the four monitoring stations are listed in Table 5-3.

Table 5-3. Volatile organic compound average concentrations, FY 2017

Compound[a]	Station CMPSVOC	Station CWVOC[b]	Station MDLVOC[c]	Station A2VOC	TLV[d]
Acetone	5.197	4.490	5.359	3.677	500,000
Benzene	0.155	0.093	0.144	0.104	500
Benzyl chloride	0.163	0.170	0.163	0.163	NE
Bromodichloromethane	0.066	0.069	0.066	0.070	NE
Butane, N-	0.922	0.554	1.502	0.803	800,000
Butanone, 2-	0.514	0.468	0.522	0.375	200,000
Carbon disulfide	0.096	0.282	0.095	0.088	NE
Carbon tetrachloride	0.067	0.077	0.080	0.089	5,000
Chloromethane	0.705	0.706	0.643	0.724	50,000
Dichlorodifluoromethane	0.425	0.461	0.505	0.456	1,000,000
Dichloroethene, trans-1,2-	0.100	0.104	0.100	0.101	NE
Dioxane, 1,4-	0.101	0.105	0.176	0.101	NE
Ethyl benzene	0.090	0.122	0.100	0.078	NE
Hexane, N-	0.088	0.079	0.081	0.100	50,000
Hexanone, 2-	0.096	0.091	0.087	0.096	NE
Methylene chloride	0.161	0.130	0.170	0.163	50,000
Pentane, N-	0.336	0.284	0.443	0.323	600,000
Pentanone, 4-methyl-, 2-	0.141	0.140	0.137	0.137	NE
Styrene	0.059	0.061	0.060	0.069	NE
Tetrachloroethene	0.052	0.064	0.087	0.062	25,000
Toluene	0.301	0.171	0.308	0.170	50,000
Trichloroethene	0.105	0.109	0.105	0.115	50,000
Trichlorofluoromethane	0.240	0.248	0.281	0.262	1,000,000
Trimethylbenzene, 1,2,4-	0.162	0.169	0.162	0.163	NE
Vinyl chloride	0.120	0.125	0.120	0.125	NE
Xylene, m-, p-	0.158	0.214	0.196	0.132	NE
Xylene, o-	0.072	0.086	0.081	0.066	100,000

NOTE: All units in parts per billion by volume.
[a]VOCs may be shown as separate species as well as in combination with another analyte.
[b]Data not available for January, February, April, June, July, and September of 2017.
[c]Data not available for June, July, and September of 2017.
[d]Threshold limit values are guidelines and not legal standards; these guidelines help to control occupational health hazards (American Conference of Governmental Hygienists 2011).
FY = fiscal year
NE = not established
TLV = threshold limit value

5.3 Meteorology Program

Meteorology Program personnel provide decision support services, data, and analyses to all Sandia programs and operations that require atmospheric information. Program monitoring activities provide data that are used to assist with health and safety operations, emergency management and response, regulatory permitting and reporting processes, and general research and development activities. The DOE directives and regulations applicable to the Meteorology Program are listed in the References section.

5.3.1 Meteorological Monitoring Network

Meteorological monitoring is conducted through a network of meteorological towers located throughout KAFB on or near Sandia property. The network includes six 10-meter towers, one 30-meter tower, and one 60-meter tower. Meteorological tower locations are shown in Figure 5-1. All towers are instrumented to measure temperature and wind velocity at 3-meter and 10-meter levels above the surface. Temperature and wind velocity are also measured at the top of the two tallest towers (30 meters and 60 meters). Relative humidity is measured at all locations, while rainfall is measured at the A36, A21, and SC1 locations. Barometric pressure is measured at towers A36 and A21. Routine instrument calibrations and a strong preventative maintenance field program are used to ensure data quality. Current weather information from the meteorological network can be found at the following website:

http://clean-air.sandia.gov

5.3.2 Meteorological Monitoring Results

Tower A36 is a60-meter tower used to describe general meteorology due to its central geographic position and the availability of all network measurements at that location. The 2017 annual summary for Tower A36 is shown in Table 5-4.

Table 5-4. Annual climatic summary from Tower A36, 2017

Measurement	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	2017 Annual
Temperature (°C)													
Average daily high	9.5	14.8	20.9	21.4	25.6	34.0	33.6	31.2	28.9	22.5	18.7	12.1	22.8
Average daily low	−2.1	0.2	2.7	5.1	8.9	16.0	18.4	16.8	13.5	6.9	3.0	−3.7	7.1
Monthly mean	3.6	7.9	12.4	13.3	17.6	24.6	24.5	22.3	20.5	14.6	12.3	6.0	15.0
Extremes (°C)													
High	16.2	23.9	27.8	27.3	31.8	39.3	37.1	34.3	34.5	28.6	22.5	17.8	39.3
Low	−11.4	−8.6	−7.2	−3.4	1.9	10.2	15.9	13.5	7.0	0.4	-6.0	−9.0	−11.4
Relative													
Humidity (%)	57.4	45.7	28.7	33.5	28.8	24.2	41.1	47.3	38.6	40.5	35.5	35.6	38.1
Precipitation (cm)													
Monthly	3.00	0.36	0.25	2.72	0.69	0.15	2.39	3.53	3.99	0.18	0.00	0.00	17.25
24-hour maximum	1.27	0.18	0.20	1.12	0.36	0.15	1.24	1.85	1.60	0.10	0.00	0.00	1.85
Wind (m/sec)													
Monthly mean	3.37	3.73	3.86	4.27	4.39	4.29	3.94	3.64	3.99	3.65	2.95	2.83	3.7
Highest 24-hour average	6.6	9.9	7.6	7.2	7.3	6.7	6.8	5.6	8.4	7.3	5.2	5.2	9.9
Maximum gust	24.3	27.9	24.5	23.3	27.3	32.3	24.0	20.2	20.6	25.4	19.2	17.2	32.3
Barometric													
Pressure (mb)	833	833	835	831	832	834	838	837	836	836	837	838	835.0

NOTE: January through April precipitation may be underestimated due to the amount of precipitation that fell as snow.
% = percent

Local weather in 2017 was warmer and drier than climatological means. Temperatures were above average and precipitation was below average for most of the year. This was especially true for the October through December time period when La Niña conditions returned to the eastern equatorial Pacific Ocean. The year ended with relative humidity values far below normal and almost no precipitation measured across the Sandia network, quickly deteriorating the local area into drought conditions. As in 2016, the 2017 monsoon season began a few weeks later than usual, but July to September precipitation totals finished near average. This was due to a wet September with primarily

non-monsoonal type rainfall. Wind speeds in 2017 were lighter than usual during the spring wind season, but stronger than usual during monsoon season.

In general, the annual statistics for each of the monitoring towers are similar. However, daily meteorology varies considerably across the meteorological network. This real-time variability of meteorological conditions has implications on the transport and dispersion of pollutants, which are important in atmospheric emergency release scenarios and air dispersion modeling. Table 5-5 shows some of the variations and extremes found in meteorological measurements across Sandia.

Table 5-5. Variations and extremes in meteorological measurements across the tower network, 2017

Meteorological Measurement	Minimum	Maximum	Spread
Wind Speed	**m/sec**	**m/sec**	**m/sec**
Average annual wind speed	3.58 A21 & KU1	3.92 CW1	0.34
Greatest difference in wind speed over 24 hours	5.59 KU1	9.15 A13	3.56
Greatest difference in daily maximum wind speed	15.47 SC1	30.95 A13	15.48
Average difference in daily wind speed		1.00	
Temperature	**ºC**	**ºC**	**ºC**
Average annual temperature	14.96 A36	15.84 MW1	0.88
Network annual temp extremes	−12.88 CW1	39.52 MW1	52.4
Greatest difference in daily minimum temp	−0.92 CW1	6.77 A21	7.69
Greatest difference in average daily temp	21.55 A36	23.86 CL1	2.31
Greatest difference in daily maximum temp	0.09 A13	4.39 A36	4.30
Precipitation	**cm**	**cm**	**cm**
Annual precipitation (extremes)	17.25 A36	25.78 SC1	8.53
Daily rainfall variation	0.0 A36	2.29 SC1	2.29
Greatest monthly precipitation difference	2.81 A21	7.95 SC1	5.14

NOTE: Winter precipitation that falls as snow is underestimated (mostly at the SC1 tower).

5.3.3 Wind Analysis

The most important implication of meteorological variations is the wind impact on transport and dispersion of potential pollutants. Wind transport is a complex result of large-scale, synoptic-based weather systems and local or regional topographic influences. The local topography produces nocturnal drainage flows, and can also channel the large-scale driven winds. Wind roses are used to present the distributions of wind speed and wind direction. It should be noted that wind direction is defined as the direction from which the wind originates. The wind roses for towers A36, CL1, and SC1 are shown in Figure 5-2. Typical diurnal variations and wind shifts cannot be seen in Figure 5-2. Figure 5-3 shows a much different pattern and nature to the wind with the data divided into daytime and nighttime intervals at tower A36. A similar diurnal pattern is seen at other locations

within KAFB. The predominant wind direction at most locations is a product of local topographic features.

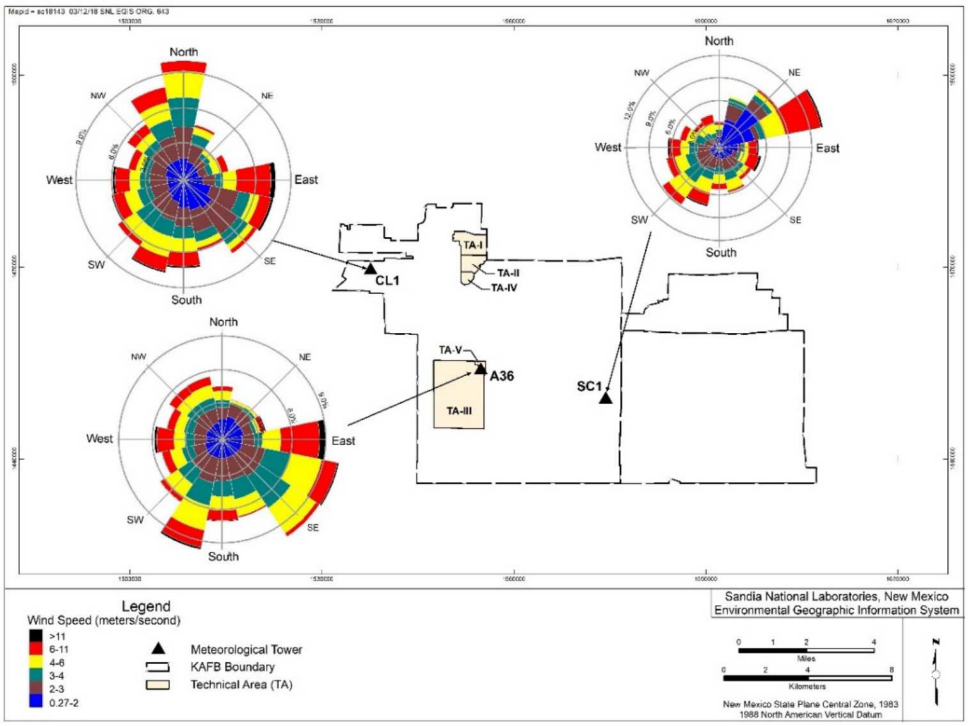


Figure 5-2. Annual wind roses at towers A36, CL1, and SC1

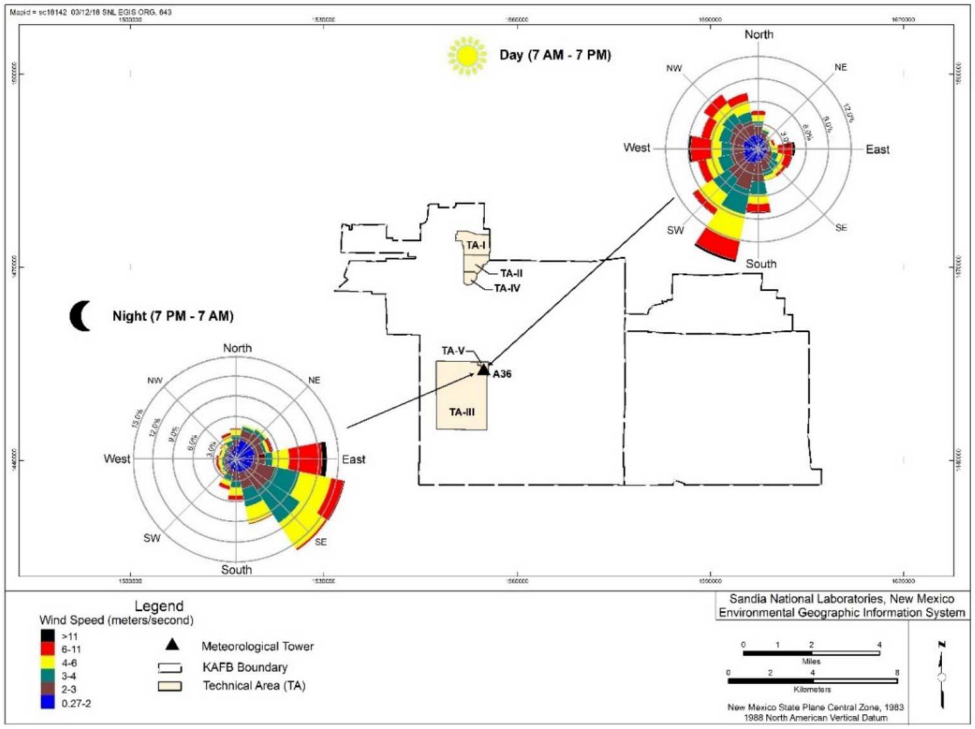


Figure 5-3. Annual wind roses for daytime and nighttime frequency at tower A36

The relative location of a monitoring tower to local slopes and canyons identifies the exact direction of local topographic influences, which determine the predominant wind for the year and especially during night time hours.

Wind direction is the direction from which the wind originates.

Table 5-6 lists the predominant wind directions for day and nighttime periods for all towers in the network. Across the network, nighttime-predominant winds ranged from north through south-southeasterly. During the day, south-southwesterly winds were predominant with little exception.

Table 5-6. Predominant wind directions by tower, 2017

Tower	Day	Night
A13	West	East-northeast
A21	South-southwest	East-northeast
A36	South-southwest	East-southeast
CL1	South-southwest	North
CW1	South-southwest	East
KU1	South-southwest	South-southeast
MW1	South-southwest	East-southeast
SC1	Southwest	East-northeast

5.4 Radionuclide National Emission Standards for Hazardous Air Pollutants Program

Radionuclide NESHAP Program personnel ensure compliance with radionuclide NESHAP requirements. EPA regulates radionuclide air emissions in accordance with 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." EPA has set a maximally exposed individual radiological dose limit of 10 mrem/year resulting from all radiological air emissions produced from a DOE facility. A summary of radiological releases and public doses resulting from Sandia operations in 2017 is provided in Table 5-7.

Table 5-7. Radiological dose and release reporting, 2017

Radiologic Dose							
Dose to Off-Site MEI (mrem)	Dose to On-Site MEI (mrem)	Estimated Population Dose in an 80 km Radius (person-rem)	Estimated Background Radiation Population Dose (person-rem)	EPA and DOE Dose Limit for Air Pathway (mrem)			
1.00E-02	3.75E-03	1.26E-02	2.83E+05	10			
Radiological Atmospheric Releases (in Curies)							
Tritium	Noble Gases (half-life < 40 days)	Fission and Activation Products (half-life < 3 hours)	Fission and Activation Products (half-life > 3 hours)	Total Radio-strontium	Total Uranium	Other Actinides	Other
3.71E+01	0.74E+01	4.45E-03	8.36E-05	1.5E-08	2.60E-11	3.26E-09	0.00E+00

> = greater than
< = less than
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
MEI = maximally exposed individual

5.4.1 Compliance Reporting

The annual radionuclide NESHAP report summarizes radionuclide air emission releases from Sandia facilities and presents the results of the annual dose assessment. DOE submits the annual report to EPA and the City of Albuquerque Environmental Health Department. Details can be found in the *Radionuclide NESHAP Annual Report for Calendar Year (CY) 2017, SNL/NM* (SNL/NM 2018d).

5.4.2 Facilities

Point releases are emission sources that could potentially discharge material to the atmosphere through a facility's exhaust stack or rooftop vent (Figure 5-4). Table 5-8 lists the radionuclides and the total reported emissions from each of Sandia's radionuclide NESHAP sources in 2017.

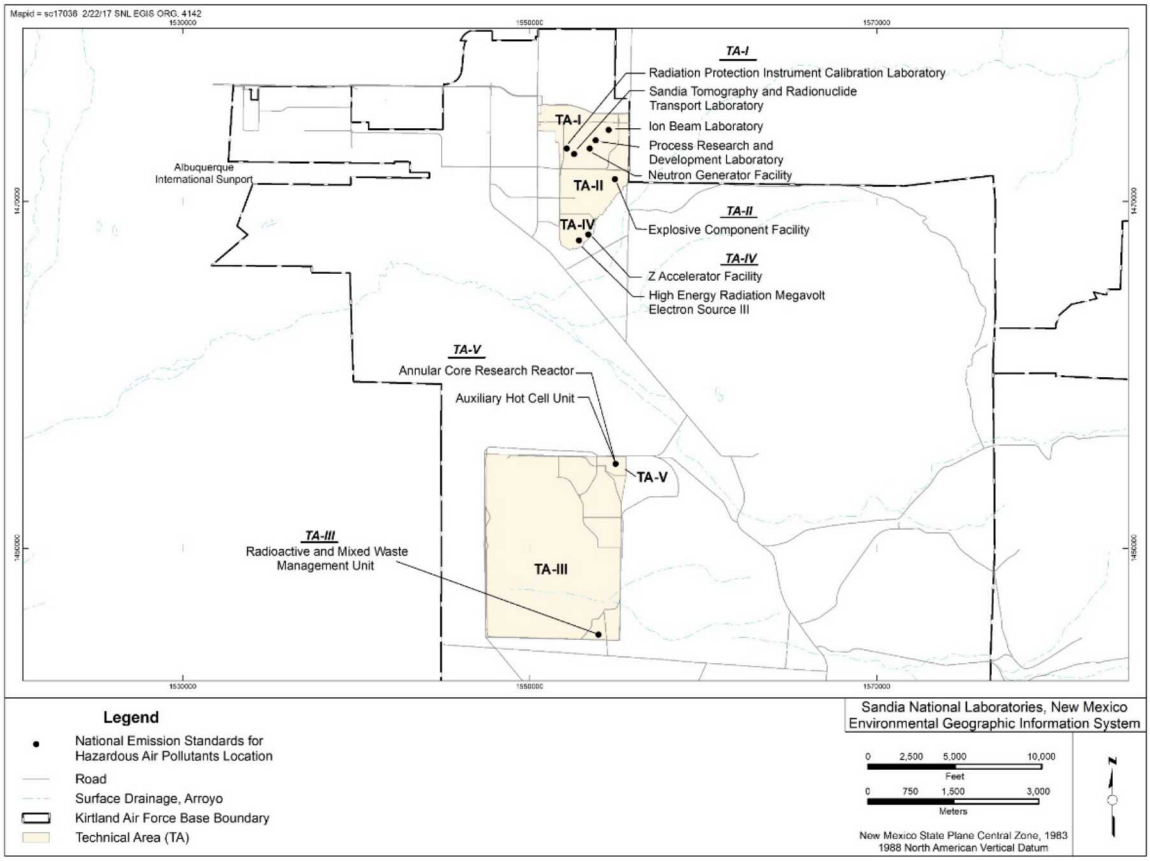


Figure 5-4. Locations of facilities that provided radionuclide inventories

Table 5-8. Summary of radionuclide releases from NESHAP sources, 2017

Source Name, Location	Description	Source Type	Monitoring Method	Radionuclide Emitted	Reported Release (Ci/year)
ACRR, TA-V	Reactor used to perform in-pile experiments for severe reactor accident research projects	Point	Periodic	Argon-41	7.43
AHCU, TA-V	Facility used to identify, sort, characterize, and repackage legacy nuclear materials for permanent removal; legacy material may include accountable nuclear material, spent nuclear fuel, and radiological material	Point	Periodic	Krypton-85 Strontium-90 Cesium-137	2.8E-08 1.5E-08 1.0E-08
ECF, TA-II	Facility used to test neutron generator design and manufacturing	Point	Calculation	Tritium	1.07E-03
HERMES III, TA-IV	Gamma simulator used primarily to simulate the effects of prompt radiation from a nuclear burst on electronics	Point	Periodic	Nitrogen-13 Oxygen-15	5.4E-04 5.4E-05
IBL, TA-I	Ion and electron accelerators used to study and modify materials systems	Point	Calculation	Tritium	21.7
NGF, TA-I	Principal production facility for neutron generators	Point	Continuous	Tritium	15.4
RMWMU, TA-III	Facility used to handle radioactive and mixed waste	Point	Continuous and Calculation	Tritium (oxide) Tritium (elemental) Strontium-90 Cesium-137	1.46E-02 2.33E-03 5.02E-06 5.02E-06
RPICL, TA-I	Laboratory used to calibrate radiation detection equipment	Point	Calculation	Tritium	2.5E-05
PRD, TA-I	Small-scale laboratory operation involved in handling and researching sealed and unsealed tritiated materials	Point	Calculation	Tritium	7.5E-05
Z Accelerator Facility, TA-IV	Experimental facility used to research light-ion inertial confinement fusion	Point	Calculation	Tritium	2.4E-03

NOTE: Monitoring methods include periodic, calculation, and continuous. Periodic is based on periodic measurements; calculation is calculated from known parameters; continuous is based on continuous air-monitoring results.

ACRR = Annular Core Research Reactor
AHCU = Auxiliary Hot Cell Unit
ECF = Explosives Components Facility
HERMES = High-Energy Radiation Megavolt Electron Source
IBL = Ion Beam Laboratory
NESHAP = National Emission Standards for Hazardous Air Pollutants
NGF = Neutron Generator Facility
PRD = Process Research and Development Laboratory
RMWMU = Radioactive and Mixed Waste Management Unit
RPICL = Radiation Protection Instrument Calibration Laboratory
TA = technical area

TA-I Sources

The Ion Beam Laboratory ion and electron accelerators are used to study and modify materials systems. Activities at the laboratory result in the release of tritium.

The Neutron Generator Facility is the nation's principal production facility for neutron generators. This facility currently emits only tritium. The facility has two stacks, but only the main stack in the Tritium Envelope North Wing is used. Although anticipated tritium releases do not exceed the

regulatory threshold requiring continuous monitoring, monitoring is performed voluntarily at the facility as a best management practice.

The Process Research and Development Laboratory is used to perform small-scale operations. Activities at the laboratory include handling and researching sealed and unsealed tritiated materials. Activities at the laboratory could result in the release of tritium.

The Radiation Protection Instrument Calibration Laboratory is used to calibrate radiation detection equipment. Activities at the laboratory could result in small releases of tritium.

The Sandia Tomography and Radionuclide Transport Laboratory is used to perform small-scale experiments. Activities at the laboratory could result in the occasional release of trace amounts of radionuclides. No releases were reported for the laboratory in 2017.

TA-II Sources

The Explosives Components Facility is used to perform destructive testing on neutron generators. Activities at the facility could result in the release of trace amounts of tritium.

TA-III Sources

The Radioactive and Mixed Waste Management Unit (RMWMU) is used for handling radioactive and mixed waste products. Activities at the RMWMU could result in the release of trace amounts of radionuclides. Although anticipated releases do not exceed the regulatory threshold requiring continuous monitoring, monitoring is performed voluntarily at the RMWMU as a best management practice.

TA-IV Sources

The High-Energy Radiation Megavolt Electron Source III accelerator is used to test the effects of prompt radiation on electronics and complete military systems. Activities at the accelerator produce air activation products, primarily nitrogen-13 and oxygen-15.

The Z Accelerator Facility is used for research on light-ion inertial confinement fusion. Large amounts of electrical energy are stored over several minutes and then released as an intense concentrated burst (shot) at a target. Some experiments could result in the release of trace amounts of radionuclides.

TA-V Sources

The Annular Core Research Reactor is used to subject test objects to a mixed photon and neutron irradiation environment. Activities at the reactor could result in the occasional release of trace amounts of radionuclides.

The Auxiliary Hot Cell Unit is used to identify, sort, characterize, and repackage legacy nuclear materials for permanent removal from Sandia. Legacy material may include accountable nuclear material, spent nuclear fuel, and radiological material. Activities at the Auxiliary Hot Cell Unit could result in the occasional release of trace amounts of radionuclides.

5.4.3 Assessment of Potential Dose to the Public

In general, the radiation dose a person receives is dependent on the person's distance from the source, the available pathways in the environment (food chain, air, and water), radionuclide quantities and properties, and meteorological conditions. Historically, radioactive releases from Sandia facilities have resulted in doses to the public that are several orders of magnitude below the EPA and DOE standard of 10 mrem/year. See Chapter 2 for DOE dose limits.

To assess compliance, all facilities with point releases must submit annual facility emission data. The emissions are modeled using the EPA Clean Air Act Assessment Package-1988 (EPA 2013) to estimate the annual dose to each of the identified public receptors.

Emission Sources

Radionuclide NESHAP regulations require DOE to continuously monitor any radionuclide air emission source that has the potential to produce a dose of 0.1 mrem/year to the maximally exposed individual; no Sandia facilities exceed this criterion. However, as a best management practice, stacks are monitored continuously at some facilities. At other facilities, emission estimates are based on periodic confirmatory measurements or engineering calculations. In 2017, the highest emissions were from argon-41 and tritium. Historically, argon-41 and tritium have been the most significant contributors to the effective dose equivalent of the maximally exposed individual. Figure 5-5 shows the annual reported release of argon-41 and tritium for 2013 through 2017. The atmosphere contains 78.09 percent nitrogen, 20.95 percent oxygen, 0.93 percent argon, 0.03 percent carbon dioxide, and minor concentrations of neon, methane, hydrogen, helium, and krypton. Some of these constituents are susceptible to isotope transformations during high-energy processes, which result in air activation products such as argon-41. Emissions vary from year to year based on the operations conducted at the various facilities.

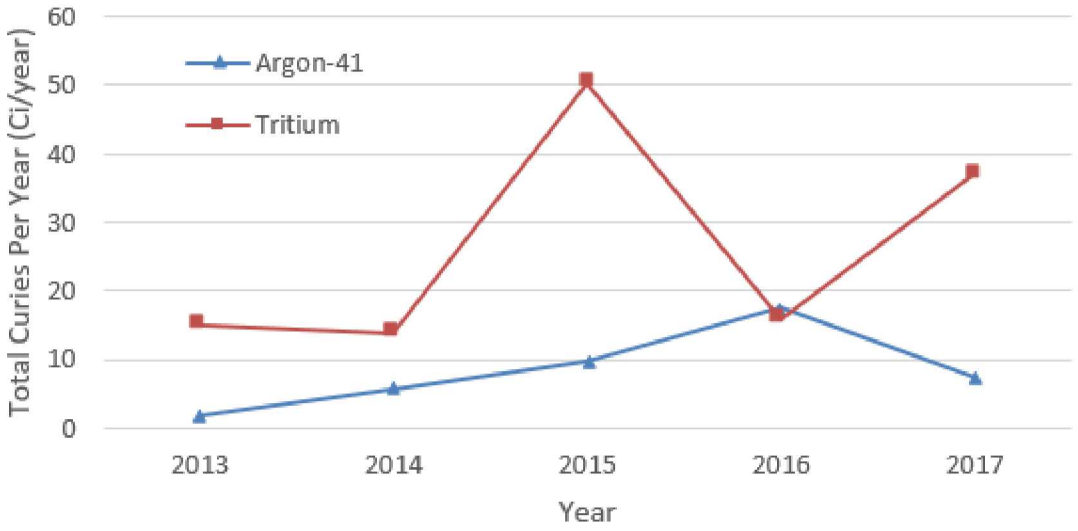


Figure 5-5. Atmospheric releases of argon-41 and tritium, 2013–2017

Demographic data include the resident population, the number of beef and dairy cattle, and the utilized food crop area fraction for a 50-mile radius study area. The densities for resident population, cattle, and food crops are calculated as the quotient of the most recent county data and the county land area (e.g., cows per acre). The radionuclide NESHAP calculation for the resident population was based on estimated urban and county population data and U.S. Census Bureau data (Census 2014). The beef and dairy cattle numbers and the food crop area fraction were calculated using 2007 agricultural statistics. The statistics were supplied by the New Mexico Department of Agriculture (NMDOA 2013).

Off-Site and On-Site Public Receptors

Receptor locations in the vicinity of emission sources have been identified as potential locations of maximum exposure to a member of the public. Off-site receptor locations extend to the Isleta Resort Casino, the Four Hills subdivision north of KAFB, and areas near the Albuquerque International Sunport west of KAFB (Table 5-9). On-site receptors include U.S. Air Force facilities, offices, and housing areas as well as other non-DOE and non-DOD facilities on KAFB (Table 5-10).

Meteorology

Data from three meteorological towers (A21, A36, and CW1) in the proximity of emission sources were used in 2017. Data from each tower consisted of approximately 35,000 hourly observations of wind direction, wind speed, and stability class (inferred from wind and solar insulation data). The data were compiled into a normalized distribution from which all wind and stability frequency-of-occurrence data were derived.

5.4.4 Dose Assessment Results

The Clean Air Act Assessment Package-1988 uses a Gaussian plume equation to estimate air dispersion in both horizontal and vertical directions (EPA 2013). Individual effective dose equivalents to off-site and on-site receptors from emission sources are presented in Table 5-9 and Table 5-10, respectively. Dose assessment results are summarized in Table 5-11.

Table 5-9. Annual source-specific effective dose equivalent for off-site receptors, 2017

Facility/Location	ACRR Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMU Emission (mrem/yr)	Z Accelerator Facility Emission (mrem/yr)	Total (mrem/yr)
City of Albuquerque Environmental Health Department Bio-Disease	1.90E-04	6.40E-04	7.10E-06	8.30E-08	8.37E-04
Eubank Gate area (Building 8895)	1.10E-04	9.10E-04	3.70E-06	9.80E-08	1.02E-03
Four Hills resident	1.30E-04	6.30E-04	3.70E-06	8.50E-08	7.64E-04
Isleta Casino	2.30E-05	6.10E-04	3.50E-06	7.90E-08	6.37E-04
La Luz Childcare	9.60E-05	7.10E-04	3.40E-06	9.10E-08	8.09E-04
Mesa del Sol Housing Development	1.10E-04	6.20E-04	8.10E-06	8.36E-08[a]	7.38E-04
New Mexico School for the Blind and Visually Impaired	8.60E-05	6.90E-04	3.20E-06	8.90E-08	7.79E-04
U.S. Geological Survey	3.40E-05	6.00E-04	2.10E-06	7.80E-08	6.36E-04
Veterans Administration Hospital	1.10E-04	6.50E-04	3.80E-06	8.90E-08	7.64E-04
Willow Wood	9.10E-05	6.80E-04	3.30E-06	8.90E-08	7.74E-04
TOTAL	**9.80E-04**	**6.74E-03**	**4.19E-05**	**8.36E+03**	**7.76E-03**

[a] Value corrected from previous years.
ACRR = Annular Core Research Reactor
NGF = Neutron Generator Facility
RMWMU = Radioactive and Mixed Waste Management Unit
U.S. = United States

Table 5-10. Annual source-specific effective dose equivalent for on-site receptors, 2017

Facility/Location	ACRR Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMU Emission (mrem/yr)	Z Accelerator Facility Emission (mrem/yr)	Total (mrem/yr)
AFRL Cryocooler Characterization Laboratory (Building 30136)	2.40E-04	7.30E-04	3.90E-06	3.20E-09	9.74E-04
Armed Forces Reserve Center	2.80E-04	7.60E-04	3.90E-06	1.00E-07	1.04E-03
Chestnut Site	2.40E-04	7.30E-04	4.10E-05	2.10E-09	1.01E-03
Child Development Center at Maxwell Housing Center	1.10E-04	7.40E-04	2.50E-06	4.90E-09	8.53E-04
Golf Course Club House	6.80E-04	7.40E-04	6.10E-06	9.30E-09	1.43E-03
Homeland Security Building (1008)	1.50E-04	8.60E-04	3.30E-06	3.20E-08	1.01E-03

Table continued on next page.

Table 5-10. Annual source-specific effective dose equivalent for on-site receptors, 2017 (continued)

Facility/Location	ACRR Emission (mrem/yr)	NGF Emission (mrem/yr)	RMWMU Emission (mrem/yr)	Z Accelerator Facility Emission (mrem/yr)	Total (mrem/yr)
Honeywell Systems\Support Site	1.90E-04	8.90E-04	3.10E-06	2.80E-08	1.08E-03
Lovelace Respiratory Research Institute	6.30E-05	7.30E-04	3.80E-06	1.20E-09	7.97E-04
KAFB Fire Station	1.40E-04	8.00E-04	2.60E-06	1.50E-08	9.43E-04
KAFB Landfill	2.20E-04	7.60E-04	4.00E-06	2.80E-08	9.84E-04
Kirtland Elementary	1.10E-04	7.40E-04	2.50E-06	4.60E-09	8.53E-04
Kirtland Family Housing	8.50E-05	7.90E-04	2.40E-06	1.30E-08	8.77E-04
Kirtland Storage Facility	1.20E-03	7.40E-04	7.90E-06	1.00E-08	1.95E-03
Manzano Offices (fire station)	2.90E-04	7.40E-04	5.30E-06	2.90E-09	1.04E-03
Maxwell Housing (southeast corner)	1.20E-04	7.40E-04	2.30E-06	5.40E-09	8.62E-04
Richard W. Davis Advanced Laser Facility (formally Airport Building)	2.40E-04	7.70E-04	3.90E-06	1.50E-08	1.01E-03
Sandia Elementary School	8.10E-05	7.80E-04	2.30E-06	1.00E-08	8.63E-04
TA-IV Cafeteria	2.10E-04	7.60E-04	4.00E-06	1.50E-07	9.74E-04
Wherry Elementary	1.20E-04	7.60E-04	2.90E-06	7.90E-09	8.83E-04
TOTAL	**4.77E-03**	**1.46E-02**	**1.08E-04**	**4.43E-07**	**1.94E-02**

ACRR = Annular Core Research Reactor
AFRL = Air Force Research Laboratory
KAFB = Kirtland Air Force Base
NGF = Neutron Generator Facility
RMWMU = Radioactive and Mixed Waste Management Unit
TA = technical area

Table 5-11. Calculated dose assessment results for on-site and off-site receptors and for collective populations, 2017

Dose to Receptor	Location	2017 Calculated Dose	NESHAP Standard
Individual Dose			
On-site receptor effective dose equivalent to the maximally exposed individual	Kirtland Storage Facility	3.75E-03 mrem/yr	10 mrem/yr
Off-site receptor effective dose equivalent to the maximally exposed individual	Eubank Gate area	1.00E-02 mrem/yr	10 mrem/yr
Collective Dose			
Collective regional population	Residents within a 50-mile radius	7.81E-02 person-rem/yr	No standard available
Collective KAFB population	KAFB housing	1.26E-02 person-rem/yr	No standard available

KAFB = Kirtland Air Force Base
NESHAP = National Emissions Standards for Hazardous Air Pollutants

The total dose at each receptor location is determined by summing the individual doses resulting from each source. The dose to the maximally exposed individual member of the public is then compared to the EPA NESHAP limit of 10 mrem/year.

In 2017, the primary radionuclides released from SNL/NM facilities were tritium and argon-41. In 2017, the on-site maximally exposed individual was located on KAFB at the Kirtland Storage Facility. The on-site maximally exposed individual dose of 3.75E-03 mrem/year resulted primarily from tritium releases at the Neutron Generator Facility and argon-41 releases from the Annular Core Research Reactor. The off-site maximally exposed individual dose of 1.00E-02 mrem/year was

located at the KAFB Eubank Gate area and primarily resulted from tritium releases at the Neutron Generator Facility. Both doses are well below the 10 mrem/year EPA NESHAP standard. By comparison, the average person in the U.S. receives 311 mrem/year from natural background radiation (NCRP 2009).

Collective Dose

The collective population dose resulting from all Sandia radiological emissions was calculated for both KAFB and the regional area (Table 5-11). Collective dose calculations are not required by NESHAP regulations; however, a collective calculation provides a useful numerical comparison of the public dose from year to year. Collective dose is calculated by multiplying a representative individual dose within a population by the total population. The collective population dose was calculated for both the KAFB housing areas and the general Albuquerque area population within a 50-mile radius.

Regional

The Albuquerque regional collective population dose in 2017 was 7.81E-02 person-rem/year. This is comparable with the average over the past five years for regional collective population dose data. For the purpose of calculating the collective dose, all releases were assumed to occur from a location centered in TA-V.

Kirtland Air Force Base

A collective population dose for KAFB residents was calculated based on three main housing areas (Maxwell, Pershing Park, and Kirtland Family). The total population dose for KAFB housing was calculated by summing the total residential population. The 2017 calculation resulted in an estimated population dose of 1.26E-02 person-rem/year.

Chapter 6. Water Quality Programs



Coyote Springs

OVERVIEW ■ Water quality programs—which include the Oil Storage Program; Safe Drinking Water Protection Program; Environmental Release, Response, and Reporting Program; Stormwater Program; Surface Discharge Program; and Wastewater Discharge Program—collectively ensure compliance with requirements established by local, state, and federal agencies.

Sandia personnel ensure water quality through numerous programs. Operations comply with water quality requirements established by local, state, tribal, and federal agencies. Groundwater programs are summarized in Chapter 3. Additional water quality programs discussed in this chapter include the following:

- Environmental Release, Response, and Reporting Program
- Oil Storage Program
- Safe Drinking Water Protection Program
- Stormwater Program
- Surface Discharge Program
- Wastewater Discharge Program

The NMED and the ABCWUA implement EPA standards at the state and local level. Currently, EPA Region 6 implements stormwater regulations under the NPDES. Sandia personnel also adhere to the water quality guidelines in DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment.*

6.1 Environmental Release, Response, and Reporting Program

Environmental Release, Response, and Reporting Program personnel are contacted in the event of an accidental spill or any type of environmental release. A set of procedures provides guidance and specific instructions for reporting an environmental release and for understanding the communications chain to develop an accurate report. Environmental Release, Response, and Reporting Program personnel implement the guidance and document all aspects of an environmental release to ensure compliance with local, state, and federal reporting requirements.

6.1.1 Events Reported to the New Mexico Environment Department

In 2017, one release was reported to NMED as a best management practice. The release is summarized as follows:

> On July 16, 2017, a major leak from a potable water line occurred in TA-I. The release lasted for approximately 45 minutes. Facilities personnel shut down the system's water supply, preventing additional discharge. The volume of potable water discharged to nearby storm drains was estimated to be 500,000 gallons. The release was from a broken 10-inch cast iron pipe. The break was due to a failed fitting restraint, which caused a section of the pipe to break under the pressure. Repairs were completed with new ductile iron pipe and mechanical joint fittings. Personnel performed the repairs under the direction and approval of operations engineers and the water systems engineer. The system was flushed, disinfected, tested, backfilled, and returned to service.

6.1.2 Events Categorized as a DOE Reportable Occurrence

In 2017, one event met the criteria for a DOE reportable occurrence (see Chapter 2). The release is summarized as follows:

> On July 11, 2017, Saturn Accelerator operations personnel were performing a routine activity, transferring oil from the accelerator to two outdoor storage tanks. An oil spill was discovered, with oil flowing into the secondary containment area. The transfer of oil was terminated immediately. Approximately 30,000 to 40,000 gallons of oil spilled from the top of the tank through the hatch into the secondary containment area. The oil spill posed no threat to human health or the environment and posed no safety concerns. This event was categorized as a DOE reportable occurrence near miss. The event did not warrant reporting to any other agency.

An *environmental release* is any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing into the environment, which may include (but is not limited to) soil, air, and drain systems.

6.2 Oil Storage Program

The oil storage capacity at SNL/NM is approximately 2.2 million gallons in 46 stationary aboveground storage tanks and 3 underground storage tanks. Additional oil storage capacity in 55-gallon drums, mobile and portable containers, mobile refuelers, and oil-filled operational equipment (transformers, hydraulic elevators, etc.) occurs throughout the site on an as-needed basis. All oil storage sites with regulated containers must be equipped with secondary containment. Secondary containment structures include concrete-lined basins, retaining walls, containment reservoirs, double-wall tanks, sloped pads, trenches, and containment pallets. Two 20,000-gallon underground storage tanks and one 10,000-gallon underground storage tank are currently in operation and registered with NMED. Forty-six stationary aboveground storage tanks are

currently in operation, seven of which are registered with NMED. Registration numbers for those tanks registered with NMED are provided in Table 9-1. Sandia's State of New Mexico owner identification number is 14109.

A Spill Prevention, Control, and Countermeasure Plan is required under the Clean Water Act. The plan was revised in 2016 to update general information, the oil storage container inventory, and other aspects of oil storage management. The plan is updated at least every five years, per 40 CFR 112, *Oil Pollution Prevention*. The 2016 revision of the plan complies with that requirement.

The Spill Prevention, Control, and Countermeasure Plan describes oil storage facilities and the mitigation controls in place to prevent inadvertent discharges of oil. Facilities subject to the requirements include those having the following types of oil storage containers: aboveground storage tanks, underground storage tanks, generator base tanks, drum storage areas, mobile or portable containers, mobile refuelers, and oil-filled operational equipment (transformers, hydraulic elevators, etc.).

In 2017, there was one spill into a secondary containment structure. See Section 6.1.2 for more information.

6.3 Safe Drinking Water Protection Program

The Safe Drinking Water Protection Program ensures the availability of safe drinking water to personnel at Sandia-operated facilities. Program personnel work in conjunction with Facilities and Emergency Management Center personnel to maintain compliance with applicable federal, state, local, and DOE requirements. Program personnel also coordinate with Facilities and Emergency Management Center personnel regarding operations that maintain, test, and inspect appropriate backflow-prevention activities.

KAFB supplies water to the DOE-owned drinking water distribution system at SNL/NM. The KAFB water system is registered with the NMED Drinking Water Bureau as a nontransient Community Public Water System. Because KAFB is identified as the sole registered party, the DOE-owned and Sandia personnel-operated and maintained distribution system on KAFB is regulated by the NMED Drinking Water Bureau as a component of the KAFB Public Water System. Safe Drinking Water Protection Program personnel coordinate with KAFB to support compliance activities.

KAFB publishes an annual summary of drinking water quality, and it can be found at the following website:

http://www.kirtland.af.mil/Home/Environment

6.3.1 Summary of Wastewater Monitoring Results and Inspection Activities in 2017

During 2017, Sandia personnel collected wastewater samples (sample splits) during the ABCWUA and NMED DOE Oversight Bureau sampling events. Laboratory analytical results for these split wastewater samples, based on the parameters shown in Section 6.6.2, confirmed that Sandia operations were in compliance with ABCWUA requirements for permits 2069A, 2069F, 2069G, 2069I, 2069K, and 2238A. All water discharged from the Liquid Effluent Control System in 2017 met requirements for radiological levels in wastewater. All analytical results from sampling conducted in 2017 met ABCWUA Sewer Use and Wastewater Control Ordinance discharge requirements. Analytical results are provided in Appendix D, "2017 Wastewater Sampling Results."

In addition, the ABCWUA industrial waste engineer inspected individual laboratory operations within permitted flow basins 2069F, 2069G, and 2238A during February 2017 with no issues noted.

6.4 Stormwater Program

Stormwater Program personnel are responsible for protecting surface water quality by minimizing the discharge of stormwater pollutants. Program personnel maintain regulatory compliance with federal, state, tribal, and local stormwater requirements by: helping organizations obtain NPDES permit coverage, conducting routine assessments and stormwater monitoring, and training personnel on stormwater pollution prevention practices. Compliance with NPDES permits reduces the impact of construction, industrial, and municipal activities on the environment.

Stormwater flowing over the ground's surface has the potential to pick up and transport contaminants. Stormwater contaminants—such as oil, solvents, vehicle residues, chemicals, metals, sediments, building materials, hazardous materials, fertilizers, pesticides, herbicides, and sanitary waste—may derive from construction, industrial, and municipal activities. Stormwater Program personnel collaborate with other program and organization personnel to implement stormwater control measures and install best management practices to prevent or reduce contaminants from being discharged from permitted sites or activities. Potential stormwater contaminants are controlled by minimizing stormwater exposure to chemicals and materials, performing good housekeeping practices, installing and maintaining erosion and sediment controls, implementing long-term stabilization practices following construction, maintaining post-construction stormwater runoff management controls, training personnel on how their jobs may impact stormwater quality, controlling non-stormwater discharges, implementing solid waste management and recycling programs, and stabilizing construction sites. In addition, some facilities, such as the Hazardous Waste Handling Unit and the RMWMU, have lined catchment basins that collect stormwater so potential contaminants can be evaluated prior to release.



"Dragon's teeth," stormwater energy dissipator

6.4.1 Surface Waters and Stormwater Drainage

Stormwater is regulated because of its ability to discharge to "waters of the United States" as defined under the Clean Water Act. Furthermore, the State of New Mexico has defined "surface water(s) of the state" to mean: "all surface waters situated wholly or partly within or bordering upon the state, including lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, reservoirs or natural ponds. Surface waters of the state also means all tributaries of such waters, including adjacent wetlands, any manmade bodies of

water that were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state, and any 'waters of the United States' as defined in the Clean Water Act that are not included in the preceding description" (20.6.4 NMAC).

An ephemeral spring flows only briefly in the immediate locality.

The major drainage features within KAFB are the Tijeras Arroyo and its named tributary, Arroyo de Coyote. Both are designated as "waters of the United States," are ephemeral, and flow for short durations in response to precipitation. According to Appendix A of the 2016 through 2018 State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List, application of the NMED Surface Water Quality Bureau's Hydrology Protocol (survey date June 24, 2009) indicates Tijeras Arroyo Assessment Unit NM-9000.A_070 as ephemeral; however, until the process detailed in 20.6.4.15 NMAC Subsection C is completed, the arroyo will be regulated as intermittent under 20.6.4.98 NMAC. As shown in Figure 6-1, Tijeras Arroyo enters KAFB from the northeast; flows just south of TA-I, TA-II, and TA-IV; exits at the west boundary of KAFB; and continues approximately 8 miles to its outfall at the Rio Grande. Tijeras Arroyo is a significant topographic feature across KAFB, where erosion of unconsolidated basin sediments has resulted in a channel width of over one-half mile in some areas.

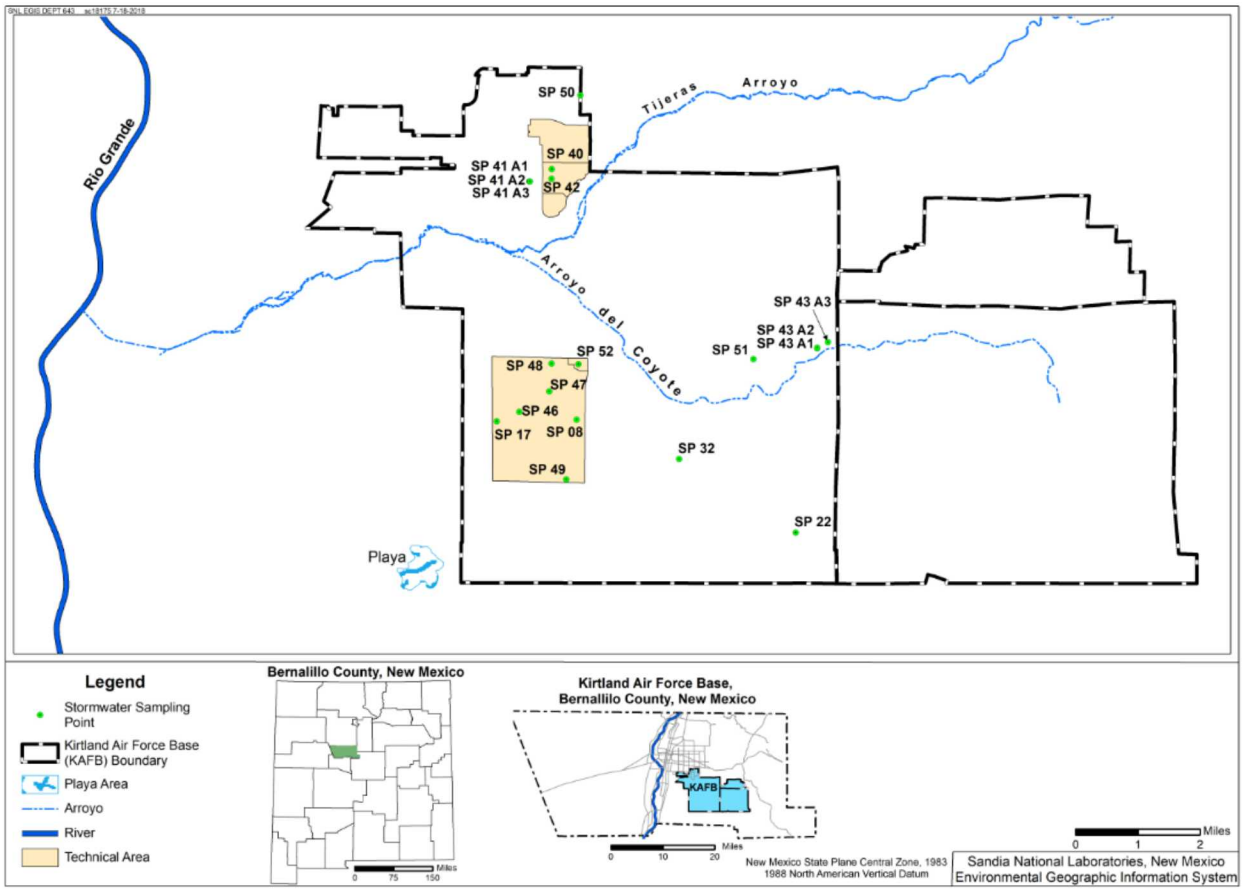


Figure 6-1. Multi-Sector General Permit stormwater sampling point locations

Stormwater from facilities in TA-I, TA-II, and TA-IV flows to a centralized stormwater drainage system (covered under the Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System permit), which is comprised of numerous gutters, ditches, inlets, and storm drains. Approximately 90 percent of this area drains to a concrete-lined channel that discharges stormwater

directly to the Tijeras Arroyo (the main outfall of the Municipal Separate Storm Sewer System south of TA-I). Stormwater from the remaining area (in the northwest quadrant of TA-I) flows to the KAFB Municipal Separate Storm Sewer System through three separate discharge points. Stormwater entering the KAFB Municipal Separate Storm Sewer System at these points is ultimately conveyed to the Rio Grande via the Albuquerque Metro Area Flood Control Authority North Diversion Channel.

The Arroyo del Coyote drains much of the eastern mountainous portion of KAFB, including the drainages of Madera Canyon, Lurance Canyon, and Sol se Mete Canyon. The channel flows from east to west and joins the Tijeras Arroyo northwest of the Tijeras Arroyo Golf Course. TA-V and the immediate surrounding area—which includes impervious buildings, roads, and parking lots—is comprised of highly permeable soils, and stormwater is diverted by curbs and small ditches away from facilities. There is no centralized stormwater drainage system for this area and no discernible discharge directly to a water of the United States.

The majority of TA-III, TA-V, and Coyote Test Field discharge stormwater within a closed basin. Current U.S. Geological Survey 12-digit maps show TA-V and most of TA-III to be located within the boundary of Closed Basin Hydrologic Unit Code 130202030403, which is defined as a drainage area that is 100 percent noncontributing; all surface flow is internal and no overland flow leaves the basin through the outlet point such that it would contribute surface flow to a stream or river. Activity areas located in the southern portion of TA-III and KAFB have the potential to discharge stormwater via overland flow to unnamed playa lakes located southwest of the KAFB boundary (Figure 6-1). Playa lakes are not designated as "waters of the United States," but they are considered "surface waters of the state."

6.4.2 National Pollutant Discharge Elimination System Permitting

EPA retains authority for NPDES permits in New Mexico. SNL/NM operations are covered under three NPDES permits, as discussed below.

Multi-Sector General Permit. The Multi-Sector General Permit is intended to regulate stormwater quality associated with industrial operations or activities. EPA renewed the permit on June 4, 2015; Sandia personnel and DOE subsequently jointly filed Notices of Intent, which EPA approved on September 30, 2015. The 23 sites covered under the Multi-Sector General Permit are listed in Table 6-1. Compliance with the Multi-Sector General Permit is maintained by developing and updating a site-specific Stormwater Pollution Prevention Plan, implementing control measures, conducting site inspections, submitting annual reports, sampling stormwater runoff for comparison to benchmark values, and submitting discharge monitoring reports. The Stormwater Pollution Prevention Plan, Notices of Intent, and other associated documents are available to the public in the digital repository at the University of New Mexico Zimmerman Library online database:

http://digitalrepository.unm.edu/snl_msgp/

Construction General Permit. The Construction General Permit is intended to regulate stormwater discharges associated with construction activities. Notices of Intent are submitted to the EPA for coverage under the 2017 Construction General Permit for every construction project anticipated to disturb one or more acres of land, following development of a site-specific Stormwater Pollution Prevention Plan. During 2017, Sandia held active permit coverage of 12 construction sites (listed in Table 9-1); DOE and its management and operating contractor for Sandia held joint Construction General Permit coverage for two of these sites. The management and operating contractor and other permittees maintain compliance with the Construction General Permit by developing and updating a site-specific Stormwater Pollution Prevention Plan, installing best management practices, implementing pollution prevention measures, conducting site inspections on a routine basis and after storm events, and stabilizing all disturbed areas of a site upon completion of a project.

Table 6-1. Sites with coverage under the Multi-Sector General Permit and associated stormwater sampling points

Sector Title	Sector	Permitted Sites	Stormwater Sampling Point
Scrap and Waste Recycling, except Source-separated Recycling	N1	TA-III Borrow Pit	No outfall
Source-separated Recycling	N2	Reapplication Yard	41 (no analytical requirement)
		Solid Waste Collection and Recycling Center	42 (no analytical requirement)
Hazardous Waste Treatment, Storage, or Disposal Facilities	K1	Auxiliary Hot Cell Unit	52
		Coyote Canyon Blast Area (SWMUs 8/58)	43
		Gun Facility (SWMU 84)	46
		Hazardous Waste Handling Unit	40
		Long Sled Track (SWMU 83)	17
		Manzano Storage Bunkers	51
		Old Burn Site (SWMU 68)	22
		Radioactive and Mixed Waste Management Unit	49
		Short Sled Track (SWMU 240)	47
		Surface Discharge Site (SWMU 502)	32
		TA-V Sandlot	52
		Thermal Treatment Unit	48
		Thunder Range 6 Detonation Site	none; emergency use only
Electronic and Electrical Equipment and Components, Photographic and Optical Goods	AC1	Advanced Manufacturing Process Laboratory	05 (no analytical requirement)
		Building 858 Complex	
		Neutron Generator Facility	
		Center or Integrated Nanotechnologies	50 (no analytical requirement)
Non-metallic Mineral and Mining Dressing; Construction Sand and Gravel	J1	TA-III Borrow Pit	No outfall
Landfills	L1 & L2	Chemical Waste Landfill (per permit nomenclature)	08
Local and Highway Passenger Transportation	P1	Fleet Services	05 (no analytical requirement)

SWMU = Solid Waste Management Unit TA = technical area

Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System Permit. The Municipal Separate Storm Sewer System Permit establishes requirements to reduce stormwater pollutants discharged to the Rio Grande. The Municipal Separate Storm Sewer System Permit was effective upon publication in the Federal Register on December 22, 2014. DOE and its management and operating contractor for Sandia submitted Notices of Intent and a Stormwater Management Program Plan in June 2015. The EPA approved the Notices of Intent for DOE and its management and operating contractor in November and December 2015, respectively. Sandia personnel maintain compliance with the Municipal Separate Storm Sewer System Permit by developing and updating the Stormwater Management Program Plan, implementing control measures, conducting inspections, submitting annual reports, sampling stormwater from the Municipal Separate Storm Sewer System,

and submitting discharge monitoring reports. The Stormwater Management Program Plan, Notices of Intent, and other associated documents are available to the public in the digital repository at the University of New Mexico Zimmerman Library online database:

http://digitalrepository.unm.edu/snl_ms4/

6.4.3 Stormwater Sampling and Parameters

Stormwater sampling is required for compliance with the Multi-Sector General Permit and the Municipal Separate Storm Sewer System Permit. Given that SNL/NM is located in an arid/semiarid region of the Southwest and historical meteorological data shows that approximately 60 percent of the annual rainfall occurs in four months of the year (July, August, September, and October), there is a defined wet season for stormwater sampling of July 1 through October 31. Multi-Sector General Permit sampling has been conducted exclusively during the wet season, as authorized by the permit; however, the permit requires sampling to be conducted year-round starting in 2016 for reporting in 2017. In addition to collecting stormwater samples for laboratory analysis, visual assessments are performed at 16 outfalls to observe color, odor, clarity, solids, oils, and foam that may indicate the presence of a pollutant.

Figure 6-1 illustrates the stormwater sampling points (SWSPs) located at the outfalls of Multi-Sector General Permit sites (listed in Table 6-1) used to collect stormwater runoff and any possible pollutants associated with permitted activities (SWSPs 05, 08, 17, 22, 32, 40, 41, 42, 43, 46, 47, 48, 49, 50, 51, and 52). Table 6-2 presents the analytical parameters sampled for in each industry sector as required by the Multi-Sector General Permit (with the exception of sectors N2, P1, and AC1, for which laboratory analysis is not required). Table 6-2 applies to samples collected for the remainder of the Multi-Sector General Permit term (through 2020).

Table 6-2. Multi-Sector General Permit stormwater sampling requirements and benchmark values

Pollutant	MSGP Sector/ Subsector	EPA Benchmark (total; mg/L)	New Mexico Benchmark (total; mg/L)	New Mexico Benchmark (dissolved; mg/L)
Arsenic	K1	N/A	0.01	N/A
Cadmium[a]	K1	N/A	N/A	0.00298[a]
Cyanide	K1	N/A	0.0052	N/A
Lead[a]	K1, N1	N/A	N/A	0.14[a]
Mercury	K1	N/A	0.00077	N/A
Magnesium	K1	0.064	N/A	N/A
Selenium	K1	0.005	N/A	N/A
Silver[a]	K1	N/A	N/A	0.011[a]
Aluminum[a]	N1	N/A	N/A	8.838[a] (total recoverable[b])
Copper[a]	N1	N/A	N/A	0.026[a]
Iron	N1, L2	1.0	N/A	N/A
Zinc[a]	N1	N/A	N/A	0.301[a]
Ammonia	K1	2.14	N/A	N/A
Chemical oxygen demand	K1, N1	120	N/A	N/A
Total nitrogen (nitrate + nitrite)	J1	N/A	132	N/A
Total suspended solids	J1, L1, N1	100	N/A	N/A

[a] Hardness-dependent benchmark. Value determined using a hardness value of 125 mg/L, determined for the Middle Rio Grande from U.S. Geological Survey Sampling Data.
[b] The modified benchmark concentration value for aluminum specified in the New Mexico water quality hardness-based values table in MSGP Part 9.6.2.1 is 8.838 mg/L as *total recoverable*.
EPA = U.S. Environmental Protection Agency MSGP = Multi-Sector General Permit N/A = not applicable

Figure 6-2 illustrates the stormwater sampling points installed for compliance with the Municipal Separate Storm Sewer System Permit, located at the inflow (SWSP-2) and outflow (SWSPs 5, 24, 35, and 36) of the stormwater drainage system (Municipal Separate Storm Sewer System).

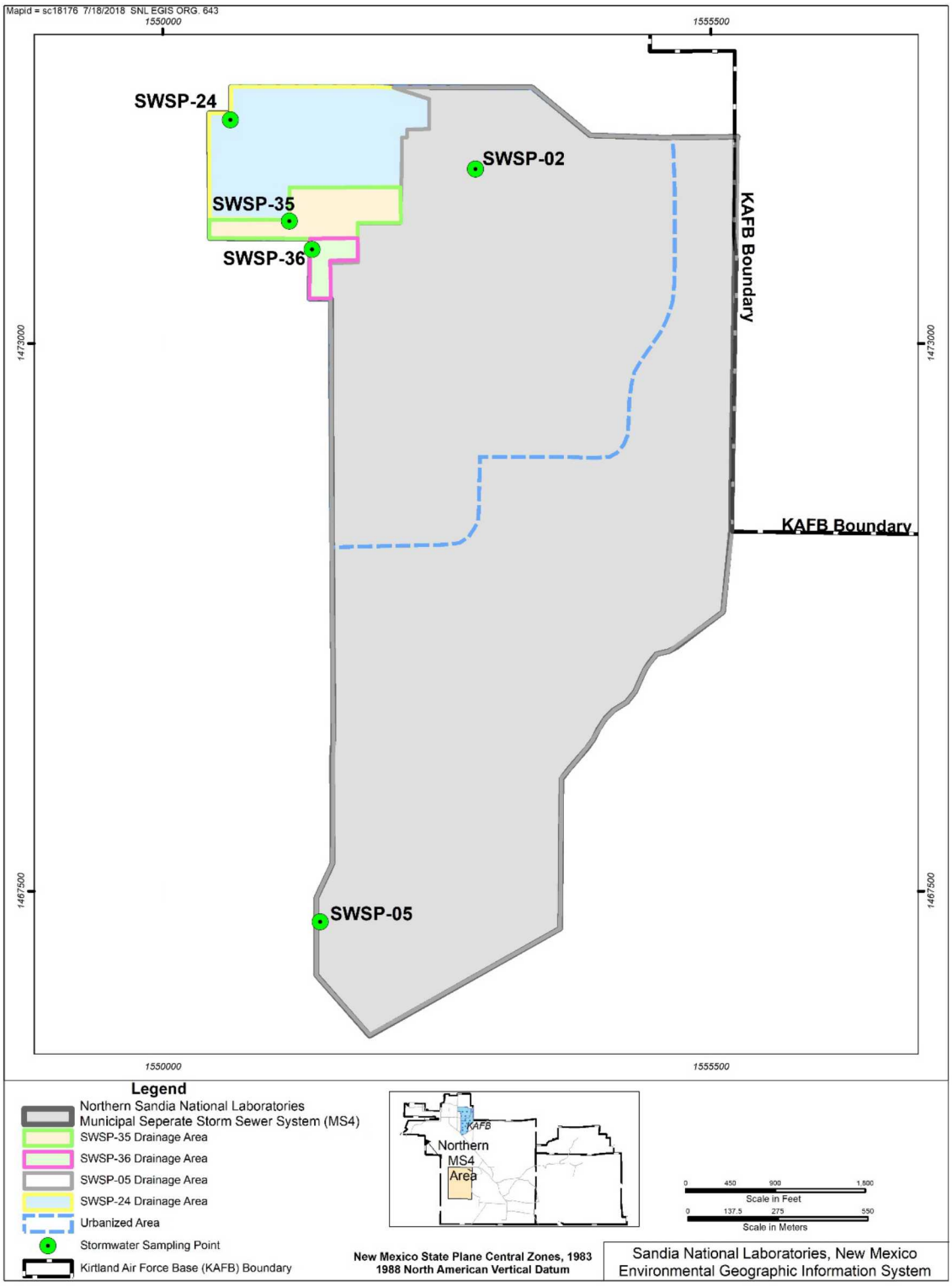


Figure 6-2. Northern Municipal Separate Storm Sewer System drainage areas and monitoring locations

6.4.4 Summary of Stormwater Program Activities in 2017

Stormwater samples were collected in compliance with the Multi-Sector General Permit from July 1 through October 31, 2017, when there was sufficient runoff for sample collection. Precipitation events from July 1 through October 31 of 2017 did not produce sufficient runoff from permitted sites to collect stormwater samples at SWSP-08, SWSP-22, SWSP 43, SWSP-44, and SWSP-46.

At the remaining five stormwater sampling points where adequate runoff did collect stormwater samples, there was one parameter at one stormwater sampling point where the average of four consecutive monitoring values exceeded its Multi-Sector General Permit benchmark. This initiated a Stormwater Pollution Prevention Plan review to determine whether modifications were necessary. Arsenic exceeded the Multi-Sector General Permit benchmark by a small margin at SWSP-32, the Surface Discharge Site (SWMU-502). The average concentration of arsenic at SWSP-32 was 0.0112 mg/L, which is 0.001 mg/L above the benchmark value of 0.01 mg/L. Review of the site conditions resulted in the determination that no modifications were necessary at this time. No additional exceedances of the four-quarter average or single-event exceedances occurred at the stormwater sampling points in the 2017 monitoring season.

At SWSP-32, seven parameters (ammonia, cadmium, cyanide, lead, mercury, selenium, and silver) met permit requirements such that the average of four monitoring values were below the Multi-Sector General Permit benchmark. These parameters no longer require monitoring per the 2015 Multi-Sector General Permit. At SWSP-48, seven parameters (arsenic, cadmium, cyanide, lead, mercury, selenium, and silver) met the same permit requirements and no longer require monitoring. Stormwater exceedances for magnesium were not attributed to permitted activities because the values are consistent with background soil concentrations at SNL/NM. The analytical results, as submitted to EPA, are provided in Appendix E, "2017 Stormwater Sampling Results."

Stormwater was assessed visually when there was adequate runoff to collect a sample. Settled or suspended sediment is common in samples throughout SNL/NM and is likely a result of sediment displaced from heavy summer precipitation events. Observations from site inspections did not indicate that erosion was occurring as a result of permitted activities. As a best management practice, erosion controls were installed at the TA-V Sandlot to minimize discharge of sediments from the site.



Stormwater draining channel

Middle Rio Grande Watershed-Based Municipal Separate Storm Sewer System. A total of 17 wet weather samples were collected, 11 during the wet season (July 1, 2016 to October 31, 2016) and 6 during the dry season (November 1, 2016 through June 30, 2017). Stormwater samples were collected in compliance with the Municipal Separate Storm Sewer System Permit during the

monitoring period starting July 1, 2016, and ending June 30, 2017. Wet weather monitoring is performed only when the predicted (or actual) rainfall magnitude of a storm event is greater than 0.25 inches and an antecedent dry period of at least 48 hours after a rain event greater than 0.1 inch in magnitude has been satisfied.

Stormwater quality parameters discharged from the Municipal Separate Storm Sewer System during the monitoring period were below New Mexico water quality standards for all constituents except total polychlorinated biphenyls and Escherichia coli (E. coli). The Municipal Separate Storm Sewer System Permit requires that permittees use the monitoring results to guide efforts to improve the quality of stormwater discharges. Efforts have been initiated to identify potential sources of constituents for which exceedances occur and to prepare a reduction strategy. Analytical results submitted to EPA for the July 1, 2016, to June 30, 2017, Municipal Separate Storm Sewer System monitoring period are provided in Appendix E.

Total polychlorinated biphenyls collected from the Sandia Municipal Separate Storm Sewer System locations exceeded the New Mexico and Isleta Pueblo water quality standards in all samples. Polychlorinated biphenyls were detected in stormwater at exceptionally low concentrations with a maximum value of 0.0398 µg/L; however, the maximum concentration exceeded the Isleta Pueblo water quality standard of 0.00017 µg/L for total polychlorinated biphenyls. For reference, snow samples collected at the Sandia Crest (approximately 10,493 feet above mean sea level) contained polychlorinated biphenyls as high as 0.00065 µg/L, three times higher than the Isleta Pueblo water quality standard (LANL 2012). During the 1990s, a campaign was implemented to remove all polychlorinated biphenyl sources from Sandia operations. There are currently no known polychlorinated biphenyls used or stored at SNL/NM. Nonetheless, polychlorinated biphenyls degrade slowly and bind strongly to soil particles. Soil stabilization and sediment control methods are planned for locations with greater erodibility to reduce sediment and polychlorinated biphenyl discharges to the stormwater drainage system.

The Rio Grande provides critical habitat for threatened and endangered species of birds and fish, and serves as a municipal, agricultural, and recreational water resource for Albuquerque and surrounding communities.

As with polychlorinated biphenyls, the Isleta Pueblo water quality standard for E. coli is very low (88 colony-forming unit [CFU]/100 mL). E. coli results in collected samples were above the Isleta Pueblo water quality standard in all but one of the samples. The seven E. coli samples collected during this monitoring period had a median of 1,553 CFU/100 mL and a maximum of 3,873 CFU/100 mL. These values were well below the concentrations found in the greater Albuquerque metropolitan area. Between 2003 and 2012, stormwater from nine storm drains and arroyos in Albuquerque reported median E. coli concentrations of 1,986 to 8,000 CFU/100 mL with a maximum concentration of 1.4×10^6 CFU/100 mL.

E. coli is found in the intestines of warm-blooded animals, including birds, rodents, dogs, raccoons, cats, and deer. EPA uses E. coli in stormwater as an indicator of animal waste and associated harmful bacteria. Anthropogenic sources of E. coli in stormwater include pet waste and improperly functioning septic system wastewater treatment facilities. None of these sources exist at SNL/NM; instead, natural sources such as birds, rodents, and raccoons, and to a lesser extent coyotes, rabbit, skunk, and deer are suspected to be contributing to E. coli in SNL/NM stormwater.

6.4.5 Stormwater Data Quality Assurance

Given the variability of precipitation events in the arid region, the volume of stormwater collected at monitoring points is often insufficient to achieve the minimum volume for laboratory analysis of all required parameters. Parameters are prioritized and analyzed based on the volume of stormwater necessary for analysis and their relevance with respect to potential pollutant discharges. Any remaining parameters are analyzed with stormwater collected from the next storm event within the same monitoring period.

Quality assurance, control, and assessment processes are used to ensure that stormwater sampling produces reliable data to meet permit requirements and verify the effectiveness of implemented pollution control measures. Due to the heterogeneous nature of stormwater, there is a low expectation of reproducibility from one sample to the next; therefore, field duplicates are not collected. Equipment blanks are only collected whenever analytical data indicate that sample contamination may be occurring.

The analytical laboratory prepares and analyzes quality control samples to estimate (1) the level of contamination introduced by the analytical process and (2) the accuracy of the selected analytical method in accordance with laboratory procedures. Method blanks are analyzed at a minimum frequency of once every 20 samples to determine the presence of contamination or calibration drift originating in the analytical laboratory. Matrix spike analyses are performed at a minimum frequency of one sample per each data package. Replicate analyses are performed at a frequency of once per sample batch to document the precision, or repeatability, of laboratory measurements. See Chapter 8 for more information on quality assurance and quality control.

6.5 Surface Discharge Program

All water and water-based compounds that discharge to the ground surface are evaluated for compliance with New Mexico Water Quality Control Commission regulations (20.6.2 NMAC) as implemented by the NMED Ground Water Quality Bureau. These regulations are designed to protect the state's groundwater and surface water.

6.5.1 Surface Discharge Approvals

Surface discharges are releases of water and water-based compounds made to roads, open areas, or impoundments. Surface discharges are only made with the approval of the Surface Discharge Program. Proposed discharges are evaluated for potential contaminants to determine whether the discharge complies with applicable requirements for surface releases. If any discharges do not meet surface water quality standards, alternative methods of disposal are found.

Surface discharges are releases of water and water-based compounds to roads, open areas, or confined areas such as reservoirs.

Surface discharge requests are made when access to a sanitary sewer line is not available, such as in remote locations on KAFB where no sewer lines exist. Typical surface discharges are requested as a result of fire-training activities, dust control, and the cleaning of building exteriors. In 2017, 20 individual surface discharge requests were approved. Approved releases were in compliance with NMED applicable requirements.

6.5.2 Activities at Evaporation Lagoons

Surface Discharge Program personnel report on water quality results from routine sampling events conducted at two surface discharge lagoons in TA-IV. Both lagoons are permitted through NMED in Discharge Permit (DP) 530. The two surface discharge lagoons (Lagoon 1 and Lagoon 2) are used

to contain and evaporate water that collects in the secondary containments around seven outdoor oil storage tanks used to store dielectric oil. The secondary containments are designed to hold the entire content of the tanks in the event of an accidental release. Significant volumes of precipitation can collect in the containments during storm events. The water that has collected within the containments is visually inspected for oil contamination, and any oil present is removed prior to discharge to the TA-IV lagoons.

The original DP-530 was issued on March 8, 1988, for discharges from the pulsed power facilities located in TA-IV to Lagoons 1 and 2. DP-530 was submitted pursuant to 20.6.2.3106 NMAC and was approved pursuant to 20.6.2.3109 NMAC. On September 5, 2014, a new DP-530 was issued, which expires on September 5, 2019. The monitoring and reporting requirements associated with DP-530 are listed in Table 6-3.

Samples were collected from Lagoon 1 and Lagoon 2 on September 26, 2017. Sample fractions were collected for major cations and anions, total dissolved solids, and purgeable and extractable organics as specified in DP-530. All samples were transported with sample custody documentation to the analytical laboratory. The analytical laboratory prepares and analyzes quality control samples as described in Section 6.4.5 See Chapter 8 for more information on quality assurance and quality control.

Although there were no discharges to Lagoon 2 in 2017, it was sampled to ensure that no residual or outside contamination had occurred. Laboratory analysis results indicated that all detected constituents met the standards in 20.6.2 NMAC. Additionally, monthly inspections are performed on both lagoons to verify water levels and ensure that no damage to the lagoons exists.

Table 6-3. Discharge Permit (DP)-530 monitoring and reporting requirements

Action	Frequency	Reporting
Volume of wastewater discharged	Monthly	Annually
Inspection of lagoons	Monthly	Documented in checklists
Lagoon water samples	Annually	Annually
Inspection of sump pump stations	Quarterly	Annually

6.6 Wastewater Discharge Program

Wastewater that is discharged to the public sewer system is divided into two categories: sanitary discharges and industrial discharges. Sanitary discharges include wastewater from restrooms and showers, food service establishments, and other domestic-type activities. Industrial discharges are produced from general laboratory research operations, including electroplating, metal finishing, microelectronic development, and photographic processes.

Sanitary discharges include wastewater from restrooms and showers, food service establishments, and other domestic-type activities. *Industrial* discharges are produced from general laboratory research operations.

Federal and local regulations establish the standards for sanitary sewer releases. Discharged wastewater effluent must meet the ABCWUA Sewer Use and Wastewater Control Ordinance requirements. Information on the ABCWUA Sewer Use and Wastewater Control Ordinance can be found at the following website:

www.abcwua.org/Legislation___Ordinances.aspx

Sanitary sewer releases must also meet requirements in DOE O 435.1 Change 1, *Radioactive Waste Management*, and DOE O 458.1 Admin Change 3, *Radiation Protection of the Public and the Environment*.

Liquid effluent discharges are monitored to meet regulatory compliance. Toxic discharges are further reduced by implementing Toxic Organic Management Plans, general good housekeeping, and engineering practices.

6.6.1 Albuquerque Bernalillo County Water Utility Authority Permitting and Reporting

The ABCWUA operates a Publicly Owned Treatment Works that discharges to the Rio Grande. The Sandia sewer system connects to the ABCWUA sanitary sewer system and eventually to the Publicly Owned Treatment Works through six permitted outfalls (Figure 6-3). Wastewater effluent discharged from any of the six outfalls must meet the permit-specific ABCWUA Sewer Use and Wastewater Control Ordinance requirements.

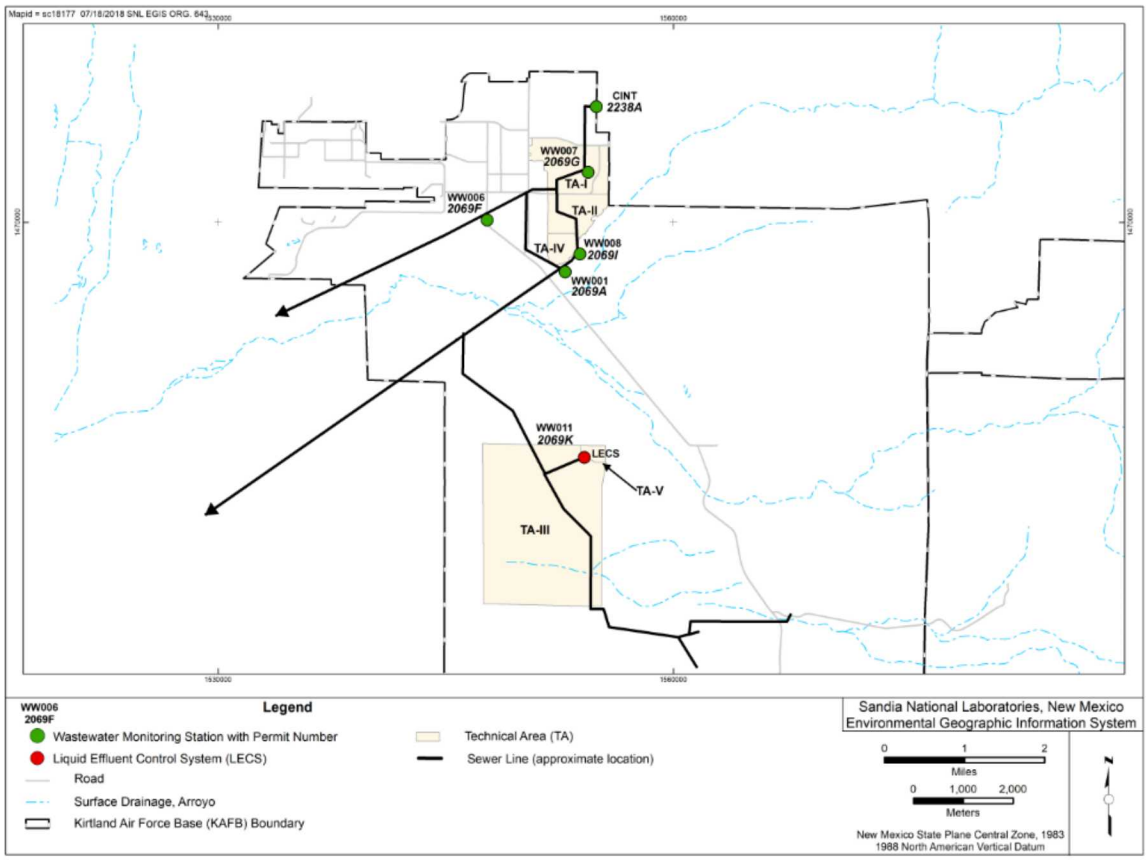


Figure 6-3. Wastewater monitoring station locations

DOE and Sandia personnel are required to report exceedances to the ABCWUA immediately in the event of accidental releases or slug discharges. In addition, Sandia personnel submit semiannual wastewater reports to the ABCWUA.

Wastewater discharges resulting from ongoing chemical, manufacturing, and industrial processes conducted at Sandia facilities are tracked through the Wastewater Discharge Approval System. Facility processes are reviewed for contaminants, concentrations, and discharge frequencies to determine whether the effluent will meet regulatory criteria. Once approved, a facility is issued an internal permit, which is reviewed annually. Generally, processes are well characterized, and any constituents that are detected above the permit-specific limits at a wastewater monitoring station

usually can be tracked back to the source facility. Corrective actions to mitigate further releases are implemented as necessary. One-time releases are approved on a case-by-case basis. Wastewater discharge approvals are not required for buildings that only produce domestic sewage from lavatories, restrooms, showers, sinks, and fountains.

Table 6-4. Wastewater discharge permits and station characteristics

Permit	Station	Waste Stream Process
General Outfall		
2069A	WW001	All waste streams
2069F	WW006	All waste streams
2069I	WW008	All waste streams
2069K	WW011	All waste streams and radiological screening of TA-V process water at the Liquid Effluent Control System
Categorical		
2069G	WW007	Laboratory industrial process acid wastewater from Microsystems and Engineering Sciences Applications activities
2238A	Center for Integrated Nanotechnologies	Laboratory industrial process acid wastewater from Center for Integrated Nanotechnologies activities

NOTE: "All waste streams" include both domestic and industrial discharges.
TA = technical area
WW = wastewater

6.6.2 Wastewater Monitoring Stations and Sampling Parameters

There are six on-site monitoring stations permitted by the ABCWUA (Figure 6-3) at SNL/NM. Wastewater monitoring station characteristics are listed in Table 6-4. Wastewater from the four permitted general outfall monitoring stations—WW001, WW006, WW008, and WW011—contains a mixture of sanitary and industrial wastewater, which discharges into the ABCWUA sanitary sewer system through the Tijeras Arroyo Intercept.

EPA has established categorical pretreatment standards for specified classes of industrial discharges. Categorical monitoring station WW007 monitors the wastewater discharged from the acid waste neutralization system within the Microelectronics Development Laboratory in TA-I. Laboratory discharges from the Microsystems and Engineering Sciences Applications Complex may also be configured to discharge to this acid waste neutralization system. An acid waste neutralization system is used at the Center for Integrated Nanotechnologies to pretreat its process wastewater, which discharged to categorical monitoring station Permit 2238A.

All general outfall monitoring stations are equipped with flow meters and potential of hydrogen (pH) sensors that continuously monitor the wastewater. The flow meters and pH sensors are connected to a central computer system that has alarm processing, remote real-time display of data, and report-generating capabilities. If the pH of the wastewater approaches discharge limits, an auto dialer notifies Sandia personnel before a pH regulatory limit is reached. Sandia personnel notify DOE when a pH limit is exceeded. Sandia or DOE personnel are required to report the exceedance limit to the ABCWUA as soon as possible.

ABCWUA personnel sample wastewater from Sandia permitted outfalls on a regular basis (usually twice a year) to determine compliance with permit requirements. The NMED DOE Oversight Bureau is notified when sampling is scheduled to occur and is offered the opportunity to obtain split samples for analysis. All samples are obtained as 24-hour flow proportional or time-weighted composites. In addition, Sandia personnel collect samples (sample splits) during the ABCWUA

sampling event which are sent to an EPA-approved laboratory for analysis. The ABCWUA determines which parameters it plans to analyze. Wastewater monitoring parameters are as follows:

- Metals—aluminum, arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, and zinc
- Radiological constituents—gamma spectroscopy, gross alpha, gross beta, and tritium
- General chemistry—fluoride, ammonia, cyanide, semivolatile organic compounds, and VOCs

Discharge monitoring stations WW001, WW006, WW008, and WW011 are manhole-type installations with permanently installed continuous-flow measuring and pH-recording instrumentation. Wastewater monitoring station WW007 and the Center for Integrated Nanotechnologies (Permit 2238A) are located within buildings, and are also equipped with installed continuous-flow measuring and pH-recording instrumentation.

Wastewater is the spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

Three active septic tank systems and one holding tank are maintained in remote areas on KAFB and are used only for domestic sanitary sewage collection. Since these tanks receive only domestic sewage and no industrial discharges, they do not require sampling prior to pumping and discharge to the public sewer. Septic holding tank pumping records are sent to NMED every six months.

6.6.3 Technical Area V Wastewater Radiological Screening

Research and engineering reactors are maintained in TA-V. These reactors and support facilities have the potential to produce radioactive process wastewater that includes liquids from floor drains, laboratory sinks, and other drains located in buildings that use, process, or store radioactive materials. To ensure that all wastewater from these facilities meets regulatory standards, liquid effluent is separated into two process streams: reactor and nonreactor wastewater. Nonreactor wastewater is water from restrooms and nonradioactive laboratory activities. Reactor wastewater is water from areas that use, process, or store radioactive materials and is channeled to holding tanks where it can be screened within the Liquid Effluent Control System for radiological constituents (Figure 6-3). The Liquid Effluent Control System was developed to maintain the integrity of the ABCWUA sanitary sewer system by collecting, analyzing, and handling reactor process wastewater from TA-V reactor activities. The system consists of three 5,000-gallon holding tanks with liquid level and radioactive alarm systems, a control room, and an ion exchange/filtration unit (a treatment processor). The Liquid Effluent Control System is an engineered facility operating within an established safety envelope.

Wastewater samples are analyzed for tritium, gross alpha, gross beta, and gamma spectroscopy to ensure that radiological levels meet regulatory standards before the water is released to the public sewer system. If radioactivity levels are detected above regulatory limits and contamination is due to short-lived medical radioisotopes, the water will not be released to the sanitary sewer system; an alternative disposal path will be found or the radionuclides will be allowed to decay in place over a matter of days or weeks. Once the radioactivity level is at or below regulatory limits, the water can be discharged safely to the public sewer system. Discharges to the sanitary sewer from the Liquid Effluent Control System and other Sandia activities did not exceed standards for radionuclides at any of the wastewater monitoring stations in 2017.

6.6.4 Sanitary Sewer System Releases in 2017

In August 2017, there was one reportable release to the sanitary sewer that required notification to the ABCWUA. An alarm was triggered in the Microsystems and Engineering Sciences Applications

Complex (Station WW007) when high fluoride concentrations were detected over a period of 122 minutes.

The cause of the elevated fluoride level was identified as maintenance personnel incorrectly performing a task to remove residual crystals from the processing bench secondary containment. A buffered oxide etch solution consisting of hydrogen fluoride and ammonium fluoride is used at that processing bench, and the crystals (fluoride compounds) resulted from the evaporation of buffered oxide etch. The secondary containment drains directly to the sanitary sewer system, which triggered the alarm.

Wastewater Discharge Program personnel reported the excursion within 24 hours; however, a Notice of Violation was issued for failure to immediately report a slug discharge as required in the ABCWUA Sewer Use and Wastewater Control Ordinance. Corrective action measures have been implemented to ensure immediate notifications in the event of a future release.

Chapter 7. Ecology Program



Eastern collared lizard (*Crotaphytus collaris*)

OVERVIEW ■ Ecology Program personnel monitor biota as an element of the overall environmental monitoring process. Ecological data is collected on plants and wildlife to support documentation, land-use decisions, and ecological and wildlife awareness campaigns to ensure safe work environments and sustainable decision-making strategies. Ecology Program personnel help operations comply with wildlife regulations and laws by providing biological evaluations and surveys in support of site activities.

Ecology Program personnel at Sandia monitor and surveil flora and fauna to support operations. Activities are conducted on DOE-permitted or fee-owned land as follows:

- Collect biological inventory data to support site activities and maintain regulatory compliance while preserving ecological resources. Data are collected on plant, mammal, reptile, amphibian, bird, and insect species that currently inhabit DOE-controlled land. Data collected include information on species diversity, abundance, and land-use patterns. These data are used to support NEPA documentation, land-use decisions, and ecological and wildlife awareness campaigns, and to ensure safe work environments and sustainable decision-making strategies. Table 1-1 lists some of the more common plant and animal species identified at SNL/NM and KAFB.
- Collect data on plant and animal species to advance the understanding of on-site ecological processes.
- Collect biota contaminant data on an as needed basis in support of site projects and regulatory compliance. No data on wildlife has been collected with respect to contaminant radionuclides and metals since 2001, as no significantly elevated levels of radionuclides or metals have been observed in soil, sediment, or vegetation samples collected by Terrestrial Surveillance Program personnel (see Chapter 4 for details).
- Educate the Laboratories community regarding ecological conservation.
- Provide support when biological issues arise, i.e., injured wildlife, nesting birds, snake relocation, and/or other wildlife encounter concerns.

Biota monitoring was added to environmental monitoring in 1996, and includes annual monitoring and surveillance of vegetation, insects, herpetofauna (reptiles and amphibians), mammals, and birds. Ecological monitoring and surveillance occurs throughout the year for routine and nonroutine activities. Surveys of flora and fauna are conducted in six primary habitat types. Sampling locations and vegetation habitats are described in Table 7-1.

Table 7-1. Sampling locations with vegetation habitat

Sampling Location Site Name	Vegetation Habitat
Madera Canyon[a]	Closed canopy woodland
Madera Canyon Guzzler	Shrub, open woodland, and grassland
Optics Range east of Starfire[a]	Shrub, open woodland, and grassland
Range Wildlife Guzzler[a]	Shrub, open woodland, and grassland
Robotics Vehicle Range[a]	Grassland with sparse dwarf shrub
SC Dome	Shrub, open woodland, and grassland
Solar Tower at the National Solar Tower Test Facility[a]	Dwarf shrub grassland
TA-III[a]	Large shrub grassland
Tijeras Arroyo[a]	Disturbed arroyo shrub-large shrub
West and southwest of TA-III[a]	Large shrub grassland
Winch Site[a]	Shrub, open woodland, and grassland

[a]Denotes a bird survey location.
TA = technical area

7.1 Vegetation Surveillance

Vegetation is a key ecosystem component. It is involved in essential processes, including: cycling and regulating water, carbon, and nitrogen; converting solar energy into biomass and forming the base of all food chains; and releasing oxygen while sequestering carbon. Vegetation also serves the critical roles of (1) providing habitat and food for wildlife and (2) mitigating local climate extremes by influencing the earth's surface energy balance and the lower atmosphere. Humans derive indirect socioeconomic services, such as soil and watershed protection, and direct socioeconomic products, such as timber and food, from vegetation. Vegetation affects soil development over time, generally contributing to a more productive soil (CNVC 2013).

Ecosystem services are the natural resources and processes that occur in a well-functioning environment that benefit humans at no cost.

Vegetation monitoring enables better ecosystem understanding, and allows for correlations to be examined between transformations in a vegetation habitat and other ecosystem changes. Long-term monitoring can be used to observe changes in vegetation cover, composition, and structure due to natural or human-influenced events. Vegetation data collection across many years also enables improved planning and management of natural areas and facilitates goals for conservation, habitat management, and reclamation (Hockings 1998).

7.1.1 Vegetation Monitoring Strategy

In 2017, Ecology Program personnel began adoption of the national Assessment, Inventory, and Monitoring (AIM) vegetation strategy. Vegetation monitoring strategies were reviewed and evaluated in 2017, with the goal of implementing a long-term strategy that provides a landscape level, data-driven understanding of ecosystem conditions to better support management decisions, resources, and reporting.

AIM is a comprehensive and rigorous strategy that can serve many monitoring objectives and can also be aggregated for use across multiple scales of management. This strategy, published by the Bureau of Land Management in 2011 (BLM 2011), was developed to help land managers gather data in a consistent and efficient manner.

The AIM strategy provides a framework that includes methods, protocols, and principles to quantitatively assess the condition, trend, amount, location, and spatial pattern of natural resources on the nation's public lands. The approach is built on five key elements: a standardized set of core and contingent indicators for both terrestrial and aquatic ecosystems, a statistically valid sampling design, a structured implementation process, electronic data capture, and integration with remote sensing.

By using standardized monitoring indicators and methods for collecting vegetation data, land managers have a basis from which to (1) adaptively manage resources in order to achieve management goals and objectives, (2) improve understanding of the ecosystem, and (3) adjust monitoring efforts as necessary using a well-documented and consistent approach.

7.1.2 Vegetation Monitoring in 2017

In 2017, Ecology Program personnel attended an AIM training event, generated random sample plot locations, and completed a pilot plot.

7.2 Herpetofauna Surveillance

Snakes and lizards play principal roles in maintaining well-functioning natural ecosystems. Lizards, which are important prey species across all habitats at SNL/NM, are easily seen by predators due to diurnal activity patterns, are defenseless when captured, and are available in abundant numbers. Snakes are also important prey species, supporting medium- to larger-sized mammal and bird populations. Lizards prey on insects, thus moderating ant, grasshopper, termite, beetle, and spider populations. Snakes regulate small mammal populations, which help to control Hantavirus, a potentially lethal virus that is transmitted to humans through mouse excrement. Hantavirus control by snakes is a valuable ecosystem service for humans.

Herpetology is the study of reptiles and amphibians.
Herpetofauna are the reptiles and amphibians of a particular region, habitat, or geological period.

Amphibians largely eat invertebrates and play an important role in controlling insect populations. Tadpoles are often prey and are a significant part of nutrient cycling. Amphibians are very sensitive to changes in their environment and are widely regarded as ecological indicators.

7.2.1 Drift Fence Trapping

Many different techniques are available to detect the presence of reptiles and amphibians in the environment. In 2012, funnel traps (Figure 7-1) and pitfall traps along drift fence arrays were implemented to detect both reptiles and amphibians. A funnel trap consists of wire mesh boxes placed on either side of a 100-foot drift fence. The boxes have one-way entrances, whereby animals can easily enter the trap but not exit. This detection technique has proven successful in two of the grassland habitats at SNL/NM and continues to be used.



Figure 7-1. Temporarily closed funnel traps along a drift fence in a desert grassland habitat

Four drift fence trapping arrays were set up in 2017 at two different grassland sites: the Robotics Vehicle Range and the SC Dome. The SC Dome site was first incorporated in 2016. The traps are checked twice daily during the field season, and all animals are released.

7.2.2 Herpetofauna Survey Results

During the 2017 field season, 109 individuals from 19 different species were captured using funnel trapping: nine snake species, eight lizard species, and two amphibian species. Of those species, Eastern Collared Lizard (*Crotaphytus collaris*) and Striped Whipsnake (*Masticophis taeniatus*) were both captured for the first time in 2017 at the SC Dome site (Figure 7-2).



Figure 7-2. Eastern Collared Lizard (*Crotaphytus collaris*) (left) and Striped Whipsnake (*Masticophis taeniatus*) in funnel traps at the SC Dome site

Site captures by trapping period are shown on Table 7-2. The total number of captures, percent total capture per site, and percent total capture for each trapping period are presented.

Table 7-2. Herpetofauna site captures by trapping period, 2017

Species		Trapping Period by Location									
		5/25/17–6/9/17			7/10/17–7/21/17			8/14/17–8/24/17			
Common Name	Scientific Name	RVR	SCD	WTA3	RVR	SCD	WTA3	RVR	SCD	WTA3	Total
Lizard											
Chihuahuan Spotted Whiptail	*Aspidoscelis exsanguis*		3			11			1		15
Little Striped Whiptail	*Aspidoscelis inornata*			3			1				4
New Mexico Whiptail	*Aspidoscelis neomexicana*	14		3	10		3				30
Eastern Collared Lizard	*Crotaphytus collaris*		1								1
Lesser Earless Lizard	*Holbrookia maculata*										0
Horned Lizard spp.	*Phrynosoma spp.*										0
Short-horned Lizard	*Phrynosoma hernandesi*	1			1		3				5
Roundtail Horned Lizard	*Phrynosoma modestum*										0
Great Plains Skink	*Plestiodon obsoletus*			1			1			1	3
Southwestern Fence Lizard	*Sceloporus cowlesi*	2	1								3
Side-blotched Lizard	*Uta stansburiana*			2			3			3	8
Snake											
Glossy Snake	*Arizona elegans*			3			1				4
Western Diamondback Rattlesnake	*Crotalus atrox*								1		1
Prairie Rattlesnake	*Crotalus viridis*	1						1			2
Ringneck Snake	*Diadophis punctatus*										0
Hooknose Snake	*Gyalopion canum*										0
Western Hognose Snake	*Heterodon nasicus*			1							1
Coachwhip Snake	*Masticophus flagellum*	4		2	2					1	9
Striped Whipsnake	*Masticophis taeniatus*								3		3
Gopher Snake	*Pituophis catenifer*	2					2				4
Long-nosed Snake	*Rhinocheilus lecontei*	1		1	1		1	1			5
Mountain Patchnose Snake	*Salvadora grahamiae*					1			1		2
Desert Massasauga	*Sistrurus catenatus*										0
Amphibian											
Couch's Spadefoot Toad	*Scaphiopus couchii*				1						1
Mexican Spadefoot Toad	*Spea multiplicata*					6			2		8
Total		**25**	**5**	**16**	**15**	**18**	**15**	**2**	**8**	**5**	**109**
Percent Total Capture Per Site		**59.5%**	**16.1%**	**44.4%**	**35.7%**	**58.1%**	**41.7%**	**4.8%**	**25.8%**	**13.9%**	
Percent Total Capture		**42.20%**			**44.04%**			**13.76%**			

RVR = Robotics Vehicle Range SCD = SC Dome WTA3 = west of Technical Area III

7.3 Remote Camera Surveillance

Ecology Program personnel have conducted passive surveillance for a diversity of wildlife in various habitats since 2005.

7.3.1 Remote Camera Stations

Wildlife water guzzlers, commonly used throughout the arid western United States, capture and store precipitation (rainfall and snowfall) for use by wildlife. Wildlife may rely on these artificial water sources to help meet their biologic and metabolic needs during times of water stress (Krausman et al. 2006). Two guzzlers are maintained on DOE-permitted or fee-owned land: the Madera Canyon Guzzler (MCG) in a closed canopy woodland and the Range Wildlife Guzzler (Range) in a shrub, open woodland, and grassland habitat. The guzzlers consist of a catchment system, a storage tank, and a ground-level open-water trough.

Automated cameras have been maintained at the two wildlife guzzlers since July 2005. The motion-activated cameras provide a safe, passive, and cost-effective method of sampling animal populations with little to no effect on the individual animals. The cameras record wildlife that are using the water sources day and night year-round, documenting the presence, abundance, diversity, and activity of medium and large mammals. The cameras also record birds, reptiles, and amphibians, thus enhancing understanding of these species.

7.3.2 Madera Canyon Guzzler Results

In 2017, 35 different species were captured in images at the MCG (Table 7-3). Camera sensitivity settings were adjusted to help eliminate the majority of small bird images, as other more effective methods are employed to census and survey for birds (including bird banding and surveys using transects). This allowed cameras to capture guzzler use by medium and large wildlife, including mammals, raptors, and other large birds.

Table 7-3. Madera Canyon Guzzler species occurrences, 2017

Species		2017 Occurrences	Months Occurred
Common Name	**Scientific Name**	**Total**	**Total**
American Robin	*Turdus migratorius*	33	3
American black bear	*Ursus americanus*	37	3
Black-headed Grosbeak	*Pheucticus melanocephalus*	21	3
black-tailed jackrabbit	*Lepus californicus*	3	1
bobcat	*Felis rufus*	11	3
Canyon Towhee	*Pipilo fuscus*	3	2
Cassin's Finch	*Carpodacus cassinii*	3	2
Common Raven	*Corvus corax*	141	5
Cooper's Hawk	*Accipiter cooperii*	22	4
cougar	*Felis concolor*	157	8
coyote	*Canus latrans*	19	4
Dark-eyed Junco	*Junco hyemalis*	42	3
gray fox	*Urocyon cineroargentus*	489	8
Great Horned Owl	*Bubo virginianus*	3	1
American hog-nosed skunk	*Conepatus leuconotus*	1	1
House Finch	*Haemorhous mexicanus*	16	5

Table continued on next page.

Table 7.3. Madera Canyon Guzzler species occurrences, 2017 (continued)

Species		2017 Occurrences	Months Occurred
Common Name	**Scientific Name**	**Total**	**Total**
Lesser Goldfinch	*Carduelis psaltria*	3	2
Lark Sparrow	*Chondestes grammacus*	3	1
Mountain Bluebird	*Sialia currucoides*	3	1
Mourning Dove	*Zenaida macroura*	111	4
mule deer	*Odocoileus heminonus*	938	11
Northern Mockingbird	*Mimus polyglottis*	3	1
Pinyon Jay	*Gymnorhinus cyanocaphalus*	9	2
Red-shafted Flicker	*Colaptes auratus*	38	3
Red-tailed Hawk	*Buteo jamaicensis*	22	2
rock squirrel	*Spermophilus variegatus*	4	1
Sage Thrasher	*Oreoscoptes montanus*	8	2
striped skunk	*Mephitis*	8	2
Townsend's Solitaire	*Myadestes townsendi*	3	1
Turkey Vulture	*Cathartes aura*	60	3
Western Bluebird	*Sialia mexicana*	22	3
Western Kingbird	*Tyrannus verticalis*	8	2
Woodhouse's Scrub-Jay	*Aphelocoma woodhouseii*	48	8
White-crowned Sparrow	*Zonotrichia albicollis*	11	1
White-winged Dove	*Zenaida asiatica*	68	4

An American hog-nosed skunk (*Conepatus leuconotus*) was recorded in 2017 at the MCG. This species has not been recorded since 2007. Only one image was captured, but it clearly shows the hognose that gives them their name (Figure 7-3). A solitary species, hog-nosed skunks are thought to only come together when breeding (February and March), which is most likely why the image shows only one. They are known to occur in a wide range of habitat types in South and North America, which is one reason why they are considered a least concern species for federal listing (Dohring 2002; Helgen 2016). Additionally, a Cassin's Finch visited the MCG, the first one to do so since 2012.



Figure 7-3. An American hog-nosed skunk (*Conepatus leuconotus*) at the Madera Canyon Guzzler

Since June 2005, 63 species have been recorded at the MCG. Of these, seven species have been documented in each calendar year since monitoring with remote-sensor cameras began. These include: American black bear (*Ursus americanus*), Common Raven (*Corvus corax*), coyote (*Canus latrans*), gray fox (*Urocyon cineroargentus*), Mourning Dove (*Zenaida macroura*), mule deer (*Odocoileus hemionus*), and Red-shafted Flicker (*Colaptes auratus*). An additional seven species have been documented at the MCG

that have not been recorded using the Range. These included Audubon's Warbler (*Dendroica audubon*i), Brown-headed Cowbird (*Molothorus ater*), Curve-billed Thrasher (*Toxostoma curvirostre*), Lark Sparrow (*Chondestes grammacus*), Turkey Vulture (*Cathartes aura*), Wild Turkey (*Meleagris gallopavo*), and white-tailed deer (*Odocoileus virginianus*).

Black bears (*Ursus americanus*) have been documented at the MCG each year since monitoring began in 2005. They appear on average in 80 images (events) per year. They appear most often from March through September, which is their active season before hibernation. In 2017, black bears were recorded in 37 images, representing 12 events, which is well below the 13-year average. Six different bears were recorded at the MCG in 2017. A group of three bears were captured visiting the MCG in September (Figure 7-4). No cubs were recorded visiting the guzzler. Studies have been done on recruitment based on food availability, the major limiting factor in cub survival and sow reproduction (Costello et al. 2003). Sows only breed every other year, and will not deposit fertilized eggs if conditions are unfavorable.



Figure 7-4. Black bears (*Ursus americanus*) at the Madera Canyon Guzzler

Mountain lions (*Puma concolor*) appeared in a total of 157 images over eight months. This is well above the average of 17 images per year between 2005 and 2017. Most of the images were from two different individuals (Figure 7-5). One of the individuals exhibited a tag on the right ear. Mountain lions can breed during any month of the year, but typically most births of cubs come between May and October. Because there is such a wide range in which breeding and birthing occurs, it is difficult to determine with certainty the age of mountain lions.



Figure 7-5. A mountain lion (*Puma concolor*) at the Madera Canyon Guzzler

Mule deer (*Odocoileus hemionus*) was the most recorded species at the MCG in 2017, with a total of 938 images. This is much lower than previous years. In 2017, there was an increase in human activity at the MCG, which could have played a role in the lower number of visits. The deer reached their peak

abundance in February with a total of 241 images; normally their peak would occur just before the monsoon season. In 2017, the majority of images came from individuals and small groups of does and bucks (Figure 7-6).



Figure 7-6. Mule deer (*Odocoileus hemionus*) at the Madera Canyon Guzzler

7.3.3 Range Canyon Guzzler Results

In 2017, 16 species were documented using the Range Canyon Guzzler (Table 7-4), which is lower than in previous years. Again, the lower numbers of species documented is likely the result of continuing to use less-sensitive camera settings, which target medium- and large-sized wildlife to the exclusion of smaller species. Coyotes, gray fox, and mule deer continuously visited the guzzler throughout the year, while other species tended to appear in the season leading up to, and sometime after, monsoonal rains.

Table 7-4. Range Canyon Guzzler species occurrences, 2017

Species		2017 Occurrences	Months Occurred
Common Name	**Scientific Name**	**Total**	**Total**
American Robin	*Turdus migratorius*	2	1
bobcat	*Felis rufus*	4	2
Common Raven	*Corvus corvax*	3	1
Cooper's Hawk	*Accipiter cooperi*	1	1
mountain lion	*Puma concolor*	7	3
coyote	*Canis latrans*	615	12
gray fox	*Urocyon cineroargentus*	93	10
House Finch	*Haemorhous mexicanus*	1	1
Mountain Chickadee	*Poecile gambeli*	1	1
Mourning Dove	*Zenaida macroura*	38	4
mule deer	*Odocoileus heminonus*	6,534	12
Northern Mockingbird	*Mimus polyglottis*	2	1
Toad species	*Bufo spp.*	50	3
Townsend's Solitaire	*Myadestes townsendi*	2	1
Western Bluebird	*Sialia mexicana*	5	2
Woodhouse's Scrub-Jay	*Aphelocoma woodhouseii*	3	2

Since monitoring began at the Range Canyon Guzzler, 66 species have been documented in remote-sensor camera images. Several species were not identified in images, including small terrestrial mammals, bats, and toads. This brings the total number of species documented at the Range Canyon Guzzler to 72.

Two species have been observed in images from the Range Canyon Guzzler in all years of monitoring: gray fox (*Urocyon cineroargentus*) and mule deer (*Odocoileus hemionus*). As many as 20 species have been documented in a single calendar year. In addition, 18 species have been documented at the Range Canyon Guzzler that have not been recorded at the MCG. These include American badger (*Taxidea taxus*), ringtail (*Bassariscus astutus*), western spotted skunk (*Spilogale gracilis*), Texas antelope squirrel (*Ammospermophilus interpres*), and Scaled Quail (*Callipepla squamata*) among others.

Mule deer (*Odocoileus hemionus*) were observed using the Range Canyon Guzzler in every month of 2017. A total of 6,534 images, representing 2,178 events, were captured of mule deer, making them the species most often recorded during the year (Figure 7-7). Coyote (*Canis latrans*) were also recorded in every month of 2017 and appeared in 615 images representing 205 events. Coyotes were the second-most abundant mammal species documented at the Range Canyon Guzzler (Tokar 2001). A sole gray fox was recorded at the Range Canyon Guzzler during ten months of 2017; this is the same individual that visited during five months in 2016. All other recorded species were seen less frequently.



Figure 7-7. A mule deer (*Odocoileus hemionus*) at the Range Canyon Guzzler

December had the most captured images of mule deer, with a total of 2,024. November was next with 1,358 total captured images. In December and November 2016, there was a combined total of 1,831 images of mule deer. The increase in presence for the month of December is most likely due to the lack of winter precipitation.

Throughout the year, a pair of coyotes were making frequent visits to the Range Canyon Guzzler (Figure 7-8). Their relationship is most likely a young female and a parent, as young males tend to disperse six to nine months after first emerging from the den (Tokar 2001). This may initiate the formation of a pack, although this is more common in wolves than coyotes. Another reason for this delayed dispersal can be linked to the size of primary prey being taken (Gese 1988; Bowen 1981). In winter when more ungulates tend to make up more of the coyote diet, forming a pack is essential for hunting larger prey.



Figure 7-8. A pair of coyotes (Canis latrans) were documented at the Range Canyon Guzzler throughout 2017

There were four images of a bobcat (*Felis rufus*) at the Range Canyon Guzzler in 2017. This is fewer than the number of images captured in 2016 (22 total). It appears to be the same individual visiting the Range Canyon Guzzler (Figure 7-9).



Figure 7-9. A bobcat (*Felis rufus*) at the Range Canyon Guzzler

7.4 Avian Surveillance

Long-term monitoring of breeding and wintering birds can reveal population trends and dynamics. Data collected aids land-use decisions and provides documentation regarding bird population trends regionally and continentally.

7.4.1 Bird Surveys Using Transects

In 2017, bird surveys were conducted during the breeding season (May through June) and in the winter months (January through March) to measure diversity and abundance of birds, and to monitor trends and changes over time associated with particular species and various habitats.

Each survey transect consists of 12 points, and each point is surveyed for five-minute periods. Each transect is surveyed three times during both the winter bird surveys (WBSs) and the breeding bird surveys. Surveys were conducted at Madera Canyon, the Optics Range, the Robotics Vehicle Range, the Solar Tower, TA III, Tijeras Arroyo, west of TA-III, and the Winch Site.

Winter Bird Transect Survey Results

A total of 50 bird species were encountered during the 2016–2017 WBS season. The number of species encountered at each site varied from 4 to 26. Table 7-5 presents the species, scientific name, and numbers of individuals detected by transect on WBS in 2017.

Table 7-5. Winter bird survey species detections, 2017

Species		Total
Common Name	Scientific Name	
Scaled Quail	*Callipepla squamata*	8
Eurasian Collared-Dove	*Streptopelia decaocto*	1
White-winged Dove	*Zenaida asiatica*	4
Mourning Dove	*Zenaida macroura*	4
Greater Roadrunner	*Geococcyx californianus*	1
Sandhill Crane	*Antigone canadensis*	1
Northern Harrier	*Circus hudsonius*	2
Red-tailed Hawk	*Buteo jamaicensis*	2
Williamson's Sapsucker	*Sphyrapicus thyroideus*	1
Ladder-backed Woodpecker	*Picoides scalaris*	3
Hairy Woodpecker	*Picoides villosus*	9
Northern Flicker	*Colaptes auratus*	12
American Kestrel	*Falco sparverius*	5
Prairie Falcon	*Falco mexicanus*	3
Say's Phoebe	*Sayornis saya*	4
Loggerhead Shrike	*Lanius ludovicianus*	7
Pinyon Jay	*Gymnorhinus cyanocephalus*	45
Woodhouse's Scrub-Jay	*Aphelocoma woodhouseii*	33
Common Raven	*Corvus corax*	32
Raven spp.	*Corvus spp.*	1
Horned Lark	*Eremophila alpestris*	927
Mountain Chickadee	*Poecile gambeli*	11
Juniper Titmouse	*Baeolophus ridgwayi*	33
Bushtit	*Psaltriparus minimus*	52
Red-breasted Nuthatch	*Sitta canadensis*	5
White-breasted Nuthatch	*Sitta carolinensis*	4
Rock Wren	*Salpinctes obsoletus*	1
Bewicks's Wren	*Thryomanes bewickii*	31
Cactus Wren	*Campylorhynchus brunneicapillus*	13
Ruby-crowned Kinglet	*Regulus calendula*	1
Western Bluebird	*Sialia mexicana*	30
Mountain Bluebird	*Sialia currucoides*	234
Townsend's Solitaire	*Myadestes townsendi*	31
American Robin	*Turdus migratorius*	78
Curve-billed Thrasher	*Toxostoma curvirostre*	1
Crissal Thrasher	*Toxostoma crissale*	16

Table continued on next page.

Table 7-5. Winter bird survey species detections, 2017 (continued)

Species		Total
Common Name	Scientific Name	
Sage Thrasher	*Oreoscoptes montanus*	6
House Finch	*Haemorhous mexicanus*	117
Chestnut-collared Longspur	*Calcarius ornatus*	5
Spotted Towhee	*Pipilo maculatus*	27
Canyon Towhee	*Melozone fusca*	11
Chipping Sparrow	*Spizella passerina*	1
Sagebrush Sparrow	*Artemisiospiza nevadensis*	6
Savannah Sparrow	*Passerculus sandwichensis*	3
Song Sparrow	*Melospiza melodia*	7
Lincoln's Sparrow	*Melospiza lincolnii*	4
White-crowned Sparrow	*Zonotrichia leucophrys*	51
Dark-eyed Junco	*Junco hyemalis*	146
Eastern Meadowlark	*Sturnella magna*	25
Western Meadowlark	*Sturnella neglecta*	37

NOTE: Species are listed by taxonomic classification.

Breeding Bird Transect Survey Results

In 2017, 75 bird species were seen or heard while conducting the breeding bird surveys. The number of species encountered at each site ranged from 13 to 71. Table 7-6 presents the species, scientific name, and numbers of individuals detected by transect on breeding bird surveys in 2017.

Table 7-6. Breeding bird survey species detections, 2017

Species		Total
Common Name	Scientific Name	
Scaled Quail	*Callipepla squamata*	13
Wild Turkey	*Meleagris gallopavo*	2
Eurasian Collared-Dove	*Streptopelia decaocto*	2
White-winged Dove	*Zenaida asiatica*	1
Mourning Dove	*Zenaida macroura*	57
Greater Roadrunner	*Geococcyx californianus*	2
Black-chinned Hummingbird	*Archilochus alexandri*	8
Broad-tailed Hummingbird	*Selasphorus platycercus*	3
Cooper's Hawk	*Accipiter cooperii*	3
Swainson's Hawk	*Buteo swainsoni*	7
Red-tailed Hawk	*Buteo jamaicensis*	5
Burrowing Owl	*Athene cunicularia*	1
Ladder-backed Woodpecker	*Picoides scalaris*	7
Hairy Woodpecker	*Picoides villosus*	8
Northern Flicker	*Colaptes auratus*	3
American Kestrel	*Falco sparverius*	4
Peregrine Falcon	*Falco peregrinus*	2
Western Wood-Pewee	*Contopus sordidulus*	14
Gray Flycatcher	*Empidonax wrightii*	16
Say's Phoebe	*Sayornis saya*	23

Table continued on next page.

Table 7-6. Breeding bird survey species detections, 2017 (continued)

Species		Total
Common Name	**Scientific Name**	
Ash-throated Flycatcher	*Myiarchus cinerascens*	45
Cassin's Kingbird	*Tyrannus vociferans*	11
Western Kingbird	*Tyrannus verticalis*	39
Loggerhead Shrike	*Lanius ludovicianus*	5
Gray Vireo	*Vireo vicinior*	26
Plumbeous Vireo	*Vireo plumbeus*	21
Pinyon Jay	*Gymnorhinus cyanocephalus*	2
Woodhouses's Scrub Jay	*Aphelocoma woodhouseii*	35
Chihuahuan Raven	*Corvus cryptoleucus*	3
Common Raven	*Corvus corax*	7
Raven spp.	*Corvus spp.*	1
Horned Lark	*Eremophila alpestris*	183
Violet-green Swallow	*Tachycineta thalassina*	10
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	1
Cliff Swallow	*Petrochelidon pyrrhonota*	6
Barn Swallow	*Hirundo rustica*	13
Mountain Chickadee	*Poecile gambeli*	11
Juniper Titmouse	*Baeolophus ridgwayi*	40
Bushtit	*Psaltriparus minimus*	60
Red-breasted Nuthatch	*Sitta canadensis*	1
White-breasted Nuthatch	*Sitta carolinensis*	1
Rock Wren	*Salpinctes obsoletus*	18
Bewick's Wren	*Thryomanes bewickii*	33
Cactus Wren	*Campylorhynchus brunneicapillus*	13
Blue-gray Gnatcatcher	*Polioptila caerulea*	7
American Robin	*Turdus migratorius*	4
Curve-billed Thrasher	*Toxostoma curvirostre*	7
Crissal Thrasher	*Toxostoma crissale*	3
Northern Mockingbird	*Mimus polyglottos*	110
Evening Grosbeak	*Coccothraustes vespertinus*	1
House Finch	*Haemorhous mexicanus*	131
Lesser Goldfinch	*Spinus psaltria*	5
Green-tailed Towhee	*Pipilo chlorurus*	1
Spotted Towhee	*Pipilo maculatus*	57
Rufous-crowned Sparrow	*Aimophila ruficeps*	8
Canyon Towhee	*Melozone fusca*	5
Cassin's Sparrow	*Peucaea cassinii*	100
Chipping Sparrow	*Spizella passerina*	8
Black-chinned Sparrow	*Spizella atrogularis*	25
Lark Sparrow	*Chondestes grammacus*	21
Black-throated Sparrow	*Amphispiza bilineata*	77
White-crowned Sparrow	*Zonotrichia leucophrys*	1
Eastern Meadowlark	*Sturnella magna*	55

Table continued on next page.

Table 7-6. Breeding bird survey species detections, 2017 (continued)

Species		Total
Common Name	Scientific Name	
Western Meadowlark	*Sturnella neglecta*	45
Bullock's Oriole	*Icterus bullockii*	6
Scott's Oriole	*Icterus parisorum*	13
Brown-headed Cowbird	*Molothrus ater*	17
MacGillivray's Warbler	*Geothlypis tolmiei*	1
Yellow-rumped Warbler	*Setophaga coronata*	2
Black-throated Gray Warbler	*Setophaga nigrescens*	22
Wilson's Warbler	*Cardellina pusilla*	1
Hepatic Tanager	*Piranga flava*	1
Western Tanager	*Piranga ludoviciana*	3
Black-headed Grosbeak	*Pheucticus melanocephalus*	36
Blue Grosbeak	*Passerina caerulea*	14

NOTE: Species are listed by taxonomic classification.

7.4.2 Bird Banding Monitoring

In 2003, Ecology Program personnel implemented two projects that use bird banding to monitor bird diversity and abundance: (1) the Monitoring Avian Productivity and Survivorship (MAPS) protocol (DeSante et al. 2010), as developed by the Institute for Bird Populations, for banding birds, and (2) fall bird migration. Bird banding is a useful tool for investigating population dynamics, survival, productivity, dispersal timing, migration timing, and other ecological and biological aspects of bird populations. In order to make comparisons between seasons, days, and net sites, personnel calculate birds captured per net hour using marked or banded birds. For this, the number of birds captured in a day or season is divided by the number of total net hours in that period.

MAPS Monitoring Results

The MAPS Program seeks to derive population and productivity trends for nesting birds throughout North America through constant-effort mist netting during the breeding season (May through mid-August). The overall Institute for Bird Population MAPS data, collected since 1989, has helped ornithologists better understand population trends, dynamics, sex ratios, and productivity for over 200 species of breeding birds. This information provides natural resource managers with conservation and ecological aspects for local species. MAPS banding sessions have been conducted annually since 2003 at SNL/NM.

A total of 127 individual birds representing 29 species were captured and released in 2017. Of the 127 birds, 109 were newly banded, 14 were banded previously (repeats), and 4 were released without being banded. The number of birds captured per net hour for the MAPS season was 0.27 (471.6 total net hours). For 2017, the three most abundant captured species were: Bushtit (23), Black-throated Sparrow (17), and Northern Mockingbird (14).

The 2017 capture rate (27.0 birds per 100 net hours) was above the average rate in previous years of 21.2 birds per 100 net hours. However, the MAPS season analysis of total birds per net hour over the past 15 years continues to show an overall downward trend (Figure 7-10).

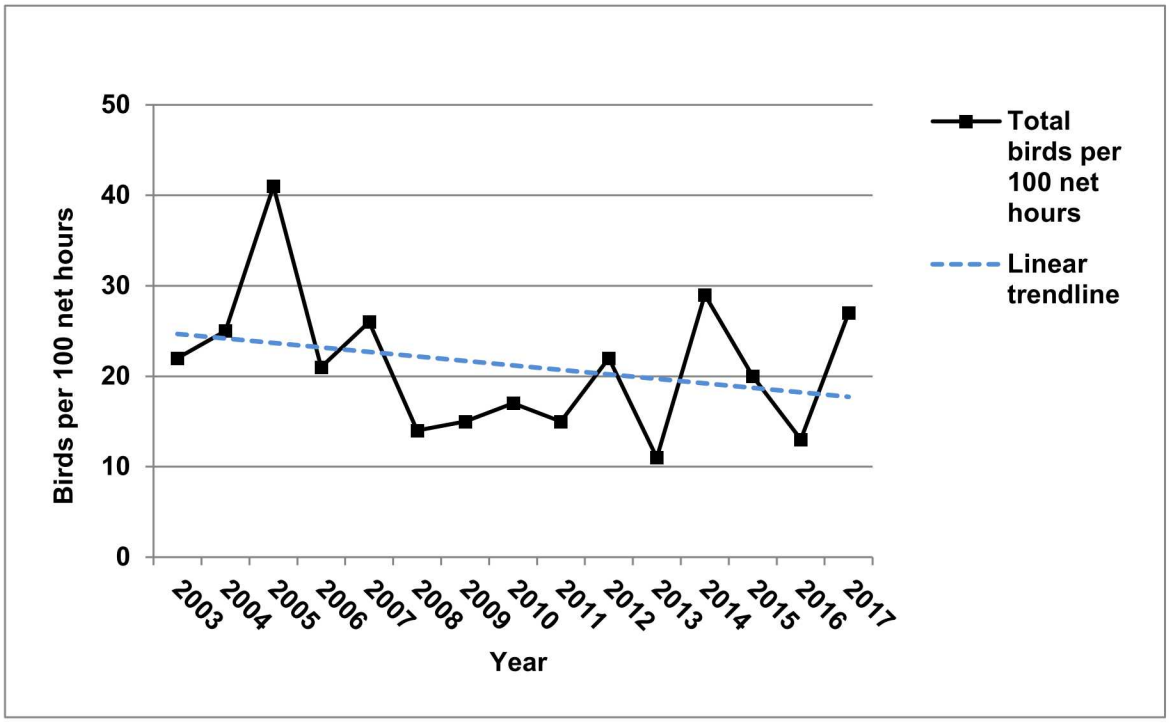


Figure 7-10. Linear trend of all birds captured during the MAPS monitoring project, 2003–2017

Fall Migration Monitoring

Fall migration monitoring has been conducted annually since 2003. Ecology Program personnel monitor birds weekly from early August through late October. These annual monitoring activities are an effort to document breeding bird productivity and investigate fall migration patterns of songbirds in a shrub, open woodland, and grassland habitat.

During the 2017 fall migration monitoring, a total of 309 birds were captured, representing 45 species. One of these species was new to this project: Lazuli Bunting (*Passerina amoena*). A two-year-old male was captured (Figure 7-11). Of the 309 birds, 276 were newly banded, 26 were banded previously (repeats), and 7 were released without being banded. The average number of birds banded per net hour was 0.44 (697.1 total net hour), or 44 birds per 100 net hours. The average number of birds banded over the 12-year period was 0.27 birds per net hour, or 27 birds per 100 net hours.



Figure 7-11. Lazuli Bunting (*Passerina amoena*)

The three most abundant captured species during the fall migration monitoring were: Dark-eyed Junco (49), Chipping Sparrow (31), and Bushtit (23).

The fall migration monitoring shows a downward trend for total birds per 100 net hours from 2003 through 2017 (Figure 7-12), even though the past several seasons' capture rates were above average.

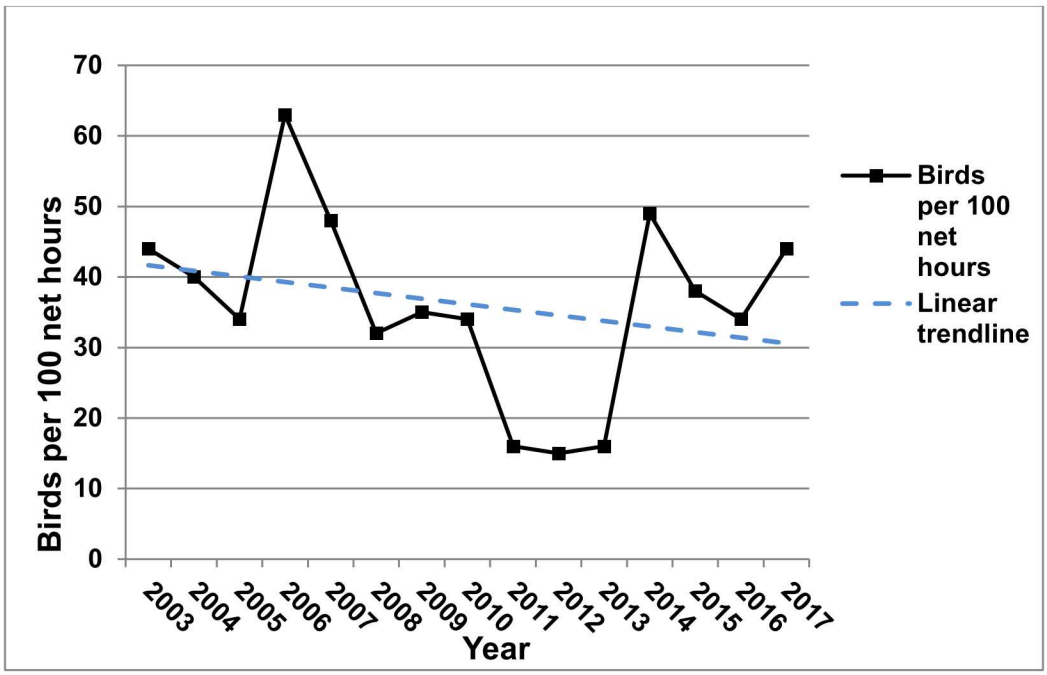


Figure 7-12. Linear trend of all birds captured during the fall migration monitoring project, 2003–2017

7.5 Eco Ticket System for Monitoring Wildlife

In 2013, Ecology Program personnel launched the Eco Ticket system. This is a web-based software program that helps to provide prompt notification and timely communication with personnel who have issues or concerns with wildlife they encounter. Project personnel who require biological surveys before starting outdoor work activities also use the system. Eco Ticket is the best way to track encounters with wildlife in the workplace and work toward negotiating ways of appropriately managing wildlife within high report areas, which coincides the Ecology Program mission.

Use of this system by personnel has been increasing steadily. Facilities and Emergency Management Center personnel use the system most frequently, supporting work orders that require biological surveys. Individuals most commonly submit Eco Ticket requests for assistance with wildlife issues, which may include snakes, bird's nests, injured or trapped wildlife, and dead wildlife. Sorting and analyzing the ticket types adds to understanding the dynamics of wildlife issues at SNL/NM.

In 2017, there was a continued increase in reported mammal sightings. Mammals frequently reported through the Eco Ticket system include desert cottontails (*Sylvilagus audubonii*), striped skunks (*Mephitis mephitis*), and raccoons (*Procyon lotor*). Badgers (*Taxidea taxus*), coyotes (*Canis latrans*), black-tailed jack rabbits (*Lepus californicus*), and bobcats (*Felis rufus*) have been reported in smaller quantities. Most of the mammals reported were within TA-I, TA-II, and TA-IV.

Many of the mammals reported are very resourceful and highly adaptable, so, when paired with available food, shelter, and water resources, there is no reason for these animals to move away from urban life (Dell'Amore 2016). Manipulating their habitat is the best means of controlling their presence in an urban setting (Cecil 2016). Other wildlife reported include reptiles, amphibians, a plethora of bird species, and some insects, all of which are monitored through the Eco Ticket system.

7.5.1 Eco Ticket Responses

Ecology Program personnel respond to Eco Ticket system requests in various ways, which are discussed below.

Work Orders and Projects

Before any outdoor work is initiated, Ecology Program personnel survey the work site. The primary reason for these surveys is to identify birds protected under the MBTA. The surveys also search for signs of other federal and state protected wildlife.

Wildlife Response

For Eco Tickets pertaining to a wildlife issue, Ecology Program personnel will call the individual who placed the ticket to gather information. Requested information may include the type of animal, the location, the time last seen, and any pertinent safety information. For nonvenomous wildlife outside of buildings, Ecology Program personnel typically leave the animal alone unless it is trapped, sick, or injured. Venomous snakes are always relocated whether inside or outside due to the risk they pose to personnel. If an animal is injured, it is taken to wildlife rescue. Wildlife trapped inside a building are captured and then released in an appropriate habitat.

If an animal is injured, it is taken to wildlife rescue. Wildlife trapped inside a building are captured and then released in an appropriate habitat.

Each Eco Ticket is archived into a database that can be analyzed to gain insight into the locations where various animals occur most frequently and ways to properly manage for their safety and the safety of the workforce.

7.5.2 Results

In 2017, Ecology Program personnel responded to 505 Eco Tickets. Table 7-7 provides results for each ticket type placed for the last five years (2013 to 2017).

Table 7-7. Eco Tickets by number and type, 2013–2017

Year	Birds Nest	Dead Wildlife	Facilities Work Order	Injured Wildlife	NEPA Request	Other	Snake	Trapped Wildlife	Annual Total
2013	—	—	12	—	5	—	—	—	17
2014	37	29	150	6	88	36	38	17	401
2015	21	42	256	16	83	42	75	25	560
2016	14	40	139	12	86	35	85	19	430
2017	24	44	146	7	105	86	68	25	505
Total	**96**	**155**	**703**	**41**	**367**	**199**	**266**	**86**	**1,913**

Note: Shaded cells denote the maximum number of tickets received in each category.
— = wildlife not encountered; no Eco Ticket submitted
NEPA = National Environmental Policy Act

Reptiles and Amphibians

Reptiles, specifically snakes (venomous and nonvenomous), are frequently encountered at SNL/NM, especially when the weather begins to warm. Eco Tickets for snake species from 2014 to 2017 are presented in Table 7-8. The two species most often reported are Prairie Rattlesnakes (*Crotalus viridis*) and Gopher Snakes (*Pituophis catenifer*).

Table 7-8. Eco Tickets for snake species, 2014–2017

Species		Year				Species Total
Common Name	Scientific Name	2014	2015	2016	2017	
Gopher Snake	*Pituophis catenifer*	5	28	23	22	78
Coachwhip	*Masticophis flagellum*	1	1	1	—	3
Desert Massasauga	*Sistrurus catenatus*	—	1	1	4	6
Glossy Snake	*Arizona elegans*	—	4	—	—	4
Plains Black-headed Snake	*Tantilla nigerceps*	1	—	—	—	1
Prairie Rattlesnake	*Crotalus viridis*	14	34	41	30	119
Western Hognose Snake	*Heterodon nasicus*	—	—	—	1	1
Western Diamondback Rattlesnake	*Crotalus atrox*	2	2	1	2	7
Western Garter Snake	*Thamnophis elegans*	—	1	—	—	1

— = wildlife not encountered; no Eco Ticket submitted

Mammals

In 2017, there were 32 reported skunk sightings throughout the year, the majority of which occurred in the early morning. There were only two sightings in 2014 and 2015 combined, and seven in 2016. However, because of their defensive behaviors, reports of skunks in urban areas have been known to be out of proportion to their urban densities (Bateman and Fleming 2012).

For raccoons (*Procyon lotor*), sightings remained close to the same as for 2016. Seven individuals were reported in 2017 between March and October. Only two were reported in 2015. Food and water availability within urban habitats provide a favorable living environment (Bateman and Fleming, 2012), which can cause these animals to seek shelter close to humans.

Desert cottontails are common along edge habitat at SNL/NM. Unfortunately, most of the rabbits encountered are deceased, likely due to their presence along roadways. Thirteen rabbits were reported in 2017, nine of which were deceased or died from injuries shortly after personnel arrived. In 2016, there was also a high proportion of deceased rabbits.

In 2017, a North American porcupine (*Erithizon dorsatum*) was trapped between fences. In 2017, a bobcat was reported for the first time through the Eco Ticket process, with seven submitted sightings between July and November.

Birds

Bird species make up the majority of wildlife encountered at SNL/NM. Much of the biodiversity is associated with biological survey assessments; however, a variety of bird species are reported trapped within buildings. In 2017, 60 percent of all reported trapped wildlife were birds. Having the lowest number for the past four years, there were 73 total recorded bird Eco Tickets in 2017 versus 222 in 2014, 225 in 2015, and 80 in 2016. Many of the dead wildlife tickets are also birds, at approximately 45 percent in 2017. While retrieving deceased animals, personnel try to determine the cause of death, which is often window strikes for avian samples. In 2017, 47 percent of all bird deaths were likely associated with window strikes. This is an increase from 2016, where only 37percent of deaths were attributed to window strikes.

7.6 Ecological Restoration

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed; it is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability (SER 2004).

Ecology Program personnel have been providing ecological restoration guidance and support to a variety of projects since 2009. The successful recovery of degraded lands in central New Mexico is extremely challenging. SNL/NM resides in an arid climate that receives less than 9 inches of precipitation per year, experiences drying winds in the spring, and has hot summers and cold winters.

Biota is the animal and plant life of a given region; *biotic* is relating to or resulting from living organisms.

Prior to Ecology Program personnel becoming involved with the restoration of degraded sites, reseeding efforts were generally unsuccessful. The Ecology Program shifted the approach at degraded sites, now focusing on ecological restoration as the desired outcome. The reestablishment of native vegetation is the first step in the restoration process. A foundation of this ecologically based approach is the recognition that all biotic components need to be assessed and addressed to successfully reestablish the historic native community of each site. Biotic characteristics such as the absence or presence of healthy, living soils capable of supporting a native plant community determine the next steps in the restoration process. The process includes selecting the appropriate plant species and density, using proper implementation methods, providing seed protection, and eliminating or significantly reducing site competition from weeds and their seeds in the soil bank. Identifying appropriate project goals and applying approaches best suited to the degree of site impairment are part of the essential framework for each restoration project.

7.6.1 Ecological Restoration Support Role

Ecology Program personnel provide support on projects to improve the quality of degraded land. Ecological restoration projects are most often related to construction activities, commonly in support of the Stormwater Pollution Prevention Plan development process. When possible, a biological evaluation of the area is conducted to document the native biological community prior to beginning activities that will disturb the earth. If a predisturbance evaluation of the area is not possible, or if the area has existing disturbance, a reference ecosystem serves as a guide for planning the restoration work. The full scope of disturbance effects, either existing or planned, the anticipated final state of the site, and any other relevant factors are also assessed in planning the restoration work. Ecology Program personnel develop a detailed written restoration plan, or specification, for the project. This is provided to Facilities personnel, who oversee work contracts. Ecology Program personnel continue to provide support and guidance throughout the restoration project, including conducting post-restoration site monitoring and biological evaluations of the recovery.

A Certified Ecological Restoration Practitioner provides ecological restoration support at SNL/NM. This certification is awarded by Society for Ecological Restoration to practitioners who have met the society's rigorous standards of knowledge and experience.

In 2017, Ecology Program personnel supported the following ecological restoration projects:

- Brayton Gas Line Seeding Project—The restoration plan was redeveloped and fully implemented for this project; native seedlings became established across the 1-acre area in 2017.
- Inactive Test Structure Inventory Project Site 47—Preconstruction and post-construction site evaluations were conducted. A restoration plan was developed and implemented. Native seedlings became established across the approximately 1-acre area in 2017.

- Inactive Test Structure Inventory Project Site 59—Preconstruction and post-construction site evaluations were conducted. A restoration plan was developed and implemented. Native seedlings became established across the approximately 1-acre area in 2017.
- Inactive Test Structure Inventory Project Sites 63A, 63B, and 93B—Restoration evaluations were conducted.
- Inactive Test Structure Inventory Project Site 66—A preconstruction site evaluation was conducted. A restoration plan was developed and implemented for the seven locations within the project area, including post-seeding site controls. Site monitoring is planned for 2018.
- Inactive Test Structure Inventory Project Site 70—A post-construction site evaluation was conducted, and a restoration plan was developed.
- Inactive Test Structure Inventory Project Site 82—A preconstruction site evaluation was conducted; specific issues were identified for each of the 26 construction locations and the associated non-road construction vehicle paths within the project area. Post-construction site conditions were evaluated and a restoration plan developed, specifying three different treatment plans to be implemented across the 26 locations and vehicle paths. The restoration plan was fully implemented in June 2017. Native seedlings became well developed across all areas by October 2017.
- TA-II Battery Test Facility—A preconstruction site evaluation was conducted, and a restoration plan was developed for a 4-acre project area. Construction and restoration is planned for 2018.
- Telecommunications Bore Pits—A preconstruction site evaluation was conducted, and a restoration plan was developed for the bore pit areas.
- Telecommunications Line Project—The restoration plan was redeveloped in 2017 and partially implemented late in the growing season on this 2.5-acre project; implementation will conclude during the 2018 growing season.

Additional activities included monitoring restoration projects (completed in previous years) during the 2017 growing season for their ecological recovery trajectories.

7.7 Threatened, Endangered, and Sensitive Species

As stated in Chapter 2, the Endangered Species Act is intended to protect all animal, plant, and insect species that are federally listed as threatened or endangered. Currently, no known federally listed threatened or endangered species breed or reside within KAFB boundaries. Several federally listed species are found within Bernalillo County, New Mexico (Table 7-9).

A few mammal species protected by the State of New Mexico have been encountered within KAFB boundaries (Table 7-9). One species in particular, the Gray Vireo (*Vireo vicinior*), listed as threatened by the New Mexico Department of Game and Fish, is well known as a breeding bird on both KAFB property and on DOE-permitted and fee-owned areas. The Gray Vireo's primary breeding habitat is open piñon-juniper woodlands within the foothills of the Manzano Mountains.

Table 7-9. Threatened, endangered, and other sensitive species occurring or potentially occurring in Bernalillo County, New Mexico

Species		Federal ESA Status	New Mexico Status	Previously Observed at KAFB
Common Name	**Scientific Name**			
Mammals				
big free-tailed bat	*Nyctinomops macrotis*	—	Sensitive	
common hog-nosed skunk	*Conepatus leuconotus*	—	Sensitive	✓
fringed myotis	*Myotis thysanodes*	—	Sensitive	
Gunnison's prairie dog	*Cynomys gunnisoni zuniensis*	—	Sensitive	✓
long-legged myotis	*Myotis volans*	—	Sensitive	
meadow jumping mouse	*Zapus hudsonius luteus*	Endangered and critical habitat	Endangered	
pale Townsend's big-eared bat	*Corynorhinus townsendii*	SOC	Sensitive	✓
red fox	*Vulpes*	—	Sensitive	
ringtail	*Bassariscus astutus*	—	Sensitive	✓
southwestern little brown myotis	*Myotis occultus*	—	Sensitive	✓
spotted bat	*Euderma maculatum*	—	Threatened	
western small-footed myotis	*Myotis ciliolabrum*	—	Sensitive	
western spotted skunk	*Spilogale gracilis*	—	Sensitive	
Yuma myotis	*Myotis yumanensis*	—	Sensitive	
Birds				
Aplomado Falcon	*Falco femoralis*	Endangered	Endangered	
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	SOC	Threatened	
Baird's Sparrow	*Ammodramus bairdii*	SOC	Threatened	
Bald Eagle	*Haliaeetus leucocephalus*	—	Threatened	✓
Bell's Vireo	*Vireo bellii*	SOC	Threatened	✓
Black Swift	*Cypseloides niger*	—	Sensitive	
Broad-billed Hummingbird	*Cynanthus latirostris*	—	Threatened	
Brown Pelican	*Pelecanus occidentalis*	—	Endangered	
Burrowing Owl	*Athene cunicularia*	SOC	—	✓
Common Black Hawk	*Buteogallus anthracinus*	SOC	Sensitive	
Gray Vireo	*Vireo vicinior*	—	Threatened	✓
Least Tern	*Sternula antillarum*	Endangered	Threatened	
Loggerhead Shrike	*Lanius ludovicianus*	—	Sensitive	✓
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened and critical habitat	Threatened	
Mountain Plover	*Charadrius montanus*	—	Sensitive	
Neotropic Cormorant	*Phalacrocorax brasilianus*	—	Threatened	
Northern Goshawk	*Accipiter gentilis*	SOC	Sensitive	
Peregrine Falcon	*Falco peregrinus*	SOC	Threatened	✓
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered and critical habitat	Threatened	✓
Sprague's Pipit	*Anthus spragueii*	Candidate	—	✓
White-eared Hummingbird	*Hylocharis leucotis*	—	Threatened	
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	Threatened	Sensitive	

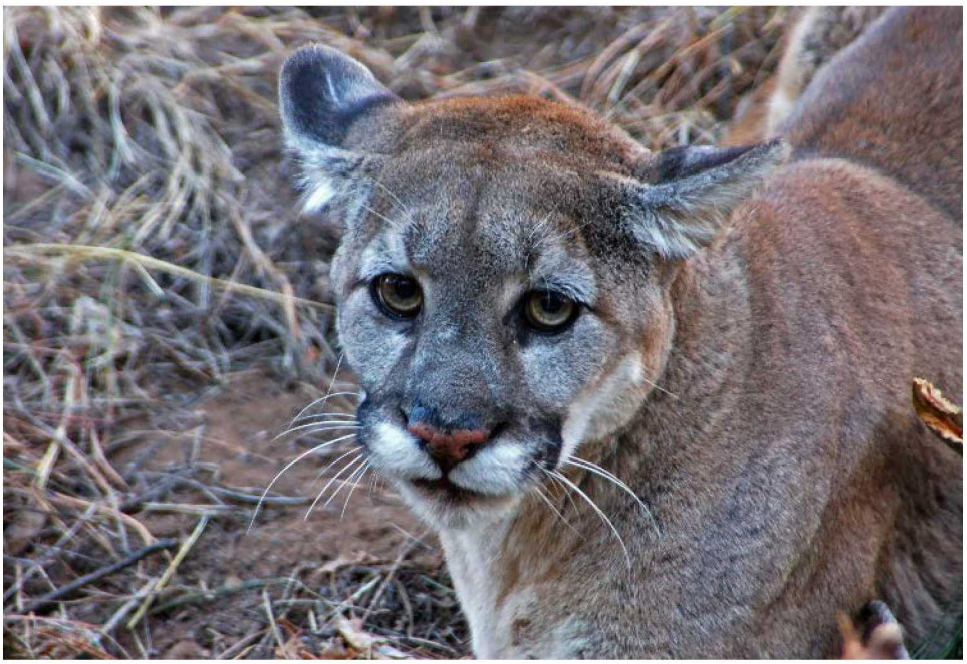
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Table 7-9. Threatened, endangered, and other sensitive species occurring or potentially occurring in Bernalillo County, New Mexico (continued)

Species		Federal ESA Status	New Mexico Status	Previously Observed at KAFB
Common Name	Scientific Name			
Reptiles				
Desert Massasauga	*Sistrurus catenatus dewardsii*	Under review	—	✓
Southwestern Fence Lizard	*Sceloporus cowlesi*	—	Sensitive	✓
Fish				
Rio Grande Chub	*Gila pandora*	—	Sensitive	
Rio Grande Silvery Minnow	*Hybognathus amarus*	Endangered and critical habitat	Threatened	
Invertebrates				
Socorro Mountainsnail	*Oreohelix neomexicana*	—	Sensitive	

SOURCE: Biota Information System of New Mexico. Accessed April 18, 2018. http://www.bison-m.org.
— = no designation
ESA = Endangered Species Act
KAFB = Kirtland Air Force Base
SOC = species of concern

Chapter 8. Quality Assurance



Mountain lion (*Felis concolor*)

OVERVIEW ■ Sandia National Laboratories quality assurance teams monitor environmental impacts of the work done at SNL/NM. Personnel in various programs collect environmental samples and analyze them for radiological and nonradiological constituents. Quality control samples are sent to contract laboratories to ensure that the samples meet statistically established control criteria or prescribed acceptance control limits. No findings for SNL/NM samples were issued in 2017 during quality assurance audits.

Sandia personnel take responsibility and assume accountability for implementing quality assurance for operations as specified in International Organization for Standard 9001 (ISO 2008), the Contractor Requirements Document of the DOE Order 414.1D (DOE O 414.1D Admin Change 1), *Quality Assurance*, and 10 CFR 830 (10 CFR 830), Subpart A, "Quality Assurance," via policy statements, processes, and procedures, and by executing the actions specified in those processes and procedures. Sandia management is responsible for ensuring the quality of the company's products; for assessing its operations, programs, projects, and business systems; and for identifying deficiencies and effecting continuous improvements.

8.1 Environmental Monitoring for Quality Assurance

Environmental monitoring (which includes sampling) is conducted in accordance with program-specific sampling and analysis plans, work plans, or quality assurance plans, which contain applicable quality assurance elements. These documents meet appropriate federal, state, and local requirements for conducting sampling and analysis activities. Personnel in various programs collect environmental samples and analyze the samples for radiological and nonradiological constituents.

Project sampling and analysis plans (or equivalent) include critical elements, such as procedures for sample collection, sample preservation and handling, sample control, laboratory quality control, required limits of detection, field quality control, health and safety, schedules and frequency of

sampling, data review, data acceptability, and reporting. Project sampling and analysis plans also include references to analytical methods and analyte lists and known potential matrix interference.

8.1.1 Sample Management Office

Sample Management Office (SMO) personnel package, ship, and track environmental samples to off-site contracted laboratories. Radiation Protection Sample Diagnostics laboratory personnel process and analyze some samples for radiological constituents in accordance with Radiation Protection Sample Diagnostics procedures. SMO personnel are responsible for quality assurance and quality control once field team members relinquish the samples to the SMO.

SMO personnel provide guidance and sample management support for field activities. However, program leads are responsible for each distinct program's overall adherence to and compliance with any sampling and analysis activity performed.

8.1.2 Contract Laboratory Selection

All off-site contract laboratories are selected based on performance objectives, licenses and accreditations, and appraisals (pre-award assessments) as described in the *Quality Assurance Project Plan (QAPP) for the Sample Management Office* (SNL/NM 2016c). All laboratories must employ EPA test procedures whenever possible; when these are not available, other suitable and validated test procedures are applied. Laboratory instruments must be calibrated in accordance with established procedures, methods, and the SMO Statement of Work for Analytical Laboratories (SNL/NM 2013). All calibrations and detection limits must be verified before analyzing samples and reporting data. Once a laboratory has passed an initial appraisal and has been awarded a contract, SMO personnel are responsible for continuously monitoring laboratory performance to ensure that the laboratory meets its contractual requirements during annual audits.

SMO contract laboratories perform work in compliance with the SMO Statement of Work for Analytical Laboratories (SNL/NM 2013). Contract laboratories are required to participate in applicable DOE and EPA programs for blind audit check sampling to monitor the overall accuracy of analyses routinely performed on SNL/NM samples. SMO contract laboratories are required to participate in the DOE Mixed Analyte Performance Evaluation Program. Contract laboratories also participate in commercial vendor programs designed to meet the evaluation requirements given in the proficiency testing section (Chapter II) of the National Environmental Laboratory Accreditation Conference Standard.

8.1.3 Quality Control for Samples

Project-specified quality control samples are submitted to contract laboratories in order to meet project data quality objectives and sampling and analysis plan requirements. Various field quality control samples are collected to assess the data's quality and final usability. Errors, some of which are unavoidable, can be introduced into the sampling process, including potential contamination of samples in the field or during transportation. Additionally, sample results can be affected by the variability present at each sample location.

With each sample batch, laboratory quality control samples are prepared concurrently at defined frequencies and analyzed in accordance with established methods. Contract laboratory personnel determine the analytical accuracy, precision, contamination, and matrix effects associated with each analytical measurement.

Quality control sample results are compared either to statistically established control criteria or to prescribed acceptance control limits. Analytical results generated concurrently with quality control sample results within established limits are considered acceptable. If quality control analytical

results exceed control limits, the results are qualified and corrective action is initiated if warranted. Reanalysis is then performed for samples in the analytical batch as specified in the Statement of Work and laboratory procedures. Quality control sample summaries are included in analytical reports prepared by contract laboratory personnel.

The Radiation Protection Dosimetry Program owns the TLD used to measure gamma radiation, and program personnel issue and process the dosimeters.

The Radiation Protection Dosimetry Program owns the TLD used to measure gamma radiation, and program personnel issue and process the dosimeters.

The technical basis for the environmental dosimeter monitoring program is provided in *Description and Procedures of the Environment Radiation Dosimetry Program* (SNL/NM 1987). Dosimeters are issued and processed quarterly following established protocols and quality assurance/quality control requirements specified in Radiation Protection Dosimetry Program operating procedures and the Radiation Protection Dosimetry Program Quality Plan (SNL/NM 2016d). Automated dosimeter equipment is used to manage environmental dosimeters. Radiation Protection Dosimetry Program external dosimetry technical personnel manage the data and perform dose calculations.

8.1.4 Data Validation and Records Management

Sample collection, analysis request and chain of custody documentation, and measurement data are reviewed and validated for each sample collected. Analytical data reported by contract laboratories are reviewed to assess laboratory and field precision, accuracy, completeness, representativeness, and comparability with respect to the particular program's method of compliance and data quality objectives.

The data are validated at a minimum of three levels as follows:

- The analytical laboratory validates data per the laboratory's quality assurance plan, standard operating procedures, and client-specific requirements.
- SMO personnel review the analytical reports, corresponding sample collection, and analysis request and chain of custody documentation for completeness and laboratory contract compliance.
- A program lead reviews program objectives, regulatory compliance, and project-specific data quality requirements, and makes the final decision regarding the data's usability and reporting.

Additionally, all groundwater monitoring data, site-wide confirmatory data, radioactive mixed waste characterization data, and a specified percentage of other program data are validated to detailed method-specified requirements.

8.2 Sample Management Office Activities in 2017

SMO activities in 2017 included sample packaging, shipping, and tracking to off-site contracted laboratories, and reviewing all data deliverables for compliance with contract and data quality requirements.

8.2.1 Sample Handling and Analyses

In 2017, SMO personnel processed a total of 3,625 samples in support of programs and projects at SNL/NM. Of the 3,625 samples, 954 were submitted as field and analytical quality control samples

to assist with data validation and decision-making. Of the 3,625 samples, 3,606 (including quality control) were collected for the first five programs and projects listed below:

- Air Quality Compliance
- Water Quality
- Terrestrial Surveillance
- LTS
- Environmental Restoration Operation
- Waste Management
- Decontamination and Demolition

During 2017, the following contract laboratories were employed to analyze samples:

- General Engineering Laboratories in Charleston, South Carolina
- TestAmerica Laboratories in St. Louis, Missouri; Richland, Washington; and West Sacramento, California
- Hall Environmental Analysis Laboratory in Albuquerque, New Mexico
- State of New Mexico Department of Health in Albuquerque, New Mexico
- Cape Fear Analytical in Wilmington, North Carolina
- Landauer in Glenwood, Illinois

In 2017, SMO personnel processed 3,625 samples in support of programs and projects at SNL/NM.

8.2.2 Laboratory Quality Assurance Assessments and Validation

In 2017, SMO personnel continued independent, on-site assessments and validation at the National Environmental Laboratory Accreditation Conference-approved laboratories used by Sandia personnel. Specific checks were made for documentation completeness, proper equipment calibration, proper laboratory practices, and batch quality control data. These assessments focused on data defensibility and regulatory compliance requirements specific to SNL/NM work.

8.2.3 Quality Assurance Audits

DOE Consolidated Audit Program personnel conducted audits in 2017 at the primary SMO contract laboratories using DOE/Department of Defense *Consolidated Quality Systems Manual* requirements. The audit reports, laboratory responses, and closure letters are all posted on and tracked through the DOE Consolidated Audit Program website. SMO personnel worked closely with the contract laboratories to resolve audit findings expeditiously. Decisions regarding sample distribution to contract laboratories were based on audit information, including outstanding corrective actions.

No findings for SNL/NM samples were issued in 2017 in either the DOE Consolidated Audit Program audit or the Mixed Analyte Performance Evaluation Program audit.

Chapter 9. Permits, Regulations, and Standards for Environmental Programs



Coyote (*Canis latrans*)

OVERVIEW ■ Sandia National Laboratories maintain compliance with all required permits, regulations, and standards for environmental programs.

Table 9-1 through Table 9-3 summarize various permits, regulations, and standards that define environmental programs and compliance with those requirements.

Table 9-1. Summary of environmental permits and registrations in effect, 2017

Permit Type and/or Facility Name	Location	Permit/Registration Number	Issue Date	Expiration Date	Regulatory Agency
Sewer Wastewater					
General	WW001 Station Manhole, south of TA-IV at Tijeras Arroyo	2069A	2/28/2013	2/28/2018	ABCWUA
General	WW006 Station Manhole, at Pennsylvania Avenue	2069F	4/1/2014	3/31/2019	ABCWUA
MESA	WW007 Station Manhole, TA-I	2069G	3/1/2015	1/31/2020	ABCWUA
General	WW008 Station Manhole, south of TA-II at Tijeras Arroyo	2069I	9/1/2014	7/31/2019	ABCWUA
General	WW011 Station Manhole, north of TA-III (includes TA-III and TA-V, and Coyote Test Field sewer lines)	2069K	11/1/2014	9/30/2019	ABCWUA
CINT	CINT	2238A	5/1/2016	4/30/2021	ABCWUA
Surface Discharge					
Pulsed Power Development Facilities (Discharge Permit)	TA-IV, Lagoon I and Lagoon II	DP-530	9/5/2014	9/5/2019	NMED
Ground Water (Discharge Permit)	TA-V	DP-1845	5/20/2017	5/29/2022	NMED

Table continued on next page.

Table 9-1. Summary of environmental permits and registrations in effect, 2017 (continued)

Permit Type and/or Facility Name	Location	Permit/Registration Number	Issue Date	Expiration Date	Regulatory Agency
Underground Storage Tanks					
UST (20,000 gallons)	TA-I	2479	7/1/2017	6/30/2018	NMED
UST (20,000 gallons)	TA-I	2480	7/1/2017	6/30/2018	NMED
UST (10,000 gallons)	TA-I	2481	7/1/2017	6/30/2018	NMED
Aboveground Storage Tanks					
AST (3,020 gallons)	TA-I	2469	7/1/2017	6/30/2018	NMED
AST (2,119 gallons)	TA-I	2470	7/1/2017	6/30/2018	NMED
AST (2,000 gallons)	TA-I	2471	7/1/2017	6/30/2018	NMED
AST (5,000 gallons)	TA-III	2472	7/1/2017	6/30/2018	NMED
AST (5,500 gallons)	Coyote Test Field	2473	7/1/2017	6/30/2018	NMED
AST (4,500 gallons)	TA-IV	2474	7/1/2017	6/30/2018	NMED
AST (1,500 gallons)	TA-I	2475	7/1/2017	6/30/2018	NMED
Stormwater					
NPDES Rio Grande Watershed-Based Municipal Separate Storm Sewer System (MS4) Permit					
NPDES MS4	TA-I, TA-II and TA-IV	NTESS: NMR053122 DOE/SFO: NMR053114	12/22/2015 (NTESS) 11/18/2015 (DOE/SFO)	12/19/2019	EPA
NPDES Multi-Sector General Permit					
NPDES MSGP	SNL/NM industrial discharge locations	NTESS: NMR04A012 DOE/SFO: NMR04A011	9/30/2015	6/4/2020	EPA
NPDES Construction General Permit					
LAZAP	TA-I	NTESS: NMR1000B7	5/22/2017	NOI terminated 1/16/2018	EPA
DETS Thunder Range	Thunder Range	NTESS: NMR1000FD DOE/SFO: NMR1000F2	5/30/2017	CGP expires 2/16/2022	EPA
DETS North	Thunder Range	NTESS: NMR1000FE DOE/SFO: NMR1000F1	5/30/2017	CGP expires 2/16/2022	EPA
Building 905 Addition	TA-II	NTESS: NMR1000FF	5/30/2017	CGP expires 2/16/2022	EPA
Brayton Cycle Gas Line	TA-III	NTESS: NMR1000FG	5/30/2017	CGP expires 2/16/2022	EPA
Long Sled Track Clearing	TA-III	NTESS: NMR1000FH	5/30/2017	CGP expires 2/16/2022	EPA
Telecommunications Cable Installation to Building 9972	Coyote Test Field	NTESS: NMR1000FI	5/30/2017	CGP expires 2/16/2022	EPA
Division 6000 Igloos	Division 6000 Igloos	NTESS: NMR1000FJ	5/30/2017	CGP expires 2/16/2022	EPA
TA-III Road Replacement	TA-III	NTESS: NMR1000FK	5/30/2017	CGP expires 2/16/2022	EPA
Building 9920 to building 9956 Fiber Line	Coyote Test Field	NTESS: NMR1000FL	5/30/2017	CGP expires 2/16/2022	EPA
Building 725	TA-I	NTESS: NMR1000MX	7/25/2017	CGP expires 2/16/2022	EPA
Battery Test Facility	TA-II	NTESS: NMR1000XA	11/27/2017	CGP expires 2/16/2022	EPA

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Table 9-1. Summary of environmental permits and registrations in effect, 2017 (continued)

Permit Type and/or Facility Name	Location	Permit/Registration Number	Issue Date	Expiration Date	Regulatory Agency
Ecological					
New Mexico Department of Game and Fish Nuisance Permit	Site-wide ecological monitoring activity	119	3/25/2014	3/31/2019	New Mexico Department of Game and Fish
New Mexico Department of Game and Fish for Scientific/Educational Purposes Authorization for Taking of Protected Wildlife	Site-wide ecological monitoring activity	2931	4/4/2017	12/31/2019	New Mexico Department of Game and Fish
RCRA					
Hazardous Waste Permit (Post-Closure Care)	Chemical Waste Landfill	NM5890110518	Issued 10/15/2009; effective 6/2/2011	6/2/2021	NMED
RCRA Facility Operating Permit	• Hazardous Waste Handling Unit • Thermal Treatment Unit • RMWMU • Auxiliary Hot Cell Unit • Manzano Storage Bunkers (5) • Corrective Action Management Unit	NM5890110518	Issued 1/27/2015; effective 2/26/2015	2/26/2025	NMED
Open Burning/Detonation					
Explosives Testing	Building 9920 Test Site	18-0004	1/1/2018	12/31/2018	COA
IED and HME Explosives Testing and Training	Building 9930 Test Site	18-0005	1/1/2018	12/31/2018	COA
High Heat Flux Tests	Solar Tower	18-0006	1/1/2018	12/31/2018	COA
Explosive Tests	Rocket Sled Track	18-0007	1/1/2018	12/31/2018	COA
Thermal Treatment Unit	Thermal Treatment Unit	18-0008	1/1/2018	12/31/2018	COA
Crude Oil Combustion and Fuel Fire Experiments	Burn Site	18-0009	1/1/2018	12/31/2018	COA
Explosives Testing	Building 9939 Test Site	18-0010	1/1/2018	12/31/2018	COA
Explosives Testing	Thunder Range	18-0011	1/1/2018	12/31/2018	COA
Explosive Applications–Terminal Ballistics Facility	Building 6750	18-0012	1/1/2018	12/31/2018	COA
Thermite Applications–Terminal Ballistics Facility	Building 6750	18-0013	1/1/2018	12/31/2018	COA
Propellant Applications–Terminal Ballistics Facility	Building 6750	18-0014	1/1/2018	12/31/2018	COA
Explosives Training and Testing	DETS	18-0015	1/1/2018	12/31/2018	COA
Stationary Source (Air)					
Document Disintegrator	TA-III	Permit 144-M1	9/28/2006	N/A	COA
Neutron Generator Facility	TA-I	Permit 374-M2	12/6/2010	N/A	COA
Standby Diesel Generators at Substation 41	TA-I	Permit 402-M1	5/7/1996	N/A	COA
RMWMU	TA-III	Permit 415-M2-RV1	9/23/2011	N/A	COA
Title V Operating Permit	Site-wide	Permit 515 (pending)	Submitted 3/1/1996	N/A	COA
Emergency Generator at Building 702	TA-I	Permit 924-RV1	2/8/2012	N/A	COA

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Table 9-1. Summary of environmental permits and registrations in effect, 2017 (continued)

Permit Type and/or Facility Name	Location	Permit/Registration Number	Issue Date	Expiration Date	Regulatory Agency
Stationary Source (Air) (continued)					
PETL Emergency Generator	TA-I	Permit 925-M2	4/11/2012	N/A	COA
Thermal Test Complex	TA-III	Permit 1712-RV2	5/20/2016	N/A	COA
CINT	Sandia Science and Technology Park	Permit 1725-M1	4/12/2012	N/A	COA
MESA Facility Boilers and Generators	TA-I	Permit 1820-M1-RV1	9/16/2015	N/A	COA
Southeast TA-I Generator	TA-I	Permit 1828	9/28/2006	N/A	COA
Strategic Defense Facility, Building 963	TA-IV	Permit 1900	1/11/2008	N/A	COA
Site-wide Chemical Use	Site-wide	Permit 1901-M1	10/10/2016	N/A	COA
Building 962 Generator	TA-IV	Permit 1930-RV1	2/3/2012	N/A	COA
Building 833 Generator	TA-I	Permit 2097-M2	1/20/2014	N/A	COA
Building 880 Boiler and Generator	TA-I	Permit 2116-M1	9/10/2015	N/A	COA
Lurance Canyon Burn Site Igloo/FLAME	Remote	Permit 3216-M1	7/1/2016	N/A	COA
Explosives Components Facility	TA-II	Registration 547-RV1	9/27/2011	N/A	COA
Advanced Manufacturing Prototype Facility	TA-I	Registration 1406-M1-RV1	10/4/2011	N/A	COA
Building 899A Boiler	TA-I	Registration 1823-RV1	9/30/2011	N/A	COA
Building 878 Boiler	TA-I	Registration 1888-RV1	5/11/2011	N/A	COA
Building 865 Boiler	TA-I	Registration 1902-RV1	11/30/2010	N/A	COA
Building 802 Boiler	TA-I	Registration 2109	10/28/2010	N/A	COA
Building 804 Boiler	TA-I	Registration 2110	11/8/2010	N/A	COA
Building 810 Boiler	TA-I	Registration 2111	11/8/2010	N/A	COA
Building 823 Boiler	TA-I	Registration 2112	11/8/2010	N/A	COA
Building 840 Boiler	TA-I	Registration 2113	11/8/2010	N/A	COA
Building 857 Boiler	TA-I	Registration 2114	11/8/2010	N/A	COA
Building 860 Boiler	TA-I	Registration 2115	11/8/2010	N/A	COA
Building 890 Boiler	TA-I	Registration 2117	11/29/2010	N/A	COA
Building 887 Boiler	TA-I	Registration 2118	11/29/2010	N/A	COA
Building 891 Boiler	TA-I	Registration 2119	11/29/2010	N/A	COA
Building 892 Boiler	TA-I	Registration 2120	11/30/2010	N/A	COA
Building 894 Boiler	TA-I	Registration 2121	11/30/2010	N/A	COA
Building 897 Boiler	TA-I	Registration 2122	11/30/2010	N/A	COA
Building 960 Boiler	TA-IV	Registration 2169	9/27/2011	N/A	COA
Building 895 Boiler	TA-I	Registration 2170	9/27/2011	N/A	COA
Building 800 Boiler	TA-I	Registration 2171	9/27/2011	N/A	COA
Building 6585 Boiler	TA-V	Registration 2172-RV1	1/26/2012	N/A	COA
Building 6597 Boiler	TA-V	Registration 2173	2/10/2012	N/A	COA
Building 6580 Boiler	TA-V	Registration 2174-RV1	2/26/2012	N/A	COA
Building 981 Boiler	TA-IV	Registration 2175	9/22/2011	N/A	COA
Building 983 Boiler	TA-IV	Registration 3111	9/13/2013	N/A	COA
Building 963 Boiler	TA-IV	Registration 3211	2/15/2015	N/A	COA
Building 970 Boiler	TA-IV	Registration 3302	12/29/2016	N/A	COA

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Table 9-1. Summary of environmental permits and registrations in effect, 2017 (continued)

Permit Type and/or Facility Name	Location	Permit/Registration Number	Issue Date	Expiration Date	Regulatory Agency
Fugitive Dust Control Construction/ Demolition, as of 12/14/2017					
Assembly Building at Thunder Range	Remote	6303-C	10/9/2013	10/9/2018	COA
TA-IV South Escarpment Stabilization	TA-IV	6895-C	10/10/2014	10/10/2019	COA
756 Trailers D&D	TA-I	8599-C	4/4/2017	4/4/2018	COA
875 Asphalt Replacement	TA-I	8682-C	5/22/2017	5/22/2018	COA
Fugitive Dust Control Programmatic Permit	Site-wide	8683-P	6/12/2017	6/12/2022	COA
952 LAZAP Enclosure	TA-1	8703-C	5/26/2017	8/16/2018	COA
Revegetation near Building 9972	Remote	8708-C	5/31/2017	6/1/2018	COA
Building 725 Addition	TA-1	8881-C	8/31/2017	8/31/2020	COA

ABCWUA = Albuquerque Bernalillo County Water Utility Authority
AST = aboveground storage tank
CGP = Construction General Permit
CINT = Center for Integrated Nanotechnologies
COA = City of Albuquerque
D&D = decontamination and demolition
DETS = Dynamic Explosives Test Site
DOE = U.S. Department of Energy
DP = discharge permit
EPA = U.S. Environmental Protection Agency
FLAME = Fire Laboratory for Accreditation of Modeling by Experiment
HME = homemade explosive
IED = improvised explosive device
LAZAP = Laser Applications Facility
MESA = Microsystems and Engineering Sciences Applications
MS4 = Municipal Separate Storm Sewer System
MSGP = Multi-Sector General Permit
N/A = not applicable
NMED = New Mexico Environment Department
NOI = Notice of Intent
NPDES = National Pollution Discharge Elimination System
NTESS = National Technology & Engineering Solutions of Sandia, LLC
PETL = Processing and Environmental Technology Laboratory
RCRA = Resource Conservation and Recovery Act
RMWMU = Radioactive and Mixed Waste Management Unit
SFO = Sandia Field Office
SNL/NM = Sandia National Laboratories, New Mexico
TA = technical area
UST = underground storage tank
WW = wastewater

Table 9-2. Summary of compliance history with regard to mixed waste

Date	Milestone	Comment
Nov 1984	1984 HSWA to RCRA	Extended storage became an issue after HSWA established land disposal restrictions and a prohibition on storage of wastes for more than one year.
Aug 1990	RCRA Part A interim status permit application submitted	Submitted the RCRA Part A interim status permit application to NMED for mixed waste storage. Later revisions to the interim status application were added to include proposed mixed waste treatment processes.
Oct 1992	FFCA passed	The FFCA allows storage of mixed waste that does not meet the applicable treatment standard beyond the one-year RCRA time limit. This required DOE to submit a STP for mixed waste.
Dec 1992	NON-issued	The EPA issued an NON for storage of RCRA-regulated mixed waste over the one-year maximum period.
Oct 1993	Conceptual STP submitted	DOE submitted a conceptual STP for mixed waste to NMED; subsequent drafts followed.
Mar 1995	Final STP submitted	DOE submitted a final STP for mixed waste to NMED.
Jun 1995	HDRV Project initiated	The HDRV Project was initiated to characterize and sort legacy mixed waste. The project continued into 1997, when it was replaced with new sorting procedures.
Oct 1995	FFCO signed	The FFCO, an agreement between NMED, DOE, and Sandia personnel, detailed specific actions required with regard to mixed waste management, including the requirement to develop an STP, to be updated annually.
Mar 1996	STP milestones met	Updated the STP to reflect fiscal year 1995 activities.
Sep 1996	First mixed waste shipment made FFCO Amendment No. 1	The first mixed waste shipment was made; mixed waste was sent to Perma-Fix/ Diversified Scientific Services, Inc., for treatment. The FFCO was amended.
Dec 1996	N/A	DOE and Sandia personnel resubmitted the RCRA Part A and Part B permit application to reflect revisions to proposed on-site treatment methods.
May 1997	FFCO Amendment No. 2	The FFCO was amended.
Dec 1997	On-site MW treatment	On-site treatment of mixed waste began at the RMWMU in compliance with regulatory requirements.
1997–2001	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 1 through 5 to the STP, which revised waste volumes and treatment/ disposal technologies and established new deadlines.
May 2001	FFCO Amendment No. 3	The FFCO was amended.
Feb 2002	N/A	DOE and Sandia personnel submitted the updated RCRA Part A and Part B permit application to NMED to reflect revisions to on-site waste management operations. Permit application for mixed waste management units was combined with permit renewal requests for hazardous waste management units.
2002–2003	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 6 and 7 to the STP, which revised waste volumes and treatment/disposal technologies and established new deadlines.
Apr 2003, Nov 2003	N/A	DOE and Sandia personnel revised the RCRA Part A and Part B permit application in response to NMED comments.

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Table 9-2. Summary of compliance history with regard to mixed waste (continued)

Date	Milestone	Comment
Apr 2004	FFCO Amendment No. 4	The FFCO was amended.
Nov 2004	N/A	DOE and Sandia personnel revised the RCRA Part A and Part B permit application in response to NMED comments.
2004–2007	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved revisions 8 through 11 to the STP, which revised waste volumes and treatment/disposal technologies and established new deadlines.
Jun 2005, Oct 2005, May 2006, Mar 2007	N/A	DOE and Sandia personnel revised the RCRA Part A and Part B permit application to reflect changes in waste management operations.
Aug 2007	N/A	NMED issued a draft RCRA permit to DOE and Sandia personnel, and made it available for public comment.
Jan 2008	N/A	DOE and Sandia personnel submitted extensive comments on the draft permit to NMED and requested resolution of comments.
2008–2010	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP annually to reflect activities and changes to proposed treatment technologies. NMED approved Revision 12 to the STP, which revised waste volumes and treatment/disposal technologies and established new deadlines.
Oct 2009, Nov 2010	N/A	DOE and Sandia personnel revised the RCRA Part B permit application to reflect changes in waste management operations.
Dec 2010	FFCO Amendment No. 5	The FFCO was amended to extend certain compliance deadlines.
2011	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Completed disposition of all mixed wastes subject to the STP, in compliance with applicable deadlines. Updated the STP to reflect fiscal year 2010 activities.
Oct 2011, May 2012	N/A	DOE and Sandia personnel revised the RCRA Part A and Part B permit application to reflect changes in waste management operations.
Sep 2012	N/A	NMED issued a draft RCRA permit to DOE and Sandia personnel, and made it available for public comment.
Nov 2012	N/A	DOE and Sandia personnel submitted comments on the draft permit to NMED and requested resolution of comments.
2012–2014	No STP milestones	Treated wastes on-site and shipped mixed wastes to off-site treatment/ disposal facilities in compliance with regulatory requirements. Updated the STP annually to reflect waste management activities and waste volumes. Requested Revision 14 to STP to revise waste volumes, establish new deadlines and provide continuity.
Dec 2014	No STP milestones	NMED approved Revision 14 to the STP, which revised waste volumes and established new deadlines.
Jan 2015	N/A	NMED issued the RCRA Facility Operating Permit for SNL/NM. The permit includes mixed waste storage and treatment units.

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Table 9-2. Summary of compliance history with regard to mixed waste (continued)

Date	Milestone	Comment
2015-2016	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP annually to reflect waste management activities and waste volumes. Requested Revision 15 to STP to establish new deadlines, update waste management technologies, and provide continuity.
Oct 2016	N/A	NMED approved Revision 15 to the STP, which revised waste volumes and technologies, and establishing new deadlines.
2017	STP milestones met	Treated wastes on-site and shipped mixed wastes to off-site treatment and disposal facilities in compliance with regulatory requirements, meeting all treatment and disposal milestones. Updated the STP to reflect waste management activities and waste volumes.

DOE = U.S. Department of Energy
FFCA = Federal Facility Compliance Act
FFCO = Federal Facility Compliance Order
HDRV = Historical Disposal Requests Validation
HSWA = Hazardous and Solid Waste Amendment
MW = mixed waste
N/A = not applicable
NMED = New Mexico Environment Department
No. = number
NON = Notice of Noncompliance
RCRA = Resource Conservation and Recovery Act
SNL/NM = Sandia National Laboratories, New Mexico
STP = Site Treatment Plan

Table 9-3. Quantity of mixed waste subject to the Federal Facility Compliance Order, end of FY 2017

Waste Category	Volume (m^3)	Description	Status and Plans
TG 1	0	Inorganic debris with explosives component	No waste currently in inventory
TG 2	0	Inorganic debris with a water-reactive component	No waste currently in inventory
TG 3	0	Reactive metals	No waste currently in inventory
TG 4	0	Elemental lead	No waste currently in inventory
TG 5	0	Aqueous liquids (corrosive)	No waste currently in inventory
TG 6	0	Elemental mercury	No waste currently in inventory
TG 7	0	Organic liquids I	No waste currently in inventory
TG 8	0	Organic debris with organic contaminants	No waste currently in inventory
TG 9	0	Inorganic debris with TCLP metals	No waste currently in inventory
TG 10	0	Heterogeneous debris	No waste currently in inventory
TG 11	0	Organic liquids II	No waste currently in inventory
TG 12	0	Organic debris with TCLP metals	No waste currently in inventory
TG 13	0	Oxidizers	No waste currently in inventory
TG 14	0	Aqueous liquids with organic contaminants	No waste currently in inventory
TG 15	0	Soils < 50 percent debris and particulates with TCLP metals	No waste currently in inventory
TG 16	0	Cyanide waste	No waste currently in inventory
TG 17	0	Liquid/solid with organic and/or metal contaminants	No waste currently in inventory
TG 18	0	Particulates with organic contaminants	No waste currently in inventory
TG 19	0	Liquids with metals	No waste currently in inventory
TG 20	0	Propellant with TCLP metals	No waste currently in inventory
TG 21	0	Sealed sources with TCLP metals	No waste currently in inventory
TG 22	0	Reserved	N/A
TG 23	0	Thermal batteries	No waste currently in inventory
TG 24	0	Spark gap tubes with TCLP metals	No waste currently in inventory
TG 25	0	Classified items with TCLP metals	No waste currently in inventory
TG 26	0	Debris items with reactive compounds and TCLP metals	No waste currently in inventory
TG 27	0	High mercury solids and liquids	No waste currently in inventory
MTRU	1.92	MTRU	Stored at SNL/NM; awaiting shipment to WIPP

< = less than
FY = fiscal year
MTRU = mixed transuranic
N/A = not applicable
SNL/NM = Sandia National Laboratories, New Mexico
TCLP = toxicity characteristic leaching procedure
TG = treatability group
WIPP = Waste Isolation Pilot Plant

Appendix A. 2017 Summary of Groundwater Monitoring



Mourning Dove (*Zenaida macroura*)

Table A-1. Sample collection dates for groundwater quality monitoring at SNL/NM, 2017

Sampling Event	Groundwater Monitoring Program [12 wells + 1 spring]	Chemical Waste Landfill [4 wells]	Mixed Waste Landfill [4 wells]	TA-V Groundwater AOC [16 wells]	Tijeras Area Groundwater AOC [20 wells]	Burn Site Groundwater [10 wells]
January	√	√				
February	√			√		
March				√	√	
April	√					√
May	√		√	√		
June	√			√	√	
July		√		√		
August				√	√	
September					√	
October			√	√		√
November				√		
December					√	

AOC = area of concern
SNL/NM = Sandia National Laboratories, New Mexico
TA = technical area

Table A-2. Summary of SNL/NM groundwater monitoring analytical results, 2017

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	MCL
Summary of Field Water Quality Parameters (units as indicated)						
pH in SU	147	0	6.17	7.91	7.41	NE
Specific conductivity in µmhos/cm	147	0	354.8	3,817.1	732.0	NE
Temperature in °C	147	0	11.75	27.07	19.66	NE
Turbidity in NTU	147	0	0.11	12.8	1.39	NE
Detected Organic Compounds in µg/L						
Acetone	5	134	1.52	2.81	2.12	NE
Carbon disulfide	1	138	1.77	1.77	1.77	NE
Chloroform	7	153	0.630	0.960	0.804	NE
Dichloroethane, 1,1-	6	149	0.310	0.450	0.377	NE
Dichloroethene, 1,1-	2	158	0.820	0.840	0.830	7.0
Dichloroethene, cis-1,2-	36	119	0.300	3.59	1.01	70
Methylene chloride	2	153	1.04	1.49	1.27	5.0
Tetrachloroethene	11	149	0.360	1.59	0.867	5.0
Toluene	3	152	0.340	1.06	0.597	1,000
Trichloroethene	78	87	0.340	17.4	3.91	5.0
Detected Metals in mg/L						
Aluminum	24	46	0.0212	0.221	0.0958	NE
Antimony	1	69	0.00116	0.00116	0.00116	0.006
Arsenic	53	81	0.00175	0.00777	0.00249	0.010
Barium	70	0	0.00871	0.219	0.0684	2.0
Beryllium	1	69	0.00722	0.00722	0.00722	0.004
Cadmium	1	79	0.00201	0.00201	0.00201	0.005
Calcium	73	0	36.5	332	91.4	NE
Chromium	5	85	0.00371	0.0255	0.0131	0.100
Cobalt	10	60	0.000127	0.00955	0.00140	NE
Copper	33	37	0.000316	0.00261	0.000741	NE
Iron	51	83	0.0341	0.800	0.129	NE
Magnesium	73	0	3.39	74.9	21.5	NE
Manganese	46	88	0.001	1.69	0.0609	NE
Mercury	1	85	0.000158	0.000158	0.000158	0.002
Nickel	28	62	0.000503	0.0245	0.00299	NE
Potassium	73	0	1.68	31.7	3.92	NE
Selenium	51	19	0.00203	0.0283	0.00507	0.050
Silver	6	64	0.000337	0.000480	0.000430	NE
Sodium	73	0	17.8	1,290	88.5	NE
Thallium	1	69	0.00112	0.00112	0.00112	0.002
Uranium	69	2	0.000976	0.0183	0.00505	0.030
Vanadium	47	23	0.00354	0.00955	0.00609	NE
Zinc	23	47	0.00347	0.0492	0.0120	NE

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Table A-2. Summary of SNL/NM groundwater monitoring analytical results, 2017

Analyte	Number of Detects	Number of Non-Detects	Minimum Detected Value	Maximum Detected Value	Mean Detected Value	MCL
Detected Inorganic Parameters in mg/L						
Alkalinity as $CaCO_3$	73	0	81.8	1,050	223.1	NE
Bromide	72	1	0.142	2.63	0.593	NE
Chloride	73	0	9.93	497	66.3	NE
Fluoride	73	0	0.191	2.70	0.925	4.0
Nitrate plus nitrite	162	0	0.124	44.9	9.20	10
Perchlorate	4	11	0.004	3.19	0.801	NE
Sulfate	73	0	16.6	1,880	141	NE
Total organic halogens	7	9	0.00350	0.015	0.00622	NE
Total phenols	1	15	0.00182	0.00182	0.00182	NE
Detected Radiological Parameters (units as indicated)						
Alpha, gross (corrected) in mrem/yr[c]	80	0	-11.66	13.66	3.62	15.0[a]
Beta, gross in mrem/yr	77	3	1.06	28.7	4.96	4
Potassium-40 in pCi/L	4	70	54.7	81.1	66.9	NE
Radium-226 in pCi/L	12	4	0.226	1.58	0.739	5.0[b]
Radium-228 in pCi/L	2	14	0.542	0.850	0.696	5.0[b]
Radon-222 in pCi/L	10	0	120	509	295	NE
Uranium-233/234 in pCi/L	17	0	0.42	35.5	13.8	NE
Uranium-235/236 in pCi/L	15	2	0.156	0.552	0.334	NE
Uranium-238 in pCi/L	17	0	0.109	6.33	3.04	NE

[a] The 15.0 pCi/L MCL is for corrected gross alpha activity.
[b] The 5.0 pCi/L MCL is for combined Ra-226 and Ra-228.
[c] Gross alpha results reported as corrected values (uranium activities subtracted out)
See notes at end of appendices.

Table A-3. Summary of exceedances[a] for SNL/NM groundwater monitoring wells and springs sampled, 2017

Analyte	Well	Exceedance	Date
Beryllium MCL = 0.004 mg/L	Coyote Springs	0.00722 mg/L[a]	February 2017
Nitrate plus nitrite (as nitrogen) MCL = 10.0 mg/L	CYN-MW9	44.9 mg/L	April 2017
		35.8 mg/L	October 2017
	CYN-MW10	18.5 mg/L	April 2017
		14.5 mg/L	October 2017
	CYN-MW10 (duplicate)	15.5 mg/L	October 2017
	CYN-MW11	25.4 mg/L	April 2017
		22.6 mg/L	October 2017
	CYN-MW11 (duplicate)	18.4 mg/L	October 2017
	CYN-MW12	20.2 mg/L	April 2017
		19.4 mg/L	October 2017
	CYN-MW13	38.2 mg/L	April 2017
		36.9 mg/L	October 2017
	CYN-MW13 (duplicate)	36.2 mg/L	April 2017
	CYN-MW14A	11.9 mg/L	April 2017
		15.0 mg/L	October 2017
	CYN-MW14A (duplicate)	12.0 mg/L	April 2017
	CYN-MW15	28.2 mg/L	April 2017
		22.9 mg/L	October 2017
	CYN-MW15 (duplicate)	22.2 mg/L	October 2017
	LWDS-MW1	11.8 mg/L	March 2017
		11.5 mg/L	June 2017
		12.0 mg/L	August 2017
		11.3 mg/L	November 2017
	TA2-W-19	10.9 mg/L	March 2017
		11.2 mg/L	June 2017
		11.1 mg/L	September 2017
		11.4 mg/L	December 2017
	TA2-W-28	21.4 mg/L	March 2017
		18.1 mg/L	June 2017
		16.4 mg/L	September 2017
		16.9 mg/L	December 2017
	TA2-W-28 (duplicate)	17.0 mg/L	December 2017
	TAV-MW10	11.2 mg/L	February 2017
		11.9 mg/L	June 2017
		11.4 mg/L	August 2017
		12.2 mg/L	November 2017
	TAV-MW10 (duplicate)	11.5 mg/L	February 2017
	TAV-MW14	11.7 mg/L	February 2017

Table continued on next page.

Table A-3. Summary of exceedances[a] for SNL/NM groundwater monitoring wells and springs sampled, 2017 (continued)

Analyte	Well (Relevant Chapter)	Exceedance	Date
Nitrate plus nitrite (as nitrogen) MCL = 10.0 mg/L	TJA-2	11.1 mg/L	March 2017
		11.2 mg/L	June 2017
		11.0 mg/L	September 2017
		12.2 mg/L	December 2017
	TJA-2 (duplicate)	10.6 mg/L	March 2017
	TJA-4	31.1 mg/L	March 2017
		29.0 mg/L	June 2017
		29.9 mg/L	September 2017
		33.1 mg/L	December 2017
	TJA-4 (duplicate)	29.2 mg/L	June 2017
	TJA-7	25.5 mg/L	March 2017
		22.2 mg/L	June 2017
		23.4 mg/L	September 2017
		26.0 mg/L	December 2017
Trichloroethene MCL = 5.0 µg/L	LWDS-MW1	17.4 µg/L	March 2017
		10.2 µg/L	June 2017
		16.8 µg/L	August 2017
		15.0 µg/L	November 2017
	TAV-MW6	12.3 µg/L	February 2017
		10.1 µg/L	June 2017
		9.15 µg/L	August 2017
		9.34 µg/L	November 2017
	TAV-MW10	10.1 µg/L	February 2017
		8.63 µg/L	June 2017
		9.96 µg/L	August 2017
		7.48 µg/L	November 2017
	TAV-MW10 (duplicate)	10.6 µg/L	February 2017
	TAV-MW12	5.73 µg/L	February 2017
		5.13 µg/L	June 2017
		5.87 µg/L	November 2017

NOTES:
[a] Analytical result for filtered groundwater sample. All other analytical results are for unfiltered groundwater samples
See notes at end of appendices.

Appendix B. 2017 Terrestrial Surveillance Analytical Results



Sandia foothills

Table B-1. Summary of radiological results in soil, 2017

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Americium-241	pCi/g	C-9	-0.0316 ± 0.0304	0.0479	U	BD	HASL 300
		pCi/g	C-10	0.0115 ± 0.0268	0.0231	U	BD	HASL 300
		pCi/g	C-25	-0.01 ± 0.0882	0.149	U	BD	HASL 300
	Cesium-137	pCi/g	C-9	0.156 ± 0.0381	0.0281		None	HASL 300
		pCi/g	C-10	0.276 ± 0.0393	0.0224		None	HASL 300
		pCi/g	C-25	0.163 ± 0.0388	0.0331		None	HASL 300
	Tritium	pCi/L	C-9	64.1 ± 97.9	168	U	BD	GL-RAD-A-002
		pCi/L	C-10	67.1 ± 97.2	166	U	BD	GL-RAD-A-002
		pCi/L	C-25	16.9 ± 92.7	167	U	BD	GL-RAD-A-002
	Uranium	mg/kg	C-9	0.507	0.0398		None	SW846 3050B/6020
On-Site	Americium-241	pCi/g	S-1	-0.00258 ± 0.0773	0.145	U	BD	HASL 300
		pCi/g	S-6	-0.00254 ± 0.0109	0.0202	U	BD	HASL 300
		pCi/g	S-33	-0.0515 ± 0.0791	0.115	U	BD	HASL 300
		pCi/g	S-34	0.0177 ± 0.0727	0.126	U	BD	HASL 300
		pCi/g	S-45	0.0379 ± 0.0692	0.124	U	BD	HASL 300
		pCi/g	S-46	0.0235 ± 0.0715	0.119	U	BD	HASL 300
		pCi/g	S-49	0.0366 ± 0.0809	0.117	U	BD	HASL 300
		pCi/g	S-51	0.0316 ± 0.0322	0.0394	U	BD	HASL 300
		pCi/g	S-53	-0.0162 ± 0.0607	0.0992	U	BD	HASL 300
		pCi/g	S-55	0.00491 ± 0.0124	0.0223	U	BD	HASL 300
		pCi/g	S-57	0.00231 ± 0.0166	0.0286	U	BD	HASL 300
		pCi/g	S-76	0.00546 ± 0.012	0.0211	U	BD	HASL 300
		pCi/g	S-77	-0.0107 ± 0.0622	0.104	U	BD	HASL 300
		pCi/g	S-86	0.00766 ± 0.0268	0.0453	U	BD	HASL 300
		pCi/g	S-90	0.00831 ± 0.0184	0.0153	U	BD	HASL 300
		pCi/g	S-92	0.00654 ± 0.0114	0.0201	U	BD	HASL 300
	Cesium-137	pCi/g	S-1	0.155 ± 0.04	0.0315		None	HASL 300
		pCi/g	S-6	0.186 ± 0.0229	0.0172		None	HASL 300
		pCi/g	S-33	0.317 ± 0.0309	0.0222		None	HASL 300

Table continued on next page.

Table B-1. Summary of radiological results in soil, 2017 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Cesium-137	pCi/g	S-34	0.0526 ± 0.0231	0.0215		J	HASL 300
		pCi/g	S-45	-0.00107 ± 0.0172	0.0279	U	BD	HASL 300
		pCi/g	S-46	0.118 ± 0.0262	0.0198		None	HASL 300
		pCi/g	S-49	0.221 ± 0.026	0.0186		None	HASL 300
		pCi/g	S-51	0.0832 ± 0.0266	0.0267		None	HASL 300
		pCi/g	S-53	0.0254 ± 0.0185	0.0175		J	HASL 300
		pCi/g	S-55	0.301 ± 0.025	0.016		None	HASL 300
		pCi/g	S-57	0.0198 ± 0.0224	0.0198	U	BD	HASL 300
		pCi/g	S-76	0.0622 ± 0.0254	0.0222		J	HASL 300
		pCi/g	S-77	0.309 ± 0.0344	0.0171		None	HASL 300
		pCi/g	S-86	0.0286 ± 0.0163	0.0172		J	HASL 300
		pCi/g	S-90	0.179 ± 0.0271	0.0156		None	HASL 300
		pCi/g	S-92	0.192 ± 0.0334	0.0199		None	HASL 300
	Tritium	pCi/L	S-1	81.5 ± 79.8	131	U	BD	GL-RAD-A-002
		pCi/L	S-6	78 ± 99	167	U	BD	GL-RAD-A-002
		pCi/L	S-33	-32.4 ± 84.6	158	U	BD	GL-RAD-A-002
		pCi/L	S-34	34.6 ± 87.9	154	U	BD	GL-RAD-A-002
		pCi/L	S-45	82.7 ± 98.1	164	U	BD	GL-RAD-A-002
		pCi/L	S-46	90.7 ± 89.1	147	U	BD	GL-RAD-A-002
		pCi/L	S-49	136 ± 97.8	155	U	BD	GL-RAD-A-002
		pCi/L	S-51	39 ± 95.4	169	U	BD	GL-RAD-A-002
		pCi/L	S-53	34.5 ± 85.2	149	U	BD	GL-RAD-A-002
		pCi/L	S-55	36 ± 94.6	167	U	BD	GL-RAD-A-002
		pCi/L	S-57	120 ± 102	164	U	BD	GL-RAD-A-002
		pCi/L	S-76	17.1 ± 93.8	169	U	BD	GL-RAD-A-002
		pCi/L	S-77	86 ± 94.1	156	U	BD	GL-RAD-A-002
		pCi/L	S-86	157 ± 97.9	151		J	GL-RAD-A-002
		pCi/L	S-92	-14 ± 81.7	153	U	BD	GL-RAD-A-002

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Table B-1. Summary of radiological results in soil, 2017 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Uranium	mg/kg	S-1	0.94	0.0389		None	SW846 3050B/6020
		mg/kg	S-6	0.359	0.0394		None	SW846 3050B/6020
		mg/kg	S-33	0.673	0.0391		None	SW846 3050B/6020
		mg/kg	S-34	0.512	0.0385		None	SW846 3050B/6020
		mg/kg	S-45	0.46	0.039		None	SW846 3050B/6020
		mg/kg	S-51	0.635	0.0366		None	SW846 3050B/6020
		mg/kg	S-53	0.326	0.0368		None	SW846 3050B/6020
		mg/kg	S-55	0.431	0.0376		None	SW846 3050B/6020
		mg/kg	S-57	1.1	0.0388		None	SW846 3050B/6020
		mg/kg	S-90	0.367	0.0398		None	SW846 3050B/6020
		mg/kg	S-92	0.518	0.0399		None	SW846 3050B/6020
Perimeter	Americium-241	pCi/g	P-4	-0.00115 ± 0.0664	0.129	U	BD	HASL 300
		pCi/g	P-5	0.0266 ± 0.043	0.0711	U	BD	HASL 300
		pCi/g	P-16	0.0251 ± 0.0283	0.0445	U	BD	HASL 300
		pCi/g	P-19	0.00404 ± 0.0476	0.0785	U	BD	HASL 300
		pCi/g	P-58	0.00132 ± 0.0122	0.0221	U	BD	HASL 300
		pCi/g	P-59	-0.0185 ± 0.0587	0.0987	U	BD	HASL 300
		pCi/g	P-61	0.0827 ± 0.101	0.17	U	BD	HASL 300
		pCi/g	P-63	-0.00915 ± 0.0326	0.0553	U	BD	HASL 300
		pCi/g	P-64	-0.00424 ± 0.0572	0.111	U	BD	HASL 300
		pCi/g	P-81	0.035 ± 0.0442	0.0738	U	BD	HASL 300
		pCi/g	P-82	0.0353 ± 0.053	0.0829	U	BD	HASL 300
		pCi/g	P-89	-0.0169 ± 0.0508	0.0861	U	BD	HASL 300
		pCi/g	P-95	0.00582 ± 0.0158	0.0272	U	BD	HASL 300
	Cesium-137	pCi/g	P-4	0.247 ± 0.0391	0.0264		None	HASL 300
		pCi/g	P-5	0.124 ± 0.0195	0.0152		None	HASL 300
		pCi/g	P-16	0.0641 ± 0.0188	0.0169		None	HASL 300
		pCi/g	P-19	0.715 ± 0.0477	0.0213		None	HASL 300
		pCi/g	P-58	0.0589 ± 0.0191	0.0189		None	HASL 300

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Table B-1. Summary of radiological results in soil, 2017 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Cesium-137	pCi/g	P-59	0.181 ± 0.027	0.0204		None	HASL 300
		pCi/g	P-61	0.00949 ± 0.0223	0.0421	U	BD	HASL 300
		pCi/g	P-63	0.275 ± 0.0249	0.0165		None	HASL 300
		pCi/g	P-64	0.322 ± 0.0337	0.0223		None	HASL 300
		pCi/g	P-81	0.323 ± 0.0421	0.031		None	HASL 300
		pCi/g	P-82	0.000641 ± 0.0112	0.0202	U	BD	HASL 300
		pCi/g	P-95	0.0623 ± 0.02	0.0211		J	HASL 300
	Tritium	pCi/L	P-4	-22.4 ± 83.2	154	U	BD	GL-RAD-A-002
		pCi/L	P-16	71.6 ± 99.7	170	U	BD	GL-RAD-A-002
		pCi/L	P-19	91.1 ± 101	169	U	BD	GL-RAD-A-002
		pCi/L	P-58	179 ± 113	170		J	GL-RAD-A-002
		pCi/L	P-59	176 ± 110	167		J	GL-RAD-A-002
		pCi/L	P-61	119 ± 103	165	U	BD	GL-RAD-A-002
		pCi/L	P-63	38.9 ± 87.8	153	U	BD	GL-RAD-A-002
		pCi/L	P-64	93 ± 99.9	165	U	BD	GL-RAD-A-002
		pCi/L	P-81	-28.9 ± 82.8	154	U	BD	GL-RAD-A-002
		pCi/L	P-82	72.2 ± 88.8	149	U	BD	GL-RAD-A-002
		pCi/L	P-89	65.3 ± 96.6	165	U	BD	GL-RAD-A-002
		pCi/L	P-95	-19.6 ± 80.2	148	U	BD	GL-RAD-A-002
	Uranium	mg/kg	P-4	0.339	0.038		None	SW846 3050B/6020
		mg/kg	P-16	0.718	0.0391		None	SW846 3050B/6020
		mg/kg	P-19	0.426	0.0394		None	SW846 3050B/6020
		mg/kg	P-58	0.686	0.0373		None	SW846 3050B/6020
		mg/kg	P-61	0.565	0.04		None	SW846 3050B/6020
		mg/kg	P-64	0.978	0.037		None	SW846 3050B/6020
		mg/kg	P-81	0.447	0.038		None	SW846 3050B/6020
		mg/kg	P-82	0.894	0.0398		None	SW846 3050B/6020
		mg/kg	P-89	0.512	0.039		None	SW846 3050B/6020
		mg/kg	P-95	0.301	0.0382		None	SW846 3050B/6020

See notes at end of appendices.

Table B-2. Summary of radiological results in sediment, 2017

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Americium-241	pCi/g	C-8	-0.000817 ± 0.0568	0.0986	U	BD	HASL 300
		pCi/g	C-68	-0.00407 ± 0.0438	0.0783	U	BD	HASL 300
	Cesium-137	pCi/g	C-8	0.0533 ± 0.0185	0.0161		None	HASL 300
		pCi/g	C-68	0.0289 ± 0.0139	0.0175		J	HASL 300
	Tritium	pCi/L	C-8	204 ± 147	239	U	BD	GL-RAD-A-002
		pCi/L	C-68	16.1 ± 92.4	167	U	BD	GL-RAD-A-002
	Uranium	mg/kg	C-68	0.866	0.0387		None	SW846 3050B/6020
On-Site	Americium-241	pCi/g	S-72	-0.0142 ± 0.0626	0.103	U	BD	HASL 300
		pCi/g	S-74N	-0.00966 ± 0.0167	0.0276	U	BD	HASL 300
		pCi/g	S-75	0.00648 ± 0.0733	0.133	U	BD	HASL 300
		pCi/g	S-83	0.0337 ± 0.0491	0.085	U	BD	HASL 300
		pCi/g	S-85	-0.0554 ± 0.0575	0.0871	U	BD	HASL 300
		pCi/g	S-91	0.037 ± 0.111	0.106	U	BD	HASL 300
	Cesium-137	pCi/g	S-72	0.0795 ± 0.024	0.0211		None	HASL 300
		pCi/g	S-74N	0.0201 ± 0.0191	0.0211	U	BD	HASL 300
		pCi/g	S-75	0.0401 ± 0.0201	0.018		J	HASL 300
		pCi/g	S-83	0.0921 ± 0.0238	0.0175		None	HASL 300
		pCi/g	S-85	0.179 ± 0.0298	0.02		None	HASL 300
		pCi/g	S-91	0.0699 ± 0.0214	0.016		None	HASL 300
	Tritium	pCi/L	S-72	69.8 ± 97.2	165	U	BD	GL-RAD-A-002
		pCi/L	S-83	115 ± 84.6	135	U	BD	GL-RAD-A-002
		pCi/L	S-85	173 ± 107	163		J	GL-RAD-A-002
	Uranium	mg/kg	S-72	0.907	0.0385		None	SW846 3050B/6020
		mg/kg	S-74N	0.782	0.0378		None	SW846 3050B/6020
		mg/kg	S-75	0.762	0.037		None	SW846 3050B/6020
		mg/kg	S-83	0.697	0.0397		None	SW846 3050B/6020
		mg/kg	S-85	0.903	0.0373		None	SW846 3050B/6020
		mg/kg	S-91	0.601	0.0398		None	SW846 3050B/6020

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Table B-2. Summary of radiological results in sediment, 2017 (continued)

Location Classification	Analyte	Units	Location	Activity	MDA	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Americium-241	pCi/g	P-60	-0.00607 ± 0.0608	0.108	U	BD	HASL 300
		pCi/g	P-73	0.000642 ± 0.0241	0.0459	U	BD	HASL 300
	Cesium-137	pCi/g	P-60	-.00778 ± .0146	0.0223	U	BD	HASL 300
		pCi/g	P-73	-.00902 ± .0156	0.0172	U	BD	HASL 300
	Tritium	pCi/L	P-60	73.5 ± 99.3	168	U	BD	GL-RAD-A-002
	Uranium	mg/kg	P-60	0.663	0.0388		None	SW846 3050B/6020
		mg/kg	P-73	1.27	0.0377		None	SW846 3050B/6020

See notes at end of appendices.

Table B-3. Summary of thermoluminescent dosimeter measurements, fiscal year 2017

Location Classification	Location Number	1st Quarter (85 Days)		2nd Quarter (83 Days)		3rd Quarter (93 Days)		4th Quarter (84 Days)	
		Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error	Exposure (mR)	Error
Community	C-10	36.5	0.9	37.2	1.2	36.1	2.2	33.8	1.9
	C-21	34.2	0.9	33.2	5.8	33.4	5.8	32.4	5.7
	C-22	31.2	1	31.4	0.7	29.9	2.2	25.5	2.5
	C-23	27.6	1.6	27.7	1.3	26.7	2.2	22.1	1.6
	C-25	29.7	1.2	30.2	1	29	2.5	24	1.7
	C-26	33	1	34	0.9	29.3	2.1	26.8	2.2
	C-30	31.7	0.9	32.8	0.8	27.2	2.3	24.3	1.6
On-Site	S-1	35.7	1.5	30.4	1.1	32.4	2.1	27.4	1.9
	S-6	32	1.2	29.6	0.8	28.1	2.3	21.1	1.8
	S-7	33.9	2	30.5	0.7	30.1	1.6	27	2
	S-20	35.8	0.9	32.7	0.9	31.2	2.1	28.1	4.1
	S-45	34.8	2.1	31.2	0.7	34.3	4.6	25.6	2.1
	S-46	38.5	1.2	31.6	5.4	30.4	5.3	23.5	4.6
	S-48	38.4	0.9	32.2	2.3	32.3	1.6	26.4	2.8
Perimeter	P-4	32.9	1.1	29.6	0.8	31.3	3	25.8	2.2
	P-5	32.2	1.1	26.4	1.4	26.3	1.6	21.7	1.8
	P-16	40.3	2	37.1	0.7	36	2.5	30.3	3
	P-19	36.9	0.9	32.2	0.7	31.8	1.6	29.3	2.7
	P-39	36.3	1.3	30.4	1.1	32.4	3.2	28.5	3.1
	P-40	33.6	1.6	30.3	0.9	28.4	1.7	25.6	2.6
	P-81	32.8	2.7	31.3	0.8	31	2.2	24.4	1.8

See notes at end of appendices.

Table B-4. Summary of nonradiological results in soil, 2017

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Aluminum	C-9	15500	45.3	99.6	N	J	SW846 3050B/6020
	Antimony	C-9	0.736	0.311	0.943	J	0.94UJ	SW846 3050B/6010B
	Arsenic	C-9	4.02	0.337	0.996	*	J	SW846 3050B/6020
	Beryllium	C-9	0.638	0.0199	0.0996	N	None	SW846 3050B/6020
	Cadmium	C-9	0.189	0.0199	0.199	*J	None	SW846 3050B/6020
	Chromium	C-9	15.7	0.199	0.598	N	J	SW846 3050B/6020
	Copper	C-9	11	0.0657	0.199	N	J	SW846 3050B/6020
	Iron	C-9	15200	65.7	199	N	J	SW846 3050B/6020
	Lead	C-9	15.4	0.0996	0.398	*N	J	SW846 3050B/6020
	Magnesium	C-9	4550	1.99	5.98	N	None	SW846 3050B/6020
	Nickel	C-9	12.8	0.0996	0.398	N	J	SW846 3050B/6020
	Selenium	C-9	0.809	0.359	0.996	J	None	SW846 3050B/6020
	Silver	C-9	0.0943	0.0943	0.472	U	UJ	SW846 3050B/6010B
	Thallium	C-9	0.139	0.139	0.398	U	None	SW846 3050B/6020
	Zinc	C-9	38.4	0.797	1.99		J	SW846 3050B/6020
On-Site	Aluminum	S-1	17200	44.3	97.3		J	SW846 3050B/6020
	Antimony	S-1	0.326	0.326	0.988	NU	UJ	SW846 3050B/6010B
	Arsenic	S-1	3.64	0.329	0.973		None	SW846 3050B/6020
	Beryllium	S-1	0.761	0.0195	0.0973		None	SW846 3050B/6020
	Cadmium	S-1	0.325	0.0195	0.195		None	SW846 3050B/6020
	Chromium	S-1	15.7	0.195	0.584		None	SW846 3050B/6020
	Copper	S-1	17.1	0.0642	0.195	N	J	SW846 3050B/6020
	Iron	S-1	19700	64.2	195		J	SW846 3050B/6020
	Lead	S-1	18.7	0.0973	0.389		None	SW846 3050B/6020
	Magnesium	S-1	6630	1.95	5.84	N	None	SW846 3050B/6020
	Nickel	S-1	15.5	0.0973	0.389		None	SW846 3050B/6020
	Selenium	S-1	1.77	0.35	0.973	N	J	SW846 3050B/6020
	Thallium	S-1	0.261	0.136	0.389	J	None	SW846 3050B/6020
	Zinc	S-1	62.1	0.778	1.95	N	J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-6	8700	4.48	9.84	N	J	SW846 3050B/6020
	Antimony	S-6	0.324	0.324	0.982	U	0.98UJ	SW846 3050B/6010B
	Arsenic	S-6	2.04	0.333	0.984		None	SW846 3050B/6020
	Beryllium	S-6	0.385	0.0197	0.0984		None	SW846 3050B/6020
	Cadmium	S-6	0.102	0.0197	0.197	J	None	SW846 3050B/6020
	Chromium	S-6	7.54	0.197	0.591		None	SW846 3050B/6020
	Copper	S-6	6.44	0.065	0.197		None	SW846 3050B/6020
	Iron	S-6	7570	6.5	19.7	N	J	SW846 3050B/6020
	Lead	S-6	6.17	0.0978	0.391	N	J	SW846 3050B/6020
	Magnesium	S-6	2080	1.97	5.91	N	None	SW846 3050B/6020
	Nickel	S-6	5.58	0.0984	0.394		None	SW846 3050B/6020
	Selenium	S-6	0.902	0.354	0.984	JN	None	SW846 3050B/6020
	Silver	S-6	0.0982	0.0982	0.491	U	None	SW846 3050B/6010B
	Thallium	S-6	0.138	0.138	0.394	U	None	SW846 3050B/6020
	Zinc	S-6	22.2	0.787	1.97	N	J	SW846 3050B/6020
	Aluminum	S-33	12600	44.4	97.7	N	J	SW846 3050B/6020
	Antimony	S-33	0.665	0.322	0.977	J	0.98UJ	SW846 3050B/6010B
	Arsenic	S-33	3.57	0.33	0.977		None	SW846 3050B/6020
	Beryllium	S-33	0.537	0.0195	0.0977		None	SW846 3050B/6020
	Cadmium	S-33	0.259	0.0195	0.195		None	SW846 3050B/6020
	Chromium	S-33	12.4	0.195	0.586		None	SW846 3050B/6020
	Copper	S-33	8.6	0.0645	0.195		None	SW846 3050B/6020
	Iron	S-33	13200	64.5	195	N	J	SW846 3050B/6020
	Lead	S-33	9.52	0.0971	0.388	N	J	SW846 3050B/6020
	Magnesium	S-33	4140	1.95	5.86	N	None	SW846 3050B/6020
	Nickel	S-33	10.8	0.0977	0.391		None	SW846 3050B/6020
	Selenium	S-33	1.17	0.352	0.977	N	None	SW846 3050B/6020
	Thallium	S-33	0.137	0.137	0.391	U	None	SW846 3050B/6020
	Zinc	S-33	36.6	0.781	1.95	N	J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-34	18900	43.8	96.3	N	J	SW846 3050B/6020
	Antimony	S-34	0.329	0.329	0.998	U	None	SW846 3050B/6010B
	Arsenic	S-34	4.52	0.326	0.963		None	SW846 3050B/6020
	Beryllium	S-34	0.761	0.0193	0.0963		None	SW846 3050B/6020
	Cadmium	S-34	0.163	0.0193	0.193	J	None	SW846 3050B/6020
	Chromium	S-34	15.9	0.193	0.578		None	SW846 3050B/6020
	Copper	S-34	9.83	0.0636	0.193		None	SW846 3050B/6020
	Iron	S-34	16300	63.6	193	N	J	SW846 3050B/6020
	Lead	S-34	12.2	0.0967	0.387	N	J	SW846 3050B/6020
	Magnesium	S-34	4390	1.93	5.78	N	None	SW846 3050B/6020
	Nickel	S-34	13.1	0.0963	0.385		None	SW846 3050B/6020
	Selenium	S-34	1.35	0.347	0.963	N	None	SW846 3050B/6020
	Silver	S-34	0.0998	0.0998	0.499	U	None	SW846 3050B/6010B
	Thallium	S-34	0.166	0.135	0.385	J	None	SW846 3050B/6020
	Zinc	S-34	40.8	0.771	1.93	N	J	SW846 3050B/6020
	Aluminum	S-45	11700	44.3	97.5	N	J	SW846 3050B/6020
	Antimony	S-45	0.317	0.317	0.962	U	0.96UJ	SW846 3050B/6010B
	Arsenic	S-45	2.9	0.329	0.975		None	SW846 3050B/6020
	Beryllium	S-45	0.478	0.0195	0.0975		None	SW846 3050B/6020
	Cadmium	S-45	0.125	0.0195	0.195	J	None	SW846 3050B/6020
	Chromium	S-45	9.02	0.195	0.585		None	SW846 3050B/6020
	Copper	S-45	5.97	0.0643	0.195		None	SW846 3050B/6020
	Iron	S-45	8830	6.43	19.5	N	J	SW846 3050B/6020
	Lead	S-45	7.24	0.0967	0.387	N	J	SW846 3050B/6020
	Magnesium	S-45	3140	1.95	5.85	N	None	SW846 3050B/6020
	Nickel	S-45	6.7	0.0975	0.39		None	SW846 3050B/6020
	Selenium	S-45	1.34	0.351	0.975	N	None	SW846 3050B/6020
	Silver	S-45	0.0962	0.0962	0.481	U	None	SW846 3050B/6010B
	Thallium	S-45	0.136	0.136	0.39	U	None	SW846 3050B/6020
	Zinc	S-45	26.5	0.78	1.95	N	J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-51	13200	41.7	91.6	N	J	SW846 3050B/6020
	Antimony	S-51	0.3	0.3	0.909	NU	None	SW846 3050B/6010B
	Arsenic	S-51	3.11	0.31	0.916		None	SW846 3050B/6020
	Beryllium	S-51	0.597	0.0183	0.0916		None	SW846 3050B/6020
	Cadmium	S-51	0.101	0.0183	0.183	J	None	SW846 3050B/6020
	Chromium	S-51	65.4	0.183	0.549		None	SW846 3050B/6020
	Copper	S-51	12.8	0.0604	0.183		None	SW846 3050B/6020
	Iron	S-51	11500	60.4	183		J	SW846 3050B/6020
	Lead	S-51	12.7	0.0916	0.366		None	SW846 3050B/6020
	Magnesium	S-51	3670	1.83	5.49		None	SW846 3050B/6020
	Nickel	S-51	9.9	0.0916	0.366		None	SW846 3050B/6020
	Selenium	S-51	0.696	0.33	0.916	JN	J	SW846 3050B/6020
	Silver	S-51	0.0909	0.0909	0.455	U	None	SW846 3050B/6010B
	Thallium	S-51	0.128	0.128	0.366	U	None	SW846 3050B/6020
	Zinc	S-51	99	0.733	1.83		J	SW846 3050B/6020
	Aluminum	S-53	11300	41.8	91.9		J	SW846 3050B/6020
	Antimony	S-53	0.311	0.311	0.942	NU	UJ	SW846 3050B/6010B
	Arsenic	S-53	2.36	0.311	0.919		None	SW846 3050B/6020
	Beryllium	S-53	0.502	0.0184	0.0919		None	SW846 3050B/6020
	Cadmium	S-53	0.114	0.0184	0.184	J	None	SW846 3050B/6020
	Chromium	S-53	9.01	0.184	0.551		None	SW846 3050B/6020
	Copper	S-53	7.12	0.0607	0.184	N	J	SW846 3050B/6020
	Iron	S-53	10200	60.7	184		J	SW846 3050B/6020
	Lead	S-53	8.35	0.0919	0.368		None	SW846 3050B/6020
	Magnesium	S-53	2640	1.84	5.51	N	None	SW846 3050B/6020
	Nickel	S-53	7.26	0.0919	0.368		None	SW846 3050B/6020
	Selenium	S-53	0.724	0.331	0.919	JN	J	SW846 3050B/6020
	Silver	S-53	0.0942	0.0942	0.471	U	None	SW846 3050B/6010B
	Thallium	S-53	0.129	0.129	0.368	U	None	SW846 3050B/6020
	Zinc	S-53	24.1	0.735	1.84	N	J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-55	12200	42.8	94	N	J	SW846 3050B/6020
	Antimony	S-55	0.394	0.315	0.954	J	J+	SW846 3050B/6010B
	Arsenic	S-55	2.62	0.318	0.94		None	SW846 3050B/6020
	Beryllium	S-55	0.428	0.0188	0.094		None	SW846 3050B/6020
	Cadmium	S-55	0.151	0.0188	0.188	J	None	SW846 3050B/6020
	Chromium	S-55	8.44	0.188	0.564		None	SW846 3050B/6020
	Copper	S-55	6.08	0.062	0.188		None	SW846 3050B/6020
	Iron	S-55	8420	6.2	18.8	N	J	SW846 3050B/6020
	Lead	S-55	7.2	0.0973	0.389	N	J	SW846 3050B/6020
	Magnesium	S-55	3240	1.88	5.64	N	None	SW846 3050B/6020
	Nickel	S-55	6.7	0.094	0.376		None	SW846 3050B/6020
	Selenium	S-55	1.04	0.338	0.94	N	None	SW846 3050B/6020
	Silver	S-55	0.0954	0.0954	0.477	U	None	SW846 3050B/6010B
	Thallium	S-55	0.132	0.132	0.376	U	None	SW846 3050B/6020
	Zinc	S-55	26.7	0.752	1.88	N	J	SW846 3050B/6020
	Aluminum	S-57	7800	4.41	9.69	N	J	SW846 3050B/6020
	Antimony	S-57	0.506	0.303	0.919	JN	None	SW846 3050B/6010B
	Arsenic	S-57	3.19	0.328	0.969		None	SW846 3050B/6020
	Beryllium	S-57	0.271	0.0194	0.0969		None	SW846 3050B/6020
	Cadmium	S-57	0.212	0.0194	0.194		None	SW846 3050B/6020
	Chromium	S-57	7.63	0.194	0.581		None	SW846 3050B/6020
	Copper	S-57	9.73	0.064	0.194		None	SW846 3050B/6020
	Iron	S-57	10700	64	194		J	SW846 3050B/6020
	Lead	S-57	6.8	0.0969	0.388		None	SW846 3050B/6020
	Magnesium	S-57	4280	1.94	5.81		None	SW846 3050B/6020
	Nickel	S-57	6.71	0.0969	0.388		None	SW846 3050B/6020
	Selenium	S-57	0.815	0.349	0.969	JN	J	SW846 3050B/6020
	Silver	S-57	0.0919	0.0919	0.46	U	None	SW846 3050B/6010B
	Thallium	S-57	0.136	0.136	0.388	U	None	SW846 3050B/6020
	Zinc	S-57	70.9	0.775	1.94		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Aluminum	S-90	7390	45.3	99.6		J	SW846 3050B/6020
	Antimony	S-90	0.317	0.317	0.96	U	UJ	SW846 3050B/6010B
	Arsenic	S-90	1.56	0.337	0.996		None	SW846 3050B/6020
	Beryllium	S-90	0.331	0.0199	0.0996		None	SW846 3050B/6020
	Cadmium	S-90	0.123	0.0199	0.199	J	None	SW846 3050B/6020
	Chromium	S-90	6.95	0.199	0.598		None	SW846 3050B/6020
	Copper	S-90	5.37	0.0657	0.199		None	SW846 3050B/6020
	Iron	S-90	6900	65.7	199		J	SW846 3050B/6020
	Lead	S-90	7.45	0.0996	0.398		None	SW846 3050B/6020
	Magnesium	S-90	1700	19.9	59.8	B	None	SW846 3050B/6020
	Nickel	S-90	5.3	0.0996	0.398		None	SW846 3050B/6020
	Selenium	S-90	0.747	0.359	0.996	JN	J	SW846 3050B/6020
	Silver	S-90	0.096	0.096	0.48	U	None	SW846 3050B/6010B
	Thallium	S-90	0.139	0.139	0.398	U	None	SW846 3050B/6020
	Zinc	S-90	21.1	0.797	1.99		None	SW846 3050B/6020
	Aluminum	S-92	8370	4.54	9.98	N	J	SW846 3050B/6020
	Antimony	S-92	0.318	0.307	0.929	JN	None	SW846 3050B/6010B
	Arsenic	S-92	2	0.337	0.998		None	SW846 3050B/6020
	Beryllium	S-92	0.407	0.02	0.0998		None	SW846 3050B/6020
	Cadmium	S-92	0.126	0.02	0.2	J	None	SW846 3050B/6020
	Chromium	S-92	8.43	0.2	0.599		None	SW846 3050B/6020
	Copper	S-92	7.09	0.0659	0.2		None	SW846 3050B/6020
	Iron	S-92	8790	6.59	20		J	SW846 3050B/6020
	Lead	S-92	8.89	0.0998	0.399		None	SW846 3050B/6020
	Magnesium	S-92	2030	2	5.99		None	SW846 3050B/6020
	Nickel	S-92	6.76	0.0998	0.399		None	SW846 3050B/6020
	Selenium	S-92	0.703	0.359	0.998	JN	J	SW846 3050B/6020
	Silver	S-92	0.0929	0.0929	0.465	U	None	SW846 3050B/6010B
	Thallium	S-92	0.14	0.14	0.399	U	None	SW846 3050B/6020
	Zinc	S-92	27	0.798	2		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-4	9220	4.32	9.49	N	J	SW846 3050B/6020
	Antimony	P-4	0.328	0.328	0.994	U	None	SW846 3050B/6010B
	Arsenic	P-4	2.12	0.321	0.949		None	SW846 3050B/6020
	Beryllium	P-4	0.357	0.019	0.0949		None	SW846 3050B/6020
	Cadmium	P-4	0.142	0.019	0.19	J	None	SW846 3050B/6020
	Chromium	P-4	7.94	0.19	0.569		None	SW846 3050B/6020
	Copper	P-4	5.38	0.0626	0.19		None	SW846 3050B/6020
	Iron	P-4	7890	6.26	19	N	J	SW846 3050B/6020
	Lead	P-4	8.66	0.0912	0.365	N	J	SW846 3050B/6020
	Magnesium	P-4	2900	1.9	5.69	N	None	SW846 3050B/6020
	Nickel	P-4	6.35	0.0949	0.38		None	SW846 3050B/6020
	Selenium	P-4	0.954	0.342	0.949	N	None	SW846 3050B/6020
	Silver	P-4	0.0994	0.0994	0.497	U	None	SW846 3050B/6010B
	Thallium	P-4	0.133	0.133	0.38	U	None	SW846 3050B/6020
	Zinc	P-4	23.6	0.759	1.9	N	J	SW846 3050B/6020
	Aluminum	P-16	11800	44.5	97.8	N	J	SW846 3050B/6020
	Antimony	P-16	0.312	0.312	0.945	NU	None	SW846 3050B/6010B
	Arsenic	P-16	2.33	0.331	0.978		None	SW846 3050B/6020
	Beryllium	P-16	0.492	0.0196	0.0978		None	SW846 3050B/6020
	Cadmium	P-16	0.117	0.0196	0.196	J	None	SW846 3050B/6020
	Chromium	P-16	7.82	0.196	0.587		None	SW846 3050B/6020
	Copper	P-16	9.94	0.0646	0.196		None	SW846 3050B/6020
	Iron	P-16	15800	64.6	196		J	SW846 3050B/6020
	Lead	P-16	8.45	0.0978	0.391		None	SW846 3050B/6020
	Magnesium	P-16	4490	1.96	5.87		None	SW846 3050B/6020
	Nickel	P-16	8.7	0.0978	0.391		None	SW846 3050B/6020
	Selenium	P-16	0.982	0.352	0.978	N	J	SW846 3050B/6020
	Silver	P-16	0.0945	0.0945	0.473	U	None	SW846 3050B/6010B
	Thallium	P-16	0.14	0.137	0.391	J	None	SW846 3050B/6020
	Zinc	P-16	40.4	0.783	1.96		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-19	11500	44.9	98.6	N	J	SW846 3050B/6020
	Antimony	P-19	0.319	0.319	0.967	NU	None	SW846 3050B/6010B
	Arsenic	P-19	2.41	0.333	0.986		None	SW846 3050B/6020
	Beryllium	P-19	0.43	0.0197	0.0986		None	SW846 3050B/6020
	Cadmium	P-19	0.197	0.0197	0.197		None	SW846 3050B/6020
	Chromium	P-19	13.3	0.197	0.592		None	SW846 3050B/6020
	Copper	P-19	11.3	0.0651	0.197		None	SW846 3050B/6020
	Iron	P-19	13600	65.1	197		J	SW846 3050B/6020
	Lead	P-19	17.3	0.0986	0.394		None	SW846 3050B/6020
	Magnesium	P-19	3800	1.97	5.92		None	SW846 3050B/6020
	Nickel	P-19	11.2	0.0986	0.394		None	SW846 3050B/6020
	Selenium	P-19	0.658	0.355	0.986	JN	J	SW846 3050B/6020
	Silver	P-19	0.0967	0.0967	0.484	U	None	SW846 3050B/6010B
	Thallium	P-19	0.138	0.138	0.394	U	None	SW846 3050B/6020
	Zinc	P-19	38.5	0.789	1.97		J	SW846 3050B/6020
	Aluminum	P-58	10300	42.4	93.3	N	J	SW846 3050B/6020
	Antimony	P-58	0.319	0.319	0.965	NU	None	SW846 3050B/6010B
	Arsenic	P-58	3.35	0.315	0.933		None	SW846 3050B/6020
	Beryllium	P-58	0.392	0.0187	0.0933		None	SW846 3050B/6020
	Cadmium	P-58	0.209	0.0187	0.187		None	SW846 3050B/6020
	Chromium	P-58	9.49	0.187	0.56		None	SW846 3050B/6020
	Copper	P-58	9.93	0.0616	0.187		None	SW846 3050B/6020
	Iron	P-58	12700	61.6	187		J	SW846 3050B/6020
	Lead	P-58	13.7	0.0933	0.373		None	SW846 3050B/6020
	Magnesium	P-58	4910	1.87	5.6		None	SW846 3050B/6020
	Nickel	P-58	9.26	0.0933	0.373		None	SW846 3050B/6020
	Selenium	P-58	0.664	0.336	0.933	JN	J	SW846 3050B/6020
	Silver	P-58	0.0965	0.0965	0.483	U	None	SW846 3050B/6010B
	Thallium	P-58	0.131	0.131	0.373	U	None	SW846 3050B/6020
	Zinc	P-58	36.5	0.746	1.87		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-61	7300	4.55	10	N	J	SW846 3050B/6020
	Antimony	P-61	0.322	0.322	0.977	U	None	SW846 3050B/6010B
	Arsenic	P-61	2.98	0.338	1	*	J	SW846 3050B/6020
	Beryllium	P-61	0.324	0.02	0.1	N	None	SW846 3050B/6020
	Cadmium	P-61	0.188	0.02	0.2	*J	None	SW846 3050B/6020
	Chromium	P-61	6.57	0.2	0.6	N	J	SW846 3050B/6020
	Copper	P-61	6.5	0.066	0.2	N	J	SW846 3050B/6020
	Iron	P-61	7290	6.6	20	N	J	SW846 3050B/6020
	Lead	P-61	7.63	0.1	0.4	*N	J	SW846 3050B/6020
	Magnesium	P-61	3180	2	6	N	None	SW846 3050B/6020
	Nickel	P-61	5.56	0.1	0.4	N	J	SW846 3050B/6020
	Selenium	P-61	0.596	0.36	1	J	None	SW846 3050B/6020
	Silver	P-61	0.0977	0.0977	0.488	U	UJ	SW846 3050B/6010B
	Thallium	P-61	0.14	0.14	0.4	U	None	SW846 3050B/6020
	Zinc	P-61	22.7	0.8	2		J	SW846 3050B/6020
	Aluminum	P-64	14300	52.7	116	N	J	SW846 3050B/6020
	Antimony	P-64	0.329	0.329	0.998	NU	None	SW846 3050B/6010B
	Arsenic	P-64	2.65	0.313	0.926		None	SW846 3050B/6020
	Beryllium	P-64	0.451	0.0185	0.0926		None	SW846 3050B/6020
	Cadmium	P-64	0.156	0.0185	0.185	J	None	SW846 3050B/6020
	Chromium	P-64	6.49	0.185	0.556		None	SW846 3050B/6020
	Copper	P-64	13.7	0.0611	0.185		None	SW846 3050B/6020
	Iron	P-64	30600	76.4	231		J	SW846 3050B/6020
	Lead	P-64	9.71	0.0926	0.37		None	SW846 3050B/6020
	Magnesium	P-64	10900	23.1	69.4		None	SW846 3050B/6020
	Nickel	P-64	10.8	0.0926	0.37		None	SW846 3050B/6020
	Selenium	P-64	1.95	0.333	0.926	N	J	SW846 3050B/6020
	Silver	P-64	0.0998	0.0998	0.499	U	None	SW846 3050B/6010B
	Thallium	P-64	0.13	0.13	0.37	U	None	SW846 3050B/6020
	Zinc	P-64	88.1	0.741	1.85		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-81	10500	43.3	95.1	N	J	SW846 3050B/6020
	Antimony	P-81	0.316	0.316	0.958	U	None	SW846 3050B/6010B
	Arsenic	P-81	1.83	0.321	0.951		None	SW846 3050B/6020
	Beryllium	P-81	0.483	0.019	0.0951		None	SW846 3050B/6020
	Cadmium	P-81	0.151	0.019	0.19	J	None	SW846 3050B/6020
	Chromium	P-81	8.64	0.19	0.57		None	SW846 3050B/6020
	Copper	P-81	7.71	0.0627	0.19		None	SW846 3050B/6020
	Iron	P-81	8910	6.27	19	N	J	SW846 3050B/6020
	Lead	P-81	10.4	0.0962	0.385	N	J	SW846 3050B/6020
	Magnesium	P-81	2460	1.9	5.7	N	None	SW846 3050B/6020
	Nickel	P-81	6.56	0.0951	0.38		None	SW846 3050B/6020
	Selenium	P-81	0.99	0.342	0.951	N	None	SW846 3050B/6020
	Silver	P-81	0.0958	0.0958	0.479	U	None	SW846 3050B/6010B
	Thallium	P-81	0.133	0.133	0.38	U	None	SW846 3050B/6020
	Zinc	P-81	26.9	0.76	1.9	N	J	SW846 3050B/6020
	Aluminum	P-82	11800	45.2	99.4	N	J	SW846 3050B/6020
	Antimony	P-82	0.567	0.305	0.924	JN	J+	SW846 3050B/6010B
	Arsenic	P-82	4.72	0.336	0.994		None	SW846 3050B/6020
	Beryllium	P-82	0.453	0.0199	0.0994		None	SW846 3050B/6020
	Cadmium	P-82	0.115	0.0199	0.199	J	None	SW846 3050B/6020
	Chromium	P-82	8.64	0.199	0.596		None	SW846 3050B/6020
	Copper	P-82	7.14	0.0656	0.199		None	SW846 3050B/6020
	Iron	P-82	11000	65.6	199		J	SW846 3050B/6020
	Lead	P-82	6.97	0.0994	0.398		None	SW846 3050B/6020
	Magnesium	P-82	4920	1.99	5.96		None	SW846 3050B/6020
	Nickel	P-82	8.4	0.0994	0.398		None	SW846 3050B/6020
	Selenium	P-82	0.765	0.358	0.994	JN	J	SW846 3050B/6020
	Silver	P-82	0.0924	0.0924	0.462	U	None	SW846 3050B/6010B
	Thallium	P-82	0.139	0.139	0.398	U	None	SW846 3050B/6020
	Zinc	P-82	24.6	0.795	1.99		J	SW846 3050B/6020

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Table B-4. Summary of nonradiological results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Aluminum	P-89	8200	4.43	9.75	N	J	SW846 3050B/6020
	Antimony	P-89	0.315	0.315	0.956	U	None	SW846 3050B/6010B
	Arsenic	P-89	2.9	0.329	0.975	*	J	SW846 3050B/6020
	Beryllium	P-89	0.303	0.0195	0.0975	N	None	SW846 3050B/6020
	Cadmium	P-89	0.0813	0.0195	0.195	*J	None	SW846 3050B/6020
	Chromium	P-89	6.31	0.195	0.585	N	J	SW846 3050B/6020
	Copper	P-89	4.51	0.0643	0.195	N	J	SW846 3050B/6020
	Iron	P-89	6940	6.43	19.5	N	J	SW846 3050B/6020
	Lead	P-89	3.97	0.0975	0.39	*N	J	SW846 3050B/6020
	Magnesium	P-89	4090	1.95	5.85	N	None	SW846 3050B/6020
	Nickel	P-89	5.43	0.0975	0.39	N	J	SW846 3050B/6020
	Selenium	P-89	0.598	0.351	0.975	J	None	SW846 3050B/6020
	Silver	P-89	0.478	0.478	2.39	U	UJ	SW846 3050B/6010B
	Thallium	P-89	0.136	0.136	0.39	U	None	SW846 3050B/6020
	Zinc	P-89	16	0.78	1.95		J	SW846 3050B/6020
	Aluminum	P-95	9420	43.4	95.4	N	J	SW846 3050B/6020
	Antimony	P-95	0.325	0.325	0.984	U	None	SW846 3050B/6010B
	Arsenic	P-95	2.16	0.323	0.954		None	SW846 3050B/6020
	Beryllium	P-95	0.411	0.0191	0.0954		None	SW846 3050B/6020
	Cadmium	P-95	0.11	0.0191	0.191	J	None	SW846 3050B/6020
	Chromium	P-95	8.4	0.191	0.573		None	SW846 3050B/6020
	Copper	P-95	6.05	0.063	0.191		None	SW846 3050B/6020
	Iron	P-95	7860	6.3	19.1	N	J	SW846 3050B/6020
	Lead	P-95	10.8	0.0943	0.377	N	J	SW846 3050B/6020
	Magnesium	P-95	2830	1.91	5.73	N	None	SW846 3050B/6020
	Nickel	P-95	6.51	0.0954	0.382		None	SW846 3050B/6020
	Selenium	P-95	0.893	0.344	0.954	JN	None	SW846 3050B/6020
	Silver	P-95	0.0984	0.0984	0.492	U	None	SW846 3050B/6010B
	Thallium	P-95	0.134	0.134	0.382	U	None	SW846 3050B/6020
	Zinc	P-95	22.7	0.763	1.91	N	J	SW846 3050B/6020

See notes at end of appendices.

Table B-5. Summary of nonradiological results in sediment, 2017

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Community	Aluminum	C-68	7170	4.4	9.67	N	J	SW846 3050B/6020
	Antimony	C-68	0.78	0.325	0.984	J	0.98UJ	SW846 3050B/6010B
	Arsenic	C-68	5.45	0.327	0.967	*	J	SW846 3050B/6020
	Beryllium	C-68	0.363	0.0193	0.0967	N	None	SW846 3050B/6020
	Cadmium	C-68	0.168	0.0193	0.193	*J	None	SW846 3050B/6020
	Chromium	C-68	9.09	0.193	0.58	N	J	SW846 3050B/6020
	Copper	C-68	5.79	0.0638	0.193	N	J	SW846 3050B/6020
	Iron	C-68	8120	6.38	19.3	N	J	SW846 3050B/6020
	Lead	C-68	12.5	0.0967	0.387	*N	J	SW846 3050B/6020
	Magnesium	C-68	3150	1.93	5.8	N	None	SW846 3050B/6020
	Nickel	C-68	9.71	0.0967	0.387	N	J	SW846 3050B/6020
	Selenium	C-68	0.73	0.348	0.967	J	None	SW846 3050B/6020
	Silver	C-68	0.492	0.492	2.46	U	UJ	SW846 3050B/6010B
	Thallium	C-68	0.135	0.135	0.387	U	None	SW846 3050B/6020
	Zinc	C-68	26.2	0.774	1.93		J	SW846 3050B/6020
On-Site	Aluminum	S-72	9500	4.38	9.63	N	J	SW846 3050B/6020
	Antimony	S-72	0.32	0.32	0.969	U	0.97UJ	SW846 3050B/6010B
	Arsenic	S-72	2.44	0.326	0.963		None	SW846 3050B/6020
	Beryllium	S-72	0.348	0.0193	0.0963		None	SW846 3050B/6020
	Cadmium	S-72	0.172	0.0193	0.193	J	None	SW846 3050B/6020
	Chromium	S-72	10.7	0.193	0.578		None	SW846 3050B/6020
	Copper	S-72	10	0.0636	0.193		None	SW846 3050B/6020
	Iron	S-72	12700	63.6	193	N	J	SW846 3050B/6020
	Lead	S-72	9.07	0.0952	0.381	N	J	SW846 3050B/6020
	Magnesium	S-72	4630	1.93	5.78	N	None	SW846 3050B/6020
	Nickel	S-72	9.13	0.0963	0.385		None	SW846 3050B/6020
	Selenium	S-72	1.32	0.347	0.963	N	None	SW846 3050B/6020
	Silver	S-72	0.0969	0.0969	0.484	U	None	SW846 3050B/6010B
	Thallium	S-72	0.135	0.135	0.385	U	None	SW846 3050B/6020

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Table B-5. Summary of nonradiological results in sediment, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Zinc	S-72	30.5	0.771	1.93	N	J	SW846 3050B/6020
	Aluminum	S-74N	3970	4.3	9.45		J	SW846 3050B/6020
	Antimony	S-74N	0.324	0.324	0.98	NU	UJ	SW846 3050B/6010B
	Arsenic	S-74N	2.71	0.319	0.945		None	SW846 3050B/6020
	Beryllium	S-74N	0.196	0.0189	0.0945		None	SW846 3050B/6020
	Cadmium	S-74N	0.168	0.0189	0.189	J	None	SW846 3050B/6020
	Chromium	S-74N	4.64	0.189	0.567		None	SW846 3050B/6020
	Copper	S-74N	4.35	0.0624	0.189	N	J	SW846 3050B/6020
	Iron	S-74N	6860	6.24	18.9		J	SW846 3050B/6020
	Lead	S-74N	3.18	0.0945	0.378		None	SW846 3050B/6020
	Magnesium	S-74N	2440	1.89	5.67	N	None	SW846 3050B/6020
	Nickel	S-74N	4.67	0.0945	0.378		None	SW846 3050B/6020
	Selenium	S-74N	0.629	0.34	0.945	JN	J	SW846 3050B/6020
	Silver	S-74N	0.098	0.098	0.49	U	None	SW846 3050B/6010B
	Thallium	S-74N	0.132	0.132	0.378	U	None	SW846 3050B/6020
	Zinc	S-74N	19.1	0.756	1.89	N	J	SW846 3050B/6020
	Aluminum	S-75	5620	4.21	9.26	N	J	SW846 3050B/6020
	Antimony	S-75	0.664	0.312	0.945	J	0.95UJ	SW846 3050B/6010B
	Arsenic	S-75	2.95	0.313	0.926		None	SW846 3050B/6020
	Beryllium	S-75	0.369	0.0185	0.0926		None	SW846 3050B/6020
	Cadmium	S-75	0.136	0.0185	0.185	J	None	SW846 3050B/6020
	Chromium	S-75	6.63	0.185	0.556		None	SW846 3050B/6020
	Copper	S-75	7.86	0.0611	0.185		None	SW846 3050B/6020
	Iron	S-75	7490	6.11	18.5	N	J	SW846 3050B/6020
	Lead	S-75	2.64	0.0978	0.391	N	J	SW846 3050B/6020
	Magnesium	S-75	3160	1.85	5.56	N	None	SW846 3050B/6020
	Nickel	S-75	8.03	0.0926	0.37		None	SW846 3050B/6020
	Selenium	S-75	1.22	0.333	0.926	N	None	SW846 3050B/6020
	Silver	S-75	0.0945	0.0945	0.473	U	None	SW846 3050B/6010B

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Table B-5. Summary of nonradiological results in sediment, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Thallium	S-75	0.13	0.13	0.37	U	None	SW846 3050B/6020
	Zinc	S-75	23.7	0.741	1.85	N	J	SW846 3050B/6020
	Aluminum	S-83	9240	4.51	9.92		J	SW846 3050B/6020
	Antimony	S-83	0.314	0.314	0.952	NU	UJ	SW846 3050B/6010B
	Arsenic	S-83	2.65	0.335	0.992		None	SW846 3050B/6020
	Beryllium	S-83	0.428	0.0198	0.0992		None	SW846 3050B/6020
	Cadmium	S-83	0.192	0.0198	0.198	J	None	SW846 3050B/6020
	Chromium	S-83	9.1	0.198	0.595		None	SW846 3050B/6020
	Copper	S-83	10.1	0.0655	0.198	N	J	SW846 3050B/6020
	Iron	S-83	12800	65.5	198		J	SW846 3050B/6020
	Lead	S-83	10.1	0.0992	0.397		None	SW846 3050B/6020
	Magnesium	S-83	4770	1.98	5.95	N	None	SW846 3050B/6020
	Nickel	S-83	8.62	0.0992	0.397		None	SW846 3050B/6020
	Selenium	S-83	1.01	0.357	0.992	N	J	SW846 3050B/6020
	Silver	S-83	0.0952	0.0952	0.476	U	None	SW846 3050B/6010B
	Thallium	S-83	0.152	0.139	0.397	J	None	SW846 3050B/6020
	Zinc	S-83	41.6	0.794	1.98	N	J	SW846 3050B/6020
	Aluminum	S-85	11500	42.4	93.3	N	J	SW846 3050B/6020
	Antimony	S-85	0.326	0.326	0.988	U	0.99UJ	SW846 3050B/6010B
	Arsenic	S-85	2.91	0.315	0.933		None	SW846 3050B/6020
	Beryllium	S-85	0.458	0.0187	0.0933		None	SW846 3050B/6020
	Cadmium	S-85	0.2	0.0187	0.187		None	SW846 3050B/6020
	Chromium	S-85	11.3	0.187	0.56		None	SW846 3050B/6020
	Copper	S-85	7.89	0.0616	0.187		None	SW846 3050B/6020
	Iron	S-85	11500	61.6	187	N	J	SW846 3050B/6020
	Lead	S-85	8.4	0.0945	0.378	N	J	SW846 3050B/6020
	Magnesium	S-85	3860	1.87	5.6	N	None	SW846 3050B/6020
	Nickel	S-85	10.3	0.0933	0.373		None	SW846 3050B/6020
	Selenium	S-85	1.2	0.336	0.933	N	None	SW846 3050B/6020

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Table B-5. Summary of nonradiological results in sediment, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Silver	S-85	0.0988	0.0988	0.494	U	UJ	SW846 3050B/6010B
	Thallium	S-85	0.131	0.131	0.373	U	None	SW846 3050B/6020
	Zinc	S-85	27.6	0.746	1.87	N	J	SW846 3050B/6020
	Aluminum	S-91	6420	4.52	9.94	N	J	SW846 3050B/6020
	Antimony	S-91	0.311	0.311	0.943	U	None	SW846 3050B/6010B
	Arsenic	S-91	3.95	0.336	0.994		None	SW846 3050B/6020
	Beryllium	S-91	0.364	0.0199	0.0994		None	SW846 3050B/6020
	Cadmium	S-91	0.107	0.0199	0.199	J	None	SW846 3050B/6020
	Chromium	S-91	6.89	0.199	0.596		None	SW846 3050B/6020
	Copper	S-91	6.24	0.0656	0.199		J-	SW846 3050B/6020
	Iron	S-91	8270	6.56	19.9	N	J	SW846 3050B/6020
	Lead	S-91	3.92	0.0947	0.379	N	J	SW846 3050B/6020
	Magnesium	S-91	2170	1.99	5.96	N	None	SW846 3050B/6020
	Nickel	S-91	7.3	0.0994	0.398		None	SW846 3050B/6020
	Selenium	S-91	0.973	0.358	0.994	JN	None	SW846 3050B/6020
	Silver	S-91	0.0943	0.0943	0.472	U	None	SW846 3050B/6010B
	Thallium	S-91	0.139	0.139	0.398	U	None	SW846 3050B/6020
	Zinc	S-91	23.1	0.795	1.99	N	J	SW846 3050B/6020
Perimeter	Aluminum	P-60	5990	4.41	9.69	N	J	SW846 3050B/6020
	Antimony	P-60	0.443	0.329	0.996	J	1.0UJ	SW846 3050B/6010B
	Arsenic	P-60	2.04	0.328	0.969	*	J	SW846 3050B/6020
	Beryllium	P-60	0.268	0.0194	0.0969	N	None	SW846 3050B/6020
	Cadmium	P-60	0.133	0.0194	0.194	*J	None	SW846 3050B/6020
	Chromium	P-60	6.37	0.194	0.581	N	J	SW846 3050B/6020
	Copper	P-60	5.81	0.064	0.194	N	J	SW846 3050B/6020
	Iron	P-60	9270	6.4	19.4	N	J	SW846 3050B/6020
	Lead	P-60	4.77	0.0969	0.388	*N	J	SW846 3050B/6020
	Magnesium	P-60	2830	1.94	5.81	N	None	SW846 3050B/6020
	Nickel	P-60	6.25	0.0969	0.388	N	J	SW846 3050B/6020

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Table B-5. Summary of nonradiological results in sediment, 2017 (continued)

Location Classification	Analyte	Location	Result (mg/kg)	MDL (mg/kg)	PQL (mg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
Perimeter	Selenium	P-60	0.563	0.349	0.969	J	None	SW846 3050B/6020
	Silver	P-60	0.0996	0.0996	0.498	U	UJ	SW846 3050B/6010B
	Thallium	P-60	0.136	0.136	0.388	U	None	SW846 3050B/6020
	Zinc	P-60	23.4	0.775	1.94		J	SW846 3050B/6020
	Aluminum	P-73	5370	4.29	9.43	N	J	SW846 3050B/6020
	Antimony	P-73	0.31	0.31	0.938	U	None	SW846 3050B/6010B
	Arsenic	P-73	1.81	0.319	0.943		None	SW846 3050B/6020
	Beryllium	P-73	0.274	0.0189	0.0943		None	SW846 3050B/6020
	Cadmium	P-73	0.116	0.0189	0.189	J	None	SW846 3050B/6020
	Chromium	P-73	5.08	0.189	0.566		None	SW846 3050B/6020
	Copper	P-73	6.86	0.0623	0.189		None	SW846 3050B/6020
	Iron	P-73	13200	62.3	189	N	J	SW846 3050B/6020
	Lead	P-73	3.4	0.0978	0.391	N	J	SW846 3050B/6020
	Magnesium	P-73	3090	1.89	5.66	N	None	SW846 3050B/6020
	Nickel	P-73	5.13	0.0943	0.377		None	SW846 3050B/6020
	Selenium	P-73	1.86	0.34	0.943	N	None	SW846 3050B/6020
	Thallium	P-73	0.132	0.132	0.377	U	None	SW846 3050B/6020
	Zinc	P-73	27.7	0.755	1.89	N	J	SW846 3050B/6020

See notes at end of appendices.

Table B-6. Summary of perchlorate results in soil, 2017

Location Classification	Analyte	Location	Result (µg/kg)	MDL (µg/kg)	PQL (µg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Perchlorate	S-53	0.0135	0.0398	0.0392	U	None	EPA 314.0

See notes at end of appendices.

Table B-7. Summary of high explosives results in soil, 2017

Location Classification	Analyte	Location	Result (µg/kg)	MDL (µg/kg)	PQL (µg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Amino-2,6-dinitrotoluene, 4-	S-90	49.3	49.3	148	U	None	SW846 8330A
	Amino-4,6-dinitrotoluene, 2-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrobenzene, 1,3-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrotoluene, 2,4-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrotoluene, 2,6-		49.3	49.3	148	U	None	SW846 8330A
	HMX		49.3	49.3	148	U	None	SW846 8330A
	Nitro-benzene		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 2-		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 3-		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 4-		49.3	49.3	148	U	None	SW846 8330A
	Pentaerythritol tetranitrate		81.3	81.3	493	U	None	SW846 8330A
	RDX		49.3	49.3	148	U	None	SW846 8330A
	Tetryl		49.3	49.3	148	U	None	SW846 8330A
	Trinitrobenzene, 1,3,5-		49.3	49.3	148	U	None	SW846 8330A
	Trinitrotoluene, 2,4,6-		49.3	49.3	148	U	None	SW846 8330A
	Amino-2,6-dinitrotoluene, 4-	S-93	49.3	49.3	148	U	None	SW846 8330A
	Amino-4,6-dinitrotoluene, 2-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrobenzene, 1,3-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrotoluene, 2,4-		49.3	49.3	148	U	None	SW846 8330A
	Dinitrotoluene, 2,6-		49.3	49.3	148	U	None	SW846 8330A
	HMX		49.3	49.3	148	U	None	SW846 8330A
	Nitro-benzene		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 2-		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 3-		49.3	49.3	148	U	None	SW846 8330A
	Nitrotoluene, 4-		49.3	49.3	148	U	None	SW846 8330A
	Pentaerythritol tetranitrate		81.3	81.3	493	U	None	SW846 8330A
	RDX		49.3	49.3	148	U	None	SW846 8330A
	Tetryl		49.3	49.3	148	U	None	SW846 8330A

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Table B-7. Summary of high explosives results in soil, 2017 (continued)

Location Classification	Analyte	Location	Result (µg/kg)	MDL (µg/kg)	PQL (µg/kg)	Laboratory Data Qualifiers	Data Validation Qualifiers	Analytical Method
On-Site	Trinitrobenzene, 1,3,5-		49.3	49.3	148	U	None	SW846 8330A
	Trinitrotoluene, 2,4,6-		49.3	49.3	148	U	None	SW846 8330A
	Amino-2,6-dinitrotoluene, 4-	S-94	50	50	150	U	None	SW846 8330A
	Amino-4,6-dinitrotoluene, 2-		50	50	150	U	None	SW846 8330A
	Dinitrobenzene, 1,3-		50	50	150	U	None	SW846 8330A
	Dinitrotoluene, 2,4-		50	50	150	U	None	SW846 8330A
	Dinitrotoluene, 2,6-		50	50	150	U	None	SW846 8330A
	HMX		50	50	150	U	None	SW846 8330A
	Nitro-benzene		50	50	150	U	None	SW846 8330A
	Nitrotoluene, 2-		50	50	150	U	None	SW846 8330A
	Nitrotoluene, 3-		50	50	150	U	None	SW846 8330A
	Nitrotoluene, 4-		50	50	150	U	None	SW846 8330A
	Pentaerythritol tetranitrate		82.5	82.5	500	U	None	SW846 8330A
	RDX		50	50	150	U	None	SW846 8330A
	Tetryl		50	50	150	U	None	SW846 8330A
	Trinitrobenzene, 1,3,5-		50	50	150	U	None	SW846 8330A
	Trinitrotoluene, 2,4,6-		50	50	150	U	None	SW846 8330A

See notes at end of appendices.

Appendix C. FY 2017 Ambient Air Surveillance Results



Western Spotted Orb Weaver (*Neoscona oaxacensis*)

Table C-1. Summary of ambient air metals analysis, FY 2017

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	29-Oct-16	Aluminum	0.837	0.08	0.0272	
		Antimony	0.00191	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0446	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000405	0.002	0.0004	J
		Calcium	7.43	0.1	0.032	B
		Chromium	0.0197	0.002	0.0006	
		Cobalt	0.00787	0.002	0.0006	
		Copper	0.242	0.004	0.0012	
		Iron	1.12	0.1	0.032	
		Lead	0.00822	0.004	0.00132	
		Magnesium	0.563	0.12	0.034	
		Manganese	0.0287	0.004	0.0008	
		Nickel	0.0056	0.002	0.0006	
		Potassium	0.492	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000697	0.002	0.0004	J
		Sodium	4.52	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000097	0.00001	0.0000033	J
		Vanadium	0.00224	0.002	0.0004	
		Zinc	0.0831	0.004	0.0016	B
	30-Nov-16	Aluminum	0.0457	0.01	0.0034	
		Antimony	0.000165	0.0005	0.000165	U
		Arsenic	0.00025	0.0015	0.00025	U
		Barium	0.00402	0.00025	0.00005	
		Beryllium	0.00005	0.00025	0.00005	U
		Cadmium	0.00005	0.00025	0.00005	U
		Calcium	0.336	0.0125	0.004	

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	30-Nov-16	Chromium	0.00208	0.00025	0.000075	
		Cobalt	0.000269	0.00025	0.000075	
		Copper	0.0053	0.0005	0.00015	
		Iron	0.065	0.0125	0.004	
		Lead	0.000674	0.0005	0.000165	
		Magnesium	0.0424	0.015	0.00425	
		Manganese	0.00131	0.0005	0.0001	
		Nickel	0.000516	0.00025	0.000075	
		Potassium	0.0328	0.0125	0.0032	
		Selenium	0.00025	0.0015	0.00025	U
		Silver	0.00005	0.00025	0.00005	U
		Sodium	1.42	0.0125	0.0035	B
		Thallium	0.00025	0.001	0.00025	U
		Uranium	0.0000808	0.00008	0.0000264	
		Vanadium	0.000165	0.00025	0.00005	J
		Zinc	0.00802	0.0005	0.0002	B
	30-Dec-16	Aluminum	0.16	0.08	0.0272	
		Antimony	0.00326	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0271	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.14	0.1	0.032	
		Chromium	0.00882	0.002	0.0006	
		Cobalt	0.000932	0.002	0.0006	J
		Copper	0.034	0.004	0.0012	
		Iron	0.457	0.1	0.032	
		Lead	0.00725	0.004	0.00132	
		Magnesium	0.155	0.12	0.034	
		Manganese	0.00951	0.004	0.0008	

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	30-Dec-16	Nickel	0.00206	0.002	0.0006	
		Potassium	0.216	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000968	0.002	0.0004	J
		Sodium	1.59	0.1	0.028	
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000076	0.00008	0.0000264	J
		Vanadium	0.000735	0.002	0.0004	J
		Zinc	0.0744	0.004	0.0016	
	26-Jan-17	Aluminum	0.423	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0604	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000515	0.002	0.0004	J
		Calcium	3.26	0.1	0.032	B
		Chromium	0.0183	0.002	0.0006	
		Cobalt	0.00196	0.002	0.0006	J
		Copper	0.0705	0.004	0.0012	
		Iron	0.725	0.1	0.032	
		Lead	0.00616	0.004	0.00132	
		Magnesium	0.357	0.12	0.034	
		Manganese	0.0144	0.004	0.0008	
		Nickel	0.00451	0.002	0.0006	
		Potassium	0.359	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00206	0.002	0.0004	
		Sodium	3.7	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000816	0.00008	0.0000264	

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	26-Jan-17	Vanadium	0.00104	0.002	0.0004	J
		Zinc	0.0758	0.004	0.0016	
	27-Feb-17	Aluminum	0.471	0.08	0.0272	
		Antimony	0.00155	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0419	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	3.85	0.1	0.032	
		Chromium	0.017	0.002	0.0006	B
		Cobalt	0.00525	0.002	0.0006	
		Copper	0.0632	0.004	0.0012	
		Iron	0.751	0.1	0.032	
		Lead	0.00532	0.004	0.00132	
		Magnesium	0.402	0.12	0.034	
		Manganese	0.0164	0.004	0.0008	
		Nickel	0.00492	0.002	0.0006	B
		Potassium	0.264	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000908	0.002	0.0004	J
		Sodium	2.88	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000084	0.00008	0.0000264	
		Vanadium	0.00107	0.002	0.0004	J
		Zinc	0.0644	0.004	0.0016	
	30-Mar-17	Aluminum	0.962	0.08	0.0272	
		Antimony	0.00219	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0392	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	30-Mar-17	Cadmium	0.000567	0.002	0.0004	J
		Calcium	6.32	0.1	0.032	B
		Chromium	0.00869	0.002	0.0006	
		Cobalt	0.00328	0.002	0.0006	
		Copper	0.0737	0.004	0.0012	
		Iron	1.31	0.1	0.032	
		Lead	0.0159	0.004	0.00132	
		Magnesium	0.658	0.12	0.034	
		Manganese	0.033	0.004	0.0008	
		Nickel	0.00426	0.002	0.0006	
		Potassium	0.546	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000672	0.002	0.0004	J
		Sodium	3.55	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000036	0.00008	0.0000264	J
		Vanadium	0.00276	0.002	0.0004	
		Zinc	0.067	0.004	0.0016	
	30-Apr-17	Aluminum	1.42	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00312	0.012	0.002	J
		Barium	0.0683	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	8.97	0.1	0.032	B
		Chromium	0.0217	0.002	0.0006	
		Cobalt	0.0018	0.002	0.0006	J
		Copper	0.0496	0.004	0.0012	
		Iron	1.88	0.1	0.032	
		Lead	0.00921	0.004	0.00132	

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A2PM	30-Apr-17	Magnesium	1.02	0.12	0.034	
		Manganese	0.0457	0.004	0.0008	
		Nickel	0.00554	0.002	0.0006	
		Potassium	0.63	0.1	0.0256	
		Selenium	0.00232	0.012	0.002	J
		Silver	0.00062	0.002	0.0004	J
		Sodium	14.2	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000332	0.00008	0.0000264	J
		Vanadium	0.00394	0.002	0.0004	
		Zinc	0.0527	0.004	0.0016	
A3PM	29-Oct-16	Aluminum	0.898	0.08	0.0272	
		Antimony	0.00157	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0328	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.00048	0.002	0.0004	J
		Calcium	5.32	0.1	0.032	B
		Chromium	0.0189	0.002	0.0006	
		Cobalt	0.00327	0.002	0.0006	
		Copper	0.0436	0.004	0.0012	
		Iron	1.07	0.1	0.032	
		Lead	0.00808	0.004	0.00132	
		Magnesium	0.526	0.12	0.034	
		Manganese	0.0247	0.004	0.0008	
		Nickel	0.00532	0.002	0.0006	
		Potassium	0.503	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000631	0.002	0.0004	J
		Sodium	4.31	0.1	0.028	B

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A3PM	29-Oct-16	Thallium	0.002	0.008	0.002	U
		Uranium	0.0000063	0.00001	0.0000033	J
		Vanadium	0.0023	0.002	0.0004	
		Zinc	0.0629	0.004	0.0016	B
	30-Nov-16	Aluminum	0.0285	0.01	0.0034	
		Antimony	0.000165	0.0005	0.000165	U
		Arsenic	0.00025	0.0015	0.00025	U
		Barium	0.00262	0.00025	0.00005	
		Beryllium	0.00005	0.00025	0.00005	U
		Cadmium	0.00005	0.00025	0.00005	U
		Calcium	0.201	0.0125	0.004	
		Chromium	0.00191	0.00025	0.000075	
		Cobalt	0.00018	0.00025	0.000075	J
		Copper	0.00307	0.0005	0.00015	
		Iron	0.0389	0.0125	0.004	
		Lead	0.000626	0.0005	0.000165	
		Magnesium	0.0295	0.015	0.00425	
		Manganese	0.000781	0.0005	0.0001	
		Nickel	0.000512	0.00025	0.000075	
		Potassium	0.0285	0.0125	0.0032	
		Selenium	0.00025	0.0015	0.00025	U
		Silver	0.00005	0.00025	0.00005	U
		Sodium	1.22	0.0125	0.0035	B
		Thallium	0.00025	0.001	0.00025	U
		Uranium	0.0000476	0.00008	0.0000264	J
		Vanadium	0.000119	0.00025	0.00005	J
		Zinc	0.00589	0.0005	0.0002	B
	30-Dec-16	Aluminum	0.1	0.08	0.0272	
		Antimony	0.0035	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A3PM	30-Dec-16	Barium	0.0193	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	1.2	0.1	0.032	
		Chromium	0.00795	0.002	0.0006	
		Cobalt	0.00166	0.002	0.0006	J
		Copper	0.0329	0.004	0.0012	
		Iron	0.178	0.1	0.032	
		Lead	0.00424	0.004	0.00132	
		Magnesium	0.113	0.12	0.034	J
		Manganese	0.00396	0.004	0.0008	J
		Nickel	0.0017	0.002	0.0006	J
		Potassium	0.138	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00122	0.002	0.0004	J
		Sodium	1.5	0.1	0.028	
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000552	0.00008	0.0000264	J
		Vanadium	0.000676	0.002	0.0004	J
		Zinc	0.0686	0.004	0.0016	
	26-Jan-17	Aluminum	0.491	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00303	0.012	0.002	J
		Barium	0.0535	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000422	0.002	0.0004	J
		Calcium	2.97	0.1	0.032	B
		Chromium	0.0187	0.002	0.0006	
		Cobalt	0.00312	0.002	0.0006	
		Copper	0.0515	0.004	0.0012	

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A3PM	26-Jan-17	Iron	0.709	0.1	0.032	
		Lead	0.00665	0.004	0.00132	
		Magnesium	0.348	0.12	0.034	
		Manganese	0.0138	0.004	0.0008	
		Nickel	0.00471	0.002	0.0006	
		Potassium	0.306	0.1	0.0256	
		Selenium	0.0024	0.012	0.002	J
		Silver	0.00143	0.002	0.0004	J
		Sodium	3.65	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000728	0.00008	0.0000264	J
		Vanadium	0.00157	0.002	0.0004	J
		Zinc	0.0708	0.004	0.0016	
	27-Feb-17	Aluminum	0.393	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.035	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.51	0.1	0.032	
		Chromium	0.018	0.002	0.0006	B
		Cobalt	0.00583	0.002	0.0006	
		Copper	0.0347	0.004	0.0012	
		Iron	0.622	0.1	0.032	
		Lead	0.00551	0.004	0.00132	
		Magnesium	0.364	0.12	0.034	
		Manganese	0.0126	0.004	0.0008	
		Nickel	0.00564	0.002	0.0006	B
		Potassium	0.277	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A3PM	27-Feb-17	Silver	0.000638	0.002	0.0004	J
		Sodium	3.49	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000046	0.00008	0.0000264	J
		Vanadium	0.000978	0.002	0.0004	J
		Zinc	0.0828	0.004	0.0016	
	30-Mar-17	Aluminum	0.686	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00352	0.012	0.002	J
		Barium	0.0235	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000462	0.002	0.0004	J
		Calcium	3.98	0.1	0.032	B
		Chromium	0.00662	0.002	0.0006	
		Cobalt	0.00467	0.002	0.0006	
		Copper	0.128	0.004	0.0012	
		Iron	0.901	0.1	0.032	
		Lead	0.0128	0.004	0.00132	
		Magnesium	0.451	0.12	0.034	
		Manganese	0.0226	0.004	0.0008	
		Nickel	0.00337	0.002	0.0006	
		Potassium	0.507	0.1	0.0256	
		Selenium	0.00241	0.012	0.002	JB
		Silver	0.000611	0.002	0.0004	J
		Sodium	3.35	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.00209	0.002	0.0004	
		Zinc	0.0709	0.004	0.0016	

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
A3PM	30-Apr-17	Aluminum	1.18	0.08	0.0272	
		Antimony	0.00152	0.004	0.00132	J
		Arsenic	0.00301	0.012	0.002	J
		Barium	0.0477	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	5.96	0.1	0.032	B
		Chromium	0.0206	0.002	0.0006	
		Cobalt	0.00143	0.002	0.0006	J
		Copper	0.0458	0.004	0.0012	
		Iron	1.46	0.1	0.032	
		Lead	0.00703	0.004	0.00132	
		Magnesium	0.801	0.12	0.034	
		Manganese	0.0344	0.004	0.0008	
		Nickel	0.00486	0.002	0.0006	
		Potassium	0.541	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.0004	0.002	0.0004	U
		Sodium	13.9	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.00299	0.002	0.0004	
		Zinc	0.0626	0.004	0.0016	
BKPM	29-Oct-16	Aluminum	0.1	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0137	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.8	0.1	0.032	B

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	29-Oct-16	Chromium	0.0223	0.002	0.0006	
		Cobalt	0.0113	0.002	0.0006	
		Copper	0.0099	0.004	0.0012	
		Iron	0.224	0.1	0.032	
		Lead	0.0014	0.004	0.00132	J
		Magnesium	0.207	0.12	0.034	
		Manganese	0.00228	0.004	0.0008	J
		Nickel	0.00676	0.002	0.0006	
		Potassium	0.136	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000479	0.002	0.0004	J
		Sodium	4.24	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000033	0.00001	0.0000033	U
		Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0544	0.004	0.0016	B
	30-Nov-16	Aluminum	0.0107	0.01	0.0034	
		Antimony	0.000165	0.0005	0.000165	U
		Arsenic	0.00025	0.0015	0.00025	U
		Barium	0.00246	0.00025	0.00005	
		Beryllium	0.00005	0.00025	0.00005	U
		Cadmium	0.00005	0.00025	0.00005	U
		Calcium	0.188	0.0125	0.004	
		Chromium	0.00191	0.00025	0.000075	
		Cobalt	0.000491	0.00025	0.000075	
		Copper	0.00145	0.0005	0.00015	
		Iron	0.0197	0.0125	0.004	
		Lead	0.000194	0.0005	0.000165	J
		Magnesium	0.0244	0.015	0.00425	
		Manganese	0.00019	0.0005	0.0001	J

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	30-Nov-16	Nickel	0.00042	0.00025	0.000075	
		Potassium	0.00937	0.0125	0.0032	J
		Selenium	0.00025	0.0015	0.00025	U
		Silver	0.00005	0.00025	0.00005	U
		Sodium	1.6	0.0125	0.0035	B
		Thallium	0.00025	0.001	0.00025	U
		Uranium	0.0000688	0.00008	0.0000264	J
		Vanadium	0.00005	0.00025	0.00005	U
		Zinc	0.00536	0.0005	0.0002	B
	30-Dec-16	Aluminum	0.0272	0.08	0.0272	U
		Antimony	0.00186	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.00532	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	0.314	0.1	0.032	
		Chromium	0.00203	0.002	0.0006	
		Cobalt	0.000646	0.002	0.0006	J
		Copper	0.00249	0.004	0.0012	J
		Iron	0.032	0.1	0.032	U
		Lead	0.00132	0.004	0.00132	U
		Magnesium	0.034	0.12	0.034	U
		Manganese	0.0008	0.004	0.0008	U
		Nickel	0.0006	0.002	0.0006	U
		Potassium	0.0353	0.1	0.0256	J
		Selenium	0.002	0.012	0.002	U
		Silver	0.0004	0.002	0.0004	U
		Sodium	0.427	0.1	0.028	
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	30-Dec-16	Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0446	0.004	0.0016	
	26-Jan-17	Aluminum	0.0614	0.08	0.0272	J
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0271	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	1.67	0.1	0.032	B
		Chromium	0.0158	0.002	0.0006	
		Cobalt	0.00613	0.002	0.0006	
		Copper	0.0219	0.004	0.0012	
		Iron	0.17	0.1	0.032	
		Lead	0.00132	0.004	0.00132	U
		Magnesium	0.159	0.12	0.034	
		Manganese	0.0016	0.004	0.0008	J
		Nickel	0.00389	0.002	0.0006	
		Potassium	0.0625	0.1	0.0256	J
		Selenium	0.002	0.012	0.002	U
		Silver	0.000893	0.002	0.0004	J
		Sodium	2.97	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000324	0.00008	0.0000264	J
		Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0711	0.004	0.0016	
	27-Feb-17	Aluminum	0.0646	0.08	0.0272	J
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.025	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	27-Feb-17	Cadmium	0.0004	0.002	0.0004	U
		Calcium	1.25	0.1	0.032	
		Chromium	0.0157	0.002	0.0006	B
		Cobalt	0.00213	0.002	0.0006	
		Copper	0.0136	0.004	0.0012	
		Iron	0.163	0.1	0.032	
		Lead	0.00132	0.004	0.00132	U
		Magnesium	0.127	0.12	0.034	
		Manganese	0.00165	0.004	0.0008	J
		Nickel	0.00475	0.002	0.0006	B
		Potassium	0.076	0.1	0.0256	J
		Selenium	0.002	0.012	0.002	U
		Silver	0.000539	0.002	0.0004	J
		Sodium	4.45	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0577	0.004	0.0016	
	30-Mar-17	Aluminum	0.0366	0.08	0.0272	J
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00206	0.012	0.002	J
		Barium	0.00262	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	1.34	0.1	0.032	B
		Chromium	0.00488	0.002	0.0006	
		Cobalt	0.00307	0.002	0.0006	
		Copper	0.00261	0.004	0.0012	J
		Iron	0.065	0.1	0.032	J
		Lead	0.00132	0.004	0.00132	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	30-Mar-17	Magnesium	0.106	0.12	0.034	J
		Manganese	0.000861	0.004	0.0008	J
		Nickel	0.00157	0.002	0.0006	J
		Potassium	0.0256	0.1	0.0256	U
		Selenium	0.003	0.012	0.002	JB
		Silver	0.0004	0.002	0.0004	U
		Sodium	2.49	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0224	0.004	0.0016	
	30-Apr-17	Aluminum	0.0855	0.08	0.0272	
		Antimony	0.00142	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0248	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.57	0.1	0.032	B
		Chromium	0.0185	0.002	0.0006	
		Cobalt	0.00233	0.002	0.0006	
		Copper	0.00924	0.004	0.0012	
		Iron	0.126	0.1	0.032	
		Lead	0.00132	0.004	0.00132	U
		Magnesium	0.234	0.12	0.034	
		Manganese	0.00158	0.004	0.0008	J
		Nickel	0.00325	0.002	0.0006	
		Potassium	0.07	0.1	0.0256	J
		Selenium	0.002	0.012	0.002	U
		Silver	0.000429	0.002	0.0004	J
		Sodium	12.2	0.1	0.028	B

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
BKPM	30-Apr-17	Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.0004	0.002	0.0004	U
		Zinc	0.0538	0.004	0.0016	
CPMS	29-Oct-16	Aluminum	0.638	0.08	0.0272	
		Antimony	0.00297	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0457	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000453	0.002	0.0004	J
		Calcium	5.02	0.1	0.032	B
		Chromium	0.0193	0.002	0.0006	
		Cobalt	0.0107	0.002	0.0006	
		Copper	0.147	0.004	0.0012	
		Iron	0.956	0.1	0.032	
		Lead	0.0109	0.004	0.00132	
		Magnesium	0.466	0.12	0.034	
		Manganese	0.0232	0.004	0.0008	
		Nickel	0.00619	0.002	0.0006	
		Potassium	0.454	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000786	0.002	0.0004	J
		Sodium	4.27	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000077	0.00001	0.0000033	J
		Vanadium	0.00168	0.002	0.0004	J
		Zinc	0.119	0.004	0.0016	B
	30-Nov-16	Aluminum	0.0451	0.01	0.0034	
		Antimony	0.000171	0.0005	0.000165	J
		Arsenic	0.000284	0.0015	0.00025	J

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CPMS	30-Nov-16	Barium	0.00532	0.00025	0.00005	
		Beryllium	0.00005	0.00025	0.00005	U
		Cadmium	0.0000639	0.00025	0.00005	J
		Calcium	0.316	0.0125	0.004	
		Chromium	0.00191	0.00025	0.000075	
		Cobalt	0.000496	0.00025	0.000075	
		Copper	0.00732	0.0005	0.00015	
		Iron	0.0841	0.0125	0.004	
		Lead	0.000841	0.0005	0.000165	
		Magnesium	0.0426	0.015	0.00425	
		Manganese	0.00177	0.0005	0.0001	
		Nickel	0.000489	0.00025	0.000075	
		Potassium	0.0385	0.0125	0.0032	
		Selenium	0.00025	0.0015	0.00025	U
		Silver	0.00005	0.00025	0.00005	U
		Sodium	1.16	0.0125	0.0035	B
		Thallium	0.00025	0.001	0.00025	U
		Uranium	0.000074	0.00008	0.0000264	J
		Vanadium	0.000193	0.00025	0.00005	J
		Zinc	0.00896	0.0005	0.0002	B
	30-Dec-16	Aluminum	0.227	0.08	0.0272	
		Antimony	0.00352	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0406	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.34	0.1	0.032	
		Chromium	0.0122	0.002	0.0006	
		Cobalt	0.0031	0.002	0.0006	
		Copper	0.0498	0.004	0.0012	

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CPMS	30-Dec-16	Iron	0.517	0.1	0.032	
		Lead	0.00686	0.004	0.00132	
		Magnesium	0.186	0.12	0.034	
		Manganese	0.0108	0.004	0.0008	
		Nickel	0.00272	0.002	0.0006	
		Potassium	0.259	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00114	0.002	0.0004	J
		Sodium	2.05	0.1	0.028	
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000114	0.00008	0.0000264	
		Vanadium	0.000835	0.002	0.0004	J
		Zinc	0.104	0.004	0.0016	
	26-Jan-17	Aluminum	0.389	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0638	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000552	0.002	0.0004	J
		Calcium	2.71	0.1	0.032	B
		Chromium	0.0184	0.002	0.0006	
		Cobalt	0.0021	0.002	0.0006	
		Copper	0.12	0.004	0.0012	
		Iron	0.788	0.1	0.032	
		Lead	0.00734	0.004	0.00132	
		Magnesium	0.313	0.12	0.034	
		Manganese	0.0145	0.004	0.0008	
		Nickel	0.0051	0.002	0.0006	
		Potassium	0.342	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CPMS	26-Jan-17	Silver	0.00175	0.002	0.0004	J
		Sodium	3.46	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000836	0.00008	0.0000264	
		Vanadium	0.00115	0.002	0.0004	J
		Zinc	0.0817	0.004	0.0016	
	27-Feb-17	Aluminum	0.468	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00219	0.012	0.002	J
		Barium	0.0495	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.93	0.1	0.032	
		Chromium	0.028	0.002	0.0006	B
		Cobalt	0.00914	0.002	0.0006	
		Copper	0.0976	0.004	0.0012	
		Iron	0.84	0.1	0.032	
		Lead	0.00722	0.004	0.00132	
		Magnesium	0.42	0.12	0.034	
		Manganese	0.0172	0.004	0.0008	
		Nickel	0.00704	0.002	0.0006	B
		Potassium	0.264	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00102	0.002	0.0004	J
		Sodium	3.21	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000832	0.00008	0.0000264	
		Vanadium	0.00128	0.002	0.0004	J
		Zinc	0.0508	0.004	0.0016	

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CPMS	30-Mar-17	Aluminum	0.798	0.08	0.0272	
		Antimony	0.00515	0.004	0.00132	
		Arsenic	0.0029	0.012	0.002	J
		Barium	0.0442	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000523	0.002	0.0004	J
		Calcium	4.62	0.1	0.032	B
		Chromium	0.00868	0.002	0.0006	
		Cobalt	0.00509	0.002	0.0006	
		Copper	0.101	0.004	0.0012	
		Iron	1.21	0.1	0.032	
		Lead	0.014	0.004	0.00132	
		Magnesium	0.551	0.12	0.034	
		Manganese	0.0297	0.004	0.0008	
		Nickel	0.00437	0.002	0.0006	
		Potassium	0.516	0.1	0.0256	
		Selenium	0.00217	0.012	0.002	JB
		Silver	0.000892	0.002	0.0004	J
		Sodium	3.5	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000648	0.00008	0.0000264	J
		Vanadium	0.00271	0.002	0.0004	
		Zinc	0.0828	0.004	0.0016	
	30-Apr-17	Aluminum	0.963	0.08	0.0272	
		Antimony	0.00284	0.004	0.00132	J
		Arsenic	0.00346	0.012	0.002	J
		Barium	0.0601	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	5.2	0.1	0.032	B

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CPMS	30-Apr-17	Chromium	0.0192	0.002	0.0006	
		Cobalt	0.00249	0.002	0.0006	
		Copper	0.0638	0.004	0.0012	
		Iron	1.35	0.1	0.032	
		Lead	0.00804	0.004	0.00132	
		Magnesium	0.762	0.12	0.034	
		Manganese	0.0323	0.004	0.0008	
		Nickel	0.00505	0.002	0.0006	
		Potassium	0.509	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00058	0.002	0.0004	J
		Sodium	12.8	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000324	0.00008	0.0000264	J
		Vanadium	0.00289	0.002	0.0004	
		Zinc	0.0685	0.004	0.0016	
CWPM	29-Oct-16	Aluminum	1.12	0.08	0.0272	
		Antimony	0.00196	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0394	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000853	0.002	0.0004	J
		Calcium	7.41	0.1	0.032	B
		Chromium	0.0228	0.002	0.0006	
		Cobalt	0.00401	0.002	0.0006	
		Copper	0.108	0.004	0.0012	
		Iron	1.28	0.1	0.032	
		Lead	0.00687	0.004	0.00132	
		Magnesium	0.721	0.12	0.034	
		Manganese	0.0328	0.004	0.0008	

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CWPM	29-Oct-16	Nickel	0.0067	0.002	0.0006	
		Potassium	0.535	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.000458	0.002	0.0004	J
		Sodium	5.18	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.000008	0.00001	0.0000033	J
		Vanadium	0.00267	0.002	0.0004	
		Zinc	0.0712	0.004	0.0016	B
	30-Nov-16	Aluminum	0.0443	0.01	0.0034	
		Antimony	0.000165	0.0005	0.000165	U
		Arsenic	0.00025	0.0015	0.00025	U
		Barium	0.00318	0.00025	0.00005	
		Beryllium	0.00005	0.00025	0.00005	U
		Cadmium	0.00005	0.00025	0.00005	U
		Calcium	0.301	0.0125	0.004	
		Chromium	0.00205	0.00025	0.000075	
		Cobalt	0.000213	0.00025	0.000075	J
		Copper	0.0168	0.0005	0.00015	
		Iron	0.0663	0.0125	0.004	
		Lead	0.000762	0.0005	0.000165	
		Magnesium	0.0397	0.015	0.00425	
		Manganese	0.00132	0.0005	0.0001	
		Nickel	0.000523	0.00025	0.000075	
		Potassium	0.0399	0.0125	0.0032	
		Selenium	0.00025	0.0015	0.00025	U
		Silver	0.00005	0.00025	0.00005	U
		Sodium	1.27	0.0125	0.0035	B
		Thallium	0.00025	0.001	0.00025	U
		Uranium	0.0000628	0.00008	0.0000264	J

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CWPM	30-Nov-16	Vanadium	0.000184	0.00025	0.00005	J
		Zinc	0.00638	0.0005	0.0002	B
	30-Dec-16	Aluminum	0.0506	0.08	0.0272	J
		Antimony	0.00261	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0108	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	0.908	0.1	0.032	
		Chromium	0.00387	0.002	0.0006	
		Cobalt	0.00066	0.002	0.0006	J
		Copper	0.0195	0.004	0.0012	
		Iron	0.172	0.1	0.032	
		Lead	0.00392	0.004	0.00132	J
		Magnesium	0.0663	0.12	0.034	J
		Manganese	0.00345	0.004	0.0008	J
		Nickel	0.000779	0.002	0.0006	J
		Potassium	0.109	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00165	0.002	0.0004	J
		Sodium	0.825	0.1	0.028	
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000496	0.00008	0.0000264	J
		Vanadium	0.000464	0.002	0.0004	J
		Zinc	0.0645	0.004	0.0016	
	26-Jan-17	Aluminum	0.319	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00288	0.012	0.002	J
		Barium	0.0499	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U

Table continued on next page.

Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CWPM	26-Jan-17	Cadmium	0.000414	0.002	0.0004	J
		Calcium	2.47	0.1	0.032	B
		Chromium	0.0185	0.002	0.0006	
		Cobalt	0.00147	0.002	0.0006	J
		Copper	0.0762	0.004	0.0012	
		Iron	0.596	0.1	0.032	
		Lead	0.00629	0.004	0.00132	
		Magnesium	0.322	0.12	0.034	
		Manganese	0.0112	0.004	0.0008	
		Nickel	0.00477	0.002	0.0006	
		Potassium	0.266	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00205	0.002	0.0004	
		Sodium	3.79	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.00007	0.00008	0.0000264	J
		Vanadium	0.000886	0.002	0.0004	J
		Zinc	0.113	0.004	0.0016	
	27-Feb-17	Aluminum	0.38	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0348	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	2.23	0.1	0.032	
		Chromium	0.0176	0.002	0.0006	B
		Cobalt	0.01	0.002	0.0006	
		Copper	0.0481	0.004	0.0012	
		Iron	0.567	0.1	0.032	
		Lead	0.00452	0.004	0.00132	

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CWPM	27-Feb-17	Magnesium	0.354	0.12	0.034	
		Manganese	0.0124	0.004	0.0008	
		Nickel	0.00573	0.002	0.0006	B
		Potassium	0.252	0.1	0.0256	
		Selenium	0.002	0.012	0.002	U
		Silver	0.00214	0.002	0.0004	
		Sodium	3.25	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000492	0.00008	0.0000264	J
		Vanadium	0.000658	0.002	0.0004	J
		Zinc	0.0503	0.004	0.0016	
	30-Mar-17	Aluminum	0.607	0.08	0.0272	
		Antimony	0.00135	0.004	0.00132	J
		Arsenic	0.002	0.012	0.002	U
		Barium	0.0209	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.000443	0.002	0.0004	J
		Calcium	3.66	0.1	0.032	B
		Chromium	0.00664	0.002	0.0006	
		Cobalt	0.00359	0.002	0.0006	
		Copper	0.0455	0.004	0.0012	
		Iron	0.811	0.1	0.032	
		Lead	0.0118	0.004	0.00132	
		Magnesium	0.467	0.12	0.034	
		Manganese	0.0218	0.004	0.0008	
		Nickel	0.00294	0.002	0.0006	
		Potassium	0.45	0.1	0.0256	
		Selenium	0.00283	0.012	0.002	JB
		Silver	0.0004	0.002	0.0004	U
		Sodium	3.42	0.1	0.028	B

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Table C-1. Summary of ambient air metals analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (mg/sa)	MDL (mg/sa)	PQL (mg/sa)	Laboratory Data Qualifiers
CWPM	30-Mar-17	Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.00198	0.002	0.0004	J
		Zinc	0.05	0.004	0.0016	
	30-Apr-17	Aluminum	1.02	0.08	0.0272	
		Antimony	0.00132	0.004	0.00132	U
		Arsenic	0.00325	0.012	0.002	J
		Barium	0.0413	0.002	0.0004	
		Beryllium	0.0004	0.002	0.0004	U
		Cadmium	0.0004	0.002	0.0004	U
		Calcium	5.16	0.1	0.032	B
		Chromium	0.0209	0.002	0.0006	
		Cobalt	0.00277	0.002	0.0006	
		Copper	0.0501	0.004	0.0012	
		Iron	1.23	0.1	0.032	
		Lead	0.0078	0.004	0.00132	
		Magnesium	0.728	0.12	0.034	
		Manganese	0.03	0.004	0.0008	
		Nickel	0.00476	0.002	0.0006	
		Potassium	0.47	0.1	0.0256	
		Selenium	0.00443	0.012	0.002	J
		Silver	0.000416	0.002	0.0004	J
		Sodium	12.6	0.1	0.028	B
		Thallium	0.002	0.008	0.002	U
		Uranium	0.0000264	0.00008	0.0000264	U
		Vanadium	0.00258	0.002	0.0004	
		Zinc	0.0597	0.004	0.0016	

See notes at end of appendices.

Table C-2. Summary of ambient air radiological analysis, FY 2017

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	29-Oct-16	Actinium-228	-3.39	27	34.7	16.6	U
		Alpha, gross	129	38.7	17.2	6.36	
		Americium-241	-25.4	32.3	27.4	13.4	U
		Beryllium-7	8.13	64.3	110	53.1	U
		Beta, gross	100	15	3.61	1.75	
		Bismuth-212	-8.01	110	114	54.8	U
		Bismuth-214	-1.28	17.1	20	9.71	U
		Cesium-137	3.54	5.79	8.43	4.05	U
		Cobalt-60	2.27	4.07	7.37	3.43	U
		Lead-212	-1.68	14.9	15.3	7.48	U
		Lead-214	-12.9	20.2	18.8	9.14	U
		Neptunium-237	-2.9	8.82	14.9	7.24	U
		Potassium-40	12.8	112	63.9	29.4	U
		Radium-223	-35.8	86.8	145	70.5	U
		Radium-224	-184	120	141	68.5	U
		Radium-226	84	222	173	85	U
		Radium-228	-3.39	27	34.7	16.6	U
		Sodium-22	0.639	3.99	7.2	3.35	U
		Thorium-227	20.8	34.4	58.6	28.6	U
		Thorium-231	56.4	90.6	77.7	37.9	U
		Thorium-234	136	307	274	134	U
		Uranium-235	24	50.5	39.9	19.5	U
		Uranium-238	136	307	274	134	U
	30-Nov-16	Actinium-228	-5.56	28	25	11.9	U
		Alpha, gross	112	23.1	5.39	2.46	
		Americium-241	1.82	9.62	16.3	7.91	U
		Beryllium-7	-12.3	37.8	64.5	30.9	U
		Beta, gross	65.8	10.1	2.83	1.37	
		Bismuth-212	49.3	66.3	89.7	42.7	U
		Bismuth-214	9.68	22.2	15.2	7.34	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	30-Nov-16	Cesium-137	1.94	3.46	6.03	2.87	U
		Cobalt-60	-0.92	3.64	6.45	2.99	U
		Lead-212	-1.84	10.2	11.6	5.65	U
		Lead-214	-4.19	13.1	13.5	6.54	U
		Neptunium-237	0.837	6.17	11	5.3	U
		Potassium-40	2.03	85.3	54	24.7	U
		Radium-223	20.1	60.5	108	51.9	U
		Radium-224	-169	123	103	50	U
		Radium-226	-146	154	157	77	U
		Radium-228	-5.56	28	25	11.9	U
		Sodium-22	-2.47	3.56	5.79	2.67	U
		Thorium-227	-1.38	22.7	40.4	19.5	U
		Thorium-231	22.8	68.3	55.4	27	U
		Thorium-234	-33.6	196	206	101	U
		Uranium-235	-10.2	33.4	33.2	16.2	U
		Uranium-238	-33.6	196	206	101	U
	30-Dec-16	Actinium-228	1.74	33.9	29.3	14	U
		Alpha, gross	129	30.3	5.73	2.65	
		Americium-241	2.33	14.8	23.8	11.6	U
		Beryllium-7	-23.3	54.6	94	45.2	U
		Beta, gross	143	21.1	2.62	1.26	
		Bismuth-212	23.5	54.2	96	45.8	U
		Bismuth-214	9.48	20.1	13.6	6.53	U
		Cesium-137	-7.5	8.1	6.67	3.18	U
		Cobalt-60	-5.7	7.96	7.74	3.65	U
		Lead-212	10.7	15.3	13.2	6.46	U
		Lead-214	-5.51	16.8	16.3	7.92	U
		Neptunium-237	0.44	7.68	12.6	6.1	U
		Potassium-40	-58	92.6	107	51.1	U
		Radium-223	-22.1	68.5	121	58.7	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	30-Dec-16	Radium-224	107	128	113	54.8	U
		Radium-226	-102	169	167	81.9	U
		Radium-228	1.74	33.9	29.3	14	U
		Sodium-22	0.82	4.28	6.72	3.14	U
		Thorium-227	-1.21	27.6	45.4	22.1	U
		Thorium-231	34.6	103	73.7	35.9	U
		Thorium-234	541	454	541	140	U
		Uranium-235	11.3	47.6	39	19.1	U
		Uranium-238	541	454	541	140	U
	26-Jan-17	Actinium-228	-9.84	31	30	14.3	U
		Alpha, gross	178	37	4.4	2	
		Americium-241	-8.21	11.7	19.2	9.3	U
		Beryllium-7	-1.38	47.3	75.7	36.2	U
		Beta, gross	141	21.3	2.29	1.1	
		Bismuth-212	22.7	50.3	88.4	42	U
		Bismuth-214	-6.35	14.4	14.8	7.14	U
		Cesium-137	1.75	10.1	5.8	2.75	U
		Cobalt-60	-1.96	3.96	6.72	3.12	U
		Lead-212	14.6	15.1	9.49	4.59	X
		Lead-214	-14.7	14.7	14.1	6.81	U
		Neptunium-237	0.227	7.05	11.6	5.6	U
		Potassium-40	46.6	96.2	58.5	26.8	U
		Radium-223	32.9	63.7	114	55.2	U
		Radium-224	61.1	65.5	101	48.8	U
		Radium-226	-236	184	155	75.9	U
		Radium-228	-9.84	31	30	14.3	U
		Sodium-22	-3.08	7.72	6.01	2.77	U
		Thorium-227	-6.48	26.8	43.7	21.1	U
		Thorium-231	54.9	49.4	60.1	29.2	U
		Thorium-234	-157	192	227	111	U

Table continued on next page.

Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	26-Jan-17	Uranium-235	7.25	41.8	34.9	17	U
		Uranium-238	-157	192	227	111	U
	27-Feb-17	Actinium-228	-3.44	30.1	31.3	15.2	U
		Alpha, gross	139	28.4	5.17	2.35	
		Americium-241	13.9	19.8	31.7	15.5	U
		Beryllium-7	25.8	48	79.4	38.5	U
		Beta, gross	75.3	11.8	3.51	1.71	
		Bismuth-212	-48.4	97.3	88.6	42.7	U
		Bismuth-214	8.45	20.5	12.7	6.15	U
		Cesium-137	4.86	5.4	5.73	2.76	U
		Cobalt-60	-0.0813	3.54	6.17	2.93	U
		Lead-212	2.77	12.9	13.2	6.49	U
		Lead-214	7.81	18.6	15.6	7.6	U
		Neptunium-237	0.822	6.19	10.8	5.22	U
		Potassium-40	-53.8	85.1	74.4	35.6	U
		Radium-223	53.9	69.4	104	50.6	U
		Radium-224	34.7	67.7	106	51.9	U
		Radium-226	-124	152	146	71.5	U
		Radium-228	-3.44	30.1	31.3	15.2	U
		Sodium-22	-2.04	3.48	5.65	2.67	U
		Thorium-227	-0.999	23.1	40.6	19.8	U
		Thorium-231	0.122	70.2	74.5	36.4	U
		Thorium-234	-318	346	292	143	U
		Uranium-235	-10.1	40.2	33.8	16.5	U
		Uranium-238	-318	346	292	143	U
	30-Mar-17	Actinium-228	-30.3	32.1	29.4	14	U
		Alpha, gross	117	24.3	6.31	2.96	
		Americium-241	6.77	5.31	5.57	2.68	X
		Beryllium-7	0.36	38.2	68.4	32.7	U
		Beta, gross	86.6	13.3	3.24	1.57	

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	30-Mar-17	Bismuth-212	-35.7	53.5	84.6	40.1	U
		Bismuth-214	18.3	21.6	12.5	5.96	X
		Cesium-137	0.813	3.68	6.48	3.09	U
		Cobalt-60	0.309	4.22	6.77	3.14	U
		Lead-212	-1.78	9.94	10.3	5.03	U
		Lead-214	10.7	17.1	10.7	5.11	X
		Neptunium-237	2.01	6.14	10.2	4.93	U
		Potassium-40	-7.04	79.5	98.7	47	U
		Radium-223	27.9	62.4	103	49.7	U
		Radium-224	-115	80.7	93.9	45.5	U
		Radium-226	-114	119	128	62.5	U
		Radium-228	-30.3	32.1	29.4	14	U
		Sodium-22	5.12	4.19	7.09	3.31	U
		Thorium-227	9.3	22.4	37.6	18.2	U
		Thorium-231	-37.9	48.8	42.4	20.7	U
		Thorium-234	44.2	115	64.5	31.3	U
		Uranium-235	18.1	36.9	29.7	14.4	U
		Uranium-238	44.2	115	64.5	31.3	U
	30-Apr-17	Actinium-228	8.13	32.5	26.3	12.5	U
		Alpha, gross	109	22.7	4.6	2.12	
		Americium-241	-4.74	11	16.4	7.97	U
		Beryllium-7	11.5	42	74.1	35.5	U
		Beta, gross	86	13.1	2.54	1.22	
		Bismuth-212	32.7	50.7	87.3	41.5	U
		Bismuth-214	-14.7	15.9	14.6	7.04	U
		Cesium-137	0.903	3.55	6.2	2.95	U
		Cobalt-60	-3.84	7.55	7.49	3.52	U
		Lead-212	6.15	13.9	9.36	4.53	U
		Lead-214	-7.01	15.1	13.5	6.52	U
		Neptunium-237	2.01	6.83	10.5	5.07	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A2PM	30-Apr-17	Potassium-40	-98.9	98	89	42.2	U
		Radium-223	12.4	58.6	104	50.3	U
		Radium-224	52.7	66.8	104	50.5	U
		Radium-226	50.2	176	155	76.1	U
		Radium-228	8.13	32.5	26.3	12.5	U
		Sodium-22	0.768	3.29	6.14	2.84	U
		Thorium-227	-2.03	23.1	41.1	19.9	U
		Thorium-231	-38.1	67.1	63.2	30.8	U
		Thorium-234	226	179	145	70.4	X
		Uranium-235	4.9	36.6	30.5	14.8	U
		Uranium-238	226	179	145	70.4	X
A3PM	29-Oct-16	Actinium-228	22.4	26.4	24.9	11.8	U
		Alpha, gross	132	27.8	8.6	4.02	
		Americium-241	-1.48	10.4	16.1	7.79	U
		Beryllium-7	45.8	50.4	84.5	40.5	U
		Beta, gross	97.3	14.7	3.78	1.84	
		Bismuth-212	17.4	46.1	80.8	38.3	U
		Bismuth-214	5.9	15.9	11.9	5.69	U
		Cesium-137	1.34	3.7	6.45	3.07	U
		Cobalt-60	1.98	3.41	6.36	2.95	U
		Lead-212	-11.1	13.2	10.9	5.31	U
		Lead-214	3.15	17	14.4	6.99	U
		Neptunium-237	1.18	6.01	10.7	5.17	U
		Potassium-40	117	57.8	58.8	27.1	
		Radium-223	-30.7	62.3	100	48.3	U
		Radium-224	-140	87.6	97.6	47.2	U
		Radium-226	95.2	169	96.6	46.9	U
		Radium-228	22.4	26.4	24.9	11.8	U
		Sodium-22	-2.82	3.76	6.03	2.79	U
		Thorium-227	-4.04	23.2	41	19.8	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A3PM	29-Oct-16	Thorium-231	-6.44	61.1	59.4	29	U
		Thorium-234	125	231	141	68.3	U
		Uranium-235	-30.3	38.9	33.8	16.5	U
		Uranium-238	125	231	141	68.3	U
	30-Nov-16	Actinium-228	-21.1	21.3	25.8	12.2	U
		Alpha, gross	122	25.8	9.65	4.52	
		Americium-241	0.771	3.72	6.35	3.07	U
		Beryllium-7	14.1	37.1	66.4	31.8	U
		Beta, gross	65.2	10	3.14	1.52	
		Bismuth-212	40.3	54.2	92.6	44.1	U
		Bismuth-214	-8.25	14.2	15.1	7.28	U
		Cesium-137	-1.88	3.62	5.95	2.82	U
		Cobalt-60	-0.269	3.6	6.5	3.01	U
		Lead-212	-3.94	11.5	10.6	5.18	U
		Lead-214	-10.8	13.7	12.7	6.15	U
		Neptunium-237	-4.08	6.32	9.64	4.64	U
		Potassium-40	46.8	102	93.4	44.3	U
		Radium-223	-30.7	61.1	95.4	45.9	U
		Radium-224	-155	93.8	90.4	43.7	U
		Radium-226	-81.3	130	126	61.4	U
		Radium-228	-21.1	21.3	25.8	12.2	U
		Sodium-22	1.46	3.81	7.02	3.28	U
		Thorium-227	1.01	21.7	36.6	17.6	U
		Thorium-231	-10.3	49.2	41.9	20.4	U
		Thorium-234	86.6	120	105	51.5	U
		Uranium-235	-1.09	30.3	28.7	14	U
		Uranium-238	86.6	120	105	51.5	U
	30-Dec-16	Actinium-228	22.3	67.3	55.7	26.7	U
		Alpha, gross	179	37.3	5.28	2.41	
		Americium-241	-1.42	12.8	22.3	11	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A3PM	30-Dec-16	Beryllium-7	-56.5	87.1	142	67.9	U
		Beta, gross	123	19.2	3.17	1.54	
		Bismuth-212	43.1	203	179	85.6	U
		Bismuth-214	5.71	29.3	23.4	11.2	U
		Cesium-137	-0.2	6.79	11.7	5.59	U
		Cobalt-60	0.446	6.87	12.4	5.77	U
		Lead-212	20.8	25.2	16.1	7.81	X
		Lead-214	2.27	24.8	25.4	12.3	U
		Neptunium-237	-5.48	10.7	18.4	8.89	U
		Potassium-40	-85.5	197	168	79.8	U
		Radium-223	-9.98	101	181	87.2	U
		Radium-224	12.1	111	170	82.2	U
		Radium-226	92.3	280	160	77.6	U
		Radium-228	22.3	67.3	55.7	26.7	U
		Sodium-22	0.87	6.88	12.5	5.83	U
		Thorium-227	13	41.9	69.2	33.5	U
		Thorium-231	-13.1	81	79.9	39	U
		Thorium-234	-106	213	255	126	U
		Uranium-235	14.1	62.5	46.2	22.4	U
		Uranium-238	-106	213	255	126	U
	26-Jan-17	Actinium-228	-18.5	34.3	31.3	14.9	U
		Alpha, gross	65.4	14.9	6.03	2.83	
		Americium-241	13.8	28.5	42.7	20.7	U
		Beryllium-7	-11.4	52.6	89.2	42.7	U
		Beta, gross	141	21.4	2.49	1.2	
		Bismuth-212	35.7	62.4	106	50.7	U
		Bismuth-214	8.96	16.9	14.6	6.96	U
		Cesium-137	-2.89	4.64	7.28	3.46	U
		Cobalt-60	7.16	5.8	7.85	3.66	U
		Lead-212	14.8	16.1	11	5.33	X

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A3PM	26-Jan-17	Lead-214	2.95	19.9	14.3	6.88	U
		Neptunium-237	4.43	7.6	13.1	6.31	U
		Potassium-40	52.4	104	76.3	35.5	U
		Radium-223	-41	74.6	122	59	U
		Radium-224	43.8	75.3	117	56.8	U
		Radium-226	78.5	208	174	85.5	U
		Radium-228	-18.5	34.3	31.3	14.9	U
		Sodium-22	0.713	3.81	7.04	3.26	U
		Thorium-227	-20.2	28.6	45.7	22.1	U
		Thorium-231	-33.5	106	97.1	47.3	U
		Thorium-234	142	427	352	171	U
		Uranium-235	-13.9	39.9	39.7	19.3	U
		Uranium-238	142	427	352	171	U
	27-Feb-17	Actinium-228	-18.8	36.9	33.7	16.1	U
		Alpha, gross	103	21.7	6.57	3.03	
		Americium-241	6.46	17.8	27.3	13.3	U
		Beryllium-7	-44.8	71.7	100	48.2	U
		Beta, gross	90.6	13.8	3.11	1.5	
		Bismuth-212	66.4	138	115	55	U
		Bismuth-214	-7.46	17.5	17.5	8.45	U
		Cesium-137	-6.18	9.41	7.98	3.82	U
		Cobalt-60	1.41	4.13	7.47	3.48	U
		Lead-212	1.57	19.9	12.5	6.08	U
		Lead-214	-4.24	18.4	17.9	8.71	U
		Neptunium-237	-2.86	9.35	14.1	6.86	U
		Potassium-40	223	112	63.9	29.4	
		Radium-223	15.8	83.3	144	70.1	U
		Radium-224	54.9	88.8	137	66.8	U
		Radium-226	34.9	164	177	86.7	U
		Radium-228	-18.8	36.9	33.7	16.1	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A3PM	27-Feb-17	Sodium-22	2.17	4.39	7.9	3.7	U
		Thorium-227	19	34	58.2	28.3	U
		Thorium-231	54.6	58.5	82.4	40.2	U
		Thorium-234	85	296	212	103	U
		Uranium-235	11.4	55.2	44.4	21.7	U
		Uranium-238	85	296	212	103	U
	30-Mar-17	Actinium-228	6.03	39.3	31.7	15.1	U
		Alpha, gross	149	29.7	5.17	2.37	
		Americium-241	10.2	28.8	43.4	21.1	U
		Beryllium-7	12.8	47	81.7	39.1	U
		Beta, gross	96.5	14.8	2.96	1.43	
		Bismuth-212	-1.09	111	108	51.2	U
		Bismuth-214	11.4	19.7	16.7	8.05	U
		Cesium-137	1.44	3.9	6.77	3.21	U
		Cobalt-60	1.1	3.89	7.19	3.33	U
		Lead-212	2.64	14.9	14.1	6.87	U
		Lead-214	26.2	20.7	26.3	8.07	U
		Neptunium-237	2.78	7.22	12.6	6.07	U
		Potassium-40	38.3	103	60.7	27.7	U
		Radium-223	45.4	76.2	131	63.1	U
		Radium-224	53.8	77.2	119	57.6	U
		Radium-226	97.3	193	116	56.4	U
		Radium-228	6.03	39.3	31.7	15.1	U
		Sodium-22	2.46	4.13	7.59	3.54	U
		Thorium-227	14.8	27.5	47.6	23	U
		Thorium-231	0.154	79.5	103	50.4	U
		Thorium-234	170	509	411	201	U
		Uranium-235	18.1	44.3	36.3	17.6	U
		Uranium-238	170	509	411	201	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
A3PM	30-Apr-17	Actinium-228	24.6	34.6	31.3	15	U
		Alpha, gross	72.1	15.5	4.61	2.13	
		Americium-241	5.98	17.6	27.4	13.3	U
		Beryllium-7	-10.8	51.4	86	41.3	U
		Beta, gross	69.5	10.9	3.01	1.46	
		Bismuth-212	76.8	80.6	103	49.4	U
		Bismuth-214	39.8	24.9	39.8	7.66	U
		Cesium-137	1.34	3.88	7.01	3.35	U
		Cobalt-60	0.442	3.92	6.94	3.23	U
		Lead-212	3.13	15	10.7	5.19	U
		Lead-214	-15.7	17.7	14.4	6.97	U
		Neptunium-237	-2.02	7.16	12.2	5.88	U
		Potassium-40	47.3	106	64.8	30	U
		Radium-223	-20.6	69.8	118	57.1	U
		Radium-224	25.9	74.1	117	56.6	U
		Radium-226	-31.6	163	180	88.4	U
		Radium-228	24.6	34.6	31.3	15	U
		Sodium-22	-0.759	3.89	6.7	3.11	U
		Thorium-227	0.528	26.6	46.6	22.6	U
		Thorium-231	-51.9	91.4	78.8	38.4	U
		Thorium-234	254	291	231	112	X
		Uranium-235	-23.8	39	38.5	18.8	U
		Uranium-238	254	291	231	112	X
BKPM	29-Oct-16	Actinium-228	10.6	41.5	34.5	16.5	U
		Alpha, gross	28.2	7.79	6	2.71	
		Americium-241	-9.63	27.7	43.9	21.3	U
		Beryllium-7	14.1	59.1	102	49.1	U
		Beta, gross	13.7	3.53	4.25	2.07	
		Bismuth-212	32.3	63	108	51.3	U
		Bismuth-214	11.4	23.8	14.6	6.99	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	29-Oct-16	Cesium-137	4.69	6.13	6.96	3.3	U
		Cobalt-60	1.92	4.76	7.79	3.63	U
		Lead-212	3.63	15.6	14	6.82	U
		Lead-214	10.7	18.8	16.8	8.15	U
		Neptunium-237	-1.11	7.36	12.7	6.13	U
		Potassium-40	-77.7	100	97.2	46	U
		Radium-223	-61.5	77.9	122	58.6	U
		Radium-224	29.1	76.8	121	58.5	U
		Radium-226	-57.1	158	178	87.3	U
		Radium-228	10.6	41.5	34.5	16.5	U
		Sodium-22	-0.0272	3.59	6.58	3.03	U
		Thorium-227	-21.1	32	46	22.2	U
		Thorium-231	51.5	122	96.2	46.8	U
		Thorium-234	-94.9	417	426	208	U
		Uranium-235	-0.411	39.7	41.3	20.2	U
		Uranium-238	-94.9	417	426	208	U
	30-Nov-16	Actinium-228	41.4	38.2	17.5	8.06	X
		Alpha, gross	18.3	6.13	6.86	3.2	
		Americium-241	10.8	14.7	23.7	11.5	U
		Beryllium-7	-23.5	54.9	62.8	29.9	U
		Beta, gross	9.57	2.46	2.96	1.44	
		Bismuth-212	52	52	87.1	41.3	U
		Bismuth-214	8.95	17.5	11.3	5.38	U
		Cesium-137	0.749	4.03	5.92	2.8	U
		Cobalt-60	-0.574	2.89	5.3	2.4	U
		Lead-212	-2.38	11.7	12.1	5.9	U
		Lead-214	-8.18	13	13.3	6.43	U
		Neptunium-237	7	6.9	10.7	5.16	U
		Potassium-40	-68.4	75.4	88	41.5	U
		Radium-223	-33.8	64.3	99.8	47.9	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	30-Nov-16	Radium-224	-81	74.2	101	49.1	U
		Radium-226	75.1	165	140	68.5	U
		Radium-228	41.4	38.2	17.5	8.06	X
		Sodium-22	-0.837	3	5.41	2.46	U
		Thorium-227	-9.77	24.7	39.6	19.1	U
		Thorium-231	41.2	58.8	59.6	28.9	U
		Thorium-234	5.99	305	237	116	U
		Uranium-235	-23.5	30.5	32.5	15.8	U
		Uranium-238	5.99	305	237	116	U
	30-Dec-16	Actinium-228	-4.8	37.6	33.1	15.7	U
		Alpha, gross	16.7	5.89	6.59	3.06	
		Americium-241	1.01	24.4	41.5	20.1	U
		Beryllium-7	45.3	61.9	103	49.5	U
		Beta, gross	5.84	2.43	3.44	1.67	
		Bismuth-212	7.19	60.7	109	51.6	U
		Bismuth-214	18.6	12.3	18.6	8.25	U
		Cesium-137	-2.35	4.26	7.13	3.38	U
		Cobalt-60	3.18	4.16	7.73	3.58	U
		Lead-212	1.5	13.5	13	6.34	U
		Lead-214	-6.6	15.4	14.8	7.16	U
		Neptunium-237	0.603	6.84	11.9	5.74	U
		Potassium-40	-46.5	101	99.9	47.1	U
		Radium-223	0.282	67.5	117	56.3	U
		Radium-224	68.2	77.7	117	56.8	U
		Radium-226	-250	188	139	68.1	U
		Radium-228	-4.8	37.6	33.1	15.7	U
		Sodium-22	4.04	4.45	8.08	3.76	U
		Thorium-227	5.27	24.6	43.2	20.9	U
		Thorium-231	-101	105	93.4	45.4	U
		Thorium-234	-256	402	366	178	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	30-Dec-16	Uranium-235	29.2	32.5	35.7	17.3	U
		Uranium-238	-256	402	366	178	U
	26-Jan-17	Actinium-228	-57	59.5	47.3	22.7	U
		Alpha, gross	16.1	4.95	4.69	2.14	
		Americium-241	11	9.49	12.5	6.15	U
		Beryllium-7	-8.7	73.3	124	59.5	U
		Beta, gross	11.6	2.34	1.47	0.69	
		Bismuth-212	-167	187	159	76.1	U
		Bismuth-214	-1.56	22.1	22.9	11.1	U
		Cesium-137	2.15	5.87	10.6	5.07	U
		Cobalt-60	-0.795	5.25	9.5	4.39	U
		Lead-212	-12.7	19.4	17.7	8.69	U
		Lead-214	-10.1	31.2	20.7	10.1	U
		Neptunium-237	-4.98	10.5	17	8.28	U
		Potassium-40	57.6	136	95.1	43.9	U
		Radium-223	-74.8	106	165	80.1	U
		Radium-224	-104	112	167	81.4	U
		Radium-226	44.5	191	132	64.1	U
		Radium-228	-57	59.5	47.3	22.7	U
		Sodium-22	-2.98	5.73	9.73	4.52	U
		Thorium-227	-11.7	37.6	62.2	30.3	U
		Thorium-231	55.1	51.7	66.8	32.7	U
		Thorium-234	154	250	156	77	U
		Uranium-235	27.2	54.9	41	20.1	U
		Uranium-238	154	250	156	77	U
	27-Feb-17	Actinium-228	0.806	37.9	27.1	12.8	U
		Alpha, gross	16.2	5.89	6.67	3.07	
		Americium-241	-5.85	16.6	26.8	13	U
		Beryllium-7	6.17	65.2	111	53.7	U
		Beta, gross	9.46	2.51	3.09	1.5	

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	27-Feb-17	Bismuth-212	-22.3	117	122	58.4	U
		Bismuth-214	-2.48	16.9	16.9	8.17	U
		Cesium-137	-3.77	9.25	8.57	4.12	U
		Cobalt-60	-0.878	4.08	7.08	3.29	U
		Lead-212	0.43	17.2	15	7.35	U
		Lead-214	2.88	18.3	18.3	8.91	U
		Neptunium-237	0.964	8.52	14.8	7.18	U
		Potassium-40	174	88.2	64.6	29.7	
		Radium-223	5.99	86.6	150	72.8	U
		Radium-224	-36.7	90.2	136	66.5	U
		Radium-226	28.5	165	181	88.9	U
		Radium-228	0.806	37.9	27.1	12.8	U
		Sodium-22	-2.7	4.32	6.95	3.22	U
		Thorium-227	-8.72	32.5	55.8	27.1	U
		Thorium-231	37.8	51.2	80.6	39.4	U
		Thorium-234	-91.7	260	278	136	U
		Uranium-235	33.7	59.3	44.2	21.6	U
		Uranium-238	-91.7	260	278	136	U
	30-Mar-17	Actinium-228	-29.3	37.4	34.3	16.4	U
		Alpha, gross	12.9	4.95	5.75	2.62	
		Americium-241	6.58	16.3	27	13.2	U
		Beryllium-7	-31.1	57	91.5	44.2	U
		Beta, gross	9.27	2.68	3.44	1.67	
		Bismuth-212	-15.6	66.9	118	56.6	U
		Bismuth-214	4.36	10.2	17.1	8.28	U
		Cesium-137	2.46	4.48	8.03	3.85	U
		Cobalt-60	2.59	5.97	7.83	3.66	U
		Lead-212	15.6	19.1	12.2	5.94	X
		Lead-214	11.9	14.2	17.2	8.38	U
		Neptunium-237	3.5	8.66	14.9	7.26	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	30-Mar-17	Potassium-40	119	68.6	70.7	32.8	
		Radium-223	2.7	84.5	146	71	U
		Radium-224	0.319	114	137	66.6	U
		Radium-226	-230	198	170	83.6	U
		Radium-228	-29.3	37.4	34.3	16.4	U
		Sodium-22	1.25	4.66	7.44	3.47	U
		Thorium-227	-50.6	61.4	54.7	26.6	U
		Thorium-231	37.2	88.9	77.7	37.9	U
		Thorium-234	-1.08	299	279	137	U
		Uranium-235	21.9	48.9	44.2	21.6	U
		Uranium-238	-1.08	299	279	137	U
	30-Apr-17	Actinium-228	8.32	31.5	22.4	10.6	U
		Alpha, gross	8.96	2.91	2.48	1.08	
		Americium-241	0.172	15	24.1	11.7	U
		Beryllium-7	-43.8	51.8	82.1	39.4	U
		Beta, gross	5.09	1.86	2.61	1.26	
		Bismuth-212	-63.9	88.8	97.6	46.6	U
		Bismuth-214	-0.523	20.2	16.9	8.19	U
		Cesium-137	-2.01	4.01	6.72	3.21	U
		Cobalt-60	-11.2	10.2	7.11	3.33	U
		Lead-212	9.87	16.8	13.2	6.45	U
		Lead-214	7.8	20.1	15.7	7.62	U
		Neptunium-237	7.1	7.92	12.4	5.99	U
		Potassium-40	-175	120	97.8	46.7	U
		Radium-223	-2.55	73.4	120	57.9	U
		Radium-224	-15.7	73.6	110	53.5	U
		Radium-226	-138	168	166	81.5	U
		Radium-228	8.32	31.5	22.4	10.6	U
		Sodium-22	-1.29	3.71	6.15	2.86	U
		Thorium-227	-0.92	27.5	45.2	21.9	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
BKPM	30-Apr-17	Thorium-231	-59.6	89	82.2	40.2	U
		Thorium-234	270	337	282	138	U
		Uranium-235	27.2	46.8	38.4	18.7	U
		Uranium-238	270	337	282	138	U
CPMS	29-Oct-16	Actinium-228	2.3	32.2	27.6	13.1	U
		Alpha, gross	150	30.8	7.88	3.67	
		Americium-241	-2.73	3.57	5.91	2.86	U
		Beryllium-7	-4.31	44.3	78.8	37.7	U
		Beta, gross	95.3	14.4	3.66	1.77	
		Bismuth-212	54.3	75.3	90.7	43.1	U
		Bismuth-214	2.19	18.9	12.6	6.05	U
		Cesium-137	0.482	3.43	6.06	2.88	U
		Cobalt-60	1.54	3.46	6.44	2.98	U
		Lead-212	1.98	12	8.9	4.31	U
		Lead-214	4.2	16.8	11.4	5.5	U
		Neptunium-237	-1.38	5.83	9.49	4.56	U
		Potassium-40	115	113	63.6	29.4	
		Radium-223	-18.5	59.3	95.4	45.9	U
		Radium-224	42.8	62.1	94.7	45.8	U
		Radium-226	57.3	148	84.2	40.7	U
		Radium-228	2.3	32.2	27.6	13.1	U
		Sodium-22	0.197	3.4	6.25	2.89	U
		Thorium-227	-0.406	22.3	37.3	18	U
		Thorium-231	-2.53	41.8	41.3	20.1	U
		Thorium-234	-33.9	93.5	101	49.5	U
		Uranium-235	-0.58	24.4	28.8	14	U
		Uranium-238	-33.9	93.5	101	49.5	U
	30-Nov-16	Actinium-228	0.564	32.5	27.7	13.1	U
		Alpha, gross	116	24.3	6.9	3.21	
		Americium-241	9.47	18.4	27.9	13.6	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CPMS	30-Nov-16	Beryllium-7	-24	53.9	87.9	42.4	U
		Beta, gross	68.8	10.6	2.85	1.38	
		Bismuth-212	-18.2	100	110	52.5	U
		Bismuth-214	-1.31	18.8	18.8	9.12	U
		Cesium-137	2.94	4.82	8.56	4.12	U
		Cobalt-60	0.489	4.34	7.75	3.62	U
		Lead-212	10.8	17.7	14.8	7.23	U
		Lead-214	-19.2	20	17.9	8.7	U
		Neptunium-237	3.81	8.78	15.1	7.35	U
		Potassium-40	-41.7	82.8	92.3	43.6	U
		Radium-223	-17.1	87.3	149	72.5	U
		Radium-224	25.3	89.2	140	68.3	U
		Radium-226	48.1	192	178	87.1	U
		Radium-228	0.564	32.5	27.7	13.1	U
		Sodium-22	-0.632	4.17	7.31	3.41	U
		Thorium-227	-0.0901	32.6	56.9	27.7	U
		Thorium-231	10.1	90.2	77.1	37.6	U
		Thorium-234	50.8	301	283	139	U
		Uranium-235	38	39.9	41	20	U
		Uranium-238	50.8	301	283	139	U
	30-Dec-16	Actinium-228	0.598	37.8	32	15.4	U
		Alpha, gross	207	41.1	5.89	2.74	
		Americium-241	8.31	9.62	15.7	7.64	U
		Beryllium-7	-19.5	52.3	88	42.4	U
		Beta, gross	126	18.8	2.39	1.15	
		Bismuth-212	98.3	100	101	48.7	U
		Bismuth-214	14.1	22	16.9	8.19	U
		Cesium-137	-0.0101	4.12	6.28	3	U
		Cobalt-60	2.43	3.86	6.92	3.25	U
		Lead-212	-3.34	14.5	12.3	6	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CPMS	30-Dec-16	Lead-214	-3.15	13.5	14.9	7.24	U
		Neptunium-237	5.39	6.95	11.8	5.74	U
		Potassium-40	18.7	102	58.3	27	U
		Radium-223	-50.9	73.2	107	51.5	U
		Radium-224	110	83.8	135	66.2	U
		Radium-226	-117	141	162	79.7	U
		Radium-228	0.598	37.8	32	15.4	U
		Sodium-22	-0.826	3.67	6.4	2.99	U
		Thorium-227	6.27	27.7	44.8	21.8	U
		Thorium-231	32.9	84.1	57.9	28.2	U
		Thorium-234	-102	208	199	97.7	U
		Uranium-235	-23.4	37.4	35.4	17.3	U
		Uranium-238	-102	208	199	97.7	U
	26-Jan-17	Actinium-228	9.87	35.1	27.4	13	U
		Alpha, gross	154	30.7	4.27	1.93	
		Americium-241	-0.283	16.8	30.8	14.8	U
		Beryllium-7	47.6	48	82.4	39.3	U
		Beta, gross	146	22.7	3	1.46	
		Bismuth-212	51.3	70.3	94.6	44.9	U
		Bismuth-214	11	18.6	13.6	6.5	U
		Cesium-137	0.858	3.5	6.31	2.98	U
		Cobalt-60	2.48	5.31	6.19	2.84	U
		Lead-212	-4.71	11.2	12	5.84	U
		Lead-214	8.72	19.9	13.6	6.53	U
		Neptunium-237	-0.418	6.56	11	5.26	U
		Potassium-40	23	90.5	57.1	26	U
		Radium-223	64.7	72.8	117	56.2	U
		Radium-224	-162	120	101	48.6	U
		Radium-226	-166	179	165	80.8	U
		Radium-228	9.87	35.1	27.4	13	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CPMS	26-Jan-17	Sodium-22	-0.411	3.37	6.21	2.86	U
		Thorium-227	-7.09	25.1	41.5	20	U
		Thorium-231	-16.3	84.5	79.4	38.5	U
		Thorium-234	-82.1	339	364	178	U
		Uranium-235	4.15	44.8	35.4	17.2	U
		Uranium-238	-82.1	339	364	178	U
	27-Feb-17	Actinium-228	-10.7	27.3	30.7	14.6	U
		Alpha, gross	114	23.5	5.81	2.67	
		Americium-241	-0.0373	11.6	20.1	9.71	U
		Beryllium-7	-14.6	50.7	86.7	41.4	U
		Beta, gross	72.9	14.5	5.87	2.55	
		Bismuth-212	35	121	102	48.6	U
		Bismuth-214	-10	18.6	15.3	7.35	U
		Cesium-137	3.55	4.16	7.04	3.35	U
		Cobalt-60	-1.08	4.07	7.09	3.29	U
		Lead-212	-3.5	14.7	12.9	6.3	U
		Lead-214	5.37	17.9	14.8	7.16	U
		Neptunium-237	0.633	6.51	11.7	5.62	U
		Potassium-40	33.9	115	60.5	27.7	U
		Radium-223	-31.8	66.4	113	54.5	U
		Radium-224	-182	107	111	53.7	U
		Radium-226	170	192	170	72.6	U
		Radium-228	-10.7	27.3	30.7	14.6	U
		Sodium-22	1.26	3.75	6.92	3.21	U
		Thorium-227	-55.6	53.7	42.4	20.4	U
		Thorium-231	13	82.7	62.4	30.2	U
		Thorium-234	-37.2	201	227	111	U
		Uranium-235	-1.15	33	33.4	16.2	U
		Uranium-238	-37.2	201	227	111	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CPMS	30-Mar-17	Actinium-228	-3.96	24.8	26.4	12.5	U
		Alpha, gross	175	34.8	3.89	1.71	
		Americium-241	-2.11	10.7	16.4	7.99	U
		Beryllium-7	6.1	38	67.1	32.1	U
		Beta, gross	115	18.6	3.91	1.9	
		Bismuth-212	19.4	48.8	85.1	40.4	U
		Bismuth-214	5.55	17.3	14	6.75	U
		Cesium-137	1.98	3.5	6.09	2.9	U
		Cobalt-60	14.6	6.92	6.25	2.89	X
		Lead-212	5.54	12.1	9.02	4.37	U
		Lead-214	10.3	15.6	13.9	6.72	U
		Neptunium-237	-2.1	5.93	10.3	4.94	U
		Potassium-40	-36.6	66.3	85.1	40.2	U
		Radium-223	12.4	60.4	108	51.9	U
		Radium-224	-33.8	64	97.3	47.1	U
		Radium-226	69.8	170	154	75.3	U
		Radium-228	-3.96	24.8	26.4	12.5	U
		Sodium-22	0.215	3.43	6.32	2.93	U
		Thorium-227	-1.13	22.7	40.4	19.5	U
		Thorium-231	-14.1	62.9	62	30.3	U
		Thorium-234	173	215	143	69.3	X
		Uranium-235	0.0668	41.2	29.2	14.2	U
		Uranium-238	173	215	143	69.3	X
	30-Apr-17	Actinium-228	-28.2	45.3	35.5	16.9	U
		Alpha, gross	94.2	19.7	3.71	1.69	
		Americium-241	-10.9	25.5	40.6	19.7	U
		Beryllium-7	9.36	50.3	89.3	42.6	U
		Beta, gross	77.4	12	3.22	1.56	
		Bismuth-212	7.99	59.9	105	49.9	U
		Bismuth-214	21.4	31.3	14.2	6.75	X

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CPMS	30-Apr-17	Cesium-137	-2.3	4.75	7.83	3.72	U
		Cobalt-60	-7.82	19.9	10	4.71	U
		Lead-212	3.74	19.4	16.5	8.06	U
		Lead-214	12.2	20.9	18.1	8.74	U
		Neptunium-237	1.32	8.77	14	6.76	U
		Potassium-40	9.65	108	81.5	37.7	U
		Radium-223	38.8	79.1	139	67.1	U
		Radium-224	71.7	90	139	67.4	U
		Radium-226	-251	230	209	103	U
		Radium-228	-28.2	45.3	35.5	16.9	U
		Sodium-22	-0.995	4.37	7.96	3.67	U
		Thorium-227	2.83	31	55.1	26.7	U
		Thorium-231	12.1	96.7	86.5	42.1	U
		Thorium-234	125	387	419	205	U
		Uranium-235	3.35	69.4	47.8	23.4	U
		Uranium-238	125	387	419	205	U
CWPM	29-Oct-16	Actinium-228	-26.3	29.8	30.3	14.5	U
		Alpha, gross	121	26.1	5.86	2.65	
		Americium-241	-0.18	4.93	7.41	3.6	U
		Beryllium-7	15	63.3	110	52.9	U
		Beta, gross	97.9	15.3	4.52	2.2	
		Bismuth-212	34.6	58.4	103	49.3	U
		Bismuth-214	-9.01	18.3	17.4	8.46	U
		Cesium-137	-5.32	5.36	6.8	3.25	U
		Cobalt-60	0.0589	4.39	7.88	3.7	U
		Lead-212	-1.04	13.2	12.6	6.14	U
		Lead-214	5.98	16.7	12.7	6.12	U
		Neptunium-237	-1.31	6.49	11.4	5.51	U
		Potassium-40	22.1	83.4	70.4	32.8	U
		Radium-223	57.2	73.1	124	60.1	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CWPM	29-Oct-16	Radium-224	-201	119	111	53.9	U
		Radium-226	28.4	150	143	69.9	U
		Radium-228	-26.3	29.8	30.3	14.5	U
		Sodium-22	0.792	4.37	7.94	3.73	U
		Thorium-227	1.83	27.3	45.6	22.1	U
		Thorium-231	30.2	53.8	46.7	22.8	U
		Thorium-234	35.2	107	112	55.1	U
		Uranium-235	-8.75	29.6	33.3	16.3	U
		Uranium-238	35.2	107	112	55.1	U
	30-Nov-16	Actinium-228	6.73	38.6	32.1	15.3	U
		Alpha, gross	69.1	15.2	7.3	3.43	
		Americium-241	3.11	28.5	42.9	20.9	U
		Beryllium-7	-30.8	48.8	77.6	37.1	U
		Beta, gross	58.6	9.66	3.64	1.77	
		Bismuth-212	44.4	64.1	108	51.6	U
		Bismuth-214	-2.48	17.2	17.6	8.47	U
		Cesium-137	0.672	4.44	7.62	3.63	U
		Cobalt-60	0.553	3.68	6.08	2.78	U
		Lead-212	10.8	17.4	14.8	7.22	U
		Lead-214	-4.39	17.4	16.4	7.92	U
		Neptunium-237	4.42	7.76	13.3	6.45	U
		Potassium-40	-82.6	118	91.6	43.2	U
		Radium-223	-32.7	74.6	125	60.1	U
		Radium-224	47.9	79.6	123	59.9	U
		Radium-226	27.1	207	174	85.2	U
		Radium-228	6.73	38.6	32.1	15.3	U
		Sodium-22	-0.0139	4.04	7.33	3.41	U
		Thorium-227	-7.62	27.4	46.9	22.7	U
		Thorium-231	-181	149	101	49.2	U
		Thorium-234	842	635	842	214	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CWPM	30-Nov-16	Uranium-235	27.3	50.7	36.1	17.5	U
		Uranium-238	842	635	842	214	U
	30-Dec-16	Actinium-228	0.911	33.6	28.8	13.7	U
		Alpha, gross	153	30.8	4.19	1.88	
		Americium-241	-3.59	28.3	43.2	21	U
		Beryllium-7	12.7	55.7	97.6	46.9	U
		Beta, gross	127	19	3.52	1.71	
		Bismuth-212	-40.3	93.7	99.8	47.5	U
		Bismuth-214	-5.33	17.9	16.5	7.94	U
		Cesium-137	-1.16	3.93	6.61	3.14	U
		Cobalt-60	4.86	4.46	7.79	3.63	U
		Lead-212	-0.979	13.6	14	6.81	U
		Lead-214	3.06	19	16.4	7.94	U
		Neptunium-237	3.69	7.33	12.8	6.2	U
		Potassium-40	-39.6	99.2	97.2	46	U
		Radium-223	21.3	71.7	127	61.1	U
		Radium-224	-75.7	83.5	130	63.1	U
		Radium-226	-186	175	172	84.1	U
		Radium-228	0.911	33.6	28.8	13.7	U
		Sodium-22	-0.0597	3.51	6.48	2.98	U
		Thorium-227	-4.38	27.7	48.8	23.6	U
		Thorium-231	-13.1	92.8	90.1	43.9	U
		Thorium-234	144	432	329	160	U
		Uranium-235	6.3	43.6	41.6	20.3	U
		Uranium-238	144	432	329	160	U
	26-Jan-17	Actinium-228	-22.2	28.7	27.1	12.9	U
		Alpha, gross	118	24.4	6.34	2.95	
		Americium-241	2.94	14.1	23.5	11.4	U
		Beryllium-7	19.1	39.4	71.1	33.9	U
		Beta, gross	150	22.9	2.71	1.31	

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CWPM	26-Jan-17	Bismuth-212	6.85	46.5	82.5	39	U
		Bismuth-214	3.22	22.2	13.9	6.66	U
		Cesium-137	0.965	3.07	5.52	2.6	U
		Cobalt-60	-2.48	5.77	6.78	3.14	U
		Lead-212	-1.05	12	12.2	5.94	U
		Lead-214	-13.7	14.5	13	6.25	U
		Neptunium-237	-2.02	6.3	10.1	4.86	U
		Potassium-40	9.35	88.8	65.9	30.4	U
		Radium-223	96.4	88.7	108	52	U
		Radium-224	-72.7	72.2	102	49.2	U
		Radium-226	55.5	1160	94.4	45.7	U
		Radium-228	-22.2	28.7	27.1	12.9	U
		Sodium-22	0.876	3.52	6.62	3.06	U
		Thorium-227	-15.6	24.1	37	17.8	U
		Thorium-231	114	72.1	55.4	26.8	X
		Thorium-234	194	255	242	118	U
		Uranium-235	-11.5	31.3	31.2	15.2	U
		Uranium-238	194	255	242	118	U
	27-Feb-17	Actinium-228	-5.72	27.9	29.6	14.2	U
		Alpha, gross	110	23.5	7.63	3.58	
		Americium-241	2.78	9.42	15	7.28	U
		Beryllium-7	13.1	47.9	84.3	40.5	U
		Beta, gross	77.3	11.8	3.11	1.51	
		Bismuth-212	10.3	51.8	89.6	42.8	U
		Bismuth-214	-8.54	16.5	15.9	7.69	U
		Cesium-137	-1.24	6.51	6.22	2.97	U
		Cobalt-60	2.49	3.96	7.16	3.36	U
		Lead-212	-4.13	11.7	11.7	5.71	U
		Lead-214	0.561	14.6	14	6.8	U
		Neptunium-237	0.518	6.12	10.9	5.29	U

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Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CWPM	27-Feb-17	Potassium-40	0.63	84.6	56.8	26.2	U
		Radium-223	-37.6	62.7	105	50.5	U
		Radium-224	42.8	82.2	132	64.3	U
		Radium-226	14.2	177	142	69.6	U
		Radium-228	-5.72	27.9	29.6	14.2	U
		Sodium-22	1.6	3.47	6.42	2.99	U
		Thorium-227	-17.1	24.2	40	19.3	U
		Thorium-231	-36.8	68.5	58.6	28.6	U
		Thorium-234	57.3	189	129	62.6	U
		Uranium-235	8.23	36	29.3	14.2	U
		Uranium-238	57.3	189	129	62.6	U
	30-Mar-17	Actinium-228	13.6	18.9	34.9	16.3	U
		Alpha, gross	162	32.7	5.4	2.45	
		Americium-241	-0.119	2.99	4.97	2.36	U
		Beryllium-7	-19.2	43.1	74.6	35.2	U
		Beta, gross	94.5	14.8	2.07	0.988	
		Bismuth-212	-17.7	64.3	110	51.2	U
		Bismuth-214	9.48	22.8	14.1	6.61	U
		Cesium-137	5.51	14.1	7.51	3.51	U
		Cobalt-60	-9.24	10.6	9.19	4.17	U
		Lead-212	-2.56	9.36	9.73	4.69	U
		Lead-214	6.56	17.8	16.1	7.73	U
		Neptunium-237	-3.82	6.52	10.3	4.89	U
		Potassium-40	93.7	75.5	83	37.2	X
		Radium-223	64.8	68.7	112	53.4	U
		Radium-224	10.7	53.8	94.1	45.1	U
		Radium-226	16.1	132	84.6	40.6	U
		Radium-228	13.6	18.9	34.9	16.3	U
		Sodium-22	1.61	5.39	10	4.59	U
		Thorium-227	3.17	23.3	40.4	19.4	U

Table continued on next page.

Table C-2. Summary of ambient air radiological analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (pCi/sa)	Error (pCi/sa)	Lc (pCi/sa)	MDA (pCi/sa)	Laboratory Data Qualifiers
CWPM	30-Mar-17	Thorium-231	18.5	28	30.1	14.4	U
		Thorium-234	-20.1	50	52.5	25.1	U
		Uranium-235	11.8	14.4	25.1	12.1	U
		Uranium-238	-20.1	50	52.5	25.1	U
	30-Apr-17	Actinium-228	42.3	32.1	42.4	16.1	U
		Alpha, gross	67	13.9	3.84	1.77	
		Americium-241	0.211	23.3	41.1	19.9	U
		Beryllium-7	-11.8	48.8	84.7	40.4	U
		Beta, gross	69.1	10.5	2.46	1.19	
		Bismuth-212	48.8	70.1	109	51.7	U
		Bismuth-214	36.6	14.6	13.9	6.6	
		Cesium-137	-0.345	4.01	6.95	3.29	U
		Cobalt-60	0.285	4.16	7.57	3.51	U
		Lead-212	5.35	16.2	10.5	5.05	U
		Lead-214	10	13	15.5	7.47	U
		Neptunium-237	4.41	7.17	12.7	6.14	U
		Potassium-40	72.6	98.2	63.8	29.1	X
		Radium-223	-45.5	70.9	119	57.1	U
		Radium-224	25.3	75.3	115	55.5	U
		Radium-226	-87.1	152	153	74.6	U
		Radium-228	42.3	32.1	42.4	16.1	U
		Sodium-22	-1.96	4.1	6.95	3.2	U
		Thorium-227	-12.3	29.7	46.8	22.6	U
		Thorium-231	-9.7	91.4	90.8	44.1	U
		Thorium-234	14.7	382	368	179	U
		Uranium-235	-8.3	38.5	37.4	18.2	U
		Uranium-238	14.7	382	368	179	U

See notes at end of appendices.

Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	26-Oct-16	Acetone	7.37	0.178	5	
		Benzene	0.183	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.4	0.154	0.4	
		Butanone, 2-	0.796	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.703	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.517	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	26-Oct-16	Ethyl benzene	0.12	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.192	0.075	0.8	J
		Hexanone, 2-	0.087	0.087	0.4	U*
		Methylene chloride	0.18	0.072	0.4	J
		Pentane, N-	0.405	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U*
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.484	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.246	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m-, p-	0.276	0.1	0.8	J
		Xylene, o-	0.101	0.054	0.4	J
	29-Nov-16	Acetone	1.29	0.178	5	J
		Benzene	0.184	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	29-Nov-16	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.608	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.178	0.078	0.8	J
		Carbon tetrachloride	0.0708	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.566	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.451	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	29-Nov-16	Methylene chloride	0.116	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.483	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.231	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.235	0.1	0.8	J
		Xylene, o-	0.0975	0.054	0.4	J
	15-Dec-16	Acetone	3.86	0.178	5	J
		Benzene	0.238	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.932	0.154	0.4	
		Butanone, 2-	0.286	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0762	0.064	0.8	J

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	15-Dec-16	Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.613	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.462	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.103	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.1	0.072	0.4	J
		Pentane, N-	0.264	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	15-Dec-16	Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.436	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.223	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.268	0.1	0.8	J
		Xylene, o-	0.105	0.054	0.4	J
	30-Jan-17	Acetone	2.88	0.178	5	J
		Benzene	0.265	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	2.13	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0697	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.79	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	30-Jan-17	Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.236	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.124	0.072	0.4	J
		Pentane, N-	0.509	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.425	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	30-Jan-17	Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.196	0.196	0.4	U
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.164	0.1	0.8	J
		Xylene, o-	0.0705	0.054	0.4	J
	27-Feb-17	Acetone	1.79	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.212	0.154	0.4	J
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.646	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	27-Feb-17	Dichlorodifluoromethane	0.476	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.115	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.051	0.051	0.4	U
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.218	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	27-Feb-17	Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	29-Mar-17	Acetone	5.65	0.178	5	
		Benzene	0.109	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.59	0.154	0.4	
		Butanone, 2-	0.745	0.199	0.8	J
		Carbon disulfide	0.143	0.078	0.8	J
		Carbon tetrachloride	0.0705	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.687	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.462	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	29-Mar-17	Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.259	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.162	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.196	0.196	0.4	U
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	19-Apr-17	Acetone	5.72	0.178	5	
		Benzene	0.0817	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.454	0.154	0.4	
		Butanone, 2-	0.541	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.681	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.308	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	19-Apr-17	Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.208	0.072	0.4	J
		Pentane, N-	0.31	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.29	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.249	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	30-May-17	Acetone	10.5	0.178	5	
		Benzene	0.16	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	30-May-17	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.904	0.154	0.4	
		Butanone, 2-	0.868	0.199	0.8	
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.897	0.197	0.8	
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.585	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.153	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	30-May-17	Methylene chloride	0.213	0.072	0.4	J
		Pentane, N-	0.461	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.228	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.313	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.152	0.1	0.8	J
		Xylene, o-	0.055	0.054	0.4	J
	9-Aug-17	Acetone	7.71	0.178	5	
		Benzene	0.093	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.07	0.154	0.4	
		Butanone, 2-	0.797	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	9-Aug-17	Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.766	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.326	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.119	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.167	0.087	0.4	J
		Methylene chloride	0.135	0.072	0.4	JB
		Pentane, N-	0.295	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.19	0.135	0.4	J
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CPMS	9-Aug-17	Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.0609	0.051	0.4	JB
		Toluene	0.153	0.051	0.4	JB
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.287	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.147	0.1	0.8	J
		Xylene, o-	0.0593	0.054	0.4	J
CW	26-Oct-16	Acetone	2.86	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.406	0.154	0.4	
		Butanone, 2-	0.236	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0821	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.663	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	26-Oct-16	Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.53	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U*
		Methylene chloride	0.0959	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U*
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.107	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	26-Oct-16	Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.239	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m-, p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	29-Nov-16	Acetone	6.55	0.221	6.2	
		Benzene	0.112	0.098	0.496	J
		Benzyl chloride	0.202	0.202	0.992	U
		Bromodichloromethane	0.0818	0.0818	0.372	U
		Bromoform	0.0868	0.0868	0.496	U
		Bromomethane	0.415	0.415	0.992	U
		Butane, N-	0.38	0.191	0.496	J
		Butanone, 2-	0.405	0.247	0.992	J
		Carbon disulfide	1.3	0.0967	0.992	
		Carbon tetrachloride	0.0794	0.0794	0.992	U
		Chlorobenzene	0.0794	0.0794	0.372	U
		Chloroethane	0.382	0.382	0.992	U
		Chloroform	0.118	0.118	0.372	U
		Chloromethane	0.556	0.244	0.992	J
		Dibromochloromethane	0.098	0.098	0.496	U
		Dibromoethane, 1,2-	0.093	0.093	0.992	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.192	0.192	0.496	U
		Dichlorobenzene, 1,2-	0.161	0.161	0.496	U
		Dichlorobenzene, 1,3-	0.136	0.136	0.496	U
		Dichlorobenzene, 1,4-	0.185	0.185	0.496	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	29-Nov-16	Dichlorodifluoromethane	0.417	0.18	0.496	J
		Dichloroethane, 1,1-	0.0893	0.0893	0.372	U
		Dichloroethane, 1,2-	0.109	0.109	0.992	U
		Dichloroethene, 1,1-	0.16	0.16	0.992	U
		Dichloroethene, cis-1,2-	0.11	0.11	0.496	U
		Dichloroethene, trans-1,2-	0.124	0.124	0.496	U
		Dichloropropane, 1,2-	0.298	0.298	0.496	U
		Dichloropropene, cis-1,3-	0.129	0.129	0.496	U
		Dichloropropene, trans-1,3-	0.109	0.109	0.496	U
		Dioxane, 1,4-	0.125	0.125	0.992	U
		Ethyl benzene	0.0781	0.0781	0.496	U
		Ethyltoluene, 4-	0.232	0.232	0.496	U
		Hexachlorobutadiene	0.536	0.536	2.48	U
		Hexane, N-	0.093	0.093	0.992	U
		Hexanone, 2-	0.108	0.108	0.496	U
		Methylene chloride	0.109	0.0893	0.496	J
		Pentane, N-	0.324	0.324	0.992	U
		Pentanone, 4-methyl-, 2-	0.167	0.167	0.496	U
		Styrene	0.0732	0.0732	0.496	U
		Tert-butyl methyl ether	0.149	0.149	0.992	U
		Tetrachloroethane, 1,1,2,2-	0.0856	0.0856	0.496	U
		Tetrachloroethene	0.0632	0.0632	0.496	U
		Toluene	0.0931	0.0632	0.496	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.202	0.202	0.496	U
		Trichlorobenzene, 1,2,4-	0.537	0.537	2.48	U
		Trichloroethane, 1,1,1-	0.0806	0.0806	0.372	U
		Trichloroethane, 1,1,2-	0.0831	0.0831	0.496	U
		Trichloroethene	0.13	0.13	0.496	U
		Trichlorofluoromethane	0.243	0.243	0.496	U
		Trimethylbenzene, 1,2,4-	0.201	0.201	0.992	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	29-Nov-16	Trimethylbenzene, 1,3,5-	0.155	0.155	0.496	U
		Vinyl acetate	0.18	0.18	0.992	U
		Vinyl chloride	0.149	0.149	0.496	U
		Xylene, m- & p-	0.124	0.124	0.992	U
		Xylene, o-	0.067	0.067	0.496	U
	15-Dec-16	Acetone	2.28	0.178	5	J
		Benzene	0.108	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.227	0.154	0.4	J
		Butanone, 2-	0.383	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.627	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.469	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	15-Dec-16	Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.382	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.13	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.116	0.051	0.4	J
		Toluene	0.626	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.235	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.648	0.1	0.8	J
		Xylene, o-	0.235	0.054	0.4	J

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	29-Mar-17	Acetone	2.35	0.178	5	J
		Benzene	0.0988	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.47	0.154	0.4	
		Butanone, 2-	0.276	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0826	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.679	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.496	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	29-Mar-17	Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.15	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.082	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.256	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	30-May-17	Acetone	8.43	0.178	5	
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	30-May-17	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.791	0.154	0.4	
		Butanone, 2-	0.887	0.199	0.8	
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0928	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.946	0.197	0.8	
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.539	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	30-May-17	Methylene chloride	0.171	0.072	0.4	J
		Pentane, N-	0.334	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.051	0.051	0.4	U
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.254	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	9-Aug-17	Acetone	4.47	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.05	0.154	0.4	
		Butanone, 2-	0.62	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	9-Aug-17	Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.765	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.312	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.0851	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.126	0.072	0.4	JB
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
CW	9-Aug-17	Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.0677	0.051	0.4	JB
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.258	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
MDL	26-Oct-16	Acetone	5.23	0.178	5	
		Benzene	0.126	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.882	0.154	0.4	
		Butanone, 2-	0.389	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.749	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	26-Oct-16	Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.608	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.065	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.127	0.075	0.8	J
		Hexanone, 2-	0.087	0.087	0.4	U*
		Methylene chloride	0.151	0.072	0.4	J
		Pentane, N-	0.279	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U*
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.315	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	26-Oct-16	Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.289	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m-, p-	0.185	0.1	0.8	J
		Xylene, o-	0.0824	0.054	0.4	J
	29-Nov-16	Acetone	2.34	0.178	5	J
		Benzene	0.217	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.551	0.154	0.4	
		Butanone, 2-	0.352	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.548	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	29-Nov-16	Dichlorodifluoromethane	0.468	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.118	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.152	0.135	0.4	J
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.317	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.196	0.196	0.4	U
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	29-Nov-16	Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.147	0.1	0.8	J
		Xylene, o-	0.0578	0.054	0.4	J
	15-Dec-16	Acetone	4.36	0.178	5	J
		Benzene	0.233	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	6.52	0.154	0.4	
		Butanone, 2-	0.472	0.199	0.8	J
		Carbon disulfide	0.233	0.078	0.8	J
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.714	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.482	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	15-Dec-16	Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.273	0.101	0.8	J
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.144	0.072	0.4	J
		Pentane, N-	0.587	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.386	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.232	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.169	0.1	0.8	J
		Xylene, o-	0.0652	0.054	0.4	J

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	30-Jan-17	Acetone	2.96	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.93	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.868	0.197	0.8	
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.275	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	30-Jan-17	Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.0974	0.072	0.4	J
		Pentane, N-	0.548	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.0783	0.051	0.4	J
		Toluene	0.051	0.051	0.4	U
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.278	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	27-Feb-17	Acetone	1.99	0.178	5	J
		Benzene	0.0819	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	27-Feb-17	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.729	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.633	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.483	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	27-Feb-17	Methylene chloride	0.127	0.072	0.4	J
		Pentane, N-	0.588	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.306	0.051	0.4	J
		Toluene	0.459	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.225	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	29-Mar-17	Acetone	3.65	0.178	5	J
		Benzene	0.132	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.489	0.154	0.4	
		Butanone, 2-	0.354	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	29-Mar-17	Chlorobenzene	0.0674	0.064	0.3	J
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.677	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.473	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.151	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.194	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.0649	0.059	0.4	J
		Tert-butyl methyl ether	0.12	0.12	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	29-Mar-17	Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.425	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.248	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.566	0.1	0.8	J
		Xylene, o-	0.225	0.054	0.4	J
	19-Apr-17	Acetone	2.73	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.434	0.154	0.4	
		Butanone, 2-	0.256	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0757	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.666	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	19-Apr-17	Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.323	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.148	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.162	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	19-Apr-17	Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.245	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	30-May-17	Acetone	19.6	0.178	5	
		Benzene	0.254	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.873	0.154	0.4	
		Butanone, 2-	1.76	0.199	0.8	
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.193	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.197	0.197	0.8	U
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	30-May-17	Dichlorodifluoromethane	1.12	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.461	0.101	0.8	J
		Ethyl benzene	0.225	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.379	0.072	0.4	J
		Pentane, N-	0.912	0.261	0.8	
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.0886	0.051	0.4	J
		Toluene	0.513	0.051	0.4	
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.199	0.163	0.4	J
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.53	0.196	0.4	
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	30-May-17	Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.239	0.1	0.8	J
		Xylene, o-	0.0832	0.054	0.4	J
	9-Aug-17	Acetone	5.37	0.178	5	
		Benzene	0.0984	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.11	0.154	0.4	
		Butanone, 2-	0.713	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0716	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.738	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.316	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
MDL	9-Aug-17	Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.245	0.101	0.8	J
		Ethyl benzene	0.147	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.161	0.072	0.4	JB
		Pentane, N-	0.29	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.148	0.051	0.4	JB
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.288	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.144	0.1	0.8	J
		Xylene, o-	0.0563	0.054	0.4	J

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	26-Oct-16	Acetone	4.19	0.178	5	J
		Benzene	0.103	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.969	0.154	0.4	
		Butanone, 2-	0.421	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.633	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.495	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	26-Oct-16	Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.187	0.075	0.8	J
		Hexanone, 2-	0.087	0.087	0.4	U*
		Methylene chloride	0.191	0.072	0.4	J
		Pentane, N-	0.336	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U*
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.257	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.254	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m-, p-	0.13	0.1	0.8	J
		Xylene, o-	0.054	0.054	0.4	U
	29-Nov-16	Acetone	3.29	0.178	5	J
		Benzene	0.101	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	29-Nov-16	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.463	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.546	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.502	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	29-Nov-16	Methylene chloride	0.124	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.051	0.051	0.4	U
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.177	0.105	0.4	J
		Trichlorofluoromethane	0.253	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	15-Dec-16	Acetone	5.08	0.178	5	
		Benzene	0.109	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.03	0.154	0.4	
		Butanone, 2-	0.564	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	15-Dec-16	Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.643	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.523	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.116	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	15-Dec-16	Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.212	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.233	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.109	0.1	0.8	J
		Xylene, o-	0.054	0.054	0.4	U
	30-Jan-17	Acetone	2.51	0.178	5	J
		Benzene	0.0917	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.7	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0814	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.867	0.197	0.8	
		Dibromochloromethane	0.079	0.079	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	30-Jan-17	Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.287	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.0962	0.072	0.4	J
		Pentane, N-	0.429	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.298	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	30-Jan-17	Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.233	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.137	0.1	0.8	J
		Xylene, o-	0.054	0.054	0.4	U
	27-Feb-17	Acetone	1.32	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.509	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.064	0.064	0.8	U
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.607	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	27-Feb-17	Dichlorodifluoromethane	0.492	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.117	0.072	0.4	J
		Pentane, N-	0.367	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.211	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.23	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	27-Feb-17	Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	29-Mar-17	Acetone	2.16	0.178	5	J
		Benzene	0.0905	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.473	0.154	0.4	
		Butanone, 2-	0.199	0.199	0.8	U
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0876	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.742	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.506	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	29-Mar-17	Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.203	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.0815	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.275	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	19-Apr-17	Acetone	2.63	0.178	5	J
		Benzene	0.079	0.079	0.4	U
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.275	0.154	0.4	J
		Butanone, 2-	0.206	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.0736	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.74	0.197	0.8	J
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.345	0.145	0.4	J
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	19-Apr-17	Ethyl benzene	0.063	0.063	0.4	U
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U
		Methylene chloride	0.21	0.072	0.4	J
		Pentane, N-	0.261	0.261	0.8	U
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.111	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.255	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	30-May-17	Acetone	8.22	0.178	5	
		Benzene	0.111	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.066	0.066	0.3	U
		Bromoform	0.07	0.07	0.4	U

Table continued on next page.

Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	30-May-17	Bromomethane	0.335	0.335	0.8	U
		Butane, N-	0.631	0.154	0.4	
		Butanone, 2-	0.777	0.199	0.8	J
		Carbon disulfide	0.078	0.078	0.8	U
		Carbon tetrachloride	0.106	0.064	0.8	J
		Chlorobenzene	0.064	0.064	0.3	U
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.095	0.095	0.3	U
		Chloromethane	0.948	0.197	0.8	
		Dibromochloromethane	0.079	0.079	0.4	U
		Dibromoethane, 1,2-	0.075	0.075	0.8	U
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.155	0.155	0.4	U
		Dichlorobenzene, 1,2-	0.13	0.13	0.4	U
		Dichlorobenzene, 1,3-	0.11	0.11	0.4	U
		Dichlorobenzene, 1,4-	0.149	0.149	0.4	U
		Dichlorodifluoromethane	0.579	0.145	0.4	
		Dichloroethane, 1,1-	0.072	0.072	0.3	U
		Dichloroethane, 1,2-	0.088	0.088	0.8	U
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.089	0.089	0.4	U
		Dichloroethene, trans-1,2-	0.1	0.1	0.4	U
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.104	0.104	0.4	U
		Dichloropropene, trans-1,3-	0.088	0.088	0.4	U
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.0694	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.075	0.075	0.8	U
		Hexanone, 2-	0.087	0.087	0.4	U

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	30-May-17	Methylene chloride	0.187	0.072	0.4	J
		Pentane, N-	0.37	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.135	0.135	0.4	U
		Styrene	0.059	0.059	0.4	U
		Tert-butyl methyl ether	0.12	0.12	0.8	U
		Tetrachloroethane, 1,1,2,2-	0.069	0.069	0.4	U
		Tetrachloroethene	0.051	0.051	0.4	U
		Toluene	0.116	0.051	0.4	J
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.065	0.065	0.3	U
		Trichloroethane, 1,1,2-	0.067	0.067	0.4	U
		Trichloroethene	0.105	0.105	0.4	U
		Trichlorofluoromethane	0.275	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.162	0.162	0.8	U
		Trimethylbenzene, 1,3,5-	0.125	0.125	0.4	U
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.12	0.12	0.4	U
		Xylene, m- & p-	0.1	0.1	0.8	U
		Xylene, o-	0.054	0.054	0.4	U
	9-Aug-17	Acetone	3.69	0.178	5	J
		Benzene	0.173	0.079	0.4	J
		Benzyl chloride	0.163	0.163	0.8	U
		Bromodichloromethane	0.0998	0.066	0.3	J
		Bromoform	0.13	0.07	0.4	J
		Bromomethane	0.335	0.335	0.8	U
		Butane, N-	1.18	0.154	0.4	
		Butanone, 2-	0.613	0.199	0.8	J
		Carbon disulfide	0.158	0.078	0.8	J
		Carbon tetrachloride	0.192	0.064	0.8	J

Table continued on next page.

Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	9-Aug-17	Chlorobenzene	0.147	0.064	0.3	JB
		Chloroethane	0.308	0.308	0.8	U
		Chloroform	0.116	0.095	0.3	J
		Chloromethane	0.794	0.197	0.8	J
		Dibromochloromethane	0.112	0.079	0.4	J
		Dibromoethane, 1,2-	0.12	0.075	0.8	J
		Dichloro-1,1,2,2-tetrafluoroethane, 1,2-	0.158	0.155	0.4	J
		Dichlorobenzene, 1,2-	0.197	0.13	0.4	J
		Dichlorobenzene, 1,3-	0.181	0.11	0.4	J
		Dichlorobenzene, 1,4-	0.179	0.149	0.4	J
		Dichlorodifluoromethane	0.372	0.145	0.4	J
		Dichloroethane, 1,1-	0.109	0.072	0.3	J
		Dichloroethane, 1,2-	0.111	0.088	0.8	J
		Dichloroethene, 1,1-	0.129	0.129	0.8	U
		Dichloroethene, cis-1,2-	0.106	0.089	0.4	J
		Dichloroethene, trans-1,2-	0.113	0.1	0.4	J
		Dichloropropane, 1,2-	0.24	0.24	0.4	U
		Dichloropropene, cis-1,3-	0.12	0.104	0.4	J
		Dichloropropene, trans-1,3-	0.126	0.088	0.4	J
		Dioxane, 1,4-	0.101	0.101	0.8	U
		Ethyl benzene	0.193	0.063	0.4	J
		Ethyltoluene, 4-	0.187	0.187	0.4	U
		Hexachlorobutadiene	0.432	0.432	2	U
		Hexane, N-	0.185	0.075	0.8	J
		Hexanone, 2-	0.171	0.087	0.4	J
		Methylene chloride	0.223	0.072	0.4	JB
		Pentane, N-	0.364	0.261	0.8	J
		Pentanone, 4-methyl-, 2-	0.157	0.135	0.4	J
		Styrene	0.153	0.059	0.4	J
		Tert-butyl methyl ether	0.135	0.12	0.8	J

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Table C-3. Summary of ambient air volatile organic compound analysis, FY 2017 (continued)

Sample Location	Sample Date	Analyte	Result (ppb v/v)	MDL (ppb v/v)	PQL (ppb v/v)	Laboratory Data Qualifiers
TA2	9-Aug-17	Tetrachloroethane, 1,1,2,2-	0.163	0.069	0.4	J
		Tetrachloroethene	0.148	0.051	0.4	JB
		Toluene	0.189	0.051	0.4	JB
		Trichloro-1,2,2-trifluoroethane, 1,1,2-	0.163	0.163	0.4	U
		Trichlorobenzene, 1,2,4-	0.433	0.433	2	U
		Trichloroethane, 1,1,1-	0.113	0.065	0.3	J
		Trichloroethane, 1,1,2-	0.11	0.067	0.4	J
		Trichloroethene	0.124	0.105	0.4	J
		Trichlorofluoromethane	0.354	0.196	0.4	J
		Trimethylbenzene, 1,2,4-	0.169	0.162	0.8	J
		Trimethylbenzene, 1,3,5-	0.165	0.125	0.4	J
		Vinyl acetate	0.145	0.145	0.8	U
		Vinyl chloride	0.162	0.12	0.4	J
		Xylene, m- & p-	0.312	0.1	0.8	J
		Xylene, o-	0.161	0.054	0.4	J

See notes at end of appendices.

Appendix D. 2017 Wastewater Monitoring Results



Black and Yellow Mud Dauber (*Sceliphron caementarium*) on a desert willow (*Chilopsis linearis*)

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	13-Feb-17	101643-001	Cyanide, total		0.00167	U	EPA 335.4
			101644-001	Cyanide, total		0.00167	U	EPA 335.4
			101642-001	Cyanide, total		0.00167	U	EPA 335.4
			101641-001	Cyanide, total		0.00167	U	EPA 335.4
		14-Feb-17	101639-001	Aluminum		0.015	U	EPA 200.8
			101639-001	Arsenic	0.00444	0.0017	J	EPA 200.8
			101639-001	Boron	0.0596	0.0075		EPA 200.8
			101639-001	Cadmium		0.0003	U	EPA 200.8
			101639-001	Chromium	0.00304	0.003	J	EPA 200.8
			101639-001	Copper	0.0011	0.00035		EPA 200.8
			101639-002	Fluoride	0.905	0.033		EPA 300.0
			101639-001	Lead		0.0005	U	EPA 200.8
			101639-001	Mercury		0.000067	U	EPA 245.1/245.2
			101639-001	Molybdenum	0.0997	0.0003	B	EPA 200.8
			101639-001	Nickel		0.0005	U	EPA 200.8
			101639-001	Selenium	0.0029	0.002	J	EPA 200.8
			101639-001	Silver		0.0004	U	EPA 200.8
			101639-001	Zinc		0.0035	U	EPA 200.8
		15-Feb-17	101640-001	Aluminum		0.015	U	EPA 200.8
			101640-001	Arsenic	0.00412	0.0017	J	EPA 200.8
			101640-001	Boron	0.2	0.0375		EPA 200.8
			101640-001	Cadmium		0.0003	U	EPA 200.8
			101640-001	Chromium	0.00327	0.003	J	EPA 200.8
			101640-001	Copper	0.00459	0.00035		EPA 200.8
			101640-002	Fluoride	0.934	0.033		EPA 300.0
			101640-001	Lead		0.0005	U	EPA 200.8
			101640-001	Mercury		0.000067	U	EPA 245.1/245.2
			101640-001	Molybdenum	0.0869	0.0003		EPA 200.8
			101640-001	Nickel		0.0005	U	EPA 200.8

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Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	15-Feb-17	101640-001	Selenium	0.00281	0.002	J	EPA 200.8
			101640-001	Silver		0.0004	U	EPA 200.8
			101640-001	Zinc		0.0035	U	EPA 200.8
		25-Apr-17	101951-005	Ammonia	0.0382	0.017	JB	EPA 350.1
		26-Apr-17	101961-001	Ammonia	0.928	0.017	B	EPA 350.1
WW001	2069A	25-Apr-17	102176-001	Aluminum	0.111	0.0193		EPA 200.8
			102176-007	Ammonia	18.2	0.425	B	EPA 350.1
			102176-001	Arsenic	0.00433	0.002	J	EPA 200.8
			102176-001	Boron	0.0735	0.0052		EPA 200.8
			102176-001	Cadmium		0.0003	U	EPA 200.8
			102176-001	Chromium	0.00474	0.003	J	EPA 200.8
			102176-001	Copper	0.0474	0.0003		EPA 200.8
			102176-002	Fluoride	6.4	0.066		EPA 300.0
			102176-001	Lead	0.00691	0.0005		EPA 200.8
			102176-001	Mercury		0.000067	U	EPA 245.1/245.2
			102176-001	Molybdenum	0.0128	0.0002		EPA 200.8
			102176-001	Nickel	0.00256	0.0006		EPA 200.8
			102176-001	Selenium	0.00351	0.002	J	EPA 200.8
			102176-001	Silver	0.000752	0.0003	J	EPA 200.8
			102176-001	Zinc	0.25	0.0033		EPA 200.8
		26-Apr-17	101955-001	Aluminum	0.0599	0.0193		EPA 200.8
			101955-003	Ammonia	15.2	0.425	B	EPA 350.1
			101955-001	Arsenic	0.00424	0.002	J	EPA 200.8
			101955-001	Boron	0.0613	0.0052		EPA 200.8
			101955-001	Cadmium		0.0003	U	EPA 200.8
			101955-001	Chromium	0.00335	0.003	J	EPA 200.8
			101955-001	Copper	0.0293	0.0003		EPA 200.8
			101955-002	Fluoride	0.929	0.033		EPA 300.0
			101955-001	Lead	0.00479	0.0005		EPA 200.8

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Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	26-Apr-17	101955-001	Mercury		0.000067	U	EPA 245.1/245.2
			101955-001	Molybdenum	0.0114	0.0002		EPA 200.8
			101955-001	Nickel	0.0023	0.0006		EPA 200.8
			101955-001	Selenium	0.00314	0.002	J	EPA 200.8
			101955-001	Silver		0.0003	U	EPA 200.8
			101955-001	Zinc	0.134	0.0033		EPA 200.8
WW006	2069F	24-Apr-17	101939-001	Cyanide, total	0.00209	0.00167	J	EPA 335.4
			101938-001	Cyanide, total	0.00172	0.00167	J	EPA 335.4
			101937-001	Cyanide, total	0.00269	0.00167	J	EPA 335.4
			101936-001	Cyanide, total	0.00181	0.00167	J	EPA 335.4
		25-Apr-17	101952-001	Aluminum	0.0807	0.0193		EPA 200.8
			101952-007	Ammonia	24.5	0.425	B	EPA 350.1
			101952-001	Arsenic	0.00413	0.002	J	EPA 200.8
			101952-001	Boron	0.124	0.0052		EPA 200.8
			101952-001	Cadmium		0.0003	U	EPA 200.8
			101952-001	Chromium		0.003	U	EPA 200.8
			101952-001	Copper	0.0269	0.0003		EPA 200.8
			101943-001	Cyanide, total	0.00238	0.00167	J	EPA 335.4
			101942-001	Cyanide, total		0.00167	U	EPA 335.4
			101941-001	Cyanide, total		0.00167	U	EPA 335.4
			101940-001	Cyanide, total	0.00196	0.00167	J	EPA 335.4
			101952-002	Fluoride	0.903	0.033		EPA 300.0
			101952-001	Lead	0.00224	0.0005		EPA 200.8
			101952-001	Mercury		0.000067	U	EPA 245.1/245.2
			101952-001	Molybdenum	0.0411	0.0002		EPA 200.8
			101952-001	Nickel	0.00155	0.0006	J	EPA 200.8
			101952-001	Selenium	0.00235	0.002	J	EPA 200.8
			101952-001	Silver	0.000305	0.0003	J	EPA 200.8
			101952-001	Zinc	0.0519	0.0033		EPA 200.8

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Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	26-Apr-17	101956-001	Aluminum	0.0876	0.0193		EPA 200.8
			101956-003	Ammonia	33.5	0.425	B	EPA 350.1
			101956-001	Arsenic	0.00312	0.002	J	EPA 200.8
			101956-001	Boron	0.116	0.0052		EPA 200.8
			101956-001	Cadmium		0.0003	U	EPA 200.8
			101956-001	Chromium		0.003	U	EPA 200.8
			101956-001	Copper	0.0237	0.0003		EPA 200.8
			101956-002	Fluoride	6.44	0.066		EPA 300.0
			101956-001	Lead	0.00364	0.0005		EPA 200.8
			101956-001	Mercury		0.000067	U	EPA 245.1/245.2
			101956-001	Molybdenum	0.0395	0.0002		EPA 200.8
			101956-001	Nickel	0.00128	0.0006	J	EPA 200.8
			101956-001	Selenium		0.002	U	EPA 200.8
			101956-001	Silver		0.0003	U	EPA 200.8
			101956-001	Zinc	0.0567	0.0033		EPA 200.8
WW007	2069G	24-Apr-17	101944-001	Cyanide, total	0.00352	0.00167	J	EPA 335.4
			101947-001	Cyanide, total		0.00167	U	EPA 335.4
			101946-001	Cyanide, total		0.00167	U	EPA 335.4
			101945-001	Cyanide, total		0.00167	U	EPA 335.4
		25-Apr-17	101953-001	Aluminum		0.0193	U	EPA 200.8
			101953-004	Ammonia	2.63	0.085	B	EPA 350.1
			101953-001	Arsenic		0.002	U	EPA 200.8
			101953-001	Boron	0.0197	0.0052		EPA 200.8
			101953-001	Cadmium		0.0003	U	EPA 200.8
			101953-001	Chromium		0.003	U	EPA 200.8
			101953-001	Copper	0.00215	0.0003		EPA 200.8
			101953-002	Fluoride	7.51	0.066		EPA 300.0
			101953-001	Lead		0.0005	U	EPA 200.8
			101953-001	Mercury	0.000243	0.000067		EPA 245.1/245.2

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Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	25-Apr-17	101953-001	Molybdenum	0.0109	0.0002		EPA 200.8
			101953-001	Nickel	0.000975	0.0006	J	EPA 200.8
			101953-001	Selenium		0.002	U	EPA 200.8
			101953-001	Silver		0.0003	U	EPA 200.8
			101953-001	Zinc	0.0122	0.0033		EPA 200.8
		26-Apr-17	101960-001	Aluminum		0.0193	U	EPA 200.8
			101960-003	Ammonia	2.12	0.085	B	EPA 350.1
			101960-001	Arsenic		0.002	U	EPA 200.8
			101960-001	Boron	0.0219	0.0052		EPA 200.8
			101960-001	Cadmium		0.0003	U	EPA 200.8
			101960-001	Chromium		0.003	U	EPA 200.8
			101960-001	Copper	0.00277	0.0003		EPA 200.8
			101960-002	Fluoride	8.38	0.165		EPA 300.0
			101960-001	Lead		0.0005	U	EPA 200.8
			101960-001	Mercury		0.000067	U	EPA 245.1/245.2
			101960-001	Molybdenum	0.0111	0.0002		EPA 200.8
			101960-001	Nickel	0.00092	0.0006	J	EPA 200.8
			101960-001	Selenium		0.002	U	EPA 200.8
			101960-001	Silver		0.0003	U	EPA 200.8
			101960-001	Zinc		0.0033	U	EPA 200.8
WW008	2069I	24-Apr-17	101933-001	Cyanide, total	0.00454	0.00167	J	EPA 335.4
			101934-001	Cyanide, total	0.00262	0.00167	J	EPA 335.4
			101932-001	Cyanide, total		0.00167	U	EPA 335.4
			101935-001	Cyanide, total	0.004	0.00167	J	EPA 335.4
		25-Apr-17	101954-001	Aluminum	0.148	0.0193		EPA 200.8
			101954-007	Ammonia	38.3	0.425	B	EPA 350.1
			101954-001	Arsenic	0.00493	0.002	J	EPA 200.8
			101954-001	Boron	0.094	0.0052		EPA 200.8
			101954-001	Cadmium		0.0003	U	EPA 200.8

Table continued on next page.

Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	25-Apr-17	101954-001	Chromium	0.00323	0.003	J	EPA 200.8
			101954-001	Copper	0.0621	0.0003		EPA 200.8
			101954-002	Fluoride	0.984	0.033		EPA 300.0
			101954-001	Lead	0.000693	0.0005	J	EPA 200.8
			101954-001	Mercury		0.000067	U	EPA 245.1/245.2
			101954-001	Molybdenum	0.00643	0.0002		EPA 200.8
			101954-001	Nickel	0.00816	0.0006		EPA 200.8
			101954-001	Selenium	0.00315	0.002	J	EPA 200.8
			101954-001	Silver		0.0003	U	EPA 200.8
			101954-001	Zinc	0.0954	0.0033		EPA 200.8
		26-Apr-17	101959-001	Aluminum	0.089	0.0193		EPA 200.8
			101959-003	Ammonia	50.5	0.85	B	EPA 350.1
			101959-001	Arsenic	0.00395	0.002	J	EPA 200.8
			101959-001	Boron	0.0925	0.0052		EPA 200.8
			101959-001	Cadmium		0.0003	U	EPA 200.8
			101959-001	Chromium		0.003	U	EPA 200.8
			101959-001	Copper	0.036	0.0003		EPA 200.8
			101959-002	Fluoride	0.839	0.033		EPA 300.0
			101959-001	Lead		0.0005	U	EPA 200.8
			101959-001	Mercury		0.000067	U	EPA 245.1/245.2
			101959-001	Molybdenum	0.00432	0.0002		EPA 200.8
			101959-001	Nickel	0.00647	0.0006		EPA 200.8
			101959-001	Selenium	0.00273	0.002	J	EPA 200.8
			101959-001	Silver		0.0003	U	EPA 200.8
			101959-001	Zinc	0.0896	0.0033		EPA 200.8
WW011	2069K	25-Apr-17	102174-001	Aluminum	0.229	0.0193		EPA 200.8
			102174-007	Ammonia	20.7	0.425	B	EPA 350.1
			102174-001	Arsenic	0.00474	0.002	J	EPA 200.8
			102174-001	Boron	0.352	0.026		EPA 200.8

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Table D-1. Summary of inorganic results for permitted sanitary outfalls, February–April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	25-Apr-17	102174-001	Cadmium		0.0003	U	EPA 200.8
			102174-001	Chromium	0.00918	0.003	J	EPA 200.8
			102174-001	Copper	0.0281	0.0003		EPA 200.8
			102174-002	Fluoride	1.05	0.033		EPA 300.0
			102174-001	Lead	0.00137	0.0005	J	EPA 200.8
			102174-001	Mercury	0.000084	0.000067	J	EPA 245.1/245.2
			102174-001	Molybdenum	0.0269	0.0002		EPA 200.8
			102174-001	Nickel	0.00197	0.0006	J	EPA 200.8
			102174-001	Selenium	0.00283	0.002	J	EPA 200.8
			102174-001	Silver	0.0278	0.0003		EPA 200.8
			102174-001	Zinc	0.0728	0.0033		EPA 200.8
		26-Apr-17	101958-001	Aluminum	0.324	0.0193		EPA 200.8
			101958-003	Ammonia	16.9	0.425	B	EPA 350.1
			101958-001	Arsenic	0.00564	0.002		EPA 200.8
			101958-001	Boron	0.203	0.026		EPA 200.8
			101958-001	Cadmium		0.0003	U	EPA 200.8
			101958-001	Chromium	0.00856	0.003	J	EPA 200.8
			101958-001	Copper	0.0465	0.0003		EPA 200.8
			101958-002	Fluoride	0.84	0.033		EPA 300.0
			101958-001	Lead	0.0023	0.0005		EPA 200.8
			101958-001	Mercury		0.000067	U	EPA 245.1/245.2
			101958-001	Molybdenum	0.0404	0.0002		EPA 200.8
			101958-001	Nickel	0.00277	0.0006		EPA 200.8
			101958-001	Selenium	0.00229	0.002	J	EPA 200.8
			101958-001	Silver	0.00968	0.0003		EPA 200.8
			101958-001	Zinc	0.208	0.0033		EPA 200.8

See notes at end of appendices.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	25-Apr-2017	101951-002	Actinium-228	23 ± 25.4	29.5	U	EPA 901.1
			101951-001	Alpha, gross	-4.43 ± 6.16	12.1	U	EPA 900.0/SW846 9310
			101951-002	Americium-241	4.66 ± 16.5	26.3	U	EPA 901.1
			101951-002	Beryllium-7	-13.1 ± 29.1	48.3	U	EPA 901.1
			101951-001	Beta, gross	11.8 ± 5.57	8.25		EPA 900.0/SW846 9310
			101951-002	Bismuth-212	-43.3 ± 52.3	83.3	U	EPA 901.1
			101951-002	Bismuth-214	14.4 ± 10.8	16.9	U	EPA 901.1
			101951-002	Cesium-137	0.237 ± 4.22	7.37	U	EPA 901.1
			101951-002	Cobalt-60	03.39 ± 3.1	5.68	U	EPA 901.1
			101951-002	Lead-212	0.773 ± 10.8	11.7	U	EPA 901.1
			101951-002	Lead-214	6.91 ± 8.67	15.1	U	EPA 901.1
			101951-002	Neptunium-237	3.07 ± 6.78	12.2	U	EPA 901.1
			101951-002	Potassium-40	49.5 ± 37.5	58.1	U	EPA 901.1
			101951-002	Radium-223	-30.5 ± 66.2	111	U	EPA 901.1
			101951-002	Radium-224	-33.1 ± 75.2	108	U	EPA 901.1
			101951-002	Radium-226	-96.1 ± 94.6	127	U	EPA 901.1
			101951-002	Radium-228	23 ± 25.4	29.5	U	EPA 901.1
			101951-002	Sodium-22	1.39 ± 3.06	6.16	U	EPA 901.1
			101951-002	Thorium-227	-1.6 ± 30.8	46.3	U	EPA 901.1
			101951-002	Thorium-231	42.5 ± 57.6	83.6	U	EPA 901.1
			101951-002	Thorium-234	51 ± 250	220	U	EPA 901.1
			101951-003	Tritium	12.2 ± 83.5	149	U	EPA 906.0 Modified
			101951-002	Uranium-235	-8.67 ± 23.5	35.6	U	EPA 901.1
			101951-002	Uranium-238	51 ± 250	220	U	EPA 901.1
WW001	2069A	25-Apr-2017	102176-004	Actinium-228	-6.41 ± 13.4	11.7	U	EPA 901.1
			102176-003	Alpha, gross	6.07 ± 2.86	3.81		EPA 900.0/SW846 9310
			102176-004	Americium-241	0.0778 ± 6.97	12.1	U	EPA 901.1

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Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	25-Apr-2017	102176-004	Beryllium-7	-4.65 ± 12.2	21.1	U	EPA 901.1
			102176-003	Beta, gross	9.23 ± 2.14	1.88		EPA 900.0/SW846 9310
			102176-004	Bismuth-212	12.9 ± 38.7	39	U	EPA 901.1
			102176-004	Bismuth-214	5.58 ± 8.72	4.89	X	EPA 901.1
			102176-004	Cesium-137	1.07 ± 1.73	2.77	U	EPA 901.1
			102176-004	Cobalt-60	2.24 ± 3.12	3.06	U	EPA 901.1
			102176-004	Lead-212	12.3 ± 5.31	4.03		EPA 901.1
			102176-004	Lead-214	-2.8 ± 5.78	6.25	U	EPA 901.1
			102176-004	Neptunium-237	-0.569 ± 2.79	4.51	U	EPA 901.1
			102176-004	Potassium-40	16.9 ± 40.2	22.7	U	EPA 901.1
			102176-004	Radium-223	-16.2 ± 27.6	47.2	U	EPA 901.1
			102176-004	Radium-224	-0.332 ± 28.6	43.4	U	EPA 901.1
			102176-004	Radium-226	-13.7 ± 60.4	65.4	U	EPA 901.1
			102176-004	Radium-228	-6.41 ± 13.4	11.7	U	EPA 901.1
			102176-004	Sodium-22	-0.359 ± 1.45	2.45	U	EPA 901.1
			102176-004	Thorium-227	-3.97 ± 18.7	19.2	U	EPA 901.1
			102176-004	Thorium-231	38.5 ± 44.4	33.6	X	EPA 901.1
			102176-004	Thorium-234	-24.5 ± 95.9	132	U	EPA 901.1
			102176-005	Tritium	6.07 ± 86.2	154	U	EPA 906.0 Modified
			102176-004	Uranium-235	11.8 ± 21.9	15.9	U	EPA 901.1
			102176-004	Uranium-238	-24.5 ± 95.9	132	U	EPA 901.1
WW006	2069F	25-Apr-2017	101952-004	Actinium-228	4.1 ± 25.2	17.4	U	EPA 901.1
			101952-003	Alpha, gross	2.05 ± 2.49	4.16	U	EPA 900.0/SW846 9310
			101952-004	Americium-241	7.91 ± 18.3	22.6	U	EPA 901.1
			101952-004	Beryllium-7	2.24 ± 21.3	32.8	U	EPA 901.1
			101952-003	Beta, gross	14.9 ± 3.08	2.31		EPA 900.0/SW846 9310
			101952-004	Bismuth-212	13.9 ± 30	54.4	U	EPA 901.1
			101952-004	Bismuth-214	222 ± 19.7	7.24		EPA 901.1

Table continued on next page.

Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	25-Apr-2017	101952-004	Cesium-137	1.63 ± 2.32	3.74	U	EPA 901.1
			101952-004	Cobalt-60	-0.62 ± 2.49	3.91	U	EPA 901.1
			101952-004	Lead-212	7.35 ± 7.28	5.72	X	EPA 901.1
			101952-004	Lead-214	226 ± 18.4	7.93		EPA 901.1
			101952-004	Neptunium-237	0.842 ± 4.02	7.06	U	EPA 901.1
			101952-004	Potassium-40	16 ± 55.9	37.9	U	EPA 901.1
			101952-004	Radium-223	-26.9 ± 40.6	65.9	U	EPA 901.1
			101952-004	Radium-224	50.5 ± 70.5	61.3	U	EPA 901.1
			101952-004	Radium-226	-51.9 ± 81.5	94.9	U	EPA 901.1
			101952-004	Radium-228	4.1 ± 25.2	17.4	U	EPA 901.1
			101952-004	Sodium-22	0.577 ± 2.46	4.35	U	EPA 901.1
			101952-004	Thorium-227	-12.3 ± 16.6	26.9	U	EPA 901.1
			101952-004	Thorium-231	-32.6 ± 49.7	50.4	U	EPA 901.1
			101952-004	Thorium-234	-147 ± 196	222	U	EPA 901.1
			101952-005	Tritium	-10.5 ± 85.3	155	U	EPA 906.0 Modified
			101952-004	Uranium-235	2.64 ± 21	23.5	U	EPA 901.1
			101952-004	Uranium-238	-147 ± 196	222	U	EPA 901.1
WW008	2069I	25-Apr-2017	101954-004	Actinium-228	-14.3 ± 15.1	13.9	U	EPA 901.1
			101954-003	Alpha, gross	2.13 ± 1.9	3.08	U	EPA 900.0/SW846 9310
			101954-004	Americium-241	7.84 ± 9.52	14.1	U	EPA 901.1
			101954-004	Beryllium-7	3.22 ± 15.7	27	U	EPA 901.1
			101954-003	Beta, gross	14.2 ± 2.73	1.45		EPA 900.0/SW846 9310
			101954-004	Bismuth-212	-4.63 ± 26.8	47.7	U	EPA 901.1
			101954-004	Bismuth-214	6.8 ± 6.79	7.51	U	EPA 901.1
			101954-004	Cesium-137	1.07 ± 2	3.6	U	EPA 901.1
			101954-004	Cobalt-60	-1.45 ± 1.72	2.58	U	EPA 901.1
			101954-004	Lead-212	0.201 ± 6.44	5.86	U	EPA 901.1
			101954-004	Lead-214	6.04 ± 6.04	7.26	U	EPA 901.1

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Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	25-Apr-2017	101954-004	Neptunium-237	-1.92 ± 3.67	6.05	U	EPA 901.1
			101954-004	Potassium-40	86.5 ± 36	30		EPA 901.1
			101954-004	Radium-223	0.184 ± 36	62.2	U	EPA 901.1
			101954-004	Radium-224	0.505 ± 44	55.2	U	EPA 901.1
			101954-004	Radium-226	5.54 ± 77.5	74.3	U	EPA 901.1
			101954-004	Radium-228	-14.3 ± 15.1	13.9	U	EPA 901.1
			101954-004	Sodium-22	0.254 ± 1.73	3.13	U	EPA 901.1
			101954-004	Thorium-227	-5.32 ± 22.3	24.4	U	EPA 901.1
			101954-004	Thorium-231	11.4 ± 45.2	39.8	U	EPA 901.1
			101954-004	Thorium-234	32.7 ± 160	116	U	EPA 901.1
			101954-005	Tritium	-21.2 ± 84	154	U	EPA 906.0 Modified
			101954-004	Uranium-235	7.91 ± 20.2	18.1	U	EPA 901.1
			101954-004	Uranium-238	32.7 ± 160	116	U	EPA 901.1
WW011	2069K	25-Apr-2017	102174-004	Actinium-228	-13.7 ± 12.6	12.4	U	EPA 901.1
			102174-003	Alpha, gross	6.27 ± 4.57	7.21	U	EPA 900.0/SW846 9310
			102174-004	Americium-241	0.0831 ± 6.1	10	U	EPA 901.1
			102174-004	Beryllium-7	0.217 ± 12.3	21.8	U	EPA 901.1
			102174-003	Beta, gross	22.9 ± 4.38	2.52		EPA 900.0/SW846 9310
			102174-004	Bismuth-212	-3.99 ± 22.8	39	U	EPA 901.1
			102174-004	Bismuth-214	0.726 ± 4.95	6.56	U	EPA 901.1
			102174-004	Cesium-137	0.767 ± 3.93	2.73	U	EPA 901.1
			102174-004	Cobalt-60	1.77 ± 1.68	3.01	U	EPA 901.1
			102174-004	Lead-212	6.25 ± 5.54	4.19	X	EPA 901.1
			102174-004	Lead-214	0.758 ± 6.34	5.93	U	EPA 901.1
			102174-004	Neptunium-237	1.74 ± 2.89	5.14	U	EPA 901.1
			102174-004	Potassium-40	53.8 ± 42.5	24.7	X	EPA 901.1

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Table D-2. Summary of radiological results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	25-Apr-2017	102174-004	Radium-223	-3.52 ± 26.8	48.1	U	EPA 901.1
			102174-004	Radium-224	-0.805 ± 29.6	44.9	U	EPA 901.1
			102174-004	Radium-226	51.5 ± 72.1	44.3	X	EPA 901.1
			102174-004	Radium-228	-13.7 ± 12.6	12.4	U	EPA 901.1
			102174-004	Sodium-22	-0.723 ± 1.5	2.56	U	EPA 901.1
			102174-004	Thorium-227	5.18 ± 11.8	19.3	U	EPA 901.1
			102174-004	Thorium-231	1.4 ± 32.5	32.3	U	EPA 901.1
			102174-004	Thorium-234	36.2 ± 109	86.8	U	EPA 901.1
			102174-005	Tritium	6.19 ± 86.4	155	U	EPA 906.0 Modified
			102174-004	Uranium-235	-7.64 ± 16.3	15.6	U	EPA 901.1
			102174-004	Uranium-238	36.2 ± 109	86.8	U	EPA 901.1

See notes at end of appendices.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	26-Apr-2017	101961-002	Acenaphthene		0.3	U	EPA 625
			101961-002	Acenaphthylene		0.3	U	EPA 625
			101961-002	Anthracene		0.3	U	EPA 625
			101961-002	Benzidine		3.9	*NU	EPA 625
			101961-002	Benzo(a)anthracene		0.3	U	EPA 625
			101961-002	Benzo(a)pyrene		0.3	U	EPA 625
			101961-002	Benzo(b)fluoranthene		0.3	U	EPA 625
			101961-002	Benzo(ghi)perylene		0.3	U	EPA 625
			101961-002	Benzo(k)fluoranthene		0.3	U	EPA 625
			101961-002	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			101961-002	Butylbenzyl phthalate		3	U	EPA 625
			101961-002	Chloro-3-methylphenol, 4-		3	U	EPA 625
			101961-002	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			101961-002	Chloroethyl)ether, bis(2-		3	U	EPA 625
			101961-002	Chloroisopropyl ether, bis-		3	U	EPA 625
			101961-002	Chloronaphthalene, 2-		0.41	U	EPA 625
			101961-002	Chlorophenol, 2-		3	U	EPA 625
			101961-002	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			101961-002	Chrysene		0.3	U	EPA 625
			101961-002	Di-n-butyl phthalate		3	U	EPA 625
			101961-002	Di-n-octyl phthalate		3	U	EPA 625
			101961-002	Dibenz[a,h]anthracene		0.3	U	EPA 625
			101961-002	Dichlorobenzidine, 3,3'-		3	U	EPA 625
			101961-002	Dichlorophenol, 2,4-		3	U	EPA 625
			101961-002	Diethylphthalate		3	U	EPA 625
			101961-002	Dimethylphenol, 2,4-		3	U	EPA 625
			101961-002	Dimethylphthalate		3	U	EPA 625

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Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	26-Apr-2017	101961-002	Dinitro-o-cresol		3	*U	EPA 625
			101961-002	Dinitrophenol, 2,4-		5	*U	EPA 625
			101961-002	Dinitrotoluene, 2,4-		3	U	EPA 625
			101961-002	Dinitrotoluene, 2,6-		3	U	EPA 625
			101961-002	Diphenyl amine		3	U	EPA 625
			101961-002	Diphenylhydrazine, 1,2-		3	U	EPA 625
			101961-002	Ethylhexyl)phthalate, bis(2-		3	U	EPA 625
			101961-002	Fluoranthene		0.3	U	EPA 625
			101961-002	Fluorene		0.3	U	EPA 625
			101961-002	Hexachlorobenzene		3	U	EPA 625
			101961-002	Hexachlorobutadiene		3	U	EPA 625
			101961-002	Hexachlorocyclopentadiene		3	U	EPA 625
			101961-002	Hexachloroethane		3	U	EPA 625
			101961-002	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625
			101961-002	Isophorone		3.5	U	EPA 625
			101961-002	Naphthalene		0.3	U	EPA 625
			101961-002	Nitro-benzene		3	U	EPA 625
			101961-002	Nitrophenol, 2-		3	U	EPA 625
			101961-002	Nitrophenol, 4-		3	*U	EPA 625
			101961-002	Nitrosodimethylamine, n-		3	U	EPA 625
			101961-002	Nitrosodipropylamine, n-		3	U	EPA 625
			101961-002	Pentachlorophenol		3	U	EPA 625
			101961-002	Phenanthrene		0.3	U	EPA 625
			101961-002	Phenol		3	U	EPA 625
			101961-002	Pyrene		0.3	U	EPA 625
			101961-002	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			101961-002	Trichlorophenol, 2,4,6-		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	26-Apr-2017	101955-004	Acenaphthene		0.3	U	EPA 625
			101955-004	Acenaphthylene		0.3	U	EPA 625
			101955-004	Anthracene		0.3	U	EPA 625
			101955-004	Benzidine		3.9	*NU	EPA 625
			101955-004	Benzo(a)anthracene		0.3	U	EPA 625
			101955-004	Benzo(a)pyrene		0.3	U	EPA 625
			101955-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			101955-004	Benzo(ghi)perylene	0.36	0.3	J	EPA 625
			101955-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			101955-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			101955-004	Butylbenzyl phthalate	46.1	3		EPA 625
			101955-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			101955-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			101955-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			101955-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			101955-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			101955-004	Chlorophenol, 2-		3	U	EPA 625
			101955-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			101955-004	Chrysene		0.3	U	EPA 625
			101955-004	Di-n-butyl phthalate		3	U	EPA 625
			101955-004	Di-n-octyl phthalate		3	U	EPA 625
			101955-004	Dibenz[a,h]anthracene	0.3	0.3	J	EPA 625
			101955-004	Dichlorobenzidine, 3,3'-		3	U	EPA 625
			101955-004	Dichlorophenol, 2,4-		3	U	EPA 625
			101955-004	Diethylphthalate		3	U	EPA 625
			101955-004	Dimethylphenol, 2,4-		3	U	EPA 625
			101955-004	Dimethylphthalate		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	26-Apr-2017	101955-004	Dinitro-o-cresol		3	*U	EPA 625
			101955-004	Dinitrophenol, 2,4-		5	*U	EPA 625
			101955-004	Dinitrotoluene, 2,4-		3	U	EPA 625
			101955-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			101955-004	Diphenyl amine		3	U	EPA 625
			101955-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			101955-004	Ethylhexyl)phthalate, bis(2-	7.29	3	J	EPA 625
			101955-004	Fluoranthene		0.3	U	EPA 625
			101955-004	Fluorene		0.3	U	EPA 625
			101955-004	Hexachlorobenzene		3	U	EPA 625
			101955-004	Hexachlorobutadiene		3	U	EPA 625
			101955-004	Hexachlorocyclopentadiene		3	U	EPA 625
			101955-004	Hexachloroethane		3	U	EPA 625
			101955-004	Indeno(1,2,3-c,d)pyrene	0.57	0.3	J	EPA 625
			101955-004	Isophorone		3.5	U	EPA 625
			101955-004	Naphthalene		0.3	U	EPA 625
			101955-004	Nitro-benzene		3	U	EPA 625
			101955-004	Nitrophenol, 2-		3	U	EPA 625
			101955-004	Nitrophenol, 4-		3	*U	EPA 625
			101955-004	Nitrosodimethylamine, n-		3	U	EPA 625
			101955-004	Nitrosodipropylamine, n-		3	U	EPA 625
			101955-004	Pentachlorophenol		3	U	EPA 625
			101955-004	Phenanthrene		0.3	U	EPA 625
			101955-004	Phenol		3	U	EPA 625
			101955-004	Pyrene		0.3	U	EPA 625
			101955-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			101955-004	Trichlorophenol, 2,4,6-		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	26-Apr-2017	101956-004	Acenaphthene		0.3	U	EPA 625
			101956-004	Acenaphthylene		0.3	U	EPA 625
			101956-004	Anthracene		0.3	U	EPA 625
			101956-004	Benzidine		3.9	*NU	EPA 625
			101956-004	Benzo(a)anthracene		0.3	U	EPA 625
			101956-004	Benzo(a)pyrene		0.3	U	EPA 625
			101956-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			101956-004	Benzo(ghi)perylene		0.3	U	EPA 625
			101956-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			101956-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			101956-004	Butylbenzyl phthalate		3	U	EPA 625
			101956-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			101956-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			101956-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			101956-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			101956-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			101956-004	Chlorophenol, 2-		3	U	EPA 625
			101956-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			101956-004	Chrysene		0.3	U	EPA 625
			101956-004	Di-n-butyl phthalate		3	U	EPA 625
			101956-004	Di-n-octyl phthalate		3	U	EPA 625
			101956-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			101956-004	Dichlorobenzidine, 3,3'-		3	U	EPA 625
			101956-004	Dichlorophenol, 2,4-		3	U	EPA 625
			101956-004	Diethylphthalate		3	U	EPA 625
			101956-004	Dimethylphenol, 2,4-		3	U	EPA 625
			101956-004	Dimethylphthalate		3	U	EPA 625

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Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	26-Apr-2017	101956-004	Dinitro-o-cresol		3	*U	EPA 625
			101956-004	Dinitrophenol, 2,4-		5	*U	EPA 625
			101956-004	Dinitrotoluene, 2,4-		3	U	EPA 625
			101956-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			101956-004	Diphenyl amine		3	U	EPA 625
			101956-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			101956-004	Ethylhexyl)phthalate, bis(2-	10.5	3		EPA 625
			101956-004	Fluoranthene		0.3	U	EPA 625
			101956-004	Fluorene		0.3	U	EPA 625
			101956-004	Hexachlorobenzene		3	U	EPA 625
			101956-004	Hexachlorobutadiene		3	U	EPA 625
			101956-004	Hexachlorocyclopentadiene		3	U	EPA 625
			101956-004	Hexachloroethane		3	U	EPA 625
			101956-004	Indeno(1,2,3-c,d)pyrene	0.32	0.3	J	EPA 625
			101956-004	Isophorone		3.5	U	EPA 625
			101956-004	Naphthalene		0.3	U	EPA 625
			101956-004	Nitro-benzene		3	U	EPA 625
			101956-004	Nitrophenol, 2-		3	U	EPA 625
			101956-004	Nitrophenol, 4-		3	*U	EPA 625
			101956-004	Nitrosodimethylamine, n-		3	U	EPA 625
			101956-004	Nitrosodipropylamine, n-		3	U	EPA 625
			101956-004	Pentachlorophenol		3	U	EPA 625
			101956-004	Phenanthrene		0.3	U	EPA 625
			101956-004	Phenol		3	U	EPA 625
			101956-004	Pyrene		0.3	U	EPA 625
			101956-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			101956-004	Trichlorophenol, 2,4,6-		3	U	EPA 625

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Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	26-Apr-2017	101960-004	Acenaphthene		3	U	EPA 625
			101960-004	Acenaphthylene		3	U	EPA 625
			101960-004	Anthracene		3	U	EPA 625
			101960-004	Benzidine		39	*NU	EPA 625
			101960-004	Benzo(a)anthracene		3	U	EPA 625
			101960-004	Benzo(a)pyrene		3	U	EPA 625
			101960-004	Benzo(b)fluoranthene		3	U	EPA 625
			101960-004	Benzo(ghi)perylene		3	U	EPA 625
			101960-004	Benzo(k)fluoranthene		3	U	EPA 625
			101960-004	Bromophenyl phenyl ether, 4-		30	U	EPA 625
			101960-004	Butylbenzyl phthalate		30	U	EPA 625
			101960-004	Chloro-3-methylphenol, 4-		30	U	EPA 625
			101960-004	Chloroethoxy)methane, bis(2-		30	U	EPA 625
			101960-004	Chloroethyl)ether, bis(2-		30	U	EPA 625
			101960-004	Chloroisopropyl ether, bis-		30	U	EPA 625
			101960-004	Chloronaphthalene, 2-		4.1	U	EPA 625
			101960-004	Chlorophenol, 2-		30	U	EPA 625
			101960-004	Chlorophenyl phenyl ether, 4-		30	U	EPA 625
			101960-004	Chrysene		3	U	EPA 625
			101960-004	Di-n-butyl phthalate		30	U	EPA 625
			101960-004	Di-n-octyl phthalate		30	U	EPA 625
			101960-004	Dibenz[a,h]anthracene		3	U	EPA 625
			101960-004	Dichlorobenzidine, 3,3'-		30	U	EPA 625
			101960-004	Dichlorophenol, 2,4-		30	U	EPA 625
			101960-004	Diethylphthalate		30	U	EPA 625
			101960-004	Dimethylphenol, 2,4-		30	U	EPA 625
			101960-004	Dimethylphthalate		30	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	26-Apr-2017	101960-004	Dinitro-o-cresol		30	*U	EPA 625
			101960-004	Dinitrophenol, 2,4-		50	*U	EPA 625
			101960-004	Dinitrotoluene, 2,4-		30	U	EPA 625
			101960-004	Dinitrotoluene, 2,6-		30	U	EPA 625
			101960-004	Diphenyl amine		30	U	EPA 625
			101960-004	Diphenylhydrazine, 1,2-		30	U	EPA 625
			101960-004	Ethylhexyl)phthalate, bis(2-		30	U	EPA 625
			101960-004	Fluoranthene		3	U	EPA 625
			101960-004	Fluorene		3	U	EPA 625
			101960-004	Hexachlorobenzene		30	U	EPA 625
			101960-004	Hexachlorobutadiene		30	U	EPA 625
			101960-004	Hexachlorocyclopentadiene		30	U	EPA 625
			101960-004	Hexachloroethane		30	U	EPA 625
			101960-004	Indeno(1,2,3-c,d)pyrene		3	U	EPA 625
			101960-004	Isophorone		35	U	EPA 625
			101960-004	Naphthalene		3	U	EPA 625
			101960-004	Nitro-benzene		30	U	EPA 625
			101960-004	Nitrophenol, 2-		30	U	EPA 625
			101960-004	Nitrophenol, 4-		30	*U	EPA 625
			101960-004	Nitrosodimethylamine, n-		30	U	EPA 625
			101960-004	Nitrosodipropylamine, n-		30	U	EPA 625
			101960-004	Pentachlorophenol		30	U	EPA 625
			101960-004	Phenanthrene		3	U	EPA 625
			101960-004	Phenol		30	U	EPA 625
			101960-004	Pyrene		3	U	EPA 625
			101960-004	Trichlorobenzene, 1,2,4-		30	U	EPA 625
			101960-004	Trichlorophenol, 2,4,6-		30	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	26-Apr-2017	101959-004	Acenaphthene		0.3	U	EPA 625
			101959-004	Acenaphthylene		0.3	U	EPA 625
			101959-004	Anthracene		0.3	U	EPA 625
			101959-004	Benzidine		3.9	*NU	EPA 625
			101959-004	Benzo(a)anthracene		0.3	U	EPA 625
			101959-004	Benzo(a)pyrene		0.3	U	EPA 625
			101959-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			101959-004	Benzo(ghi)perylene		0.3	U	EPA 625
			101959-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			101959-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			101959-004	Butylbenzyl phthalate		3	U	EPA 625
			101959-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			101959-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			101959-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			101959-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			101959-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			101959-004	Chlorophenol, 2-		3	U	EPA 625
			101959-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			101959-004	Chrysene		0.3	U	EPA 625
			101959-004	Di-n-butyl phthalate		3	U	EPA 625
			101959-004	Di-n-octyl phthalate		3	U	EPA 625
			101959-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			101959-004	Dichlorobenzidine, 3,3'-		3	U	EPA 625
			101959-004	Dichlorophenol, 2,4-		3	U	EPA 625
			101959-004	Diethylphthalate		3	U	EPA 625
			101959-004	Dimethylphenol, 2,4-		3	U	EPA 625
			101959-004	Dimethylphthalate		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	26-Apr-2017	101959-004	Dinitro-o-cresol		3	*U	EPA 625
			101959-004	Dinitrophenol, 2,4-		5	*U	EPA 625
			101959-004	Dinitrotoluene, 2,4-		3	U	EPA 625
			101959-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			101959-004	Diphenyl amine		3	U	EPA 625
			101959-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			101959-004	Ethylhexyl)phthalate, bis(2-		3	U	EPA 625
			101959-004	Fluoranthene		0.3	U	EPA 625
			101959-004	Fluorene		0.3	U	EPA 625
			101959-004	Hexachlorobenzene		3	U	EPA 625
			101959-004	Hexachlorobutadiene		3	U	EPA 625
			101959-004	Hexachlorocyclopentadiene		3	U	EPA 625
			101959-004	Hexachloroethane		3	U	EPA 625
			101959-004	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625
			101959-004	Isophorone		3.5	U	EPA 625
			101959-004	Naphthalene		0.3	U	EPA 625
			101959-004	Nitro-benzene		3	U	EPA 625
			101959-004	Nitrophenol, 2-		3	U	EPA 625
			101959-004	Nitrophenol, 4-		3	*U	EPA 625
			101959-004	Nitrosodimethylamine, n-		3	U	EPA 625
			101959-004	Nitrosodipropylamine, n-		3	U	EPA 625
			101959-004	Pentachlorophenol		3	U	EPA 625
			101959-004	Phenanthrene		0.3	U	EPA 625
			101959-004	Phenol		3	U	EPA 625
			101959-004	Pyrene		0.3	U	EPA 625
			101959-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			101959-004	Trichlorophenol, 2,4,6-		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	26-Apr-2017	101958-004	Acenaphthene		0.3	U	EPA 625
			101958-004	Acenaphthylene		0.3	U	EPA 625
			101958-004	Anthracene		0.3	U	EPA 625
			101958-004	Benzidine		3.9	*NU	EPA 625
			101958-004	Benzo(a)anthracene		0.3	U	EPA 625
			101958-004	Benzo(a)pyrene		0.3	U	EPA 625
			101958-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			101958-004	Benzo(ghi)perylene		0.3	U	EPA 625
			101958-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			101958-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			101958-004	Butylbenzyl phthalate		3	U	EPA 625
			101958-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			101958-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			101958-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			101958-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			101958-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			101958-004	Chlorophenol, 2-		3	U	EPA 625
			101958-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			101958-004	Chrysene		0.3	U	EPA 625
			101958-004	Di-n-butyl phthalate		3	U	EPA 625
			101958-004	Di-n-octyl phthalate		3	U	EPA 625
			101958-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			101958-004	Dichlorobenzidine, 3,3'-		3	U	EPA 625
			101958-004	Dichlorophenol, 2,4-		3	U	EPA 625
			101958-004	Diethylphthalate		3	U	EPA 625
			101958-004	Dimethylphenol, 2,4-		3	U	EPA 625
			101958-004	Dimethylphthalate		3	U	EPA 625

Table continued on next page.

Table D-3. Summary of semivolatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	26-Apr-2017	101958-004	Dinitro-o-cresol		3	*U	EPA 625
			101958-004	Dinitrophenol, 2,4-		5	*U	EPA 625
			101958-004	Dinitrotoluene, 2,4-		3	U	EPA 625
			101958-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			101958-004	Diphenyl amine		3	U	EPA 625
			101958-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			101958-004	Ethylhexyl)phthalate, bis(2-	3.95	3	J	EPA 625
			101958-004	Fluoranthene		0.3	U	EPA 625
			101958-004	Fluorene		0.3	U	EPA 625
			101958-004	Hexachlorobenzene		3	U	EPA 625
			101958-004	Hexachlorobutadiene		3	U	EPA 625
			101958-004	Hexachlorocyclopentadiene		3	U	EPA 625
			101958-004	Hexachloroethane		3	U	EPA 625
			101958-004	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625
			101958-004	Isophorone		3.5	U	EPA 625
			101958-004	Naphthalene		0.3	U	EPA 625
			101958-004	Nitro-benzene		3	U	EPA 625
			101958-004	Nitrophenol, 2-		3	U	EPA 625
			101958-004	Nitrophenol, 4-		3	*U	EPA 625
			101958-004	Nitrosodimethylamine, n-		3	U	EPA 625
			101958-004	Nitrosodipropylamine, n-		3	U	EPA 625
			101958-004	Pentachlorophenol		3	U	EPA 625
			101958-004	Phenanthrene		0.3	U	EPA 625
			101958-004	Phenol		3	U	EPA 625
			101958-004	Pyrene		0.3	U	EPA 625
			101958-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			101958-004	Trichlorophenol, 2,4,6-		3	U	EPA 625

See notes at end of appendices.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	25-Apr-2017	101951-004	Acrolein		1.67	U	EPA 624
			101951-004	Acrylonitrile		1.67	U	EPA 624
			101951-004	Benzene		0.333	U	EPA 624
			101951-004	Bromodichloromethane	1.85	0.333		EPA 624
			101951-004	Bromoform	2.15	0.333		EPA 624
			101951-004	Bromomethane		0.337	U	EPA 624
			101951-004	Carbon tetrachloride		0.333	U	EPA 624
			101951-004	Chlorobenzene		0.333	U	EPA 624
			101951-004	Chloroethane		0.333	U	EPA 624
			101951-004	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			101951-004	Chloroform	1.64	0.333		EPA 624
			101951-004	Chloromethane		0.333	U	EPA 624
			101951-004	Dibromochloromethane	2.06	0.333		EPA 624
			101951-004	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			101951-004	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			101951-004	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			101951-004	Dichlorodifluoromethane		0.355	U	EPA 624
			101951-004	Dichloroethane, 1,1-		0.333	U	EPA 624
			101951-004	Dichloroethane, 1,2-		0.333	U	EPA 624
			101951-004	Dichloroethene, 1,1-		0.333	U	EPA 624
			101951-004	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			101951-004	Dichloropropane, 1,2-		0.333	U	EPA 624
			101951-004	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			101951-004	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			101951-004	Ethyl benzene		0.333	U	EPA 624
			101951-004	Methylene chloride		1.67	U	EPA 624
			101951-004	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			101951-004	Tetrachloroethene		0.333	U	EPA 624
			101951-004	Toluene		0.333	U	EPA 624

Table continued on next page.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	25-Apr-2017	101951-004	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			101951-004	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			101951-004	Trichloroethene		0.333	U	EPA 624
			101951-004	Trichlorofluoromethane		0.333	U	EPA 624
			101951-004	Vinyl chloride		0.333	U	EPA 624
WW001	2069A	25-Apr-2017	102176-006	Acrolein		1.67	U	EPA 624
			102176-006	Acrylonitrile		1.67	U	EPA 624
			102176-006	Benzene		0.333	U	EPA 624
			102176-006	Bromodichloromethane		0.333	U	EPA 624
			102176-006	Bromoform	0.77	0.333	J	EPA 624
			102176-006	Bromomethane		0.337	U	EPA 624
			102176-006	Carbon tetrachloride		0.333	U	EPA 624
			102176-006	Chlorobenzene		0.333	U	EPA 624
			102176-006	Chloroethane		0.333	U	EPA 624
			102176-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			102176-006	Chloroform		0.333	U	EPA 624
			102176-006	Chloromethane		0.333	U	EPA 624
			102176-006	Dibromochloromethane	0.55	0.333	J	EPA 624
			102176-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			102176-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			102176-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			102176-006	Dichlorodifluoromethane		0.355	U	EPA 624
			102176-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			102176-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			102176-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			102176-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			102176-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			102176-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			102176-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624

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Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	25-Apr-2017	102176-006	Ethyl benzene		0.333	U	EPA 624
			102176-006	Methylene chloride		1.67	U	EPA 624
			102176-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			102176-006	Tetrachloroethene		0.333	U	EPA 624
			102176-006	Toluene		0.333	U	EPA 624
			102176-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			102176-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			102176-006	Trichloroethene		0.333	U	EPA 624
			102176-006	Trichlorofluoromethane		0.333	U	EPA 624
			102176-006	Vinyl chloride		0.333	U	EPA 624
WW006	2069F	25-Apr-17	101952-006	Acrolein		1.67	U	EPA 624
			101952-006	Acrylonitrile		1.67	U	EPA 624
			101952-006	Benzene		0.333	U	EPA 624
			101952-006	Bromodichloromethane		0.333	U	EPA 624
			101952-006	Bromoform		0.333	U	EPA 624
			101952-006	Bromomethane		0.337	U	EPA 624
			101952-006	Carbon tetrachloride		0.333	U	EPA 624
			101952-006	Chlorobenzene		0.333	U	EPA 624
			101952-006	Chloroethane		0.333	U	EPA 624
			101952-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			101952-006	Chloroform		0.333	U	EPA 624
			101952-006	Chloromethane		0.333	U	EPA 624
			101952-006	Dibromochloromethane		0.333	U	EPA 624
			101952-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			101952-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			101952-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			101952-006	Dichlorodifluoromethane		0.355	U	EPA 624

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Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	25-Apr-17	101952-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			101952-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			101952-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			101952-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			101952-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			101952-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			101952-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			101952-006	Ethyl benzene		0.333	U	EPA 624
			101952-006	Methylene chloride		1.67	U	EPA 624
			101952-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			101952-006	Tetrachloroethene		0.333	U	EPA 624
			101952-006	Toluene		0.333	U	EPA 624
			101952-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			101952-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			101952-006	Trichloroethene		0.333	U	EPA 624
			101952-006	Trichlorofluoromethane		0.333	U	EPA 624
			101952-006	Vinyl chloride		0.333	U	EPA 624
WW007	2069G	25-Apr-17	101953-003	Acrolein		1.67	U	EPA 624
			101953-003	Acrylonitrile		1.67	U	EPA 624
			101953-003	Benzene		0.333	U	EPA 624
			101953-003	Bromodichloromethane		0.333	U	EPA 624
			101953-003	Bromoform	0.36	0.333	J	EPA 624
			101953-003	Bromomethane		0.337	U	EPA 624
			101953-003	Carbon tetrachloride		0.333	U	EPA 624
			101953-003	Chlorobenzene		0.333	U	EPA 624
			101953-003	Chloroethane		0.333	U	EPA 624
			101953-003	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			101953-003	Chloroform		0.333	U	EPA 624
			101953-003	Chloromethane		0.333	U	EPA 624

Table continued on next page.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	25-Apr-17	101953-003	Dibromochloromethane		0.333	U	EPA 624
			101953-003	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			101953-003	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			101953-003	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			101953-003	Dichlorodifluoromethane		0.355	U	EPA 624
			101953-003	Dichloroethane, 1,1-		0.333	U	EPA 624
			101953-003	Dichloroethane, 1,2-		0.333	U	EPA 624
			101953-003	Dichloroethene, 1,1-		0.333	U	EPA 624
			101953-003	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			101953-003	Dichloropropane, 1,2-		0.333	U	EPA 624
			101953-003	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			101953-003	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			101953-003	Ethyl benzene		0.333	U	EPA 624
			101953-003	Methylene chloride		1.67	U	EPA 624
			101953-003	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			101953-003	Tetrachloroethene		0.333	U	EPA 624
			101953-003	Toluene		0.333	U	EPA 624
			101953-003	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			101953-003	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			101953-003	Trichloroethene		0.333	U	EPA 624
			101953-003	Trichlorofluoromethane		0.333	U	EPA 624
			101953-003	Vinyl chloride		0.333	U	EPA 624
WW008	2069I	25-Apr-17	101954-006	Acrolein		1.67	U	EPA 624
			101954-006	Acrylonitrile		1.67	U	EPA 624
			101954-006	Benzene		0.333	U	EPA 624
			101954-006	Bromodichloromethane		0.333	U	EPA 624
			101954-006	Bromoform	0.77	0.333	J	EPA 624
			101954-006	Bromomethane		0.337	U	EPA 624
			101954-006	Carbon tetrachloride		0.333	U	EPA 624

Table continued on next page.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	25-Apr-17	101954-006	Chlorobenzene		0.333	U	EPA 624
			101954-006	Chloroethane		0.333	U	EPA 624
			101954-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			101954-006	Chloroform		0.333	U	EPA 624
			101954-006	Chloromethane		0.333	U	EPA 624
			101954-006	Dibromochloromethane		0.333	U	EPA 624
			101954-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			101954-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			101954-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			101954-006	Dichlorodifluoromethane		0.355	U	EPA 624
			101954-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			101954-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			101954-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			101954-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			101954-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			101954-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			101954-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			101954-006	Ethyl benzene		0.333	U	EPA 624
			101954-006	Methylene chloride		1.67	U	EPA 624
			101954-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			101954-006	Tetrachloroethene		0.333	U	EPA 624
			101954-006	Toluene		0.333	U	EPA 624
			101954-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			101954-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			101954-006	Trichloroethene		0.333	U	EPA 624
			101954-006	Trichlorofluoromethane		0.333	U	EPA 624
			101954-006	Vinyl chloride		0.333	U	EPA 624

Table continued on next page.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	25-Apr-17	102174-006	Acrolein		1.67	U	EPA 624
			102174-006	Acrylonitrile		1.67	U	EPA 624
			102174-006	Benzene		0.333	U	EPA 624
			102174-006	Bromodichloromethane		0.333	U	EPA 624
			102174-006	Bromoform		0.333	U	EPA 624
			102174-006	Bromomethane		0.337	U	EPA 624
			102174-006	Carbon tetrachloride		0.333	U	EPA 624
			102174-006	Chlorobenzene		0.333	U	EPA 624
			102174-006	Chloroethane		0.333	U	EPA 624
			102174-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			102174-006	Chloroform		0.333	U	EPA 624
			102174-006	Chloromethane		0.333	U	EPA 624
			102174-006	Dibromochloromethane		0.333	U	EPA 624
			102174-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			102174-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			102174-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			102174-006	Dichlorodifluoromethane		0.355	U	EPA 624
			102174-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			102174-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			102174-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			102174-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			102174-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			102174-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			102174-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			102174-006	Ethyl benzene		0.333	U	EPA 624
			102174-006	Methylene chloride		1.67	U	EPA 624
			102174-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			102174-006	Tetrachloroethene		0.333	U	EPA 624
			102174-006	Toluene		0.333	U	EPA 624

Table continued on next page.

Table D-4. Summary of volatile organic compound results for permitted sanitary outfalls, April 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	25-Apr-17	102174-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			102174-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			102174-006	Trichloroethene		0.333	U	EPA 624
			102174-006	Trichlorofluoromethane		0.333	U	EPA 624
			102174-006	Vinyl chloride		0.333	U	EPA 624

See notes at end of appendices.

Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	28-Aug-2017	103251-001	Cyanide, total		0.00167	U	EPA 335.4
			103252-001	Cyanide, total		0.00167	U	EPA 335.4
			103250-001	Cyanide, total		0.00167	U	EPA 335.4
			103249-001	Cyanide, total		0.00167	U	EPA 335.4
		29-Aug-2017	103247-001	Aluminum		0.0193	U	EPA 200.8
			103247-001	Arsenic	0.00413	0.002	J	EPA 200.8
			103247-001	Boron	0.0361	0.0052		EPA 200.8
			103247-001	Cadmium		0.0003	U	EPA 200.8
			103247-001	Chromium		0.003	U	EPA 200.8
			103247-001	Copper	0.0101	0.0003		EPA 200.8
			103247-002	Fluoride	0.486	0.033		EPA 300.0
			103247-001	Lead		0.0005	U	EPA 200.8
			103247-001	Mercury		0.000067	U	EPA 245.1/245.2
			103247-001	Molybdenum	0.0204	0.0002		EPA 200.8
			103247-001	Nickel		0.0006	U	EPA 200.8
			103247-001	Selenium	0.00208	0.002	J	EPA 200.8
			103247-001	Silver		0.0003	U	EPA 200.8
			103247-001	Zinc	0.00942	0.0033	JB	EPA 200.8
		30-Aug-2017	103248-001	Aluminum		0.0193	U	EPA 200.8
			103248-001	Arsenic	0.00323	0.002	J	EPA 200.8
			103248-001	Boron	0.067	0.0052		EPA 200.8
			103248-001	Cadmium		0.0003	U	EPA 200.8
			103248-001	Chromium		0.003	U	EPA 200.8
			103248-001	Copper	0.00492	0.0003		EPA 200.8
			103248-002	Fluoride	0.899	0.033		EPA 300.0
			103248-001	Lead		0.0005	U	EPA 200.8
			103248-001	Mercury		0.000067	U	EPA 245.1/245.2
			103248-001	Molybdenum	0.0473	0.0002		EPA 200.8
			103248-001	Nickel		0.0006	U	EPA 200.8

Table continued on next page.

Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	30-Aug-2017	103248-001	Selenium		0.002	U	EPA 200.8
			103248-001	Silver		0.0003	U	EPA 200.8
			103248-001	Zinc	0.00644	0.0033	JB	EPA 200.8
		17-Oct-2017	103824-005	Ammonia	0.572	0.017	B	EPA 350.1
		18-Oct-2017	103830-001	Ammonia	0.258	0.017	B	EPA 350.1
WW001	2069A	17-Oct-2017	103821-001	Aluminum	0.0352	0.0193	J	EPA 200.8
			103821-007	Ammonia	12.1	0.425	B	EPA 350.1
			103821-001	Arsenic	0.00412	0.002	J	EPA 200.8
			103821-001	Boron	0.0609	0.0052		EPA 200.8
			103821-001	Cadmium		0.0003	U	EPA 200.8
			103821-001	Chromium		0.003	U	EPA 200.8
			103821-001	Copper	0.154	0.0003		EPA 200.8
			103821-002	Fluoride	2.53	0.066		EPA 300.0
			103821-001	Lead	0.00287	0.0005		EPA 200.8
			103821-001	Mercury		0.000067	U	EPA 245.1/245.2
			103821-001	Molybdenum	0.0106	0.0002		EPA 200.8
			103821-001	Nickel	0.00208	0.0006		EPA 200.8
			103821-001	Selenium	0.00259	0.002	J	EPA 200.8
			103821-001	Silver		0.0003	U	EPA 200.8
			103821-001	Zinc	0.0304	0.0033		EPA 200.8
		18-Oct-2017	103827-001	Aluminum	0.0428	0.0193	J	EPA 200.8
			103827-003	Ammonia	13.8	0.425	B	EPA 350.1
			103827-001	Arsenic	0.00373	0.002	J	EPA 200.8
			103827-001	Boron	0.062	0.0052		EPA 200.8
			103827-001	Cadmium		0.0003	U	EPA 200.8
			103827-001	Chromium		0.003	U	EPA 200.8
			103827-001	Copper	0.0364	0.0003		EPA 200.8
			103827-002	Fluoride	2.7	0.033		EPA 300.0
			103827-001	Lead	0.00526	0.0005		EPA 200.8

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Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	18-Oct-2017	103827-001	Mercury		0.000067	U	EPA 245.1/245.2
			103827-001	Molybdenum	0.011	0.0002		EPA 200.8
			103827-001	Nickel	0.00193	0.0006	J	EPA 200.8
			103827-001	Selenium		0.002	U	EPA 200.8
			103827-001	Silver		0.0003	U	EPA 200.8
			103827-001	Zinc	0.0371	0.0033		EPA 200.8
WW006	2069F	16-Oct-2017	103804-001	Cyanide, total		0.00167	U	EPA 335.4
			103803-001	Cyanide, total		0.00167	U	EPA 335.4
			103802-001	Cyanide, total	0.00295	0.00167	J	EPA 335.4
			103805-001	Cyanide, total		0.00167	U	EPA 335.4
		17-Oct-2017	103822-001	Aluminum	0.079	0.0193		EPA 200.8
			103822-007	Ammonia	27.3	0.425	B	EPA 350.1
			103822-001	Arsenic	0.0049	0.002	J	EPA 200.8
			103822-001	Boron	0.0856	0.0052		EPA 200.8
			103822-001	Cadmium		0.0003	U	EPA 200.8
			103822-001	Chromium		0.003	U	EPA 200.8
			103822-001	Copper	0.0197	0.0003		EPA 200.8
			103809-001	Cyanide, total		0.00167	U	EPA 335.4
			103806-001	Cyanide, total	0.00341	0.00167	J	EPA 335.4
			103807-001	Cyanide, total	0.00306	0.00167	J	EPA 335.4
			103808-001	Cyanide, total	0.00288	0.00167	J	EPA 335.4
			103822-002	Fluoride	0.729	0.033		EPA 300.0
			103822-001	Lead	0.000618	0.0005	J	EPA 200.8
			103822-001	Mercury		0.000067	U	EPA 245.1/245.2
			103822-001	Molybdenum	0.0536	0.0002		EPA 200.8
			103822-001	Nickel	0.00139	0.0006	J	EPA 200.8
			103822-001	Selenium	0.0028	0.002	J	EPA 200.8
			103822-001	Silver	0.000467	0.0003	J	EPA 200.8
			103822-001	Zinc	0.0585	0.0033		EPA 200.8

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Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	18-Oct-2017	103828-001	Aluminum		0.0193	U	EPA 200.8
			103828-003	Ammonia	28	0.425	B	EPA 350.1
			103828-001	Arsenic		0.002	U	EPA 200.8
			103828-001	Boron	0.101	0.0052		EPA 200.8
			103828-001	Cadmium		0.0003	U	EPA 200.8
			103828-001	Chromium		0.003	U	EPA 200.8
			103828-001	Copper		0.0003	U	EPA 200.8
			103828-002	Fluoride	0.69	0.033		EPA 300.0
			103828-001	Lead		0.0005	U	EPA 200.8
			103828-001	Mercury		0.000067	U	EPA 245.1/245.2
			103828-001	Molybdenum		0.0002	U	EPA 200.8
			103828-001	Nickel		0.0006	U	EPA 200.8
			103828-001	Selenium		0.002	U	EPA 200.8
			103828-001	Silver		0.0003	U	EPA 200.8
			103828-001	Zinc	0.0635	0.0033		EPA 200.8
WW007	2069G	16-Oct-2017	103812-001	Cyanide, total		0.00167	U	EPA 335.4
			103813-001	Cyanide, total		0.00167	U	EPA 335.4
			103811-001	Cyanide, total		0.00167	U	EPA 335.4
			103810-001	Cyanide, total		0.00167	U	EPA 335.4
		17-Oct-2017	103823-001	Aluminum		0.0193	U	EPA 200.8
			103823-004	Ammonia	2.15	0.085	B	EPA 350.1
			103823-001	Arsenic		0.002	U	EPA 200.8
			103823-001	Boron	0.0242	0.0052		EPA 200.8
			103823-001	Cadmium		0.0003	U	EPA 200.8
			103823-001	Chromium		0.003	U	EPA 200.8
			103823-001	Copper	0.224	0.0003		EPA 200.8
			103823-002	Fluoride	4.42	0.033		EPA 300.0
			103823-001	Lead		0.0005	U	EPA 200.8
			103823-001	Mercury		0.000067	U	EPA 245.1/245.2

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Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	17-Oct-2017	103823-001	Molybdenum	0.0117	0.0002		EPA 200.8
			103823-001	Nickel	0.00203	0.0006		EPA 200.8
			103823-001	Selenium		0.002	U	EPA 200.8
			103823-001	Silver		0.0003	U	EPA 200.8
			103823-001	Zinc		0.0033	U	EPA 200.8
		18-Oct-2017	103829-001	Aluminum		0.0193	U	EPA 200.8
			103829-003	Ammonia	3.76	0.085	B	EPA 350.1
			103829-001	Arsenic	0.00211	0.002	J	EPA 200.8
			103829-001	Boron	0.0287	0.0052		EPA 200.8
			103829-001	Cadmium		0.0003	U	EPA 200.8
			103829-001	Chromium		0.003	U	EPA 200.8
			103829-001	Copper	0.0136	0.0003		EPA 200.8
			103829-002	Fluoride	3.46	0.033		EPA 300.0
			103829-001	Lead		0.0005	U	EPA 200.8
			103829-001	Mercury		0.000067	U	EPA 245.1/245.2
			103829-001	Molybdenum	0.0109	0.0002		EPA 200.8
			103829-001	Nickel	0.00122	0.0006	J	EPA 200.8
			103829-001	Selenium		0.002	U	EPA 200.8
			103829-001	Silver		0.0003	U	EPA 200.8
			103829-001	Zinc		0.0033	U	EPA 200.8
WW008	2069I	16-Oct-2017	103817-001	Cyanide, total		0.00167	U	EPA 335.4
			103814-001	Cyanide, total	0.0031	0.00167	J	EPA 335.4
			103815-001	Cyanide, total	0.00282	0.00167	J	EPA 335.4
			103816-001	Cyanide, total		0.00167	U	EPA 335.4
		17-Oct-2017	103820-001	Aluminum	0.198	0.0193		EPA 200.8
			103820-007	Ammonia	47.3	0.85	B	EPA 350.1
			103820-001	Arsenic	0.00498	0.002	J	EPA 200.8
			103820-001	Boron	0.121	0.0052		EPA 200.8
			103820-001	Cadmium		0.0003	U	EPA 200.8

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Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	17-Oct-2017	103820-001	Chromium	0.00404	0.003	J	EPA 200.8
			103820-001	Copper	0.0561	0.0003		EPA 200.8
			103820-002	Fluoride	0.786	0.033		EPA 300.0
			103820-001	Lead	0.00105	0.0005	J	EPA 200.8
			103820-001	Mercury		0.000067	U	EPA 245.1/245.2
			103820-001	Molybdenum	0.00619	0.0002		EPA 200.8
			103820-001	Nickel	0.00625	0.0006		EPA 200.8
			103820-001	Selenium	0.00353	0.002	J	EPA 200.8
			103820-001	Silver		0.0003	U	EPA 200.8
			103820-001	Zinc	0.104	0.0033		EPA 200.8
		18-Oct-2017	103826-001	Aluminum	0.0782	0.0193		EPA 200.8
			103826-003	Ammonia	43.8	0.85	B	EPA 350.1
			103826-001	Arsenic	0.00376	0.002	J	EPA 200.8
			103826-001	Boron	0.0924	0.0052		EPA 200.8
			103826-001	Cadmium		0.0003	U	EPA 200.8
			103826-001	Chromium		0.003	U	EPA 200.8
			103826-001	Copper	0.0251	0.0003		EPA 200.8
			103826-002	Fluoride	0.679	0.033		EPA 300.0
			103826-001	Lead		0.0005	U	EPA 200.8
			103826-001	Mercury		0.000067	U	EPA 245.1/245.2
			103826-001	Molybdenum	0.00454	0.0002		EPA 200.8
			103826-001	Nickel	0.00402	0.0006		EPA 200.8
			103826-001	Selenium	0.0021	0.002	J	EPA 200.8
			103826-001	Silver		0.0003	U	EPA 200.8
			103826-001	Zinc	0.0571	0.0033		EPA 200.8
WW011	2069K	17-Oct-2017	103818-001	Aluminum	0.0642	0.0193		EPA 200.8
			103818-007	Ammonia	8.95	0.085	B	EPA 350.1
			103818-001	Arsenic	0.00408	0.002	J	EPA 200.8
			103818-001	Boron	0.182	0.0052		EPA 200.8

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Table D-5. Summary of inorganic results for permitted sanitary outfalls, August and October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (mg/L)	MDL (mg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	17-Oct-2017	103818-001	Cadmium		0.0003	U	EPA 200.8
			103818-001	Chromium		0.003	U	EPA 200.8
			103818-001	Copper	0.0204	0.0003		EPA 200.8
			103818-002	Fluoride	0.628	0.033		EPA 300.0
			103818-001	Lead	0.000625	0.0005	J	EPA 200.8
			103818-001	Mercury		0.000067	U	EPA 245.1/245.2
			103818-001	Molybdenum	0.0702	0.0002		EPA 200.8
			103818-001	Nickel	0.00154	0.0006	J	EPA 200.8
			103818-001	Selenium	0.00267	0.002	J	EPA 200.8
			103818-001	Silver	0.00034	0.0003	J	EPA 200.8
			103818-001	Zinc	0.0585	0.0033		EPA 200.8
		18-Oct-2017	103825-001	Aluminum	0.159	0.0193		EPA 200.8
			103825-003	Ammonia	17.6	0.425	B	EPA 350.1
			103825-001	Arsenic	0.00393	0.002	J	EPA 200.8
			103825-001	Boron	0.434	0.026		EPA 200.8
			103825-001	Cadmium		0.0003	U	EPA 200.8
			103825-001	Chromium		0.003	U	EPA 200.8
			103825-001	Copper	0.0276	0.0003		EPA 200.8
			103825-002	Fluoride	0.657	0.033		EPA 300.0
			103825-001	Lead	0.000938	0.0005	J	EPA 200.8
			103825-001	Mercury		0.000067	U	EPA 245.1/245.2
			103825-001	Molybdenum	0.0421	0.0002		EPA 200.8
			103825-001	Nickel	0.00231	0.0006		EPA 200.8
			103825-001	Selenium		0.002	U	EPA 200.8
			103825-001	Silver	0.00122	0.0003		EPA 200.8
			103825-001	Zinc	0.0783	0.0033		EPA 200.8

See notes at end of appendices.

Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	17-OCT-2017	103824-002	Actinium-228	-2.11 ± 17.8	20	U	EPA 901.1
			103824-R01	Alpha, gross	4.39 ± 5.64	9.46	U	EPA 900.0/SW846 9310
			103824-001	Alpha, gross	17.3 ± 10.6	16.1		EPA 900.0/SW846 9310
			103824-002	Americium-241	4.28 ± 4.54	5.18	U	EPA 901.1
			103824-002	Beryllium-7	-10.3 ± 23	38.4	U	EPA 901.1
			103824-001	Beta, gross	3.57 ± 4.45	7.4	U	EPA 900.0/SW846 9310
			103824-002	Bismuth-212	36.4 ± 36.5	64.9	U	EPA 901.1
			103824-002	Bismuth-214	2.61 ± 11.2	8.41	U	EPA 901.1
			103824-002	Cesium-137	-0.451 ± 2.45	4.17	U	EPA 901.1
			103824-002	Cobalt-60	1.96 ± 2.58	4.88	U	EPA 901.1
			103824-002	Lead-212	1.74 ± 7.16	5.74	U	EPA 901.1
			103824-002	Lead-214	5.59 ± 7.54	8.7	U	EPA 901.1
			103824-002	Neptunium-237	1.81 ± 3.6	6.5	U	EPA 901.1
			103824-002	Potassium-40	27.1 ± 51.7	40.5	U	EPA 901.1
			103824-002	Radium-223	-18.2 ± 42.6	65.1	U	EPA 901.1
			103824-002	Radium-224	35.6 ± 38.4	60.5	U	EPA 901.1
			103824-002	Radium-226	-17.4 ± 72.8	105	U	EPA 901.1
			103824-002	Radium-228	-2.11 ± 17.8	20	U	EPA 901.1
			103824-002	Sodium-22	-.217 ± 2.52	4.56	U	EPA 901.1
			103824-002	Thorium-227	-13 ± 15.1	23.7	U	EPA 901.1
			103824-002	Thorium-231	-16.8 ± 26.5	31.6	U	EPA 901.1
			103824-002	Thorium-234	-37.5 ± 69.7	101	U	EPA 901.1
			103824-003	Tritium	-6.21 ± 80.6	145	U	EPA 906.0 Modified
			103824-002	Uranium-235	23.3 ± 27.5	23.3	U	EPA 901.1
			103824-002	Uranium-238	-37.5 ± 69.7	101	U	EPA 901.1
WW001	2069A	17-Oct-17	103821-004	Actinium-228	2.68 ± 13.7	14	U	EPA 901.1
			103821-003	Alpha, gross	5.71 ± 2.75	3.62		EPA 900.0/SW846 9310
			103821-004	Americium-241	4.01 ± 9.5	15.7	U	EPA 901.1

Table continued on next page.

Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	17-Oct-17	103821-004	Beryllium-7	-8.13 ± 18.3	30.8	U	EPA 901.1
			103821-003	Beta, gross	8.8 ± 1.95	1.62		EPA 900.0/SW846 9310
			103821-004	Bismuth-212	39.1 ± 35.8	48.7	U	EPA 901.1
			103821-004	Bismuth-214	5.84 ± 8.85	8.3	U	EPA 901.1
			103821-004	Cesium-137	-1.23 ± 2.05	2.86	U	EPA 901.1
			103821-004	Cobalt-60	-0.461 ± 1.99	3.53	U	EPA 901.1
			103821-004	Lead-212	2.34 ± 5.43	6.92	U	EPA 901.1
			103821-004	Lead-214	3.23 ± 9.01	7.69	U	EPA 901.1
			103821-004	Neptunium-237	0.592 ± 3.41	6.19	U	EPA 901.1
			103821-004	Potassium-40	-18.4 ± 49.5	46.9	U	EPA 901.1
			103821-004	Radium-223	15.7 ± 34.2	61.4	U	EPA 901.1
			103821-004	Radium-224	-55.7 ± 45.3	56.6	U	EPA 901.1
			103821-004	Radium-226	-57.2 ± 79.7	83.2	U	EPA 901.1
			103821-004	Radium-228	2.68 ± 13.7	14	U	EPA 901.1
			103821-004	Sodium-22	-0.088 ± 1.83	3.36	U	EPA 901.1
			103821-004	Thorium-227	-1.96 ± 12.9	23.3	U	EPA 901.1
			103821-004	Thorium-231	18.9 ± 24.2	40.3	U	EPA 901.1
			103821-004	Thorium-234	31 ± 172	135	U	EPA 901.1
			103821-005	Tritium	149 ± 106	163	U	EPA 906.0 Modified
			103821-004	Uranium-235	-9.65 ± 17.9	19.3	U	EPA 901.1
			103821-004	Uranium-238	31 ± 172	135	U	EPA 901.1
WW006	2069F	17-Oct-17	103822-004	Actinium-228	5.14 ± 20.9	17.1	U	EPA 901.1
			103822-003	Alpha, gross	4.69 ± 3.52	5.44	U	EPA 900.0/SW846 9310
			103822-004	Americium-241	2.02 ± 17.3	30.1	U	EPA 901.1
			103822-004	Beryllium-7	10.8 ± 21	37.5	U	EPA 901.1
			103822-003	Beta, gross	13.4 ± 2.87	2.19		EPA 900.0/SW846 9310
			103822-004	Bismuth-212	-8.63 ± 42.8	54	U	EPA 901.1
			103822-004	Bismuth-214	-5.95 ± 8.42	9	U	EPA 901.1

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Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	17-Oct-17	103822-004	Cesium-137	3.52 ± 6.44	3.44	X	EPA 901.1
			103822-004	Cobalt-60	-1.48 ± 1.96	3.13	U	EPA 901.1
			103822-004	Lead-212	-5.4 ± 7.26	8.52	U	EPA 901.1
			103822-004	Lead-214	-2.27 ± 7.82	8.93	U	EPA 901.1
			103822-004	Neptunium-237	-1.48 ± 3.93	6.86	U	EPA 901.1
			103822-004	Potassium-40	38.7 ± 65	35.3	X	EPA 901.1
			103822-004	Radium-223	-6.33 ± 38.1	67.9	U	EPA 901.1
			103822-004	Radium-224	-202 ± 113	69.5	U	EPA 901.1
			103822-004	Radium-226	-47.9 ± 87.2	91.6	U	EPA 901.1
			103822-004	Radium-228	5.14 ± 20.9	17.1	U	EPA 901.1
			103822-004	Sodium-22	-1.6 ± 2.31	3.78	U	EPA 901.1
			103822-004	Thorium-227	6.72 ± 17.5	28.7	U	EPA 901.1
			103822-004	Thorium-231	1.65 ± 52.5	55.4	U	EPA 901.1
			103822-004	Thorium-234	39.9 ± 232	224	U	EPA 901.1
			103822-005	Tritium	38.3 ± 93.3	163	U	EPA 906.0 Modified
			103822-004	Uranium-235	0.403 ± 29.5	24	U	EPA 901.1
			103822-004	Uranium-238	39.9 ± 232	224	U	EPA 901.1
WW008	2069I	17-Oct-17	103820-004	Actinium-228	-6.41 ± 16	21.9	U	EPA 901.1
			103820-003	Alpha, gross	3.72 ± 1.86	2.29		EPA 900.0/SW846 9310
			103820-004	Americium-241	-12.5 ± 7.22	7	U	EPA 901.1
			103820-004	Beryllium-7	-0.414 ± 25.1	43.7	U	EPA 901.1
			103820-003	Beta, gross	22.1 ± 3.9	1.28		EPA 900.0/SW846 9310
			103820-004	Bismuth-212	17.2 ± 39.9	70.2	U	EPA 901.1
			103820-004	Bismuth-214	4.98 ± 12.9	9.05	U	EPA 901.1
			103820-004	Cesium-137	0.601 ± 2.61	4.62	U	EPA 901.1
			103820-004	Cobalt-60	1.23 ± 2.68	5.15	U	EPA 901.1
			103820-004	Lead-212	-1.86 ± 6.47	8.27	U	EPA 901.1
			103820-004	Lead-214	-11 ± 10.9	10.6	U	EPA 901.1

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Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	17-Oct-17	103820-004	Neptunium-237	0.898 ± 4.43	7.73	U	EPA 901.1
			103820-004	Potassium-40	11.4 ± 84.8	47.2	U	EPA 901.1
			103820-004	Radium-223	5.42 ± 44.6	77.6	U	EPA 901.1
			103820-004	Radium-224	-43.9 ± 50	76.3	U	EPA 901.1
			103820-004	Radium-226	-44.1 ± 77.3	89.8	U	EPA 901.1
			103820-004	Radium-228	-6.41 ± 16	21.9	U	EPA 901.1
			103820-004	Sodium-22	0.0694 ± 2.57	4.85	U	EPA 901.1
			103820-004	Thorium-227	2.44 ± 16.5	28.7	U	EPA 901.1
			103820-004	Thorium-231	-2.22 ± 20.2	34.9	U	EPA 901.1
			103820-004	Thorium-234	9.16 ± 60.7	86.4	U	EPA 901.1
			103820-005	Tritium	69.1 ± 96.1	162	U	EPA 906.0 Modified
			103820-004	Uranium-235	-2.02 ± 12.2	20.9	U	EPA 901.1
			103820-004	Uranium-238	9.16 ± 60.7	86.4	U	EPA 901.1
WW011	2069K	17-Oct-17	103818-004	Actinium-228	-7.85 ± 14.2	17.3	U	EPA 901.1
			103818-003	Alpha, gross	2.82 ± 2.08	3.08	U	EPA 900.0/SW846 9310
			103818-004	Americium-241	9.11 ± 11.9	17.9	U	EPA 901.1
			103818-004	Beryllium-7	3.04 ± 22.7	39.3	U	EPA 901.1
			103818-003	Beta, gross	11.8 ± 2.63	2.32		EPA 900.0/SW846 9310
			103818-004	Bismuth-212	-0.891 ± 33.5	53.7	U	EPA 901.1
			103818-004	Bismuth-214	-2.9 ± 8.5	8.7	U	EPA 901.1
			103818-004	Cesium-137	1.47 ± 2.28	4.12	U	EPA 901.1
			103818-004	Cobalt-60	0.85 ± 1.88	3.55	U	EPA 901.1
			103818-004	Lead-212	1.52 ± 6.38	6.98	U	EPA 901.1
			103818-004	Lead-214	-3.24 ± 7.21	8.83	U	EPA 901.1
			103818-004	Neptunium-237	1.58 ± 4.21	7.35	U	EPA 901.1
			103818-004	Potassium-40	13.4 ± 46.5	33.9	U	EPA 901.1
			103818-004	Radium-223	20.4 ± 41.2	71.4	U	EPA 901.1
			103818-004	Radium-224	34.1 ± 43.3	66.5	U	EPA 901.1

Table continued on next page.

Table D-6. Summary of radiological results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Activity (pCi/L)	MDA (pCi/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	17-Oct-17	103818-004	Radium-226	9.4 ± 117	89.1	U	EPA 901.1
			103818-004	Radium-228	-7.85 ± 14.2	17.3	U	EPA 901.1
			103818-004	Sodium-22	-1.36 ± 2.1	3.36	U	EPA 901.1
			103818-004	Thorium-227	-6.31 ± 16.4	27.9	U	EPA 901.1
			103818-004	Thorium-231	-49.3 ± 53.8	45.3	U	EPA 901.1
			103818-004	Thorium-234	26 ± 142	171	U	EPA 901.1
			103818-005	Tritium	43 ± 91.3	159	U	EPA 906.0 Modified
			103818-004	Uranium-235	11.7 ± 18.9	23.1	U	EPA 901.1
			103818-004	Uranium-238	26 ± 142	171	U	EPA 901.1

See notes at end of appendices.

Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	17-Oct-2017	103824-004	Acrolein		1.67	NU	EPA 624
			103824-004	Acrylonitrile		1.67	U	EPA 624
			103824-004	Benzene		0.333	U	EPA 624
			103824-004	Bromodichloromethane	1.93	0.333		EPA 624
			103824-004	Bromoform	3.54	0.333		EPA 624
			103824-004	Bromomethane		0.337	U	EPA 624
			103824-004	Carbon tetrachloride		0.333	U	EPA 624
			103824-004	Chlorobenzene		0.333	U	EPA 624
			103824-004	Chloroethane		0.333	U	EPA 624
			103824-004	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103824-004	Chloroform	1.46	0.333		EPA 624
			103824-004	Chloromethane		0.333	U	EPA 624
			103824-004	Dibromochloromethane	2.64	0.333		EPA 624
			103824-004	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			103824-004	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103824-004	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103824-004	Dichlorodifluoromethane		0.355	U	EPA 624
			103824-004	Dichloroethane, 1,1-		0.333	U	EPA 624
			103824-004	Dichloroethane, 1,2-		0.333	U	EPA 624
			103824-004	Dichloroethene, 1,1-		0.333	U	EPA 624
			103824-004	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103824-004	Dichloropropane, 1,2-		0.333	U	EPA 624
			103824-004	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103824-004	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			103824-004	Ethyl benzene		0.333	U	EPA 624
			103824-004	Methylene chloride		1.67	U	EPA 624
			103824-004	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103824-004	Tetrachloroethene		0.333	U	EPA 624
			103824-004	Toluene		0.333	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	17-Oct-2017	103824-004	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103824-004	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103824-004	Trichloroethene		0.333	U	EPA 624
			103824-004	Trichlorofluoromethane		0.333	U	EPA 624
			103824-004	Vinyl chloride		0.333	U	EPA 624
WW001	2069A	17-Oct-2017	103821-006	Acrolein		1.67	NU	EPA 624
			103821-006	Acrylonitrile		1.67	U	EPA 624
			103821-006	Benzene		0.333	U	EPA 624
			103821-006	Bromodichloromethane		0.333	U	EPA 624
			103821-006	Bromoform	1.41	0.333		EPA 624
			103821-006	Bromomethane		0.337	U	EPA 624
			103821-006	Carbon tetrachloride		0.333	U	EPA 624
			103821-006	Chlorobenzene		0.333	U	EPA 624
			103821-006	Chloroethane		0.333	U	EPA 624
			103821-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103821-006	Chloroform		0.333	U	EPA 624
			103821-006	Chloromethane		0.333	U	EPA 624
			103821-006	Dibromochloromethane		0.333	U	EPA 624
			103821-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			103821-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103821-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103821-006	Dichlorodifluoromethane		0.355	U	EPA 624
			103821-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			103821-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			103821-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			103821-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103821-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			103821-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103821-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	17-Oct-2017	103821-006	Ethyl benzene		0.333	U	EPA 624
			103821-006	Methylene chloride		1.67	U	EPA 624
			103821-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103821-006	Tetrachloroethene		0.333	U	EPA 624
			103821-006	Toluene		0.333	U	EPA 624
			103821-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103821-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103821-006	Trichloroethene		0.333	U	EPA 624
			103821-006	Trichlorofluoromethane		0.333	U	EPA 624
			103821-006	Vinyl chloride		0.333	U	EPA 624
WW006	2069F	17-Oct-2017	103822-006	Acrolein		1.67	NU	EPA 624
			103822-006	Acrylonitrile		1.67	U	EPA 624
			103822-006	Benzene		0.333	U	EPA 624
			103822-006	Bromodichloromethane		0.333	U	EPA 624
			103822-006	Bromoform		0.333	U	EPA 624
			103822-006	Bromomethane		0.337	U	EPA 624
			103822-006	Carbon tetrachloride		0.333	U	EPA 624
			103822-006	Chlorobenzene		0.333	U	EPA 624
			103822-006	Chloroethane		0.333	U	EPA 624
			103822-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103822-006	Chloroform		0.333	U	EPA 624
			103822-006	Chloromethane		0.333	U	EPA 624
			103822-006	Dibromochloromethane		0.333	U	EPA 624
			103822-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			103822-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103822-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103822-006	Dichlorodifluoromethane		0.355	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	17-Oct-2017	103822-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			103822-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			103822-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			103822-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103822-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			103822-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103822-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			103822-006	Ethyl benzene		0.333	U	EPA 624
			103822-006	Methylene chloride		1.67	U	EPA 624
			103822-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103822-006	Tetrachloroethene		0.333	U	EPA 624
			103822-006	Toluene		0.333	U	EPA 624
			103822-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103822-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103822-006	Trichloroethene		0.333	U	EPA 624
			103822-006	Trichlorofluoromethane		0.333	U	EPA 624
			103822-006	Vinyl chloride		0.333	U	EPA 624
WW007	2069G	17-Oct-2017	103823-003	Acrolein		1.67	NU	EPA 624
			103823-003	Acrylonitrile		1.67	U	EPA 624
			103823-003	Benzene		0.333	U	EPA 624
			103823-003	Bromodichloromethane		0.333	U	EPA 624
			103823-003	Bromoform		0.333	U	EPA 624
			103823-003	Bromomethane		0.337	U	EPA 624
			103823-003	Carbon tetrachloride		0.333	U	EPA 624
			103823-003	Chlorobenzene		0.333	U	EPA 624
			103823-003	Chloroethane		0.333	U	EPA 624
			103823-003	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103823-003	Chloroform		0.333	U	EPA 624
			103823-003	Dichlorobenzene, 1,2-		0.333	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	17-Oct-2017	103823-003	Chloromethane		0.333	U	EPA 624
			103823-003	Dibromochloromethane	0.96	0.333	J	EPA 624
			103823-003	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103823-003	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103823-003	Dichlorodifluoromethane		0.355	U	EPA 624
			103823-003	Dichloroethane, 1,1-		0.333	U	EPA 624
			103823-003	Dichloroethane, 1,2-		0.333	U	EPA 624
			103823-003	Dichloroethene, 1,1-		0.333	U	EPA 624
			103823-003	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103823-003	Dichloropropane, 1,2-		0.333	U	EPA 624
			103823-003	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103823-003	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			103823-003	Ethyl benzene		0.333	U	EPA 624
			103823-003	Methylene chloride		1.67	U	EPA 624
			103823-003	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103823-003	Tetrachloroethene		0.333	U	EPA 624
			103823-003	Toluene		0.333	U	EPA 624
			103823-003	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103823-003	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103823-003	Trichloroethene		0.333	U	EPA 624
			103823-003	Trichlorofluoromethane		0.333	U	EPA 624
			103823-003	Vinyl chloride		0.333	U	EPA 624
WW008	2069I	17-Oct-2017	103820-006	Acrolein		1.67	NU	EPA 624
			103820-006	Acrylonitrile		1.67	U	EPA 624
			103820-006	Benzene		0.333	U	EPA 624
			103820-006	Bromodichloromethane		0.333	U	EPA 624
			103820-006	Bromoform		0.333	U	EPA 624
			103820-006	Bromomethane		0.337	U	EPA 624
			103820-006	Chloroethane		0.333	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	17-Oct-2017	103820-006	Carbon tetrachloride		0.333	U	EPA 624
			103820-006	Chlorobenzene		0.333	U	EPA 624
			103820-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103820-006	Chloroform		0.333	U	EPA 624
			103820-006	Chloromethane		0.333	U	EPA 624
			103820-006	Dibromochloromethane		0.333	U	EPA 624
			103820-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			103820-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103820-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103820-006	Dichlorodifluoromethane		0.355	U	EPA 624
			103820-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			103820-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			103820-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			103820-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103820-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			103820-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103820-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			103820-006	Ethyl benzene		0.333	U	EPA 624
			103820-006	Methylene chloride		1.67	U	EPA 624
			103820-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103820-006	Tetrachloroethene		0.333	U	EPA 624
			103820-006	Toluene		0.333	U	EPA 624
			103820-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103820-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103820-006	Trichloroethene		0.333	U	EPA 624
			103820-006	Trichlorofluoromethane		0.333	U	EPA 624
			103820-006	Vinyl chloride		0.333	U	EPA 624
			103818-006	Bromodichloromethane		0.333	U	EPA 624

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Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	17-Oct-2017	103818-006	Acrolein		1.67	NU	EPA 624
			103818-006	Acrylonitrile		1.67	U	EPA 624
			103818-006	Benzene		0.333	U	EPA 624
			103818-006	Bromoform		0.333	U	EPA 624
			103818-006	Bromomethane		0.337	U	EPA 624
			103818-006	Carbon tetrachloride		0.333	U	EPA 624
			103818-006	Chlorobenzene		0.333	U	EPA 624
			103818-006	Chloroethane		0.333	U	EPA 624
			103818-006	Chloroethyl vinyl ether, 2-		1.67	NU	EPA 624
			103818-006	Chloroform		0.333	U	EPA 624
			103818-006	Chloromethane		0.333	U	EPA 624
			103818-006	Dibromochloromethane		0.333	U	EPA 624
			103818-006	Dichlorobenzene, 1,2-		0.333	U	EPA 624
			103818-006	Dichlorobenzene, 1,3-		0.333	U	EPA 624
			103818-006	Dichlorobenzene, 1,4-		0.333	U	EPA 624
			103818-006	Dichlorodifluoromethane		0.355	U	EPA 624
			103818-006	Dichloroethane, 1,1-		0.333	U	EPA 624
			103818-006	Dichloroethane, 1,2-		0.333	U	EPA 624
			103818-006	Dichloroethene, 1,1-		0.333	U	EPA 624
			103818-006	Dichloroethene, trans-1,2-		0.333	U	EPA 624
			103818-006	Dichloropropane, 1,2-		0.333	U	EPA 624
			103818-006	Dichloropropene, cis-1,3-		0.333	U	EPA 624
			103818-006	Dichloropropene, trans-1,3-		0.333	U	EPA 624
			103818-006	Ethyl benzene		0.333	U	EPA 624
			103818-006	Methylene chloride		1.67	U	EPA 624
			103818-006	Tetrachloroethane, 1,1,2,2-		0.333	U	EPA 624
			103818-006	Tetrachloroethene		0.333	U	EPA 624
			103818-006	Toluene		0.333	U	EPA 624

Table continued on next page.

Table D-7. Summary of volatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	17-Oct-2017	103818-006	Trichloroethane, 1,1,1-		0.333	U	EPA 624
			103818-006	Trichloroethane, 1,1,2-		0.333	U	EPA 624
			103818-006	Trichloroethene		0.333	U	EPA 624
			103818-006	Trichlorofluoromethane		0.333	U	EPA 624
			103818-006	Vinyl chloride		0.333	U	EPA 624

See notes at end of appendices.

Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	18-Oct-2017	103830-002	Acenaphthene		0.316	U	EPA 625
			103830-002	Acenaphthylene		0.316	U	EPA 625
			103830-002	Anthracene		0.316	U	EPA 625
			103830-002	Benzidine		4.11	NU	EPA 625
			103830-002	Benzo(a)anthracene		0.316	U	EPA 625
			103830-002	Benzo(a)pyrene		0.316	U	EPA 625
			103830-002	Benzo(b)fluoranthene		0.316	U	EPA 625
			103830-002	Benzo(ghi)perylene		0.316	U	EPA 625
			103830-002	Benzo(k)fluoranthene		0.316	U	EPA 625
			103830-002	Bromophenyl phenyl ether, 4-		3.16	U	EPA 625
			103830-002	Butylbenzyl phthalate		3.16	U	EPA 625
			103830-002	Chloro-3-methylphenol, 4-		3.16	U	EPA 625
			103830-002	Chloroethoxy)methane, bis(2-		3.16	U	EPA 625
			103830-002	Chloroethyl)ether, bis(2-		3.16	U	EPA 625
			103830-002	Chloroisopropyl ether, bis-		3.16	U	EPA 625
			103830-002	Chloronaphthalene, 2-		0.432	U	EPA 625
			103830-002	Chlorophenol, 2-		3.16	U	EPA 625
			103830-002	Chlorophenyl phenyl ether, 4-		3.16	U	EPA 625
			103830-002	Chrysene		0.316	U	EPA 625
			103830-002	Di-n-butyl phthalate		3.16	U	EPA 625
			103830-002	Di-n-octyl phthalate		3.16	U	EPA 625
			103830-002	Dibenz[a,h]anthracene		0.316	U	EPA 625
			103830-002	Dichlorobenzidine, 3,3'-		3.16	NU	EPA 625
			103830-002	Dichlorophenol, 2,4-		3.16	U	EPA 625
			103830-002	Diethylphthalate		3.16	U	EPA 625
			103830-002	Dimethylphenol, 2,4-		3.16	U	EPA 625
			103830-002	Dimethylphthalate		3.16	U	EPA 625
			103830-002	Dinitro-o-cresol		3.16	NU	EPA 625
			103830-002	Dinitrophenol, 2,4-		5.26	NU	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
CINT	2238A	18-Oct-2017	103830-002	Dinitrotoluene, 2,4-		3.16	NU	EPA 625
			103830-002	Dinitrotoluene, 2,6-		3.16	U	EPA 625
			103830-002	Diphenyl amine		3.16	U	EPA 625
			103830-002	Diphenylhydrazine, 1,2-		3.16	U	EPA 625
			103830-002	Ethylhexyl)phthalate, bis(2-		3.16	U	EPA 625
			103830-002	Fluoranthene		0.316	U	EPA 625
			103830-002	Fluorene		0.316	U	EPA 625
			103830-002	Hexachlorobenzene		3.16	U	EPA 625
			103830-002	Hexachlorobutadiene		3.16	U	EPA 625
			103830-002	Hexachlorocyclopentadiene		3.16	U	EPA 625
			103830-002	Hexachloroethane		3.16	U	EPA 625
			103830-002	Indeno(1,2,3-c,d)pyrene		0.316	U	EPA 625
			103830-002	Isophorone		3.68	U	EPA 625
			103830-002	Naphthalene		0.316	U	EPA 625
			103830-002	Nitro-benzene		3.16	NU	EPA 625
			103830-002	Nitrophenol, 2-		3.16	U	EPA 625
			103830-002	Nitrophenol, 4-		3.16	U	EPA 625
			103830-002	Nitrosodimethylamine, n-		3.16	U	EPA 625
			103830-002	Nitrosodipropylamine, n-		3.16	U	EPA 625
			103830-002	Pentachlorophenol		3.16	U	EPA 625
			103830-002	Phenanthrene		0.316	U	EPA 625
			103830-002	Phenol		3.16	NU	EPA 625
			103830-002	Pyrene		0.316	U	EPA 625
			103830-002	Trichlorobenzene, 1,2,4-		3.16	U	EPA 625
			103830-002	Trichlorophenol, 2,4,6-		3.16	U	EPA 625
WW001	2069A	18-Oct-2017	103827-004	Acenaphthene		0.306	U	EPA 625
			103827-004	Acenaphthylene		0.306	U	EPA 625
			103827-004	Anthracene		0.306	U	EPA 625
			103827-004	Benzidine		3.98	NU	EPA 625

Table continued on next page.

Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	18-Oct-2017	103827-004	Benzo(a)anthracene		0.306	U	EPA 625
			103827-004	Benzo(a)pyrene		0.306	U	EPA 625
			103827-004	Benzo(b)fluoranthene		0.306	U	EPA 625
			103827-004	Benzo(ghi)perylene		0.306	U	EPA 625
			103827-004	Benzo(k)fluoranthene		0.306	U	EPA 625
			103827-004	Bromophenyl phenyl ether, 4-		3.06	U	EPA 625
			103827-004	Butylbenzyl phthalate	12.8	3.06		EPA 625
			103827-004	Chloro-3-methylphenol, 4-		3.06	U	EPA 625
			103827-004	Chloroethoxy)methane, bis(2-		3.06	U	EPA 625
			103827-004	Chloroethyl)ether, bis(2-		3.06	U	EPA 625
			103827-004	Chloroisopropyl ether, bis-		3.06	U	EPA 625
			103827-004	Chloronaphthalene, 2-		0.418	U	EPA 625
			103827-004	Chlorophenol, 2-		3.06	U	EPA 625
			103827-004	Chlorophenyl phenyl ether, 4-		3.06	U	EPA 625
			103827-004	Chrysene		0.306	U	EPA 625
			103827-004	Di-n-butyl phthalate		3.06	U	EPA 625
			103827-004	Di-n-octyl phthalate		3.06	U	EPA 625
			103827-004	Dibenz[a,h]anthracene		0.306	U	EPA 625
			103827-004	Dichlorobenzidine, 3,3'-		3.06	NU	EPA 625
			103827-004	Dichlorophenol, 2,4-		3.06	U	EPA 625
			103827-004	Diethylphthalate		3.06	U	EPA 625
			103827-004	Dimethylphenol, 2,4-		3.06	U	EPA 625
			103827-004	Dimethylphthalate		3.06	U	EPA 625
			103827-004	Dinitro-o-cresol		3.06	NU	EPA 625
			103827-004	Dinitrophenol, 2,4-		5.1	NU	EPA 625
			103827-004	Dinitrotoluene, 2,4-		3.06	NU	EPA 625
			103827-004	Dinitrotoluene, 2,6-		3.06	U	EPA 625
			103827-004	Diphenyl amine		3.06	U	EPA 625
			103827-004	Diphenylhydrazine, 1,2-		3.06	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW001	2069A	18-Oct-2017	103827-004	Ethylhexyl)phthalate, bis(2-	13.7	3.06		EPA 625
			103827-004	Fluoranthene		0.306	U	EPA 625
			103827-004	Fluorene		0.306	U	EPA 625
			103827-004	Hexachlorobenzene		3.06	U	EPA 625
			103827-004	Hexachlorobutadiene		3.06	U	EPA 625
			103827-004	Hexachlorocyclopentadiene		3.06	U	EPA 625
			103827-004	Hexachloroethane		3.06	U	EPA 625
			103827-004	Indeno(1,2,3-c,d)pyrene		0.306	U	EPA 625
			103827-004	Isophorone		3.57	U	EPA 625
			103827-004	Naphthalene		0.306	U	EPA 625
			103827-004	Nitro-benzene		3.06	NU	EPA 625
			103827-004	Nitrophenol, 2-		3.06	U	EPA 625
			103827-004	Nitrophenol, 4-		3.06	U	EPA 625
			103827-004	Nitrosodimethylamine, n-		3.06	U	EPA 625
			103827-004	Nitrosodipropylamine, n-		3.06	U	EPA 625
			103827-004	Pentachlorophenol		3.06	U	EPA 625
			103827-004	Phenanthrene		0.306	U	EPA 625
			103827-004	Phenol		3.06	NU	EPA 625
			103827-004	Pyrene		0.306	U	EPA 625
			103827-004	Trichlorobenzene, 1,2,4-		3.06	U	EPA 625
			103827-004	Trichlorophenol, 2,4,6-		3.06	U	EPA 625
WW006	2069F	18-Oct-2017	103828-004	Acenaphthene		0.3	U	EPA 625
			103828-004	Acenaphthylene		0.3	U	EPA 625
			103828-004	Anthracene		0.3	U	EPA 625
			103828-004	Benzidine		3.9	NU	EPA 625
			103828-004	Benzo(a)anthracene		0.3	U	EPA 625
			103828-004	Benzo(a)pyrene		0.3	U	EPA 625
			103828-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			103828-004	Benzo(ghi)perylene		0.3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	18-Oct-2017	103828-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			103828-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			103828-004	Butylbenzyl phthalate		3	U	EPA 625
			103828-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			103828-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			103828-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			103828-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			103828-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			103828-004	Chlorophenol, 2-		3	U	EPA 625
			103828-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			103828-004	Chrysene		0.3	U	EPA 625
			103828-004	Di-n-butyl phthalate		3	U	EPA 625
			103828-004	Di-n-octyl phthalate		3	U	EPA 625
			103828-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			103828-004	Dichlorobenzidine, 3,3'-		3	NU	EPA 625
			103828-004	Dichlorophenol, 2,4-		3	U	EPA 625
			103828-004	Diethylphthalate		3	U	EPA 625
			103828-004	Dimethylphenol, 2,4-		3	U	EPA 625
			103828-004	Dimethylphthalate		3	U	EPA 625
			103828-004	Dinitro-o-cresol		3	NU	EPA 625
			103828-004	Dinitrophenol, 2,4-		5	NU	EPA 625
			103828-004	Dinitrotoluene, 2,4-		3	NU	EPA 625
			103828-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			103828-004	Diphenyl amine		3	U	EPA 625
			103828-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			103828-004	Ethylhexyl)phthalate, bis(2-	16.3	3		EPA 625
			103828-004	Fluoranthene		0.3	U	EPA 625
			103828-004	Fluorene		0.3	U	EPA 625
			103828-004	Hexachlorobenzene		3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW006	2069F	18-Oct-2017	103828-004	Hexachlorobutadiene		3	U	EPA 625
			103828-004	Hexachlorocyclopentadiene		3	U	EPA 625
			103828-004	Hexachloroethane		3	U	EPA 625
			103828-004	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625
			103828-004	Isophorone		3.5	U	EPA 625
			103828-004	Naphthalene		0.3	U	EPA 625
			103828-004	Nitro-benzene		3	NU	EPA 625
			103828-004	Nitrophenol, 2-		3	U	EPA 625
			103828-004	Nitrophenol, 4-		3	U	EPA 625
			103828-004	Nitrosodimethylamine, n-		3	U	EPA 625
			103828-004	Nitrosodipropylamine, n-		3	U	EPA 625
			103828-004	Pentachlorophenol		3	U	EPA 625
			103828-004	Phenanthrene		0.3	U	EPA 625
			103828-004	Phenol		3	NU	EPA 625
			103828-004	Pyrene		0.3	U	EPA 625
			103828-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			103828-004	Trichlorophenol, 2,4,6-		3	U	EPA 625
WW007	2069G	18-Oct-2017	103829-004	Acenaphthene		0.3	U	EPA 625
			103829-004	Acenaphthylene		0.3	U	EPA 625
			103829-004	Anthracene		0.3	U	EPA 625
			103829-004	Benzidine		3.9	NU	EPA 625
			103829-004	Benzo(a)anthracene		0.3	U	EPA 625
			103829-004	Benzo(a)pyrene		0.3	U	EPA 625
			103829-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			103829-004	Benzo(ghi)perylene		0.3	U	EPA 625
			103829-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			103829-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			103829-004	Butylbenzyl phthalate		3	U	EPA 625
			103829-004	Chloro-3-methylphenol, 4-		3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	18-Oct-2017	103829-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			103829-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			103829-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			103829-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			103829-004	Chlorophenol, 2-		3	U	EPA 625
			103829-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			103829-004	Chrysene		0.3	U	EPA 625
			103829-004	Di-n-butyl phthalate		3	U	EPA 625
			103829-004	Di-n-octyl phthalate		3	U	EPA 625
			103829-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			103829-004	Dichlorobenzidine, 3,3'-		3	NU	EPA 625
			103829-004	Dichlorophenol, 2,4-		3	U	EPA 625
			103829-004	Diethylphthalate		3	U	EPA 625
			103829-004	Dimethylphenol, 2,4-		3	U	EPA 625
			103829-004	Dimethylphthalate		3	U	EPA 625
			103829-004	Dinitro-o-cresol		3	NU	EPA 625
			103829-004	Dinitrophenol, 2,4-		5	NU	EPA 625
			103829-004	Dinitrotoluene, 2,4-		3	NU	EPA 625
			103829-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			103829-004	Diphenyl amine		3	U	EPA 625
			103829-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			103829-004	Ethylhexyl)phthalate, bis(2-		3	U	EPA 625
			103829-004	Fluoranthene		0.3	U	EPA 625
			103829-004	Fluorene		0.3	U	EPA 625
			103829-004	Hexachlorobenzene		3	U	EPA 625
			103829-004	Hexachlorobutadiene		3	U	EPA 625
			103829-004	Hexachlorocyclopentadiene		3	U	EPA 625
			103829-004	Hexachloroethane		3	U	EPA 625
			103829-004	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW007	2069G	18-Oct-2017	103829-004	Isophorone		3.5	U	EPA 625
			103829-004	Naphthalene		0.3	U	EPA 625
			103829-004	Nitro-benzene		3	NU	EPA 625
			103829-004	Nitrophenol, 2-		3	U	EPA 625
			103829-004	Nitrophenol, 4-		3	U	EPA 625
			103829-004	Nitrosodimethylamine, n-		3	U	EPA 625
			103829-004	Nitrosodipropylamine, n-		3	U	EPA 625
			103829-004	Pentachlorophenol		3	U	EPA 625
			103829-004	Phenanthrene		0.3	U	EPA 625
			103829-004	Phenol		3	NU	EPA 625
			103829-004	Pyrene		0.3	U	EPA 625
			103829-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			103829-004	Trichlorophenol, 2,4,6-		3	U	EPA 625
WW008	2069I	18-Oct-2017	103826-004	Acenaphthene		0.306	U	EPA 625
			103826-004	Acenaphthylene		0.306	U	EPA 625
			103826-004	Anthracene		0.306	U	EPA 625
			103826-004	Benzidine		3.98	NU	EPA 625
			103826-004	Benzo(a)anthracene		0.306	U	EPA 625
			103826-004	Benzo(a)pyrene		0.306	U	EPA 625
			103826-004	Benzo(b)fluoranthene		0.306	U	EPA 625
			103826-004	Benzo(ghi)perylene		0.306	U	EPA 625
			103826-004	Benzo(k)fluoranthene		0.306	U	EPA 625
			103826-004	Bromophenyl phenyl ether, 4-		3.06	U	EPA 625
			103826-004	Butylbenzyl phthalate		3.06	U	EPA 625
			103826-004	Chloro-3-methylphenol, 4-		3.06	U	EPA 625
			103826-004	Chloroethoxy)methane, bis(2-		3.06	U	EPA 625
			103826-004	Chloroethyl)ether, bis(2-		3.06	U	EPA 625
			103826-004	Chloroisopropyl ether, bis-		3.06	U	EPA 625
			103826-004	Chloronaphthalene, 2-		0.418	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	18-Oct-2017	103826-004	Chlorophenol, 2-		3.06	U	EPA 625
			103826-004	Chlorophenyl phenyl ether, 4-		3.06	U	EPA 625
			103826-004	Chrysene		0.306	U	EPA 625
			103826-004	Di-n-butyl phthalate		3.06	U	EPA 625
			103826-004	Di-n-octyl phthalate		3.06	U	EPA 625
			103826-004	Dibenz[a,h]anthracene		0.306	U	EPA 625
			103826-004	Dichlorobenzidine, 3,3'-		3.06	NU	EPA 625
			103826-004	Dichlorophenol, 2,4-		3.06	U	EPA 625
			103826-004	Diethylphthalate		3.06	U	EPA 625
			103826-004	Dimethylphenol, 2,4-		3.06	U	EPA 625
			103826-004	Dimethylphthalate		3.06	U	EPA 625
			103826-004	Dinitro-o-cresol		3.06	NU	EPA 625
			103826-004	Dinitrophenol, 2,4-		5.1	NU	EPA 625
			103826-004	Dinitrotoluene, 2,4-		3.06	NU	EPA 625
			103826-004	Dinitrotoluene, 2,6-		3.06	U	EPA 625
			103826-004	Diphenyl amine		3.06	U	EPA 625
			103826-004	Diphenylhydrazine, 1,2-		3.06	U	EPA 625
			103826-004	Ethylhexyl)phthalate, bis(2-		3.06	U	EPA 625
			103826-004	Fluoranthene		0.306	U	EPA 625
			103826-004	Fluorene		0.306	U	EPA 625
			103826-004	Hexachlorobenzene		3.06	U	EPA 625
			103826-004	Hexachlorobutadiene		3.06	U	EPA 625
			103826-004	Hexachlorocyclopentadiene		3.06	U	EPA 625
			103826-004	Hexachloroethane		3.06	U	EPA 625
			103826-004	Indeno(1,2,3-c,d)pyrene		0.306	U	EPA 625
			103826-004	Isophorone		3.57	U	EPA 625
			103826-004	Naphthalene		0.306	U	EPA 625
			103826-004	Nitro-benzene		3.06	NU	EPA 625
			103826-004	Nitrophenol, 2-		3.06	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW008	2069I	18-Oct-2017	103826-004	Nitrophenol, 4-		3.06	U	EPA 625
			103826-004	Nitrosodimethylamine, n-		3.06	U	EPA 625
			103826-004	Nitrosodipropylamine, n-		3.06	U	EPA 625
			103826-004	Pentachlorophenol		3.06	U	EPA 625
			103826-004	Phenanthrene		0.306	U	EPA 625
			103826-004	Phenol		3.06	NU	EPA 625
			103826-004	Pyrene		0.306	U	EPA 625
			103826-004	Trichlorobenzene, 1,2,4-		3.06	U	EPA 625
			103826-004	Trichlorophenol, 2,4,6-		3.06	U	EPA 625
WW011	2069K	18-Oct-2017	103825-004	Acenaphthene		0.3	U	EPA 625
			103825-004	Acenaphthylene		0.3	U	EPA 625
			103825-004	Anthracene		0.3	U	EPA 625
			103825-004	Benzidine		3.9	NU	EPA 625
			103825-004	Benzo(a)anthracene		0.3	U	EPA 625
			103825-004	Benzo(a)pyrene		0.3	U	EPA 625
			103825-004	Benzo(b)fluoranthene		0.3	U	EPA 625
			103825-004	Benzo(ghi)perylene		0.3	U	EPA 625
			103825-004	Benzo(k)fluoranthene		0.3	U	EPA 625
			103825-004	Bromophenyl phenyl ether, 4-		3	U	EPA 625
			103825-004	Butylbenzyl phthalate		3	U	EPA 625
			103825-004	Chloro-3-methylphenol, 4-		3	U	EPA 625
			103825-004	Chloroethoxy)methane, bis(2-		3	U	EPA 625
			103825-004	Chloroethyl)ether, bis(2-		3	U	EPA 625
			103825-004	Chloroisopropyl ether, bis-		3	U	EPA 625
			103825-004	Chloronaphthalene, 2-		0.41	U	EPA 625
			103825-004	Chlorophenol, 2-		3	U	EPA 625
			103825-004	Chlorophenyl phenyl ether, 4-		3	U	EPA 625
			103825-004	Chrysene		0.3	U	EPA 625
			103825-004	Di-n-butyl phthalate		3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	18-Oct-2017	103825-004	Di-n-octyl phthalate		3	U	EPA 625
			103825-004	Dibenz[a,h]anthracene		0.3	U	EPA 625
			103825-004	Dichlorobenzidine, 3,3'-		3	NU	EPA 625
			103825-004	Dichlorophenol, 2,4-		3	U	EPA 625
			103825-004	Diethylphthalate		3	U	EPA 625
			103825-004	Dimethylphenol, 2,4-		3	U	EPA 625
			103825-004	Dimethylphthalate		3	U	EPA 625
			103825-004	Dinitro-o-cresol		3	NU	EPA 625
			103825-004	Dinitrophenol, 2,4-		5	NU	EPA 625
			103825-004	Dinitrotoluene, 2,4-		3	NU	EPA 625
			103825-004	Dinitrotoluene, 2,6-		3	U	EPA 625
			103825-004	Diphenyl amine		3	U	EPA 625
			103825-004	Diphenylhydrazine, 1,2-		3	U	EPA 625
			103825-004	Ethylhexyl)phthalate, bis(2-		3	U	EPA 625
			103825-004	Fluoranthene		0.3	U	EPA 625
			103825-004	Fluorene		0.3	U	EPA 625
			103825-004	Hexachlorobenzene		3	U	EPA 625
			103825-004	Hexachlorobutadiene		3	U	EPA 625
			103825-004	Hexachlorocyclopentadiene		3	U	EPA 625
			103825-004	Hexachloroethane		3	U	EPA 625
			103825-004	Indeno(1,2,3-c,d)pyrene		0.3	U	EPA 625
			103825-004	Isophorone		3.5	U	EPA 625
			103825-004	Naphthalene		0.3	U	EPA 625
			103825-004	Nitro-benzene		3	NU	EPA 625
			103825-004	Nitrophenol, 2-		3	U	EPA 625
			103825-004	Nitrophenol, 4-		3	U	EPA 625
			103825-004	Nitrosodimethylamine, n-		3	U	EPA 625
			103825-004	Nitrosodipropylamine, n-		3	U	EPA 625
			103825-004	Pentachlorophenol		3	U	EPA 625

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Table D-8. Summary of semivolatile organic compound results for permitted sanitary outfalls, October 2017 (continued)

Station	Permit Number	Date Collected	Sample Identifier	Analyte	Result (µg/L)	MDL (µg/L)	Laboratory Data Qualifiers	Analytical Method
WW011	2069K	18-Oct-2017	103825-004	Phenanthrene		0.3	U	EPA 625
			103825-004	Phenol		3	NU	EPA 625
			103825-004	Pyrene		0.3	U	EPA 625
			103825-004	Trichlorobenzene, 1,2,4-		3	U	EPA 625
			103825-004	Trichlorophenol, 2,4,6-		3	U	EPA 625

See notes at end of appendices.

Appendix E. 2017 Stormwater Sampling Results



Greater Roadrunner (*Geococcyx californianus*)

Table E- 1. Multi-Sector General Permit stormwater sampling results, 2017

Sampling Point	Sample Date	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Sample Preparation
SWSP-17	2-Oct-17	Ammonia	0.154	0.017	0.05	Unfiltered
		Arsenic	<.002	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Chemical oxygen demand	68.9	8.95	20	Unfiltered
		Cyanide, total	<.00167	0.00167	0.005	Unfiltered
		Lead	0.000527	0.0005	0.002	Filtered
		Magnesium	3.51	0.01	0.03	Unfiltered
		Mercury	<.000067	0.000067	0.0002	Unfiltered
		Selenium	<.002	0.002	0.005	Unfiltered
		Silver	<.0003	0.0003	0.001	Filtered
SWSP-32	18-Jul-17	Ammonia	0.597	0.017	0.05	Unfiltered
		Arsenic	0.00846	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Chemical oxygen demand	33.1	8.95	20	Unfiltered
		Cyanide, total	<.00167	0.00167	0.005	Unfiltered
		Lead	<.0005	0.0005	0.002	Filtered
		Magnesium	13.2	0.01	0.03	Unfiltered
		Mercury	0.000115	0.000067	0.0002	Unfiltered
		Selenium	<.002	0.002	0.005	Unfiltered
		Silver	<.0003	0.0003	0.001	Filtered
	7-Aug-17	Arsenic	0.0196	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Lead	<.0005	0.0005	0.002	Filtered
		Magnesium	40.2	0.01	0.03	Unfiltered
		Mercury	0.000174	0.000067	0.0002	Unfiltered
		Selenium	0.00251	0.002	0.005	Unfiltered
		Silver	<.0003	0.0003	0.001	Filtered
	14-Aug-17	Ammonia	0.568	0.017	0.05	Unfiltered
		Chemical oxygen demand	65.8	8.95	20	Unfiltered
		Cyanide, total	<.00167	0.00167	0.005	Unfiltered

Table continued on next page.

Table E-1. Multi-Sector General Permit stormwater sampling results, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result (mg/L)	MDL (mg/L)	PQL (mg/L)	Sample Preparation
SWSP-47	29-Sep-17	Arsenic	0.00354	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Chemical oxygen demand	54.8	8.95	20	Unfiltered
		Lead	0.000656	0.0005	0.002	Filtered
		Magnesium	5.93	0.01	0.03	Unfiltered
		Mercury	<.000067	0.000067	0.0002	Unfiltered
		Selenium	<.002	0.002	0.005	Unfiltered
		Silver	<.0003	0.0003	0.001	Filtered
	2-Oct-17	Ammonia	0.488	0.017	0.05	Unfiltered
SWSP-48	15-Sep-17	Arsenic	0.00499	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Cyanide, total	<.00167	0.00167	0.005	Unfiltered
		Lead	0.000565	0.0005	0.002	Filtered
		Magnesium	7.36	0.01	0.03	Unfiltered
		Mercury	<.000067	0.000067	0.0002	Unfiltered
		Selenium	<.002	0.002	0.005	Unfiltered
		Silver	0.00091	0.0003	0.001	Filtered
SWSP-51	14-Aug-17	Ammonia	0.365	0.017	0.05	Unfiltered
		Arsenic	0.00484	0.002	0.005	Unfiltered
		Cadmium	<.0003	0.0003	0.001	Filtered
		Chemical oxygen demand	32.5	8.95	20	Unfiltered
		Cyanide, total	<.00167	0.00167	0.005	Unfiltered
		Lead	<.0005	0.0005	0.002	Filtered
		Magnesium	6.45	0.01	0.03	Unfiltered
		Mercury	<.000067	0.000067	0.0002	Unfiltered
		Selenium	<.002	0.002	0.005	Unfiltered
		Silver	<.0003	0.0003	0.001	Filtered

See notes at end of appendices.

Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-02	1-Aug-16	Alpha, gross	6.11	0.382	0.831	pCi/L	Unfiltered
		Chemical oxygen demand	64.5	8.95	20	mg/L	Unfiltered
		Grease and oil	1.28	1.2	4.27	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.54	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.21	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.337	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	87.1	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	60.8	2.28	10	mg/L	Unfiltered
		Total PCB congeners	0.00527		0.0000202	µg/L	Unfiltered
	5-Aug-16	Alpha, gross	5.49	0.371	0.983	pCi/L	Unfiltered
		Chemical oxygen demand	19.8	8.95	20	mg/L	Unfiltered
		Grease and oil	<1.19	1.19	4.24	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.448	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.1	0.02	0.05	mg/L	Unfiltered
		Phosphorus, total as P	0.304	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	30	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	33.5	0.877	3.85	mg/L	Unfiltered
		Total PCB congeners	0.0065		0.0000206	µg/L	Unfiltered
	22-Aug-16	Alpha, gross	13	1.49	3.67	pCi/L	Unfiltered
		Biochemical oxygen demand	10		2	mg/L	Unfiltered
		Chemical oxygen demand	89.7	8.95	20	mg/L	Unfiltered
		Grease and oil	<1.19	1.19	4.24	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.37	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.4	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.14	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.545	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	133	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	137	2.85	12.5	mg/L	Unfiltered
		Total PCB congeners	0.0252		0.00002	µg/L	Unfiltered
	12-Sep-16	Biochemical oxygen demand	15		2	mg/L	Unfiltered
		Dissolved phosphorous	0.143	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.328	0.02	0.05	mg/L	Unfiltered

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Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-02	22-Nov-16	Alpha, gross	11.7	0.595	1.28	pCi/L	Unfiltered
		Biochemical oxygen demand	14		2	mg/L	Unfiltered
		Chemical oxygen demand	429	8.95	20	mg/L	Unfiltered
		E. coli	2098	10	10	CFU/100ml	Unfiltered
		Grease and oil	<1.18	1.18	4.2	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.465	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.05	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.0811	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.488	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	110	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	96.8	3.68	16.1	mg/L	Unfiltered
		Total PCB congeners	0.0398		0.0000196	µg/L	Unfiltered
SWSP-05	1-Aug-16	Alpha, gross	0.85	0.443	0.944	pCi/L	Unfiltered
		Chemical oxygen demand	250	8.95	20	mg/L	Unfiltered
		Grease and oil	1.33	1.24	4.42	mg/L	Unfiltered
		Nitrate plus nitrite as N	2.85	0.085	0.25	mg/L	Unfiltered
		Nitrogen, Kjeldahl	4.38	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.337	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	237	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	25.4	1.63	7.14	mg/L	Unfiltered
		Total PCB Congeners	0.000428		0.0000217	µg/L	Unfiltered
	5-Aug-16	Alpha, gross	7.49	0.584	1.58	pCi/L	Unfiltered
		Chemical oxygen demand	39	8.95	20	mg/L	Unfiltered
		Grease and oil	<1.2	1.2	4.27	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.608	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.19	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.101	0.02	0.05	mg/L	Unfiltered
		Phosphorus, total as P	0.256	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	130	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	94.6	2.19	9.62	mg/L	Unfiltered
		Total PCB congeners	0.00127		0.0000213	µg/L	Unfiltered
	12-Sep-16	Biochemical oxygen demand	13		2	mg/L	Unfiltered
		Dissolved phosphorous	0.0955	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.26	0.02	0.05	mg/L	Unfiltered

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Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-05	10-Oct-16	Biochemical oxygen demand	7		2	mg/L	Unfiltered
	22-Nov-16	Alpha, gross	12.9	0.906	1.94	pCi/L	Unfiltered
		Biochemical oxygen demand	7		2	mg/L	Unfiltered
		Chemical oxygen demand	58	8.95	20	mg/L	Unfiltered
		E. coli	3873	10	10	CFU/100ml	Unfiltered
		Grease and oil	<1.21	1.21	4.31	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.355	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	0.458	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.057	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.262	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	103	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	53.7	1.9	8.33	mg/L	Unfiltered
		Total PCB congeners	0.0098		0.0000205	µg/L	Unfiltered
	25-Apr-17	Alpha, gross	4.13	0.454	0.974	pCi/L	Unfiltered
		Biochemical oxygen demand	28		2	mg/L	Unfiltered
		Chemical oxygen demand	166	8.95	20	mg/L	Unfiltered
		E. coli	2613	10	10	MPN/100 ml	Unfiltered
		Grease and oil	<1.4	1.4	5	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.845	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	3.5	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.189	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.358	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	116	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	75	5.7	25	mg/L	Unfiltered
		Total PCB congeners	0.00191		0.0000199	µg/L	Unfiltered
SWSP-24	1-Aug-16	Alpha, gross	2.4	0.294	0.643	pCi/L	Unfiltered
		Chemical oxygen demand	176	8.95	20	mg/L	Unfiltered
		Nitrate plus nitrite as N	1.31	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	2.84	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.148	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	137	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	168	2.28	10	mg/L	Unfiltered
		Total PCB congeners	0.00369		0.0000219	µg/L	Unfiltered

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Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-24	5-Aug-16	Alpha, gross	0.77	0.398	0.985	pCi/L	Unfiltered
		Grease and oil	<1.27	1.27	4.55	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.342	0.017	0.05	mg/L	Unfiltered
		Solids, total dissolved	30	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	38.2	0.95	4.17	mg/L	Unfiltered
		Total PCB congeners	0.0109		0.0000219	µg/L	Unfiltered
SWSP-35	1-Aug-16	Alpha, gross	0.498	0.292	0.633	pCi/L	Unfiltered
		Chemical oxygen demand	159	8.95	20	mg/L	Unfiltered
		Grease and oil	<1.24	1.24	4.42	mg/L	Unfiltered
		Nitrate plus nitrite as N	1.71	0.085	0.25	mg/L	Unfiltered
		Nitrogen, Kjeldahl	2.81	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.139	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	151	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	12.4	1.27	5.56	mg/L	Unfiltered
		Total PCB congeners	0.00439		0.0000203	µg/L	Unfiltered
SWSP-36	1-Aug-16	Alpha, gross	0.44	0.224	0.492	pCi/L	Unfiltered
		Chemical oxygen demand	204	8.95	20	mg/L	Unfiltered
		Grease and oil	1.42	1.24	4.42	mg/L	Unfiltered
		Nitrate plus nitrite as N	1.64	0.085	0.25	mg/L	Unfiltered
		Nitrogen, Kjeldahl	3.56	0.033	0.1	mg/L	Unfiltered
		Phosphorus, total as P	0.192	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	137	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	21.7	1.79	7.86	mg/L	Unfiltered
		Total PCB congeners	0.00264		0.0000223	µg/L	Unfiltered
	8-Sep-16	Alpha, gross	0.361	0.386	0.881	pCi/L	Unfiltered
		Biochemical oxygen demand	8		2	mg/L	Unfiltered
		Chemical oxygen demand	85.1	8.95	20	mg/L	Unfiltered
		E. coli	25.3	1	1	CFU/100ml	Unfiltered
		Grease and oil	<1.22	1.22	4.35	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.409	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	0.802	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.103	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.124	0.02	0.05	mg/L	Unfiltered

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Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-24	8-Sep-16	Solids, total dissolved	85.7	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	3.41	0.648	2.84	mg/L	Unfiltered
		Total PCB congeners	0.000413		0.0000219	µg/L	Unfiltered
	22-Nov-16	Alpha, gross	4.81	0.506	1.09	pCi/L	Unfiltered
		Biochemical oxygen demand	10		2	mg/L	Unfiltered
		Chemical oxygen demand	50.1	8.95	20	mg/L	Unfiltered
		E. coli	517.2	1	1	CFU/100ml	Unfiltered
		Grease and oil	2.18	1.18	4.2	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.369	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	0.393	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.0265	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.129	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	64.3	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	27	1.14	5	mg/L	Unfiltered
		Total PCB congeners	0.00322		0.0000205	µg/L	Unfiltered
	16-Jan-17	Alpha, gross	6.82	0.426	0.978	pCi/L	Unfiltered
		Biochemical oxygen demand	16		2	mg/L	Unfiltered
		Chemical oxygen demand	74.6	8.95	20	mg/L	Unfiltered
		E. coli	1553.1	1	1	CFU/100ml	Unfiltered
		Grease and oil	2.12	1.24	4.42	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.541	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.37	0.033	0.1	mg/L	Unfiltered
		Dissolved phosphorous	0.0495	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.0869	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	72.9	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	29.3	1.43	6.25	mg/L	Unfiltered
		Total PCB congeners	0.00208		0.0000196	µg/L	Unfiltered
	25-Apr-17	Alpha, gross	1.53	0.276	0.594	pCi/L	Unfiltered
		Biochemical oxygen demand	18		2	mg/L	Unfiltered
		Chemical oxygen demand	105	8.95	20	mg/L	Unfiltered
		E. coli	331	10	10	MPN/100 ml	Unfiltered
		Grease and oil	1.33	1.33	4.76	mg/L	Unfiltered
		Nitrate plus nitrite as N	0.612	0.017	0.05	mg/L	Unfiltered
		Nitrogen, Kjeldahl	1.95	0.033	0.1	mg/L	Unfiltered

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Table E-2. Municipal Separate Storm Sewer System sampling results, July 1, 2016 through June 30, 2017 (continued)

Sampling Point	Sample Date	Analyte	Result	MDL	PQL	Units	Sample Preparation
SWSP-24	25-Apr-17	Dissolved phosphorous	0.126	0.02	0.05	mg/L	Filtered
		Phosphorus, total as P	0.173	0.02	0.05	mg/L	Unfiltered
		Solids, total dissolved	92.9	3.4	14.3	mg/L	Unfiltered
		Solids, total suspended	32	5.7	25	mg/L	Unfiltered
		Total PCB congeners	0.00215		0.0000215	µg/L	Unfiltered

See notes at end of appendices.

Notes: Appendices SNL/NM

Acronyms

AOC = area of concern
$CaCO_3$ = calcium carbonate
CYN = canyon
HMX = cyclotetramethylenetranitramine
LWDS = liquid waste disposal system
MCL = maximum contaminant level (established by 40 CFR 141.11(b), Environmental Protection Agency, *National Primary Drinking Water Regulations*)
MPN = most probable number
MW = monitoring well
pH = potential of hydrogen (negative logarithm of the hydrogen ion concentration)
NE = not established
PCB = polychlorinated biphenyl
RDX = cyclotrimethylenetrinitramine
rem = roentgen equivalent man
SNL/NM = Sandia National Laboratories, New Mexico
SWSP = stormwater sampling point
SU = standard unit
TA = technical area
TA2 = Technical Area II
TAV = Technical Area V (monitoring well designation only)
TJA = Tijeras Arroyo (monitoring well designation only)

Units

°C = degrees Celsius
4 mrem/yr = any combination of beta- and/or gamma-emitting radionuclides (as dose rate)
CFU = colony-forming unit
µg/kg – micrograms per kilogram
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
µmhos/cm = micromhos per centimeter
mg/L = milligrams per liter
ml = milliliter
MPN/100 ml = most probable number per 100 milliliters
mR = milliroentgen
NTU = nephelometric turbidity units
pCi/g = picocuries per gram
pCi/L = picocuries per liter
mg/sa = milligrams per sample
mrem/yr = millirem per year
ppb v/v = parts per billion volume per volume
pCi/sa = picocuries per sample

Station

CINT = Center for Integrated Nanotechnologies
WW = wastewater

MDL or MDA

Lc = critical level
MDA = minimal detectable activity or minimum measured activity in a sample required to ensure a 95% probability that the measured activity is accurately quantified above the critical level
MDL = method detection limit; the minimum concentration or activity that can be measured and reported with 99% confidence that the analyte is greater than zero; analyte is matrix specific

PQL

PQL = practical quantitation limit; the lowest concentration of analytes in a sample that can be determined reliably within specified limits of precision and accuracy by that indicated method under routine laboratory operating conditions

Laboratory Data Qualifier

B = analyte detected in the blank

J = estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
N = a spike was outside limits
U = analyte is absent or below the method detection limit
X = data rejected due to peak not meeting identification criteria
* = a replicate was outside limits

Data Validation Qualifier

BD = below detection limit as used in radiochemistry to identify results that are not statistically different from zero
J = associated value is an estimated quantity
J+ = The associated numerical value is an estimated quantity with a suspected positive base
J- = The associated numerical value is an estimated quantity with a suspected negative base
None = no data validation for corrected gross alpha activity
U = The analyte was analyzed for but was not detected. The associated numerical value is the sample quantitation limit
UJ = The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise

Analytical Method

DOE (U.S. Department of Energy) Environmental Measurements Laboratory. 1997. *The Procedures Manual of the Environmental Measurements Laboratory*, HASL-300, 28th ed., vol. 1. New York, NY: DOE.

EPA (U.S. Environmental Protection Agency). 1974. *Mercury (Automated Cold Vapor Technique) by Atomic Absorption*, EPA 245.2. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1980. *Gamma Emitting radionuclides in Drinking Water*, EPA 901.1. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1980. *Gross Alpha and Gross Beta Radioactivity in Drinking Water*, EPA 900.0. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1980. *Tritium in Drinking Water*, EPA 906.0 Modified. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1984. *Base/Neutrals and Acids*, EPA 625. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1984. *Purgeables*, EPA 624. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1986 (and updates). *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd ed. Washington, D.C.: EPA.

———. 1993. *Determination of Ammonia Nitrogen by Semi-Automated Colorimetry,* EPA 350.1. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1993. *Determination of Inorganic Anions by Ion Chromatography,* EPA 300.0. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1993. *Determination of Total Cyanide by Semi-Automated Colorimetry*, EPA 335.4. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1994. *Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry*, EPA 200.8. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1994. *Determination of Mercury in Water by Cold Vapor Atomic Absorption Spectrometry (CVAA)*, EPA 245.1. Cincinnati, OH: EPA Environmental Monitoring Systems Laboratory Office of Research and Development.

———. 1999. *Determination of Perchlorate in Drinking Water Using Ion Chromatography,* EPA Method 314.0. Cincinnati, OH: EPA National Exposure Research Laboratory Office of Research and Development.

GEL (GEL Laboratories, LLC). 2010. *Standard Operating Procedure GL-RAD-A-002.* Charleston, SC: GEL.

Glossary



Apache plume (*Fallugia paradoxa*)

A

abatement The act of reducing the degree or intensity of, or eliminating, pollution.

aboveground storage tank A fixed, stationary, or otherwise permanently installed storage tank that is wholly or partially above the ground surface and used to contain oil of any kind (petroleum, non-petroleum, synthetic, animal, or vegetable). Sandia's aboveground storage tanks are metal construction, field erected or shop-built, and include integral generator base tanks.

alluvial Relating to and/or sand deposited by flowing water.

ambient air Any unconfined portion of the atmosphere: open air, surrounding air.

analyte A substance or chemical constituent undergoing analysis.

anthropogenic Of, relating to, or resulting from the influence of human beings on nature.

antimony A metallic element having four allotropic forms, the most common of which is a hard, extremely brittle, lustrous, silver-white, crystalline material. It is used in a wide variety of alloys, especially with lead in battery plates, and in the manufacture of flameproofing compounds, paint, semiconductor devices, and ceramic products.

appraisal A documented activity performed according to written procedures and specified criteria to evaluate an organization's compliance and conformance with programs, standards, and other requirements contained in orders, laws, and regulations or in other requirements.

aquifer An underground geological formation, or a group of formations, containing water. A source of groundwater for wells and springs.

arroyo A deep gully cut by an intermittent stream; a dry gulch.

asbestos A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. Uses for asbestos-containing material include, but are not limited to, electrical and heat insulation, paint filler, reinforcing agents in rubber and plastics (e.g., tile mastic), and cement reinforcement.

audit (1) An examination of records or financial accounts to check their accuracy. (2) An adjustment or correction of accounts. (3) An examined and verified account.

B

background radiation Relatively constant low-level radiation from environmental sources such as building materials, cosmic rays, and ingested radionuclides in the body.

basin (1) A low-lying area, wholly or largely surrounded by higher land, which ranges from a small, nearly enclosed valley to an extensive, mountain-rimmed depression. (2) An entire area drained by a given stream and its tributaries. (3) An area in which the rock strata are inclined downward from all sides toward the center. (4) An area in which sediments accumulate.

best management practice The preferred method or practice for managing operations.

biological niche A role played by a species in the environment.

biota The animal and plant life of a given region.

C

catchment basin The geographical area draining into a river or reservoir.

cesium-137 A radioactive isotope of cesium used in radiation therapy and found in atmospheric fallout.

containment An enclosed space or facility designed to contain and prevent the escape of hazardous material.

containment cell An engineered structure designed to contain and prevent the migration of hazardous waste.

contamination Introduction into water, air, or soil of microorganisms, chemicals, toxic substances, wastes, or wastewater in a concentration that makes the medium unfit for its next intended use. Also applies to the surfaces of objects, buildings, and various household and agricultural-use products.

corrective action (1) EPA requirements for treatment, storage, and disposal facilities handling hazardous waste to undertake corrective actions to clean up spills resulting from failure to follow hazardous waste management procedures or from other mistakes. The process includes cleanup procedures designed to guide treatment, storage, and disposal facilities in avoiding spills.
(2) An action identified to correct a finding that, when completed, fixes a problem or prevents its recurrence.

D

data quality objective A strategic, systematic process for planning scientific data collection efforts.

decontamination The removal of harmful substances such as noxious chemicals, harmful bacteria or other organisms, or radioactive material from exposed individuals, rooms and furnishings in buildings, or the exterior environment.

demolition The act or process of wrecking or destroying, especially destruction by explosives.

derived concentration technical standard Concentrations of radionuclides in water and air that could be consumed continuously or inhaled for one year and not exceed the DOE primary radiation standard for the public (100 mrem/year effective dose equivalent).

discharge Any liquid or solid that flows or is placed on or onto any land or into any water. This includes precipitation discharges to storm drains, accidental or intentional spilling, and leaking, pumping, pouring, emitting, emptying, or dumping any material or substance on or into any land or water.

discharge limit The maximum concentration of a specified pollutant allowed to be discharged in a volume of water or wastewater.

discharge point The site or location of the release, flow, or runoff of any waste governed by regulation.

diurnal (1) Relating to or occurring in a 24-hour period; daily. (2) Occurring or active during the daytime rather than at night: diurnal animals.

dosimeter A device used to measure the dose of ionizing radiation.

E

ecology The relationship of living things to one another and their environment, or the study of such relationships.

ecosystem A network of living organisms and nonliving components (e.g., air, water, mineral soil, buildings, and roads) that interact to comprise an overall environment.

ecosystem services The natural resources and processes that occur in a well-functioning environment that benefit humans at no cost.

effective dose equivalent The weighted average of dose equivalents in certain human organs or tissues; can be used to estimate the health-effects risk of an exposed individual.

effluent Wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Electronic Product Environmental Assessment Tool A set of criteria in eight different electronics to determine the environmental attributes of a particular electronic office product. Currently, the tool only targets computer desktops/towers, notebook computers (laptops), and monitors.

electroplating The act of coating or covering with a thin layer of metal by electrodeposition.

environment The sum of all external conditions affecting an organism's life, development, and survival.

Environment, Safety and Health (ES&H) A program designed to protect and preserve the environment and to ensure the safety and health of the organization's employees, contractors, and visitors and the public.

environmental assessment An environmental analysis prepared pursuant to NEPA to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

environmental impact statement A document required of federal agencies by NEPA for major projects or legislative proposals that significantly affect the environment. A tool for decision-making, it describes an undertaking's positive and negative effects and cites alternative actions.

environmental management A program designed to maintain compliance with federal, state, and local requirements.

Environmental Management System A continuing cycle of planning, evaluating, implementing, and improving processes and actions undertaken to achieve environmental goals.

environmental monitoring The collection and analysis of samples or direct measurements of environmental media such as air, water, and soil.

environmental release Any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing into the environment, which may include (but is not limited to) soil, air, and drain systems.

Environmental Restoration A project chartered with assessing and, if necessary, remediating inactive waste sites.

Environmental restoration site Any location listed on the environmental restoration site list that has been identified as an area that is (or may be) contaminated—either on or beneath the land surface—as a result of operations. Contaminants may be chemicals, radioactive material, or both.

environmental surveillance A program that includes soil and vegetation surveys, water sampling, and analysis in an attempt to identify and quantify long-term effects of pollutants resulting from operations.

ephemeral spring A spring that flows only briefly in the immediate locality.

exceedance Violation of the regulatory limits for pollutants permitted by environmental protection standards.

explosives waste Any explosive substance, article, or explosive-contaminated item that cannot be used for its intended purpose and does not have a legitimate investigative or research use.

F

fault A fracture in the continuity of a rock formation caused by the earth's crust shifting or dislodging, after which adjacent surfaces are displaced relative to one another and parallel to the plane of fracture.

fauna (1) Animals, especially the animals of a particular region or period, considered as a group. (2) A catalog of the animals of a specific region or period.

flora (1) Plants. (2) The plant life characterizing a specific geographic region or environment.

fungicide An agent that destroys fungi or inhibits their growth.

G

gamma radiation Very high-energy and high-frequency electromagnetic radiation that is emitted by the nuclei of radioactive substances during decay, or by the interactions of high-energy electrons with matter. They are similar to but have a shorter wavelength than X-rays.

geology The scientific study of the earth's origin, history, and structure.

greenhouse gas emission An air pollutant comprised of an aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

groundwater The water found beneath the earth's surface in pore spaces and in fractures of rock formations.

H

habitat The place or environment where a plant or animal naturally or normally lives and grows.

hazardous substance (1) Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive. (2) Any substance EPA requires to be reported if a designated quantity of the substance is spilled in the waters of the United States or is otherwise released into the environment.

hazardous waste site Any facility or location at which hazardous waste operations take place.

herbicide A chemical pesticide designed to control or destroy plants, weeds, or grasses.

herpetofauna The reptiles and amphibians of a particular region, habitat, or geological period.

high-level radioactive waste Waste generated in the core fuel of a nuclear reactor; found at nuclear reactors or by nuclear fuel reprocessing.

I

industrial discharge Wastewater discharge from industrial and commercial sources that may contain pollutants at levels that could affect the quality of receiving waters or interfere with publicly owned treatments works.

inertial confinement fusion A method of controlled fusion in which the rapid implosion of a fuel pellet—produced by laser, electron, or ion beams—raises the pellet core's temperature and density to levels at which nuclear fusion can take place before the pellet flies apart.

inhalation hazard Risk from materials or chemicals that present a hazard if respired (inhaled) into the lungs.

insecticide A pesticide compound specifically used to kill or prevent the growth of insects.

Integrated Safety Management System A set of guidelines that systematically integrate safety into management and work practices at all levels so missions are accomplished while protecting the worker, the public, and the environment.

L

lagoon (1) A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater; also used for storing wastewater. (2) A shallow body of water, often separated from the sea by coral reefs or sandbars.

leachate Water that collects contaminants as it percolates through wastes, pesticides, or fertilizers. Leaching may occur in farming areas, feedlots, or landfills, and may result in hazardous substances entering surface water, groundwater, or soil.

legacy site A former Environmental Restoration site.

legacy waste Waste originally generated between 1990 and 1998.

low-level radioactive waste Wastes less hazardous than most of those associated with a nuclear reactor; generated by hospitals, research laboratories, and certain industries. DOE, the Nuclear Regulatory Commission, and EPA share responsibilities for managing low-level radioactive waste.

M

Materials Sustainability and Pollution Prevention (MSP2) Program Facilitates the use and reuse of materials in the most productive and sustainable manner across their entire life-cycle. MSP2 emphasizes purchasing sustainable products, using less, reducing waste and toxicity, recovering more of the materials that are used, slowing climate

change, and assuring sufficient resources to meet society's needs today and in the future.

maximally exposed individual A member of the public who is located in an area that receives or has the potential to receive the maximum radiological dose from air emissions of a NESHAP radionuclide source. The dose estimates are based on realistic, yet conservative input parameters.

migratory birds All birds listed within the MBTA, 50 CFR 10.13, or which are a mutation or hybrid of any such species, including any part, nest, or egg.

Mixed Analyte Performance Evaluation Program A DOE quality assurance tool for environmental analytical services. It includes radiological, stable inorganic, and organic constituents (i.e., mixed analytes) in the same single-blind sample for analytical performance evaluation. The samples use various matrices, including soils, water, vegetation, and air filters. Program samples are not a mixed waste.

mixed waste Radioactive waste that contains both source material, special nuclear material, or by-product material subject to the Atomic Energy Act of 1954, as amended; also a hazardous component subject to the RCRA, as amended.

N

National Emissions Standards for Hazardous Air Pollutants (NESHAP) Emissions standards set by EPA for an air pollutant not covered by National Ambient Air Quality Standards that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health; secondary standards are designed to protect public welfare (e.g., building facades, visibility, crops, and domestic animals).

National Environmental Policy Act (NEPA) The basic national charter for protecting the environment. It establishes policy, sets goals, and provides means for carrying out the Act.

National Pollutant Discharge Elimination System (NPDES) A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

natural resource Resource (actual and potential) supplied by nature.

nitrate A compound containing nitrogen that can exist in the atmosphere or as a dissolved gas in water and which can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and domestic animals. A plant nutrient and inorganic fertilizer, nitrate is found in septic systems, animal feedlots, agricultural fertilizers, manure, industrial wastewaters, sanitary landfills, and garbage dumps.

nitrite (1) An intermediate in the process of nitrification. (2) Nitrous oxide salts used in food preservation.

nonradiological contaminant A source of contamination that has no radiological components.

nuclear particle acceleration A method for imparting large kinetic energy to electrically charged subatomic nuclear particles (e.g., protons, deuterons, or electrons) by applying electrical potential differences for the purpose of physics experiments.

O

occurrence One or more (i.e., recurring) events or conditions that adversely affect, or may adversely affect, DOE or contractor personnel, the public, property, the environment, or the DOE mission. Events or conditions meeting the criteria thresholds identified in this order, or determined to be recurring through performance analysis, are occurrences.

outfall The place where effluent is discharged into receiving waters.

ozone (O_3) A colorless gas soluble in alkalis and cold water; a strong oxidizing agent; can be produced by electric discharge in oxygen or by the action of ultraviolet radiation on oxygen in the stratosphere (where it acts as a screen for ultraviolet radiation).

P

perched groundwater Groundwater that is unconfined and separated from an underlying main body of groundwater by an unsaturated zone (also known as perched water).

perennial spring A spring that flows continuously, as opposed to an intermittent spring or a periodic spring.

$PM_{2.5}$ Respirable particulate matter (with a diameter equal to or less than 2.5 microns).

PM_{10} Particulate matter (with a diameter equal to or less than 10 microns).

pollutant Generally, any substance introduced into the environment that adversely affects the usefulness of a resource or the health of humans, animals, or ecosystems.

polychlorinated biphenyl (PCB) A chemical term limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contain such material. Because of their persistence, toxicity, and ecological damage via water pollution, the manufacture of PCBs was discontinued in the United States in 1976.

potable water Water free from impurities present in quantities that are sufficient to cause disease or harmful physiological effects.

pulsed power Technology used to generate and apply energetic beams and high-power energy pulses.

Q

quadrant A usually rectangular plot used for ecological or population studies.

quality assurance A system of procedures, checks, audits, and corrective actions to ensure that research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

quality control A system used to determine analytical accuracy, precision, and contamination when samples are collected and to assess the data's quality and usability.

R

radioactive waste Any waste that emits energy as rays, waves, streams, or energetic particles. Radioactive materials are often mixed with hazardous waste from nuclear reactors, research institutions, or hospitals.

radiological contaminant A radioactive material deposited in any place where it is not desired, particularly where its presence may be harmful.

radionuclide A radioactive particle, man-made (anthropogenic) or natural, with a distinct atomic weight number.

radon A colorless, naturally occurring, radioactive, inert gas formed by the radioactive decay of radium atoms in soil or rocks.

reportable quantity A quantity of material or product compound or contaminant that is reportable to a regulatory agency when released to the environment.

rodenticide A chemical or agent used to destroy rats or other rodent pests, or to prevent them from damaging food or crops.

S

sample management office A Sandia office that manages environmental analytical laboratory contracts and assists with processing and tracking samples undergoing chemical and radiochemical analyses performed at these laboratories.

sampling and analysis plan A plan that contains criteria required for conducting sampling activities.

sanitary discharge The portion of liquid effluent exclusive of industrial wastewater and stormwater. It includes the liquid discharges from restrooms and food preparation activities.

secondary containment Any structure or device that has been installed to prevent leaks, spills, or other discharges of stored chemicals, waste, oil, or fuel from storage, transfer, or end-use equipment from being released to the environment. Examples of secondary containment include pans, basins, sumps, dikes, berms, or curbs.

sediment Transported and deposited particles or aggregates derived from rocks, soil, or biological material.

semivolatile organic compound An organic chemical compound that volatilizes slowly at a standard temperature (20°C and 1 atmosphere pressure).

soil All loose, unconsolidated mineral or organic materials on the immediate surface of the earth that support plant growth.

solid waste (1) Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility. (2) Any discarded material—including solid, liquid, semisolid, or contained gaseous material—resulting from industrial, commercial, mining, or agricultural operations or from community activities.

statement of work A comprehensive description of the goods, services, or combination of goods and services for which Sandia contracts.

stormwater Water runoff from rainfall or snowmelt, including that discharged to the sanitary sewer system.

sulfur dioxide (SO_2) A colorless, extremely irritating gas or liquid used in many industrial processes, especially the manufacture of sulfuric acid.

surface discharge A release of water and water-based compounds to roads, open areas, or confined areas such as reservoirs.

T

thermoluminescent dosimeter (TLD) A device that monitors both the whole body radiation dose and the skin radiation dose to which a person has been exposed during the course of work. Can also measure environmental exposure rates.

threatened and endangered species A species present in such small numbers that it is at risk of extinction.

time-weighted composite A sample consisting of several portions of the user's discharge collected during a 24-hour period in which each portion of the sample is collected with a specific time frame that is irrespective of flow.

topography The physical features of a surface area, including relative elevations and the position of natural and man-made (anthropogenic) features.

toxic chemical Any chemical listed in EPA regulations under "Emergency Planning and Community Right-to-Know Act of 1986–Section 313: Guidance for Reporting Toxic Chemicals."

transect A sample area (i.e., vegetation) usually in the form of a long continuous strip.

transuranic waste Radioactive waste containing alpha-emitting radionuclides having an atomic number greater than 92 and a half-life greater than 20 years in concentrations greater than 100 nanocuries per gram.

tritium A radioactive hydrogen isotope with an atomic mass of 3 and a half-life of 12.5 years, prepared artificially for use as a tracer and as a constituent of hydrogen bombs.

U

unconsolidated basin sediment (1) A sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. (2) Soil material that is in a loosely aggregated form.

underground storage tank A storage tank installed completely below grade, covered with earth, and used to contain oil of any kind (petroleum, non-petroleum, synthetic, animal, or vegetable). Sandia's underground storage tanks are double-wall, fiberglass-reinforced plastic construction.

upstream (1) In the direction opposite to the flow of a stream. (2) In or to a position within the production stream closer to manufacturing processes.

uranium A heavy silvery-white metallic element, radioactive and toxic, easily oxidized, and having 14 known isotopes of which U 238 is the most abundant in nature. The element occurs in several minerals, including uraninite and carnotite, from which it is extracted and processed for use in research, nuclear fuels, and nuclear weapons.

U.S. Environmental Protection Agency (EPA) A government agency tasked with protecting human health and the environment.

U.S. Forest Service withdrawal area A portion of KAFB consisting of land within the Cibola National Forest that has been withdrawn from public access for use by the U.S. Air Force and DOE.

V

vadose zone The zone between land surface and the water table within which the moisture content is less than saturation (except in the capillary fringe) and pressure is less than atmospheric. Soil pore space also typically contains air or other gases. The capillary fringe is included in the vadose zone.

vegetation Plant life or the total plant cover of an area.

volatile organic compound (VOC) An organic chemical compound with a high vapor pressure at standard temperature (20°C and 1 atmosphere pressure) causing it to evaporate.

W

waste characterization The identification of a waste material's chemical and microbiological constituents.

waste management A method for dealing with the waste from humans and organisms, including minimizing, handling, processing, storing, recycling, transporting, and final disposal.

wastewater The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

water pollution The presence in water of enough harmful or objectionable material to damage the water's quality.

watershed The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

water table The level of groundwater.

wetland An area that is saturated by surface water or groundwater, having vegetation adapted for life under those soil conditions, such as swamps, bogs, fens, marshes, and estuaries.

wind rose A graphical presentation of wind speed and direction frequency distribution.

References



Prairie Rattlesnake (*Crotalus viridis*)

Bateman, P. W., and Fleming, P. A. 2012. "Big City Life: Carnivores in Urban Environments." *Journal of Zoology* 287: 1–23.

Blaine, T. (New Mexico Environment Department). 2014. "Approval Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan, March 2012, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-12-007." January 8, 2014.

Bleakly, D. (Sandia National Laboratories/New Mexico). 1996. Memorandum. "List of Non-ER Septic/Drain Systems for the Sites Identified through the Septic System Inventory Program." July 8, 1996.

Bowen, W. D. 1981. "Variation in Coyote Social Organization: The Influence of Prey Size." *Canadian Journal of Zoology*. 59: 639–652.

Brookins, D. G. 1992. "Background Radiation in the Albuquerque, New Mexico, U.S.A. Area." *Environmental Geology and Water Sciences* 19 (1): 11–15.

Bureau of Land Management (BLM). 2011. *Assessment, Inventory, and Monitoring; Support for BLM AIM Projects and Programs.* Accessed February 19, 2018. http://aim.landscapetoolbox.org.

Census (U.S. Census Bureau). 2014. *Annual Estimates of the Resident Population for Incorporated Places Over 50,000, Ranked by July 1, 2012 Population: April 1, 2010 to July 1, 2013—United States—Places Over 50,000 Population.* Accessed 2017. http://www.census.gov/popest/data/cities/totals/2013/index.html.

——. 2018. *Estimates of Resident Population Change for the United States, Regions, States, and Puerto Rico.* Accessed 2017. https://www.census.gov/data/tables/2017/demo/popest/nation-total.html.

Canadian National Vegetation Classification (CNVC). 2013. "Canadian National Vegetation Classification." Accessed June 3, 2017. http://cnvc-cnvc.ca/index.cfm.

Cecil, K. 2016. "Urban Wildlife: Challenges and Opportunities." Accessed December 2016. http://extension.illinois.edu/lcr/wildlife.cfm.

Costello, C. M., D. E. Jones, R. M. Inman, K. H. Inman, B. C. Thompson, and H. B. Quigley. 2003. "Relationship of Variable Mast Production to American Black Bear Reproductive Parameters in New Mexico." *Ursus*, 1–16.

Davis, J. H. (New Mexico Environment Department). 2012. Letter to G. Beausoleil (U.S. Department of Energy NNSA) and S. A. Orrell (Sandia National Laboratories). "March 2006 Petition for Corrective Action Complete, SWMUs 233 and 234 and AOC 1115, Sandia National Laboratories, EPA ID No. NM5890110518 HWB-SNL-06-007." July 27, 2012.

Dell'Amore, Christine. 2016. "How Wild Animals Are Hacking Life in the City." National Geographic. http://news.nationalgeographic.com/2016/04/160418-animals-urban-cities-wildlife-science-coyotes/.

DeSante, D. F., K. M. Burton, P. Velez, D. Froehlich, and D. Kaschube. 2010. *MAPS Manual 2010 Protocol. Instructions for the Establishment and Operation of Constant-Effort Bird-Banding Stations as Part of the Monitoring Avian Productivity and Survivorship (MAPS) Program*. Point Reyes Station, CA: The Institute for Bird Populations.

Dick-Peddie, W. A., Moir, W. H., and Spellenberg, R. 1996. *New Mexico vegetation: Past, Present, and Future*. Albuquerque, NM: University of New Mexico Press.

DOE (U.S. Department of Energy). 1999. *Final Site-Wide Environmental Impact Statement for Sandia National Laboratories/New Mexico,* DOE/EIS-0281. Albuquerque, NM: DOE, Albuquerque Operations Office, Record of Decision.

———. 2002. *Title V Operating Permit Application No. 515,* 2002 update, vol. 1 for Sandia National Laboratories. Albuquerque, NM: DOE/Sandia Site Office.

———. 2011. *U.S. High Performance and Sustainable Building*, DOE G 413.3-6A. Washington, D.C.: DOE.

———. 2017. *U.S. Department of Energy 2017 Strategic Sustainability Performance Plan.* Washington, D.C.: DOE.

DOE/AL (U.S. Department of Energy/Albuquerque Operations Office). 1987. *Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1: Installation Assessment*, draft. Albuquerque, NM: DOE/AL, Environment, Safety and Health Division.

DOE National Nuclear Security Administration (NNSA) Sandia Field Office (SFO). 2017. *Fiscal Year 2017 Performance Evaluation Report (PER).* Albuquerque, NM: DOE/NNSA/SFO.

Dohring, A. 2002. *Conepatus leuconotus.* Accessed January 19, 2018. http://animaldiversity.org/accounts/Conepatus_leuconotus_leuconotus/.

Dragun, J., and K. Chekiri. 2005. *Elements in North American Soils*. Amherst, MA: The Association for Environmental Health and Sciences.

EPA (U.S. Environmental Protection Agency). 1985. 50 Federal Register 28702. *Hazardous Waste Management System: Final Codification Rule* (p. 28712).

———. 1993. *RCRA Facility Investigation Work Plan for the Liquid Waste Disposal System (LWDS), ER Program Sites 4, 5 and 52*. Albuquerque, NM: SNL/NM.

———. 2013. *Radiation Risk Assessment Software (CAP88-PC)*, version 3.0. http://www.epa.gov/radiation/assessment/CAP88/index.html.

Gese, E. G. 1988. "Relationship between Coyote Group Size and Diet in Southeastern Colorado." *The Journal of Wildlife Management.* The Wildlife Society. 52(4): 647–653.

Grant, P. R., Jr. 1982. "Geothermal Potential in the Albuquerque Area, New Mexico." In *Guidebook: New Mexico Geological Society*, vol. 33, 325–331. Albuquerque, NM: New Mexico Geological Society.

Helgen, K. 2016. *Conepatus leuconotus.* The IUCN Red List of Threatened Species 2016: e.T41632A45210809. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T41632A45210809.en.

Hockings, M. 1998. "Evaluating Management of Protected Areas: Integrating Planning and Evaluation." *Environmental Management* 22(3): 337–346.

ISO (International Organization for Standardization). 2004. ISO 14001. *Environmental Management Systems: Requirements with Guidance*. Geneva, Switzerland: ISO.

——. 2008. ISO 9001. *Quality Management Systems–Requirements*. Geneva, Switzerland: ISO.

Julyan, Robert. 1998. *The Place Names of New Mexico*, (revised edition). Albuquerque, NM: UNM Press.

Kabata-Pendias, A. 2000. *Trace Elements in Soils and Plants*, 3rd ed. Boca Raton, FL: CRC Press, Inc.

Kelley, V. C. 1977. *Geology of Albuquerque Basin, New Mexico*, Memoir 33. Socorro, NM: New Mexico Bureau of Mines and Mineral Resources.

Kieling, J. E. (New Mexico Environment Department). 2011. "Notice of Approval, Closure of Chemical Waste Landfill and Post-Closure Care Permit in Effect, Sandia National Laboratories, EPA ID No. NM5890110518, HWB-SNL-10-013." June 2, 2011.

——.2016a. Letter to J. P. Harrell (U.S. Department of Energy NNSA/Sandia Field Office) and P. B. Davies (Sandia National Laboratories, New Mexico). "Approval, Final Decision on Proposal to Grant Corrective Action Complete with Controls Status for Mixed Waste Landfill, Sandia National Laboratories, EPA ID# NM5890110518, HWB-SNL-14-014." February 18, 2016.

——.2016b. Letter to D. Rast (U.S. Department of Energy NNSA/Sandia Field Office) and J. F. Jarry (Sandia National Laboratories). "Approval, Revision Number 15 to the Mixed Waste Site Treatment Plan, Compliance Plan Volume for Sandia National Laboratories/New Mexico, May 2016, Sandia National Laboratories, EPA ID #NM5890110518, HWB-SNL-16-011." October 19, 2016.

Krausman, P. R., S. S. Rosenstock, and J. W. Cain III. 2006. "Developed Waters for Wildlife: Science, Perception, Values and Controversy." *Wildlife Society Bulletin* 34: 563–569.

LANL (Los Alamos National Laboratory). 2012. *Polychlorinated Biphenyls in Precipitation and Stormwater within the Upper Rio Grande Watershed*. Los Alamos, NM: LANL.

Lozinsky, R., and R. H. Tedford. 1991. *Geology and Paleontology of the Santa Fe Group, Southwestern Albuquerque Basin, Valencia County, New Mexico*. Socorro, NM: New Mexico Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology.

McClaran, M. P., and T. R. Van Devender, eds. 1997. *The Desert Grassland*. Tucson, AZ: University of Arizona Press.

National Climatic Data Center (NCDC). 2015. "Data Tools: 1981–2010 Normals." https://www.ncdc.noaa.gov/cdo-web/datatools/normals.

NCRP (National Council on Radiation Protection and Measurements). 2009. *Ionizing Radiation Exposure of the Population of the United States*, NCRP Report 160. Bethesda, MD: NCRP.

NMDOA (New Mexico Department of Agriculture). 2013. http://nmdaweb.nmsu.edu/2013.

NMED (New Mexico Environment Department). 1995. "Federal Facilities Compliance Order," amended on December 22, 2010, by the NMED (Amendment No. 5). Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 2004. "Compliance Order on Consent, Pursuant to the New Mexico Hazardous Waste Act § 74 4 10." Santa Fe, NM: NMED Hazardous Waste Bureau.

——2005. "Final Order, State of New Mexico Before the Secretary of the Environment in the Matter of Request for a Class 3 Permit Modification for Corrective Measures for the Mixed Waste Landfill, Sandia National Laboratories, Bernalillo County, New Mexico," EPA ID# 5890110518." Santa Fe, NM: NMED.

——. 2009. "Resource Conservation and Recovery Act, Post-Closure Care Permit (as amended), EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Chemical Waste Landfill." Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 2015. "Resource Conservation and Recovery Act Facility Operating Permit, EPA ID No. NM5890110518, to the U.S. Department of Energy/Sandia Corporation, for the Sandia National Laboratories Hazardous and Mixed Waste Treatment and Storage Units and Post-Closure Care of the Corrective Action Management Unit." Santa Fe, NM: NMED Hazardous Waste Bureau.

——. 2016. "Final Order No. HWB 15-18 (P), State of New Mexico Before the Secretary of the Environment in the Matter of Proposed Permit Modification for Sandia National Laboratories, EPA ID #5890110518, To Determine Corrective Action Complete with Controls at the Mixed Waste Landfill, New Mexico Environment Department." Santa Fe, NM: 2016.

——2017a. Notice of Public Comment Period and Intent to Approve a Modification to the U.S. Department of Energy/National Technology and Engineering Solutions of Sandia LLC RCRA Permit for Sandia National Laboratories. Santa Fe, NM: NMED.

——. 2017b. *Risk Assessment Guidance for Site Investigations and Remediation, Volume 1—Soil Screening Guidance for Human Health Risk Assessment*. Table A-1, updated March 2017. Santa Fe, NM: NMED Hazardous Waste Bureau.

Searchbug. 2018. "50.0 Mile Radius around ZIP Code 87123." https://www.searchbug.com/tools/zip-radius.aspx?TYPE=zipradius&ZIP=87123&DIST=50&submit=Search.

Shyr, L., H. Herrera, and R. Haaker. 1998. *The Role of Data Analysis in Sampling Design of Environmental Monitoring*, SAND98-0612. Albuquerque, NM: Sandia National Laboratories.

SNL/NM (Sandia National Laboratories, New Mexico). 1973. *Environmental Monitoring Report for Sandia Laboratories from 1964 through 1972*. Albuquerque, NM: SNL/NM.

——. 1987. *Description and Procedures of the Environmental Radiation Dosimetry Program*, SAND87-1916. Albuquerque, NM: SNL/NM.

——. 1995. *Site-Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report*. Albuquerque, New Mexico: SNL/NM.

——. 2004. *Chemical Waste Landfill Corrective Measures Study Report*. Albuquerque, NM: SNL/NM.

——. 2006a. *Chemical Analyses of Soil Samples Collected from the Sandia National Laboratories, New Mexico Environs, 1993–2005*, SAND2006-1468. Albuquerque, NM: SNL/NM.

——. 2006b. *Long-Range Development Plan*. Albuquerque, NM: SNL/NM.

——. 2013. "Sandia National Laboratories/New Mexico Statement of Work for Analytical Laboratories, Revision 6." Albuquerque, NM: SNL/NM.

——. 2014. *Data Validation Procedure for Chemical and Radiochemical Data*. Administrative Operating Procedure (AOP) 00-03, Revision 4. Albuquerque, NM: SNL/NM Sample Management Office.

——. 2016a. *FY 2017 Site Sustainability Plan*. Albuquerque, NM: SNL/NM.

——. 2016b. *Quality Assurance Project Plan for Terrestrial Surveillance at Sandia National Laboratories, New Mexico*, Revision 08, QUA 94-04. Albuquerque, NM: SNL/NM.

——. 2016c. *Quality Assurance Project Plan (QAPP) for the Sample Management Office, Revision 5, SMO-QAPP*. Albuquerque, NM: SNL/NM.

——. 2016d. *Radiation Protection Dosimetry Program (RPDP) Quality Plan (RPDP-00-01)*, Issue No. 9. Albuquerque, NM: SNL/NM.

———. 2017. *Hazardous and Mixed Waste Minimization Annual Report, Fiscal Year 2017*. Albuquerque, NM: SNL/NM.

———. 2018a. *Annual Groundwater Monitoring Report, Calendar Year 2017*. Albuquerque, NM: SNL/NM.

———. 2018b. *Chemical Waste Landfill Annual Post-Closure Care Report, Calendar Year 2017*. Albuquerque, NM: SNL/NM.

———. 2018c. *Corrective Action Management Unit Report of Post-Closure Care Activities for Calendar Year 2017*. Albuquerque, NM: SNL/NM.

———. 2018d. *Radionuclide NESHAP Annual Report for Calendar Year (CY) 2017, SNL/NM*. Albuquerque, NM: SNL/NM.

———. 2018e. *Site Treatment Plan for Mixed Waste, Fiscal Year 2017 Update*. Albuquerque, NM: SNL/NM.

———. 2018f. *Solid Waste Management Units and Areas of Concern Annual Long-Term Monitoring and Maintenance Report for Calendar Year 2017*. Albuquerque, NM: SNL/NM.

Society for Ecological Restoration International Science and Policy Working Group (SER). 2004. The SER International Primer on Ecological Restoration. www.ser.org and Tucson: Society for Ecological Restoration International.

Thorn, C. R., D. P. McAda, and J. M. Kernodle. 1993. *Geohydrologic Framework and Hydrologic Conditions in the Albuquerque Basin, Central New Mexico*, Water Resources Investigation Report 93-4149. Albuquerque, NM: U.S. Geological Survey.

Tokar, E. 2001. *Canis latrans*. Accessed January 19, 2018. http://animaldiversity.org/accounts/Canis_latrans/.

USACE (U.S. Army Corps of Engineers). 1979. *Special Flood Hazard Information, Tijeras Arroyo and Arroyo del Coyote, Kirtland AFB, New Mexico*. Albuquerque, NM: USACE Albuquerque District.

USAF (U.S. Air Force). 2012. *Integrated Natural Resources Management Plan, Kirtland, Air Force Base, New Mexico*. Prepared October 2012 by the 377th CES/CEANQ for the 377th Air Base Wing, Kirtland Air Force Base, Albuquerque, NM, signed November 2012.

USPopulation2017. 2018. *Population of Albuquerque 2017*. Accessed 2018. http://uspopulation2017.com/population-albuquerque-2017.html.

Woodward, L. A. 1982. "Tectonic Framework of Albuquerque Country." In *Albuquerque Country II*: *New Mexico Geological Society 33rd Annual Field Conference Guidebook*. Edited by S. G. Wells, J. A. Grambling, and J. F. Callendar. Albuquerque, NM: New Mexico Geological Society.

Executive Orders

EO 11988. *Floodplain Management*, as amended (May 24, 1977).

EO 11990. *Protection of Wetlands*, as amended (May 24, 1977).

EO 12898. *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, as amended (February 11, 1994).

EO 13693. *Planning for Federal Sustainability in the Next Decade* (March 2015).

DOE Directives

DOE O 231.1B, Admin Change 1. *Environment, Safety and Health Reporting*. 2012.

DOE O 232.2, Admin. Change 1. *Occurrence Reporting and Processing of Operations Information*. 2014.

DOE O 414.1D, Admin Change 1. *Quality Assurance*. 2011.

DOE O 435.1, Change 1. *Radioactive Waste Management*. 2001.

DOE O 436.1. *Departmental Sustainability*. 2011.

DOE O 458.1, Admin Change 3. *Radiation Protection of the Public and the Environment.* 2013.

Code of Federal Regulations

10 CFR 830. *Nuclear Safety Management.*

10 CFR 835. *Occupation Protection Program.*

10 CFR 851. *Worker Safety and Health Program.*

10 CFR 1021. *National Environmental Policy Act Implementing Procedures.*

40 CFR 50. *National Primary and Secondary Ambient Air Quality Standards.*

40 CFR 60. *Standards of Performance for New Stationary Sources.*

40 CFR 61. *National Emission Standards for Hazardous Air Pollutants (NESHAP).* Subpart H. "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities."

40 CFR 63. *National Emission Standards for Hazardous Air Pollutants for Source Categories.*

40 CFR 82. *Protection of Stratospheric Ozone.*

40 CFR 86. *Control of Emissions from New and In-Use Highway Vehicles and Engines.*

40 CFR 112. *Oil Pollution Prevention.*

40 CFR 122. *EPA Administered Permit Programs: The National Pollutant Discharge Elimination System (NPDES).*

40 CFR 141. *National Primary Drinking Water Regulations.*

40 CFR 143. *National Secondary Drinking Water Regulations.*

40 CFR 265. *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.*

40 CFR 268. *Land Disposal Restrictions.*

40 CFR 280. *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks.*

40 CFR 302. *Designation, Reportable Quantities, and Notification (CERCLA Implementing Regulation).*

40 CFR 355. *Emergency Planning and Notification.*

40 CFR 370. *Hazardous Chemical Reporting: Community Right-to-Know.*

40 CFR 372. *Toxic Chemical Release Reporting: Community Right-to-Know (EPCRA Implementing Regulation).*

Federal Acts and Statutes

- American Indian Religious Freedom Act (AIRFA) of 1978 (42 USC § 1996).
- Archaeological Resources Protection Act (ARPA) of 1979 (16 USC § 470aa).
- Atomic Energy Act (AEA) of 1954 (42 USC §2011 et seq.). (Amended by the Price-Anderson Act).
- Clean Air Act (CAA) of 1990 (42 USC § 7401).
- Clean Water Act (CWA) of 1977 (the Federal Water Pollution Control Act) (33 USC § 1251).
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. (42 USC § 9601). Amended by the Superfund Amendments and Reauthorization Act (SARA).
- Emergency Planning and Community Right to Know Act (EPCRA) of 1986 (42 USC § 11001 et seq.). (Also known as SARA Title III.)
- Endangered Species Act (ESA) (16 USC § 1531 et seq.).

- Federal Facility Compliance Act (FFCA) of 1992 (42 USC § 6961).
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC § 136).
- Fish and Wildlife Conservation Act (Public Law [PL] 96-366).
- Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC § 703 et seq.).
- National Environmental Policy Act (NEPA) of 1969 (42 USC § 4321).
- National Historic Preservation Act of 1966, as amended (16 USC § 470 et seq.).
- New Mexico Hazardous Waste Act of 1978.
- Pollution Prevention Act of 1990 (42 USC § 13101 et seq.).
- Price-Anderson Amendments Act (PAAA) (42 USC §2282 et seq.) (see Atomic Energy Act).
- Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC § 6901 et seq.).
- Safe Drinking Water Act (SDWA) (42 USC § 300f).
- Sikes Act (PL 86-97).
- Superfund Amendments and Reauthorization Act (SARA) of 1986 (see CERCLA).
- Toxic Substances Control Act (TSCA) of 1976 (15 USC § 2601 et seq.).

Note: USC = United States Code.

Applicable Local and State Laws and Regulations for Environmental Programs

Air Quality

- 20.11.2 NMAC, *Fees.*
- 20.11.8 NMAC, *New Mexico Ambient Air Quality Standards.*
- 20.11.20 NMAC, *Fugitive Dust Control.*
- 20.11.21 NMAC, *Open Burning.*
- 20.11.100 NMAC, *Motor Vehicle Inspection.*

Environmental Protection

- 20.4.1 NMAC, Hazardous Waste Management.

Miscellaneous

- 21.17.50 NMAC, *Pesticides.*
- *New Mexico Pesticide Control Act* (NMSA 1978, 76-4-1 et seq.).

Oil Storage and Spill Containment

- 20.5 NMAC, *Petroleum Storage Tanks.*

Solid Waste Program

- 20.9 NMAC, *Solid Waste Management.*
- *New Mexico Solid Waste Act* (NMSA 1978, §74-9-1 et seq.).

Water Quality

- 20.6.2 NMAC, *Ground and Surface Water Protection.*
- 20.6.4 NMAC, *Standards for Interstate and Intrastate Surface Waters.*
- 20.7.10 NMAC, *Drinking Water.*
- Albuquerque/Bernalillo County Water Utility Authority, *Sewer Use and Wastewater Control Ordinance.*

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